Visitor Use of Interpretive Facilities at Fossil Butte National Monument, Wyoming

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VISITOR USE OF INTERPRETIVE FACILITIES AT
FOSSIL BUTTE NATIONAL MONUMENT, WYOMING

by

Rizal Bukhari

A thesis submitted in partial fulfillment
of the requirements for the degree

of

MASTER OF SCIENCE

in

Recreation Resource Management

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Visitors expect to gain high-quality outdoor experiences at any recreation site they visit. In order to support that effort, most recreation managers utilize interpretive facilities to educate and inform visitors about the site. It is important for interpretive managers to be aware of what kind of interpretive media could best be used in a given setting for the type of visitor anticipated. To accomplish this goal, it is necessary to understand visitors' behavior and incorporate that understanding into the interpretive planning process.

This study looks at visitor use of interpretive facilities provided at Fossil Butte National Monument, Wyoming. The primary method of data-gathering for this study was observation (participant observation and behavioral mapping). Observations were made at randomly selected times over 63 hours of observation in 1995. Data were
collected at three locations: Fossil Butte visitor center, Fossil Lake self-guided trail, and roadside displays. Analysis was made using descriptive statistics for quantitative data and content analysis for qualitative data.

A 13-minute audiovisual program was the most attractive interpretive facility at the visitor center. Other popular activities in the center include: examining standing displays on paleontology, asking information or directions, taking pictures, making purchases, and certain activities for children. Nature trail hiking usually was done in conjunction with use of nearby picnic facilities. More visitors in vehicles passed by the roadside display than those who stopped to read it. Based on these and other results, several recommendations are made for park managers.

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INTRODUCTION

Providing opportunities for high-quality outdoor recreation experiences is the recreation planner’s and manager’s job. As part of that responsibility, most recreation managers utilize interpretive facilities to educate and inform visitors about the area. Interpretive facilities may range from simple signs to multi-million-dollar visitor centers, and include many different types of media from brochures to audiovisual presentations. Various types of media should be used based on the kind of visitors the manager wants to reach. Interpretive preferences may vary with demographic characteristics such as age, gender, socioeconomic status, and ethnicity. Some visitors may be attracted to a ranger presentation, while others feel more comfortable watching audiovisual programs. Some might only take and read brochures in their leisure, while others spend much time reading and looking at standing displays.

A visitor center or other interpretive facility is more likely to be useful and effective conveying its message if it is well equipped, with communicative interpretation facilities for every target audience. In that way visitors will most easily understand the message provided and will expect to enjoy being in the area by gaining satisfactory new experiences.

In order to be effective, interpretation media must relate to certain characteristics of the visitors. One of Tilden’s six Interpretive Principles stated that “any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile“ (Tilden, 1957, p. 9). So it is
important that interpretive planners and designers use certain techniques to help the visitor identify with the message to develop. Before planning an interpretive medium, it is essential for planners to know something about their visitor so they can design interesting and effective types of interpretation. For instance, interpretation addressed to children should not be a dilution of the presentation for adults but should follow a fundamentally different approach (Veverka, 1994). High-quality interpretation must be based upon good planning. And planning that is done well must be supported by valid data that describe visitors' behavior, preferences, response, and so forth. Whatever interpretive medium a planner develops, whether it is an exhibit, a brochure, a trail, or a video project, the planning process should reflect an understanding of visitor behaviors. Besides planning, evaluation is also an important phase in the entire interpretive process so managers and planners can obtain knowledge as to how well the plan meets its objectives.

Problem

The practice of evaluating exhibits in terms of visitor use and experience is still a relatively new field of work, and specific methods and processes are not generally widely used (Hayward, 1988). But it is important to realize that use of an exhibit is not necessarily the best measure of its success or failure. Numbers of people viewing an exhibit does not indicate whether or not the public is understanding it. But it is an important first step. However, information regarding the public’s patterns of use can help
planners and managers evaluate several aspects of an exhibit, including assumptions about audience characteristics, the exhibit’s appeal and layout, and also space planning (Hayward, 1988).

This study looks at visitor use of interpretive facilities provided at Fossil Butte National Monument, Wyoming. There has been no research done prior to this study at this monument.

*Objectives*

This study was undertaken in an effort to allow researchers to learn how different types of interpretive facilities are used by many different kinds of visitors. Moreover, the results can provide interpretive planners or recreation managers at Fossil Butte with some guidelines for evaluating and perhaps enhancing the use of interpretive media. Because it is designed to provide simple basic descriptive information about Fossil Butte visitors’ behavior at interpretive facilities, the method used was mainly observation of visitors at different times and places in the area. The objectives were:

1. To determine how visitors use interpretive facilities in the visitor center.
2. To determine the length of time visitors stay at particular types of interpretive facilities.
3. To determine characteristics of visitors to the Fossil Butte visitor center.
4. To determine how visitors use a self-guided nature trail.
5. To determine how visitors use two standing displays on the park roads.
One product of this research is information about relative preferences for different types of interpretive media. Cowley (1987) noted that visitor preference information gives an indication of what kind of setting attributes, including types of interpretive media, are most likely to provide opportunities for quality experiences for the full range of visitors. In addition, preference information can contribute to the understanding and prevention of problems such as vandalism and crowding, which threaten the physical resources and the quality of the recreational experience. Another product expected from this study is valuable information of what kind of interpretive facilities visitors most likely tend to use, under what conditions (in the center, or at the trail), and about what topic.

Study Site

Fossil Butte National Monument (FBNM), located 14 miles west of Kemmerer, Wyoming, along U.S. Highway 30, was used as the study site (Figure 1). Fossil Butte was established by Public Law 92-537 on October 23, 1972, to preserve an outstanding paleontological site and related geological phenomena, and to provide for the display and interpretation of scientific specimens of fossils. It contains 8,198 acres, which is only a fraction of the area affected by prehistoric Fossil Lake. FBNM is a unit of the national park system under the administration of the National Park Service, U.S. Department of Interior.
Figure 1. Fossil Butte National Monument map.
Fossil Butte is a unique geological area because of an Eocene epoch fresh-water fossil assemblage (National Park Service, 1991). In addition, the site is of major significance because of its unusual concentration of aquatic vertebrate remains. The fish fossils are the primary resources and, in context with insects, plants, and other animals, represent the evolution of fresh-water fishes better than those from any other known site in America. Moreover, fossil remains of plants and animal life are found in the Wasatch formation. These include fragments of primitive horses, turtles, ancestral monkeys, snakes, birds, and crocodiles (National Park Service, 1991).

The 8,198 acres of the monument also contain a variety of flora and fauna that is unexpected by many visitors. The abrupt changes from dry brushlands and grasslands to forests, and the presence of a variety of wildlife--including antelope, deer, elk, moose, beaver, hawks, and eagles--provide additional dimensions to be experienced at Fossil Butte (National Park Service, 1991).

This monument includes a wide range of outdoor experience opportunities with settings ranging from backcountry to developed. Numerous fossil specimens from the ancient Fossil Lake are on display in the visitor center, which is open year round except winter holidays. The types of interpretive facilities provided in the center are standing displays; audiovisual devices; a manned information desk; a selection of books for sale on fossils, wildlife, and other topics related to the park; a map and brochure box; and 15-minute summer porch programs by rangers.

Besides the exhibits in the visitor center, there are two self-guided trails. One trail
leads visitors to the fossil beds where 50 million-year-old fossil fish were once quarried from the lake bed deposits. This 2.5-mile trail is known as the Historic Quarry Trail, which is available for visitors who wish a closer look at a high-desert environment. The second trail is the 1.5-mile Fossil Lake Trail, which takes visitors through a grove of aspen trees. Along this trail, wildflowers and wildlife native to the area may be seen by hikers. Elevations ranges from 6600 to over 8000 feet. On summer weekends, the 1.5-mile trail is guided by Fossil Butte park rangers twice a day.

Visitors who come to Fossil Butte include tourists from other countries, states, and regions, and also local people from Kemmerer and Diamondville using the Monument for general outdoor recreation. The Fossil Butte register book recorded that in June 1995 there were 1,525 visitor-groups from the United States and 113 foreign visitor-groups. (The term “visitor-group” refers to one person from the group who signed the register book provided at the visitor center representing the entire member.) The foreign tourists originated from countries such as Australia, Canada, Great Britain, Germany, New Zealand, Japan, Switzerland, etc. The FBNM Statement for Management (National Park Service, 1991) estimated that the percentage of visitors’ origin approximately was 1% local, 35% regional, 59% national, and 5% international.
LITERATURE REVIEW

What is Interpretation?

In general, interpretation means an effort to help someone else understand something. In natural settings, interpretive media can be many things, including standing displays, pictures, exhibits, signs, audiovisuals, or even living history programs. The most important point is that interpretation is a very specific type of communication process. And as a process, the primary goal is the successful transmission of information to a group of people (Veverka, 1994, p. 19).

But the term interpretation can also mean different things to different people, because the interpretive component depends on which kind of perspective people see or evaluate things from. So it is understandable that interpretation can be addressed or viewed in many perspectives such as art, management, education, recreation, and advertising (Wright and Wells, 1990). Moreover, interpretation as a component of recreation or tourism involves pursuit of leisure, satisfaction, and sensual experiences.

Don Aldridge of Scotland, at the Second World Park Conference in Grand Teton National Park, defined environmental interpretation as “the art of explaining the place of man in his environment, to increase visitor or public awareness of the importance of this relationship, and to awaken a desire to contribute to environmental conservation” (cited in Sharpe, 1976, p. 4). In addition, interpretation in terms of parks, forest recreation, tourism sites, or historic sites is a communication process designed to reveal meanings
and relationships of one’s cultural and natural heritage to the public (visitors) through first-hand experiences with objects, artificrafts, landscapes, or sites (Veverka, 1994).

The Importance of Recreation Interpretation

Visitors expect to gain new experiences and feel satisfied being at a recreational site. The notion of satisfaction might be indicated by how well visitors understand and appreciate the entire site. However, it is likely very difficult for some visitors to obtain satisfaction without interpretive facilities available. It is strongly presumed that the more difficult an interpretive display is to understand, the more visitors will tend to ignore it, especially if the visitor comes as part of a big family with many children (Field and Wagar, 1973). Most visitors come to a recreation site to have fun and enjoy the environments, so they are in a vacation frame of mind (Veverka, 1994).

Field and Wagar (1973) said that the role of interpretation in recreation sites includes three objectives:

1. Raising the quality of visitors' experiences. Interpretation can assist the visitors in developing an appreciation for the area.

2. Helping land management agencies increase the flow of benefits they provide to the public.

3. Increasing benefits indirectly by providing an understanding of resources.

The importance of interpretive facilities and services could be seen from a visitor study at Great Basin National Park at Nevada, which indicated that most visitors (86.2%)
felt interpretation was usually a moderately to extremely important aspect of their visit to a national park (Blahna et al., 1988). Furthermore visitors felt that educational and informational goals were of equal importance as the primary function of interpretation for visitors.

Other important aspects of the interpretation process that should be addressed in almost all natural resources recreation sites are the issues of preservation and conservation. To some extent, interpretation in recreation areas can protect both the resource (nature trails, camping sites, view points, lakes, geysers, wildlife, and so on) (Sharpe, 1976) from human impact and the visitors from engaging in depreciative behaviors. Visitor enjoyment and satisfaction will be enhanced in such areas. In this way, interpretive facilities provide a useful management tool for a site, for visitors and also managers, in order to help achieve an agency’s mission. Sharpe (1976) mentioned that the one objective of interpretation is to promote public understanding of an agency’s program. And this only could be done with very good interpretation which promotes the image of the agency.

According to Regnier et al. (1994), the goals of interpretation are related to three aspects: site, agency, and visitors. The goals related to the site are to foster proper use and develop advocates for the site. The goals related to the agency are to enhance image of the agency and encourage public participation in management. And the goals of interpretation related to the visitors are provide recreation, inspire and add perspective to their lives, and heighten awareness and understanding of their natural and cultural
Methods of Interpretation

One of the most common interpretation sources in a recreation site is the visitor center. A visitor center is expected to be the first entrance location after a relatively long vehicle journey, and would be a suitable place for visitors to: 1) gain as much information prior to a “walking field-trip” in the area, 2) obtain refreshments to recover energy, and 3) obtain an overview of the main interpretive theme for the site. Based on the audience preferences in a visitor center study at Flaming Gorge National Recreation Area, the important values that visitors assigned to visitor-centers are 1) to look at exhibits, 2) to experience natural stimuli, 3) to get information about the area, 4) to explore or learn, and 5) to learn what to do in the area (Brown et al., 1978). Other reasons why people come to a visitor center are for family/children orientation, utility service, introspection, exercise, outgroup affiliation, lack of something better to do, ingroup affiliation, relaxation/escape, autonomy/achievement (Brown et al., 1978; Blahna and Roggenbuck, 1979) and also to apply for backcountry permits, purchase souvenirs, postcards, etc.

In The Anatomy of An Exhibit, Bitgood (1992b) noted that in an educational exhibition center, which is a very complex environment, one of the visitors’ major goals is to enjoy themselves whether or not they learn anything. Visitors are free to wander through an environment rich with sensory stimulation, where attention to one object or message may compete with another. Studies that conducted and measured visitors’
interest at four interpretive centers found that visitors seemed to prefer interpretive media associated with entertainment, exhibits with motion, sound, or changing lightning (Wagar and Washburne, 1972).

Several interesting points from another visitor center study conducted by Trotter (1989) at Wupatki National Monument, a small National Park Service site similar in size and facilities to Fossil Butte National Monument, were:

1. The average length of stay at Wupatki Ruin and the visitor center is less than 30 minutes. In this time visitors typically move from the parking lot into the visitor center, look at the displays and make purchases, and then move beyond the visitor center to the archeological site itself.

2. Surprisingly, some visitors never make it out of the visitor center to other park facilities. They use the toilet facilities, make purchases, ask directions, and return to their cars. These results are important and useful as a comparison since one of the objects in this study is to identify visitors’ responses to interpretive facilities and services in the visitor center.

Another interesting and important issue in natural resource interpretation is the role and function of interpretive trails for visitors who wish to conduct a self-guided tour. As already mentioned, one of the objectives of this study is to determine how visitors use the self-guided nature trail in Fossil Butte. In order to enhance the experience, it is useful to provide interpretive facilities to clarify what they are looking at by reading a short description from a standing sign, or using a map and leaflet. According to
Sharpe (1976, pp. 247-249):

The self-guided trail, in natural and human history interpretation, is a device which places visitors, usually in family size groups, in direct contact with the park or forest resources. A self-guided trail, in contrast to a conducted tour, means that the visitors are on their own, there is no one to guide them through the trail experience.... the self-guided trail is generally located near campgrounds, lodges, visitor centers, outdoor education centers, or other places of visitor concentration. A trail's value is increased if it has a feature of special interest. Such a feature could be at a lake, a sand dune, a fossil bed, an archeological site, etc.

Several advantages of a self-guided trail are that 1) visitors may use it at their own convenience, especially visitors with very young children, visitors who mostly devote time to photography, or visitors who prefer a leisurely pace; 2) it provides interpretation in out-of-the-way areas; 3) it functions during seasons when personnel are not available for guided tours; and 4) parents can interpret the written words along the trail and answer questions the children may have (Sharpe, 1976). Another advantage of this type of trail is for older visitors who still devote and involve themselves in nature. They enjoy walking in the path without disturbing other younger visitors who tend to hike faster. The main advantage with regard to a self-guided trail is that visitors feel safe enjoying their time in the area due to the existence of interpretive facilities. Because most visitors usually feel strange in the new environment, they depend on the signs, leaflets, brochures, maps, and trail surfacing to guide them safely over the trail and back to the starting point (Sharpe, 1976).

The type of interpretation approach used on trails depends on the kind of
interpretative media needed in a specific site, and the advantages or disadvantages of the method used. Sharpe (1976, p. 257) identified three main options in trail interpretation: 1) the leaflet and marker trail, 2) the sign in place, and 3) the audio trail. On a leaflet and marker trail, interpretation is presented in a printed leaflet carried by the visitor and is keyed to numbered or lettered markers along the trail. The leaflet contains a sequence of paragraphs and illustration, while the marker is used with the leaflet and identifies the stations on the trail. The interpretive story using the sign-in-place trail appears permanently on fixed signs along the trail at the selected stations. The wording and artwork are usually on treated paper, plastic, wood, metal, or a combination of these. The audio trail employs one of two possible methods of interpretation. One is the fixed listening station or “talking label” trail where each station is equipped with an audio device usually controlled by a push button. In the second method, visitors carry a hand-operated cassette player that they activate when they reach the appropriate station.

The type of self-guided trail used for this study in Fossil Butte is the leaflet and marker trail. Visitors could simply obtain leaflets at the visitor center or from a small box attached on a standing display at the starting point. This standing display shows the entire map of the trail and lists the names of the viewpoints visitors can expect to see.

Another interpretive medium whose effectiveness will be measured in this study is the roadside displays on the Chicken Creek road. These consists of two signs that tell stories about wildlife at the monuments and the geological process. They are provided for visitors to read from their own vehicles, an auto version of a self-guided trail. Those
who wish to step out and take a closer look at both the sign and surrounding area are more than welcome to do so. The only obstacle is the limited pull-off space at every roadside display.

The elements of roadside sign preferences play an important role to attract visitors to stop and read the displays provided. Some visitors prefer a rustic stone-structured sign covered with roof, some others prefer reading at a roadside display using contemporary wood material without a roof, and many other visitors are more attracted looking at a routed wood structure sign. A study of exhibit design done by Brunswick et al. (1995) noted that the structural design of scenic byway signs or roadside displays is very important for motivating visitors to stop and view exhibits. There were clear preferences for relatively large signs built from naturally occurring materials.

_Fossil Butte Interpretation Plan_

The purpose of an interpretive plan is to provide a guide for the development of future interpretive facilities and media. In general, the plan covers the agency’s policy goals and objectives, examines the unique characteristics of the site, and the characteristics of the future public who may want to visit this site. An interpretive plan could explain how interpretive resources are to be managed for a variety of uses such as preservation, multiple-use, research, and demonstration (Veverka, 1994). In addition, in planning interpretive programs and services for the site or agency, the marketing plan would look at who is using the site or facilities, demographics, use patterns, and other
visitation trends.

As Sharpe (1976) mentioned, one of the roles of planning in interpretation is to assist the visitor in developing a keener understanding and enjoyment of the area visited, and to provide public understanding of a particular organization and its programs. At Fossil Butte, the monument’s main programs for visitors concentrate on seeing and understanding the significance of the fossils and enjoying the monument’s terrain by means of trails and roads. The 1984 FBNM Interpretive Prospectus (p. 9) noted that the monument’s interpretive objectives are:

1. To convey an understanding of the significance of the National Monument’s resources.

2. To show that the earth is not static. There have been sweeping changes as demonstrated by the past and present environments of Fossil Butte.

3. To stress the importance of the fossil record in reconstructing the earth’s past.

An interpretive theme is a statement that describes what makes the site or object so important that it should not to be forgotten by the visitors (Veverka, 1994). Usually it refers to a unique quality that makes the site or area or object so special. Themes are chosen at the broadest level of interpretive planning and at smaller sublevels (program themes). Program level subthemes at FBNM are:

1. The environments of Fossil Butte.

2. The fossilization process.

3. The discovery and preparation of fossils.
4. The diversity of animals and plants found in and around Fossil Lake.

5. The geological context of the Green River and Wasatch Formations.

6. Differences between Eocene and modern life forms.

7. Stratigraphy (the layers that compose the formation).

8. Geomorphology (how the landforms reached their present configuration).

9. Extent of the fossil lake system.

10. Human history associated with discovery and subsequent quarrying of the Fossil Butte area.

11. The beauty of fossil forms.
PROCEDURES

The primary method of data-gathering for this study was observation. Observation is a qualitative technique that can be used to gain insights about the interpretive phenomenon as it takes place in the field (Wright and Wells, 1990). Observation can be performed in two ways: 1) direct observation, where the observer is known and functions as an onlooker, or 2) participant observation, where the observer takes an active role in the activities or program being studied and whose identity is not revealed. Wright and Wells (1990) mentioned that observation methods could be used to collect useful information with a minimum burden to visitors or to park personnel and at minimum cost to the park. Interpretation assessments that could be captured by an observation method include: 1) investigating problems associated with public use of park areas, exhibits, trails, etc., 2) gathering data about use and non-use of specific park areas, waysides, tours, etc., 3) discovering the relationship between visitors and the interpretive experience and 4) examining the success, failure, or need for change of a program or exhibit.

Since the purpose of this study is to increase the understanding of visitor use of interpretive facilities at Fossil Butte, there were two methods applied in combination in this study. First, visitors were counted and identified by their actions, responses, and the use of interpretive facilities and services provided. Hayward (1988) referred to the method of counting visitors as *behavioral mapping*. Behavioral mapping is a method of describing the users of a space in relation to their activity or location in it. In addition,
the method consists of counting all the people in the designated space (e.g., standing display room), using specific time intervals over different days and times of day.

Behavioral mapping as an empirical observation method focuses on actual behavior and patterns of use rather than hypothetical or recalled behavior. This reinforces the validity of the data and reduces the influence of observer bias (Hayward, 1988). The second methodology used in the study was participant observation, in which a covert approach was applied. The observer acted as a participant, not revealing that he was gathering information from other participants. Instead the researcher was in the same place and doing the same things as other visitors, who did not know they were being observed. Ham (1986) recorded that the precision or resistance to bias by conducting observations of audience behavior during activities is moderate to good.

Data were collected between July 22 through August 1, 1995. The time frame arranged for observations was randomly selected hours in a day, certain days in a week, and certain weeks in a month (a time schedule is provided in the Appendix), to avoid the problem of potential bias. The observation hours were divided into three-hour time blocks: morning (M:09:00 am-12:00 noon), afternoon (A:12:30 pm-3:30 pm) and early evening (E:04:00 pm-07:00 pm). These fall within the peak visitation period during summer. Fossil Butte’s visitor center is open from 8 am until 7 pm in summer (June-August) but visitors are welcome to hike the self-guided trails after business hours. Total observation time was 63 hours, distributed as follows:

1. Visitor Center observation: 12 x 3 hours = 36 observation hours (M,A,E).
2. Self-guided trail observation: 6 x 3 hours = 18 observation hours (M,A,E).

3. Roadside display-observation: 3 x 3 hours = 9 observation hours (M,A,E).

Data Collection

The description of each location studied and the specific data collection procedures are described below. The collection instruments may be found in the Appendix.

Visitor Center

The purpose of data collection in the visitor center was 1) to determine the use of interpretive facilities by recording where visitors were at regular intervals (task VC1) and 2) to observe the behavior patterns of individuals or parties who entered the visitor center (task VC2). There were seven different interpretive facilities where visitors could be observed: standing displays (SD), large audiovisual program (LA), small audiovisual program (SA), bookshelf (B), guest book (GB), information desk (ID), and others (O) (outside these facilities mentioned). An illustration of the standing displays and the 13-minute large audiovisual program can be seen in figure 2 and 3, respectively. Numbers of individuals at each of the seven different interpretive facilities were tallied every 15 minutes in each 3-hour observation period (morning, afternoon, and early evening).

The facilities and interpretive media that constituted the setting attributes in the visitor center are described as follows: The standing displays (SD) are exhibits that interpret the diversity of flora and fauna fossils, time periods of layers that compose the formation, and the fossilization process. The large audiovisual program (LA) is a 13-
Figure 2. One type of standing display at the center interprets stratigraphy and the difference between Eocene and modern life forms.

Figure 3. The 13-minute large audiovisual program interprets the discovery of fossils.
minute program showing the discovery of fossils and the geological context of the Green River and Wasatch Formations. The small audiovisual program (SA) only lasts 3 minutes, telling visitors about the preparation of fossils for scientific display and study. Both devices are self-service, operated by pushing a certain button to start the program. The small audiovisual device is hung adjacent to a preparatory laboratory complete with necessary fossil preparation equipment. Visitors who want to know more about this particular subject are welcome to take a look into the lab through a glass window.

The guest book (GB) and bookshelf (B) are located at the right side of the entrance door, while the information desk (ID) is a circular structured desk standing approximately in the middle of the entire room. The guest book functions as a registration book to record the number and identity of visitors entering the center every day. From this book, Fossil Butte managers could easily identify visitors’ names, origin, and suggestions given for future improvements. It also functions as an interpretive medium because visitors can learn about their fellow visitors. As in most other visitor centers I have seen, Fossil Butte offers a bookshelf corner. Besides books related to fossils, there are items such as slides, posters, and calendars.

An information desk is critical and obligatory in a visitor center. Even when people are very well educated, reading signs and following directions sometimes do not create the desired sense of a human relationship. Visitors still need to ask and speak to someone in charge. At the information desk, visitors can ask questions, get directions, make
purchases, try the rubbing table, or use the Junior Ranger stamp. The rubbing table, which is considered primarily a children’s interpretive medium, is a sample of a well-made fish fossil provided in one corner of the information desk. Visitors can put a piece of wide blank paper on the sample and start rubbing the paper with a crayon. The result is a picture of the same fish as the sample fossil. Another children’s medium provided at the information desk is a Junior Ranger assignment and passport stamp that is used specially for children to stamp their National Park passport at every National Park Service site they visit nationwide.

Interpretive facilities and media not mentioned previously are considered as “other” (O) facilities or media. These includes large and small signs in the visitor center and the fossil preparation lab.

Task VC2 was to observe selected individuals and their groups and record their use of interpretive opportunities in the center. A route was drawn for each selected subject showing which exhibits were viewed. In addition, a combination of qualitative and quantitative data was recorded, such as: the duration spent at each interpretive facility, group composition and interaction, and so forth. The individual selected to follow was the first person (child or adult) in each group to walk into the visitor center. After the person left, the next person from the next group to enter the center was selected and observed, and so on through the 3-hour observation period.
**Fossil Lake Trail**

The purpose of data collection in the Fossil Lake Trail area was to observe the use of the 1.5-mile nature loop trail from an observation point at the Chicken Creek picnic area. From that viewpoint the data recorded were how many visitors used the trail; whether their hike took place after or before a rest or having a picnic; which direction hikers went; how they used the displays provided in the picnic area; and whether they used the self-guided trail brochures. This task entailed recording each group who entered Chicken Creek, but when there were too many groups present to observe effectively, the number of groups was recorded and then two or three groups were selected at random during the sampling period for recording other data as described above. Figure 4 shows the standing display and the attached small brochure box.

**Roadside Displays**

The other task at the Fossil Lake area was to observe the use of two roadside displays provided along the Chicken Creek Road. This paved road connects the visitor center and Chicken Creek picnic area, which leads to the Fossil Lake Trail. The observation took place from the Chicken Creek parking lot using binoculars looking at the two roadside displays. The first display is located approximately 600 ft from the parking lot, on the left side of the road, and describes mammals of the monument. The second display is located approximately a half mile away, also on the left (east) side of the road, and describes geologic processes at the butte.
Figure 4. Information regarding the Fossil Lake Trail and brochures (in attached box) are provided at the trailhead and Chicken Creek starting point.

The data recorded were the percentage of cars coming from south direction that passed the display and that stopped at each sign; the duration of a typical stop; numbers of cars slowing down but not stopping; and the numbers of cars that passed on by regardless of whether it was already occupied or the auto pull-off was available.

Data Analysis

The principal data analysis tools were descriptive statistics for quantitative data (N,
means, percentages) and content analysis for qualitative data. In addition, secondary data have been obtained from the Fossil Butte staff (i.e., numbers of visitors per day in the observation period, as recorded by the information desk staff) for further analysis of how the interpretation offered meets visitors' needs.

The data recorded from each task tally sheet (in Appendix) were analyzed accordingly. The result from task VC1 is a ranking of numbers of visitors at seven different interpretive facilities in three different visitation periods. Since task VC2 was merely to observe group behavior, the product was a description, map route, and the duration of a particular individual and the relationship with his or her group in a certain time. The outcome of the Fossil Lake Trail observation was similar to VC2 except the location was the 1.5-mile nature trail. Meanwhile the result of the roadside display observation was to evaluate whether the roadside displays are utilized by visitors.
RESULTS AND DISCUSSION

*Frequency and Duration of Use of Interpretive Facilities*

The first objective of the study was to determine frequency of use of the interpretive facilities provided in the Fossil Butte visitor center. This section will also discuss the length of visitor stay in each type of interpretive facility, because to some extent frequency and duration of use are related. The more interesting and attractive an interpretive facility, the more people are expected to come and spend time enjoying it. A total of 1,233 people was observed in the visitor center during the 36 hours of observations. Observations showed that all seven interpretive facilities were being used by visitors. During the same period, visitor staff counted 1,574 visitors. The difference comes about because this study counted persons at specific areas within the center every 15 minutes, while the staff counted everyone who walked in the door but did not try to identify what those visitors did inside. Subsequent analyses in this thesis will be based on the 1,233 people whose locations were specifically noted by the observer.

*Large audiovisual program*

Results showed that the large audiovisual program had the largest number of visitors in each visitation period (Morning=25.9%, 8.1 visitors per hour; Afternoon=26.9%, 12.7 visitors per hour; and Evening=32.3%, 7.9 visitors per hour, Table 1 and 2). This means that from a total of 344 visitors at the large audiovisual, 25.9% were counted in the morning visitation period. Likewise, of 46 persons watching
Table 1. Percentage of Visitors at Different Visitor Center Interpretive Facilities

<table>
<thead>
<tr>
<th>Interpretive Fac.</th>
<th>Morning %</th>
<th>Afternoon %</th>
<th>Evening %</th>
<th>Total</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Standing Display</td>
<td>94</td>
<td>25.1</td>
<td>144</td>
<td>25.5</td>
<td>61</td>
</tr>
<tr>
<td>2. Large Audiovisual</td>
<td>97</td>
<td>25.9</td>
<td>152</td>
<td>26.9</td>
<td>95</td>
</tr>
<tr>
<td>3. Small Audiovisual</td>
<td>26</td>
<td>7.0</td>
<td>11</td>
<td>1.9</td>
<td>9</td>
</tr>
<tr>
<td>4. Bookshelf</td>
<td>46</td>
<td>12.3</td>
<td>84</td>
<td>14.9</td>
<td>28</td>
</tr>
<tr>
<td>5. Guest Book</td>
<td>5</td>
<td>1.3</td>
<td>8</td>
<td>1.4</td>
<td>5</td>
</tr>
<tr>
<td>6. Information Desk</td>
<td>54</td>
<td>14.3</td>
<td>81</td>
<td>14.3</td>
<td>57</td>
</tr>
<tr>
<td>7. Others</td>
<td>52</td>
<td>14.0</td>
<td>85</td>
<td>15.0</td>
<td>39</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>374</strong></td>
<td><strong>100.0</strong></td>
<td><strong>565</strong></td>
<td><strong>100.0</strong></td>
<td><strong>294</strong></td>
</tr>
</tbody>
</table>

Percentage of total | 374 | 30.3 | 565 | 45.8 | 294 | 23.9 | 1,233 |

the small audiovisual, 1.9% were counted in the afternoon period.

It is understandable that the large audiovisual program is the most popular interpretive medium in the center, since television in general can easily transport the visitor through time and space. This kind of electronic device can allow visitors to imagine they have gone back in time or at least that they can see, feel, and share some sense of the past. The 13-minute program shows unfamiliar places and tells a story that cannot be told on site, helping visitors visualize what happened at a time in the past. Also, it is a medium that matches the way people often get lots of information, as
Table 2. Visitation Rates for Different Visitor Center Interpretive Facilities

<table>
<thead>
<tr>
<th>Interpretive Fac.</th>
<th>Morning</th>
<th>V/H</th>
<th>Afternoon</th>
<th>V/H</th>
<th>Evening</th>
<th>V/H</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Standing Display</td>
<td>94</td>
<td>7.8</td>
<td>144</td>
<td>12</td>
<td>61</td>
<td>5.1</td>
<td>299</td>
</tr>
<tr>
<td>2. Large Audiovisual</td>
<td>97</td>
<td>8.1</td>
<td>152</td>
<td>12.7</td>
<td>95</td>
<td>7.9</td>
<td>344</td>
</tr>
<tr>
<td>3. Small Audiovisual</td>
<td>26</td>
<td>2.2</td>
<td>11</td>
<td>8.9</td>
<td>9</td>
<td>0.8</td>
<td>46</td>
</tr>
<tr>
<td>4. Bookshelf</td>
<td>46</td>
<td>3.8</td>
<td>84</td>
<td>7.0</td>
<td>28</td>
<td>2.3</td>
<td>158</td>
</tr>
<tr>
<td>5. Guest Book</td>
<td>5</td>
<td>0.4</td>
<td>8</td>
<td>0.7</td>
<td>5</td>
<td>0.4</td>
<td>18</td>
</tr>
<tr>
<td>6. Information Desk</td>
<td>54</td>
<td>4.5</td>
<td>81</td>
<td>6.8</td>
<td>57</td>
<td>4.8</td>
<td>192</td>
</tr>
<tr>
<td>7. Others</td>
<td>52</td>
<td>4.3</td>
<td>85</td>
<td>7.1</td>
<td>39</td>
<td>3.3</td>
<td>176</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>374</td>
<td>4.5</td>
<td>565</td>
<td>6.7</td>
<td>294</td>
<td>3.5</td>
<td>1,233</td>
</tr>
</tbody>
</table>

Note: Each observation period (morning, afternoon and evening) is 12 observation hours. V/H = visitor per hour.

passive seated receivers rather than active participants.

At Fossil Butte, viewers not only can witness the action of scientists discovering 50-million-year-old fossils, but they also can try to imagine the changes of environments from the past to present. In a study done at an exhibit center, Bitgood (1992a) found that people have a tendency to approach landmarks, animals, moving objects, sound, and large objects. Such factors can be used to attract visitors in the direction we wish to lead them. Although the large audiovisual and standing displays are located at the far end of the visitor center from the entrance door, visitors tend to approach these facilities and sometimes create a crowd. Bitgood (1992a) also
emphasized that people tend to approach an area containing other people.

Observation showed that most visitors who stopped and watched the large audiovisual program stayed and watched the entire program. The average length of stay was 10.5 minutes per visitor (Table 3), with the duration of stops ranging from approximately 8 minutes to 13 minutes. The program was well made in educational and communication terms. Many scientific terms related to paleontology and geology are applied in the program to help visitors interpret the information about fossils. The program also provides caption words in English on the screen to help foreign tourists keep up with dialogues, conversations, or speeches.

Standing display

The second most attractive interpretive facility was the standing display (Morning = 25.1% of visitors stopping, 7.8 visitor per hour; Afternoon = 25.5%, 12.0 visitors per hour; Evening = 20.7%, 5.1 visitors per hour; Tables 1and 2). The huge crocodile and fish fossil displays in the standing display section may be the most attractive animal media in the center. This area encourages visitors to imagine themselves living in an ancient period millions of years ago. Comments in the guest book show visitors' great appreciation towards the fossils, which most of them have never seen before.

Closer observation shows that visitors also spent much time in the standing display area (rank 2, average length of stop = 7.7 minutes per visitor, Table 3). One
Table 3. Average Length of Stops (in minutes per visitor) at Visitor Center Interpretive Facilities

<table>
<thead>
<tr>
<th>Interpretive Facilities</th>
<th>Morning</th>
<th>Afternoon</th>
<th>Evening</th>
<th>Average Length of Stop</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Standing Display</td>
<td>8.1</td>
<td>8.2</td>
<td>6.8</td>
<td>7.7</td>
<td>2</td>
</tr>
<tr>
<td>2. Large Audiovisual</td>
<td>11.5</td>
<td>9.3</td>
<td>10.8</td>
<td>10.5</td>
<td>1</td>
</tr>
<tr>
<td>3. Small Audiovisual</td>
<td>2.3</td>
<td>3.4</td>
<td>3.5</td>
<td>3.1</td>
<td>4</td>
</tr>
<tr>
<td>4. Bookshelf</td>
<td>4.9</td>
<td>5.5</td>
<td>2.7</td>
<td>4.4</td>
<td>3</td>
</tr>
<tr>
<td>5. Guest Book</td>
<td>1.0</td>
<td>-</td>
<td>1.1</td>
<td>0.7</td>
<td>9</td>
</tr>
<tr>
<td>6. Information Desk</td>
<td>1.9</td>
<td>1.5</td>
<td>2.5</td>
<td>2.0</td>
<td>5</td>
</tr>
<tr>
<td>7. Others</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Large Sign</td>
<td>2.2</td>
<td>1.5</td>
<td>0.9</td>
<td>1.5</td>
<td>7</td>
</tr>
<tr>
<td>B. Preparation Lab</td>
<td>1.3</td>
<td>1.1</td>
<td>2.5</td>
<td>1.6</td>
<td>6</td>
</tr>
<tr>
<td>C. Small Sign</td>
<td>1.5</td>
<td>2.5</td>
<td>-</td>
<td>1.3</td>
<td>8</td>
</tr>
</tbody>
</table>

Total average time in the visitor center = 33.4 m/v

Note: Calculations are based on observation of a subset of visitors whose behaviors were tracked through the entire duration of visit. The length of each stop was measured with a stopwatch.

reason is that the interpretive message here is complex. Not only do visitors with young children need extra time to explain the meaning of some messages or labels in each display, but sometimes adults also need time to digest several scientific terms. But for serious visitors, this part of the visitor center offers a challenging opportunity to learn new information about fossils. Another possible reason why people spent much time in this area is that the displays offer a large variety of information about
subjects such as the discovery of fossils, the fossilization process, and prehistoric wild animals and plants. Therefore, one reason why visitors stay longer is simply that there is so much more message to absorb.

On some occasions, visitors seemed to be not bored with the displays while enjoying it unhurriedly. Based on comments overheard by the observer, visitors learned that approximately 50 million years ago at this place and its vicinity there existed a totally different kind of environment, containing flora and fauna that nowadays visitors only can see in the form of fossils.

One interesting phenomenon during the evening visitation hour was that visitors spent less time at the standing display section (length of stop = 6.8 mpv) but much longer watching the large audiovisual (length of stop = 10.8 mpv). This probably indicates visitor fatigue, an internal factor that may influence visitor length of stay. In the evening, many visitors might already feel too tired to enter the complex standing display section and prefer to sit and enjoy the audiovisual.

Small audiovisual program

Unlike the large audiovisual program, the small audiovisual display did not seem to be an attractive interpretive medium. The average length of stop is 3.1 minutes per visitor (rank 4), relatively the same duration as the program. Some people even watched parts of the program more than once, accounting for the average duration of stop that is longer than the program itself. However, the visitation rate is low at every
observation period.

One reason for its lower attractiveness may be the layout of the visitor center. The program is shown in a video screen located in a place where distractions are common. Visitor traffic patterns might be a problem to take into consideration, as well as the small size of the screen. The program must compete for attention with visitors at the information desk, coming out of the restroom, or looking into the preparation lab. Haeseler (1989) mentioned that there are two main types of factors believed to affect visitors’ length of stay, internal and external. Internal factors include settings (indoor or outdoors), attraction content, visitor service, and visitor fatigue. Although the content of the small audiovisual program was attractive, the setting obviously may hinder some visitors from stopping to watch. Space planning is important in accommodating visitors and their use of an exhibit (Hayward, 1988).

A drawback of the layout of the small audiovisual area is the limited number of seats (4 chairs). In *Audiovisuals, a Suitable Case for Treatment*, Miles (1989) noted that seated visitors stayed longer at an audiovisual display than those who were standing. Furthermore, visitors who come to watch one audiovisual program only stayed if seats were available. It is occasionally claimed that seats serve as resting points for tired visitors, irrespective of the quality of interest in the audiovisual. But since Fossil Butte is located in a very remote area, this situation is less likely to occur. Most people who come to Fossil Butte have driven a long way and probably do not need to sit some more. With a short length of program about an interesting subject,
there is insufficient justification to add more seats at the expense of taking up more room and reducing space available for potential standing visitors.

**Information desk**

The information desk is the third most used facility in the center, with an average stop length of 2.0 minutes per visitor (rank 5). These results indicate that an information counter is still one of the interpretive facilities that must exist in a visitor center. People still need to obtain direct human service or to communicate with someone in charge in the area. Based on qualitative observations, visitors come to the information desk to perform multiple activities, like making purchases and asking directions or questions.

Young visitors can also use the rubbing table. The rubbing table is a unique and creative interpretive facility provided in one corner of the information desk. While primarily a children's exhibit, not only children are interested in trying this activity, but also parents and teens. Unfortunately this can cause a slight problem, as there is only one rubbing apparatus provided at the otherwise beneficially structured information counter.

Another children's medium provided is the Junior Ranger assignment and passport stamp. The Junior Ranger assignment is a task for children to answer questions provided about fossils. If they succeed in fulfilling this assignment, they are rewarded by being honored as Junior Rangers and given a Ranger badge. A passport stamp is
used to sign children’s national park passports at every National Park Service site they visit nationwide. In this way children are an active participant and can be expected to gain more knowledge about the national parks they have visited.

**Bookshelf**

Although the bookshelf is less attractive, with only 2.3 visitors per hour, visitors do spend more time there (rank 3, average length of stop = 4.4 minutes per visitor) making selections of which kind of book or item they intend to purchase. This bookshelf could be considered as both a sales counter and an information source that provides visitors many high-quality books and publications related to the exhibits, as well as general topics related to the National Park Service. There are postcards, slides, and posters about fossils. Through this information source, people can try to interpret or find the meaning of confusing terms or subjects related to fossils.

**Guestbook and Other Interpretive Facilities**

Table 3 shows that visitors spend little time at the interpretive facilities determined as “others” such as the fossil preparation laboratory (average length of stop = 1.6 minutes per visitor, rank 6), large sign (average length of stop = 1.5 minutes per visitor, rank 7), and the guest book (average length of stop = 0.7 minutes per visitor, rank 9).

Basically, the guest book is an optional registration book for visitors to fill in their identity and write down suggestions for future improvements. The main function
of this book with regard to interpretation management is to provide park managers some ideas on how much visitors know about fossils, how effective the interpretive media provided work, or whether these visitors are satisfied with the present facilities. Not all visitors who entered the center wrote their identity and comments, possibly because they felt reluctant, ignored the book, or feel it is not important at all.

Sometimes visitors filled in their names or comments after they had read several previous pages concerning other visitors comments or suggestions. Examples of the comments or suggestions include: Beautiful specimens! (Wyoming), Very informative and educational (Canada), Worth the sidetrip (Montana), Worth the time (New Zealand), Need more publications (Iowa), Beautiful building (New Mexico), Put it on computer (Wyoming), Very nice trail (Indiana), Very good display (England), Need to have area for kids (Washington).

Visitors spend time at the porch for viewing the butte with or without binoculars, taking pictures, consuming food and beverages, or just walking around the center. The preparation laboratory display is a small room filled with equipment showing how scientists prepare fossils after they are discovered in the field. Similar to the optional guest book is the donation box established to allow visitors to contribute for operations at Fossil Butte, which has no entry fee.

Visitor Behavior and Activities in the Visitor Center

The Fossil Butte visitor center is an impressive hexagonal building (Figure 5). There
Figure 5. Fossil Butte visitor center map.
is no admission charge and the entrance door is easy to find, connected through a
pathway to the parking lot. Visitors can also enjoy walking around the center porch to
view the butte and enter the building by an alternate entrance door that is open for the
public. The lobby is very close to the information counter and can be treated as a small
reception area for visitors. Actual observation noted that the lobby is the main
distribution point where visitors stop to decide wherever they most want to go at that
moment. This center is also accessible for people with disabilities or parents with
strollers.

The Fossil Butte visitor center provides people many choices to obtain information
such as brochures, maps, directions signs, and certainly the information counter. Some
general principles in visitor orientation studied by Bitgood (1992a) noted that people
need redundant way-finding cues. Some visitors prefer to ask for directions at the
information desk, some prefer to find information on their own, and still others may
obtain information in both ways just to make sure or confirm their own beliefs. Repeated
cues of information may also build a feeling of security to visitors and a sense of human
relationship. In a primarily outdoor landscape like Fossil Butte, once visitors are hiking
on the self-guided trails, there is nobody out there to ask.

Observations of visitors' behavior were made of 52 groups. Of that total, 30 groups
(57.7%) entered the visitor center using the right-side pathway inside the building, 19
groups (36.5%) used the left side, and three groups (5.8%) directly approached the park
ranger at the information desk with some questions and then went out after their
questions were answered. In his study about visitor flow and crowd pressure in a museum hall, de Borhegyi (1965) found that visitors almost invariably turn to the right when entering an exhibition hall. Other studies by Bitgood (1992a) also emphasized that, in the absence of explicit or implicit cues, when entering a room visitors tend to turn right.

In the case of Fossil Butte, visitors who turned to the left (clockwise) generally did so if they saw a crowd blocking the way at the bookshelf section or if they used the restrooms after asking directions at the information desk. Most visitors who turned to the right side tended to approach the large audiovisual area where other people were watching the program, or the standing display section due to the very attractive, huge crocodile fossil display. Actually, visitors could also reach the standing display area through the left side since the shape of the building is hexagonal. This tendency to turn to the right (counterclockwise) has no correlation with the attracting power of large audiovisual program or the standing displays. Any attractive interpretive facility will certainly attract many visitors regardless of the direction they come from. The hexagon-shaped building only gives people a choice to start their tour from wherever they wish to. A sample map of a visitor’s route through the center is shown in Figure 6.

Visitors’ behavior at the large audiovisual area may vary. The program is started by visitors pressing a button, and there are 23 seats provided for them to sit. Most visitors stayed and watched the entire program very seriously and quietly. Sometimes
Legend:
GB = Guest Book.
DB = Donation Box.
BS = Bookshelf.
SS = Small Sign.
LA = Large Audiovisual.
SD = Standing Displays.
SA = Small Audiovisual.
PL = Preparation Lab.
LS = Large Audiovisual.
ID = Information Desk.

Figure 6. Sample of visitors' route in the center.
a few visitors gave undisturbed comments to their peers beside them while watching the program. Interestingly, visitors stayed and watched whether they arrived at the beginning of the program or after it had started for a few minutes. Only visitors who came very late did not attempt to watch and either waited for the next show or moved to another interpretive facility. A few children seemed to lose interest in the program and left the audiovisual area while their parents remained watching. However, there was no trouble with unruly children even in mid-afternoon—a time of day called Monster Time by rangers at Wupatki National Monument (Trotter, 1989) because children were most likely to exhibit disruptive behavior at that time.

A minor problem with both audiovisual programs is the leakage of sound. This may be a small general irritant to visitors looking at other interpretive facilities in the relatively small center, especially visitors who are looking at exhibits adjacent to the large audiovisual area or who are at the information desk. If both audiovisuals are playing at the same time, the sounds may interfere with each other for 3 minutes, the length of the short program. While this may be distracting to some visitors, to others listening to the sound of music or conversation coming from audiovisual devices while wandering and looking at exhibits could enhance the experience.

Visitors’ behavior at the standing display section also may vary. Obviously visitors with children react differently than those without. They need more time and patience to explain messages at every display provided or to answer questions asked of them. One display that certainly needs parents’ explanation is the fossil process
display. Parents with more than one child sometimes had trouble trying to answer two different questions about two different displays. Children lose interest if they have no idea what they are looking at or they cannot relate it with their daily activities. As Veverka (1994) noted, good interpretation must relate with people’s daily activities. This is difficult with a subject such as fossils, especially for children. But their behavior did not at all disturb other visitors who were still enjoying their tour.

One display that seemed to draw particular interest used a magnifying glass to show fossils. A minor problem occurs in this section. Children found this attractive if they were tall enough to use the display. Some of the adults and teens were impressed by the stingray fossil seen by the magnifying glass, maybe because they are familiar with that species. Many visitors, including the younger ones, were impressed by the prehistoric flora and fauna drawing that covers one entire wall, showing a crocodile, snake, and horse with the lake background.

Overall, observations showed that the activities visitors undertake at the FBNM visitor center allow them to: 1) get information about the area by asking questions and directions of the park ranger, 2) look at and learn about an exhibit and then discuss or explain it with another member of the group or their own children, 3) take pictures using a still or video camera in the center or outside the porch, 4) complete the Junior Ranger assignments, or make a drawing at the rubbing table (children), 5) make purchases, 6) contribute in the donation box, 7) enjoy the butte from the surrounding porch, and 8) attend the Ranger porch program.
The ranger porch program received some positive comments directly from visitors and in the guest book. Although the short general lectures were full of technical and scientific terms, they were followed by plenty of time for visitors to ask individual questions. The different types and shapes of geological rocks and fossil samples that presenters handed out to visitors for a closer look were very helpful. Many visitors, regardless of their age, asked questions about fossils or about the butte in front of them. This program took place at the back porch of the center so visitors could take a very good view of the butte. This is offered twice a day, conducted only during summer season, and lasts for about 15 minutes.

Visitor Use at the Self Guided Nature Trail

The self-guided nature trail chosen for observation was the 1.5-mile Fossil Lake Trail, which provides hikers a view of the flora and fauna on the monument. At this self-guided loop trail, markers have been placed and numbered at five different locations along the trail, which represent the different environments and natural features (Figure 7). The five attractions are: 1) beaver pond, 2) high desert, 3) Green River formation, 4) aspen grove, and 5) dead and down material (National Park Service, 1991).

Hikers are expected to travel while reading the map that corresponds with the markers at each location. The actual starting point begins at the Fossil Lake trailhead, but hikers can also make a start from the Chicken Creek picnic area if they wish.
Figure 7. Self-guided Fossil Lake nature trail map.
Observation was done from the Chicken Creek picnic area, but hikers using the alternative starting point could also be counted and monitored from a distance by using binoculars, although certain behavior such as taking brochures could not always be seen from a far.

Thirty-one groups were observed using the Chicken Creek area in 18 hours of observation, with a total number of 106 people (or about 5.88 visitors per hour during the sampling period). There was an average of 3.42 people per group. Group composition showed that there were more adult females (N = 38, 35.8%) than adult male hikers (N = 33, 31.1%), but a lot more children were male (N = 27, 25.5%) than female (N = 8, 7.5%). Most visitors were estimated as young to middle aged and a small number were over 50 years old. A small number of couples with babies in strollers used a path and deck designed for disabled people but did not use the trail. Eighteen of the hiker groups (58.1%) used the picnic facilities at Chicken Creek while 12 groups (38.7%) did not use it at all, and 1 sample group could not be determined (Figure 8). Most of the sample groups (61.3%) used the nature trail. Usually people prefered to take a rest and enjoy the picnic area prior to exploring the trail.

Visitors seek the security of an identified trail (Trapp et al., 1994). Therefore, a trail head, a map, or a sign about the trail are important interpretive media that must be provided. Whenever we are inviting visitors to the backcountry, wilderness, or hiking trails, safety is not an amenity anymore but a necessity and legal obligation.

Observation showed that of the 22 groups whose behavior could be completely
Figure 8. Visitor use at the self-guided nature trail from Chicken Creek starting point.
determined, 68.2% (15 groups) took and read the trail brochures, which provide a map, and only 31.8% (7 groups) did not take a brochure. This suggests that hikers still need to be well informed about the trail they expect to hike. They try to avoid hazards and enjoy a safe hike as much as possible. But on the other hand, since the distance of the trail is merely 1.5 miles, perhaps some hikers may feel they can get a more challenging and adventurous walking experience without using the brochure. Alternatively, one or more in the group may be repeat visitors to the area.

Observation also indicated that 51.6% of hikers (16 sample groups) used the Chicken Creek picnic area as the starting point, while 48.4% (15 groups) who started the hike from the trailhead used the picnic facilities as a resting area after the hike. For those who began at the upper trailhead, typically most of the party took advantage of being in the picnic area while the head of the family continued the walk back uphill to the parking lot for the vehicle. The average duration of the walk, regardless of the starting point used, was approximately 1 hour.

Other behaviors and activities recorded are as follows: visitors hiking with their leashed dogs (2 groups = 6.5%); visitors who came down to the picnic area only to take a drink at the available fresh water fountain (3 group = 9.7%); persons who were not disabled using the handicapped picnic deck because it is not occupied (6 groups = 19.3%); and one sample group (3.2%) that decided not to try the trail (turned back to their vehicle) after they read the brochures from the box.
The Effectiveness of Roadside Displays

Two roadside displays on Chicken Creek road were observed. The first roadside display describes *Mammals of the Monument*, while the second one is entitled *Slump or Landslide*? In 6 hours of observation, 6 of the 13 vehicles (46.1%) passing by stopped at the first display, and 6 of the 11 vehicles (54.5%) passing by stopped at the second display. Furthermore, only about half of those who stopped actually read the displays. That may suggest that many visitors are not interested in roadside displays, or it may simply reflect the fact that repeat visitors may not stop to read the signs each time. At any rate, the use rate of 2 visitors per hour raises the question of whether roadside signs are worth their cost in a low-visitation monument such as Fossil Butte.

The average duration of a stop at the first display was 18 seconds/vehicle and at the second was 55 seconds/vehicle. This result is both reasonable and surprising. The first roadside display shows seven different kinds of mammals that are known to occur in Fossil Butte and explains about those mammals that visitors can expect to see. The sign is fairly simple and interesting, and the pictures are familiar for average visitors, which means there is little reason for them to read it for such a long time. Trapp et al. (1994) mentioned that travelers today are moving very fast. Signs must be simple and use letter forms and symbols that communicate quickly.

Reading the second display requires more time, attention, and patience since it is dealing with the more technical subject of geological process. Yet surprisingly, these
visitors kept reading and did not ignore the sign. Visitors who read these roadside signs did not attempt to get out from their vehicle. Stops were recorded at both the afternoon and evening visitation period.
CONCLUSIONS

Visitor Center

Among all the interpretive facilities studied at the visitor center, the large audiovisual program is the most attractive (rank 1) and frequently used facility (rank 1). For indoor interpretive purposes, using audiovisual programs would be an appropriate means to convey difficult subjects effectively in a manner that is enjoyable and easy to understand. However, standing displays are important for depicting fossils themselves in an attractive manner.

Previous research at another small national monument (Trotter, 1989) showed that visitor experiences can be adversely affected if interpretation for children is not presented, because children will find ways to amuse themselves that are often destructive or disruptive when their needs are not met. However, there were no findings of a “Monster Time” either in the visitor center and its vicinity or the self-guided trail. This may be because of the relatively small size of the center, which allows parents to control and supervise their children from the time they arrive at the parking lot. Also there are no potential natural resources for children to vandalize very close to or within the visitor center. Fortunately, Fossil Butte interpretive planners have anticipated children’s interpretive needs by providing youngsters with the rubbing table, Junior Ranger assignment, and passport stamp facilities.
Fossil Lake Trail

The Chicken Creek picnic area, which includes a parking lot, restrooms, picnic tables, and an accessible deck and pathways, is a good spot for hikers to take a rest after a hike or to enjoy a picnic before the hike. The trail brochure and map in the box attached, except the standing sign, are sufficient to meet visitors’ needs before they start to make the hike. Results showed that 61.5% of the groups who stopped used the trail and 68.2% read the brochures. However, 60% did not read the glass-protected standing signs provided in the Chicken Creek picnic area. In a backcountry outdoor landscape, visitors seek a safe and enjoyable experience, and brochures provide information that can enhance that experience.

Roadside Displays

It seems that many visitors are not very interested in the roadside displays provided at Chicken Creek Road. There are many possible explanations for the relatively low percentage of vehicles (46.1% 1st display and 54.5% 2nd display) stopping at those displays. As Brunswick et al. (1995) have noted in a study of national park and scenic byway signs, exhibit design and visibility play a significant role in motivating visitors to stop and view wayside exhibits. Structures with sufficient scale and mass to attract attention can also enhance the visual resources if creatively designed and carefully sited. The Chicken Creek signs are designed to be unobtrusive, and therefore may be missed by many visitors. Another possible explanation is simply that repeat visitors may not
stop and read the signs again.

Every interpretive facility accommodates a different range of experiences for visitors. Dealing with an unfamiliar subject such as fossils, interpretive planners and managers need to know and choose the right type of interpretive facility to be used in the right place, at the right time, and by the right person. For example, using a brochure is more helpful when visitors hike a trail than in a visitor center where more complex standing displays can be protected from weather and vandalism.
SUGGESTIONS

Visitor Center

Almost all visitors came in groups that included children. The only interpretive media provided for these young visitors are the rubbing table, Junior Ranger assignment, and passport stamp. The rubbing table was the facility most used compared to the other two facilities. Most of the children used the rubbing table at least once, but they often had to wait in line, watching adults or other children demonstrating it first. Since this interpretive medium is most likely interesting for children, adding one or two more rubbing apparatuses with different fossil types (e.g., miniature crocodile or palm fossils) would be interesting.

If adding more apparatuses would create unpleasant crowding at the information desk, rubbing tables could be moved to another location in the center called the discovery area. Besides all the interpretive facilities associated with children already provided at FBNM, in this particular area “touch and feel exhibits” of fossils or geological rocks, as were used by the ranger in porch programs, could also be placed there. The target audience in the discovery area would be all visitors, but the main focus would be children. One message to emphasize in this area would be a reminder for children and also parents not to vandalize fossils or rocks when they hike any trail.

Visitors can obtain a good view of the butte and its vicinity from the back porch of the center. From here visitors can also enjoy watching wildlife that can suddenly appear,
like a group of deer grazing or passing by. One suggestion to enhance this experience would be to install one or two automatic binoculars at that point. In this way, visitors who did not bring their own binoculars could also enjoy the view. Hopefully these improvements could increase the quality and length of visitors’ stay.

One recommendation in order to enhance the value of the excellent porch program is to manage it differently. Presentations could be given whenever a certain number of visitors were present and rangers’ other duties permitted (on demand basis) rather than twice a day whether there are visitors or not. Data showed that in the afternoon period (45.8%) there were more visitors compared to morning (30.3%) and evening (23.9%), so more porch programs could be given then. The program could flexibly be applied based on the high numbers of visitors at any visitation period.

As discussed, there are many possible reasons that made the small audiovisual less attractive and less visited (rank 6) than other media. Since the main issue seems to be space planning, it may be appropriate to move and integrate it with the large audiovisual program, which is the most attractive interpretive facility. In that way, visitors could watch two different films for a total of 16 minutes. Other advantages of this redesign are that visitors who wish to observe the fossil preparation lab, or visitors who are at the information desk will feel more comfortable.

The average length of stay of visitors at the preparation lab (independent of watching the small audiovisual program) is 1.6 minutes per visitor (rank 6). To increase visitors’ length of stay, experience, and satisfaction, Fossil Butte staff could demonstrate
the actual procedure from inside the lab. In that way, visitors can really visualize and know how to prepare a fossil. Schedules can be arranged between demonstration and porch programs to avoid time conflicts and to prevent crowding in front of the window glass lab. Signs explaining the fossil preparation could be erected at the lab, and interpretive talks could be given when fossils were actually being prepared. Alternatively, if the small audiovisual is left where it is, it may be helpful to install headphones to reduce sound leakage.

The standing display section is the second most attractive interpretive facility. Data showed that visitors also spent much time there (rank 2, average length of stop 7.7 mpv). As discussed, children will find this section more attractive if they can use the magnifying glass properly. One suggestion to solve this minor problem is to provide a small step for these young visitors. Hopefully this effort can increase their quality of experience and knowledge about fossils.

The optional guest book is located at the right-hand side of the room where it is rarely used (rank 7). To encourage visitors to use it, the FBNM staff may want to move the book to another strategic location where visitors are more likely to fill in and write down comments and suggestions after their tour in the center. For future management improvement purposes, suggestions and comments from visitors are extremely important. And visitors mostly have no idea what to suggest if they have just arrived. Since most visitors follow a counterclockwise path through the visitor center, the guest book may be more visible if placed to the left side of the room near the exit.
**Fossil Lake Trail**

Observation showed that a majority of visitors (60%) did not read the signs in the Chicken Creek picnic area. This is probably because the signs simply show the two-sided opened brochures, which visitors might already have taken from the center and would not need to read again while standing. Also, two of the signs do not relate to the picnic area or nature trail. One of the disadvantages of standing displays or exhibits, especially outdoors, is they are a poor medium for dealing with abstract subjects although they are excellent at relating visitors to the scene before them (Morgan and Kodak, 1995). It may be much better if the brochures are replaced with some other useful and attractive information about the area, such as an enlarged Fossil Lake nature trail map, or pictures of the five locations visitors can expect to see. Messages such as the way to volunteer for a national parks job may be better provided in the visitor center, which has much higher visitation.

**Roadside Display**

Planning a roadside display is very challenging because it can be difficult to motivate visitors to stop and view the displays. Visitors in their vehicles often have no expectation for this type of interpretive facility. If finances are available, the only management suggestion to increase visitors’ attention to the roadside displays is to redesign the displays to more closely match preferences for wayside exhibit elements such as using natural materials, and increasing the scale and structure of the displays.


APPENDIX
OBSERVATION OF GENERAL VISITORS' BEHAVIOR
GOAL: WHAT TYPE OF INTERPRETATION FACILITIES PEOPLE USE.
LOCATION: VISITOR CENTER.
DATE: .................................. HOUR: .....................................

TASK VC1

<table>
<thead>
<tr>
<th>Location</th>
<th>Visitors number/description</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Standing Display</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2. Large audiovisual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. Small audiovisual</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4. Bookshelf</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. Guests Book</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6. Information desk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7. Others</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description:
AM= adult male. CM= children male.
AF= adult female. CF= children female.
OBSERVATION OF GROUP BEHAVIOR.
LOCATION: VISITOR CENTER.

DATE: ..................................... HOUR: ....................................... GROUP: ..................

TASK VC2 (one tally sheet per group).

1. Behavior of individual in the group:

2. Interpretive facilities used and duration:

3. Number of people in party:

4. Composition (approx. Age and gender):
   a. Adult male:
   b. Adult female:
   c. Children male:
   d. Children female:

5. Other important notes:

6. Route:
OBSERVATION OF VISITOR USE AT THE SELF-GUIDED NATURE TRAIL
LOCATION: FOSSIL LAKE TRAIL.

DATE: .................................. HOUR: .................................. GROUP: ..................................

TASK: FLT1 (one tallysheet per group).

1. Number of people in the group:

2. Group Composition (approx age and gender):
   a. Adult male:
   b. Adult female:
   c. Children male:
   d. Children female:

3. Utilize the picnic facilities: yes / no.

4. Read the displays provided: yes / no.
   If the answer is yes, time spent for reading:

5. Utilize the nature trail: yes / no.

6. If they use the trail, do they take the brochures: yes / no.

7. Other necessary notes:
OBSERVATION ON THE USE OF ROADSIDE DISPLAYS
LOCATION: CHICKEN CREEK PARKING LOT
DATE: .................................. HOUR: ..................................

TASK: FLT 2

I. First Roadside Display
1. # of cars stopping
   # of cars slowing down
   Occupied / Not occupied
   # of cars passing

2. Duration of typical stop:

3. License plate:

II. Second Roadside Display
1. # of cars stopping
   # of cars slowing down
   Occupied / Not occupied
   # of cars passing

2. Duration of typical stop:

3. License plate:
# OBSERVATION TIME SCHEDULE:

<table>
<thead>
<tr>
<th>Date/Hours</th>
<th>09.00-12.00 (Morning)</th>
<th>12.30-3.30 (Afternoon)</th>
<th>04.00-07.00 (Evening)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Saturday, 7/22/95</td>
<td>FLT1</td>
<td>VC1/VC2</td>
<td>FLT1</td>
</tr>
<tr>
<td>2. Sunday, 7/23/95</td>
<td>FLT1</td>
<td>VC1/VC2</td>
<td>FLT1</td>
</tr>
<tr>
<td>3. Monday, 7/24/95</td>
<td>VC1/VC2</td>
<td>FLT1</td>
<td>VC1/VC2</td>
</tr>
<tr>
<td>4. Wednesday, 7/26/95</td>
<td>VC1/VC2</td>
<td>FLT2</td>
<td>VC1/VC2</td>
</tr>
<tr>
<td>5. Saturday, 7/29/95</td>
<td>VC1/VC2</td>
<td>VC1/VC2</td>
<td>FLT2</td>
</tr>
<tr>
<td>6. Sunday, 7/30/95</td>
<td>FLT2</td>
<td>VC1/VC2</td>
<td>VC1/VC2</td>
</tr>
<tr>
<td>7. Tuesday, 1/8/95</td>
<td>VC1/VC2</td>
<td>FLT1</td>
<td>VC1/VC2</td>
</tr>
</tbody>
</table>

Note: Total time was 63 observation hours.