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SOCIAL SCIENCE IN

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AN ASSESSMENT

1988

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GLACIER NATIONAL PARK:
AN ASSESSMENT
SEPTEMBER 1988

Prepared by Steven R. Martin
Seasonal Outdoor Recreation Planner
Glacier National Park



United States Department of the Interior
NATIONAL PARK SERVICE
GLACIER NATIONAL PARK
WEST GLACIER, MONTANA 59936

IN REPLY REFER TO:

September 19, 1988

Memorandum

To: Superintendent

From: Outdoor Recreation Planner

Subject: Social Science Assessment 1988

I'm pleased to submit this document as a summary of my work this season. The first part of the document is an outline assessing the state of social science in Glacier National Park as of this date. Past research on park visitors was reviewed, and potential management implications of that research briefly discussed. A list of research titles for visitor-related research in Glacier National Park immediately follows the outline.

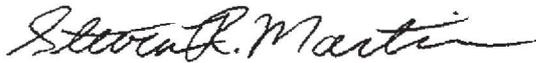
Visitor use data collected by the park was also assessed in terms of quality, organization, and usefulness to management. Possible shortcomings were identified, and recommendations for correcting them made. Much of this visitor use data was entered into one of several computer databases so that it may be more readily manipulated, displayed, and analyzed.

A needs assessment was conducted to determine what information that a social scientist could provide would be most helpful to park staff, and which social science topics it was felt were of highest priority. Possible management applications of these topics are discussed, and a ranked list of these topics also follows the outline.

A number of recommendations concerning visitor use data, future research priorities, and the importance of placing social science in a regional perspective are proposed. Finally, a wrap-up of where the park is now, and some possible direction for social science in the future is offered.

The second half of the document is an annotated bibliography of visitor-related research in Glacier National Park. References follow the entries.

I hope you will find this document of some help in charting the course of social science in Glacier National Park. The potential benefits that social science could provide are tremendous, and the applications many.

A handwritten signature in cursive script, reading "Steven R. Martin". The signature is written in dark ink and is positioned above the typed name.

Steven R. Martin

Social Science in Glacier National Park

I. Introduction

A. Reasons for position this summer

1. assess the state of social science in G.N.P.
2. assist with North Fork planning issues

B. Primary tasks

1. compile and review research and other literature related to G.N.P. visitors
2. assess and further organize visitor use statistics
3. assess perceived needs among park staff pertaining to knowledge of park visitors

II. Review of visitor-related research

A. 1984 Idaho CPSU report

B. Focus of past studies

1. primarily visitor interactions with and perceptions of wildlife, particularly grizzly bears
2. secondarily visitor use of and impact on other park resources
3. visitor attitudes or preferences regarding their park experience or park management influences on their experience
4. see attachments for list of research titles and copy of annotated bibliography

C. Some generalized or selected findings

1. most visitors have positive images of and attitudes toward grizzly bears
2. visitors holding certain beliefs about bears are more likely to engage in certain behaviors
3. threat appeal or fear arousal may interfere with reception of messages
4. visitors are more likely to support park management policies if they feel they've been given adequate information on why the policy is needed, and if they feel the policy will facilitate their park experience
5. visitors consistently prefer the more traditional interpretive activities

D. Some potential management implications of past studies

1. managers should be able to use the positive attitudes that visitors hold toward bears to their advantage in 1) getting visitors to adopt recommended behaviors, and 2) building support for management policies concerning the bears

2. managers can tailor messages about bears to 1) include more of certain kinds of information about bears (e.g. bear ecology), and 2) maximize anticipation threat while reducing inhibition threat in order to ensure better message reception and increase adoption of recommended behaviors
 3. managers can be aware that visitors' interest in and positive images of bears can also translate into a desire on the part of visitors to get close to bears
 4. interpretive programs can and should be used as a complement to management actions in attempts to influence visitor behavior, and to provide the information necessary to build support for management policies and actions
- E. Some problems with past visitor-related research
1. not much has been done, and much of what has relates to wildlife as much as to visitors
 2. studies are project-specific, they don't relate to each other or build upon one another; there is no continuity
 3. most research on visitors has been done by outside investigators (i.e. lots of theses) and generally is not oriented toward management applications

III. Visitor use data

- A. What we have
1. we have good information on total park visitation; entries by entrance station and by month, visitor use of campgrounds, paid lodging in the park, and overnight use of the backcountry
 2. we will have, starting with this summer, a good idea of day-use of the backcountry
- B. Some problems
1. total park visitation is influenced by
 - a. possibility of double (or more) counting of vehicles
 - b. counting traffic on Hwy 89 near Chief Mountain and US 2 near Walton
 - c. use of people per vehicle multiplier
 2. we're not measuring actual use, but gross visitation relative to previous years
 - a. we have no definition of what a park visit consists of
 - b. a family of four spending seven (7) days in the park could be counted the same as a single person spending a couple of hours

3. many of our records, particularly detailed records, don't go back for very many years, and it's not known how comparable the older figures are to more recent data
4. we don't know much about visitors' use of the park or travel patterns once they're inside the park aside from where they stay at night
5. there are large fluctuations in the length-of-stay figures; these figures are not actual length-of-stay but anticipated length-of-stay;

C. Computer databases

1. annual visitor use statistics have now been computerized back to 1976
2. detailed data on entries by month by entrance station have been computerized back to 1981
3. a computer database structure is now set up for detailed data on types of entries and visitor use of frontcountry campgrounds
4. overnight use of backcountry campgrounds has been computerized for a number of years now
5. some examples of graphics capabilities for displaying and analyzing trends in visitor use (computer terminal/color monitor, 35 mm color slides, high quality color printer)

IV. Needs assessment

A. The Nominal Group Process

1. groups of park staff (up to 7 people per group) were chosen roughly along division lines; 45 people were chosen in all, 33 of those people participated
2. seven (7) meetings were held
3. the question addressed was: "What information would be helpful to you in order to better understand and manage park visitors?"
4. ideas were generated and listed on a flipchart
5. individuals then ranked the top six (6) items in priority order
6. responses from each group were combined into a master list, which was distributed to 45 people for final ranking (34 people responded)
7. individuals ranked the top ten (10) items in priority order

B. Prioritized list of needs

1. see attached list
2. score precedes item
 - a. scores are not on any scale, they are simply relative to one another
 - b. highest possible score is 340

C. Management applications of these topics

1. develop the ability to improve the effectiveness and relevance of information disseminated to park visitors, including messages and information regarding appreciation of the park (interpretation), personal safety, and resource protection
2. determine visitors' motivations and expectations regarding their trip to Glacier N.P. in order to:
 - a. be able to provide opportunities that are congruent with visitors' desires (within the bounds of the park's mandate and philosophy)
 - b. determine if visitors have realistic expectations about Glacier N.P., and if not how we can "correct" their expectations
3. determine which services, activities, facilities, etc. are most important to visitors in order to assist in site-specific, facility, and area-wide planning
4. identify the visitor population of Glacier N.P. in terms of standard socio-economic-demographic variables in order to better understand the types of publics or sub-populations that we are serving
5. determine visitors' personal environmental values and understanding of natural processes, and how important different park values are to them in order to:
 - a. better understand our visitors in terms of issues that are of relevance to park management and to visitors' park experiences
 - b. direct different types of interpretive information and programs at various segments of the visitor population
 - c. help build support for park management policies
 - d. better educate visitors as to what this and other National Parks are all about

I feel that getting to know our visitors on these terms would be much more valuable than getting to know them on standard socio-economic-demographic terms

6. determine sources of visitor satisfaction and dissatisfaction so that we may provide for more enjoyable visitor experiences
7. determine how visitors perceive, how much they know about, how prepared they are for, and how well they accept the risks that are inherent in visiting Glacier N.P., so that we may better educate and inform visitors about these risks and provide for safer and more enjoyable visitor experiences
8. determine how visitors perceive park management as a whole, as well as specific policies and actions, in order to:

- a. know what items or issues we need to better educate visitors about
- b. build support for park policies
- c. gauge how well visitors understand what it takes to manage a National Park such as Glacier so that we can better educate visitors about management of the park

D. Some other issues

1. importance of social science relative to other operations
2. involvement of field personnel

V. Recommendations

A. Regional Focus

1. develop a framework for placing social science work in Glacier National Park into a regional perspective
2. work toward including local residents and communities, as well as neighboring land managing agencies in future social science work, from both a socio-economic standpoint as well as their attitudes and perceptions of Glacier National Park

B. Priorities for future research

1. information, communication and education efforts that focus on:
 - a. modifying visitor behavior (bear danger, backcountry compliance, resource protection)
 - b. interpretation of park resources and building support for park policies
2. visitor expectations, motivation, satisfaction and dissatisfaction
 - a. explore linkages between information, visitor expectations, congruency between expectations and actual experience, and resulting satisfaction or dissatisfaction in order to:
 - b. determine if by providing better pre-trip information visitors will form more realistic expectations resulting in more satisfactory experiences
3. research on fire
 - a. begin immediately photographing different areas within fire perimeters to provide baseline data for future monitoring of recovery and visitor perceptions of the visual quality of these areas
 - b. explore visitor perceptions of NPS fire policy, and how interpretation may influence them
 - c. use information gained from the above to better interpret natural fires to the public and to build support for NPS fire policies

- C. Limits of Acceptable Change/Carrying Capacity
 - 1. continue work on carrying capacity using the Limits of Acceptable Change framework
 - 2. strengthen working relationships with the U.S. Forest Service Wilderness Management Research Unit and the University of Montana

- D. Machlis' visitor survey
 - 1. similar studies in other NPS units
 - 2. could serve as a starting point for social science studies in Glacier Park, providing baseline data from which to develop more in-depth studies addressing the needs identified in the needs assessment
 - 3. what his study would encompass
 - a. visitor characteristics
 - b. visitor use of time
 - c. visitor activities
 - d. visitor expenditures
 - e. visitor travel patterns
 - f. visitors' accommodations
 - g. visitor ratings of service importance and quality
 - 4. some possible additions to the Machlis study
 - a. visitor sources of information about GNP
 - b. factors influencing people's decision to visit
 - c. what visitors liked and disliked most
 - d. what dimensions or special character about GNP differentiates it from other places they have visited (why did they choose to come here and not somewhere else?)
 - e. suggestions for improvements
 - f. perceptions of risk
 - g. willingness to endure limitations on visitor use (either site-specific or activity-specific) in order to further protect environmental or experiential quality (e.g. banning motors on Kintla lake)
 - h. possibility of developing a travel simulation model for GNP based on Machlis results

- E. The Montana Travel Survey (Univ. of Montana)
 - 1. non-residents only
 - 2. wealth of information on visitor characteristics, sources of information, origins and destinations, expenditures, activity participation

- F. Visitor use data collection
 - 1. see if older records can be located and entered into database

2. set up a standard, annual travel survey (exit survey would be preferred over entrance survey) to gather information on actual length-of-stay, persons per vehicle, accommodations, participation in certain activities (e.g. interpretive programs) and so on, and use the resulting people/vehicle figure to calculate total park visitation each year
3. consider alternatives to adjust for vehicles that are double or more counted, or that are counted on Hwy 89 or US 2 but don't actually enter the 'park proper'
4. develop a method for measuring actual park use, instead of just relative gross visitation
5. continue to enter all records into the computer databases that are now in place, and work with programmers to set up standard reports that can easily be generated from these databases (as was done with the North Fork LAC data)

G. Staff position

1. a staff position should be considered in order to incorporate social science into Glacier N.P.'s organization
2. staff position should probably be located in the Science Division
3. advantages of a social science staff position:
 - a. would provide in-house social science representation and consultation, and could provide input into planning and management documents
 - b. would provide continuity -- visitor studies could build upon each other instead of being unrelated to each other
 - c. would be geared toward management application
 - d. would provide an awareness of management constraints
 - e. could serve as contact point for outside (independent) studies; review proposals, etc.

VI. Conclusions

A. Where we are now

1. past studies have provided a start on understanding Glacier Park visitors, and a few in particular have shown the potential contribution that social science can make to park management
2. needs assessment has given us an idea of the kinds of information about park visitors that the park staff would find helpful and meaningful
3. visitor use statistics have been computerized, giving us a better capability for keeping track of use trends

B. Where we might want to be going

1. immediate
 - a. compile available data from the Montana Travel Survey
 - b. begin documentation and monitoring work on visual quality and recovery of burned areas
2. short-term
 - a. continue some type of social science position at least part of the year
 - b. have Machlis' visitor survey done next summer
3. long-term
 - a. provide for a full-time social science position
 - b. begin to address priority needs identified in this summer's needs assessment
 - c. develop framework for placing social science in Glacier N.P. into a regional perspective
 - d. develop a method for measuring actual park use, continue computerizing visitor use statistics, and consider some type of annual exit survey

Titles of visitor-related research in Glacier National Park

Habitat and visitor mapping in the Two Medicine area of Glacier National Park: combining information gathering techniques.

Mountain goat-human interactions in the Sperry-Gunsight area, Glacier National Park.

Social-normative influences and backcountry visitor behavior in occupied grizzly bear habitat.

Visitor attitudes and preferences for interpretive programs in Glacier National Park.

Visitor perceptions of management restrictions during Glacier Park's bald eagle concentration.

Characteristics, attitudes, and expectations of visitors to the bald eagle concentration at Glacier National Park.

Glacier National Park visitor images of grizzly bears.

Man's effects on the stability of alpine and subalpine vegetation in Glacier National Park, Montana.

Visitor impact on subalpine meadow vegetation in Glacier National Park, Montana.

Some effects of threat appeal in messages about hazards of grizzly bears in National Parks: an experiment.

Interactions between grizzly bears and hikers in Glacier National Park, Montana.

The Flathead River Study: Using visitor research.

Beliefs about bears.

Do river floaters perceive river segments differently? Should managers?

The Flathead River Study Final Report.

The Flathead River study: Management unit analysis.

Visitor attitudes toward grizzly bears in Glacier National Park, Montana.

Logan Pass wooden walkway study.

An analysis of the wilderness zone backcountry camping permit system in Glacier National Park.

Behavior of mountain goats, elk, and other wildlife in relation to U.S. Highway 2, Glacier National Park.

Qualitative evaluation of backcountry use patterns.

Multi-objective analysis of wilderness travel in grizzly bear habitat using parametric linear programming.

Management models for human use of grizzly bear habitat.

Exploration of optimal backcountry travel patterns in grizzly bear habitat.

Priority List of Social Science Needs
in Glacier National Park
as identified by park staff
1988

Participating staff included:

Administration Division (5)

Science Division (5)

Resource Management (5)

Ranger Division (10)

Interpretation Division (8)

Maintenance Division (1)

See outline for description of process used to produce this
prioritized list of needs.

- 209 Effectiveness of communication/interpretation/education efforts, including effectiveness of safety, appreciation, and resource protection messages and information; potential for use of local media; determining what visitors feel is most important for them to know upon entering the park, what their initial perceptions of informational messages are, and how those messages affect their visit.
- 141 Why do people come to GNP; what are visitors' expectations and motivations; what are they seeking?
- 141 Visitor preferences and priorities for services, activities, facilities, etc, including preferences for types of interpretive services/activities. What do visitors like and /or feel is important in terms of services and facilities that we and the concessions provide, and activities that they want to participate in?
- 138 Identifying our constituency: socio-demographics of visitors; who they are, where do they come from, how many, where do they go in the park (level and distribution of use), what do they do (activities), length of stay, etc.
- 123 Visitor perceptions of and priorities for different park values (for example recreation values vs. preservation values); determine visitors' personal environmental values, and their understanding of ecological processes. Determine how important it is to visitors that some areas of Glacier Park remain wild, and that grizzlies and wolves are present. How important is it to visitors to see bears in the wild?
- 122 What determines visitor satisfaction and dissatisfaction? What 'things' are important in determining whether visitors are satisfied? What are sources of dissatisfaction?
- 120 Visitor perceptions, knowledge, preparedness, and acceptance of the risks inherent in visiting Glacier. How much do they know before they come here? How well do we explain the risks? How does knowledge of certain risks (e.g. bears) affect visitors' use of the park?
- 114 Visitor perceptions of park management, policies, and actions, such as closures, access restrictions, acceptance of regulation, level of facilities and concessions, bear management, fire management, support for wolf recovery, etc.

- 108 Determine visitor perceptions of resource impacts and their causes. To what extent do visitors notice resource impacts? Do they realize that some of their actions may cause resource damage?
- 70 What are visitor expectations about backcountry experiences: facilities (trails, campsites, signing), expectations for solitude, amount of regulation, etc., and how do these affect their satisfaction with their backcountry experience?
- 69 Determine visitors' views on the adequateness of park facilities, types of facilities visitors feel are needed, and visitor acceptance of inconveniences to preserve a more primitive experience.
- 68 Determine visitor understanding of what a National Park is, and why it has the regulations it has (what does "National Park" mean to visitors?)
- 65 Contrast visitor and employee perceptions of what GNP should be with its mandated purpose as a first step in developing an internal identity and a common context in which to make decisions.
- 64 Visitor knowledge of proper behavior regarding pre-contact, contact, and attack situations involving bears; visitor knowledge about bears and proper backcountry camping practices.
- 53 Determine use of visitor centers and what visitors want/need from visitor centers; what visitors attend Naturalist-led activities, and why some don't.
- 50 Visitor attitudes toward wildlife and wildlife management, and how their park visit affects those attitudes.
- 48 Develop a methodology for gathering public input on particular issues, EA's, DCP's, etc. and how to use that public input.
- 46 Level of visitor knowledge about Glacier Park prior to their visit. Do visitors have an accurate perception of what Glacier Park is before coming here? How do inaccurate perceptions and expectations affect their visit here? How can we get accurate information about Glacier to these people before their visit?
- 25 Compare recommended vs. reported vs. actual behavior and how to improve compliance.
- 24 Identify significant interest groups and issues important in transactive decision-making.

- 21 Do visitors feel the NPS is still providing the same level of service (quality and quantity) that it has in the past, particularly with regard to increased use of VIP's.
- 20 Examine visitor/employee interaction process: contacts (type, frequency, and reasons), visitor perceptions of NPS rangers, adequacy of feedback from visitors to park. How can we increase visitor participation in management activities, such as reporting bear sightings?

An Annotated Bibliography of Visitor-related Research
in Glacier National Park

Visitors are an important component of the Glacier National Park ecosystem. They impact and influence park resources such as soil, vegetation, air, water, and wildlife, and can also affect the experiences of other visitors. Research on park visitors has generally fallen into one of two broad categories: 1) visitors' use of, interaction with, and impact on park resources; and 2) visitor attitudes, perceptions, expectations, and preferences.

A description of visitor studies (along with all other research in the park) was conducted by the University of Idaho CPSU in 1984 as part of a Man and the Biosphere report (Heyward et al. 1984). This current report updates that effort. Entries marked with an * are taken from Heyward et al. (1984).

* Preliminary investigation for the Logan Pass wooden walkway construction included visitor use surveys (Seibel 1974). Researchers found that the Logan Pass visitor center received 36% of total park travel and 59% of Going-to-the-Sun Road travel. In 1972, between 0900 and 1800 hours, the greatest number of visitors was 812 (in the hour from 1100 to 1200), and the least number, 130, occurred between 1700 and 1800 hours. From 1969-1972 trail use (on the Hidden Lake overlook trail) increased at an average rate of 25% per year. Fifty-six percent of visitors coming to the Logan Pass trailhead started out on the trail and 33% continued to the end. Of the trail hikers, 64.5% went one kilometer and 59% went to the overlook (2 km). Sampling revealed that 2% of the visitors stepped off the walkway compared to 19% which stepped off the natural trail. Shortcutting switchbacks was the greatest problem on the natural trail, while straying off the trail was the biggest problem on the macadem sections.

* A 1978 St. Mary subdistrict trail use summary indicated an average group size of 2.3 on the Red Eagle, St. Mary Falls, Gunsight Pass, Siyeh Bend and Hidden Lake trails. Ten percent of groups were larger than four. When Hidden Lake trail users were excluded, less than five percent were on overnight trips.

* Jope (1982) collected trail use information from the Many Glacier-Granite Park area as part of a grizzly bear/human interaction study. She counted 2429 people in 832 groups along trails. Ninety-four percent of visitors were day-hikers, 4.5% were backpackers; both types averaged 2.6 people/group. Horseback riders made up 1.5% of trail users and averaged 8.1 people/group. About 1/3 (29.4%) of the variation in hiker use was associated with weather variables, and hiker use gradually increased in midsummer and on warmer days. Geographic distribution of hikers appeared fairly consistent between years.

A major emphasis of Jope's study was to determine factors

affecting initial and subsequent behavior of both humans and bears in an encounter. She was particularly interested in the role of habituation in interactions and suspected surprise played a major role in aggressive encounters. Consequently, Jope examined the use of bear bells and their effect in decreasing surprise encounters. Twenty-five percent of day-hikers wore bear bells compared to 35% of backpackers. No horse groups had them. Forty-four percent of groups larger than 5 had bells, whereas only 14% of lone hikers did. If reporting by hikers with and without bells was equal, no differences appeared in frequency of grizzly bear observations made by people with and without bells, but people with bells observed bears at closer distances than people without bells--possibly due to the confidence of people with bells and their resulting inattention to their surroundings. Flight distance of bears was reduced in response to bells but a greater percent of bears moved away when approached by people wearing bells. No charges involved people with bells.

Group size seemed to have some effect on bear behavior and on whether people were able to observe the bears. A greater proportion of large groups and a smaller proportion of small groups saw bears. When encountering hikers without bells, bears moved away from groups of two more frequently than from larger groups. Just as human behavior influenced bear behavior, bear behavior influenced human behavior. Overall, people stood and watched bears 59% of the time, moved away 28%, and moved past or toward bears 13% of the time. People watched bears more frequently when bears moved past, moved away when bears moved toward them, and moved past or toward the bear when it was not moving.

Two studies have examined interactions between humans and mountain goats. * Singer (1975) examined visitor use at the Walton goat lick and its effects on goat behavior before the new highway bridge was constructed. An average of 932 vehicles per day passed the lick with peak flow occurring in the afternoon. He estimated 24,000 vehicles and 66,000 visitors stopped at the lick during the year. Stops averaged 3.3 minutes, ranging between 12 seconds and 3 hours. A total of 130 traffic safety hazards occurred at a rate of 0.45 violations per hour. Hazard rate increased to a peak in August corresponding to the peak in visitation. Vehicle speed at the lick areas was about 40 kph. No human/goat interactions occurred when people stayed at the roadside exhibit and goats stayed at the lick. Eighty-seven percent of human/goat interactions occurred with people closer than 50 meters and 46% occurred at closer than 10 m. Humans altered goat behavior in 84% of interactions, and in all observed cases goats reacted by avoiding people.

* Bansner (1978) studied human/goat interactions at the Sperry-Gunsight Pass area. Goats which exhibited aggressive behavior approached people more closely than hesitant goats, and

overall 45% of approaches were hesitant and cautious. Most approached no closer than 3 m and retreated quickly. Less than 5% of the approaches toward people were aggressive. When attractants were definitely present, however, goats approached people more closely. At these times, approaches less than 3 m were 2.5 times more frequent than approaches greater than 3 m. Mountain goats approached men more closely than women. About 1/3 of all human approaches to goats resulted in avoidance behavior. Nannies with kids were least tolerant of close approaches. Visibility, 'surprise element', and human behavior were important factors affecting goats responses to people.

Three studies have explored visitor attitudes toward grizzly bears. * Haet (1973) examined park visitors' images of grizzly bears using a series of paired adjectives describing safety and aesthetic factors of grizzly bear images. She found the majority of GNP visitors had a strong positive feeling about the beauty of grizzly bears in their natural environment; therefore grizzly bears in the park probably enhance visitors' experiences. Most visitors also felt that grizzly bears had the potential to be dangerous animals or at least were a little dangerous.

* Mihalic (1974) tried to determine what specific factors helped create a person's attitude about grizzlies. Approximately 65% of his respondents had positive attitudes toward grizzly bears, slightly more than 20% had neutral feelings, with the remaining 15% having negative attitudes. Past behavior seemed to have little causal effect in attitude formation except when controlled by intervening variables. Of these variables, visitor origin in the formative years intervened in the most number of cases. Age was the next most powerful factor, while sex and education intervened in only one case.

Based on his results, Mihalic felt resource managers could not assume past experiences were reflected in visitor attitudes. For example, hikers and campers did not necessarily have positive attitudes, but hunters did. Lack of knowledge or sophistication (in terms of rural-urban lifestyles and influences) had some effect on attitudes. Interpretive activities ranked far down on the list of sources from which visitors got their information about wildlife. Mihalic stated that interpretive programs should stress values of bears, social relationships, and their effect on the land to counter negative attitudes presented by other media.

A secondary part of Mihalic's study was to determine what effect visitor attitude might have on behavior in a grizzly bear encounter. Attitude intensity was not related to potential visitor behavior. In most instances, respondents chose correct courses of action in hypothetical encounter situations.

McCool et al. (1988) explored both park and National Forest

backcountry visitors' beliefs about grizzly bears, and how those beliefs influenced their participation in recommended camping practices. The four beliefs studied were suggested by previous work by Stephen Kellert (1976), and were as follows: ecologicistic (viewing the grizzly bear as an essential component of a naturally functioning ecosystem); naturalistic (beliefs oriented toward the bear as an object of affection or appreciation); moralistic (to what extent are bears viewed as having rights to live); and negativistic (believing bears are dangerous and cruel and should be eliminated).

Differences were found between park and National Forest (Jewel Basin Hiking Area) visitors. Jewel Basin campers were primarily local residents, while a larger proportion of park campers were from out-of-state. Jewel Basin campers felt that bears were a less significant danger than did park campers. Most respondents felt safe while in the backcountry, although park campers had a slight tendency to feel less so. Also, most visitors felt it unlikely that they would actually encounter a bear while in the area, although park campers reported a slightly higher level of likelihood. Jewel Basin campers had higher negativistic beliefs about bears (though this belief was not that strongly held).

Viewing bears in an ecologicistic manner was the most strongly held belief of those studied. McCool et al. found that belief strength is only modestly associated with camping experience; highly experienced campers reported higher naturalistic scores than those with a minimum of camping experience. Naturalistic, ecologicistic and moralistic beliefs were found to be positively intercorrelated, suggesting that there is a belief system; that is, holding one belief strongly leads to or is associated with other beliefs.

The extent to which beliefs are associated with participation in camping practices recommended to reduce the likelihood of confrontations with bears was also explored. Jewel Basin campers reported significantly less frequent participation in appropriate practices than did GNP campers. Appropriate behavior scores correlated significantly with moralistic, naturalistic and ecologicistic beliefs. However, a high proportion of GNP backpackers desired to get close enough to a bear for a close look or a photograph--a practice directly opposite the park's recommendation. Individuals scoring highest on the naturalistic scale were also those who wanted to get close enough to a bear for a good look or a photograph.

The research suggests that information directed at increasing visitors' sensitivity to the grizzly bear as an essential component of a naturally functioning ecosystem may play a significant, if indirect role in achieving greater participation in recommended backcountry camping practices. The

authors also felt that the use of fear arousal as a facilitating medium in communicating appropriate backcountry camping practices may be ineffective at best, suggesting that the fear arousal may get in the way of the message. Finally, they suggest that a variety of content areas in information programs may be more effective than emphasizing just one area.

Hodgson (1974) examined the effect of threat appeal (fear arousal) in messages about hazards of grizzly bears in National Parks. Test subjects were given different messages with varying levels of threat regarding the hazards of grizzlies. Two different types of threat appeal were used: anticipation threat--emphasizing the probability of an attack; and inhibition threat--emphasizing the painful, unpleasant and potentially gruesome effects of an attack. Subjects were then tested for feelings of anxiety, aggression toward grizzly bears, how safe they felt grizzlies were, how they viewed the grizzly aesthetically, and their propensity for seeking additional information on grizzly bears.

Scores on the anxiety index varied directly with the level of inhibition threat. As inhibition threat rose, so did the subjects' level of anxiety. However, scores on the the safety index were not significantly related to the level of either anticipation or inhibition threat. Thus, stronger threat appeals in bear management communication probably will not be associated with reevaluations of the grizzly as more dangerous by the receivers of the message. Subjects exposed to inhibition threat are more aggressive toward grizzlies (measured in terms of desire to restrict the grizzlies' range) than those exposed to anticipation threat, though the level of threat was not significant. Aesthetic and safety elements are significantly related and vary directly. As individuals view the grizzly as more dangerous they also view it less aesthetically.

The propensity of subjects to seek more information on grizzly bears varied somewhat with the type or level of threat. Subjects exposed to anticipation threat were more likely to request further information on grizzlies, while those exposed to inhibition threat were more likely to think about avoiding or surviving an attack, though these differences were not statistically significant. The type of threat may influence the type of information an individual seeks more than the amount. These findings, together with results of other research, suggest that increased anxiety generated by inhibition threat results in a preoccupation with the gruesome consequences of the threat sufficiently intense to preclude attention to other information. Subjects may not reject further information, but the kind of information to which they will pay attention probably will deal with the gruesome consequences. Thus, recommendations that instruct one in how to avoid the event (or reduce its probability), might be ignored in favor of communications

relating to the gruesome consequences.

Hodgson also addresses the problem of information about the hazards associated with visits to National Parks having to "compete" with other, possibly more immediately important, information regarding the availability and location of facilities and services and other stimulus such as scenery, etc. He points out that people visit national parks to enjoy themselves. Anxiety detracts from that enjoyment, so if threat messages about bears or other hazards arouse excessive anxiety they are likely to be ignored or avoided. Hodgson suggests trying to reach national park visitors with informational messages during the planning stages of their trip, before they arrive at the park, perhaps by incorporating such messages into public television programs about the national parks and other wild lands.

Braithwaite and McCool (1988) studied the social-normative influences on backcountry visitor behavior in occupied grizzly bear habitat. Backcountry campers were asked how important different people or groups of people (referent groups) were in determining what camping techniques they practiced while in the backcountry. Campers felt that the expectations of the rangers who managed the area were the most important in influencing their behavior, followed by the expectations of other members of their group. Similarly, campers' motivation to comply was highest for the same two referent groups, with over 95% wanting to comply with the expectations of the rangers who manage the area.

Campers were asked to assess the importance of the many types of information available to backcountry users on how to camp in grizzly country. Park rangers, previous experience, park literature and signs, and group members were viewed as the most important sources of information. Similarly, the ranger who issued the permit and the printed information received with the camping permit were perceived as the most reliable sources of information.

Campers were also asked the extent to which they participated in 11 recommended camping practices. Generally, reported compliance was fairly high (95% reported always carrying their garbage out, 85% always washing their dishes, and 79% always storing their food in trees), though 83% seldom or never travelled in large groups and 65% seldom or never wore bear bells.

Several studies have examined visitor use of the backcountry with emphasis on the overlap of visitor use and grizzly bear use of bear habitat. * Stuart (1973, 1977, 1978, 1980) evaluated backcountry use patterns based on management policies, physical features of campsites, accessibility and weather conditions. Regression models developed by Stuart had reasonably high explanatory power for the entire June 1 - September 15 season.

Accessibility of the trailhead closest to the campsite, fishing opportunities, site capacity, average maximum daily temperature, percent of trail listed as "open", possibility of using the site on a loop or longer trip, and proximity of the campsite to a lake, chalet or trail shelter were variables significant in their effect on campsite use levels. Stuart developed his models to allow managers to use pertinent variables as an aid in development of improved backcountry management plans and more desirable use patterns in the backcountry.

Stuart also developed backcountry use models based on solitude at backcountry sites, volume of overnight backcountry use, and human-grizzly contacts. Model solutions identified optimal use patterns in light of specific management objectives by indicating the number of parties that could undertake the trip in a given period. Stuart's models indicated that even with optimal use, however, increasing backcountry use would produce increases in the level of contacts with grizzlies in proportion to the increase in visitation, results similar to those of Joep (1982).

Baldwin et al. (n.d.) conducted a study in the Two Medicine area in order to provide managers with information on grizzly bear habitat, visitor use patterns and their relationships. Eighteen habitat classes were identified and subjectively ranked as to their potential summer use by grizzly bears. These are described in their report. The visitor mapping portion of the study describes the distribution of visitors and their activities in an area over time. Information on basic characteristics of visitors can also be examined. Visitor mapping addresses three variables: space, activities, and time. Because grizzly bear and human use of an area may vary with the time of day, season and year, detailed knowledge of visitor distributions may help managers in making decisions to help control interactions by closing particular campsites or trails.

Lone hikers made up 14% of sampled groups. The most common group size was two (39%). Dayhiking was the most common activity, followed by backpacking. Eighty-five percent of the groups stayed only one day, while 14% were overnight backcountry users. Most use of the area and most reported activity occurred in the afternoon. Visitor use was highest in zones that also received high bear habitat quality scores. The two most common visitor activities, dayhiking and backpacking, require the use of trails located in valleys that received high habitat quality scores. Designated campsites are also often located in high habitat quality zones.

These results suggest that there will be concentrations of grizzly bears and people in the same areas. Grizzly bears in Yellowstone National Park often use higher elevations than visitors (Chester 1977); such space partitioning apparently is

not as common in Glacier National Park. It is, however, commonly believed that grizzly bears are most active during early morning and evening hours (Jope 1982); visitor use was found to be lowest during these periods. This temporal partitioning may serve to reduce potentially higher numbers of grizzly/human conflicts.

* Seibert (1976) examined compliance of backpackers in the Nyack wilderness zone to the special zone regulations. Seventy parties obtained permits, but 24% cancelled after the first day or never left the trailhead, and a substantial portion resulted in "no-shows." Average party size was 1.75. Users tended to abide by the basic zone regulations; but only two of 23 sites met all undesignated campsite requirements, although 715 of the respondents said they were able to locate adequate sites. The regulation broken most often was locating campsites beyond sight of the trail. Eighty-four percent were readily visible from the trail, and 50% were within 3 m of the trail, probably due to the brushy and rough conditions typical of the Middle Fork drainage. Only 9% were less(???) than 8 m from water.

All indications pointed to a lack of prime, readily available or apparent undesignated campsites. Seibert located only one new fire ring; the few other violators of the no-fire restriction used existing fire rings. He found 28 traditional and undesignated campsites, 23 of which were used in the 1976 season. Contacted users overwhelmingly favored the wilderness zone--few were pushed into the zone because all other areas were full. Users were able to effectively disperse themselves, but a wet year resulted in light visitor use. All users said they found the degree of privacy they sought; they encountered an average of 2.6 people. Twenty-two percent were highly favorable of the no-campfire restriction, 44% were favorable, 10% neutral, and 4% against.

Only one study to date has directly examined visitor impact on park vegetation. Hartley (1976, 1979) conducted a study to determine the relationship between human activities and the condition of alpine/subalpine vegetation. Trailside vegetation sampling was used to measure the long-term effects of pedestrian traffic. Hartley pointed out that periods of greatest use are highly correlated with the alpine/subalpine growing season in July and August. He found that impact to the vegetation is influenced by the total number of people, but more importantly by the size of groups and their tendency to stay on the trails. Since off-trail walking accounts for the most obvious changes in vegetation and soils at high elevations, Hartley concluded that the key to minimizing such impact is keeping visitors on the trails.

Likewise, only one study to date has examined visitor attitudes and preferences for interpretive programs in Glacier Park. Davis (1977) used a questionnaire to ascertain visitors'

attitudes toward and participation in interpretive activities in the Many Glacier valley. Five subpopulations of visitors were contrasted: those participating in a boat cruise (BC), a ranger-led hike (RH), an evening campfire program (EC), a hotel slide show program (HT), and a general population sample taken at the entrance station (ES). RH visitors were found to have significantly more positive scores on a scale measuring attitudes toward interpretive programs. Other groups did not differ from one another.

Preferences for boat cruise tours were measured. RH visitors least approved of boat tours. All groups indicated that they would be more likely to take a boat cruise with a park ranger aboard than one without a ranger. Likewise, they indicated a slight preference for having a ranger instead of a boat captain tell them about the park while on a boat cruise. All groups also indicated a slight preference for hiking with a ranger instead of using a self-guiding leaflet after going to the far end of the lake on a boat cruise. Likewise, all groups indicated that they would rather have a ranger tell them about the park on a hike instead of a boat cruise. RH visitors felt particularly strongly about this point. All groups disagreed with the statement "Rangers should not be on the boat cruises at all," indicating that rangers definitely have an important function on the boat tours.

To determine visitor preferences for interpretive programs, visitors were asked to rank order eight types of interpretive opportunities offered in the Many Glacier valley according to preference. Subpopulations of visitors differed from one another, but overall the order of preference was as follows: 2-mile hike, nature trail, slide show, visitor center, 8-mile hike, stroll, boat cruise, horse trip. RH and EC visitors were most likely to prefer the hikes; HT visitors preferred the slide show; ES visitors preferred the visitor center; BC visitors preferred the 2-mile hike and the nature trail over the boat cruise. The more traditional interpretive activities were consistently preferred.

When degree of participation in interpretive and other activities was measured, ES visitors were found to participate to a far lesser degree than all other groups. HT, EC and RH groups had the highest participation rates. Low participation by ES visitors was especially pronounced for interpretive activities. RH visitors had the highest participation rate for interpretive activities, while HT visitors had the highest rate for non-interpretive activities. Visitors were most likely to participate in a ranger-led hike because they enjoyed learning about nature and the park from a ranger, and secondly because they perceived the ranger as an agent of security. Visitors who indicated that they were not likely to participate in a ranger-led hike gave two reasons most often: they preferred to hike

alone or with family/friends, and they felt ranger-led hikes were too crowded.

Frost (1985) and Frost and McCool (1985) explored the attitudes, expectations, and perceptions of management restrictions of visitors to Glacier Park's bald eagle concentration. Their objectives were to identify the experiences that visitors sought, determine visitors' level of knowledge about the eagles and the management restrictions, determine whether visitors perceived the restrictions as necessary, and determine how those perceptions affected their experience.

The majority of visitors came to the eagle concentration for the opportunity to interact with the natural setting and experience the benefits this setting may provide. Observing scenic beauty was the most important reason for visiting. The opportunities to experience the tranquility of the setting and to learn about nature were also very important to visitors. Frost concluded that visitors probably possess fairly accurate expectations of the setting and the available experiences. He noted that the more important a visitor viewed a particular experience the longer was the length of stay. Those that attached more importance to their desires invested more time in the realization of those desires.

Visitor perceptions of naturalists and naturalist-led trips to an observation blind were very favorable. Eighty-three percent (83%) of visitors felt the encounter added to their experience; 16% were neutral. Visitors were found to be fairly knowledgeable about eagles and the concentration. This suggests the need and desire of many visitors to be introduced to information of a more technical nature. Visitors exposed to the interpretive program scored higher on the knowledge test than those who weren't exposed.

Visitors were asked how they felt about the number of other people seen. As the number of others seen increased, the evaluation of that number tended to be more negative. As would be expected, visitors who placed more importance on solitude were more likely to evaluate the number seen negatively. Likewise, evaluations of human-caused noise were generally negative. Vehicular noise in particular was found to be a major source of dissatisfaction.

Visitor attitudes toward management were also explored. Eighty-eight percent (88%) of visitors said they were aware of management restrictions pertaining to the eagle concentration. About 75% of visitors felt there was adequate information about where and why closures existed. Fifty-six percent (56%) felt the restrictions had no significant impact on their experience. Indeed, 32% felt the restrictions actually facilitated their experience, while only 12% felt the restrictions detracted from

their experience. The effect of restrictions was found to be partly dependent on the importance visitors attached to particular expectations about their experience. Visitors overwhelmingly supported closures to minimize negative impact on the eagles. Almost all visitors who were aware of the restrictions perceived them as necessary.

* McLaughlin et al. (1982a, 1982b, 1984) and Krumpe et al. (1982) studied floaters on the three forks of the Flathead River. They contacted over 2000 floaters and mailed questionnaires to another 1385 (receiving back 66%). Party size and trip length data for the North and Middle Forks was collected. The section of the Middle Fork designated 'Recreational' supported the highest proportion of outfitted use (76% of total use), compared to 24% on the Wild section, 2% on the North Fork Scenic section, and 12% on the North Fork Recreational section. The North Fork and upper Middle Fork served as a recreational resource primarily for local residents. The lower Middle Fork Recreational section received more use from people outside of Montana.

Another aspect of the study was determining users' perceptions of physical and social attributes of the river setting. When asked to categorize river segments according to class descriptions (wild, scenic, recreational), 88% of people floating wild rivers classified them as wild, and 75% of scenic floaters classified the river as scenic. People floating recreational segments, however, were split between calling the river scenic (46%) or recreational (47%). Questions concerning the maximum number of people allowed in outfitted and non-outfitted groups indicated a willingness among floaters to tolerate larger party sizes for outfitted groups on all segments, but floaters of different segments perceived different acceptable party sizes for outfitted groups. For outfitted parties, however, people perceived no difference in acceptable party size. Both outfitted and non-outfitted parties felt an acceptable size for outfitted groups was 12. Private floaters, however, felt that private parties could be 10.2, whereas outfitted floaters felt that private parties should only be 8.4.

When asked to rank a list of 17 facilities important for put-in/take-out sites, recreationists ranked toilet facilities, garbage cans, and 'no facilities' as the top three items on all river segments. * Krumpe et al. (1982) stressed that the high importance given to 'no facilities' should caution managers against over-development, even on recreational segments where such development is allowed.

A survey of visitors to the North Fork subdistrict of the park was conducted during the summer months of 1986 (GNP files). Visitors were queried about their reasons for visiting the North Fork, which areas of the North Fork they visited, how they learned of the area, the importance of different activities in

which they participated while in the North Fork, and their perceptions of a number of qualities and characteristics found in the North Fork. Most visitors chose to visit the North Fork because of its scenic beauty and opportunities for solitude. Few visitors chose the North Fork because of its type of facilities. Generally, the Bowman Lake area is the most popular destination in the North Fork. Differences were found between first-time and repeat visitors, suggesting a possible progression in the type of experience repeat visitors seek.

There was general agreement among visitors that the most important activities in which they participated in the North Fork were viewing scenery, experiencing solitude, viewing wildlife, and sightseeing. Day-users rated solitude lower (5th) than other user types, and were the only group to rate driving among the top five. Visitors agreed strongly that the quality of roads, level of facilities, and type of campgrounds were appropriate for the area. Visitors also agreed that campsites, trails, and vegetation around developed areas were in good to fair condition. Repeat visitors, however, were less likely to rate conditions as good, and more likely to rate them as poor than were first-time visitors, suggesting the possibility of resource degradation as perceived by visitors over time.

Visitors were found to be drawn to the North Fork most by its primitive character and remoteness. Most North Fork visitors expected to see fewer people in the area than in other parts of the park. Overall, only 19% felt crowded, though visitors were most likely to feel crowded in the campgrounds.

Several other surveys were conducted in 1984 and 1985 that included visitors from the entire park and visitors to the Flathead Valley. The Transpo Group, Inc. (1985) conducted 1729 visitor interviews during August 1984, 740 at entrance stations and 989 at trailheads. The primary purpose of this survey was to gather information on visitor transportation patterns within the park, focusing especially on the feasibility of developing a public transportation system in the park.

It was found that 79% of visitors arrived at Glacier National Park by private automobile; 69% continued to use their vehicle to travel to and from trailheads, while 15% walked. Seven percent (7%) arrived by rental vehicle, 3% by air, and 4% by Amtrak. Forty-nine percent (49%) of respondents indicated they would use public transportation in the park if it were available; 20% said they would be willing to pay \$1.00, 22% said \$2.00, and 37% said they would pay \$2.00 to \$5.00 for public transportation in the park.

Visitors surveyed at trailheads were queried about how crowded they felt the trail would be, the number of other hikers they encountered on the trail, and how crowded they felt the

trail was. About one-fourth said they saw 0 to 10 other people on the trail, while 50% said they saw 11 to 50 others. Fifty-eight percent (58%) felt the trails were slightly to not at all crowded, while 31% felt they were moderately crowded. Only 11% felt more than moderately crowded. This compares to 47% expecting to feel slightly or not at all crowded, 35% to feel moderately crowded, and 18% to feel more than moderately crowded. Overall then, hikers did not feel as crowded as they expected to feel.

Length of stay and lodging information was also collected from visitors surveyed at trailheads. Visitors were asked how long they expected to stay in the Glacier National Park area. Thirteen percent (13%) indicated a stay of only one day, 38% a stay of 2-3 days, 32% a stay of 4-7 days, 9% said 8-14 days, and 7% over 30 days. Visitors were also asked where they had spent the previous night, and where they planned to spend the upcoming night. About 24% indicated use of a hotel/motel inside GNP, about 10% a hotel/motel outside GNP, about 31% indicated they were vehicle camping in GNP, about 10% were vehicle camping outside GNP, and about 2% were backcountry camping in the park. Six to eleven percent (6-11%) indicated use of lodging outside the GNP area. The remaining respondents indicated they were staying at home or with friends or relatives.

Most (89%) visitors surveyed were residents of the U.S., with 16% from Montana; 15% were from the North-Central states, and 19% from the states of Washington, Oregon, California, Alaska, and Hawaii. Canadian visitors comprised 7% of the sample. Median age of respondents was 28. Average group size was 3.1 persons.

Eiselein (1985) conducted a visitor survey in Glacier National Park during August 1985, interviewing 212 visitors as they left the park from the West and St. Mary entrances. Fifteen percent (15%) were from Montana, 16% from Canada, 13% from the northwest, 23% from the west, 23% from the midwest, and 7% from the east (no definitions were given for these geographic regions). The average length of stay was found to be four (4) days, with 51% spending only one day in the park. Just under half (46%) of the visitors surveyed indicated that they had stayed inside the park, while 54% stayed outside the park. Forty-two percent (42%) of visitors camped, and 21% stayed in a hotel or motel. Just over half of those surveyed had eaten in a restaurant during their visit to the park. About 39% entered the park at West Glacier and left at St. Mary, while 31% entered and left at West Glacier. This was the first trip to Glacier Park for 57% of those surveyed, and 90% planned to visit again. Repeat visitors were more likely to stay longer than first-time visitors.

The Flathead Valley Community College (1985) also conducted a survey of visitors to the Flathead Valley during the period July through September 1985. Sample size was 1000 interviews. Interviewing was conducted at various locations in and around Kalispell, Whitefish, Columbia Falls, West Glacier, Hungry Horse, Bigfork, Somers, and Lake Blaine. Only visitors from outside the Flathead Valley were surveyed. Twenty-two percent (22%) were found to be from Montana, 17% from Alberta, 11% from California, 12% from Washington/Oregon, and 3.6% from Minnesota. Overall, 21% were from Canada. First-time visitors comprised 41% of the sample, and 74% indicated they were in the area on vacation. About 40% chose to visit the area because of family or friends, 13% were simply passing through, and 5.4% primarily to visit Glacier National Park, although about 36% indicated they had visited or planned to visit Glacier. About 9% were here as a result of publicity about the area. Seventy percent (70%) of those surveyed arrived by car, 21% by recreational vehicle, and 5.6% by air. The average group size was 3.2 persons. About 30% said they were camping, and 24% were staying in motels. Only 13% indicated a stay of only one day, 55% were staying 2-5 days, 15% were staying one week, and 17% over one week. Fifty percent (50%) were white-collar workers, about 20% were retired, and about 19% were blue-collar workers. The majority of those surveyed (56%) had a household income of over \$30,000.

Some selected observations than can be drawn from some of the above research are as follows. Most visitors seem to have positive images of and attitudes toward grizzly bears. Glacier Park managers should be able to use that to their advantage in their efforts to provide information to visitors regarding recommended behaviors; this positive image can also be tapped to help build support for park management policies concerning bears. However, managers must also be aware that the positive image of bears that many visitors hold could also translate into a desire on the part of visitors to get close to bears for a better look or a photograph.

Since research by McCool et al. (1988) found that campers who held certain beliefs about the bears (ecologicistic beliefs for example) were more likely to engage in the recommended practices while camping, managers should consider including more of this type of information to visitors along with the information already given them about recommended practices. Hodgson's research (1974) suggests that managers should be very careful about using fear arousal when informing visitors of risks associated with bears. Managers should minimize inhibition threat and maximize anticipation threat, since anxiety caused by fear may interfere with reception of other messages. Such anxiety and fear could also increase "aggression" toward bears that could translate into opposition to park policies regarding preservation of the bears.

Such findings are particularly relevant in light of Baldwin et al.'s research (n.d.) indicating that areas of high visitor use are also often areas of high quality grizzly bear habitat.

Research on visitors to the bald eagle concentration (Frost and McCool 1985) has shown that visitors are more likely to support park management policies if they feel they've been given adequate information on why the policy is needed, and especially so if they feel the policy will facilitate their experience. The authors concluded that such results "suggest the importance of an interpretive program as a complement to management actions that attempt to influence visitor behavior."

Results from the 1986 North Fork visitor survey suggest that visitors will seek out areas of the park that can provide opportunities they desire, such as selecting the North Fork if solitude is important to them. Differences between first-time and repeat visitors suggest a progression in experiences sought by visitors to an area, while differences between overnight and day-users suggest that different types of visitors may try to use the same setting for experiences that are different, and possibly incompatible.

Information from other visitor surveys on travel patterns, length of stay, group size, and use of lodging and other facilities helps in the planning for and maintenance of park facilities provided for visitors.

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