

To the Graduate Council:

I am submitting herewith a thesis written by Amy Lynn Mathis entitled "A Survey of Visitors to Mt. LeConte in the Great Smoky Mountains National Park." I have examined the final electronic copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Forestry.

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A SURVEY OF VISITORS TO MT. LECONTE IN THE GREAT SMOKY MOUNTAINS NATIONAL PARK

A Thesis
Presented for the
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Degree
The University of Tennessee, Knoxville

Amy Lynn Mathis
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Abstract

This study focuses on the behaviors, attitudes, perceptions and preferences of visitors to Mt. LeConte in the Great Smoky Mountains National Park. Mt. LeConte (elevation 6,593 ft.) is a popular tourist destination year-round. In addition to the trails that access the summit, there is a backcountry shelter and a rustic lodge, built in 1926, for overnight guests. The upcoming expiration of the Concession Contract for Mt. LeConte Lodge makes it necessary to conduct an Environmental Assessment. This project serves the dual objectives of providing data needed for the Environmental Assessment (EA) and meeting the General Management Plan requirement to monitor visitor impacts on Mt. LeConte. Previous research on Mt. LeConte's summit focused solely on visitor use patterns as measured through observation and trail counts. No information has previously been gathered on visitors' behaviors, attitudes, perceptions, and preferences. To fulfill these goals, this study was conducted with four specific objectives: 1) to gather descriptive data on Mt. LeConte's visitors, such as demographic and behavioral information, 2) to determine what services and facilities visitors use and would like to have available in the future, 3) to measure the impacts of Mt. LeConte's visitors on the natural resource and visitors' recreational experiences, and 4) to assess visitor satisfaction with the management of the summit area and the lodge itself. The Human Dimensions Lab at the University of Tennessee conducted the survey at the summit of Mt. LeConte during four survey periods over a one-year period between October 25, 2002 and July 1, 2003. Surveys were administered during each of the four seasons to control for possible seasonal variations. A total of 1163 people participated in the survey. The survey times did not include a random sample of days throughout the year because of logistic and cost considerations, including the physical and financial investment of having interviewers at a remote site such as Mt. LeConte.

Managers of National Parks are faced with many social, resource, and policy issues. The challenge is maintaining an appropriate balance between visitation, resource protection, and regulations. The literature concerning visitor and resource management issues is reviewed, as are the concepts of carrying capacity, crowding, coping mechanisms and visitor satisfaction. Difficulties with measuring crowding and visitor satisfaction are also discussed.

The survey asked visitors about trails, services and facilities they had used, what places they visited, general satisfaction questions about the lodge and its food service and what services and facilities they would like to have available at Mt. LeConte in the future. They were asked how many people they had seen on their trip and whether they were comfortable with that number. The survey also asked how much impact visitors thought the current use levels were having on Mt. LeConte's natural resources as well as what they thought about National Park Service management, ranger presence, and policies.

Overall, respondents indicated satisfaction with the services and facilities provided, the number of people they encountered on their trips to the lodge, and lodge and NPS management. Satisfaction ratings with current lodge and NPS management were above 80%. They think some impact is occurring on the summit's natural resources, but they do not think the impact is severe. They wanted few, if any, changes to the number of people allowed at Mt. LeConte or to the services offered. Whenever those surveyed had the opportunity to choose "stay the same" as an option at least 60% of them chose that option. If the concessioner were allowed to increase the nightly visitor limits, the majority of survey participants would prefer a slight increase, rather than an increase to full capacity.

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Lists of Symbols or Abbreviations

ACBT – Alum Cave Bluff Trail

BH – Bullhead Trail

BLVD – Boulevard Trail

BP – Backpackers

CT – Cliff Tops Trail

DH – Day Hikers

EA – Environmental Assessment

EIS – Environmental Impact Statement

GSMNP – Great Smoky Mountains National Park

LAC – Limits of Acceptable Change

LG – Lodge Guests

MP – Myrtle Point Trail

NEPA – National Environmental Policy Act

NPS – National Park Service

RFT – Rainbow Falls Trail

SIA – Social Impact Assessment

SIS – Social Impact Statement

TGT – Trillium Gap Trail

VSC – Visitor Survey Cards

VSP – Visitor Service Projects

CHAPTER I

INTRODUCTION

Mt. LeConte (elevation 6,593 ft.) in the Great Smoky Mountains National Park is a popular tourist destination year-round. Mt. LeConte is near the center of the park overlooking the Gatlinburg area. On clear days, the summit has vast views to the west looking over the ridge and valley area to the Cumberland Plateau. In addition to the trails that access the summit area, there is a backcountry shelter and a rustic lodge for overnight guests. Paul Adams established the lodge for the Great Smoky Mountains Conservation Association as a tent camp near the summit in 1925, nine years before the Great Smoky Mountains National Park was founded. The Huff family took over operation of the lodge in 1926, built the lodge and cabins that remain in use today, and oversaw the operation of the lodge until 1960, when it was sold to Herrick Brown. In 1974 the National Park Service (NPS) considered closing the lodge because of environmental concerns and public health issues such as the over-used septic system. In the light of public opposition to closing the lodge, the NPS reconsidered this decision and determined that the lodge could remain open subject to controls to limit impacts. A number of changes were instituted in 1975, which included a better system of human waste disposal. This significantly reduced both the environmental impact and related public health issues. In 1976 James Ogle, James Hubbard, and William Rinearson purchased the lodge.

LeConte Lodge Limited Partnership, a company based in the Sevierville area, currently owns the lodge, which is closed for the winter from the end of November until mid-March.

STATEMENT OF PROBLEM

Currently the Park Service restricts reservations at the lodge to 50 guests per night although there are accommodations for as many as 67. Such restrictions were imposed to limit visitor impacts on the trails and summit of Mt. LeConte. The operation of the lodge is under a concession contract with the NPS and the contract is up for renewal. The upcoming expiration of the concession contract makes it necessary for an Environmental Assessment (EA) to be conducted on the summit as required under the National Environmental Policy Act (NEPA) to determine if an Environmental Impact Statement (EIS) is necessary (U.S. Dept. of Commerce, 1994). The mission of the Park Service is to provide opportunities for public use and enjoyment of its parks while preserving the natural resources. The purpose of the concessioner is to provide services and facilities to visitors that will facilitate their enjoyment of the park. To this end, the Park Service is interested in finding and maintaining a balance between allowing the concessioner to serve the largest number of people while not exceeding the social or ecological carrying capacities of Mt. LeConte or harming the visitor experience by allowing crowding to occur.

PURPOSE OF STUDY

To assess public perceptions of environmental and social impact and to meet the requirements of NEPA, members of the population of interest, park visitors in this case, need to be consulted. There are many ways to involve the public in the decision-making process, such as town meetings, focus groups, and surveys. Surveys can be particularly useful in assessing public opinion. From a policy formation standpoint, surveys can help the Park Service determine the wants and needs of Mt. LeConte visitors (Folz, 1996). Unlike town meetings, they can be focused on specific issues, and unlike focus groups they gather information from a large number of people. They also allow for a generalization to the larger population of visitors other methods of public involvement do not allow (O'Sullivan et al., 2003). This survey looks at the social and resource management issues Mt. LeConte's managers face by focusing on visitor behaviors, attitudes, perceptions, and preferences. Visitors' perceptions of impact to Mt. LeConte's natural resources are of specific concern.

The survey was performed at the request of the Great Smoky Mountains National Park (GSMNP) to assess environmental and social impacts to the Mt. LeConte area. The survey also sought to gather data on the amount and types of use the trails that access the summit receive and the receptiveness of visitors to increased visitor use and potential new services and facilities from the concessioner and the NPS. The results of this survey will be one source of information the NPS will use as it develops a new concessioner's contract for the Mt. LeConte Lodge and implements a Management Plan for the summit of Mt.

LeConte. Ultimately, the NPS will use the information in the contract renewal process. The NPS will use the survey results, along with other monitoring techniques such as mechanical trail counters, when deciding what changes to allow the concessioner to make, and also whether or not there is demand for NPS-provided interpretive services or changes in ranger presence, management or other policies at Mt. LeConte. The behavioral information the survey provides will also help the NPS monitor resource impact by providing managers an assessment of trail use to and from Mt. LeConte.

RESEARCH OBJECTIVES AND QUESTIONS

This study has three primary objectives:

- 1) To describe the visitors to Mt. LeConte, including demographic information such as age, gender, income, education, and place of residence as well as behavioral information such as what trails they use and what sites they see while visiting Mt. LeConte.
- 2) To assess the use and demand for facilities and services at Mt. LeConte, such as concessioner-provided services like flush toilets, boxed meals, and sales of hot and cold beverages, as well as NPS-provided services such as educational exhibits and programs, sales of park and trail maps, and the sale or rental (library) of park-related publications.
- 3) To assess the impact of visitors on the natural resources and recreational experience of Mt. LeConte.

Based on the above objectives, the primary research questions are listed below:

Visitor Behaviors and Characteristics

1. What percentage of Mt. LeConte Visitors are Day Hikers, Backpackers, Lodge Guests, and Horseback Riders (Q1)?
2. What trails did visitors use to access the summit (Q9)?
3. What trails did visitors intend to use for their return trip (Q9)?
4. What sites were visited on Mt. LeConte's summit (Q2)?
5. What are the demographic characteristics of Mt. LeConte visitors (age, gender, income, education level, and place of residence (Q22-26)?

Services and Facilities (Behaviors and Preferences)

1. What facilities and services were used by visitors to Mt. LeConte (restroom facilities) (Q3)?
2. What lodge services do they use at the summit (i.e. purchasing snacks, T-shirts, or other souvenirs) (Q4)?
3. For visitors not staying overnight at the lodge, what services and facilities would they like to have available from the lodge that are not currently available (Q5)?
4. What kind of interpretive programs and services, if any, would visitors like to have available at the summit in the future (Q16)?

Social Impacts (Perceptions and Preferences)

1. How many people did visitors encounter on their trip to Mt. LeConte (Q10)?
2. How satisfied are visitors with the number of people they encountered on their trip (Q11)?
3. How many people would visitors have preferred to encounter on their trip (Q12)?
4. How many encounters would begin to harm visitors' recreational experience (Q13)?

Environmental Impacts (Perceptions and Preferences)

1. What level of impact do visitors think the current level of use is having on Mt. LeConte's natural resources (Q7)?
2. How much use would visitors prefer in the future (Q8)?
3. What are the preferred occupancy levels for the lodge (Q6)?

Management

1. How satisfied are overnight users of Mt. LeConte Lodge (Q18)?
2. How satisfied are visitors with the food service at the lodge (Q19)?
3. How satisfied are visitors with the fixed menu at the lodge (Q20)?
4. How satisfied are visitors with NPS management of Mt. LeConte (Q14)?
5. What are visitors' attitudes about NPS policies on Mt. LeConte (Q15a)?

6. What are visitors' attitudes about the ranger presence on Mt. LeConte (Q15b)?

ASSUMPTIONS

In every instance where the public is asked about their behaviors, attitudes, perceptions and preferences, one assumption is that the respondent will provide accurate information (O'Sullivan et al., 2003). People may be inclined in some cases to answer as they think they should, especially when dealing with questions that one might perceive as socially stigmatizing or personal. This tendency is more prevalent when interviewers administer surveys than when the survey is self-administered. This survey was self-administered, so it is our assumption respondents provided an accurate assessment of their experience.

LIMITATIONS

The study's biggest limitation is that it was administered on site, so it did not survey people who do not visit Mt. LeConte or who would visit Mt. LeConte if the management style were to change. Mt. LeConte is a very popular destination in the Great Smoky Mountains and this survey seeks to determine if use levels are a significant problem. It is possible that there are people who have been displaced from Mt. LeConte because of the current number of visitors. As Manning (1999) noted: "Satisfaction is not an appropriate criterion for managing use level and crowding in recreation areas. If the process of displacement is

operating or if in some other way the population of visitors is changing, satisfaction is likely to remain high despite changing use conditions.” This limitation will be discussed in depth in the literature review.

This survey also asks for visitors’ perceptions on the amount of impact visitors are having on the Mt. LeConte area’s natural resources. In an unpublished paper, Stankey and Lucas, two pioneers in wilderness management research, noted that visitors to natural areas are far less likely to perceive resource impact than are resource managers. The NPS should not use the visitors’ survey as its only tool in determining whether there has been too much impact on Mt. LeConte.

Also at issue is the wording of question 7 on the survey. The question asks about visitors’ perception of the effect of current use levels on Mt. LeConte’s natural resources. The possible answers are “No Damage,” “A Little Damage,” “Some Damage,” and “Serious Damage.” It should be noted from a survey research standpoint the options for this question were not well delineated. There is a very vague difference between “a little” and “some damage.” It is impossible to know how each respondent defined the difference in his or her own mind. Further, “Serious” is a problematic term in this instance because some people may believe that a little damage *is* serious damage. An alternative would have been three options: “No Damage,” “Acceptable Damage,” and “Unacceptable Damage.”

This study categorizes visitors to Mt. LeConte into three groups: Lodge Guests, Backpackers, and Day Hikers. This is a useful stratification for

determining differences between groups, however one limitation to data interpretation is the fact that there were 547 Day Hikers and 523 Lodge Guests but only 93 Backpackers. The sample of Backpackers was not large enough to provide results for Backpackers by season.

Other limitations of the survey are the logistical and cost concerns that arise in administering a survey in a remote area. Survey administrators from the Human Dimensions Research Lab were required to hike to Mt. LeConte and spend several days at a time there, during which time they were paid per diem expenses. This added to the cost of the survey. The survey administrators stayed in the NPS maintenance cabin at the summit, which was only available when maintenance was not being performed in the area. These limitations made a random choice of days throughout the year on which to administer the survey unfeasible. Since a limited time period from each season is represented in the survey data (e.g. the last weekend in June), the results should not be generalized to each season.

A NOTE ON SOCIAL IMPACT

Social impact is generally discussed in Environmental Impact Statements, as required by NEPA, when presenting the social or socioeconomic ramifications of proposed actions. It is a broad term that is defined as “the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society” (U.S. Dept. of Commerce, 1994). For the

purposes of this study the concept has been narrowed to include any impacts on the recreation experience of visitors to Mt. LeConte caused by other visitors or NPS management actions. If the NPS decides to allow more people to stay at Mt. LeConte Lodge per night than are currently allowed, that decision may impact the social experience of those visitors. While previous recreation research has not referred to social impact in the same context as NEPA, the definition suggests the two concepts are directly related, if not identical. When the number or type of encounters with other visitors adversely affects a visitor's experience, social impact occurs.

DEFINITION OF TERMS

Coping mechanisms: displacement, rationalization, and product shift, or any behavioral or cognitive reaction to crowding or conflict that reduces the stress of the recreationist.

Crowding: "a negative and subjective evaluation of use levels . . . where (use level) is perceived to interfere with one's activities or intentions" (Manning, 1999).

Data Cleaning: a process by which raw data are scanned for mistakes during data entry.

Dispersal, Spatial: a management technique in which recreation sites (such as campsites or picnic areas) are spread out over the whole recreation area, usually to alleviate crowding and conflict.

Dispersal, Temporal: a management technique in which certain types of recreation are allowed at certain times and not allowed at others. For example, fishing might be allowed on a lake between sunrise and 10 a.m. and between 6 p.m. and sunset, while swimming and pleasure boating are allowed from 10 until 6. This management technique is effective at managing conflict, as well as crowding.

Displacement: a behavioral coping mechanism where, after experiencing a change in the type of recreation available, the type of services or facilities provided, or the number of other people, recreationists stop going to one place, instead seeking out places more like the place they originally recreated.

Ecological Carrying Capacity: the maximum number of users at a recreation site above which unacceptable damage occurs to the natural resources of the site.

Environmental Assessment: “a public document that provides sufficient evidence and analysis for determining whether to prepare an Environmental Impact Statement, aids an agency’s compliance with NEPA when no environmental impact statement is necessary, and facilitates preparation of an environmental impact statement when one is necessary” (U.S. Dept. of Interior, 2001).

Environmental Impact Statement: “a public document required under the National Environmental Policy Act (NEPA) that identifies and analyzes activities that might affect the human and natural environment” (U.S. Dept. of Interior, 2001).

Product Shift: a cognitive coping mechanism whereby a recreationist changes their definition of a recreation area.

Rationalization: a cognitive coping mechanism whereby a recreationist refuses to admit dissatisfaction with a recreation experience, often stemming from the fact that a great deal of anticipation, planning, and/or cost is associated with the activity.

Recreational Carrying Capacity: the maximum number of users at a recreation site “above which recreation quality cannot be sustained” (Hammit and Cole, 1987).

Social Carrying Capacity: the maximum number of users at a recreation site above which there is a negative effect on the user’s recreation experience.

Social Impact: “the consequences to human populations of any public or private actions that alter the ways in which people live, work, play, relate to one another, organize to meet their needs and generally cope as members of society” (U.S. Dept. of Commerce, 1994).

CHAPTER II

LITERATURE REVIEW

INTRODUCTION

This chapter seeks to familiarize the reader with previous research conducted on the Mt. LeConte area as well as related research in the outdoor recreation literature. We will examine the concept of social carrying capacity in outdoor recreation settings, and what happens when carrying capacity is exceeded and crowding occurs. Crowding is defined and discussed, as presented in the recreation literature, as are the problems associated with the measurement of crowding, mechanisms by which people cope with crowding, and tools to avoid crowding. Finally, the concept of measuring visitor satisfaction is reviewed.

PREVIOUS RESEARCH ON MT. LECONTE

There have been three studies concerning visitor use and its impact on the Mt. LeConte area, two published in 1977 and one in 1990. These studies were primarily concerned with trail traffic counts using mechanical counters (Nichols, 1977) and observational head counts (Bratton and Whitaker, 1977). Van Cleave (et al., 1990) also used mechanical counters. The Nichols study reported data collected from May until October 1976 and found that Alum Cave Bluffs Trail was twice as popular as any other trail to the summit. Bratton and

Whitaker (1977) gathered information on visitor use patterns by hiking a regular route between the lodge, the Alum Cave trailhead, and Rainbow Falls at two-hour intervals and observing the type and location of any visitors they encountered. The Bratton and Whitaker study identified trail users by user groups, categorizing users as Lodge Guests, Backpackers or Day Hikers. While the 1990 study (Van Cleave et al.) used data recorded over a two-year period, the Bratton and Whitaker data were collected only in October of 1977; therefore Bratton and Whitaker did not identify seasonal differences in trail traffic. Both studies found that Day Hikers outnumbered Lodge Guests in the Mt. LeConte area approximately 4 to 1 and outnumbered Backpackers 10 to 1. None of the previous studies were concerned with user attitudes, preferences or perceptions. Although this survey is intended as a tool for monitoring social impacts at Mt. LeConte, it is also a baseline assessment of visitors' attitudes toward the management, their perceptions of use levels and resource impact, and their preferences for future services, facilities, and use levels.

SOCIAL, RESOURCE, AND POLICY MANAGEMENT

When one thinks of recreation area management, quite probably one thinks specifically of resource, or environmental management. In order to protect the visitor experience both people and the impact of their presence on other people must be managed. When visitors go into a recreation area, such as a park or wilderness, their experience can be affected by the condition of the resource, the people they encounter there, and the policies used to manage

visitors. There are two ways to manage visitors in recreation settings – directly and indirectly (Hammitt and Cole, 1987). While most managers would agree that it is far easier, less time consuming and more user friendly to manage indirectly through education, signage and other indirect means, it sometimes becomes necessary to use direct measures – the making of and enforcement of regulations. In the field of recreation, therefore, there are three dimensions of management that must be considered: visitors, resources, and policies.

Environmental Assessments (EA) help managers determine the state of the resources and how proposed actions might affect them. If significant effects are expected, an Environmental Impact Statement (EIS) is required and must include alternatives and their effects on the resources. However, the natural resources of the NPS are also managed with the aim of user enjoyment in mind. It is of little importance to the recreationist that the natural resources they came to enjoy are in good condition if they cannot have an enjoyable experience because the policies in place are so restrictive as to impede freedom in choosing activities, or if other people are hindering their enjoyment, either because of their behaviors or their sheer numbers (Hammitt, 1987). EA's therefore need to consider visitors' behaviors, attitudes, perceptions, and preferences in the analysis.

In discussing the Denali Wilderness Area, Lawson and Manning (2002) state that “decisions about how to manage wilderness involve potential tradeoffs among the conditions of social, resource, and management attributes of the experience.” This is true of all natural resource-based recreation areas.

Managers are charged with providing for public enjoyment of their parks, but they must identify when there are too many visitors or too much impact and enact tougher policies and regulations accordingly to better manage visitors. Put another way, “The objective of preserving natural areas is frequently impacted by the desire to encourage recreational use, particularly with respect to government goals for economic development and the role of nature-based tourism within these programs” (Borrie et al., 1998). Thus, managers are mandated to maintain a balance between protecting the resources of their natural areas and serving the public. The concept of carrying capacity is one tool that was developed to help managers determine how many people are enough and how many are too many.

CARRYING CAPACITY

In wildlife management, carrying capacity is defined as “the number of individuals in a population that the resources can support” (Feldhamer et al., 1999). Wagar adapted this concept in 1964 for use by recreation managers in the hopes of pinpointing an exact number of visitors a site could host before unacceptable resource damage occurred. Managers still look to carrying capacity as a useful management tool, but many note that it is imperfect at best. One problem is that different types of recreationists cause different amounts of impact to resources (Washburne, 1982). For instance, horseback riders compact more soil than hikers, and campers with cook-stoves use fewer resources than campers who build fires. Impacts are also greater during wet periods, such as following rain, snowmelt, and spring thaws.

One must also consider the type of carrying capacity being determined. As was noted previously, not only are visitors impacting the resources, they are impacting other visitors as well. Thus carrying capacity is divided into two concepts: ecological and social carrying capacity (Hammitt and Cole, 1987). As the name implies, ecological carrying capacity is concerned wholly with the impacts people have on the resource itself. Ecological carrying capacity might be set following development of an Environmental Impact Statement, which is prepared after an Environmental Assessment determines that significant impact is occurring or will occur. Although weather conditions cause some variability, it is easier to determine the measures for assessing ecological carrying capacity and the measurements are finite. Social carrying capacity, on the other hand, is a more abstract concept. In a given area, for instance a trail from point A to point B, how many people is too many people to encounter? This is a perception that may vary from visitor to visitor, and on the behavior of the visitors encountered.

How then is it possible to come up with an exact number of people that can use an area in a given amount of time? Hammitt and Cole (1987) argue that setting such limits is wasteful because it does not allow use that might have been supported. Borrie (et al., 1998) say that carrying capacity wrongly focuses managers on the question, "How many is too many" when the question they should be asking is, "What are the appropriate or acceptable conditions for visitation and how do we achieve them?" Borrie (et al., 1998) and Hammitt and Cole (1987) advocate a more closely monitored approach than carrying capacity allows. They argue that setting Limits of Acceptable Change (LAC) on an area

and monitoring that area to determine when the limits are being approached is a more feasible alternative than simply saying a certain number of visitors is too many.

The Mt. LeConte survey was commissioned not only to help provide information for an Environmental Assessment, but also to provide data for the monitoring process required by the General Management Plan. At present, the limit of Mt. LeConte Lodge Guests to no more than 50 per night represents an imposed carrying capacity limit. However, the only limit on other visitors to Mt. LeConte, such as Backpackers and Day Hikers, is whether or not they can find a parking place at the trailheads. While portions of Mt. LeConte are classified as backcountry, there is nothing wilderness-like in the more than 2,000 visitors per month Mt. LeConte receives in the summer and fall (NPS data, unpublished). Aside from the resource impacts such a large number of visitors have on Mt. LeConte, park managers are concerned that the recreation experience of Mt. LeConte's visitors could be negatively affected by the popularity of the destination. When use levels in recreation areas occur to a point they are "perceived to interfere with one's activities or intentions" (Manning, 1999) crowding is said to occur. While the Mt. LeConte survey did not specifically ask visitors if they felt crowded, visitors were asked about their preferences for encounters and use levels. Such questions have often been used to determine if crowding is occurring (Hammitt and Rutlin, 1995; Stewart and Cole, 1999 and 2001; Manning and Valliere, 2001).

CROWDING AND CONFLICT

As the earth's population continues to grow exponentially, crowding will only become more and more of a problem for everyone in every aspect of life. However, it is especially troubling in recreation as we seek to escape from the pressures and stresses of everyday life. When a recreation experience, which is restorative to the mind and body, becomes a stressful event akin to sitting in rush hour traffic or standing in line at the store, some would argue it is no longer a recreational experience in the purest sense. Because of the importance of crowding to the recreational experience, it is one of the most researched aspects of the human dimensions of recreation (Manning, 1999, Vaske and Donnelly, 2002).

As opposed to density, which is a measure that can be defined as the number of people per unit of measure (e.g. per square mile), crowding is a subjective measurement, an individual judgment, and as such, is more difficult to measure. A great deal of research on crowding centers on the number of encounters with others a visitor experiences during an outing. As Vaske and Donnelly (2002) explain, when a person makes a judgment that an area is crowded, they are comparing their actual number of encounters to the number of encounters they think would be acceptable (standards), and determining that the actual number of encounters exceeds their standards (social impact). One way to generalize this internal judgment is through the development of norms. Vaske and associates (1986) define norms as standards individuals use to place a value on something, i.e. good or bad. Vaske and Donnelly (2002) say that

“norms define what people think behavior and conditions should be. Hence they are a direct measure of visitor’s standards.” Thus the “normative approach” to encounters for the purposes of crowding research has been widely used, and those using it have had a great deal of success with finding significant correlations between increasing numbers of encounters and increasing feelings of crowding (social impact). However, there is a body of research that has shown weak relationships between encounters, perceived crowding, and recreation experience quality (Stewart and Cole, 1999 and 2001). This departure from the norm will be discussed in more depth later.

Another way to look at crowding is to compare encounters with achieved privacy. Hammitt and Rutlin (1995) looked at this relationship from the perspective of environmental psychology, emphasizing the “dynamic nature of person and situation fit, rather than the sociology of normative behavior.” The purpose of the study was to try to find a satisfaction curve that could be used to evaluate encounters and achieved privacy. The authors specifically state that “privacy is not the opposite of perceived crowding,” and go on to define it later, citing Westin (1967), as “The claim of individuals, groups, or institutions to determine for themselves when, how, and to what extent information about them is communicated to others.” In this context, freedom from crowding, what one might consider solitude, is only one component of privacy. Other components include intimacy, anonymity, and reserve. They found that the degree of privacy recreationists achieved was negatively affected by encounters exceeding the ideal or maximum number as defined by each respondent.

As crowding, or achieved privacy, becomes a larger problem in recreation areas, managers can employ a number of management techniques. Dispersal of use either temporally or spatially can reduce or even eliminate problems with crowding, but spatial dispersal should be approached cautiously since even a little use can cause a great deal of resource impact. Dispersing people over the whole of the recreation area can degrade the resources much worse than concentrating them will (Hammitt and Cole, 1987). Zoning is a way to separate different types of recreationists so that incompatible uses do not cause conflict (Hammitt and Cole, 1987). For instance, it is common for conflict to occur between recreationists engaged in motorized activities and recreationists engaged in non-motorized activities, even when the activities themselves are similar, such as canoeing and motorized boating. In such instances, it is likely that those involved in non-motorized activities will be more sensitive to the conflict inherent in the two activities than those using motorized equipment (Hammitt, 1987, Vaske and Donnelly, 2002). Temporal dispersal, or zoning by time, is perhaps a better solution than spatial dispersal or zoning from a resource management standpoint because use is still concentrated at the same place but the recreationists themselves are spread out over time, either by hours, days, or even seasons, thus lessening potential perceptions of crowding. Limitation of use is another technique, but one that managers should avoid using unless absolutely necessary to protect the resource because it goes against the objective of providing for public enjoyment (Hammitt and Cole, 1987).

It is all well and good to have techniques in place to manage crowding and conflict, but what if crowding and conflict are occurring and managers are unaware of the problem? This could happen for several reasons as discussed in the next two sections.

COPING MECHANISMS

In *Studies in Outdoor Recreation* (1999), Manning discusses three coping mechanisms that people use to deal with crowding: displacement, rationalization, and product shift. Displacement, a behavioral coping mechanism, occurs when recreationists alter their behavior to avoid some undesirable aspect of a recreation area, such as crowding, conflict, or unwanted development of the area. The other two means of coping with crowding and conflict are rationalization and product shift. Both of these coping mechanisms are cognitive in nature, as they deal with internal, rather than external changes in the recreationist. Rationalization involves altering one's perception of a recreational event in order to avoid feeling disappointed that it was not wholly satisfactory. Manning uses an example from Heberlein and Shelby (1977) of rafting the Colorado River. Since the trip is something that involves a great deal of anticipation, time, and expense, they hypothesize that some people might refuse to be disappointed easily. Finally, product shift involves the mental reclassification of a recreation area. Essentially, if a visitor goes to an area expecting to find an opportunity for solitude and is unable to, that visitor will redefine what that area can be used for – he or she no longer goes there seeking

a wilderness experience, but they might go there when they want a more social outdoor experience, or to experience the “challenge” of an activity.

If displacement is at work, measuring the true attitudes of a population about a recreation area can be very difficult. There may be a large constituency who used to go visit a place but have stopped because of some undesirable experience. Hence the challenge is for researchers to reach former visitors. On-site surveys and surveys that pull from the population of people who are known to have recently recreated in an area may be leaving out the voices of those who are so unhappy with the way things are managed they refuse to visit again. Essentially, instead of sampling the entire population of people who could visit the area, in many cases we are only sampling the portion of the population that is satisfied enough to continue to visit. Manning and Valliere (2001) designed a study in Acadia National Park to target people who could recreate in the park if they chose to and to determine if those people were exhibiting coping mechanisms (2001). Residents in communities near Acadia National Park were surveyed to determine how their usage of the park’s carriage roads had changed since the roads had become more popular with tourists. Their study found that 94% of those surveyed had “used at least one coping mechanism to avoid or otherwise reconcile perceived undesirable changes in use,” such as changing the time of day or week they used the roads. Interestingly, Manning and Valliere (2001) found that problem behaviors (especially noisiness and littering) “were more powerful predictors of adoption of displacement behaviors than were increase in use level.” Similarly, West (1982) looked at the relationship between

problem behaviors and perceived crowding and found the problem behaviors of others to be just as important as the number of encounters in visitors' perceptions of crowding. Of those who said others had bothered them, the number of encounters bothered 31% and 56% were bothered by the behaviors of others (West, 1982). However, Manning and Valliere (2001) also found the use levels of the area were just as likely to predict the residents' use of the cognitive coping behaviors, rationalization and product shift, as was problem behavior.

Manning and Valliere (2001) conclude that sometimes a significant portion of the population is employing coping mechanisms. If visitor satisfaction research does not take this possibility into account, the opportunities for recreation can become homogenized because respondents are not indicating their dissatisfaction, either because of rationalization or product shift, or because they have already been displaced. Managers are led to believe that the management techniques they are using are working, when in fact both the population of visitors and the way those visitors see the area's potential for recreation are changing. Then, as people are displaced from one recreation area because of crowding or conflict, the recreation area they then choose to visit becomes more crowded. "In this way, changes in recreation use patterns and experiences can "ripple through" the societal spectrum of recreation opportunities, systematically reducing opportunities for selected types of recreation experiences." Touching on this same concept, Noe (et al., 1987) discusses the problem that while recreation opportunities are developed for the "normal" or "average" person (i.e. that person who is represented by the norm),

and as the normal person indicates satisfaction with existing facilities and programs, the minority who prefer a different experience are alienated.

VISITOR SATISFACTION

Manning (1999) points out that recreation researchers are concerned with crowding, conflict, and the problems with measuring these concepts because recreation managers' underlying goal is to provide a quality recreation experience. Visitor satisfaction is one way to evaluate the quality of the recreation experience. Expectancy theory has been the dominant conceptual basis for assessing satisfaction in outdoor recreation (Manning, 1999; Tian-Cole et al., 2002). This theory suggests that people participate in recreational activities in order to fulfill a need or reach a desired state. When the outcome of the recreation experience meets or exceeds the expectations of the recreationist, satisfaction is said to occur (Manning, 1999; Tian-Cole et al., 2002). However, the complexity of the concept of satisfaction has given rise to research that seeks to determine the contributing factors to visitor satisfaction. Manning lists three situational variables that affect satisfaction – resource, social, and management settings. Any of these three aspects of the experience can detract from visitors' satisfaction, as can several subjective evaluations, such as the visitor's experience, attitudes and preferences, cultural characteristics, and socioeconomic status (Manning, 1999).

Another way to look at the variables that influence satisfaction is to consider quality of experience and quality of performance as antecedents to

overall service quality, overall experience, and overall visitor satisfaction (Tian-Cole et al., 2002 see Figure A-1 in Appendix A). In Tian-Cole's study, quality of experience was defined as "the psychological outcomes which visitors derive from visiting a facility." Quality of performance was defined as "visitors' perceptions of the attributes of a facility that are controlled by management." With this model, quality of experience and quality of performance are both factors in, but neither is synonymous with, overall satisfaction.

The point that the authors make is a person can have a satisfactory overall experience even if the quality of experience and the quality of performance are not great, just as they can have an unsatisfactory experience that has nothing to do with quality of the experience itself or management performance. For instance, a visitor's mood or any number of personal occurrences could interfere with overall satisfaction with an experience, even if the recreational experience on-site itself was positive. This could cause the visitor to rate the overall experience as unsatisfactory, even though the quality of the actual experience was satisfactory. As the authors note, "The production of a recreational experience involves both visitors and resources (Brown, 1988). Management can only provide opportunities such as services and facilities. How visitors avail themselves of those opportunities determines the quality of the experience they receive" (Tian-Cole et al., 2002).

But quality of experience and performance do have a strong affect on the perception of overall service quality, and thereby on overall satisfaction. Quality of performance encompasses the resource and management setting while

quality of experience encompasses the social setting, as well as the subjective evaluations such as culture, experience, and socioeconomic status. It should be noted that while overall service quality is strongly influenced by quality of performance, they are not the same concept. Quality of performance is a measurement of specific services or facilities, while overall service quality is an evaluation of the services in general. Since managers have little control over the quality of experience, Tian-Cole et al. (2002) conclude, "From management's perspective, quality of performance should be viewed as the most important aspect of a service." Finally, it is possible to predict visitors' future behavior by gauging their overall satisfaction. If they are satisfied, they will probably return. If they are not satisfied, they probably will not.

One final note is that visitors' preconceived perception of the overall quality of the services can influence their overall satisfaction rating. That is to say, "When visitors perceive a leisure service's attributes to be high quality, they are likely to experience higher levels of overall satisfaction with this service" (Tian-Cole et al., 2002). This is especially important to note since visiting Mt. LeConte is considered by many to be such a high quality experience. The lodge is fully booked shortly after reservations become available each year, and there is even a grandfather clause that allows people who have been going on a yearly basis priority registration. This brings us back to the concept of rationalization. If people have a preconceived notion their visit to Mt. LeConte will be a high quality experience and they have invested a great deal into it, then they might be less likely to closely scrutinize their trip.

VISITOR SERVICES PROJECT (VSP)

As part of ongoing Visitor Service Projects (VSP) to determine visitor satisfaction with the quality of facilities and services they offer, the NPS has been collecting data for the past five years on visitor satisfaction understanding using visitor intercept surveys in the form of Visitor Survey Cards (VSC). Over 300 parks have collected VSC's since the program began. The information gathered has been compiled into a park service publication called *Serving the Visitor* (2002). Where applicable, the data from *Serving the Visitor* is presented as a comparison to the data gathered on Mt. LeConte. Anyone wishing to know which parks were involved in VSP and VSC studies should consult *Serving the Visitor* (2002). However, the publication does not indicate which parks specific questions relate to.

PROBLEMS WITH MEASURING CROWDING AND SATISFACTION

The employment of coping mechanisms is only one hindrance to the measurement of crowding and satisfaction. Almost as much has been written about the problems of measuring crowding and satisfaction as about the phenomena themselves. One major obstacle to measuring visitor perceptions, such as crowding and satisfaction, is people's inability to accurately remember their experiences. As reported in Borrie and Roggenbuck (1995), there is some question as to whether respondents who are asked to remember experiences and report on them are actually referring to true memories or generic cognitive structures. Nisbett and Wilson (1977), questioned people's access to their

cognitive processes and concluded that there is no difference between one's own ability to report the cause of past behavior and the ability of an external observer to report the cause. They tested this concept by asking people to memorize lists of word pairs. One of the pairs was ocean and moon. Afterward, they asked the subjects to name a laundry detergent. They found that people who had memorized the word pair were twice as likely to respond "Tide" than those who had not. When asked why they thought of Tide instead of some other detergent almost no one mentioned the word pair as an influence; however when asked whether they thought the word pair had any influence on their choice, only one third conceded it probably had. Borrie and Roggenbuck also note that Koriat (1983) "pointed out that respondents have an imperfect memory of memory, and the process of remembering alters the recollection of events." This would all be less troublesome in terms of assessing crowding and satisfaction if Bernard (1984) and associates had not found that when memories are not specific, respondents often report cultural norms in the place of actual occurrences. Essentially, all this seems to mean that people may not remember their experiences correctly and they substitute what they think should have happened for what actually did happen. Borrie and Roggenbuck (1995) go so far as to say that people may tell falsehoods (either intentionally or unintentionally):

Respondents may feel pressure to respond in what they perceive to be a culturally appropriate manner. For example, visitors to National Parks might feel it is inappropriate to be too critical of the management of the park for fear that this may be interpreted as

being ungrateful for the opportunity to visit. There may be strategic self-serving bias to their responses. In the knowledge that their answers may influence the management of the park, they respond in a manner which will preserve their interests (Borrie and Roggenbuck, 1995).

While there may be no foolproof way to keep people from misrepresenting their true attitudes to appear more culturally acceptable, the self-administered survey, as opposed to the survey interview, may help alleviate this problem (O'Sullivan et al., 2003, Dovidio and Fazio, 1992). As for the problem of inaccurate recall, several recommendations are made, but they boil down to keeping the questions simple.

In order to address the problems of memory discussed above, Tarrant (1999) studied the difference between the mail-back and on-site survey on response time, location, and perceived crowding using boaters from the Nantahala River. He found that people reported higher levels of crowding on mail-back surveys than they did on surveys administered on-site.

Stewart and Cole (1999 and 2001) devised a two-fold survey approach whereby the same visitors to the Grand Canyon National Park were given two surveys – a mail-back questionnaire for after their trip and a diary-like questionnaire to be completed each day while they were backpacking in the Grand Canyon. The advantage of using both survey methods at once is the ability to see whether or not the mail-back survey shows the same number of encounters. The x-axis represented length of encounters and the y-axis

represented perceived crowding. The ability to plot several points (a point for each day) on a graph instead of only one point for the whole trip allows for a clearer picture of the visitor's experience. As one would expect, the diary questionnaires show perceived crowding increasing as the time length of encounters increased. The post-trip survey asked about crowding on the trip as a whole, and offered only one point, which does not allow for the explanation of variance that the diary-like system does. Also, there was inconsistency between the longest amount of time reported in the presence of other parties, which suggests memory had already begun to fade by the time the post-trip survey was completed.

While there are advantages to the diary method, such as more data and likely more reliable data, even with the diary method Stewart and Cole (2001) found only weak relationships between encounters and crowding (2001). They conclude their position by saying, "This implies that managers should be reluctant to justify use restrictions on the basis of higher-quality experiences and that user-based empirical research is of limited utility in grappling with such restrictions." These remarks set off a firestorm of comment papers, prompting Manning (2003) to state that Stewart and Cole were suggesting that visitor survey research had little, if any, value. This in turn caused Stewart and Cole (2003) to rebut that:

Descriptive data provides little basis for prescriptive decisions about how a park ought to be managed. The fundamental basis for any prescriptive decision (e.g. whether or not to limit use and what that

use ought to be) lays in decisions about park purposes and the kind of experiences, setting attributes, and visitor groups to which management is directed. Such decisions must be based on information from many sources, most notably from legal mandates, agency policy, stakeholder dialogue processes, and analyses of regional supply and demand. The primary contribution of visitor survey data to management lies in working out the technical details to best meet specific management objectives (Stewart and Cole, 2003).

Throughout Tian-Cole's study (2002), the idea that rings through is that visitors are not managers; therefore they are not fully aware of the range of challenges managers face.

SUMMARY

This chapter has reviewed social impact issues resource managers in natural areas face today, provided some concept of the tools used to manage the issues, and given some cautions on how closely to follow reports of visitor perceptions and preferences once they have been measured. While survey research can definitely help us to understand visitor attitudes and preferences, it is also important, as Stewart and Cole (1999, 2001) reminded us, to take into account the ecological science of management before making any decisions. Just as resource management cannot be implemented without taking people and social issues into account, visitor management in parks and protected areas

should never be approached without also thoroughly examining the ecological implications of possible management decisions.

Unlike the earlier studies on Mt. LeConte, the current study expands upon behavioral data and allows the NPS to gain insights into the attitudes, perceptions, and preferences of Mt. LeConte's visitors. This research is important since the NPS is charged with managing the visitor experience and resource impact. It is not enough to say that "X" number of people visited Mt. LeConte per day and "X%" used this trail. To properly manage the visitor's experience at Mt. LeConte, the NPS needs to gain familiarity with visitors' perceptions of and preferences for encounters with other visitors and related information.

Borrie (et al., 1998) urges us to ask, "What are the appropriate or acceptable conditions for visitation and how do we achieve them?" The concepts of social carrying capacity, conflict, and crowding help us articulate what it is like when a visit to a park or natural area does not live up to our expectations. We may say to ourselves, "There are just too many people here for me to enjoy myself like I thought I would," or "If those people over there weren't so rowdy, I could be having a much better time." Often, when asked about whether or not we enjoyed our experience, we answer, "Yes, we did, but . . ." This survey was designed to go beyond "Did you enjoy your experience," and ask, "How satisfied were you with the number of people you encountered," "How many people would you have preferred to encounter," and to avoid adversely affecting your recreation experience, "Should the number of visitors decrease, increase, or stay

the same?" By asking how many people visitors encountered, and how many people they would prefer to encounter, as well as how satisfied they were with the number of encounters, we can then begin to determine at what levels of use crowding might occur. Hopefully this will help get around the issue of false satisfaction reports, whether they occur because of coping mechanisms such as rationalization and product shift, or simply because of a desire to conform to the norm.

CHAPTER III

METHODS

PARTICIPANTS

Participation in this survey was limited to those people who visited Mt. LeConte's summit during the four survey periods described below. Four user groups were initially identified as study groups for the research project. They consisted of Lodge Guests, Day Hikers, Horseback Riders, and Backpackers visiting the Mt. LeConte summit. However, no Horseback Riders were intercepted during the survey period.

INSTRUMENTATION

The survey was developed by Mark Fly and Becky Stephens in the Human Dimensions Lab at the University of Tennessee in collaboration with staff at the Great Smoky Mountains National Park, and can be found in Appendix B. The survey consists of 21 questions that measure behaviors, attitudes, perceptions, and preferences, as well as five demographic questions. All of the questions on the survey are either nominal or ordinal (Likert-type) in scale except those questions that ask for respondents' comments. Individual comments can be found in the final report to the NPS (forthcoming).

PILOT TEST

The survey was pilot-tested in Forestry 321, Wildland Recreation, a class of about 40 students. Students were asked to either answer as if they had been to Mt. LeConte or, if they had actually been to Mt. LeConte, to answer in relation to their most recent trip.

IMPLEMENTATION

The Mount LeConte Visitor Survey was conducted over four interview periods from October 25, 2002 until June 30, 2003, representing each of the four seasons: fall, winter, spring, and summer. The specific dates were: October 25 – October 29, 2002, December 28 – December 30, 2002, April 30 – May 4, 2003, and June 26 – June 30, 2003.

To capture all three user groups exiting the summit of Mt. LeConte, survey sites were situated at three intercept sites along the trails at the summit: Alum Cave Bluffs Trail and Rainbow Falls Trail junction, Trillium Gap Trailhead, and Boulevard Trail (see Figure A-2). Alum Cave Bluffs Trail was monitored continuously from 9 a.m. until 5 p.m., as were the other two intercept sites during the fall and spring survey periods (except for break periods). During the winter and summer survey periods only two interviewers were available. Therefore, the one who was not monitoring the Alum Cave Bluffs Trail spent two-hour intervals at each of the other intercept sites. Lodge Guests who volunteered to participate in the study completed the surveys in the dining hall after breakfast between 8:30 a.m. and 9:30 a.m. the day of their departure. Exit surveys for Day Hikers and

Backpackers were conducted at the three trail sites from 9:30 a.m. until 5:00 p.m. As the lodge is not open in winter, there were no Lodge Guests to survey for that season.

Electronic trail counter data were collected by the NPS during the same period that the surveys were conducted. Although more time was spent at the Alum Cave Bluff Trail, Rainbow Falls Trail junction than any other site, the ratio of people surveyed to the number of people counted on each trail using the electronic trail counters was within 1-3% (Figure A-3). This indicates the people surveyed should be representative of all visitors to Mt. LeConte during the survey time periods.

Signs displaying “Mt. LeConte Visitor Survey,” “University of Tennessee,” and “National Park Service” were placed on the trail at the survey site. When an individual or group of individuals approached the site, the survey administrator read a short introductory statement that explained the purpose of the survey. The individual had the option to complete the survey on site, take a survey to complete and return by mail, or refuse to participate in the survey.

The total number of participants used in the analysis after data cleaning was 1,163. A total of 118 people refused to complete a survey, for a response rate of 92%. Surveys not returned by mail were converted into refusals. This study has a 95% confidence interval with a $\pm 3\%$ margin of error. The results presented in this report are based on all visitors 18 years of age and older who volunteered to participate in the survey during the time periods shown in Table 1.

Table 1: Surveys Completed by Season and Date.

Season	Date	Day Hiker	USER TYPE		Total
			Backpacker	Lodge Guest	
Fall	10/25/2002	1	2	20	23
	10/26/2002	59	6	42	107
	10/27/2002	36	8	23	67
	10/28/2002	7	7	39	53
	10/29/2002	9	0	35	44
Total		112	23	159	294
Winter	12/28/2002	0	9	0	9
	12/29/2002	20	8	0	28
	12/30/2002	25	3	0	28
Total		45	20	0	65
Spring	04/30/2003	19	0	30	49
	05/01/2003	32	2	29	63
	05/02/2003	25	5	38	68
	05/03/2003	98	5	27	130
	05/04/2003	36	9	52	97
Total		210	21	176	407
Summer	06/26/2003	40	2	40	82
	06/27/2003	14	0	29	43
	06/28/2003	74	8	40	122
	06/29/2003	33	12	40	85
	06/30/2003	19	5	37	61
	07/01/2003		2	2	4
Total		180	29	188	397
Final Total		547	93	523	1163

DATA ANALYSIS

The data were entered into and analyzed with SPSS 12.0 for Windows. Frequencies and Pearson Chi-Square tests for significance were run for differences between user groups and between user groups by season. Relationships were considered significant if Chi-square values were less than or equal to 0.05. One question on the survey was analyzed with ANOVA to compare means of user groups' interest in Park Service exhibits and publications. Because Backpackers were represented in such small numbers, the values associated with them are not always statistically reliable. For this reason, wherever values are reported for Backpackers, the n size for that question is always reported.

CHAPTER IV

RESULTS

INTRODUCTION

The results of this study are divided into five sections. (1) **Descriptive Data** sought to describe Mt. LeConte's visitors – their demographic characteristics and their behaviors, such as what trails they used and what sites they visited. (2) **Services and Facilities** relates to visitor's use of services and facilities as well as their desire for services and facilities that are not currently available, such as flush toilets, educational exhibits and programs, and meals and snacks for Backpackers and Day Hikers. (3) **Social Impacts** looks at visitors' perceptions of the effect of current use levels on their recreation experience. If a majority of visitors report negative effects on their recreation experience because of current use levels, we will be able to conclude that crowding is occurring on Mt. LeConte and the social carrying capacity of the area has been exceeded. (4) **Environmental Impacts** examines visitors' perceptions of the environmental impacts visitors cause at Mt. LeConte. (5) **Management** discusses the attitudes of visitors toward NPS and lodge management. If visitors report satisfaction in these areas, it will be an indication that the current management strategies are working properly.

DESCRIPTIVE DATA

What percentage of Mt. LeConte visitors are Day Hikers, Backpackers, and Lodge Guests?

There were three primary user groups who visited Mt. LeConte during the survey period, Day Hikers (47%, n=547), Lodge Guests (45%, n=523) and Backpackers (8%, n=93, Table 1, p. 38). There were actually more Lodge Guests than Day Hikers in the fall and summer, and more Day Hikers in the spring survey period ($p < .001$). There were no Lodge Guests in the winter, since the lodge is closed.

Where do Mt. LeConte Visitors reside?

As expected, the largest percentage of participants was from Tennessee (35%). Another 44% of visitors surveyed were from the eight nearby states: Alabama, Georgia, Florida, Kentucky, Ohio, Indiana, North Carolina, and South Carolina (Figure A-5). Combined, these nine states accounted for 78% of Mt. LeConte's visitors during the survey periods. The other 21% came from 25 other states and Canada, the Netherlands, Russia, and South Africa. Foreign visitors were 0.7% of the total visitors surveyed.

What is the age distribution of Mt. LeConte visitors?

Mt. LeConte visitors surveyed ranged in age from 18 to 80 with an average age of 43 and a median of 44 (Figure A-6). Only Mt. LeConte visitors 18 years of age or older were included in the survey. Those visitors younger than

18 who completed a survey were filtered from the data before analysis. As might be expected, the average age of Backpackers (35) was lowest, followed by Day Hikers (40), then Lodge Guests (47, $p < .001$).

What is the gender distribution of visitors to Mt. LeConte?

One was more likely to encounter men going to and from Mt. LeConte than women, but such likelihood varied widely within user groups and from season to season. Women were consistently a higher percentage of Lodge Guests compared to their percentage in other user groups; in fact half of the Lodge Guests were women, as opposed to 34% of Day Hikers Figure A-7, $p < .001$). The average percentage of men in the Day Hiker and Backpacker groups for all seasons was 75% ($p < .001$). The vast majority of Day Hikers and Backpackers were male in each of the survey periods (Figures A-8 through A-11), with the highest percentage of males overall occurring in the winter season (80% - 100%).

What is the education level of visitors to Mt. LeConte?

Mt. LeConte's visitors are highly educated, (Figure A-12) with the majority of those surveyed having a college or post-graduate degree (67%), as opposed to 26.1% of the general population (U. S. Census Bureau, 2004). Another 19% said they had taken some college classes. Trade school accounted for 4% of visitors, and another 9% had completed high school. Only 1% of those surveyed had not completed high school.

What is the income level of visitors to Mt. LeConte?

Along with high education levels, visitors to Mt. LeConte represent upper levels of income as well (Figure A-13). Almost one third (32%) of the visitors to Mt. LeConte surveyed indicated their household earned over \$100,000 a year before taxes, 53% earned \$75,000 or more and 73% had an annual household income of \$50,000 or more. In every season Lodge Guests were surveyed, their average income was greater than either of the other two user groups ($p < .001$) – about 8 percentage points greater than the next user group in the fall and spring, and about 17% greater in the summer ($p < .001$). On the whole, 89% of those surveyed had an annual household income of \$30,000 or more.

What trails did visitors use to access the summit?

Summit visitors were asked about trails they used to access the summit; this is the primary basis for the following data. However, interviewers also made notes on the survey forms regarding trails used by visitors contacted on the trail. This observational data was used to supplement or replace survey data in cases where the observational data was thought to be more accurate. In some cases, survey respondents did not limit their responses to trails used on the current trip.

The most popular trail used to access the summit of Mt. LeConte was the Alum Cave Bluff Trail (ACBT) with an overall total for all seasons and user groups of 73% (Figure A-14). Day Hikers seemed to heavily favor the ACBT route (82%, $p < .001$), probably because at 5.5 miles it is the shortest route to the

summit and is accessible from the main road through the park. Day Hikers used ACBT least in the spring (77%), and most in the winter (100%, $p<.001$). By comparison, Lodge Guests used the ACBT the most in the fall (78%) and least in the spring (59%).

Although relatively low by percentage, the next most popular trails with almost equal use overall were the Boulevard Trail (BLVD) and Rainbow Falls Trail (RFT), with approximately 10% of overall use each. Boulevard Trail connects Mt. LeConte to Newfound Gap via the Appalachian Trail over a 7.7-mile route. Rainbow Falls Trail (6.5 miles) was not used at all in winter and saw the most use in the spring, when it was used by 13% of Day Hikers, 16% of Lodge Guests, and 20% of Backpackers ($n=20$). Other trails that access the summit of Mt. LeConte are Bullhead (2% of total usage, 7.2 miles) and Trillium Gap (5% of total usage, 6.5 miles). Neither of these trails was used by any user group to access the summit in the winter. While experiencing little usage overall, Trillium Gap was used more often by Lodge Guests in the spring (17%). Fewer than 2% of Day Hikers in any season reported using Trillium Gap Trail. Bullhead Trail was not used by more than 4% of any user group during any season to access the summit.

What trails did Mt. LeConte visitors intend to use for their return trip?

ACBT was also the overwhelming trail of choice for descending the mountain (72%, Figure A-15). Bullhead Trail was the next most popular descent trail at 12% overall. Bullhead Trail was more popular in the winter, with about

30% of each user group planning to take it down the mountain. This is probably because it is safer than the other trails, since there is less water flowing over it and therefore less danger of icy patches. It was used less in the spring (16%) and very little in the fall (6%).

What sites on Mt. LeConte did visitors visit?

Those surveyed were asked which places they visited while in the summit area. Figure A-16 shows overall percentage of visitation to each location. The lodge was the most popular place on the summit to visit, with 87% of those surveyed reporting stopping there (Figure A-17). Obviously all Lodge Guests reported visiting the lodge, as did 81% of Day Hikers and 62% of Backpackers (n=93).

Other than the lodge, the most popular spot to visit overall was Cliff Tops (58%, Figure A-18), particularly with Backpackers (68%, n=93, $p<.001$). Cliff Tops is a rocky outcrop about a ½ mile from the lodge that offers a spectacular view of the sunset. Overall, 58% of those surveyed reported visiting Cliff Tops. In general, everyone visited Cliff Tops more in the spring and summer than in the fall and winter. About 65% of Lodge Guests reported visiting, as did 50% of Day Hikers. Since Day Hikers are not at the summit for sunset, it makes sense that fewer of them stop at Cliff Tops than other user groups.

Thirty-four percent (34%) of respondents reported visiting the backcountry shelter on Mt. LeConte (Figure A-19). As one would expect, the user group with the largest percentage of visitors was the Backpackers. Eighty-seven percent

(87%) of them overall reported visiting there (n=93). At least 23% of the other user groups reported visiting this location as well. They may be curious about the facilities and this may be a rare opportunity to see a trail shelter.

Myrtle Point, the best place on the summit to see the sunrise, seemed to be the least popular place to visit at the summit, with only 29% of those surveyed reporting they had been there (Figure A-20). This is probably due in part to the fact that it is the further from the lodge than the shelter or Cliff Tops.

SERVICES AND FACILITIES

What services and facilities did visitors to Mt. LeConte use?

Restroom Facilities

There are three options for people who wish to use restroom facilities at the summit of Mt. LeConte. There are pit toilets at the lodge and the trail shelter, and flush toilets provided exclusively for Lodge Guests. While the flush toilets were not an option on the survey, some respondents wrote them in. For overall restroom usage, the lodge pit toilet seems to be the most popular, with 59% of those surveyed indicating they had used it (Figure A-21). Even with flush toilets available, at least 75% of the Lodge Guests indicated they used the lodge pit toilet across all four seasons surveyed (Figure A-22). In contrast more than twice as many people reported using no toilet (28%) as reported using the pit toilet at the shelter (12%, Figure A-23).

Current Lodge Services and Facilities

Among services currently provided by Mt. LeConte Lodge, the most frequently used across all user groups is the treated public water, which is available in all seasons except winter (Figure A-24). It was used by almost 60% of visitors overall. More than 90% of Lodge Guests reported use, as did at least 60% of Backpackers (n=93). Only 39% of Day Hikers reported using the treated water.

T-shirt sales are also a popular service, as 43% of those surveyed reported purchasing at least one (Figure A-25). Overall, Lodge Guests were the largest customer group with 69% buying shirts ($p<.001$), as opposed to 23% of Day Hikers and 12% of Backpackers (n=93). The slowest season for T-shirt sales to Lodge Guests was in the summer when only 58% bought shirts. The season with the highest sales was spring for all user groups, when 82% of Lodge Guests, 29% of Backpackers (n=21), and 27% of Day Hikers bought shirts ($p<.001$). It seems obvious more Lodge Guests purchased T-shirts because they were aware of their availability. Day Hikers and Backpackers who did not visit the lodge might not have known there were T-shirts for sale and might not have had any money with them.

Survey participants were also asked about purchasing other souvenirs and snack items at the lodge. Overall, less than 10% of those surveyed indicated using either of these services. Lodge Guests were more likely than the other two user groups to purchase other souvenirs (14% overall, $p<.001$), possibly because it was more convenient for them. Eleven percent (11%) of

Backpackers (n=93) and Day Hikers, as well as 8% of Lodge Guests, reported purchasing snack items.

For visitors not staying overnight at the lodge, what facilities and services would they like to have available from the lodge that are not currently available?

In an effort to determine what the Mt. LeConte Lodge could do to better cater to those visitors who do not stay at the lodge, visitors were asked whether or not they would prefer the implementation of certain services and facilities. Choices presented on the survey were: hot and cold beverages, cookies or other prepared bakery items, breakfast, lunch, dinner, and flush toilets. Visitors could also indicate no new services and write in suggestions for other new services.

Hot and cold beverages were by far the most popular of the choices, with 58% of participants indicating they would like it if Day Hikers and Backpackers were able to purchase beverages in the future (Figure A-26). Overall, across seasons and user groups, the popularity of this option ranged from 50% to 60%. In the summer 80% of Backpackers favored their sale (n=29, $p < .05$).

Other than hot and cold beverages, the next most popular choice was the option of flush toilets (Figure A-27). Curiously enough, Lodge Guests (41%) favored the installation of flush toilets for those not staying at the lodge almost 10% more often than any other user group ($p < .001$).

The possibility of lunch at the summit for Backpackers and Day Hikers was more desirable to all groups than any other meal (Figure A-28). Overall,

32% indicated that they would like to have lunch available at the lodge. As for breakfast and dinner, Backpackers indicated the strongest desire for the availability of these services (41%, n=93 for breakfast and 43%, n=93 for dinner, $p < .001$, Figures A-29 and A-30). It should be noted that 19% indicated they would not want any of the services or facilities listed to be implemented (Figure A-31).

What kinds of interpretive programs and services, if any, would visitors like to have available at the summit in the future?

Finally, the survey asked what types of interpretive programs and services visitors to the summit area might like the Park Service to offer in the future. The options were indoor and outdoor educational exhibits, educational programs, trail and park maps and other park publications for sale, and a library of park publications at the lodge. Generally speaking, some interest was expressed in having programs at the summit. The comments written in on this subject seemed to trend toward leaving programs at visitor centers and leaving the summit as a backcountry experience. Interest in these programs and services was measured on a scale of 1 – 5 where 1 = “not interested” and 5 = “very interested.” Visitors showed an above average interest in only two options on the survey (Figure A-32). Those options were the sale of park and trail maps (3.02) and a library of park-related publications at the lodge (3.03). Overall, Lodge Guests were the only user group who expressed an interest in any of the programs and services

listed on the survey. It appears those people who currently visit Mt. LeConte do not have a strong preference for any new programs or services.

SOCIAL IMPACTS

As this survey seeks to determine the social impacts taking place on Mt. LeConte's summit in terms of how visitors affect the experiences of other visitors, the perception of those surveyed may in some ways be more important than factual evidence such as trail counts. Crowding is a psychological perception not perceived equally by everyone. One person may feel crowded when there are thirty people at the same overlook while another may feel crowded when there are only three people there that are not a part of their own group. From a social analysis standpoint we cannot state that a certain number of people at the summit is "too many," we can only look at the perceptions of those who visit the summit. The next four questions, when taken as a whole, give us an indication of whether crowding is occurring at Mt. LeConte.

How many people did visitors encounter on their trip to Mt. LeConte?

From Figure A-33 we can see that a large portion of those surveyed indicated that they had seen an average of 10 – 38 people on the trails to and while at Mt. LeConte with a range of 0 -- 164. The mean was 29 and the median was 22.

There was some confusion with the question because it asked visitors to determine how many people they thought they had encountered to and from the summit, and since the survey was administered at the summit (with the exception

of the 14 surveys that were returned by mail), they had no way of knowing how many people they would see on their way back down.

How satisfied were visitors with the number of people they encountered on their trip?

Visitors were next asked how satisfied they were with the number of people they encountered on the trail. Almost two-thirds indicated satisfaction (64%) with the number of people they encountered (Figure A-34). The remaining participants were split between being neither satisfied nor dissatisfied (22%) and being dissatisfied (15%). The answers to this question are not enough however, to determine if respondents felt crowded. It only helped to determine if there was a potential problem with the number of people encountered.

How many people would visitors have preferred to see on their trip?

The following question closes in on the crowding issue by asking if visitors would have liked to see more, fewer, or about the same number of people on the trails. As Figure A-35 shows clearly, the majority of the people surveyed (77%) thought that the number of people they saw was about right, and very few (4%) would have preferred to see more people. Nineteen percent (19%) indicated that they would have preferred encountering fewer people than they did. Overall, Backpackers were most likely to respond that they would have preferred fewer people (27%, n=88), and Lodge Guests were least likely (15%, $p<.05$). Twenty-

one percent (21%) of Day Hikers would have preferred to encounter fewer people.

How many people would begin to adversely affect visitors' recreation experience?

The last social impact-related question asked visitors how many people could be allowed at the summit without adversely affecting their recreation experience (Figure A-36). Overall, 63.3% of those surveyed said they thought the number of visitors could stay the same without adversely affecting their recreational experience. Similar to what was reported in the last question, Backpackers were most likely to respond they would prefer fewer people (28%, n=75), as compared to 10% of Lodge Guests and 17% of Day Hikers. Lodge Guests were more likely to indicate increasing the number of people would be okay (24%), but only 1% of Lodge Guests said the number of people could increase a lot without adversely affecting their experience. Lodge Guests were also most likely of the three user groups to indicate that they would like the number of people to stay the same (66%), and Backpackers were least likely (59%, $p<.001$). These results could be an indication that Backpackers are the most likely user group at Mt. LeConte to become displaced.

ENVIRONMENTAL IMPACTS

What level of impact do visitors think the current level of use is having on Mt. LeConte's natural resources?

Visitors were asked how much of an effect they thought the current level of visitor use was having on the natural resources of Mt. LeConte. A substantial percentage of those who answered this question (21%) indicated they did not have enough knowledge to have an opinion. For those who did have an opinion, 43% believed a little damage was being done, while 41% indicated "some damage." Only 14% believed no damage was being done to the natural resources because of visitors (Figure A-37), and 2% said they thought serious damage was occurring because of the current use level.

How much use would visitors prefer in the future?

Overall, when asked how many visitors could be allowed at Mt. LeConte without damaging its natural resources, about 20% of respondents chose the option "Not enough knowledge to have an opinion." The majority of respondents who had an opinion indicated they thought the number of visitors should stay the same (63%, Figure A-38). Almost twice as many said the number of visitors could increase (25%) as said it should decrease (13%). However, of those who thought the number of visitors could increase, many said it should only increase a little (23%). Within user groups, however, Lodge Guests were most likely to think the number of people should stay the same (67%) and the most likely to think the number could increase slightly (24%). Backpackers were most likely to

believe that fewer visitors would be better for the natural resources, with 23% choosing a slight decrease (n=71) and 3% a large decrease, or 26% total ($p<.001$).

What are the preferred occupancy levels for the lodge?

As stated in Chapter 1, part of the purpose of this survey is to help the NPS determine whether the current limits on the number of people who can stay at the lodge should be modified. In keeping with that goal, visitors were asked if the current occupancy levels of the lodge should decrease, stay the same, increase a little, or increase to the full capacity. About 35% of Backpackers and Day Hikers who answered this question indicated that they did not have enough knowledge to have an opinion as did 12% of Lodge Guests. Of those who did have an opinion, 62% believed the occupancy levels should stay the same (Figure A-39). Thirty-three percent (33%) believed the current limits should be increased and only 5% believed the levels should decrease. Of those who wanted an increase, 16% believed they should increase but not to full capacity, and the remaining 17% wanted the lodge opened to full capacity. Day Hikers were more likely than any other user group to favor increases in the number of people allowed to stay at the lodge (38%) and Backpackers were least likely (29%, n=56). Lodge Guests were also least likely of any group to say that the lodge should be opened to full capacity (11%), and the group most likely to believe that occupancy levels should remain the same (68%) compared to about 55% of the other two user groups ($p<.001$). It should be noted that Lodge Guests

might know better than other user groups what the carrying capacity of the lodge is.

General Comments: What comments did people write in concerning Lodge Occupancy Levels?

Of the 34 comments that were collected about occupancy levels, 8 said the lodge occupancy levels should increase, 9 said more people would cause crowding or that they would be concerned about the facility and the staff's ability to handle more guests, and 6 said they think the lodge should be left alone. Three people mentioned the prohibitive cost of staying at the lodge and how difficult it is to secure reservations. Two people stated they disapproved of having the lodge in the park and would like to see it closed or removed.

MANAGEMENT

How satisfied are overnight users of Mt. LeConte Lodge?

Overall

On the survey there was a battery of questions dealing with the quality of the lodge experience. Current Lodge Guests (at the time of the survey) and Day Hikers and Backpackers who had stayed at the lodge in the past were given the opportunity to answer questions about the quality of services at the lodge on their most recent visit. About six hundred people (513 Lodge Guests, 98 Day Hikers, and 12 Backpackers) responded to this set of questions for a margin of error of +/- 4%. Overall satisfaction levels were quite high. When asked about their

overall experience at Mt. LeConte Lodge 89% of those who answered indicated they were somewhat or very satisfied (Figure A-40). In fact, 75% indicated they were very satisfied. Only 8% said that they were dissatisfied, and of those only 5% were very dissatisfied. Those who were designated current Lodge Guests (92%) reported satisfaction more often than those who were reflecting on past visits to the lodge (Day Hikers 80%). As a point of comparison, in the Park Service-sponsored survey *Serving the Visitor* (2002), 77% of 228 respondents in three parks rated concession lodging services as very good or good compared to 89% at Mt. LeConte who were somewhat or very satisfied.

How satisfied are visitors with the food service and fixed menu at the lodge?

Food Service

Overall, 88% of those surveyed were satisfied with the quality of food service at the lodge (Figure A-41), with 68% indicating “very satisfied.” Current Lodge Guests were about 27% more likely to be satisfied than any other user group, (93%, compared to 67% of Backpackers and 64% of Day Hikers, $p < .001$). In comparison, 61% of 608 respondents in 4 parks in the 2002 Service wide survey *Serving the Visitor* rated concession food services as very good or good.

Fixed Menu

Eighty percent (80%) of respondents rated the fixed menu satisfactory (Figure A-42). In fact, over half said they were very satisfied (55%) with the current menu. Only 10% indicated any level of dissatisfaction.

General Comments: When given the chance to write in opinions, what did participants comment on?

Visitors were asked for comments on their satisfaction with the lodge. The most frequent comment about the Mt. LeConte Lodge experience was not to change anything. Those who talked of change were almost always referring to the food service. The most frequent requests were coffee before breakfast and some variety in the menu, perhaps by rotating the menu yearly so that the first night's dinner becomes the second or something of that nature. There were a few people who were concerned about the healthiness of the foods served, and remarked that vegetarians and those who do not eat beef would not enjoy the meals. However there were also people who suggested replacing margarine with butter and adding gravy to breakfast. Several people commented they would like snacks, sodas, juices, and wine to be available all day long. Three people stated that they would prefer a ban on the carrying in of alcohol and that quiet hours should be enforced. Improved lighting in the cabins, especially in the bathrooms, was the biggest non-food related topic. Two people noted the propane tanks could be painted to blend in with the scenery. Concerns were also expressed about the increasing price of staying at Mt. LeConte Lodge.

How satisfied are visitors with NPS management of Mt. LeConte?

When asked how satisfied they were with NPS management of the Mt. LeConte area, the overwhelming majority (82%) said they were satisfied (Figure A-43). Of those, 60% were very satisfied and 22% were somewhat satisfied. Eleven percent (11%) said they were dissatisfied, and 7% said they were neither satisfied nor dissatisfied. In the fall and summer, Day Hikers were significantly less satisfied with NPS management than the other two user groups ($p < .05$).

What are visitors' attitudes about NPS policy and ranger presence?

When asked if there should be more or fewer rangers in the Mt. LeConte area, it should be noted that about 23% of those who answered this question chose "no opinion" (Day Hikers 28%, Backpackers 28%, and Lodge Guests 18%). Of those with an opinion, 62% said the presence of rangers should stay the same and 37% said they would like ranger presence to increase (Figure A-44). Essentially, none of the visitors wanted NPS ranger presence to decrease.

The NPS has several regulations and policies that govern behavior in its parks. Some of the most pertinent ones to Mt. LeConte visitors are the prohibition of pets on the trails, except for horses, which are allowed on the Trillium Gap trail but are not allowed to stay at Mt. LeConte overnight, no fires, no leaving the trail, and no camping except in designated areas. When asked how they viewed NPS policies for the area, 72% of those surveyed thought the policies were appropriate (Figure A-45). Only 6% thought NPS policies were not restrictive enough. A significant number of visitors (20%) had no opinion. Of

those who had an opinion, 90% said the policies were appropriate, 2% said they were too restrictive, and 8% said they were not restrictive enough.

CHAPTER V

SUMMARY AND DISCUSSION

SUMMARY

Mt. LeConte is a very popular backcountry experience in the Great Smoky Mountains National Park, particularly for Day Hikers and Lodge Guests. Proper management has allowed the lodge at the summit to endure for almost eighty years. This study was performed for the purpose of gathering information from Mt. LeConte's visitors to help the Park Service determine how the area should be managed in the near future, as well as to establish baseline data to aid in continuous monitoring for management of the area over time. The primary objectives of this study were to describe the visitors to Mt. LeConte, including demographic as well as behavioral information, such as what trails they use and what sites they see while visiting Mt. LeConte, to assess the use and demand for services and facilities at Mt. LeConte, to assess the impact of visitors on the recreational experience and the natural resources of Mt. LeConte, and to measure visitor satisfaction with lodge and NPS management. The findings of this survey will be combined with other information, such as trail-counter data gathered by the NPS, to provide information for the Environmental Assessment. The Environmental Assessment will help park managers decide what changes, if any, should be made to the management strategies of the lodge and the summit area of the park.

Participants were limited to people who visited Mt. LeConte during the survey period. It contained 21 questions related to the behaviors, attitudes, perceptions and preferences of visitors as well as five demographic questions. It was administered during four survey periods on 19 days over eight months between October 2002 and June 2003. A total of 1163 people participated with a response rate of 91%. The data gathered were entered into and analyzed with SPSS 12.0 for Windows. Pearson's Chi-square tests were performed to determine significant relationships between seasons and user groups and ANOVAs were performed where mean values were computed.

VISITOR CHARACTERISTICS AND BEHAVIORS

The survey found the majority of hikers at Mt. LeConte come from Tennessee or states surrounding Tennessee (78%). Almost half of the participants were from eight states Alabama, Georgia, Ohio, Indiana, Florida, North Carolina, South Carolina, and Kentucky. The average and median age of participants was 42. Backpackers were younger than Day Hikers, who were younger than Lodge Guests on average. More men than women visited Mt. LeConte, but the proportion of women to men was more balanced among Lodge Guests than among the other two user groups. The majority of participants were college graduates (67%) with incomes of \$75,000 or more per year (53%).

The Alum Cave Bluff Trail is by far the trail most preferred by all user groups for ascent and descent of the mountain, with more than 70% of participants indicating they used this trail for both. The Boulevard and Rainbow

Falls trails are more popular than Trillium Gap Trail for ascending and descending. Bullhead Trail is the least popular trail for going to the summit, but the second most popular for the trip down.

The most visited location at the summit is the lodge itself, with 88% of all of those surveyed indicating they had been there. Cliff Tops overlook is the next most popular site (58%). As one would expect, the Mt. LeConte shelter is visited most by Backpackers, but 34% of all those surveyed overall said they had visited the shelter during this trip. Myrtle Point is the least popular location visited, possibly because it is the most remote site at the summit. It tends to be most popular with backpackers, especially in the spring and summer.

MANAGEMENT

Environmental Impact

A very small margin of visitors believed serious damage was occurring to Mt. LeConte's resources (2%), and about 15% believed that no damage was occurring. The vast majority (85%) thought a little or some damage was taking place. Since most of the visitors indicated they thought the number of visitors to Mt. LeConte could stay the same (63%) or increase a little (23%) without adversely affecting the area's natural resources, we might conclude the visitors who were surveyed believe a little to some damage may be acceptable. With the high concentration of usage that the Alum Cave Bluff Trail and the Cliff Tops area receive, it should be noted that these areas should be monitored closely for loss of vegetation, soil compaction and the accompanying erosion.

Social Impact

For social impact, a similar pattern to the environmental impact emerges when visitors were asked about their satisfaction with the number of people they saw on the trails, the number of people they would feel comfortable encountering on the trails, and the number of people they thought should be allowed to stay at the lodge. More than 60% of the visitors on the mountain indicated satisfaction with their recreation experience and a desire for the status quo to be maintained. People thought the occupancy levels of the lodge could increase (33%) and their encounters could increase at least a little (22%) before their recreation experience would be adversely affected. Still, 20% said they would have preferred to encounter fewer people than they did and 12% said their recreation experience would have been better had they encountered fewer people. This suggests there is a difference between preferring fewer people and actually having a negative perception of use levels (crowding). The results of the survey seem to indicate the social carrying capacity of Mt. LeConte has not been exceeded, and crowding is not occurring at present. However, with a substantial percentage of visitors indicating they like things the way they are now, it could be argued more visitors to the summit could exceed the area's social carrying capacity.

Park managers must determine what percentage of visitors need to indicate a preference for fewer people before they should become concerned about the overall quality of the recreational experience they provide. While no majority of visitors in any user group indicated dissatisfaction or a preference for

fewer people, if 10% of the people who visit Mt. LeConte every year feel like their experience has been adversely affected, almost 5,000 people are already having less than satisfactory experiences. Park Managers should take steps to alleviate this type of problem before a majority of visitors indicate a poor experience.

NPS Facilities and Services

The treated public water available at the lodge was used by at least 60% of participants in every season except winter, when it was not available. Very few of those surveyed other than Backpackers used the pit toilets at the shelter – less than 25% of those surveyed used them in any season except summer. Backpackers were least likely to use the pit toilets at the lodge, but they were still used by at least 60% of visitors in every season except winter. Lodge Guests were more likely than other user groups to purchase T-shirts.

There was not a great deal of interest in having any type of educational programs or exhibits provided by the Park Service at the summit of Mt. LeConte. While a little less than 60% of those surveyed overall indicated some interest in outdoor or indoor educational exhibits and educational programs, more than 25% indicated no interest at all in such things. The highest level of interest for any type of educational material was for starting a library of park publications in the lodge (68%). There was considerable interest in having trail maps available for sale at the lodge. More than 70% of those surveyed indicated some interest in trail maps, and more than 20% said they were “Very Interested.”

Lodge Facilities and Services

When all visitors were asked to check which services and facilities they would like to have available at the lodge, (hot and cold beverages, flush toilets, meals for non-Lodge Guests, and cookies and bakery items), hot and cold beverages clearly gathered the most interest and was in fact the only service a majority of visitors were interested in (58%). Flush toilets were the next most popular with 35% indicating an interest. The user group that was most interested in the installation of flush toilets was the user group that already has access to flush toilets (Lodge Guests).

The Day Hikers were the user group with the most interest in lunch being served (38%), since they are the main users who are likely to be at Mt. LeConte in the middle of the day, but a little more than 25% of the other two groups expressed an interest in lunch as well. On the same note, more than 40% of Backpackers indicated an interest in breakfast and dinner. About 27% of every user group was interested in bakery items for sale. The other option for future services and facilities on the survey was installation of flush toilets for non-Lodge Guests (35%). Perhaps installing new toilets was seen as a detraction from the backcountry atmosphere that people go to Mt. LeConte to enjoy. While 80% of those surveyed indicated interest in some type of new service, it should be noted that 19% were not interested in any new services or facilities.

NPS MANAGEMENT SUMMARY

On the whole, visitors to Mt. LeConte seemed to be pleased with their experience. At least 75% of them were satisfied with NPS management, NPS policies, and the level of ranger presence. The only caution to be offered here is to remind the reader of Borrie and Roggenbuck's suggestion (1995) that visitors rating NPS management might hesitate to be too critical because their answers might be "interpreted as being ungrateful for the opportunity to visit."

As for the management of the lodge, at least 80% of those who responded rated the lodge, its menu and its food service satisfactory or very satisfactory. This is slightly higher than the satisfaction rate of the three parks whose concession lodging services were rated in *Serving the Visitor* (2002) and suggests that the current concessioner is performing well. The only criticism that emerges from the comments about the lodge management is that coffee is not served before breakfast, however this concern has since been addressed by lodge management and coffee is now served earlier.

DISCUSSION

Overall, it seems visitors to the summit of Mt. LeConte are pleased with the way things are managed at present. From park management to visitor encounters to possible new facilities and park programs, there seems to be little, if any, interest in changing the current management of Mt. Le Conte based on the survey results. Whenever those surveyed had the opportunity to choose "stay the same" as an option, at least 60% of them said that was what they wanted in

every category presented. The most frequent general comments were people asking for things to stay as they are and that only minor changes be made. The changes that seemed to garner any significant interest were additional flush toilets, hot coffee before breakfast, a park publication library in the lodge, and lunch availability for Day Hikers and Backpackers.

It would be wise for any manager who uses this information as a component in a management decision to do so only after careful consideration of the concepts presented in the literature review. This is not to say that visitors do not know when they are satisfied, when they feel crowded, or when they want things to change. Displacement alone can account for a great deal of a change in the actual attitudes of the population that is not reflected on this survey. Perhaps Backpackers are seeking more of a wilderness experience than hiking to Mt. LeConte has to offer. This is not to say that every backcountry area should offer opportunities for ultimate solitude, but simply to note that displacement could be a factor in the distribution of user groups, particularly Backpackers.

The other coping mechanisms, especially rationalization, could also affect satisfaction ratings. The trip to Mt. LeConte, at least for some, is a large undertaking. The round-trip hike is more than 10 miles in length with an elevation change of 2,560 feet (Alum Cave Bluff Trail), and spending a night at the lodge, while not overly expensive, is not cheap - \$83.50/per night per person (breakfast and dinner included), and reservations are difficult to secure without advanced planning. Furthermore, the trip to the lodge is often an annual

destination, a family tradition and almost a pilgrimage for some visitors. They go on the same weekend and stay in the same cabin year after year. While obviously it is unlikely they would continue to visit if they were seriously dissatisfied with the services and facilities, it is still conceivable that if the experience was not all they had hoped, rationalization could take place. And with such strong ties to the lodge, it is possible that no matter how much it, or the visitors' enjoyment of it, changed, they would continue to alter their expectations to fit their experience.

CONCLUSION

It seems as if the visitors to Mt. LeConte are pleased with their experiences as they are. The overwhelming majority indicate satisfaction across the board, with the quality of performance of the services and facilities provided by the lodge and the NPS, as well as with the quality of the recreational experience itself and their overall experience. This indicates overall satisfaction, which should be a predictor of their return to Mt. LeConte in the future. As discussed in the literature review and as seen in Figure A-1, overall satisfaction is a strong indication of future behavior. Visitors think use levels could increase, at least a little, without harming the resources of Mt. LeConte or their own recreation experiences. While the majority of visitors do not indicate feeling crowded, 19% would prefer to encounter fewer people. This is an indication the summit may be approaching its social carrying capacity. Otherwise, current

visitors do not indicate much interest in any changes in the way the area is managed or the amenities available.

Finally, the trip to Mt. LeConte is more than one type of experience. It is a physical challenge. It is a visit to an historic, rustic lodge. It is a chance to escape the city and experience nature. To some it is family tradition. The expectations of each person who visits Mt. LeConte's summit are different, and this study was only able to address a small part of their experience.

RECOMMENDATIONS FOR FUTURE RESEARCH

This study represents the first attempt by the NPS to formally gather information directly from Mt. LeConte's visitors. Previous research has established use levels and patterns, but no research had approached the concepts of quality of experience or quality of performance. Future research should follow up on the data in this study to continue to learn about visitors' attitudes toward management and perceptions about use levels, as well as to monitor use levels and their impacts.

As has been mentioned, displacement could be taking place at Mt. LeConte. Mail or telephone surveys of known past visitors to Mt. LeConte or of people in the nine states that comprise the majority of Mt. LeConte's visitors could help determine if this phenomenon is occurring.

As previously stated, this is the first time a study at Mt. LeConte has looked at the attitudes, perceptions, and preferences of visitors. Further, it has been fifteen years since any research has been done on Mt. LeConte's visitors.

Hopefully, with the baseline data gathered for the Environmental Assessment, more frequent monitoring of Mt. LeConte's visitors and resources could occur, perhaps every three to five years.

RESEARCHER'S NOTE

As in most surveys, there were some survey questions that could have been approached differently. As was noted above, the answer choices for the question about the effect of the current level of use on Mt. LeConte's natural resources were unbalanced and extremely subjective. The answer choices were "No Damage," "A Little Damage," "Some Damage," and "A Lot of Damage." The difference between a little, some, and a lot was entirely subjective. A better set of answers might have been "No Damage," "Acceptable Damage," and "Unacceptable Damage." Also, the survey, while asking about use levels and encounters, did not ask visitors about crowding specifically. Since this is an important concept in recreation management, it would seem that asking visitors specifically if they felt crowded would help determine if they believed there were too many people at Mt. LeConte.

As was noted in the literature review, visitor satisfaction is a difficult thing to measure. Questions that asked about quality of performance in terms of visitor satisfaction with the available services would have been preferred instead of only having such questions in relation to the lodge and NPS management. For instance, there could have been questions about visitor satisfaction with the toilet facilities, treated water, or the quality of products available for purchase. As it

stands, the quality of performance of NPS and lodge management was measured, but the quality of performance of services offered was not. More questions about visitors' trips as a whole or the quality of experience of staying in the shelter or lodge would have enriched the information gathered by the survey.

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APPENDICES

APPENDIX A – FIGURES

NOTES ON APPENDIX A

- In the figures in this appendix, the following abbreviations are used:
 - DH – Day Hiker
 - BP – Backpacker
 - LG – Lodge Guest



Figure A-1: Conceptual Representation of Effects of Quality of Performance, Quality of Experience, Overall Service Quality, Overall Experience, and Overall Satisfaction on Future Behavioral Intentions. Adapted from Tian-Cole et al., 2002

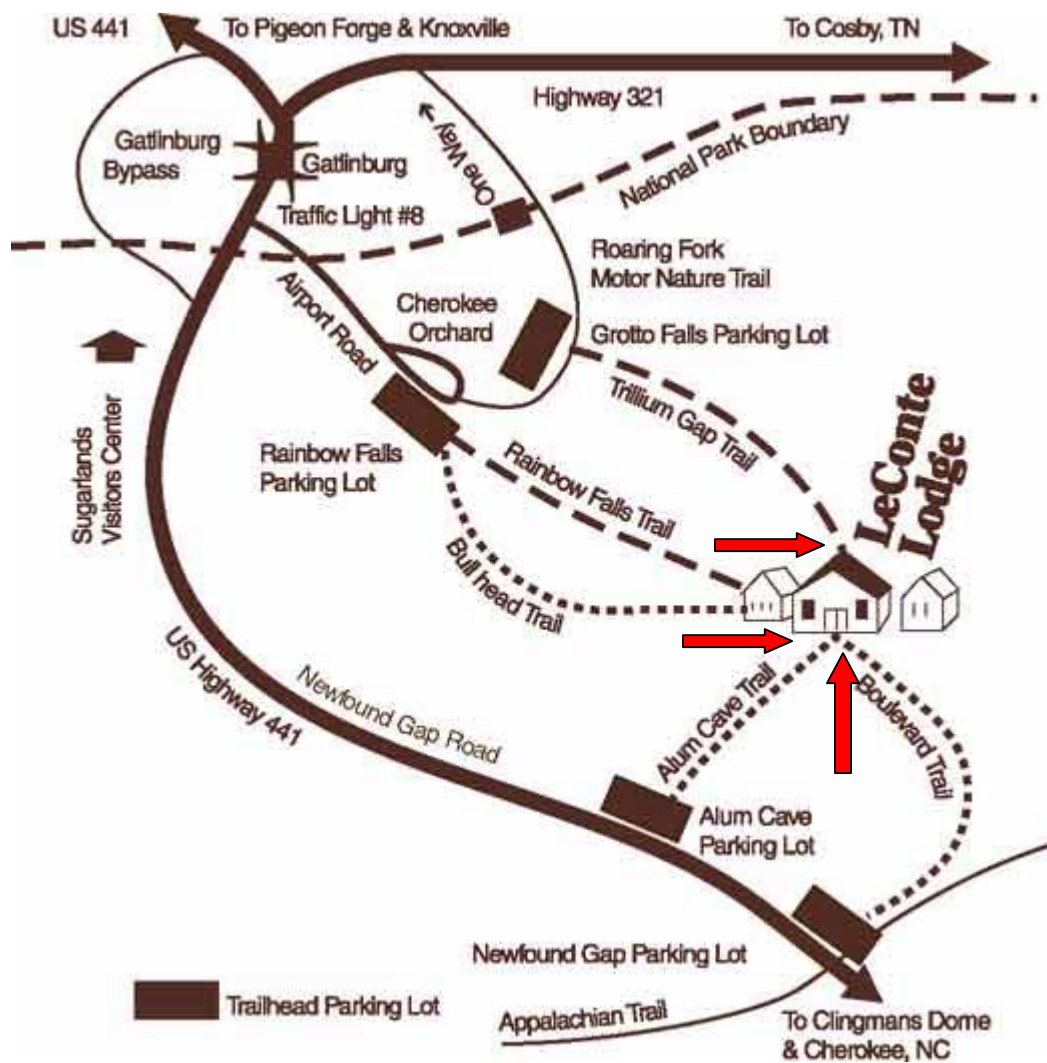


Figure A-2: Map of Mt. LeConte Area with survey sites indicated by arrows

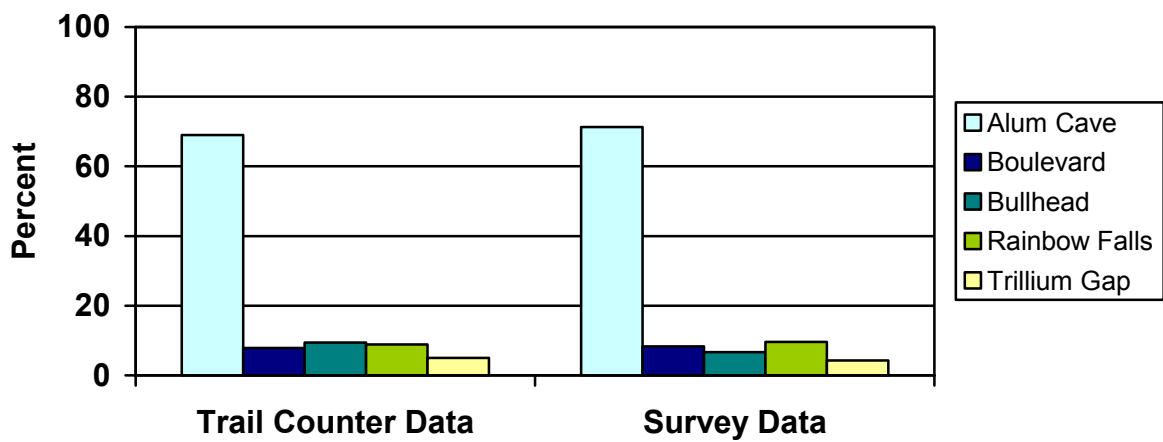


Figure A-3: Comparison of Percentage of Trail Traffic Recorded on Each Trail, by Trail Counters and by Visitor Surveys

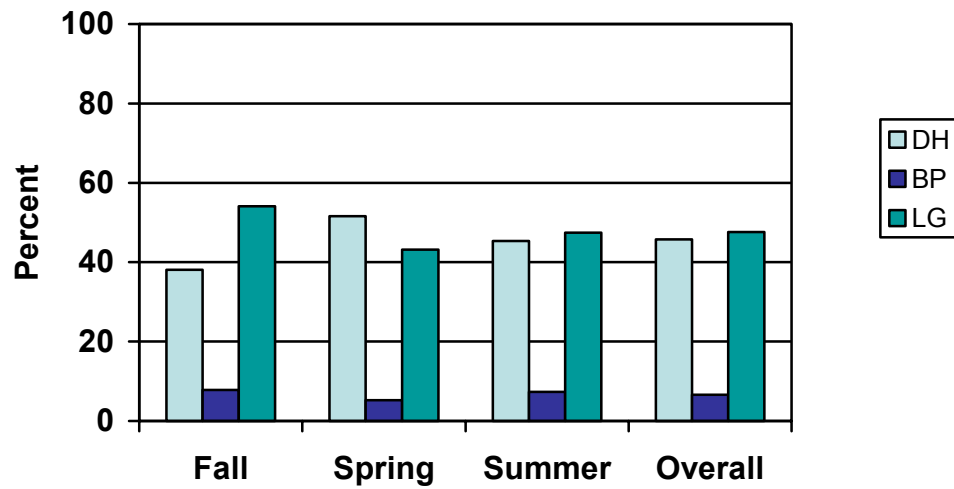


Figure A-4: User Group by Season (n=1198, $p < .05$)

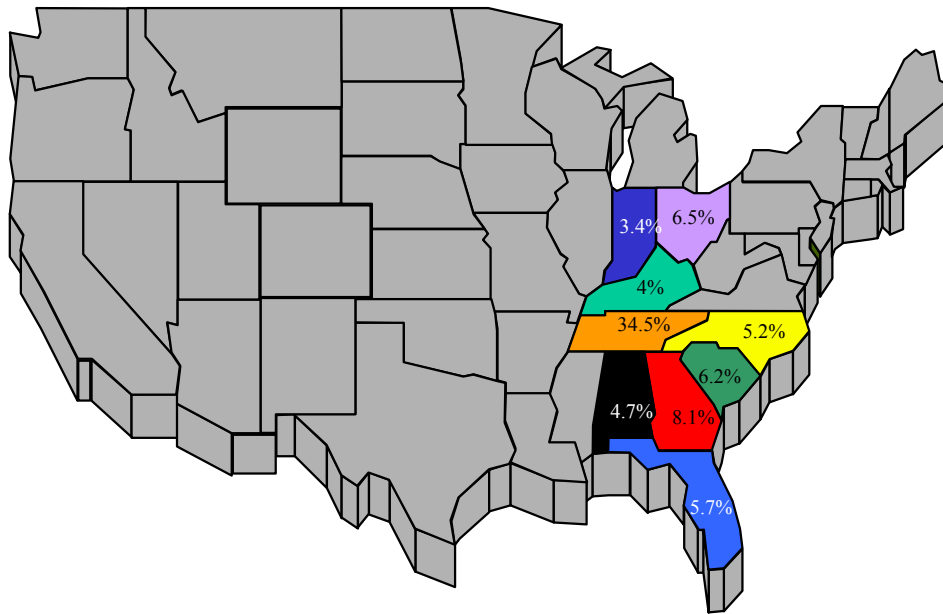


Figure A-5: Visitors' Place of Residence

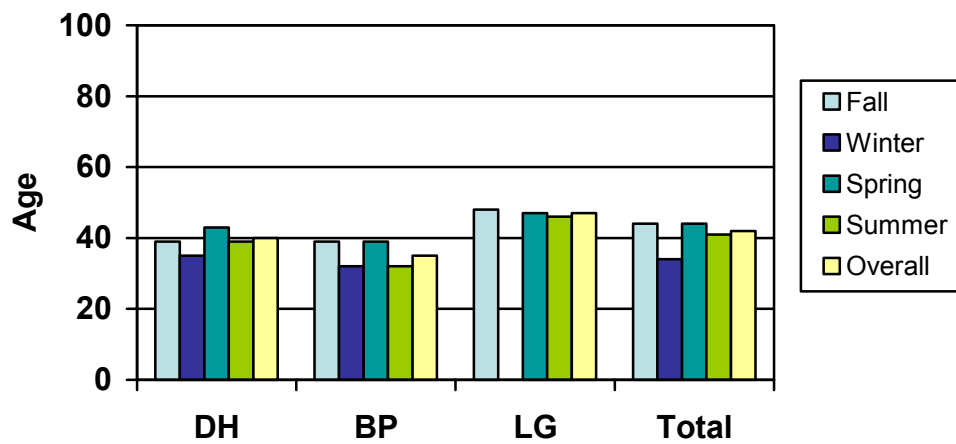


Figure A-6: Mean Age by User Group and Season (n=1054, $p < .001$)

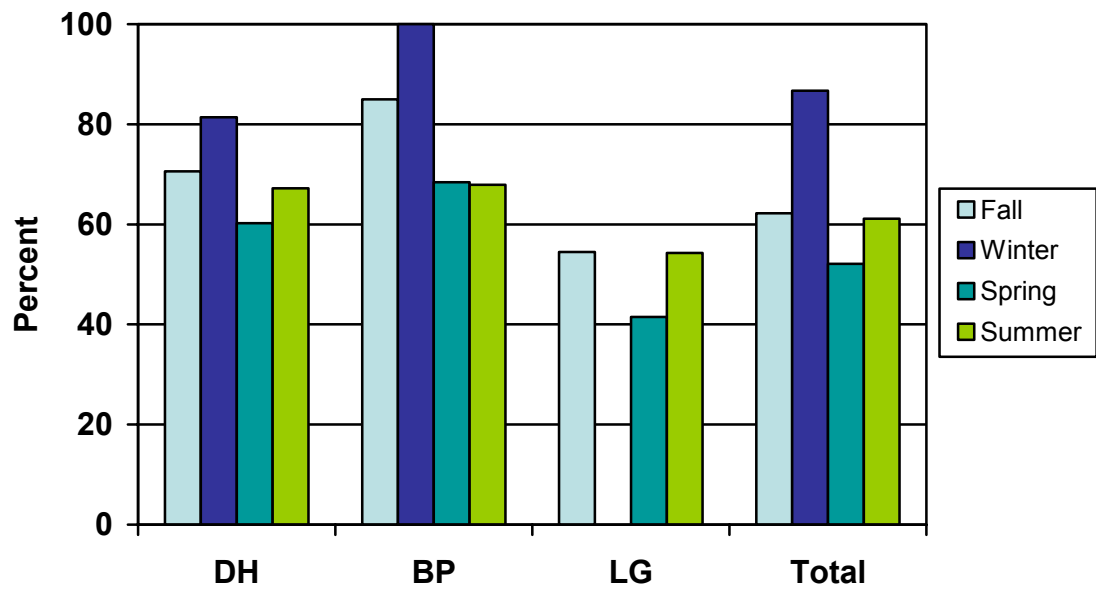


Figure A-7: Male Participants by User Group and Season

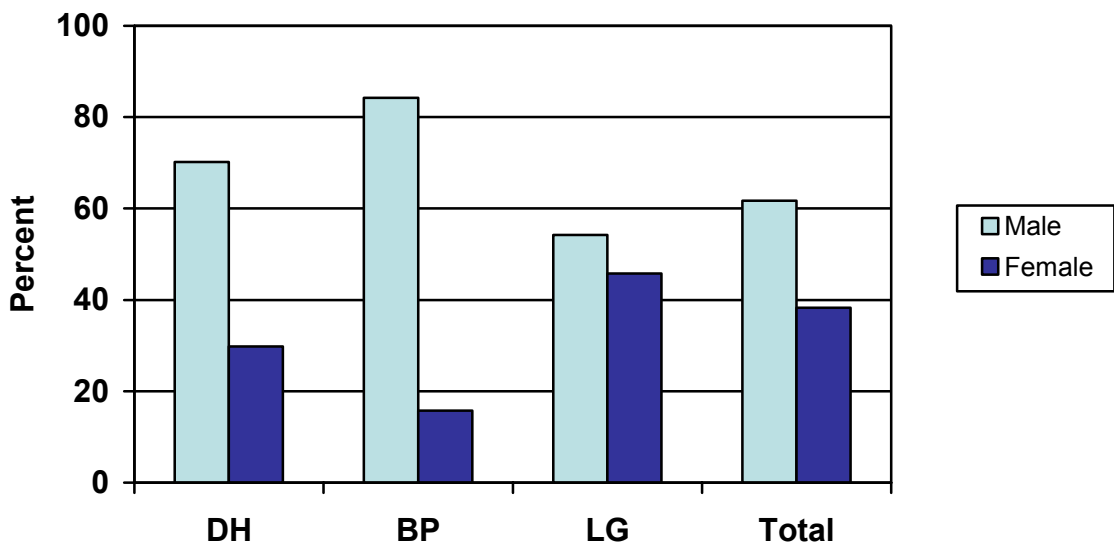


Figure A-8: Gender in Fall by User Group (n=256, p<.05)

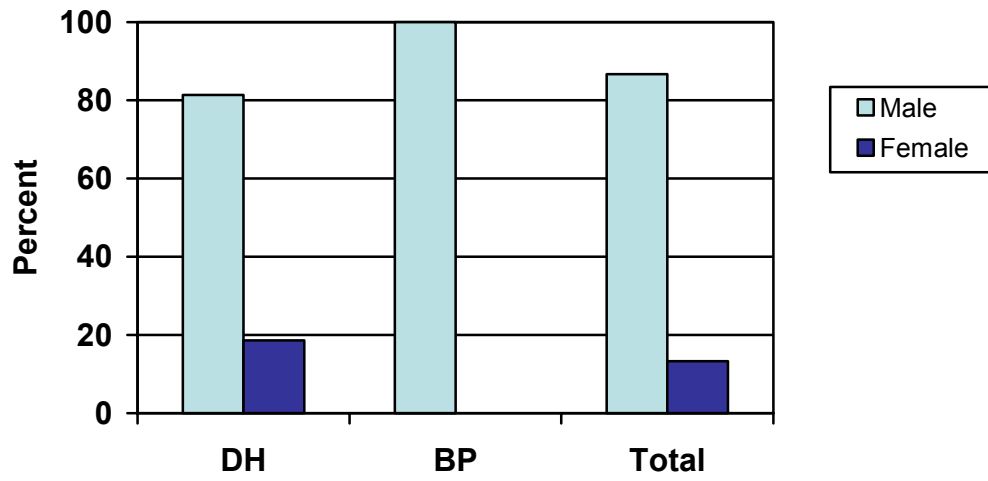


Figure A-9: Gender in Winter by User Group
(n=60)

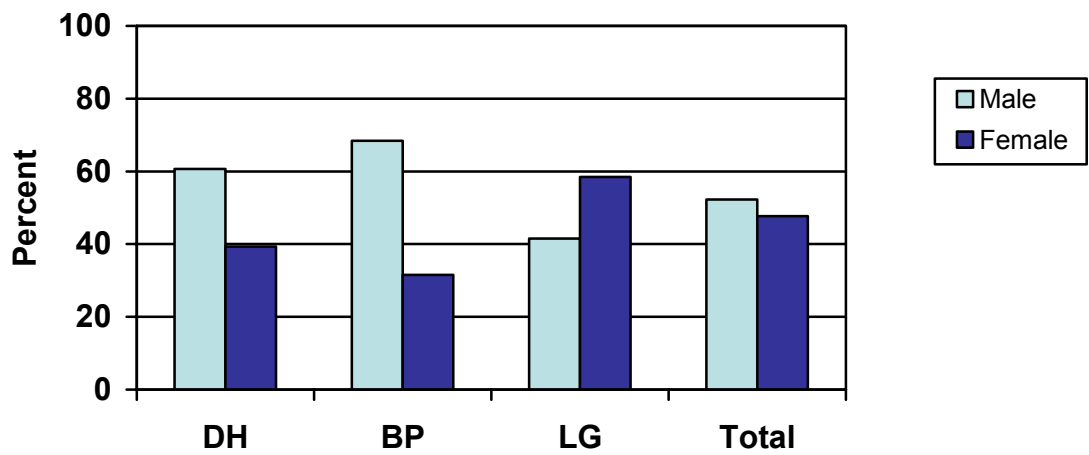


Figure A-10: Gender in Spring by User Group
(n=373, p=.001)

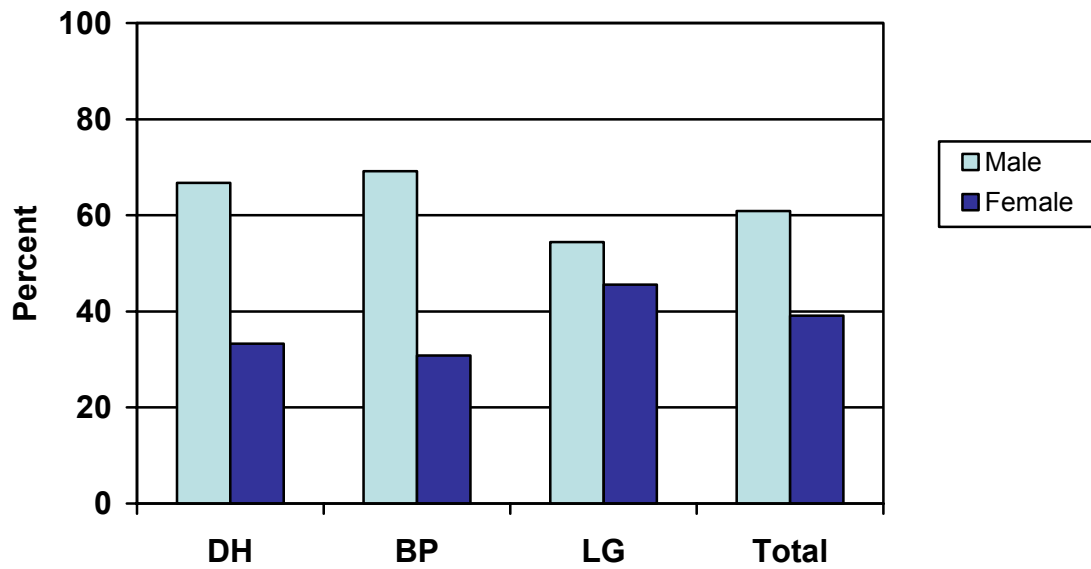


Figure A-11: Gender in Summer by User Group (n=373)

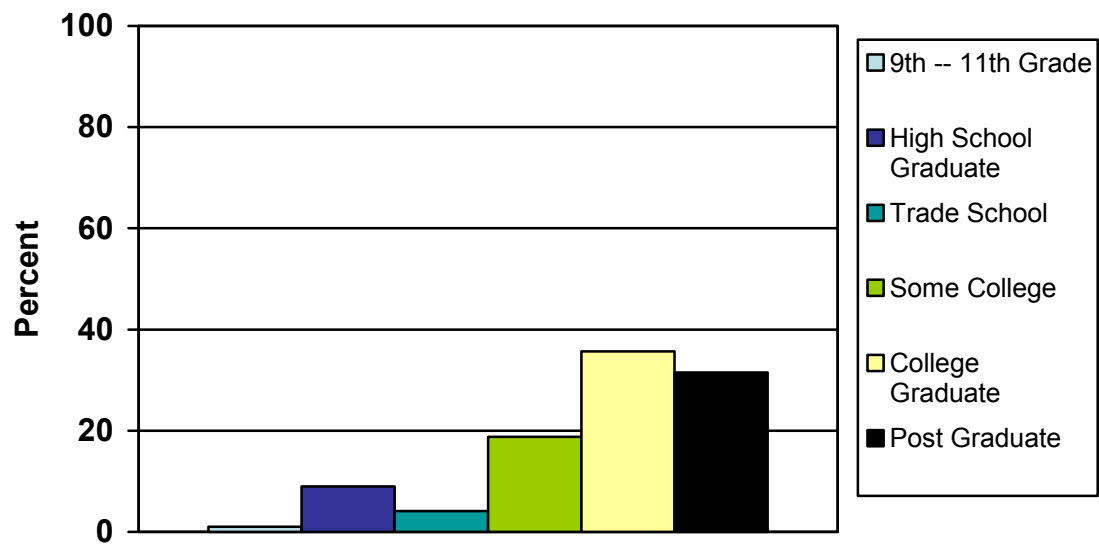


Figure A-12: Education Level (n=1056)

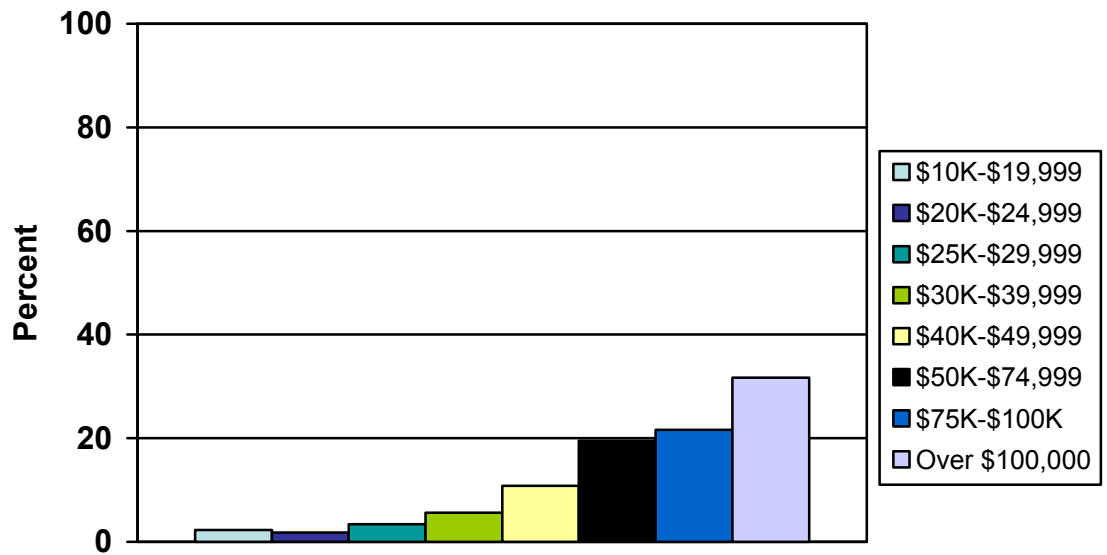


Figure A-13: Annual Household Income
(n=967)

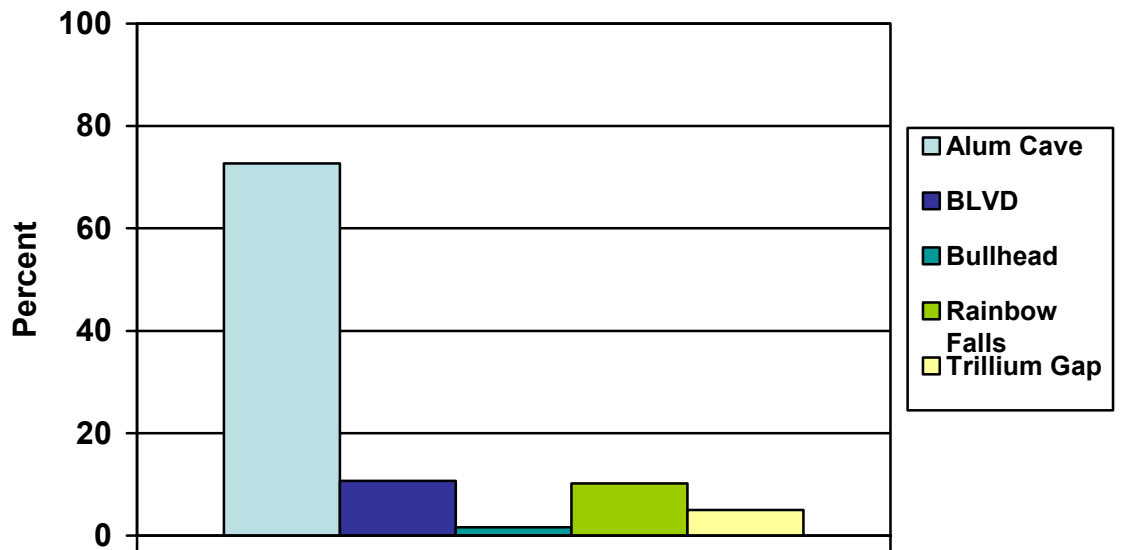


Figure A-14: Overall Trail Usage To Access
Summit (n=1148)

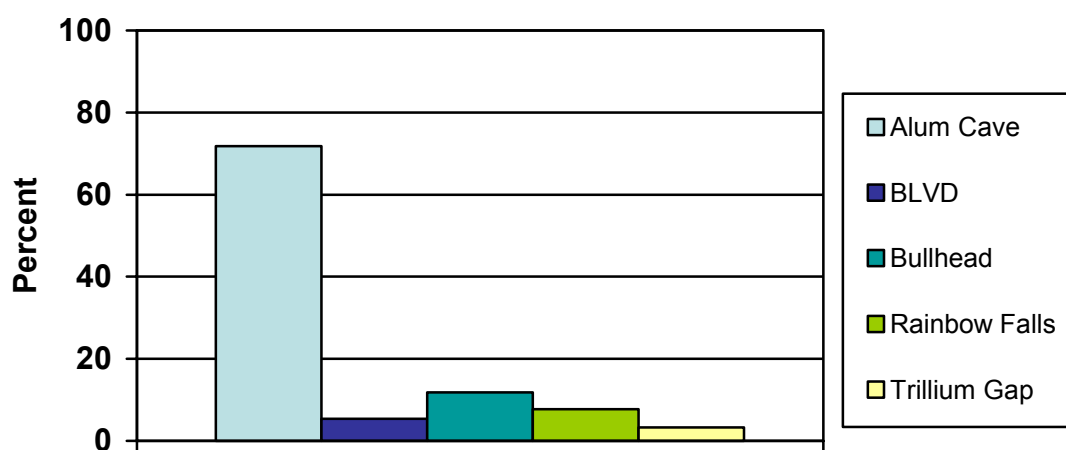


Figure A-15: Overall Trail Usage from the Summit (n=1093)

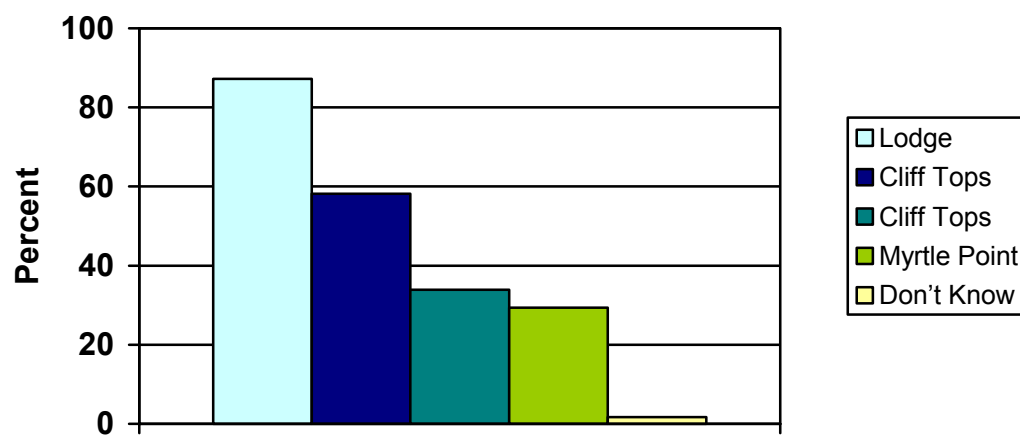


Figure A-16: Overall Visitation by Location

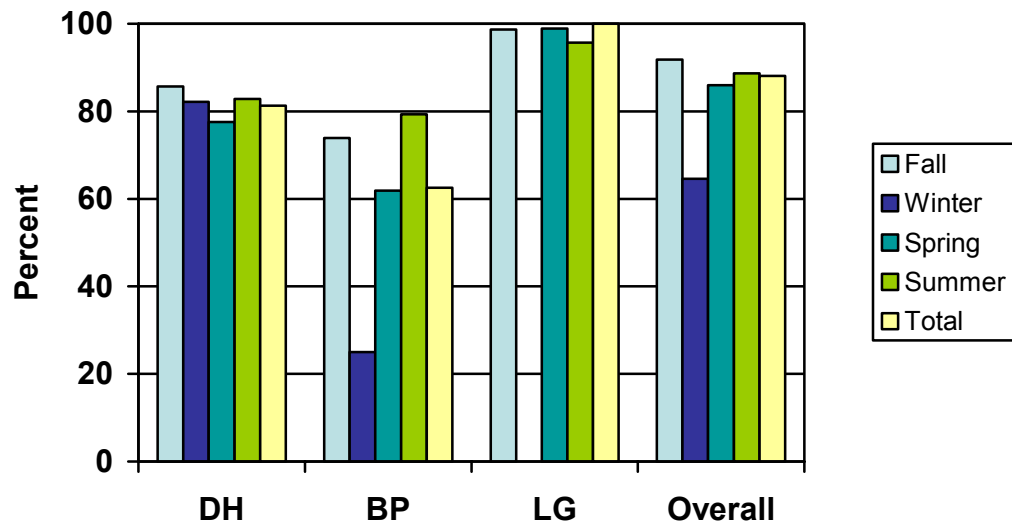


Figure A-17: Visits to Mt. LeConte Lodge by User Group and Season (n=1163, p<.001)

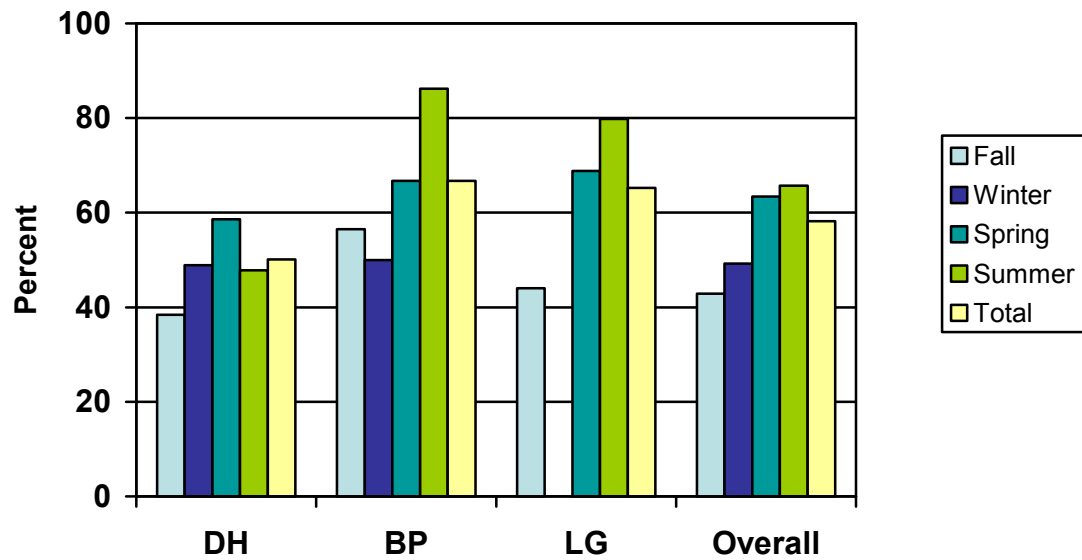


Figure A-18: Visits to Cliff Tops by User Group and Season (n=1163)

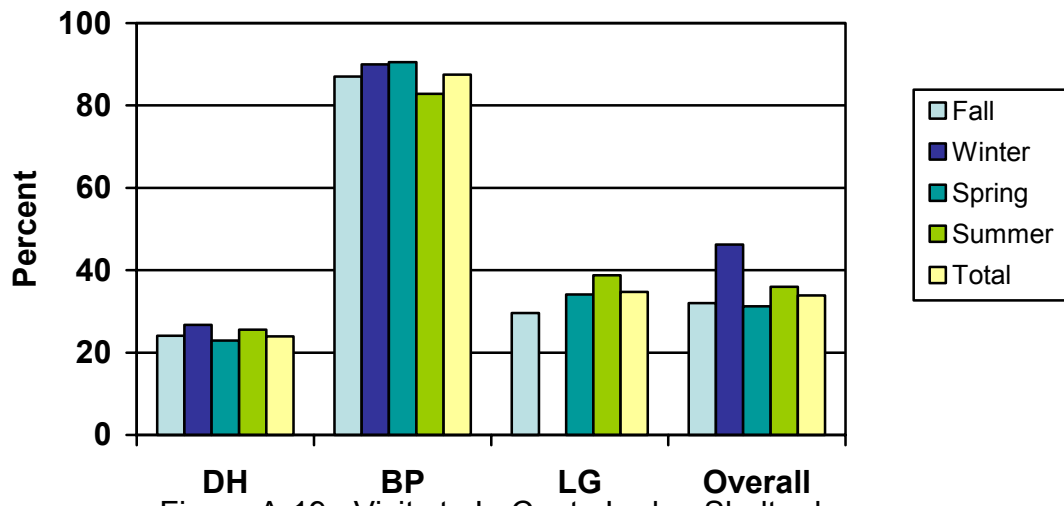
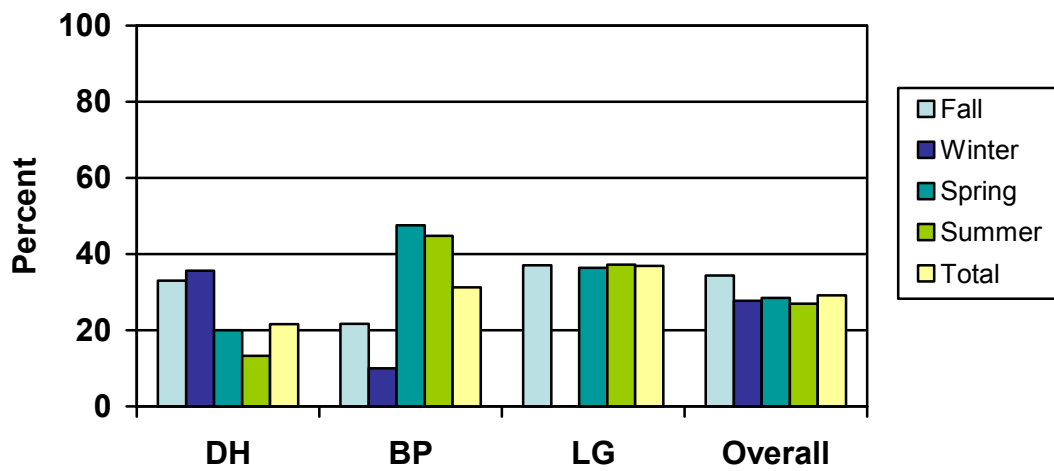


Figure A-19: Visits to LeConte Lodge Shelter by User Group and Season (n=1163, p<.001)



Figures A-20: Visits to Myrtle Point by User Group and Season (n=1163, p<.001)

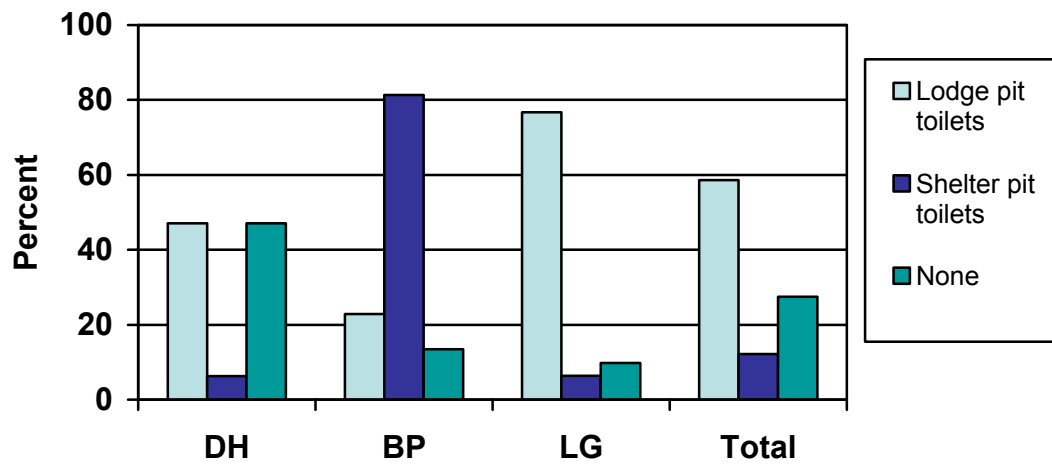


Figure A-21: Overall Restroom Usage by User Group (n=1163, $p < .001$)

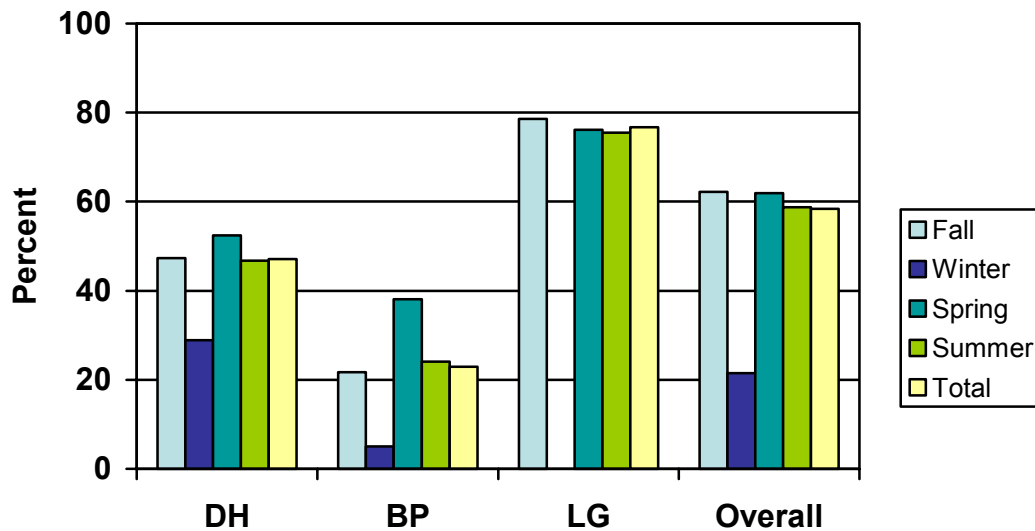


Figure A-22: Usage of Pit Toilets at the Lodge by User Group and Season (n=1163, $p < .001$)

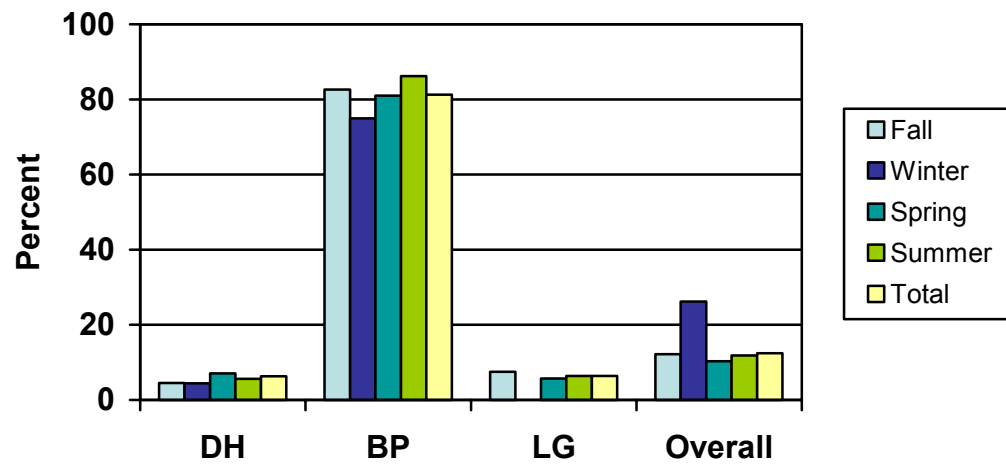


Figure A-23: Usage of Pit Toilets at the Shelter by User Group and Season (n=1163, p<.001)

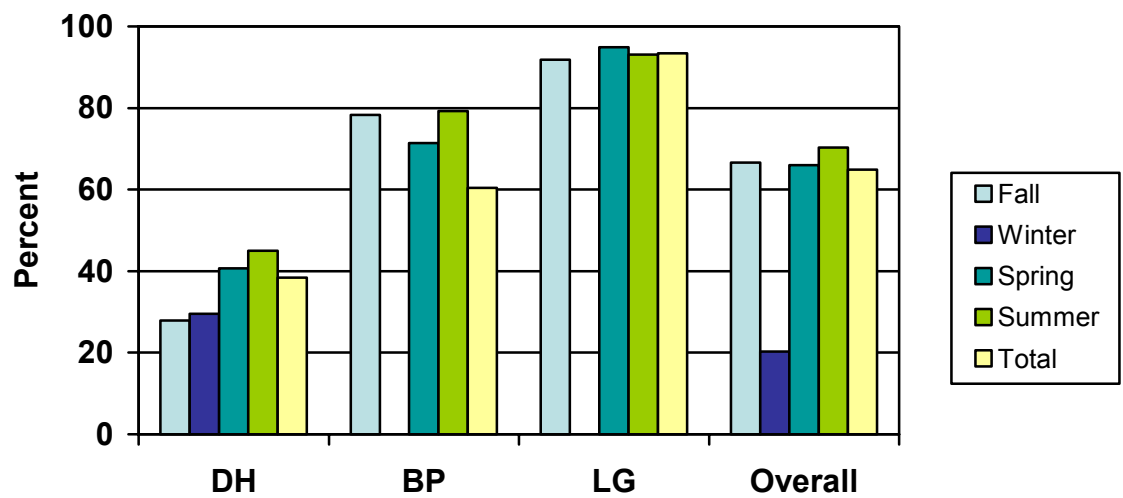


Figure A-24: Usage of Treated Public Water by User Group and Season (n=1163, p<.001)

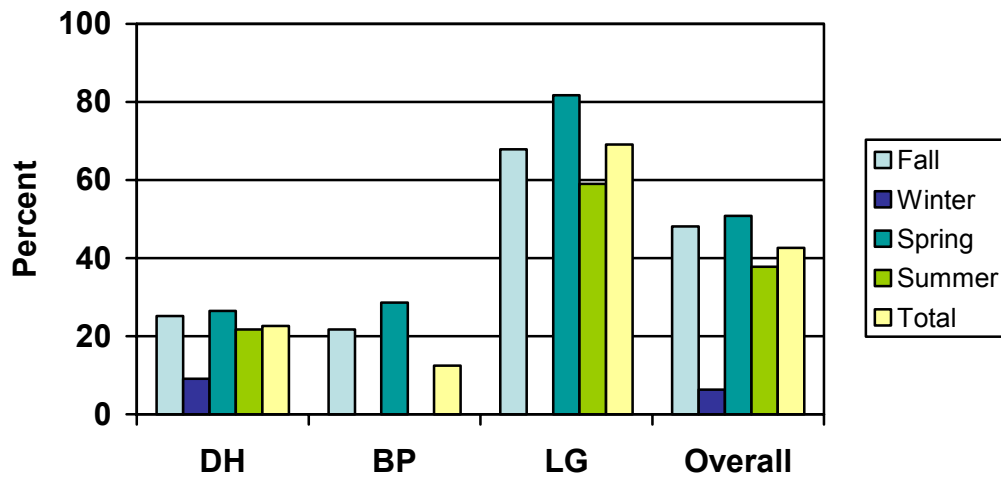


Figure A-25: T-Shirts Purchased by User Group and Season (n=1154, $p < .001$)

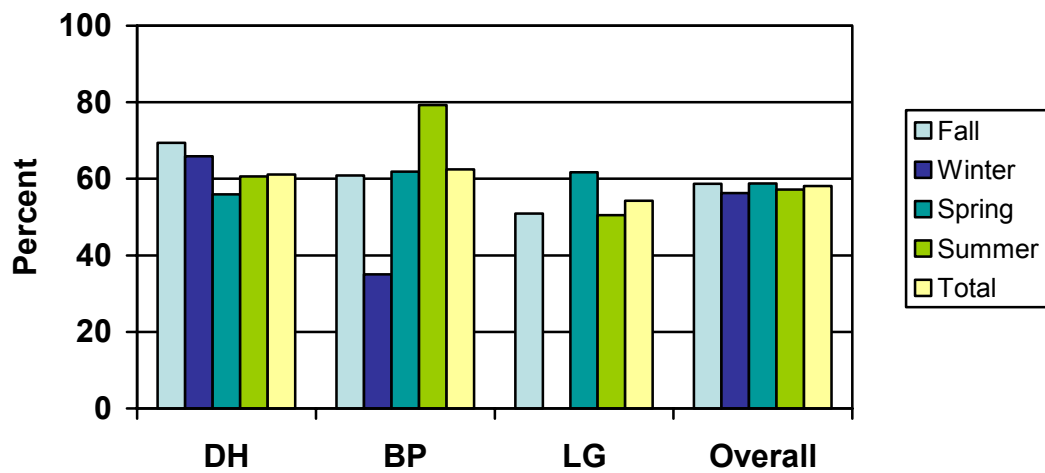


Figure A-26: Support for Hot and Cold Beverage Sales by User Group and Season (n=1154, $p < .05$)

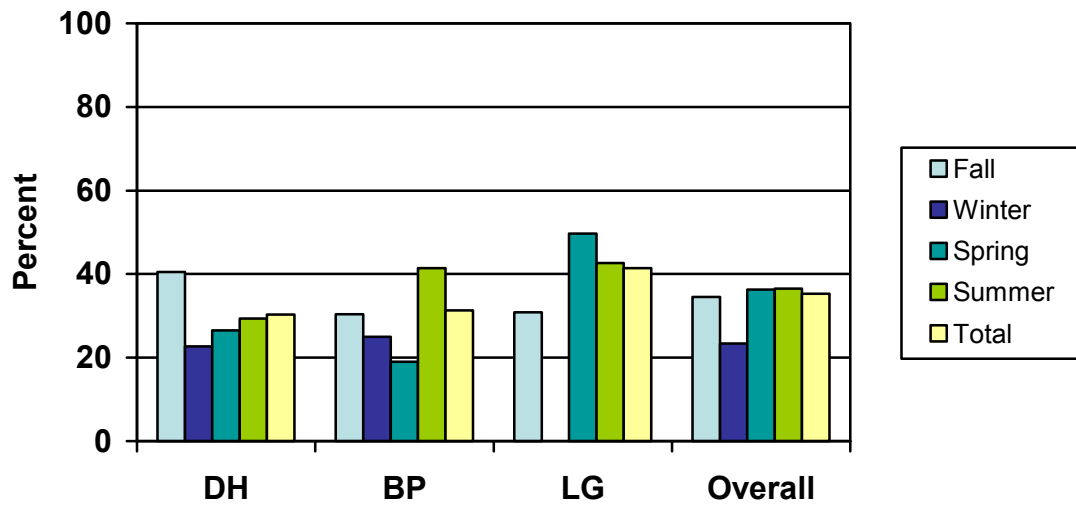


Figure A-27: Support for Addition of Flush Toilets by User Group and Season (n=1154, p<.001)

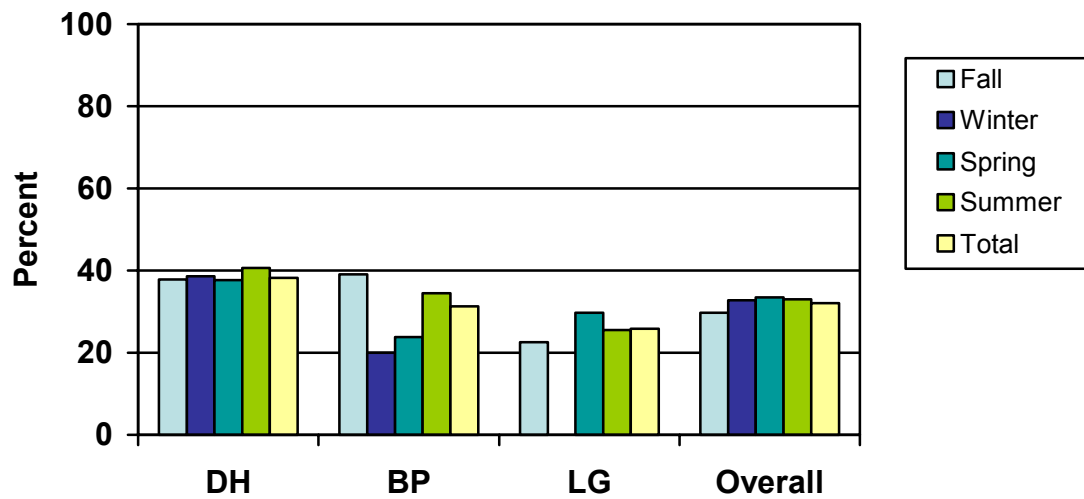


Figure A-28: Support for Lunch by User Group and Season (n=1154, p<.05)

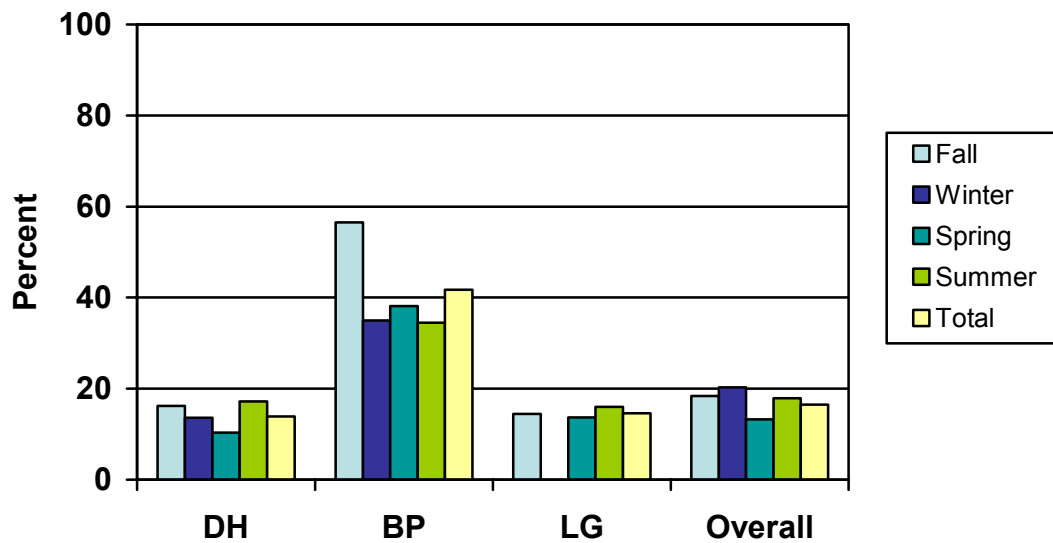


Figure A-29: Support for Breakfast by User Group and Season (n=1154, $p < .05$)

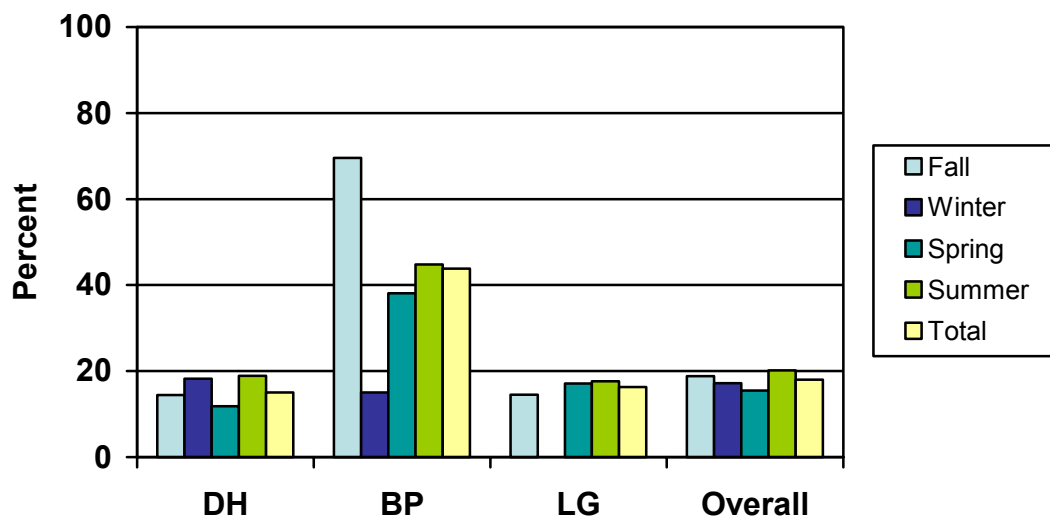


Figure A-30: Support for Dinner by User Group and Season (n=1154, $p < .05$)

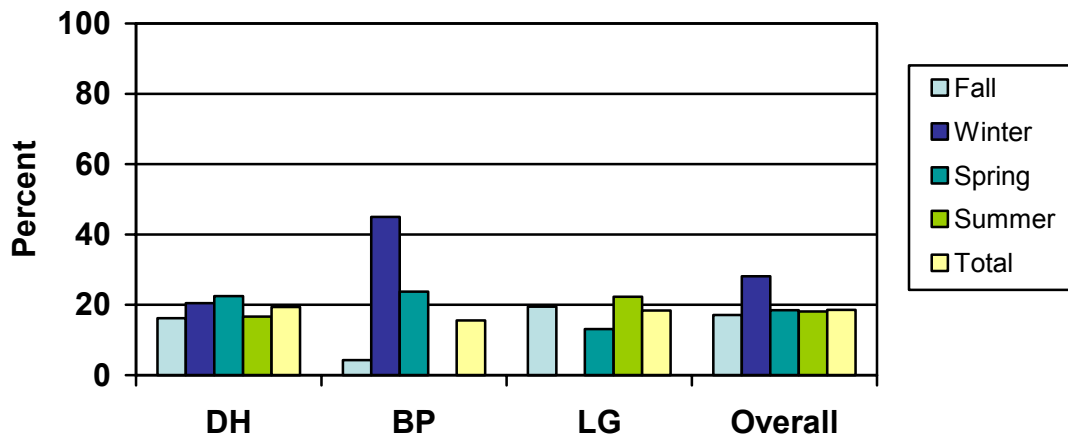


Figure A-31: Wanted No New Services by User Group and Season (n=1154, p<.05)

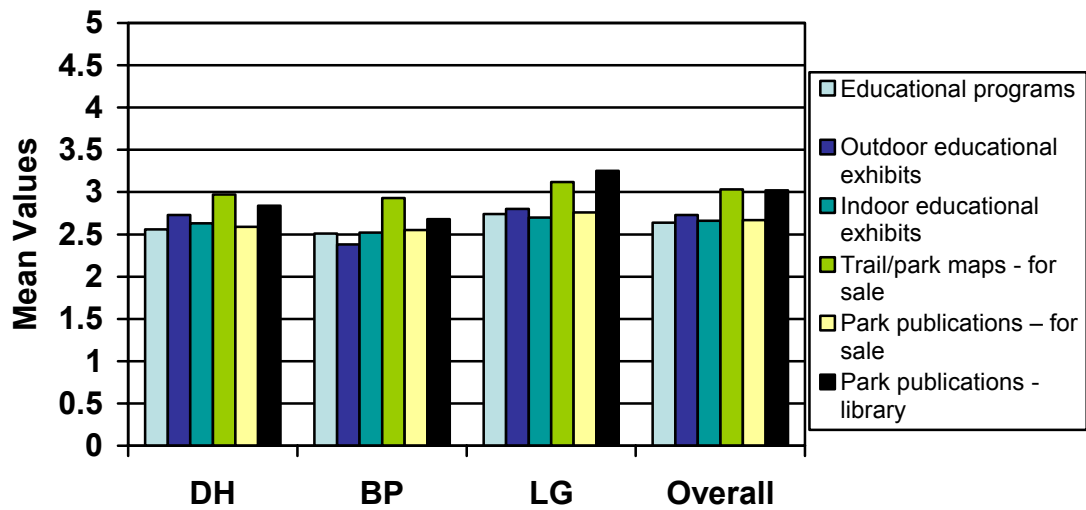


Figure A-32: Support for NPS Programs and Services by User Group and Season (1= not interested, 3 = interested, 5 = very interested) (n=1079)

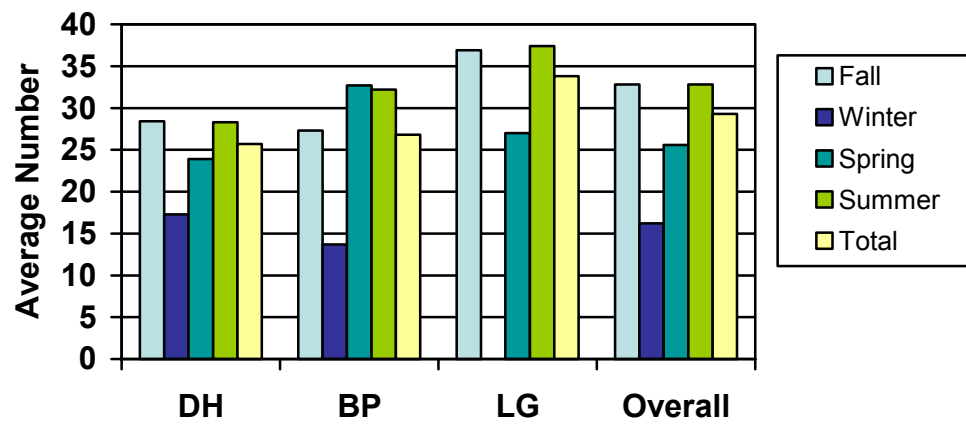


Figure A-33: Average Number of People Seen on the Trail by User Group and Season (n=1060)

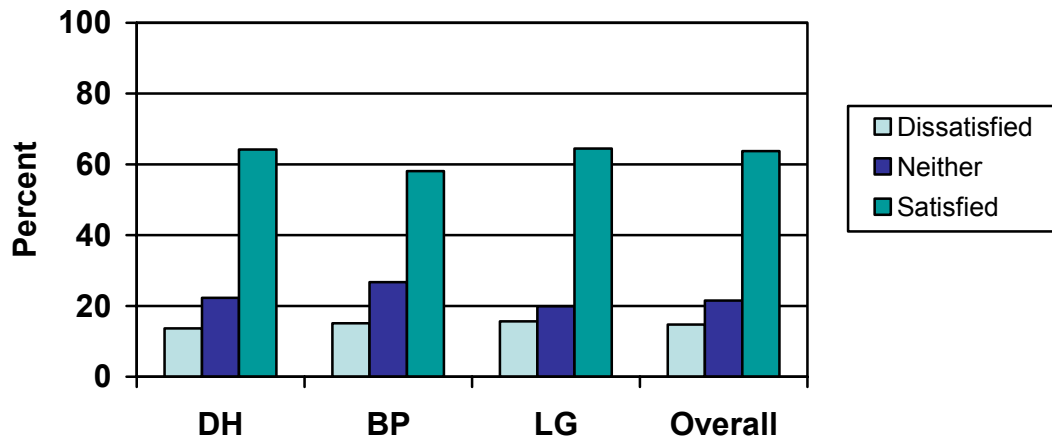


Figure A-34: Satisfaction with People Encountered by User Group (n=1089)

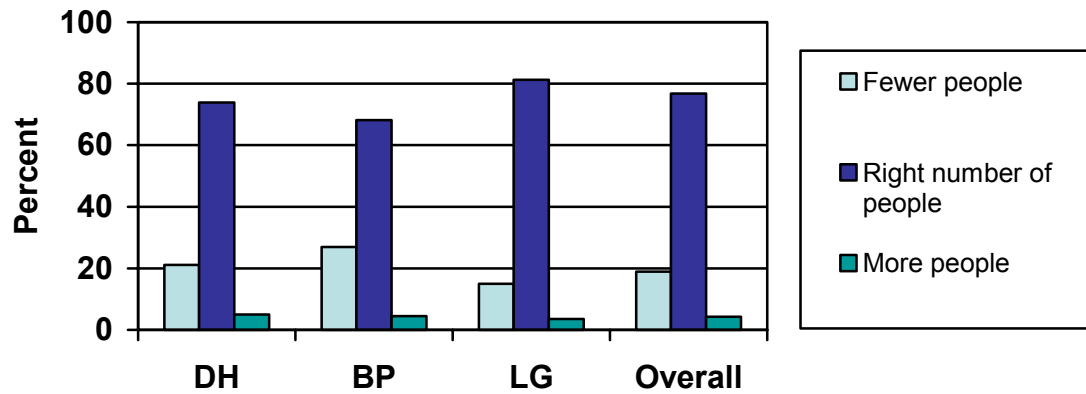


Figure A-35: Number of People User Groups Would Prefer to See on the Trail (n=1121, p<.05)

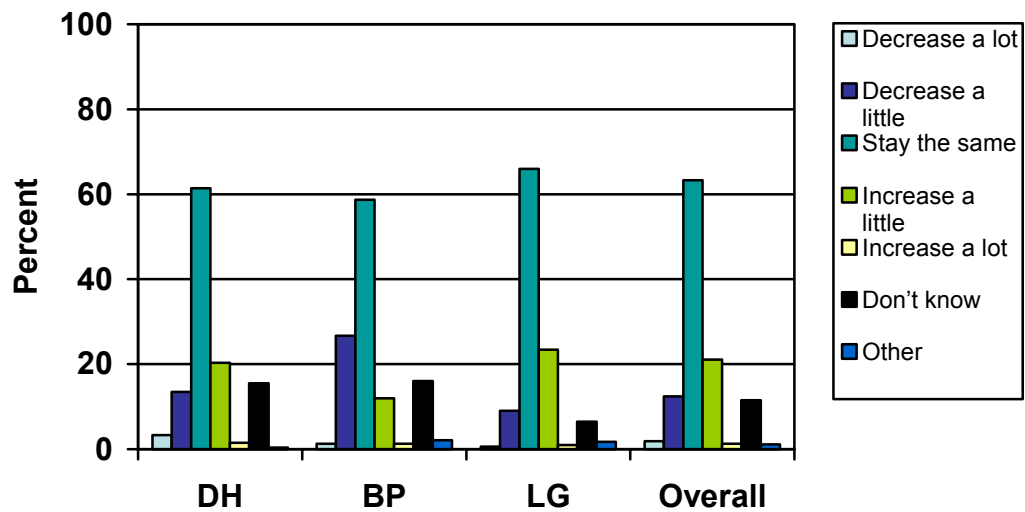


Figure A-36: Compared to the Current Use Level, to Keep from Adversely Affecting your Recreational Experience, the Number of Visitors Overall Should: (n=1012, p<.001)

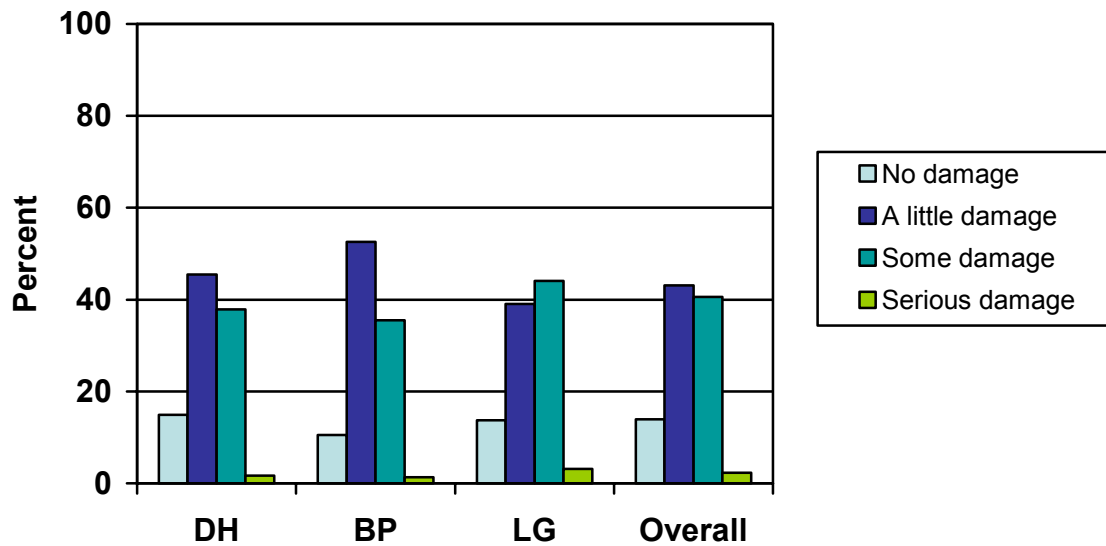


Figure A-37: Perceptions of How Much Damage Has Been Done by User Group (n=897)

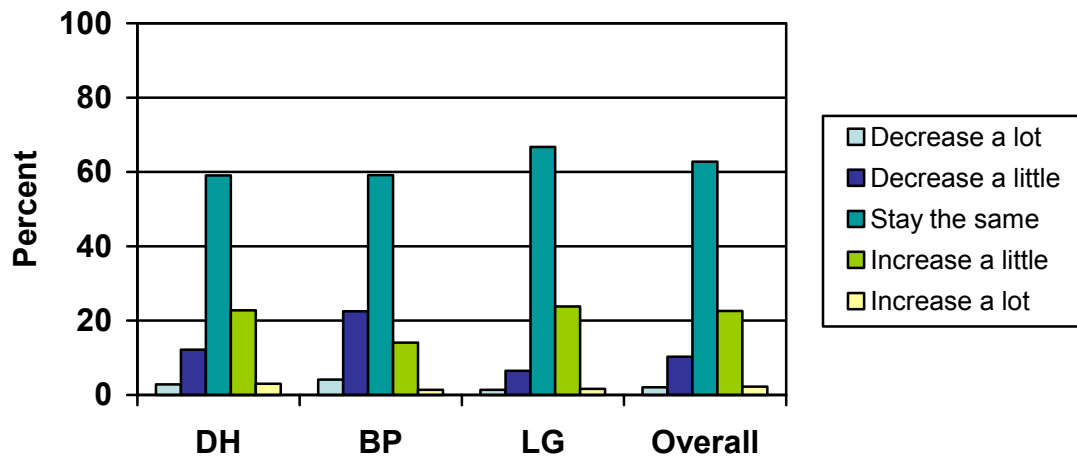


Figure A-38: Compared to the Current Use Level, to Keep from Adversely Affecting Mt. LeConte's Natural Resources, the Number of Visitors Overall Should: (n=894, p=.001)

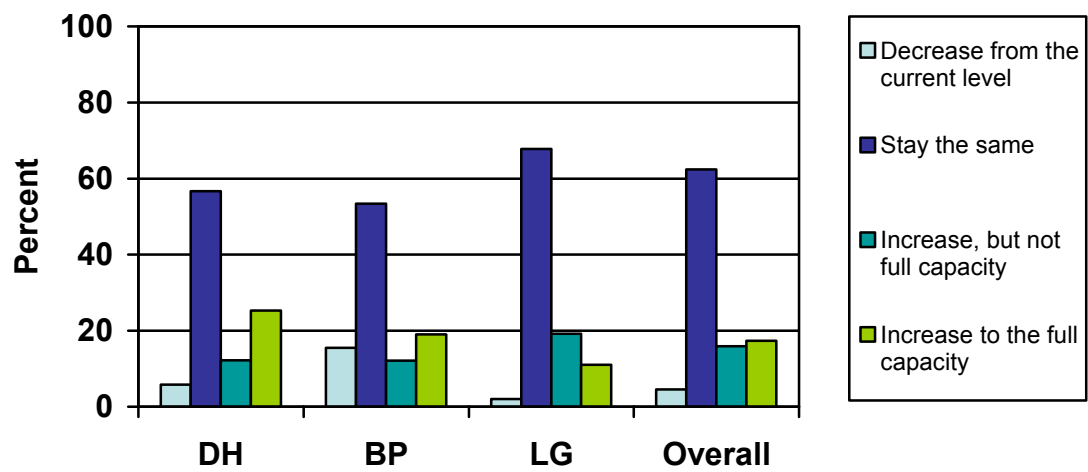


Figure A-39: Opinions on Occupancy Levels by User Group (n=844, p<.001)

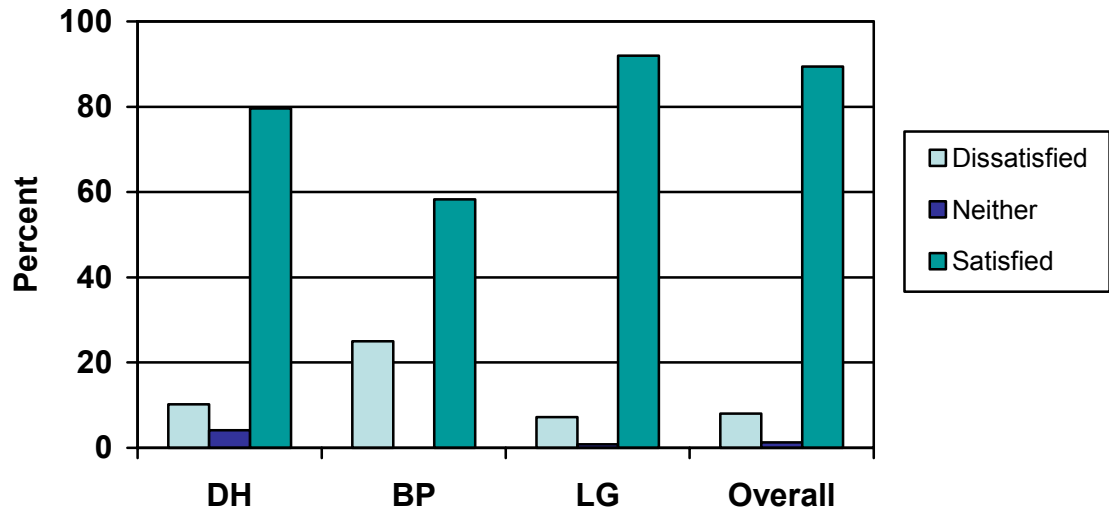


Figure A-40: Overall Satisfaction with Mt. LeConte Lodge by User Group (n=621, p<.001)

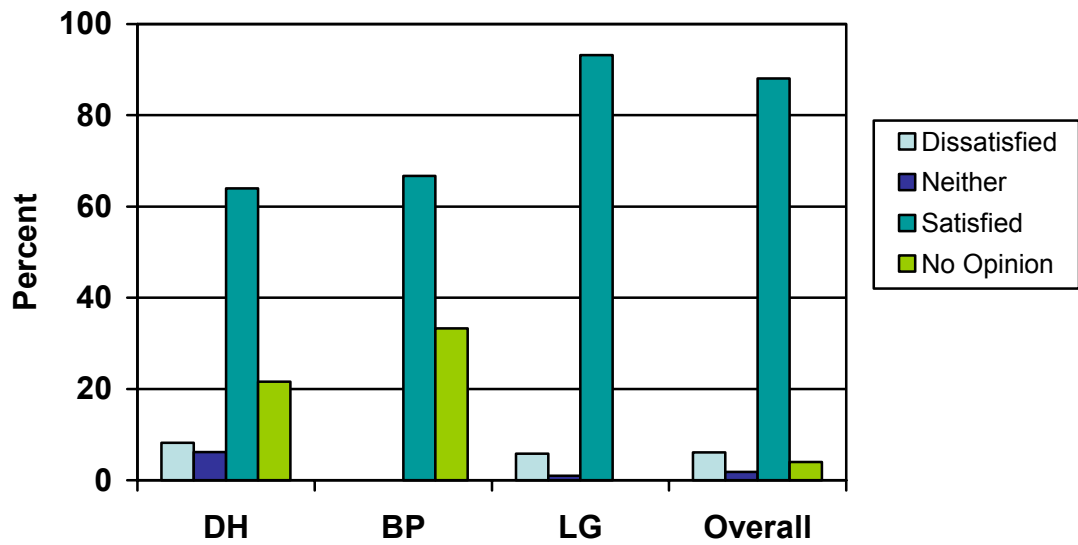


Figure A-41: Satisfaction with Quality of Food Service by User Group (n=621, p<.001)

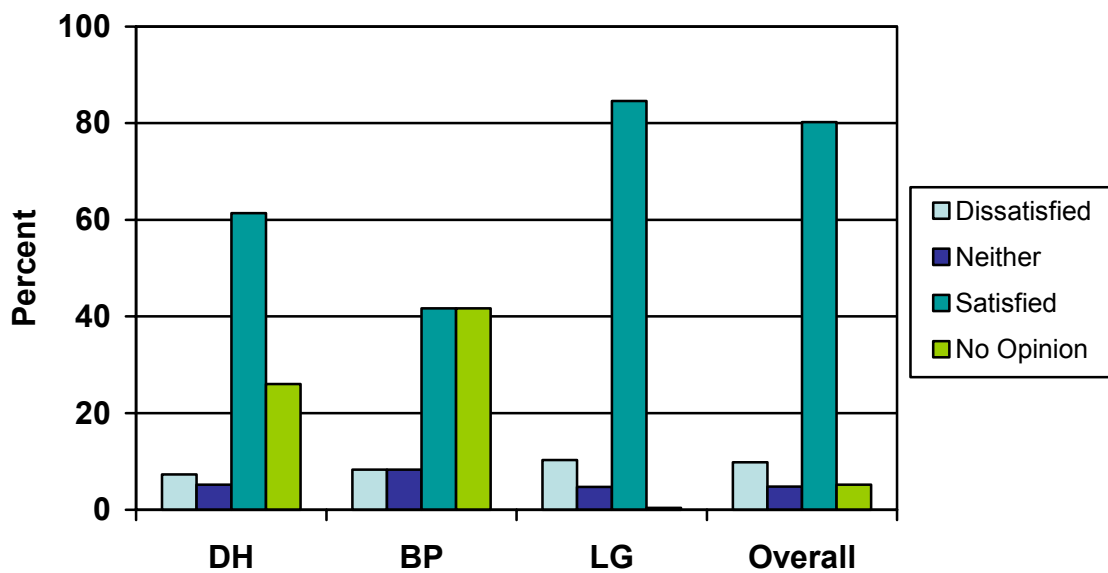


Figure A-42: Satisfaction with Current Fixed Menu by User Group (n=620, p<.001)

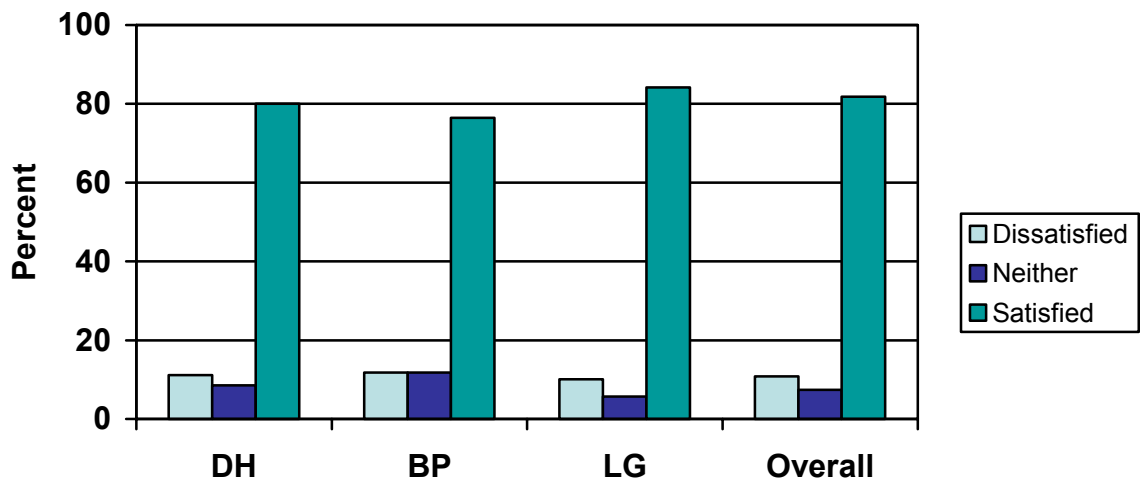


Figure A-43: Satisfaction with NPS Management by User Group (n=1062)

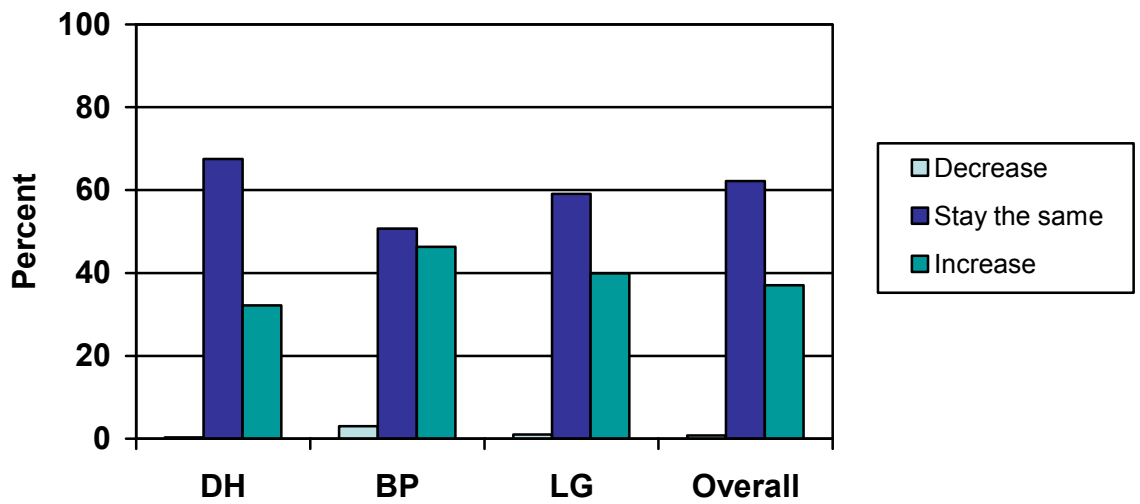


Figure A-44: Opinions on Ranger Presence by User Group (n=871, p<.05)

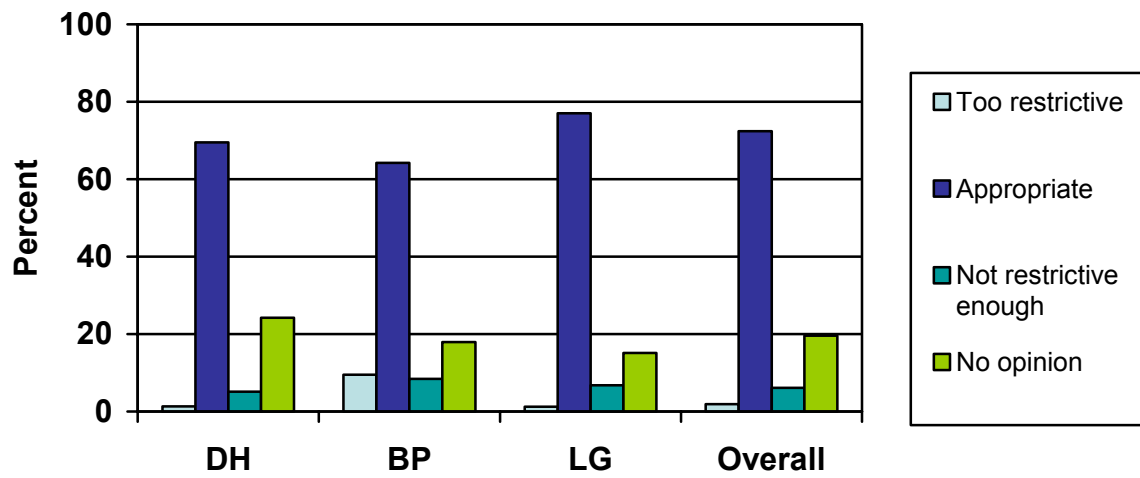


Figure A-45: Perception of Appropriateness of NPS Policies by User Group (n=1163, p<.001)

APPENDIX B – SURVEY INSTRUMENT

Great Smoky Mountains National Park
Mt. LeConte Visitor Use Survey

In the next few months, the National Park Service will develop a plan for the future management of LeConte Lodge and the Mt. LeConte area. As part of the planning process, the NPS would like to assess the opinions and preferences of guests at the Lodge and other visitors to Mt. LeConte.

- 1) Which of the following best describes you on your visit today:

☐ Day Hiker ---->	➤ Approximately how many day trips have you taken to Mt. LeConte? _____
☐ Backpacker ---->	☐ With a permit to stay at Mt. LeConte shelter.
	☐ With a permit for someplace besides Mt. LeConte shelter.
	➤ Approximately how many backpacking trips have you taken to Mt. LeConte? _____
☐ Lodge guest ---->	➤ Approximately how many times have you stayed at LeConte Lodge? _____
	➤ How many times a year do you normally stay at LeConte Lodge? _____
☐ Horseback rider>	➤ Approximately how many horseback riding trips have you taken to Mt. LeConte? _____
☐ Other (please specify): _____	

- 2) While visiting the summit area of Mt. LeConte during this trip, which of the following **places** did you visit:

- ☐ LeConte Lodge
- ☐ Myrtle Point overlook
- ☐ Cliff Tops overlook
- ☐ Mt. LeConte trail shelter
- ☐ Don't know

- 3) While visiting the summit of Mt. LeConte, which of the following **restroom facilities** did you use, if any?

(Please check all that apply)

- ☐ Public pit toilets at LeConte Lodge
- ☐ Public pit toilet at Mt. LeConte trail shelter
- ☐ None

- 4) While visiting the summit of Mt. LeConte, which of the following **services** did you use, if any?

(Check all that apply)

- ☐ Used water from the treated public water system at LeConte Lodge
- ☐ Purchased a LeConte Lodge tee shirt at LeConte Lodge
- ☐ Purchased other souvenir items at LeConte Lodge
- ☐ Purchased snack items at the Lodge
- ☐ None

- 5) Which of the following **services** would you **like to have available** at LeConte Lodge for visitors **who are not overnight guests**? (Check all that apply):
- ☐ hot and cold beverage service
 - ☐ cookies or other prepared bakery items
 - ☐ breakfast
 - ☐ lunch
 - ☐ dinner
 - ☐ flush toilets
 - ☐ none
 - ☐ Other: _____
- 6) The total capacity of LeConte Lodge is 67 overnight guests. The National Park Service allows 50 guests per night which results in a seasonal average of 44 people per night. With numerous improvements to the Lodge operation in recent years, the National Park Service is considering allowing the concessioner to accommodate more overnight guests if an Environmental Assessment concludes there would be no significant environmental impacts. Which of the following best describes your position on **occupancy levels** at LeConte Lodge?
- Occupancy Levels should:
- ☐ Decrease from the current level of 50 per night
 - ☐ Stay the same
 - ☐ Increase, but not to the full capacity of 67 guests
 - ☐ Increase to the full capacity of 67 guests
 - ☐ Do not have enough knowledge to have an opinion
 - ☐ Other: _____
- 7) What is your perception of the **effect of the current level of public use** of the summit of Mt. LeConte on plants, animals, soil and other **natural resources**? Current levels of public use have caused:
- ☐ No damage
 - ☐ A little damage
 - ☐ Some damage
 - ☐ Serious damage
 - ☐ Do not have enough knowledge to have an opinion
 - ☐ Other comments: _____
- 8) Which of the following best describes your perception of the **number of visitors** that can be allowed at Mt. LeConte without adversely affecting the **Natural Resources of the Park**? Compared to the current use level, the number of **visitors overall** should:
- ☐ Decrease a lot
 - ☐ Decrease a little
 - ☐ Stay the same
 - ☐ Increase a little
 - ☐ Increase a lot
 - ☐ Do not have enough knowledge to have an opinion
 - ☐ Other comments: _____

NOTE: Questions 9-12 refer to the number of people you encountered while at the summit of Mt. LeConte and how the number of visitors may affect your RECREATIONAL EXPERIENCE.

9) What trails did you use on this Mt. LeConte trip? (Please check all that apply in both columns)

Trail	Travel to Mt. LeConte	Travel from Mt. LeConte
Alum Cave Bluffs Trail	☐	☐
Boulevard Trail	☐	☐
Bullhead Trail	☐	☐
Rainbow Falls Trail	☐	☐
Trillium Gap Trail	☐	☐
Others (specify):		

10) How many people did you encounter on this trip on the trail to and from Mt. LeConte and while at the summit?

- Number of people encountered on this trip: _____
- ☐ Don't know

11) In terms of the overall quality of your experience as a visitor to the Mt. LeConte backcountry area of the Park, how satisfied are you with the number of people you encountered on this trip?

- ☐ Very Dissatisfied
- ☐ Somewhat Dissatisfied
- ☐ Neither Dissatisfied nor Satisfied
- ☐ Somewhat Satisfied
- ☐ Very Satisfied
- ☐ No Opinion

12) Which of the following best describes your encounters with other people on this trip to Mt. LeConte? I would prefer to encounter:

- ☐ Fewer people than I did,
- ☐ More people, or
- ☐ The number of people encountered was about right.
- ☐ Other: _____

13) Which of the following best describes your perception of the **number of visitors** that can be allowed at Mt. LeConte without adversely affecting the **quality of your recreational experience**? Compared to the current use level, the number of **visitors overall** should:

- ☐ Decrease a lot
- ☐ Decrease a little
- ☐ Stay the same
- ☐ Increase a little
- ☐ Increase a lot
- ☐ No opinion
- ☐ Other comments: _____

14) How satisfied are you with the **National Park Service management** of the Mt. LeConte area?

- ☐ Very Dissatisfied
- ☐ Somewhat Dissatisfied
- ☐ Neither Dissatisfied nor Satisfied
- ☐ Somewhat Satisfied
- ☐ Very Satisfied
- ☐ No Opinion

14a. Please explain why you are satisfied or dissatisfied:

15) Which of the following best represents your view of National Park Service management of the Mt. LeConte area:

15a. The presence of NPS Rangers on the mountain should:

- ☐ Decrease
- ☐ Stay the same
- ☐ Increase
- ☐ No opinion

15b. The NPS use policies on the mountain are:

- ☐ Too restrictive
- ☐ Appropriate
- ☐ Not restrictive enough
- ☐ No opinion

16) The National Park Service is considering offering additional programs and services at the Mt. LeConte Lodge for all visitors. Please indicate your **interest in using** the following educational programs and services at LeConte Lodge on a future visit:

	Not Interested 1	2	Interested 3	4	Very Interested 5	No Opinion
Educational programs presented by concession or NPS employees	☐	☐	☐	☐	☐	☐
Outdoor educational exhibits in the vicinity of the Lodge	☐	☐	☐	☐	☐	☐
Indoor educational exhibits in Lodge buildings	☐	☐	☐	☐	☐	☐
Trail and/or Park maps (for sale)	☐	☐	☐	☐	☐	☐
Park related publications (for sale)	☐	☐	☐	☐	☐	☐
Park related publications (library at Lodge for guest use)	☐	☐	☐	☐	☐	☐

17) Please list any additional programs or services that would recommend for the Mt. LeConte area:

☐ None

Note: If you are **currently staying overnight or in the past have stayed overnight** at LeConte Lodge, please answer the following questions. Otherwise, skip to question 22.

LeConte Lodge guests only (present or past guests)

18) Based on your personal experience as a Lodge guest, which of the following best describes your satisfaction with **LeConte Lodge** on your current or most recent visit?

- ☐ Very Dissatisfied
- ☐ Somewhat Dissatisfied
- ☐ Neither Dissatisfied nor Satisfied
- ☐ Somewhat Satisfied
- ☐ Very Satisfied
- ☐ No Opinion

19) Which of the following best describes your satisfaction with the **quality of food service** at the Lodge on your current or most recent visit?

- ☐ Very Dissatisfied
- ☐ Somewhat Dissatisfied
- ☐ Neither Dissatisfied nor Satisfied
- ☐ Somewhat Satisfied
- ☐ Very Satisfied
- ☐ No Opinion

20) Which of the following best describes your satisfaction with the **current fixed menu** at the Lodge on your current or most recent visit?

- ☐ Very Dissatisfied
- ☐ Somewhat Dissatisfied
- ☐ Neither Dissatisfied nor Satisfied
- ☐ Somewhat Satisfied
- ☐ Very Satisfied
- ☐ No Opinion

21) Please provide any **additional comments** about your satisfaction and/or dissatisfaction with LeConte Lodge, the quality of food service or the current fixed menu:

Finally, we would like some general information about you to make comparisons among the many types of visitors to Mt. LeConte. Remember all information is voluntary and confidential and will not be identified with your name. You may refuse to answer any questions.

22) What is your zip code? _____ State: _____
(IF NOT USA) What country are you from? _____

23) What is your age? _____

24) What is your gender?

☐ Male	☐ Female
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25) What is the highest grade of school that you completed?

☐ 8 th grade or less	☐ Some college
☐ 9 th - 11 th grade	☐ College graduate
☐ High school graduate or GED	☐ Post-graduate degree
☐ Trade/vocational school	☐ Other: _____

26) Which of these intervals includes your total **household income** from all sources before taxes during 2002. (Check the appropriate category.)

☐ under \$10,000	☐ \$10,000 - \$19,999	☐ \$20,000 - \$24,999
☐ \$25,000 - \$29,999	☐ \$30,000 - \$39,999	☐ \$40,000 - \$49,999
☐ \$50,000 - \$74,999	☐ \$75,000 - \$100,000	☐ More than \$100,000

27) If you have other comments about the Mt. LeConte area, Mt. LeConte Lodge, or the future management of Mt. LeConte, please write them below:

Thank you for your participation in this survey!

VITA

Amy Mathis was born in Kettering, Ohio, on June 3, 1975. She grew up in Wartburg, Tennessee, in the Mossy Grove community, and graduated as Salutatorian from Wartburg Central High School in 1993. She attended Roane State Community College, Austin Peay State University, and the University of Tennessee, Knoxville on the road to receiving a B.A. in English Literature from U.T. in December 1998. Amy decided to return to school in 2000 to pursue a career in which she could work toward the preservation and conservation of natural resources. She has been working as a teaching assistant for Dr. Mark Fly since fall, 2002, and intends to pursue a Ph.D. in conservation education.