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WILDLIFE-RELATED PERCEPTIONS OF VISITORS IN CADES COVE, GREAT SMOKY MOUNTAINS NATIONAL PARK

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Degree

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I am submitting herewith a dissertation written by Bruce C. Hastings entitled "Wildlife-related Perceptions of Visitors in Cades Cove, Great Smoky Mountains National Park." I have examined the final copy of this dissertation for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Doctor of Philosophy, with a major in Ecology.

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ABSTRACT

Wildlife viewing has become a popular recreational pursuit in the United States. However, little has been documented about visitor perceptions of wildlife at specific locations. An ideal site for conducting such a study was the Cades Cove region of Great Smoky Mountains National Park. Wildlife were abundant and often visible in Cades Cove, resulting in many positive human-wildlife interactions.

A total of 400 visitors were interviewed in their vehicles at the end of an 18 km one-way road through the Cove. Sampling was conducted during July and August of 1983. Participants were asked to take a 10-page questionnaire home to be completed at a more convenient time. The mail return rate for completed questionnaires was 85%.

The opportunity to view wildlife was a very important factor in visitation of Cades Cove; 92.3% of the respondents noted wildlife viewing as a reason for their trip to Cades Cove. More than half (58.1%) left their vehicles specifically to observe wildlife, and 56.1% also photographed them.

At least 38 species of wildlife were observed by visitors, the most common being white-tailed deer (91.0%). Other commonly reported animals included crows (70.8%), groundhogs (51.5%), black bears (29.3%), gray squirrels (28.8%), wild turkeys (19.3%) and "other birds" (28.8%). Animals commonly seen outside of the Park or not immediately perceived as wildlife (e.g. crows, squirrels, songbirds) were often not reported until visitors were shown a list of wildlife.

Rankings of visitor preferences and expectations for viewing wildlife, and actual observations of wildlife were all correlated with

each other (range of tau = .63 - .75). Participants who were interviewed in their cars expected to see white-tailed deer more than other species, but stated a preference for bears. The most preferred animals reported by questionnaire respondents were deer, bears, turkeys, eagles, and raccoons, respectively. The least popular animals included snakes, bats, and lizards. Preferred groups of animals were often aesthetic or important culturally and historically. Commonly feared, and domestic animals were least preferred.

Analysis of attitudes toward specific management issues demonstrated that: (1) most people would not object to markers on deer, particularly if the reason for the markers' existence was explained by the NPS and/or the color of the markers blended with the pelage color; (2) most people supported reintroduction of some animals (e.g. elk, river otters, undomesticated bison, and peregrine falcons), while being less enthusiastic toward re-establishment of wolves and mountain lions; (3) although exotic species such as wild hogs and coyotes were not preferred animals for viewing, they were not as universally rejected by the public as the Park Service might prefer; and (4) more people supported the present NPS management of overpopulated deer (i.e. transport out of the Park for populating other areas for eventual hunting) than any other alternative. Additional analysis demonstrated that attitudes were not highly influenced by current NPS wildlife information, that a wildlife brochure should be developed specifically for Cades Cove, and that all information sources should try to improve attitudes toward wildlife and wildlife management as well as provide knowledge.

In general, visitors were not very knowledgeable in any of six areas of wildlife and wildlife management (range = 44.6% - 58.2% correct answers). The most influential variables associated with knowledge were time of day when viewing took place and educational background. Visitor age, hunting orientation, and type of area where the respondent grew up were not related to any knowledge index. Reading the park wildlife brochure also appeared ineffective in significantly increasing knowledge for the items investigated. Knowledge was, at best, weakly correlated with attitudes toward wildlife and wildlife management.

Existing data on the wildlife resource in Cades Cove were integrated with information generated by this study about visitor preferences and needs for wildlife in order to develop wildlife viewing programs. The major questions of visitors (e.g. when and where to see different species) were answered using results of past research in Cades Cove on such animals as bear, deer, raccoon, groundhog, and skunk. Numerous alternatives for providing wildlife viewing opportunites were also outlined from integrating results of this survey with a review of the literature on management and interpretation of wildlife. The most notable recommendations for Cades Cove included providing more wildlife habitat along streams and fences, subdividing some fields, developing two short wildlife loop trails and three quiet walkways, adding a few paved pulloffs in key wildlife viewing areas to avoid traffic jams, and increasing emphasis on wildlife in the interpretation of Cades Cove.

A theoretical model was proposed to explain how various factors may be influencing how people think and act toward wildlife. While this survey was not designed to test the model, the theoretical framework may be useful in understanding some of the results and providing guidance for future research.

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CHAPTER I

INTRODUCTION

Background

Wild animals have been important to people throughout human existence. People have depended upon wildlife for food, clothing, and numerous other uses. Civilization has only gradually minimized the utility of wildlife by producing necessary staples through domestication of animals and technology. Nevertheless, much of the world is still somewhat dependent on wild animals, and some nations, including the United States, have combined the taking of wild animals for food with that of sport. Hunting and fishing in the U. S. are still popular (USDI 1978a). Pope et al. (1984) demonstrated that the recreational use of wildlife (mostly deer hunting) in Texas often contributes more to private land values than does traditional livestock production.

Nonconsumptive uses of wildlife, however, are beginning to prevail over more traditional consumptive activities (Lime 1976). Woodin (1966, pp 75-76) suggested that wild animals "have esthetic values which may become more important to the human race in the long run than any others which they might possess." Results of a 1977 nationwide survey (USDI 1978a) demonstrated that about half of the adult population (85 million people) had observed nature, watched birds, and/or photographed wildlife during the previous year. Another national survey (USDI 1977) showed that more than a quarter of the

population over 8 years old had made trips specifically to view wildlife in its natural habitat; 8% had also made trips for wildlife photography in natural areas. In 1980, about 29 million Americans took trips primarily to observe wildlife and almost twice as many people watched animals in residential settings (Lyons 1982). Thus, wildlife viewing is important to recreation in areas where wildlife can be seen, and watching animals is becoming more popular than traditional consumptive wildlife activities.

Numerous factors have influenced the move to less consumptive uses of wildlife. As mentioned above, domestication of animals and increased technology have reduced the need for wildlife products. The decline in rural population has also been prominent in this change (Lime 1976). Rural values are gradually being replaced by more urban lifestyles, which still create interest in wildlife, but with less emphasis on hunting and fishing (More 1979a). Urban living not only reduces the opportunity for adults to participate in consumptive sports, but decreases the chances of childhood participation (particularly with hunting), which is a primary means of forming interest in these activities (Hendee 1969). Other factors probably include shrinkage of wildlife habitat and available recreational land, a decline in hunting quality, and an increase in the number of people participating in conservation, outdoor recreation, and antihunting activities (Lime 1976). There is also the possibility that the popularity of nonconsumptive uses of wildlife has been in existence longer than suspected but only recently recognized. Social research on wildlife has traditionally concentrated on hunting and fishing.

Types of nonconsumptive recreational use of wildlife in natural settings have been outlined by Lime (1976). The most popular activity is probably viewing animals. Within this broad category fall numerous subcategories, such as animal observation, birdfeeding, wildlife photography, sketching, painting, and studying behavior. Seeing signs of animals is also interesting to many people; deer tracks, beaver dams, bird nests, and bear scats have likely caught the attention of many outdoor enthusiasts. Numerous people enjoy listening for sounds from such animals as songbirds, owls, whippoorwills, frogs, wolves, and coyotes (Shaw 1974, Lime 1976). Even when the probability of seeing or hearing a certain species is remote, just knowing that it exists within the nearby area can be satisfying to many people (Tombaugh 1971, Lime et al. 1978, More 1979a).

Nonconsumptive use of wildlife in artificial surroundings can also be important. Visiting zoos, circuses, and museums brings many people into direct contact with wildlife (More 1979a). In fact, a nationwide study (USDI 1979a) demonstrated that visiting zoos, aquariums, fairs, or carnivals was the most popular outdoor recreation activity in America. Vicarious enjoyment is also popular, and can be derived through television, films, books, magazines, newspapers, art, photography, friends, stories, oral presentations, scientific research, museums, caged pets, postage and migratory waterfowl stamps, and perhaps affiliation with wildlife preservation and environmental activism organizations (Hendee 1969, Hendee and Potter 1971, Faulkenberry and Cowan 1974, Aney and Cowan 1975, Evenden 1975, Lime

1975, Lime 1976, More 1977, Hendee and Schoenfeld 1978, Knudson 1978a).

Wildlife viewing is enjoyed throughout the United States. Participation appears to be highest in the western, the north-central, and northeastern regions (More 1979a). Horvath (1974a in More 1979a) reported somewhat less participation in the Southeast than the nation as a whole. However, the average monetary benefit received in 1971 by a southeastern household for a day of wildlife enjoyment (i.e. nonconsumptive use) was $70.71 compared to $47.09 and $42.93 for hunting and fishing respectively (Horvath 1974b). Southeastern people would have demanded $91.31 to give up one day of their wildlife enjoyment, and lost an average of 6.3 days pursuing nonconsumptive activities. These figures indicate that nonconsumptive uses of wildlife are very important to southeastern residents, even if their overall participation is less than that of other regions of the United States.

Statement of the Problem

Although wildlife viewing is known to be an important recreational pursuit, little has been documented about specific sites to observe and photograph animals. One natural area associated with wildlife observation is Great Smoky Mountains National Park (GSMNP, Park, Smokies). The animal which comes to mind when the Smokies are mentioned is usually the black bear (*Ursus americanus*), which has often been seen and fed along roadsides. Due to improved management,

panhandling bears are seen less often and the influence of other species on visitors is becoming prominent.

The most important area for seeing wildlife within GSMNP is Cades Cove. The Cove is a unique historical area maintained in a pastoral setting of almost 1,000 ha. Its open fields are interspersed with small wooded areas and completely surrounded by a larger forest. Management for pioneer history has turned out to be good management for many wildlife species. Wildlife are relatively abundant and often visible in the Cove, resulting in many positive human-wildlife interactions. These species include large mammals such as white-tailed deer and black bears; smaller mammals such as woodchucks, skunks, raccoons, and foxes; and birds such as songbirds, wild turkeys, ruffed grouse, and vultures. Even bobcats and golden eagles are occasionally seen. All species of wildlife are, of course, protected throughout the area.

Thus, Cades Cove is one of the more important areas in the southeastern United States for viewing wildlife in a natural setting, and for teaching people about wildlife and ecological relationships. The problem is that not enough emphasis is placed on the relationships between wildlife and visitors. A parkwide wildlife brochure exists and interpretive talks help educate some visitors, but improvements can be made. An understanding of the perceptions, preferences, attitudes, and knowledge of visitors toward wildlife should be documented and integrated with existing scientific knowledge on the wildlife resource of Cades Cove. This action would help develop better education of the public and management of wildlife viewing

without interfering with historical promotion of the area.

Purpose

The purpose of this study is to improve: (1) the understanding of wildlife viewing and human-wildlife relationships, (2) interpretation of wildlife, and (3) management of wildlife within the Cades Cove Area of GSMNP. The intent is to provide these improvements by investigating perceptions, preferences, attitudes, and knowledge of visitors in relation to wildlife.

Objectives

(1) To assemble and interrelate the wildlife literature pertinent to human-wildlife interactions, perceptions, preferences, knowledge, and attitudes.

(2) To document the wildlife species that visitors see, expect to see, and prefer to see in Cades Cove.

(3) To establish the impact of wildlife viewing on visitation of Cades Cove and GSMNP.

(4) To determine the attitudes of visitors toward wildlife information and wildlife management in Cades Cove.

(5) To determine the public's knowledge of wildlife, wildlife information, and wildlife management in Cades Cove.

(6) To integrate the findings of this study with (a) existing scientific data on the wildlife resources of Cades Cove, and (b) those in the literature on perceptions of wildlife.

(7) To provide recommendations to the National Park Service on important aspects concerning management and interpretation of wildlife for public viewing and other nonconsumptive uses.

Approach

The approach used to address the study objectives involved a survey of visitor perceptions about wildlife in Cades Cove, Great Smoky Mountains National Park. A total of 400 visitors were interviewed in their vehicles at the end of an 18 km one-way road tour through the Cove. Sampling was conducted during July and August of 1983. Participants were asked to take a 10-page questionnaire home to be completed at a more convenient time. Most of the study objectives were pursued through the written questionnaire. In addition, several background characteristics were obtained.

CHAPTER II

LITERATURE REVIEW

Relationships between people and wildlife have not been thoroughly researched. Fortunately, this trend is changing. An increasing number of studies are attempting to answer the major questions in human-wildlife relationships: How do people interact with different species of wildlife? How do people perceive wild animals? Which ones are preferred, and why? What are the major attitudes held toward various types of wildlife, and how can these attitudes be improved? How much do people know about wildlife, and how can this knowledge be improved or otherwise altered to change attitudes?

The purpose of this chapter is to provide an overview of the current knowledge on human-wildlife relationships. The concentration will be almost entirely on nonconsumptive or appreciative activities. These terms will be used synonymously throughout the remainder of this manuscript. The author realizes that neither term is entirely appropriate since "nonconsumptive" or "appreciative" activities often lead to as many or more impacts on wildlife as other recreational uses (Weeden 1976, Wilkes 1977), and that "consumptive" or "exploitive" users also enjoy nonconsumptive activities (Grieb and Graul 1975, Arthur et al. 1977, Witter 1978, Lyons 1982), find many associated experiences more important than the harvest itself (Hendee 1972, Potter et al. 1973a, Arthur 1979), and are often unsuccessful in taking game or fish. However, these terms are generally understood

and accepted in the literature and will therefore be employed in this paper. Nonconsumptive use will be defined as any activity where wild animals are enjoyed without a deliberate attempt being made to kill (e.g. most hunting, fishing, and trapping activities) or otherwise remove the animal from its habitat (e.g. catch-and-release fishing, live trapping).

Human-Wildlife Interactions

A human-wildlife interaction will be defined for the purposes of this manuscript as a meeting of at least one wild animal and one human, where the presence or behavior of one affects the other.

Interactions can be described from more than one approach. For example, one might discuss aspects of direct versus indirect effects of these interactions. It appears most appropriate, however, to focus on direct effects and to organize this portion of the dissertation in terms of positive and negative influences on people, wildlife, and agencies responsible for human-wildlife interactions. Although observational studies have been conducted on interactions between people and a number of different species (Appendix A), human-wildlife research appears more complete for bears than other groups of wildlife. In her review of human-wildlife conflicts, Ream (1979) attributed the domination of people-bear relationships within the human-wildlife literature to the dramatic appeal and potential danger of bears. Thus, bears will be used as the primary species for illustration in the following discussion.

Negative Aspects

Results of human-wildlife interactions can often be considered negative or inappropriate for people, wildlife, and management.

Problems for people. Direct interactions between people and wildlife can lead to a number of problems for humans. The most severe, of course, ends in human death. Although this outcome is very rare in North America, it does occur, particularly with grizzly bears (Herrero 1970a, Mundy and Flook 1973), polar bears (Davids 1978), occasionally black bears (Whitlock 1950, Norris-Elye 1951), and possibly poisonous snakes. Non-fatal injuries due to bears are more common, and many national parks are known for such problems. Great Smoky Mountains National Park has been averaging about 2.5 bear-related injuries per year in the 1980's (USDI 1984). Although the ratio of injuries to visitation may be considered quite low (Herrero 1970a), it should be kept in mind that certain recreational activities and specific behaviors may increase the probability of injury or at least aggression. Because of extensive research conducted in this area and its partial applicability to other wildlife, human-bear interactions deserve further mention.

Most close interactions follow the animal's habituation to people (i.e. a decrease in response to people after repeated encounters). Bears in national parks are rarely punished for failure to avoid humans, and often not only reduce the individual distance maintained but become neutral to the presence of humans (Herrero 1978, Hastings

1982). A lack of harassment has long been correlated with diminished fear of people (Geist 1972, Jonkel 1975, McCullough 1982).

The more often non-harassing encounters occur, the more rapidly some animals lose fear of people (Hendee and Schoenfeld 1978). As the tourist season progresses, contacts with humans rise and habituation becomes increasingly prominent (Tracy 1977, Aune 1981, Hastings 1983, Jope 1983). Some believe that bears take two or three years to change from timid animals rarely seen by humans to bold or aggressive nuisances (Hendee and Schoenfeld 1978). However, not considering those bears taught to be problems by their mothers, the author has observed some wild bears that appeared to take considerably less time to habituate to people in localized areas of concentrated food resources or when watching other problem bears successfully approach people for food.

Habituation may be followed by what Jonkel and Servheen (1977) termed "cultural deterioration." At this point more severe problems develop from a learned association reinforced with food (Stokes 1970). Everything else being equal, areas of wilderness with high human visitation appear more likely to have serious bear problems than those areas less frequented by people (Mundy and Flook 1973, Martinka 1982, Keay and van Wagtendonk 1983). This higher visitation may provide sufficient artificial food to place bears on a "variable ratio schedule" powerful enough to motivate bears to interact with people (Stokes 1970, Hastings 1982), even though the animal is probably enveloped in an approach-avoidance conflict (Tate 1981). A variable ratio schedule is an operant psychology term referring to

reinforcement occurring after a variable number of actions, and often leading to a high and constant rate of responding (Ruch and Zimbardo 1971). If bears are rewarded often enough for being near people, many will habitually approach human-use areas. This variable ratio schedule is similar to that employed by gambling institutions, which explains why some bears continue to visit campgrounds after stricter regulations make less food available than in previous years.

Once animals overcome their fear of people enough to deliberately approach them for food, then problems associated with food loss and property damage are compounded with the potential for aggressive encounters. Aggression in black bears usually occurs in response to inappropriate human behavior, and appears precipitated most by close proximity (Hastings et al. 1981), and by people crowding around bears (Tate 1983). Grizzlies are less predictable than black bears, and are considered more aggressive. While human aggression may sometimes be appropriate to rid campsites of black bears or even to prevent occurrence of black bear aggression (Hastings et al. 1981), the best method to prevent grizzly attack is to avoid the situation (Jonkel and Servheen 1977). A number of techniques for evading dangerous interactions between bears and people have been suggested for visitors (Herrero 1970a, Jonkel and Servheen 1977, Hastings et al. 1981) and managers (Cole 1971, Jonkel and Servheen 1977, Contor 1978, Hendee and Schoenfeld 1978, Martinka 1982, McCullough 1982); most methods are focused on preventing bears from approaching people for food, and people from approaching bears for any reason.

Bears are not the only animals attracted to artificial food sources. Some of the best known situations include raccoon (Procyon lotor), oppossum (Didelphis marsupialis), common crow (Corvus brachyrhynchos), wolf (Canis lupus), gray squirrel (Sciurus carolinensis), and various species of chipmunks, mice and other rodents, jays and other birds, insects, and a number of African wildlife (Pienaar 1968, Grace 1976, Chapman 1977, Wall and Wright 1977, Hendee and Schoenfeld 1978, Guth 1979). Obviously not all of the implications of human-bear interactions apply to each of these species, but similarities do exist. In addition to habituation resulting in property damage, personal injury, and the potential for death, interactions can stimulate human fear (Jope 1983), even if the situation does not warrant it. However, some people are well aware that even relatively small, "harmless" animals can transmit diseases to people anywhere, including urban areas (Smith 1974).

Additional negative aspects relevant to wildlife viewing include the potential for interactions to become too popular. For example, too many people interacting with some non-ursine species may actually result in enough unintentional harassment as to reduce future opportunities for observing the animals (Hendee and Schoenfeld 1978). Overly enthusiastic people might also cause technical problems for other wildlife viewers, such as the traffic jams once prevalent in many of our national parks. More importantly, these same people might hold inaccurate beliefs or inappropriate attitudes and behaviors which are reinforced during interactions where no educational information is provided.

Problems for wildlife. We saw in the preceding section that habituation in wildlife can lead to problems for people. A number of literature reviews and annotated bibliographies have concentrated on the impacts of outdoor recreation on wildlife (see Potter et al. 1973b, Neil et al. 1975, Ream 1980, Boyle and Samson 1983).

The difficulties for wildlife are probably more severe because animals can be adversely affected by both habituation and lack of habituation. Those species or individuals that habituate quickly to people may be more likely to be injured, killed, or otherwise removed from their habitat. Many animals are hit by vehicles each year (Pienaar 1968, Dean and Tracy 1979, Singer 1978), which may be more common for animals deliberately approaching people in concentrated human-use areas. They may also become easy targets for poachers (Singer 1975). In addition, management agencies may be forced to relocate or destroy individual animals that pose a threat to human safety or cause unacceptable levels of property damage (Bryan and Jansson 1973). In some cases, those that are not removed may experience physiological problems from becoming dependent on artificial foods (Kesteloot 1967).

The effects of interactions on unhabituated wildlife may be just as severe, but are often masked. Many animals are disturbed by hikers (Gray 1977), wildlife observers (Boyle and Samson 1985), photographers (Kesteloot 1967, U.S. Coun. Env. Qual. 1972, Boyle and Samson 1985), and numerous recreationists who may be uninterested in wildlife (e.g. some snowmobile operators). A combination of hikers, photographers, and hunters is particularly harassing to some species (Geist 1971a).

Human-wildlife interactions may lead to changes in both spacial and temporal use of habitat. Unhabituated animals may avoid available habitat and thus confine themselves to smaller areas and distribute themselves differently (Geist 1971a, 1978; Stalmaster and Newman 1978; Boyle and Samson 1985). Migratory movements may also be altered by "car fences" operated by wildlife observers (Dean and Tracy 1979). In addition, behavior is often altered (Scott-Williams 1967). Animals may change their activity patterns (Geist 1971a, Aune 1981) or even abandon their young in response to disturbance (Chapman 1977). Predator-prey relations are often modified, with prey being unusually vulnerable in some instances (Memphis State Univ. 1971, Bart 1977, MacInnes 1980), and predators being adversely affected in others (Memphis State Univ. 1971, Blodget 1975). For example, Blodget (1975) has demonstrated suppressed predation on weekends in an area heavily used by weekend ORV's.

Human disturbance may be particularly harmful to certain types of wildlife. For example, young animals and animals with young are less tolerant of disturbance than many other wildlife (Cowan 1974, Bart 1977, Ream 1979). Endangered or newly reintroduced species should obviously be avoided. Colonially nesting birds are also vulnerable because breeding populations concentrate in small areas, and eggs and young are defenseless when adults are absent (Boyle and Samson 1985). Other critical locations for interactions to be avoided include dens, salt licks, desert waterholes, breeding grounds for lek species, etc. (Cowan 1974, Ream 1979).

There are also critical periods when negative aspects of interactions are magnified (Tracy 1977). Disturbance results in physiological costs to animals (Geist 1971a), especially in energy expenditures. These costs may ordinarily be negligible, but during critical periods (e.g. when food is scarce) any disturbance might have serious consequences (Cowan 1974, Dorrance et al. 1975). Although adverse weather could reduce the number of interactions by sending most people indoors, even a few interactions might have serious repercussions because of increased energy requirements (Blodgett 1975).

Different aspects of human presence may affect various species differently. For example, moose in some areas may be frightened by voices while unaffected by the sight and scent of the same people (Cobus 1972). The opposite may be true for other species. Nevertheless, a few generalities are evident. An animal's initial reaction to an object, movement, odor, or sound is to orient towards it. Based on its past experience, the animal will then approach, ignore, avoid, flee, or become aggressive to it (Klinghammer 1978, Aune 1981). The animal is likely to habituate to undisturbing and consistent human behavior (Hendee and Schoenfeld 1978). In general, unintentionally disturbing events include loud or sudden noises (Geist 1971b, Memphis State Univ. 1971, Thomson 1972, Speight 1973, Tracy 1977), sudden movement (Geist 1971b, Tracy 1977), direct approach (Tracy 1977, Hastings 1982), increasing numbers of people (Dick 1982, Tate 1983), accompaniment of dogs (Godfrey 1975), and walking above the animal on a hill (Elder 1977, Freddy 1977). Sometimes, vehicles

being driven at unusually fast or slow speeds can be alarming to wildlife (Singer 1975). Stopping or leaving a vehicle may also cause a disturbance (Tracy 1977, Dean and Tracy 1979), especially when the occupants leave the road (Schultz and Bailey 1978). The bottom line is that animals do best in known, predictable environments (Geist 1971b, Cowan 1974, Cooper 1982), and humans should keep appropriate distances from the species involved (Bell 1963).

Problems for agencies. It should be evident at this point that human-wildlife interactions can result in a number of adverse consequences for both people and wildlife. Management agencies responsible for these interactions are also likely to experience problems. In areas which allow hunting, how much of the resource should be managed for traditional hunting usage, and how much for increasingly popular nonconsumptive wildlife activities? How does an agency manage for both wildlife viewing and hunting? Although possible (Hendee 1972), it is difficult. Many state conservation agencies are beginning to wrestle with these problems, while some federal bureaus may be even more involved (see Hendee 1969). However, data in this dissertation pertain largely to nonsoncumptive use and the following discussion will mostly consider agency problems resulting from direct interactions during appreciative activities.

Wildlife managers, especially in national parks, are often put into conflicting or contradictory situations. For example, they may be directed to protect wild animals from harassment, although lack of harassment may cause some species (e.g. black bears) to reduce

avoidance behavior and lead to problems for visitors, managers, and eventually themselves (Hastings et al. 1981). As a result, park employees may deliberately harass the wildlife or take other actions to separate them from people. Again, a conflict arises because the species which managers try to separate from visitors are often the wildlife that recreationists are most interested in seeing (Buchanan and Sundstrom 1984). Additional conflicts materialize because visitors are divided on how management should handle certain problems (Marsh 1970), which can lead to adverse public relations regardless of what managers do. Problems are particularly controversial when animals are destroyed or their food sources drastically altered by management in order to prevent further interactions, especially if some believe that the action is endangering a species' existence in the area. Just such a controversy has arisen over the management of grizzly bears in Yellowstone National Park, with managers calling for the rapid removal of artificial food sources and the relocation or destruction of nuisance bears (Cole 1971, 1974), while others insist that these measures are far too extreme (Craighead 1979, Chase 1986). To complicate matters further, an additional controversy existed at the same time between those who believed that managers should consider removal of grizzlies altogether from sub-Canadian national parks (Moment 1968, 1969, 1970; Wilbur 1970), and those who contended that people and grizzlies could coexist in these areas (Caras 1969; Herrero 1970a, 1970b).

A similar conflict for National Park Service managers is the almost contradictory directive of NPS policy to "preserve," but also

to do so for the "enjoyment of the people." Human influence, whether direct or indirect, is the greatest threat to the goal of preservation (White and Bratton 1980). Preserving the wildlife in a pre-Columbian state, while encouraging, or even allowing, direct interactions between visitors and wildlife, is an understandable enigma for many managers.

Managers are aware that interactions can reinforce inappropriate behavior in both species, that people may be injured, that injured parties may sue the agency (Giles 1963, Gilbert 1976), and that wildlife habitat might be damaged during interactions, particularly for smaller animals (Ream 1979). Keeping people and wildlife apart requires large investments of money and time. Some of the more expensive methods, such as reducing interactions with special wildlife crossings (Singer 1978), may not be especially controversial, while others (e.g. relocation or destruction of bears) may cause numerous public relation problems. In addition, simply removing individual nuisance animals does not solve the problem unless the habitat is altered such that conspecifics will not simply replace them (Smith 1974, Eagar and Pelton 1978). To reduce interactions without eliminating the animals, visitor use may need to be restricted (Contor 1978) and other regulations must be enforced, neither of which are accepted enthusiastically by all of the public. Although people may concede that other users impact wildlife, many do not believe that they influence animals themselves while engaged in nonconsumptive activities (Cooper 1982). Even if the majority of users comply with restrictions, the actions of only a few people may jeopardize the

privileges and safety of many (Martinka 1982).

Positive Aspects

While the previous discussion, as well as most studies on this subject, has demonstrated that a number of adverse consequences are possible, it is probably misleading to view the majority of human-wildlife relationships in such a light (Cooper 1982). The following text will outline some of the benefits and services which can result from these interactions.

Benefits to people. Natural resources provide multitudes of benefits to people. Many of these are appreciated indirectly, such as trees being converted to lumber which is eventually transformed into homes, furniture, etc. Aesthetic resources can be appreciated more directly (Daniel and Zube 1979); interactions with wildlife can have direct and positive results.

Another important distinction between aesthetic and other resources arises when deciding how to evaluate them. Aesthetics are not traditionally a part of the market system and therefore difficult to appraise (Daniel and Zube 1979). However, it is possible to express wildlife in market terms, such as the total expenditures for nonconsumptive wildlife use during 1980 being estimated at $14.8 billion (USDI 1982a). Aesthetics can be defined in psychological terms (e.g. attitudes, perceptions, preferences, satisfactions), social terms (e.g. social trends, traditions, and behavior), and ecological terms (e.g. diversity, energy role) (Shaw and Zube 1980a). The wildlife values most considered in this dissertation are those

stated in psychological terms, which are difficult to label with price tags. Improving attitudes and perceptions are not only good for the public and for wildlife, but also for relevant agencies, and will be discussed later. The satisfactions and benefits derived directly from interactions are the primary concern of the present discussion.

Satisfactions and benefits are often confusing terms. Hendee (1972) stated that they are not interchangeable, that they are similar to what many authors refer to as "values" (see King 1947, Shaw and Zube 1980b), and that satisfactions lead to benefits. For example, photography of bighorn sheep might result in exertion while finding the sheep and photographs to show friends after returning. These satisfactions realized from the interactions could then lead to physical, mental, and emotional benefits such as improved health, self esteem, and efficiency. These benefits are not only important to the individuals directly involved, but also to society through a healthier, happier, and more productive population (Driver and Brown 1978, Haas et al. 1979). In addition, off-site users not directly involved in the interactions may also receive satisfaction just knowing that wildlife are being preserved and that the opportunities for future use exist, and many of the on-site users are frequently off-site appreciators at other times (Tombaugh 1971, Driver 1985, Kellert 1984). This concept is especially applicable to national parks.

Human-wildlife interactions can provide a variety of satisfying experiences, some of which have already been mentioned. Many of these satisfactions are shared by other recreationists such as hunters and

fishermen (e.g. physical exercise, escape, simplicity, companionship, sociability, relaxation and general enjoyment, skill development and display, enjoyment of nature, and aesthetic appreciation) (Hendee 1972, Hendee and Bryan 1978). Others might include learning about nature, expression of art (e.g. painting and photography), relating experiences to others, and occupying excess time. Aesthetic and emotional experiences appear most important to wilderness recreation (Shafer and Mietz 1969). Even when aspects of wildlife are not the primary reason for visiting an area, observing and interacting with animals may add significantly to people's overall satisfaction (Lime and Cushwa 1969, Manski et al. 1981). For a few people, wildlife may be the driving force in their lives, such as those who feed animals in city parks on a daily basis, and even hire others to continue whenever unable to visit the animals themselves (Manski et al. 1981).

Another important satisfaction is excitement. Our society has done much to separate many of its people from not only outdoor occupations, but also excitement (Brocke 1977). Interactions with wildlife can provide people with thrills not experienced in daily living. Even danger can be an important positive aspect of outdoor recreation, through either a direct confrontation with wildlife or simply by knowing that the possibility exists (Hendee and Schoenfeld 1978). Interactions perceived as dangerous (e.g. with bears) often highlight trips. Minor property damage can not only lead to improved respect and understanding of a species, but can serve as a "trophy" (e.g. a water bottle riddled by bear teeth) and a reminder of an experience worth telling others.

Benefits to wildlife. Interactions can lead to a number of benefits to people, but what of wildlife? Animals have the most to lose when associated with people. What can be gained by interacting directly with people?

Many people have an almost insatiable appetite for feeding wildlife. The most common form of this activity is illustrated by some bird watchers. In a nationwide survey, Kellert (1985) found that about 3% of the nation are dedicated birdwatchers, and about one-quarter are at least casual birdwatchers. More (1979a) estimated that 20 - 25% of U. S. households engaged in birdfeeding during the mid to late 1970's. Shaw et al. (1985) estimated that 62 million Americans fed wild birds in 1980, and that consumers spent $517 million on birdseed during the same year. This food may be important to hundreds of millions of birds, particularly where feeding is consistent.

Artificial feeding, whether intentional or not, can also improve the short-term health of other animals, as seen in small mammals (Clevenger and Workman 1977) and black bears (Graber and White 1983) in campgrounds. As mentioned previously, some believe that artificial foods are necessary to maintain viable populations of grizzly bears in Yellowstone National Park (Craighead 1979, Chase 1986).

The presence of people in wildlife habitats may help some animals obtain natural foods. Predators have been known to use people to obtain prey. The most notable example is one where lions (Panthera leo) learned to use rows of tourist cars as decoys or cover, behind which they would stalk prey (Pienaar 1968). As long as these

situations do not lead to imbalances in predator-prey relationships, the predators can gain considerably from humans at close proximity without becoming dependent on handouts or endangering property and lives.

The more non-disturbing interactions that exist, the more likely and rapidly habituation will occur for many species (Hendee and Schoenfeld 1978). If this familiarity with people does not lead to the problems mentioned earlier, then a number of benefits can be realized from it. Habituation to humans can result in more efficient use of resources for wildlife (Tracy 1977; Geist 1971b, 1972; Cowan 1974). This helps maintain relatively large population sizes essential to long term viability (Geist 1972). In fact, habituation may be essential to a relict population increasingly invaded by people (Geist 1975). Even if interactions result in animals avoiding small areas much of the year, this avoidance may leave a rich food supply for critical periods when hunger is sufficient to overcome fear of nonconsumptive users (Rost 1975).

The most positive result of interactions to wildlife is probably the indirect benefits associated with changes in human perceptions and attitudes. Better understanding and a closer relationship with animals may lead to support of conservation programs which protect and improve wildlife habitat.

Benefits to agencies. Wildlife and the public are not the only recipients of benefits from nonconsumptive human-wildlife interactions; resource agencies can also gain. Seeing wildlife may

have a profoundly positive effect on recreational trip satisfaction of users (Lime and Cushwa 1969, Flewelling and Johnson 1981, Sundstrom 1984), which reflects a good image of the agency. Properly conducted interactions can increase visitor knowledge of wildlife (More 1977). More importantly human perceptions, attitudes, and behavior may also be improved. These people may return to the site as more knowledgeable, responsible users. They may also spread their information and beliefs to off-site acquaintences and inexperienced on-site users. Interactions can lead to sensitivity to and concern for relevant problems (Knudson 1978b). Kellert (1985) has shown that birdwatchers who put considerable time into their sport become exceptionally knowledgeable, interested, and protective of wildlife and the environment, without necessarily opposing the activities of more traditional wildlife users. They also tend to exhibit an ecologically oriented perspective toward wildlife. Thus, engaging in nonconsumptive wildlife interactions on a semi-regular basis may lead to support of appropriate conservation programs.

Perceptions toward Wildlife

Perception is the process, act, or result of understanding, apprehending, or becoming aware of something directly through the senses or in one's mind. Perception has also been described as the development of "meaning" resulting from past and present sensory input (Leukel 1976), and the ordering principle that gives coherence and unity by sensory input (Ruch and Zimbardo 1971).

Psychologists view environmental perception as part of the internal organization of external stimuli. Attitudes, knowledge, beliefs, behavior, values, personality factors, and demographics are all relevant to the study of perception. However, the relative importance and the manner in which they interact is still unclear (LaHart 1978). Some authors treat many of the above variables as types of perceptions, while others treat them as separate but influential factors.

LaHart and Tillis (1974) believe that all resources are ultimately defined by human perception, and that perception of resources is particularly noticeable for recreational, scenic, and aesthetic resources because of the internal and personal way they are used. Man's relation to wildlife is a perfect example of this perception.

The manner in which a situation is perceived by managers or the public often governs management actions more than reality, the difference between perception and reality being critical (Bryan and Jansson 1973). Even when perceptions of different objects are similar, people may differ in the values, preferences, and goals they establish for these objects (LaHart 1978). Human impacts on wildlife have often been a function of perceptions and attitudes (Walter 1978). Feelings about animals may influence people's behavior, willingness to support programs or organizations, and response to management actions (More 1977).

Kellert (1983) described the lack of systematic investigation of human perception of animals as surprising given the theoretical and

practical significance of the subject. He specified three components of perception which are notably important to human-animal relationships: cognitive, affective, and evaluative aspects. The cognitive type refers to knowledge and factual understanding of animals; the affective aspect refers to feelings and emotions attached to animals; and the evaluative component concerns beliefs and values associated with animals. Kellert (1983, pp 242-243) stated that:

> "knowledge and awareness of animals can be regarded as involving cognitive perceptions primarily, evaluative views secondarily, and least of all, affective perceptions. Symbolic views of animals, on the other hand, are mainly affective, evaluative in a secondary sense, and least subject to cognitive understanding of animals. Finally, attitudes appear to fall in between the other two areas---that is, they are most strongly influenced by values and beliefs of animals (the evaluative perspective), but also reflect cognitive and affective perceptions."

Thus, perceptions are highly diverse, ranging from a minor or insignificant insight to an overall understanding or disposition toward a class of related subjects. The approach taken in this dissertation will be that knowledge, beliefs, values, and even attitudes, as well as combinations of these variables, can be either types or components of perceptions.

Information on human perception of wildlife is useful in at least five management contexts: constituency identification, multiple-satisfactions, resource allocation, social impact and trade-off analysis, and public awareness/environmental education. The latter may be the most important to management (Kellert 1983). The wildlife views of most Americans appear to be based on limited

understanding and awareness (Kellert 1980a). In order to improve perceptions, we must understand public attitudes toward and appreciation of wildlife. However, the true measure of wildlife education programs will not be the amount of factual information learned, but the development of respect and concern for wildlife and the environment (Kellert 1983). To assure a good relationship between Americans, animals, and nature depends on influencing and even directing public perceptions and uses of wildlife (Kellert 1982a).

The formation of wildlife perceptions appears to be a lifetime process (More 1977). Childhood experiences with animals are probably very important to the development of these perceptions and attitudes (Pomerantz 1977, Foster 1978, Bowd 1982, Moore 1983), but later experiences can also influence perceptions. More (1977, p 81) suggested that:

> "...a person's initial experience with any particular wildlife species consists of an affective (preference) component and a belief component. Subsequent encounters also contain information that modify the existing perception. The extent of each modification depends upon the extent of the discrepancy between the existing perception and the current experience. The problem is that there are several different types of encounters and accuracy of information may vary between types."

More (1977) went on to explain that learning about specific animals results from any of three general types of encounters with wildlife: direct natural experiences (e.g. with free-ranging wildlife), direct artificial experiences (e.g. with zoo animals), and vicarious experiences (e.g. with written or filmed animals). Natural experiences probably provide the most consistently accurate portrayal

of wildlife, although observers may misinterpret what they are seeing. However, vicarious experiences offer the highest probability for transmission of misinformation. Television is the greatest source of vicarious experiences for many people, although other sources, such as books, are also important (Gilbert 1982). More (1977) believes that children's stories may be the most significant factor determining wildlife perceptions because they provide early (if not the first) contact that people have with many species, thereby forming the foundation of their perceptions. Millions of American adults have probably been influenced significantly as children by such childhood stories as Bambi. More (1977) believes that vicarious encounters will play an increasingly important role in the formation of perceptions, and that wildlife biologists should work closely with educators to produce large-scale educational efforts designed to portray an accurate image of wildlife in the media.

Attitudes toward Wildlife

An attitude can be considered a disposition, or a state of mind or feeling with regard to some matter. An attitude may also be defined as a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object (Moore 1983, Zanden 1984). Moore (1983) further stated that attitudes are refined representations of beliefs, the difference being that attitudes include evaluations of the objects in question while beliefs do not. A belief is the information that a person has about an object, a conviction or acceptance that certain things are true, or

refined representations of the information and experiences held. Collectively, beliefs help to compose one's understanding (i.e. perception) of his environment and himself. Thus, beliefs, attitudes, and overall perceptions are interrelated.

LaHart (1978) defined attitudes similarly: feelings, beliefs, and a distinguishable pattern of related ideas. This definition suggests a combination of affective, cognitive, and cultural components. Feelings and beliefs often influence decision making, thus being very important to perception (LaHart and Barnes 1978).

Moore (1983) stated that attitudes mediate perceptions and therefore determine the meaning of feedback from the environment. Steinhoff (1980) proposed that attitudes and perceptions cognitively influence each other and one's value system, while acting together to motivate behavior. Witter (1980) stated that the term "value" is used to encompass attitudes, preferences, and any of the other psychological, social, or behavioral indicators which reveal anything about the value that one attaches to a wildlife-related experience. Wagner and Sherwood (1969 in Moore 1983) proposed that an attitude refers to one object while a value refers to a series or class of objects, and thus a collection of attitudes. A value system on animals would be a constellation of one's individual attitudes toward various groups of animals such as mammals, birds, and reptiles. Milbrath and Sahr (1975) agreed that values are more general in nature than attitudes, and that values suggest hierarchical order.

Similar to Steinhoff (1980), Kellert (1980c) demonstrated that attitudes and values are interwoven. Kellert proposed four different

meanings for wildlife values, one of which was attitudes. Furthermore, he defined attitudes in social-psychological terms as broadly integrated feelings, beliefs, and values possessed by individuals.

Moore (1983) agreed with LaHart's (1978) recognition of the affective and cognitive components of attitudes, but added a behavioral aspect. In terms of wildlife, Moore felt that evaluation of an animal is the affective component, knowledge or beliefs about the animal (whether correct or incorrect) relates to the cognitive aspect, and a predisposition or tendency to act in a given manner toward the animal corresponds to the behavioral component. Thus, Moore's approach not only suggests a relationship between attitude and behavior, but also attitude and knowledge, the latter of which will be discussed at length later. In order for an attitude to be reflected in behavior, the action must first be motivated and an opportunity for its expression must be available (Pirt 1976). People often do not behave in a manner consistent with their stated attitudes. Bryan (1980) felt that this inconsistency was due to real situations being so compelling as to override attitudes. Kellert (1980c) suggested that discrepancies between attitudes and behaviors exist because attitudes refer to feelings and beliefs, and are more similar to perceptions than behaviors. Kellert's attitudes may describe elements of a person's perception, but all of someone's behavior will not be explained by just one attitude.

Reliable prediction of behavior is possible but is best made from attitudes that are well-formed. An attitude is well-formed when all

of its components achieve a balance which persists over time (Moore 1983). However, attitudes often do not stabilize, but change over time, making prediction of behavior difficult.

Attitudes can change in several ways. Moore (1983) believed that change will occur when incongruity exists. Sherif and Hovland (1956 in Moore 1983) felt that attitude change concerns perception of the subject because the alteration may involve reinterpretation of that subject. Low self esteem or reduced awareness of one's group affiliation may facilitate attitude change (Kelley 1955, Moore 1983). A person may also find it most satisfying to adopt the attitude of those who are most admired (Moore 1983).

Kellert (1980c) explained that some attitude stability does exist, but that life's experiences can alter it. Kellert has conducted the most detailed study of American attitudes toward animals through a project funded by the U. S. Fish and Wildlife Service during the mid-1970's (for thorough summary data, see Kellert 1979, 1980d; Kellert and Berry 1980; and Kellert and Westervelt 1981, 1982a), and is currently involved in similar work abroad (S. R. Kellert, pers. commun.). Kellert (1980a, p 117) classified most attitudes toward animals into 10 categories:

Naturalistic: Primary interest and affection for wildlife and the outdoors.

Ecologistic: Primary concern for the environment as a system, for interrelationships between wildlife species and natural habitats.

Humanistic: Primary interest and strong affection for

individual animals, principally pets.

Moralistic: Primary concern for the right and wrong treatment of animals, with strong opposition to exploitation or cruelty toward animals.

Scientistic: Primary interest in the physical attributes and biological functioning of animals.

Aesthetic: Primary interest in the artistic and symbolic characteristics of animals.

Utilitarian: Primary concern for the practical and material value of animals or the animal's habitat.

Dominionistic: Primary interest in the mastery and control over animals typically in sporting situations.

Negativistic: Primary orientation an active avoidance of animals due to dislike or fear.

Neutralistic: Primary orientation a passive avoidance of animals due to indifference.

Kellert (1980c) found that the most common attitudes that Americans exhibit toward animals are humanistic, moralistic, utilitarian, and negativistic. The prevalence of these attitudes suggests a blend of affection, concern, indifference, and fear of animals resulting in considerable diversity and potential conflict. The two major conflicts can be identified as: (1) moralistic versus utilitarian attitudes actively clashing around human exploitation of animals, and (2) negativistic and humanistic attitudes conflicting over affection for animals. Scientistic and dominionistic were the least common attitudes, but, unfortunately, the two attitudes

reflecting the most interest and concern for habitats (naturalistic and ecologistic) were also uncommon. Although many Americans show concern for animals, much of this concern is emotionally rather than intellectually based. As Krutch (1970 in Kellert 1982b) once said, "Love is not enough." Sometimes highly emotional interest can be harmful by placing too much attention on situations of minor importance relative to others (Kellert 1980c). Instead, we need to promote empathy for species and their ecological relationships (Kellert 1982b). Fortunately, the profile of those exhibiting naturalistic and ecologistic attitudes suggests that these people belong to groups which usually signify future change (i.e. young people, well-educated people, etc.) (Kellert 1980c).

Kellert (1983) listed the four major types of attitude issues covered in the literature: (1) human socio-economic development versus animal and habitat protection, (2) animal rights and welfare issues, (3) attitudes toward conservation uses, and (4) wildlife management practices and procedures. Although the latter issue has resulted in the least theory, all four topics relate to management. Regardless of whether the management applies to wildlife, people, or both, the public will and should be involved. Management policies should not be based solely on public attitudes, but knowing visitor attitudes can provide valuable information for making policy decisions and controlling human activities (Arthur et al. 1977, Ream 1979). The attitudes may be inappropriate, emotional, nonrational, and of negative benefit to the individual or society (Ramsey and Rickson

1976, Kellert 1980c), but are good indicators of how well management objectives match user objectives (Lime 1972). Surveys of public attitudes can provide the feedback necessary for managers to know what visitors want and how they might respond to specific management actions (Lucas and Stankey 1974). Attitudes may ultimately govern social policy, so the future state of wildlife will be partially determined by people's attitudes (Knudson 1978b, Heneson 1982).

Two additional problems which encourage the study of visitor attitudes are that scientists and managers (1) often hold different attitudes toward animal resources than the public (Hendee and Harris 1970, LaHart and Tillis 1974), and (2) may try to treat all visitors alike (Fowler and Bury 1973). Ecologists often view wildlife as environmental barometers, while the public views animals quite differently (LaHart and Tillis 1974, Hendee and Schoenfeld 1978). In addition, managers often appear more "purist" than many users, especially in relation to wilderness development (Hendee and Harris 1970). It should also be remembered that there is no such thing as an "average visitor." Although it is often convenient to stereotype visitors, managers should remember that each visitor is an individual with different needs, expectations, interests, and attitudes (Fowler and Bury 1973); even a few individuals deviating considerably from the norm may be vocal enough to convince administrators that the majority of users holds a certain attitude or preference. Therefore, instead of assuming that visitors hold similar attitudes as agency personnel or that all visitors have the same opinions as the loudest ones, it is imperative that managers understand how visitors feel about wildlife

issues.

Attitudinal Surveys

Attitudinal surveys can not only help inform managers on what to expect from the public and how to formulate or alter policy and programs, but they can also provide direction on how these changes can either meet the desires of the public or alter people's attitudes (Gilbert 1982). Information about attitudes can (1) enable communicators to predict messages which would strongly appeal to their audiences, (2) identify gaps in public understanding about wildlife ecology and management, and (3) help design messages for all mass media (Erickson 1971). These are similar goals held by the author of the present study in Cades Cove. Several surveys have been conducted in Great Smoky Mountains National Park regarding visitor attitudes toward wildlife. However, essentially all have pertained specifically to black bears. Blakeney (1969) conducted a preliminary survey of frontcountry users' attitudes toward bears during the late 1960's. This study was followed by a more thorough investigation with similar objectives (Burghardt et al. 1972). Bacon (1974) used a survey to formulate educational programs on bears, and Pelton et al. (1976) documented the attitudes of visitors who had sustained property damage or personal injury by bears in GSMNP. The most comprehensive study was conducted by Petko-Seus (1985), who investigated attitudes toward bears held by both frontcountry and backcountry users. Although considerable attitudinal research has been conducted regarding bears, very little questionnaire work in GSMNP has included other wildlife

species until the development of the present study.

Preferences toward Wildlife

A preference can be defined as the selection of one thing over another or others, something so chosen, or the state of being better liked or more valued. Strictly speaking, preferences can be considered closely related to attitudes, because attitudes may be considered learned predispositions to respond to something in a favorable or unfavorable manner (Moore 1983, Zanden 1984). However, preferences are unique and will be briefly discussed separately from attitudes.

Driver and Brown (1978) demonstrated that recreational preference is necessary to outdoor recreation resource supply inventories. This is not only true for studying wildlife viewing relative to other recreational pursuits, but also the degree to which an animal is liked relative to other species. In conjunction with additional information, knowing preferences can help managers assign conservation priorities in the absence of unlimited funds (Kellert 1983).

Recognizing people's preferences for different species is not always easy. Preferences may vary with viewing situations; the same person may not only respond differently to various species but to the same species in different environments (More 1977, 1979a). Nevertheless, several researchers have conducted studies on which types of animals are preferred over others and why these preferences exist.

Mammals and birds are generally preferred over reptiles, amphibians, and invertebrates (Kellert 1980a). Whether mammals or birds are most preferred over the other may depend on a number of factors, not the least of which is the site where the animal is found. The setting of the viewing experience is very important to preferences (Cooper and Shaw 1979). Although analysis of books (More 1979b) and newspaper articles (Eagles 1980, Kellert and Westervelt 1982b) might imply that mammals are more popular in the literature, direct preference studies show that birds are often preferred over other groups of wildlife in urban residential areas (Dagg 1974, Brown and Dawson 1978, Dawson et al. 1978), urban parks and ponds (Hardin and Van Druff 1978, Dick 1982), and perhaps in general (Kellert and Berry 1980).

A number of other reasons for preferences have appeared in the literature. Kellert (1980b) suggested various factors, several of which relate to human perceptions: aesthetics, size, intelligence (including perceived ability to feel or have emotion), perceived danger to humans or property, predatory tendencies, phylogenetic relation to humans, cultural and historical significance, familiarity of texture, familiarity of mode of locomotion, economic value, and relation to human society (e.g. pet, farm animal, pest, native and exotic species, game animal). Cooper and Shaw (1979) found that aesthetic appeal was a function of size, color, and age, and that life history, habitat, and scarcity also played a role in preference. Young animals seem to be particularly popular. Dr. G. M. Burghardt of the University of Tennessee has suggested that humans may have a

genetic predisposition to nurture juvenile animals, while Dr. E. Lawrence of Tufts University proposed that people are attracted to young animals because of psychological needs to dominate or control others (Tangley 1984).

Rarity may also make some animals more popular (Hendee and Schoenfeld 1978, Cooper and Shaw 1979, More 1979a, Burghardt and Herzog 1980), especially to experienced wildlife viewers such as committed bird-watchers. The observation of a rare or secretive animal (e.g. a wild bear) may increase one's preference for that animal (Decker et al. 1981). However, other rare and endangered species (e.g. large predators) may not be particularly favored (Bart 1972), which could explain their rare status. Some of these (e.g. the wolf) may be more desired by people living further from them (Cobus 1972).

Preferences are probably closely related to how we treat animals. Burghardt and Herzog (1980) listed a number of factors influencing ethical evaluations of our relations with other animals. These 26 factors were organized under the headings of human benefit, anthropomorphism, ecology, and psychology. Many of these characteristics were the same as those suggested for influencing preferences (e.g. danger, size, rarity, and aesthetics).

Knowledge about Wildlife

Knowledge is the sum or range of information which has been perceived, learned, or inferred. Knowledge is closely tied to beliefs, behavior, preferences, and possibly additional attitudes.

Kellert (1983) regards knowledge of animals as involving primarily cognitive perceptions, but also evaluative perceptions. The cognitive perceptual component refers largely to knowledge and factual understanding while the evaluative aspect refers mostly to beliefs and values. A belief is a conviction of the truth or reality of some statement, being, or phenomenon. Knowledge and beliefs are obviously associated perceptual phenomena, and much research conducted on knowledge refers in part to the degree to which people's beliefs are accurate. This approach is justifiable for some projects attempting to assess the gap between perception and reality in order to recommend appropriate management and education actions.

An increase in knowledge frequently leads to increased appreciation of that subject and also to increased demand for associated activities (Lime and Cushwa 1969, More 1979a). In turn, active participation influences knowledge, possibly forming a circle of increased awareness, knowledge, and appreciation (More 1979a). The association of knowledge and attitudes will be treated in depth in the last section of this literature review.

A number of studies have investigated the factors associated with or directly influencing knowledge of wildlife and ecology. Results have generally shown that males score higher on knowledge questions than females (Klimstra and Pratt 1964, Bacon 1974, Dahlgren et al. 1977, Pomerantz 1977, LaHart 1978, Kellert 1980b). It will be interesting to see how the evolution of sex roles will affect this phenomenon. At least one recent study (Petko-Seus 1985) found no significant differences between male and female backpackers answering

knowledge questions about black bears. In addition, the sexes may be more evenly distributed in nonconsumptive wildlife activities (Lyons 1982), which are rapidly becoming more prevalent than traditional consumptive activities which are skewed toward male dominance (USDI 1982a).

Many studies have found hunters to be more knowledgeable about wildlife than those who do not hunt (Bacon 1974, Dahlgren et al. 1977, Pomerantz 1977). Dahlgren et al. (1977) found that hunters were more knowledgeable than former hunters (i.e. those who had previously hunted, but for various reasons had quit) who, in turn, were more knowledgeable than other non-hunters. Pomerantz' (1977) hunting respondents also scored higher on knowledge than non-hunters who were not opposed to hunting; however, these non-hunters were better informed than anti-hunters. Kellert (1980b) documented that, as a group, anti-hunters displayed one of the lowest overall scores of any wildlife-related group of people in the United States. Sport hunters were somewhat more knowledgeable, meat hunters were still more so, and those hunters most interested in enjoying nature had one of the highest scores of all wildlife user groups. Nevertheless, nonconsumptive wildlife observers often score higher than consumptive users (LaHart and Barnes 1978), and Kellert (1985) documented that committed birdwatchers display the greatest knowledge about wildlife of any group. Perhaps the degree that a person limits his/her recreational time to a specific animal influences his/her overall knowledge about wildlife. Thus, nonconsumptive users (who tend to study numerous animals) may learn more about wildlife in general than

those who hunt a few specific animals or those who neither hunt nor study any animals. However, if a survey is limited to a few popular game species, then hunters of these species may score higher than non-hunters.

Urban residence often correlates with low knowledge scores, particularly for large cities (Dahlgren et al. 1977, Pomerantz 1977, Kellert 1980b). Accuracy of wildlife perception decreases with less visitation by an individual through inadequate familiarity or contact with wildlife; increased urbanization usually decreases contact with wildlife, thus providing less information to the person (Bryan and Jansson 1973).

Various additional factors are correlated with knowledge of animals, many of which probably interact with each other. Caucasians tend to be better informed about animals than blacks (LaHart 1978, Kellert 1980b). Dahlgren et al. (1977) found the poorly educated to be more knowledgeable than others, while Kellert (1980b) found the opposite to be true, especially for those with graduate training---a discrepancy which probably reflects the nature of the questions more than that of education. LaHart (1978) reported a significant positive correlation between the educational level of parents and their children's knowledge of animals. Kellert (1980b) demonstrated that some of the most informed groups not previously mentioned were those who studied science as a hobby, belonged to a conservation organization (especially those related to wildlife protection), resided in Alaska or the Rocky Mountains, or rarely attended religious services. The least informed people not already mentioned were

livestock producers, zoo enthusiasts, those over 75 or under 25 years of age, and especially the general public (i.e. those not categorized into any wildlife-related groups).

Americans as a whole appear extremely limited on animal knowledge (Kellert 1980b). They seem most informed about animals that inflict human injury or disease, pets, other domestic animals, and basic biological characteristics, although none of these subjects were known by much more than half of the participants. People were less knowledgeable about predators, taxonomic distinctions, and especially invertebrates. They displayed some understanding of various animal issues, but these tended to involve specific, attractive, large, and usually "higher" species.

The studies conducted in GSMNP regarding wildlife knowledge have largely been those mentioned as attitude studies in the Smokies (Blakeney 1969, Burghardt et al. 1972, Bacon 1974, Petko-Seus 1985). Again, all of these studies pertained to black bears.

Relationship of Knowledge and Attitudes

Knowledge about wildlife has often been considered closely associated with attitudes toward wildlife. Dagg (1974) stated that human attitudes toward wildlife are closely related to interest in and knowledge about wild animals. As mentioned in the previous sections, an increase in knowledge may lead to growth in appreciation and demand for related activities (Lime and Cushwa 1969, More 1979a). Kellert (1980c) reported that people belonging to conservation organizations tended to be relatively knowledgeable about animals. More

specifically, Arthur et al. (1977) found a relationship between knowledge about coyotes and several attitudes on coyote control, and Young (1980) identified a positive correlation between knowledge of wilderness and a positive attitude toward the concept of wilderness. Fortier (1983) found that the more knowledgeable people at Yellowstone National Park exhibited attitudes more complementary to bear management objectives than low knowledge respondents, and Dahlgren et al. (1977) demonstrated that wildlife knowledge can be used to predict attitudes toward hunting; these uses of knowledge can be very helpful in certain aspects of wildlife management. However, it is not always known whether knowledge actually changes attitudes or whether attitudes lead to the desire for further knowledge. Ramsey and Rickson (1976) recognized a circularity between knowledge and attitudes; they felt that neither solely causes the other, rather some knowledge may lead to initial formation of attitudes which, in turn, leads to further gains in knowledge and so on. They found a positive correlation between the two factors, but not a straight line relationship. Heneson (1982) proposed that attitudes play a role in determining how much knowledge an individual is willing and able to receive. When knowledge does influence attitudes (e.g. potentially controversial environmental issues), it may result in moderate rather than extreme positions (Ramsey and Rickson 1976).

Additional investigators have shown that increased knowledge does not necessarily produce positive attitudes toward wildlife or wildlife-related issues (Alvord 1972, Iverson 1975, LaHart 1978, Moore 1983). LaHart concluded that, while knowledge and attitudes are

related components of environmental perception, they have little influence on each other. Moore (1983) found that people with positive attitudes may not know a lot about animals, while those with a great deal of knowledge about animals do not necessarily approach the animal world in a favorable manner. Moore established that attitudes are related to behavioral intentions and beliefs, and that knowledge is also related to beliefs, but that knowledge is not highly correlated with attitudes.

The logical question at this point is: "Why is there such a discrepancy in the literature?" One of the major reasons is the use of different types of surveys by different investigators (LaHart 1978). In addition, the different attitudes pursued are subject to a host of different factors. Halloran (1967) explained that change of attitude does not just depend on knowledge transfer, but on a number of other elements such as the form in which the information is presented, the people who present it (including how they are perceived and how they deliver it), the circumstances surrounding the information, the conditions and affiliations of the audience, and the function that knowledge might perform in serving or disrupting the needs and desires of the recipients.

Although it is recognized that knowledge and attitudes may not involve cause-and-effect relationships, a broad public literacy of biological and ecological concepts is still needed (Ramsey and Rickson 1976). A person's beliefs serve as the informational basis which ultimately helps to determine attitudes and behavior (Moore 1983); these beliefs should be accurate. McKeating (1975) pointed out that

it would be very difficult to develop a proper perspective or philosophical attitude toward wildlife and wildlife management without learning some sound ecological principles. McKeating felt this was particularly important for urban dwellers because their influence will continue to increase with rising urbanization.

It should be possible to teach attitudes rather than just expecting the acquisition of knowledge to automatically lead to improved attitudes. Ramsey and Rickson (1976) felt that a person can certainly be taught environmental attitudes, but that their development takes much longer than the learning of facts. Murray (1970) developed a booklet on wolves which not only provided information, but appeared to directly change attitudes. Pomerantz (1977) suggested that the prominence of environmental issues in the news and the increase in environmental education in schools are having an impact on the attitudes of young people; such an impact may be caused by teaching attitudes as well as facts. Most natural history interpreters can attest to the potential for directly influencing attitudes; Holtz (1976) has found that 99% of the nature centers he questioned hoped to change environmental attitudes and 36% made specific attempts.

We should clearly state our objectives and goals in educating the public about wildlife and wildlife management. If we wish to change both knowledge and attitudes, we should address both issues in educational programs, and not assume that one will automatically influence the other.

Theoretical Framework

David Moore (1983) presented a pyramid model (Figure 1) relating cognitive and affective antecedents of behavior, based on a synthesis of his own work and that of Likert (1932), Fishbein and Ajzen (1975), Kellert and Berry (1980), and Driver (pers. commun. with D. Moore). In his dissertation at the University of Wyoming, Moore explained that the model represented a hierarchy of thought processes demonstrating the conceptual cognitive flow in humans. The system ultimately led to overt behavior, but each step could be influenced by feedback from other steps.

Moore's model is helpful in comprehending how visitor knowledge and particularly attitudes toward wildlife in Cades Cove may be formed. Based on Moore's hierarchy and a combination of many projects presented in this literature review, the present author has developed a model (Figure 2) which demonstrates how various factors may influence the way people think and act toward wildlife. Although the model does not intend to represent a complete picture of all variables affecting thought processes and human behavior, it does illustrate several major points.

As in Moore's hierarchy, information and experience form the base of the model. These factors directly affect perception through both knowledge and beliefs. Beliefs are important to the development of an attitude or preference. Knowledge may also affect the attitude, but the relationship may be weak. In turn, an attitude provides feedback and thus influences beliefs and probably knowledge.

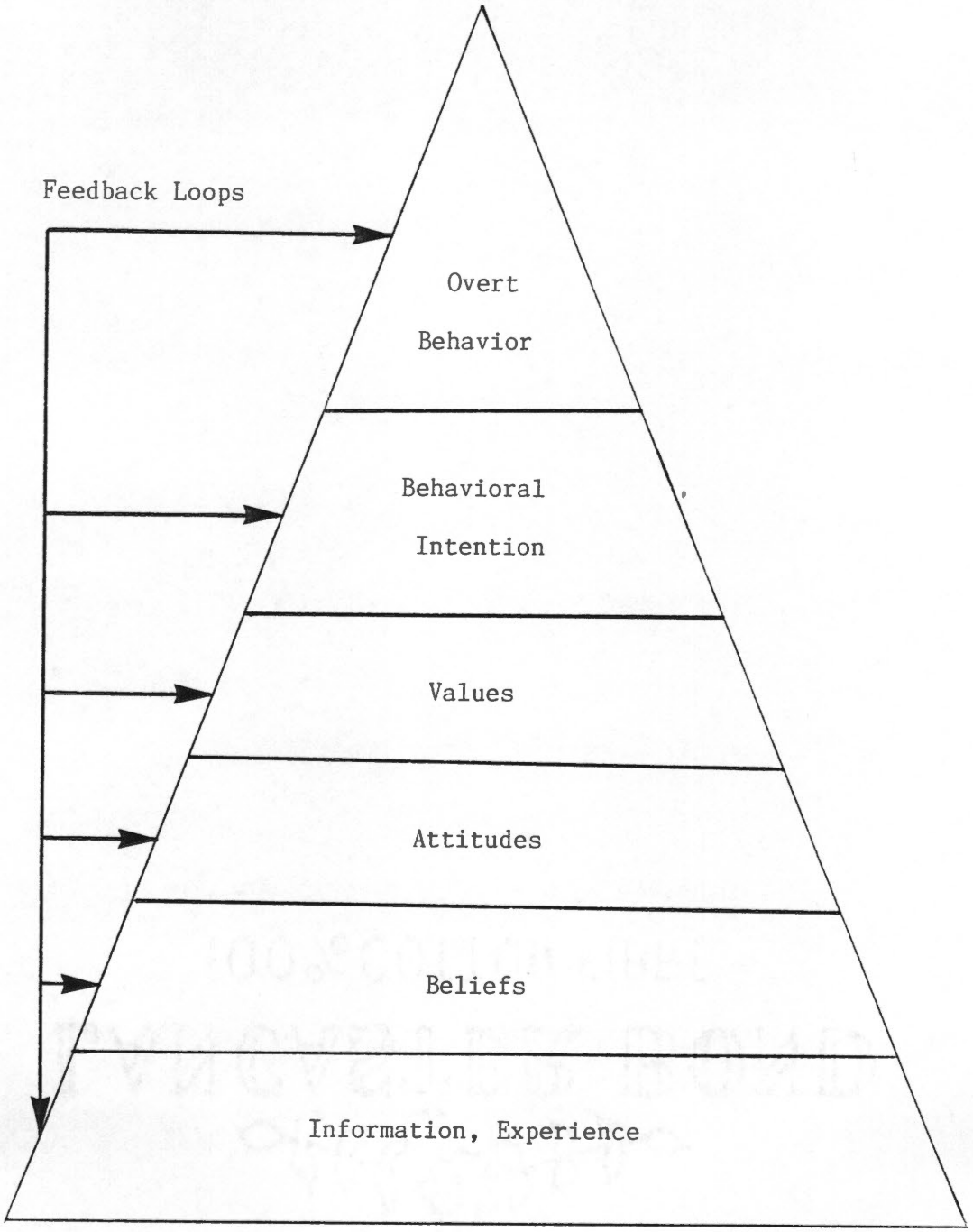


Figure 1. Moore's (1983) model of cognitive and affective antecedents of behavior.

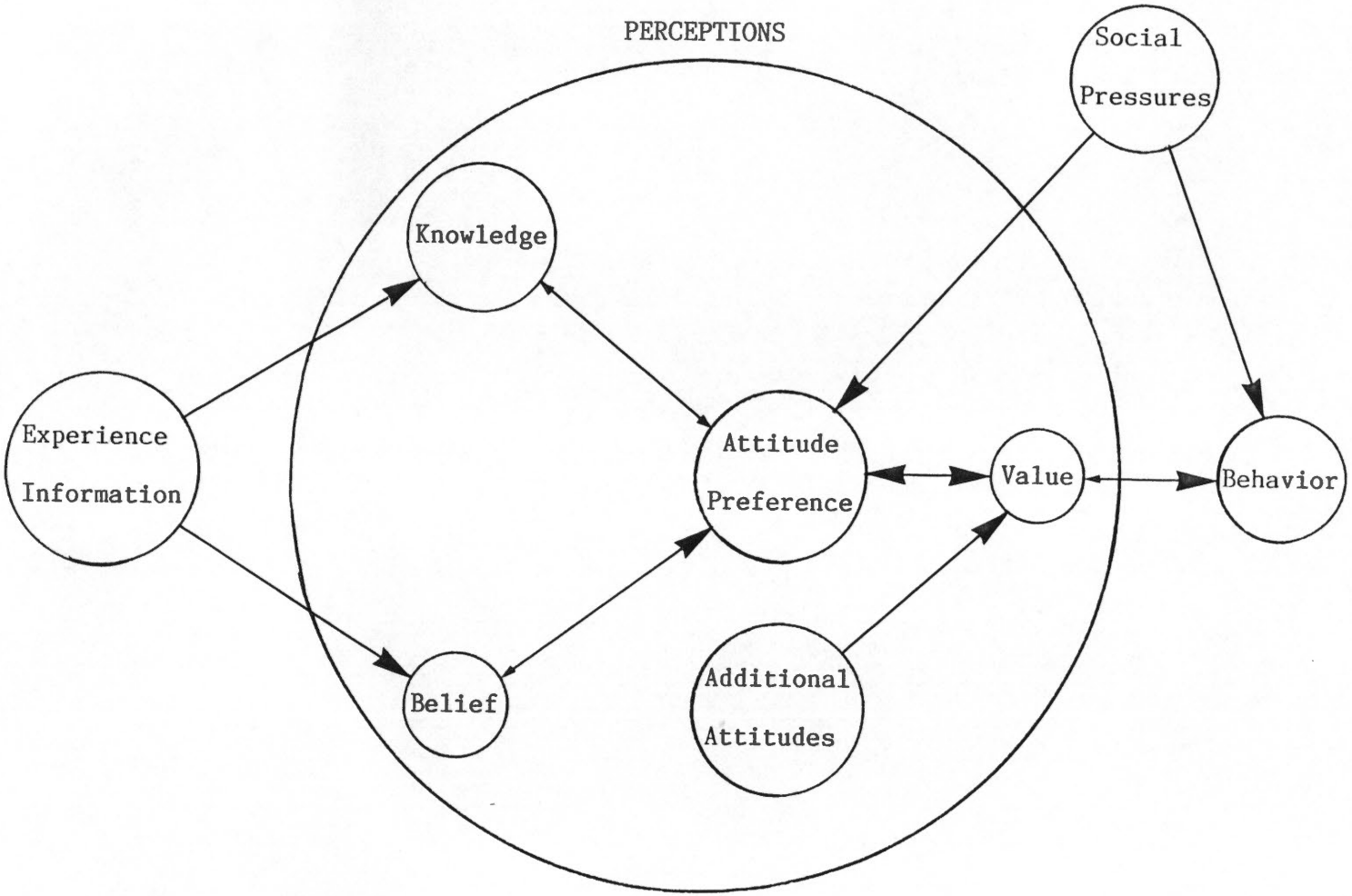


Figure 2. Model of factors influencing how people think and act toward wildlife.

The attitude, when united with other attitudes, is also important in the formation of wildlife values. Values can play a prominent role in governing behavior toward wildlife, although other factors may dilute the system. Social pressures can affect perception by influencing attitudes and therefore values. These pressures can also override values and directly affect or control behavior.

As an example of how this model might work, perception of wolves will be considered. Whenever a person hears or reads something about wolves, both his/her knowledge and beliefs are affected. A personal experience with a wolf is also likely to influence these variables. Changes in knowledge and especially beliefs can directly or indirectly affect the individual's perception of wolves by influencing an attitude toward or preference for wolves. Similarly, changes in either of these factors may influence the person's beliefs (and possibly knowledge) about wolves to at least some extent. For example, if the person heard that wolves kill helpless calves and lambs, beliefs and thus attitudes could be affected. Such changes might make the person learn or retain future information which support established attitudes and beliefs, and resist contradictory information. Furthermore, attitudes and preferences may affect the manner and complexity of the person's entire perception of wolves.

An attitude toward wolves might, when combined with other attitudes, develop or influence the person's value system on a series or class of factors. For example, a negative attitude toward predatory behavior in wolves might join with other negative attitudes toward similar species (e.g. coyotes, mountain lions). Together these

attitudes could lead the person to assign a low value to any wild canids, large predators, or predators in general. Through this value system, perceptions can affect behavior toward these animals, such as indiscriminate killing of predators. However, social pressure can dilute the expression of behavior. For example, the person's attitudes toward wolves may become less negative because of knowing that friends or other respected persons have more positive attitudes toward wolves, even if the individual does not understand why others feel differently. In addition, the person's behavior toward wolves or other predators may be more directly influenced by fear of a citation if he/she takes illegal action against these animals. Ideally, both behavior and attitudes can be improved such that behavior is appropriate even when social pressures are absent.

Some findings of this dissertation will be discussed in light of the model. Of particular relevance will be the relationship of information, knowledge, preferences, and attitudes. However, the dissertation is somewhat oriented toward management, and neither the interview nor the questionnaire was designed to test the model. Nevertheless, the model does offer a framework to view the relationships among perceptual components, and should provide guidance for future research.

CHAPTER III

STUDY AREA

Ecological Resource

Great Smoky Mountains National Park

Great Smoky Mountains National Park is located between 35° 26' and 35° 47' N latitude and 83° 2' and 84° 0' W longitude (Figure 3). The mountains are divided geographically by a single ridge running east-northeast and west-southwest. The ridge is the political boundary between Tennessee to the northwest and North Carolina to the southeast. Elevations range from 271 m in the western-most portion to 2,025 m at Clingman's Dome in the central portion. The Park encompasses over 207,000 ha.

The Great Smoky Mountains were formed during several geologic events. The most important features have been alternate uplifting and folding interspersed with long erosional periods. Erosion was responsible for cutting through overthrust sheets of rock in several areas of the Park. Fensters were formed where the younger underlying rock was made of soluble limestone and eventually widened into large, level-floored coves or valleys (Harris 1977).

Park temperatures annually range from an average of 8° C at higher elevations to 14° C at lower elevations. Precipitation annually ranges from a mean of 220 cm at higher elevations to 140 cm at lower elevations (Stephens 1969). Highest precipitation (Dickson 1960) and temperature (Stephens 1969) both occur in July.

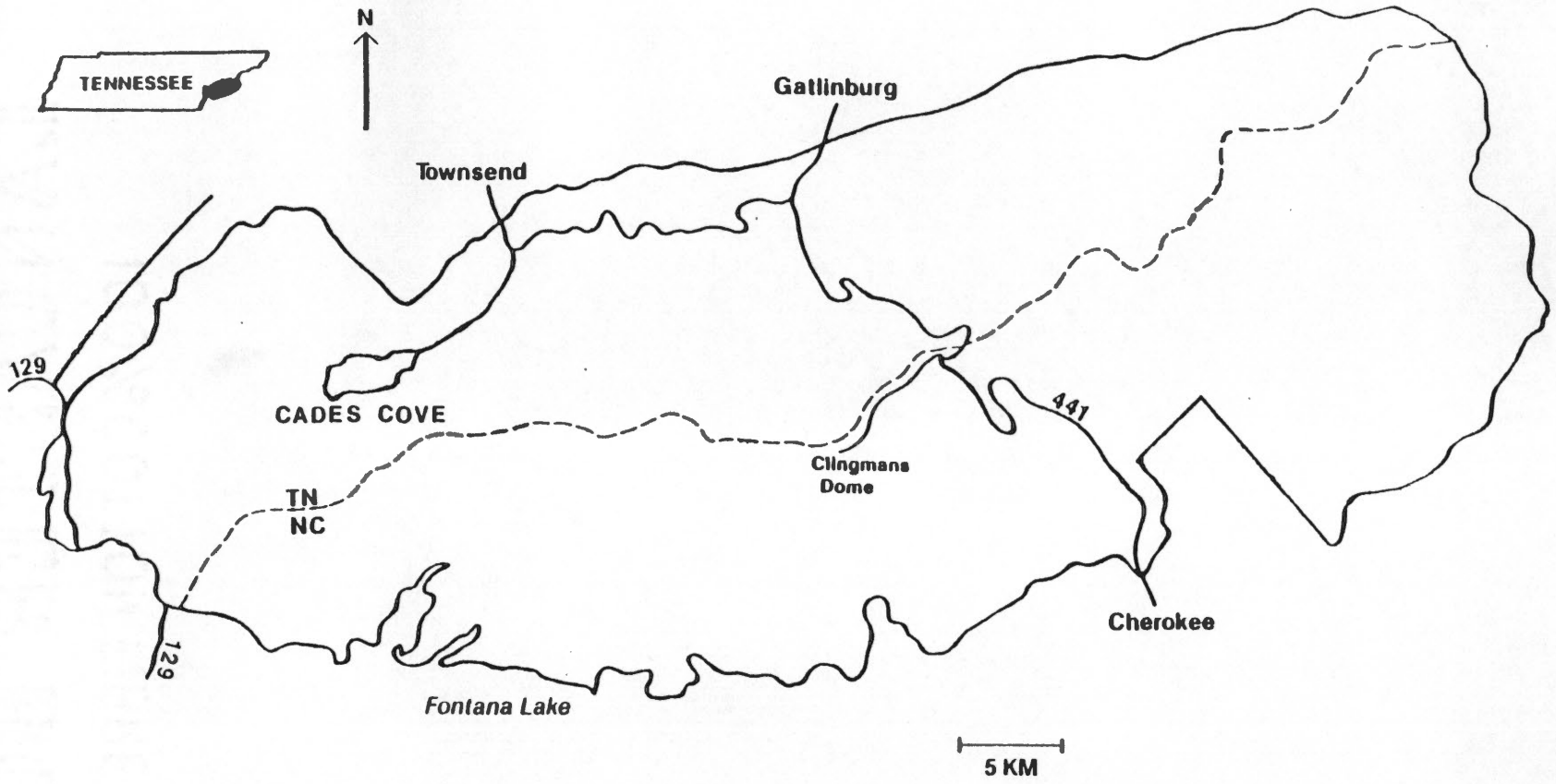


Figure 3. Map of Great Smoky Mountains National Park (adapted from Petko-Seus 1985).

The vegetational composition of the Park has been greatly affected by periglacial activity. As glaciers receded northward, cold-climate plants moved up in elevation. Due to the survival of many of these species as well as the retrieval of many warmer-climate plants, the Park holds one of the largest associations of warm- and cold-climate vegetation in the world (Harris 1977). There are 130 species of trees and over 1,200 species of flowering plants (USDI 1981).

The diverse vegetation, climate, and geographic features have created a variety of animal habitats in GSMNP (USDI 1981). Over 200 species of birds are found in the Park, along with more than 70 species of fish, 38 species of reptiles, 39 species of amphibians, and numerous invertebrates (USDI 1979b). Fifty-nine species of mammals still exist within the Park (Linzey and Linzey 1971).

Cades Cove

Cades Cove is located in the northwestern section of GSMNP (Figure 4). The Cove is a geologic fenster which is limestone based. It is a 1,000 ha historical zone and is maintained in hay fields and livestock pastures. Its open fields (75% of Cove) are interspersed with small wooded areas (25%) and surrounded by forested mountains (Rabinowitz 1981). Average elevation is approximately 530 m.

Annual precipitation averages 140 cm (Goldsmith 1981). Temperature data are less detailed, but averaged 17° C (-12° C to 33° C) in 1979-1980 (Rabinowitz 1981). Abrams Creek flows through about 8

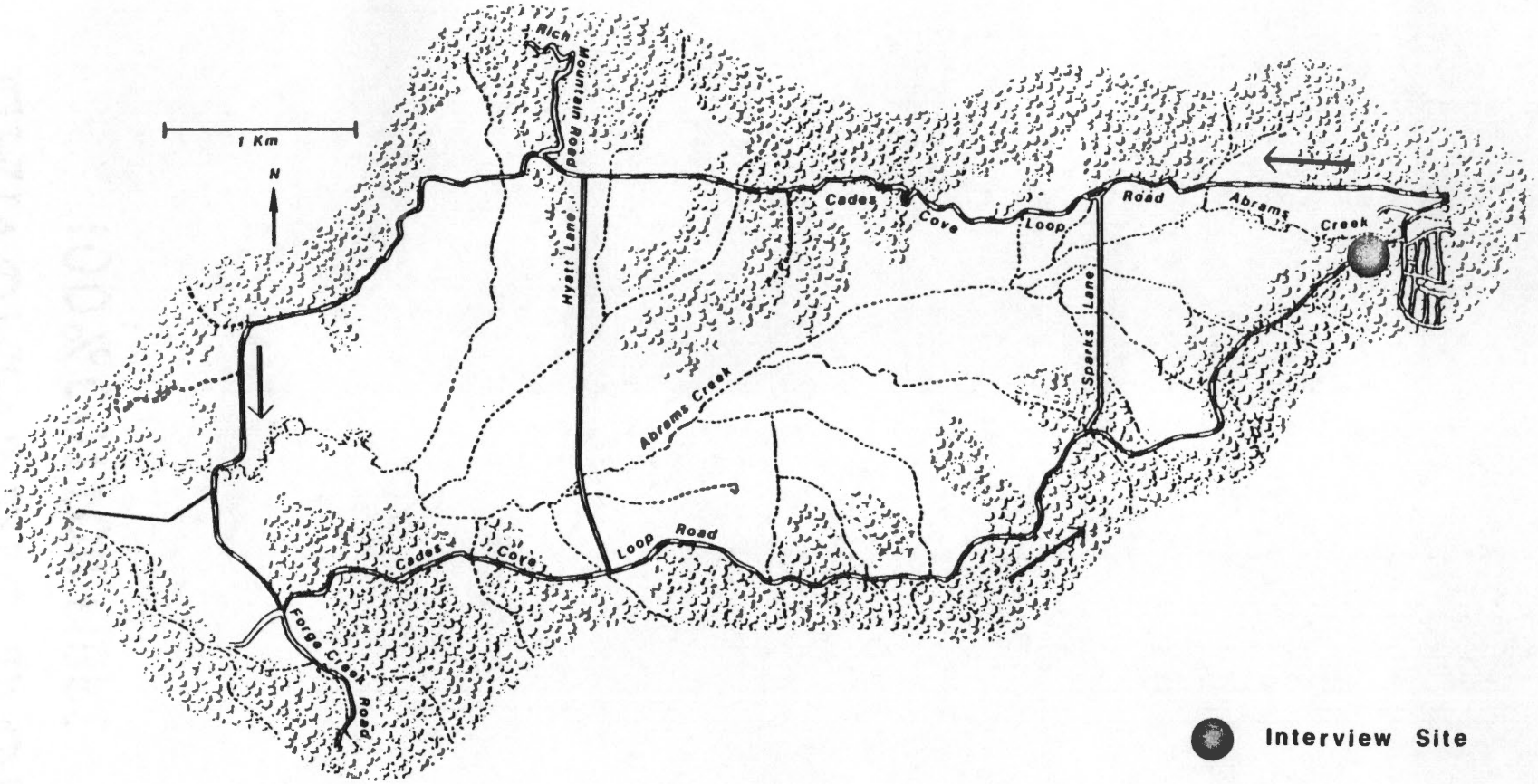


Figure 4. Map of Cades Cove, Great Smoky Mountains National Park (adapted from Dlutkowski 1985).

km of Cades Cove, although several smaller streams also drain the area. Portions of Abrams Creek flow underground during much of the summer season (Mathews 1978).

A number of plants comprise the flora of Cades Cove. The most common open field species are fescue (Festuca spp.), orchard grass (Dactylis spp.), timothy (Phleum spp.), red top (Agrostris spp.), and clover (Trifolium spp.). Major tree species are pine (Pinus spp.), hemlock (Tsuga canadensis), oak (Quercus spp.), maple (Acer spp.), hickory (Carya spp.), and yellow poplar/tulip tree (Liriodendron tulipifera). Common understory plants include blueberries (Vaccinium spp.), huckleberries (Gaylussacia spp.), rhododendron (Rhododendron spp.), mountain laurel (Kalmia latifolia), and serviceberry (Amelanchier laevis) (USDI 1969 in Rabinowitz 1981).

A large number of Park fauna may be found in Cades Cove. Of particular interest to this study are the mammals and birds. At least 29 species of mammals presently exist in the Cove (Appendix A), including black bear (Ursus americanus), white-tailed deer (Odocoileus virginianus), groundhog (Marmota monax), and striped skunk (Mephitus mephitus). A controlled number of domestic cattle and horses also share pastures with wildlife. At least six mammalian species which probably inhabited Cades Cove at various times have been extirpated from the Park: gray wolf (Canis lupus), fisher (Martes pennanti), river otter (Lutra canadensis), mountain lion (Felis concolor), American elk (Cervis canadensis), and bison (Bison bison) (Linzey and Linzey 1981). The Park's General Management Plan calls for examination of reintroducing some of these species (USDI 1981). Ten

river otters have been released on Abrams Creek below Cades Cove during 1986 (J. Griess, pers. commun.).

Stupka (1963) described the avian species sighted in GSMNP. Although a complete list of birds frequenting Cades Cove is not available, those commonly seen by visitors of the Cove are wild turkey (Meleagris gallopavo), common crow (Corvus brachyrhynchos), turkey vulture (Cathartes aura), pileated woodpecker (Dryocopus pileatus), eastern bluebird (Sialia sialis), and numerous other songbirds. The present author has also observed in the Cove such interesting birds as golden eagle (Aquila chrysaetos), ruffed grouse (Bonasa umbellus), and mallard (Anas platyrhyncos).

Huheey and Stupka (1967) documented the numerous species of snakes, turtles, lizards, salamanders, frogs, and toads living in GSMNP. Of particular relevance to Cades Cove are timber rattlesnake (Crotalus horridus), copperhead (Agkistrodon contortrix), northern water snake (Nerodia sipedon), northern fence lizard (Sceloporus undulatus), skink (Eumeces spp.), eastern box turtle (Terrapene carolina), and toad (Bufo spp.).

Twelve species of fish were collected on Abrams Creek in and near Cades Cove in 1977 (Mathews 1978). The most important game fish in Cades Cove was the rainbow trout (Salmo gairdneri), although R. Strange (pers. commun.) has also reported the brown trout (Salmo trutta) in the western-most section of the Cove.

Viewing Resource

Great Smoky Mountains National Park

GSMNP is well-known for its mountain vistas which include panoramic views of ridges, valleys, and lush vegetation. The Park's trees provide the unique feature of "smoke" or haze which gives the mountain range its name; the haze is produced by the combining of hydrocarbons called terpenes into larger molecules that refract more light (Harris 1977). Additional visual attractions within the boundaries of the Park include streams, waterfalls, caverns, wildflowers, historical buildings, and wildlife. Most of the Park's visitors are willing to view the resources from the 356 km (221 mi) of roads, although 1,384 km (860 mi) of trails are also available for those who like to hike (USDI 1982b).

Cades Cove

Cades Cove provides a number of attractions. The Cove is maintained largely for its cultural resources. Historic structures include old homes, churches, cemeteries, barns, a mill, and several other farm buildings (Figure 5). These are the remains of a community which peaked in 1850 with 685 people in 132 households and again in 1900 with 708 individuals in 125 families (Shields 1981).

The National Park Service prevents reforestation of meadows in Cades Cove not only to provide a foreground for historic structures, but also for maintaining panoramic views (USDI 1981). Scenic attractions include mountains, forests, streams, and the open fields of the valley (Figure 6).



Figure 5. Six major historic features in Cades Cove (Photography by Lars R. Snavely and Bruce C. Hastings).

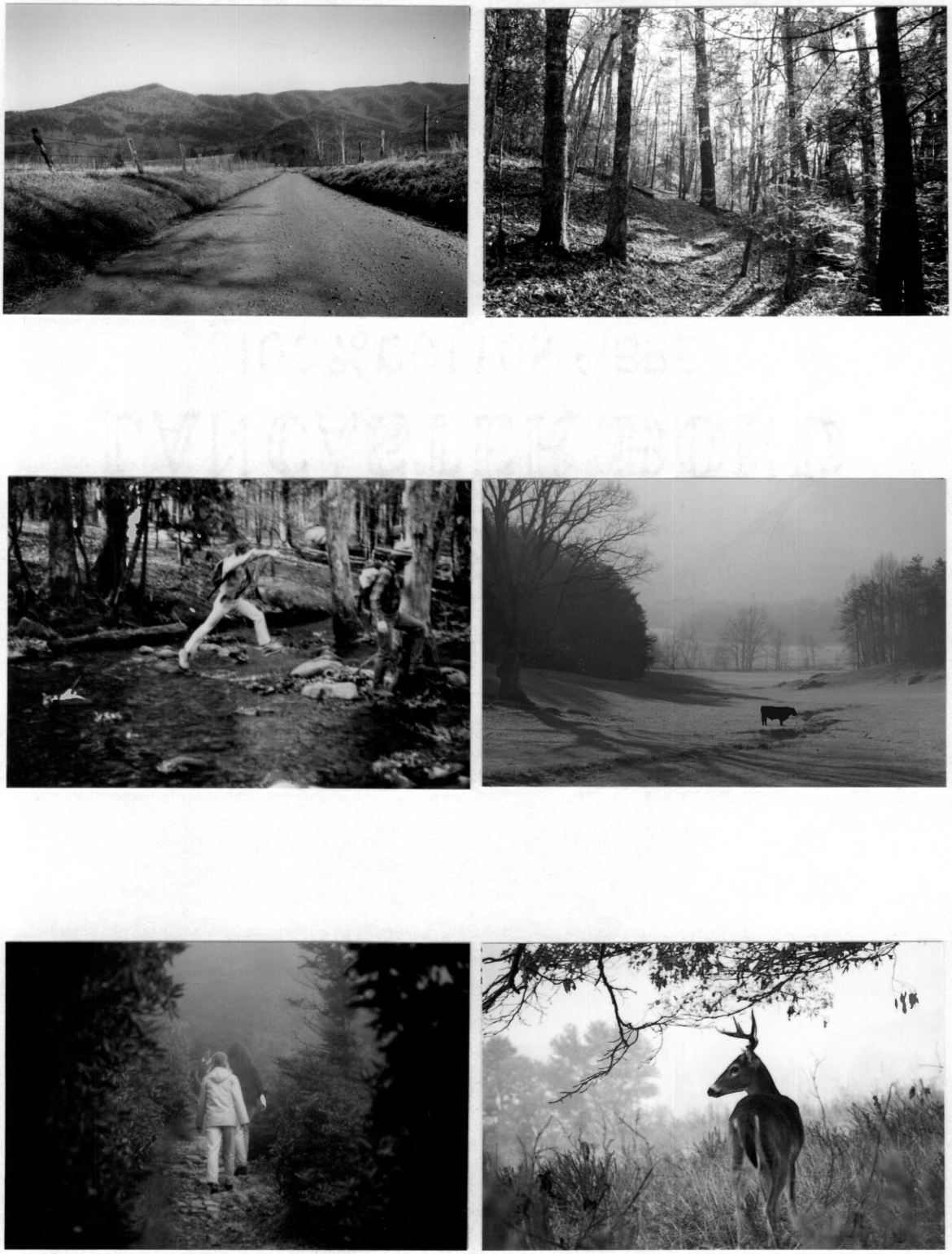


Figure 6. Major types of scenic features of Cades Cove (photography by Lars R. Snavely and Bruce C. Hastings).

Wildlife is also an important part of the viewing resource. An 18 km paved loop road circles the Cove, with 2 short gravel roads further dissecting it. These roads offer visitors contact with numerous wildlife habitats without having to leave their automobiles. Several species of wildlife are relatively abundant and highly visible, resulting in many human-wildlife interactions with such animals as white-tailed deer, black bear, wild turkey, and groundhog (Figure 7). Numerous songbirds offer both viewing and listening opportunities.

Visitation

Great Smoky Mountains National Park

Visitation in GSMNP has totaled about 8 - 9 million each year since 1972 (USDI 1982b). The actual number of Park visitors is much smaller because numerous people visit several times annually; the more than 9 million visits in 1977 was estimated at 1.5 - 2.0 million individuals (USDI 1979b). Almost 8 1/2 million visits were made to the Park during 1983 (i.e. the year that visitors were surveyed for this study).

Visitation peaks in the summer months of June, July, and August and again in October when the leaves change color (USDI 1982b). Weekend travel is much heavier than weekday visitation, over twice as much for Saturdays and Sundays as Monday through Friday combined.



Figure 7. Six major wildlife species that commonly interact with visitors in Cades Cove (photography by Bruce C. Hastings).

Cades Cove

Over 250,000 vehicles used the Cades Cove Loop Road during 1983 (National Park Service records). The highest use occurred from July through November and peaked during August. In addition to the viewing resources previously mentioned, the Cove also attracted people for camping, picnicking, hiking, bicycling, and horseback riding.

CHAPTER IV

METHODS

Development of Survey

The survey was initially developed from the author's concerns for interpretation of wildlife in Cades Cove. Further development led to consideration for an understanding of human-wildlife relationships: How do visitors perceive wild animals? What wildlife do people see, expect to see, and want to see? What do visitors know and feel about wildlife management and interpretation? A literature review and discussions with Park interpretive naturalists and University of Tennessee faculty led to an initial form of the survey. A personal interview was pre-tested in Cades Cove, while a written questionnaire was pre-tested on 30 individuals who had visited Cades Cove. Results of pre-testing led to a briefer form of the personal interview and a longer, but more refined, mail-back questionnaire to be taken home by visitors.

Sampling Procedure

The survey population consisted of visitors who drove cars, vans, trucks, or motor homes through any portion of Cades Cove. It was considered impractical to distribute questionnaires to bicyclists, motorcyclists, or pedestrians. All sampling was conducted at a pulloff located approximately 300 m from the exit of the Cove loop road.

A diamond-shaped sign (1.2 m X 1.2 m) was placed on a large easel approximately 200 m before the pulloff. The sign was orange with black borders and black lettering, and stated: "WILDLIFE SURVEY CREW 600 FT AHEAD". A smaller sign and easel were located at the pulloff. One side of this sign stated in green letters, "PLEASE PROCEED", while the other side could be easily flipped over to read in black letters, "PLEASE PULL OVER".

The occupants of 400 vehicles were interviewed. Sampling was conducted on 16 days (8 weekdays and 8 weekend days) from 30 July to 21 August 1983. No visitors were sampled on Fridays since Fridays might be considered either weekdays or weekend days.

On each sampling day, the occupants of 25 vehicles were asked to participate. Eight parties were contacted each morning at 0800 - 1000 hrs EDST and each evening at 1800 - 2000 hrs; 9 were contacted at 1300 - 1500 hrs. Vehicles were selected systematically; the first vehicle that passed after each 15 min. interval was contacted during morning and evening sessions and after 13 min. for the afternoon sessions.

Data Collection Procedures

On-site Interview

All interviewing was conducted by the author. Before a visitor was asked to participate in the study, the interviewer (who always wore a fluorescent orange vest) briefly identified himself, his institution (i.e. the University of Tennessee), and the study. Then he asked if the occupant would mind answering a few quick questions and taking home a longer questionnaire to be completed at a later

time. Of 401 vehicles stopped, the interviewer received only one refusal.

The interviewer asked nine questions (Appendix B) of the occupants of each vehicle sampled. The interview usually took 3 - 5 min. Often more than one occupant would participate, although a spokesperson (usually the driver) was easily identifiable.

The major purpose of the interview was to obtain information which the participants might otherwise forget before completing the longer form (i.e. what wildlife they saw on-site, had wanted to see, and had expected to see). The interviewer also needed data on: (1) name and address so that postcard reminders could be sent to those who were slow to return questionnaires, (2) group structure, (3) temporal patterns, and (4) response to a color photograph considered to be too expensive to reproduce in the mail-back questionnaire.

Mail-back Questionnaire

Following the personal interview questions, a 10-page questionnaire (Appendix C) was handed to an adult occupant (more than 15 years old) of each vehicle, along with a self-addressed, postage-paid envelope and a cover letter (Appendix D). The questionnaire was made as attractive and non-threatening as possible by using a photograph of a deer on a forest green cover and by reducing the size of the saddle-stitched booklet (25.2 cm X 17.6 cm).

Questions were designed to satisfy the objectives of the study while also being quick and easy to answer, almost regardless of educational attainment. The major batteries of questions dealt with:

preferences for various wildlife species; knowledge of wildlife, management, and interpretation; importance of wildlife as a reason for visitation; attitudes toward management and interpretation; background variables; and type of NPS wildlife information used.

A follow-up reminder (Appendix E) was sent to each participant who had not returned the questionnaire two weeks after the interview. A second, but different reminder (Appendix F) was sent to those who were still reluctant four weeks following the interview. Both reminders were printed on postcards. Both emphasized the importance of visitor responses.

Mail Response Rate

Of the 400 written questionnaires distributed at Cades Cove, 340 (85.0%) were returned (Table 1). One hundred and ninety-one (47.8%) questionnaires were returned in the first wave, while 25.2% were returned after the first postcard reminder and 12.0% after the second postcard reminder.

Data Analysis Procedures

The significance level was set at $P < 0.05$ unless otherwise stated. Most analyses were conducted using SPSS programs, i.e. Statistical Package for the Social Sciences (Nie et al. 1975).

Most of the questionnaire items were measured using 5-point Likert scales. As in many sociological studies, the assumption was made that Likert scale data were interval in nature, and appropriate statistics were used. The Student's t-test, paired t-tests, and

Table 1. Return rate for the 10-page mail-back questionnaire on wildlife of Cades Cove, GSMNP, 1983.

N Distributed	N Returned in First Wave	N Returned in Second Wave	N Returned in Third Wave	Total N Returned	Response Rate
400	191 (47.8%)	101 (25.2%)	48 (12.0%)	340	85%

one-way analysis of variance (with Duncan's multiple range test) were used to evaluate differences in response means. Separate variance estimates for the t-test were employed whenever an F-test identified unequal variances; otherwise the pooled variance estimate was used. Factor analysis was employed as a data reduction technique for grouping preferences for different animals; a species was placed in a category when it had a factor loading of 0.4 or above in a specific factor and at least 0.1 above its next highest value in any other factor; principle components with orthogonal varimax rotation was the factoring routine used. In limited situations, the nonparametric Cochran Q test and chi-squared test were also used to test response differences. Pearson correlation coefficients (r) were employed to correlate interval level data and Kendall correlation coefficients were used to correlate ordinal data. The Spearman correlation procedure was not used because of numerous tied ranks.

Reliability was evaluated using two methods for measuring internal consistency. Thirty-five individual items with high variance were tested through an odd/even split-half reliability estimator (Allen and Yen 1979); only two (5.7%) were found unreliable, which is probably due to random error. Reliability of indices was investigated using SPSS Subprogram RELIABILITY, which provides reliability coefficients along with basic summary statistics (Hull and Nie 1981). Results of index reliabilities were used to aid construction of indices, and are reported within the text.

Validity was evaluated by investigating whether the instruments and the entire study measured what they were supposed to measure.

Validation of the entire study was approached from the standpoint of the study's applicability to the "real world" (Bowers and Courtright 1984). To date, many of the results appear helpful for solving real management problems. Validation of the two instruments was studied largely through content validity, a common but often subjective approach. Instrument validation can, however, be strengthened beyond this face validity by investigating the degree of inter-judge agreement for individual items or by computing reliability coefficients for internal consistency. The latter can confirm validity by inferring the appropriateness of the items for the overall question (Betz and Weiss 1976). The requirements of content validity for this study were largely approached by: (1) considerable subjective evaluation of whether items measured their relevant traits prior to testing, (2) using a number of people from various professional backgrounds (e.g. wildlife scientists, recreation scientists, foresters, lay people) to judge or critique the items, and (3) computing reliability coefficients for internal consistency. The more theoretically-based construct validity was attempted where possible. Factor analysis (Allen and Yen 1979) and other evaluations of variance and correlations (Kerlinger 1973) are common tools employed in construct validation. However, construct validity is seldom achieved in a straightforward fashion or even by a single researcher (Bowers and Courtright 1984); it is usually the result of accumulated assessment from numerous studies and researchers. Some portions of this questionnaire were validated with previously mentioned procedures and through comparison with similar studies.

Although the originality of the present study hindered thorough construct validation, the design may be helpful to future researchers in developing wildlife surveys with readily measurable construct validity.

CHAPTER V

VISITOR PROFILE

Most questionnaires contain items used to describe the sample (e.g. demographics, socioeconomic variables, etc.). These background variables are often discussed in detail and placed near the end of reports and theses. It appears more logical in this thesis to include a concise profile of the sample at the beginning of the Results chapters in order to provide the reader with a quick "feel" for the type of people who visit Cades Cove. The Visitor Profile provides a perspective for interpreting the specific findings of the study. Tables in this chapter provide the necessary details for readers who want to become more familiar with sample characteristics. Visitors who participated in oral interviews are referred to as "participants" and those who responded to the written questionnaire are termed "respondents."

Ages of questionnaire respondents were relatively evenly distributed between major age classes (Table 2); mean age was 37.8 years (SD = 13.0). Sampling was skewed toward males (65.9% of respondents), especially during interviews (86.0% of participants); obviously, spokespersons during interviews were not always the vehicle occupants who completed the questionnaire. Most respondents were educated beyond high school, with about one-fourth completing college and/or attending graduate school. Many worked in professional/managerial roles or were unsalaried (e.g. housewives, retirees, students, etc.).

Table 2. Socioeconomic characteristics of questionnaire respondents in Cades Cove, GSMNP, 1983.

Socioeconomic/Demographic Characteristics	Number of Respondents	Percent of Respondents
Age		
< 20	13	3.9
20-29	81	24.2
30-39	118	35.2
40-49	58	17.3
50+	65	19.4
Total	335	100.0
Sex		
Male	222	65.9
Female	115	34.1
Total	337	100.0
Education		
< High school	40	11.9
High school	89	26.4
Technical or vocational school	37	11.0
Some college	85	25.2
Completed college	46	13.6
Graduate work or degree	37	11.0
Other	3	.9
Total	337	100.0
Occupation (Adapted from Miller 1978)		
Professional, technical, similar workers	58	17.3
Managers, officials, proprietors (except farms)	43	12.8
Clerical, sales, similar workers	46	13.7
Craftsmen, foremen, similar workers	48	14.3
Operatives and similar workers	22	6.6
Service workers	13	3.9
Laborers, including farmers and miners	22	6.6
Unemployed (housewives, retired, students, etc.)	83	24.8
Total	335	100.0

Participants were from a large number of home towns (285 towns from 400 interviews), but were largely from the Southeast (Table 3). Knoxville, TN, was the most commonly represented city, and about one-third of the respondents were from Tennessee. About half had grown up primarily in rural areas prior to their 16th birthdays, with the remainder being raised almost equally in towns and cities (Table 4). Most were not hunters, although many had quit hunting (Table 5).

Most visitors had been to Cades Cove at least once prior to the day of the interview (74.2%), and almost one-fourth had visited the site more than 25 times (Table 6). Most participants spent more than an hour in the Cove (87.0%), and about 40% spent over two hours ($\bar{x}$ = 127.6 min., SD = 83.9). The most common sizes of groups were two and four people (Table 7). Almost all vehicles contained more than one occupant with about half having at least one child (Table 8).

Unless otherwise stated, future comparisons of the background variables described above with attitude and knowledge indices will be limited to Age, Sex, Education, Occupation, Type of Area Resided in Prior to age 16, Prior Experience with Cades Cove, and Hunting Status. Some categories within these variables have been consolidated for analytical purposes (Appendix F).

Table 3. Residential characteristics of questionnaire respondents in Cades Cove, GSMNP, 1983.

Residential Characteristic	Number of Respondents	Percent of Respondents
Geographic Region		
Southeast	259	76.2
Midwest	57	16.7
Southwest	12	3.5
Mid-Atlantic	4	1.2
North Atlantic	4	1.2
West	2	.6
Foreign country	2	.6
Total	340	100.0
Home State		
Tennessee	118	34.7
Florida	35	10.3
Georgia	33	9.7
Ohio	23	6.8
Alabama	18	5.3
North Carolina	18	5.3
Kentucky	16	4.7
Mississippi	14	4.1
Louisiana	9	2.7
Illinois	12	3.5
Other	44	12.9
Total	340	100.0
Home Town		
Knoxville, TN	30	8.8
Maryville, TN	21	6.2
Sevierville, TN	6	1.8
Jacksonville, FL	5	1.5
Walland, TN	3	.9
Other	275	80.8
Total	340	100.0

Table 4. Residence before 16th birthday of Cades Cove visitors, GSMNP, 1983.

Residence before 16th birthday	Number of Respondents	Percent of Respondents
Rural	173	51.3
Town	79	23.5
City (25,000 or more)	85	25.2
Total	337	100.0

Table 5. Hunting characteristics of Cades Cove visitors, GSMNP, 1983.

Hunting Status	Number of Respondents	Percent of Respondents
Yes	125	37.1
No	149	44.2
Have, but quit	63	18.7
Total	337	100.0

Table 6. Temporal characteristics of Cades Cove visitors, GSMNP, 1983.

Temporal Characteristic	Number of Visitors	Percent of Visitors
Number of Previous Trips		
None	87	25.8
1	48	14.2
2-5	69	20.5
6-10	31	9.2
> 10	26	7.7
Total[a]	337	100.0
Minutes Spent Inside Cove		
< 61	52	13.0
61-120	186	46.5
121-180	95	23.7
> 180	67	16.8
Total[b]	400	100.0

[a] Based on questionnaire respondents.
[b] Based on personal interview participants.

Table 7. Number of vehicles containing adults and children stopped for personal interviews in Cades Cove, GSMNP, 1983.

Number of Adults in Vehicle	n	%
1	28	7.0
2	256	64.0
3	41	10.2
4	58	14.5
5	7	1.8
6 or more	10	2.5
Total	400	100.0

Number of Children in Vehicle	n	%
0	207	51.8
1	6	15.2
2	90	22.5
3	27	6.8
4	9	2.2
5	2	0.5
6 or more	4	1.0
Total	400	100.0

Table 8. Number of visitors in vehicles stopped for personal interviews in Cades Cove, GSMNP, 1983.

Number of Visitors in Vehicle	Vehicle	
	n	%
1	11	2.8
2	137	34.2
3	66	16.5
4	114	28.5
5	31	7.7
6 or more	41	10.3
Total	400	100.0

CHAPTER VI

VISITOR PREFERENCES TOWARD WILDLIFE

The purpose of this chapter is to investigate some visitor perceptions through preferences toward wildlife. This task is largely accomplished by identifying animals that people observed, expected to see, and wanted to see in Cades Cove. Most questions relating to these variables were asked during the on-site interview so that visitors might have better recall of what they had seen. In addition, visitors were asked to rate each of 33 animals for viewing preferences in the written questionnaire in order to obtain more refined data.

Wildlife that Interview Participants Saw, Expected to See, and Wanted to See

Four interview questions related to wildlife that people saw immediately prior to being interviewed and wildlife they had wanted to see and expected to see when they entered Cades Cove (Appendix B). The first three were open-ended. A partial list of animals commonly seen in Cades Cove (Appendix G) was presented to the visitors late in the interview to avoid biasing answers to previous questions. Then participants were asked if they saw any animals on the list which they had previously forgotten to mention.

Wildlife that Visitors Saw

The animal most commonly seen in Cades Cove was the white-tailed deer. Ninety-one percent of Cove visitors reported seeing at least one deer on the day they were interviewed (Table 9). More than half of the visitors also reported seeing crows (70.8%) and groundhogs (51.5%). Other wildlife commonly observed were black bears (29.3%), gray squirrels (28.8%), wild turkeys (19.3%), and "other birds" (28.8%). The high number of black bear observations was largely due to three separate yearling bears using areas near the loop road during the interview period.

At least 38 species of wild animals were observed by visitors. Most visitors (73.3%) reported 2 - 5 species. All but five of the 400 interview participants (98.8%) reported seeing at least one species of wildlife after they were shown the list of animals.

Many wildlife were not reported until visitors read the list of animals (Table 10). The number of animals mentioned early in the interview average 2.51 species, while the mean number increased to 3.93 species after seeing the list. These were generally animals that might not be immediately perceived as wildlife (e.g. fish, lizards, snakes) and those commonly seen outside of the Park (e.g. crows, vultures, other birds, squirrels). The wildlife most likely to be reported prior to visitors reading the list were relatively large animals or those not commonly seen outside of preserves (e.g. deer, bear, raccoon, wild turkey).

Visitor age and time of day were the only background factors related to the number of species seen. People in the older age group

Table 9. Animals observed by Cades Cove visitors before and after seeing a list of wildlife native to the Cove, 1983 (n = 400).

	Participants Reporting Animals		Participants Remembering Animals Without List		Participants Remembering Animals Only With List	
Animal	n	%	n	%	n	%
Deer	364	91.0	363	90.8	1	.3
Crow	283	70.8	64	16.0	219	54.8
Groundhog	206	51.5	175	43.8	31	7.8
Bear	117	29.3	116	29.0	1	.3
Squirrel	115	28.8	48	12.0	67	16.8
Other bird	115	28.8	38	9.5	77	19.3
Turkey	77	19.3	70	17.5	7	1.8
Fish	67	16.8	9	2.3	58	14.5
Vulture	44	11.0	10	2.5	34	8.5
Raccoon	35	8.8	32	8.0	3	.8
Lizard	31	7.8	5	1.3	26	6.5
Snake	28	7.0	10	2.5	18	4.5
Chipmunk	23	5.8	13	3.3	10	2.5
Butterfly	21	5.3	14	3.5	7	1.8
Skunk	19	4.8	12	3.0	7	1.8
Other	18	4.5	10	2.5	8	2.0
Rabbit	12	3.0	9	2.3	3	.8
Other mammal	9	2.3	6	1.5	3	.8
Hawk	5	1.3	4	1.0	1	.3
Nothing	5	1.3	12	3.0	-7[a]	--[b]

[a] Seven respondents, who had previously stated that they had not seen any wildlife, remembered seeing animals after reading the list.

[b] Not applicable.

Table 10. Animals reported in Cades Cove after visitors were shown a list of species native to the Cove, 1983 (n = 400).

Animal	%
Fish	86.6
Lizard	83.9
Crow	77.4
Vulture	77.3
Other birds	67.0
Snake	64.3
Squirrel	58.3
Other[a]	44.4
Chipmunk[a]	43.5
Skunk	36.8
Other mammals[b]	33.3
Butterfly[a]	33.3
Rabbit[a]	25.0
Hawk[a]	20.0
Groundhog	15.0
Turkey	9.1
Raccoon	8.6
Bear	.9
Deer	.3

[a] Not on the list.
[b] Listed as "Other fur-bearing animals."

(50 years or older) saw fewer species than younger groups ($P = 0.013$), which is difficult to interpret. Interest in wildlife was not a factor; the hope of seeing wildlife was an equally common reason for visiting the Cove for both groups ($P = 0.644$). Perhaps younger visitors were more alert. Also, those in their 30's and 40's travelled in larger groups than older visitors ($P = 0.001$); more people may have been able to sight more wildlife.

Visitors who began their trips through the Cove between 1100 hrs and 1500 hrs observed fewer species than those who started ($P < 0.001$) at other times. More wildlife species are active and can be seen in mornings and evenings than in afternoons. In addition, fewer afternoon visitors drove to Cades Cove to see wildlife than morning or evening visitors ($P < 0.001$). Thus people in the afternoons probably saw fewer wildlife species because fewer species were observable and interest in wildlife was reduced in this group.

Wildlife that Visitors Expected to See

The animal that visitors most expected to see was the white-tailed deer (80.0%), although many people also expected to observe bears (25.3%) and other wildlife (Table 11). Repeat visitors expected to see deer more than first time visitors ($P < 0.001$), but not bear ($P = 0.979$). Repeat visitors probably knew from past experience that the chances of seeing bears were not great, but that deer were very likely to be observed.

Table 11. Animals which interview participants had expected to see in Cades Cove, GSMNP, 1983.

Animal	Participants (n=400)	
	n	%
Deer	320	80.0
Bear	101	25.3
Groundhog	61	15.3
Turkey	59	14.8
Nothing in particular	39	9.8
Other bird	13	3.3
Crow	12	3.0
Squirrel	11	2.8
Fox	9	2.3
Skunk	8	2.0
Raccoon	7	1.8
Chipmunk	6	1.5
Other mammal	5	1.3
Anything	5	1.3
Rabbit	4	1.0
Other	3	.8
Hawk	2	.5
Fish	2	.5
Butterfly	1	.3
Vulture	0	0
Snake	0	0
Lizard	0	0

Wildlife that Visitors Wanted to See

The animal that interview participants reported wanting to see most was the bear (65.5%). Almost half of the visitors also wanted to see deer (Table 12). Kellert (1980b) has shown that large, aesthetic animals are highly preferred over many other animals.

Relationship of Preferences and Expectations to the Wildlife that Visitors Saw

Sixteen animals that were seen by at least one percent of the interview participants were ranked on how much people preferred, expected, and saw them (refer to Table 11; "Other" categories not included). Kendall's correlation coefficient (tau) was used to investigate relationships between the three variables of preference, expectation, and actual observation. Kendall's was preferred to Spearman because of numerous tied ranks in one of the categories.

All correlations (Figure 8) between the three variables were significant at $P < 0.001$. A logical path relationship between them might originate at human preference for wildlife. The "desire" to see certain types of wildlife may affect their expectations which in turn may affect what is actually seen by people seeking those animals. However, caution should be taken where a cause-and-effect relationship is postulated from a measure of correlation. The cause-and-effect may not actually exist or may be in the opposite direction from what is assumed. This approach supports the model in Figure 2; an experience can affect perception indirectly by supplying knowledge or changing

Table 12. Animals which interview participants had wanted to see in Cades Cove, GSMNP, 1983.

	Participants (n = 400)	
Animal	n	%
Bear	262	65.5
Deer	189	47.3
Turkey	72	18.0
Anything	41	10.3
Groundhog	23	5.8
Nothing in particular	20	5.0
Fox	13	3.3
Other mammal	13	3.3
Other bird	5	1.3
Crow	4	1.0
Squirrel	3	.8
Skunk	2	.5
Rabbit	1	.3
Hawk	1	.3
Snake	1	.3
Other	1	.3

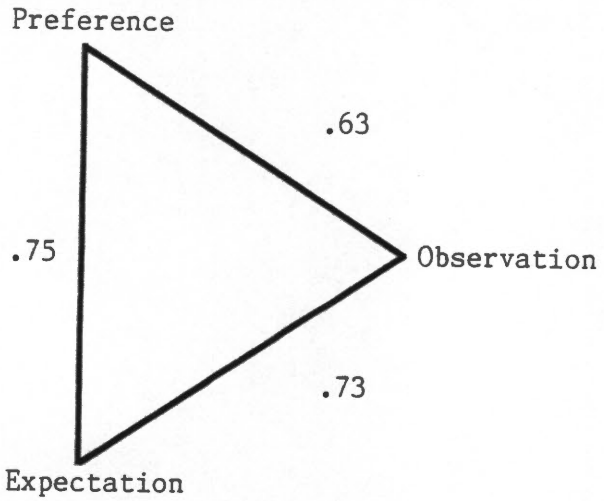


Figure 8. Kendall's correlations between preference, expectation, and observation of wildlife by interview participants.

beliefs; expectations and therefore preferences can then be altered. As an example, visitors' former observations of animals could affect their expectations of what they would find on the next trip, which in turn could alter their preference for some wildlife species that they would consider likely to see. As will be shown later, most people would like to see a fox in Cades Cove but did not mention it, possibly because they did not expect to see one. This lack of expectation may have been affected by previous experience in Cades Cove where foxes are relatively abundant but seen infrequently (e.g. none of the 400 participants saw a fox).

There were enough data to compare preference, expectation, and observation for three individual animals: bears, deer, and turkeys. The chi-squared test of independence was used because the three variables were assumed independent of one another. Results demonstrated that people who wanted to see bears were more likely to expect them ($P < 0.001$), but not more likely to see them ($P = 0.813$) than those who did not want to see them. People reacted similarly to turkeys; those who wanted to see turkeys were more likely to expect them than people who did not want to see them ($P < 0.001$), but were not more likely to see them ($P = 0.064$). However, visitors who wanted to see deer were also more likely to expect them ($P = 0.007$) but were less likely to see them ($P = 0.009$) than people who stated that they did not want to see deer. A logical assumption might be that people who did not want to see deer were repeat visitors and were somewhat tired of deer. However, there was no difference between first-time and repeat visitors on desire to see deer ($P = 0.103$). An alternate

explanation is that deer were probably the easiest wildlife to see in Cades Cove. Most people wanted to see deer when they entered the Cove (as will be supported in the next section); however, after observing several of these animals before reaching the exit where they were interviewed, some visitors may have forgotten their earlier desire to see deer and were more interested in other animals. It would be helpful to ask visitors what they want and expect to see as they enter the Cove instead of when they exit.

Of additional interest, interview participants rated the bear as the animal they most wanted to see in Cades Cove, while questionnaire respondents rated deer slightly higher than bear. A potential interpretation is that female respondents rated deer higher than bears ($P = 0.014$) and women made a higher percentage of questionnaire respondents (34.1%) than interview spokespersons (14.0%). An alternate explanation is that, in spite of our verbally asking visitors, "What kinds of wildlife were you wanting to see before you came into the Cove today?", many interview participants may have still been considering the question from their situation at the time of the interview. If visitors had already seen several deer, they may not have felt it important to see more deer. Results reported earlier demonstrated that people who saw deer were less likely to report wanting to see deer than people who had not observed them. However, visitors hoped to see bears whether or not they had already seen any; there was no difference in desire to see bears between visitors who saw bears and those who did not.

Preference of Questionnaire Respondents for Wildlife Species

To better understand preferences for wildlife species, questionnaire respondents were asked how much they would like to see each of 33 animals in Cades Cove regardless of whether they believed that the species lived within the Park. Rating each animal in a list reduced reliance on either memory or similar definitions of "wildlife." This approach also helped determine the degree to which animals and types of animals are preferred for viewing. All animals either presently exist or probably existed previously in Cades Cove. Pretesting demonstrated that the majority of people wanted to see most animals; therefore, the following 5-point Likert scale was used: Strongly Like to See, Like to See, Somewhat Like to See, Neutral, Not Like to See. Additional items in the questionnaire included variables considered most related to species preference: sex, hunting status, and previous experience in Cades Cove. All differences reported below are statistically significant. Student's t-test and one-way analysis of variance (with Duncan's multiple range test) were used to test differences in response means. Factor analysis was employed as a data reduction technique for grouping animals; a species was placed in a category when it had a factor loading of 0.4 or above in a specific factor and at least 0.1 above its next highest value in any other factor. Principle components with orthogonal varimax rotation was the factoring routine used (Nie et al. 1975).

Preferred Animals

The most popular species were deer, bears, turkeys, eagles, and raccoons (Table 13); all of these animals received preference ratings that were consistently high (i.e. low standard deviations). The least popular animals were copperheads, rattlesnakes, bats, lizards, and non-poisonous snakes. Although wild hogs and coyotes also possessed relatively low preference means, they did demonstrate unusually high variance in how people rated them.

Males and females tended to rate animals similarly; however, women rated horses, cattle, rabbits, box turtles, and "other birds" significantly higher and copperheads, rattlesnakes, and wild hogs lower than men. Hunters rated wild hogs higher than either former hunters or nonhunters (those who had never considered themselves hunters); hunters also preferred bobcats, bears, and wild turkeys more than non-hunters. Hunters rated domestic horses, rabbits, box turtles, frogs/toads, domestic cattle, and "other birds" lower than nonhunters. Hunters also rated rabbits, opossums, chipmunks, and "other birds" lower than former hunters. Those who had never visited Cades Cove prior to the day of the interview rated coyotes and wild hogs higher than those who had previous experience at the Cove. Bats, rattlesnakes, and copperheads were rated lowest (31, 32, and 33 respectively), regardless of visitor sex, hunting status, or visitation status.

Table 13. Means and standard deviations for preferences toward wildlife in Cades Cove, GSMNP, 1983.

Rank	Animal	Mean[1]	SD	Rank	Animal	Mean	SD	Rank	Animal	Mean	SD
1	Deer	1.25	0.24	12	Groundhog	2.00	0.94	23	Wild hog	2.84	2.11
2	Bear	1.32	0.36	13	Beaver	2.05	1.01	24	Coyote	2.85	2.09
3	Turkey	1.43	0.49	14	Otter	2.06	0.99	25	Vulture	2.87	1.57
4	Eagle	1.43	0.53	15	Bobcat	2.08	1.64	26	Domestic horse	2.95	1.62
5	Raccoon	1.60	0.69	16	Other birds	2.13	1.12	27	Frog or toad	2.98	1.52
6	Owl	1.68	0.66	17	Mink	2.16	1.08	28	Domestic cattle	3.10	1.54
7	Trout	1.77	0.80	18	Rabbit	2.17	0.99	29	Non-poisonous snake	3.34	1.72
8	Fox	1.84	0.87	19	Box turtle	2.36	1.12	30	Lizard	3.37	1.40
9	Chipmunk	1.89	0.89	20	Opossum	2.58	1.43	31	Bat	3.78	1.41
10	Hawk	1.92	0.95	21	Weasel	2.79	1.79	32	Rattlesnake	4.07	1.61
11	Gray squirrel	2.00	1.01	22	Skunk	2.83	1.74	33	Copperhead	4.14	1.48

[1] For calculation of means, Strongly Like to See = 1 and Not Like to See = 5.

Preferred Types of Animals

To reduce the large list of 33 species to a more manageable package for analytical purposes, categories of animals were intuitively developed and then subjected to Cronbach's alpha reliability procedure for evaluating internal consistency between items (Table 14). Aesthetic and culturally important animals were the most preferred while commonly feared and domestic animals were least preferred. All t-test comparisons of visitor responses to opposing categories (i.e. commonly feared versus not commonly feared, domestic versus non-domestic animals) were significant at $P < 0.01$. In addition, women liked animals which were culturally important, domestic, or commonly seen in Cades Cove more than men liked them. Nonhunters preferred domestic animals more than hunters. People who had never been to Cades Cove before liked predators, commonly feared animals, and those considered "pests" more than repeat visitors.

Factor analysis was employed to statistically group animals according to visitor preference. Of the six categories that factored, popular game species and small, aesthetic animals were the most preferred while poisonous snakes and other unappealing species were least preferred (Table 15). Fur species and domestic animals were the third and fourth most preferred groups. Two categories (poisonous snakes and domestic animals) were not considered strong factors because each had only two species, but their correlation values were high enough to warrant inclusion. In addition, a separate question demonstrated that 41.0% of the respondents believed that poisonous snakes should be destroyed whenever seen in Cades Cove, and Burghardt

Table 14. Preference means and reliability values (Cronbach's alpha) for selected groups of wildlife in Cades Cove, GSMNP, 1983.

Animal group[1]	Mean[2]	Alpha Value
Aesthetic animals (11)	1.75	0.83
Animals important to local culture/history (7)	1.87	0.65
Wild animals commonly taken for sport and food or fun (15)	2.00	0.81
Most commonly seen animals in Cades Cove (11)	2.15	0.79
Predators (17)	2.58	0.87
"Pest" species (11)	2.89	0.82
Domestic animals (2)	3.04	0.89
Commonly feared animals (7)	3.19	0.77

[1] Number of animals comprising groups listed in parentheses.
[2] See Appendix H for listing of these animals.
For calculation of means, Strongly Like to See = 1 and Not Like to See = 5.

Table 15. Preference means and reliability values (Cronbach's alpha) for factor analyzed groups of animals in Cades Cove, GSMNP, 1983.

Group (component animals)	Index mean	Alpha value
Popular game species commonly observed in Cades Cove	1.42	0.70
Deer		
Turkey		
Raccoon		
Small, aesthetic animals	2.01	0.86
Groundhog		
Rabbit		
Trout		
Box turtle		
Owl		
Chipmunk		
Other birds		
Fur species	2.20	0.79
Fox		
Otter		
Mink		
Beaver		
Coyote		
Domestic animals	3.04	0.89
Horse		
Cattle		
Unappealing but non-poisonous animals	3.16	0.83
Lizard		
Bat		
Weasel		
Vulture		
Skunk		
Non-poisonous snake		
Poisonous snakes	4.11	0.98
Rattlesnake		
Copperhead		

et al. (1972) found that about half of frontcountry visitors in other areas of GSMNP were in favor of eliminating all snakes.

Women rated domestic animals higher and poisonous snakes lower than men rated them. Hunters rated small/aesthetic and domestic animals lower than nonhunters. Hunters also rated small, aesthetic animals lower than did former hunters. Repeat visitors preferred game species commonly seen in the Cove more than new visitors.

Interpretation of Preferences

Deer and bear have been shown to be popular in visitor populations other than in Cades Cove. Idaho residents reported these two animals as their favorites (Fazio and Belli 1977). Kellert and Westervelt (1982b) demonstrated that the deer was the most common wild animal reported in newspaper articles over a 75 year period. Both deer and especially bear have been very popular in children's books (More 1979b). Lyons (1982) reported deer as being the most popular game mammal among the general population in America. Preference for a species is probably improved by aesthetics and large size (Kellert 1980b, Collins 1976), both of which deer and bear possess.

Eagles were also highly rated in this study, as well as in other studies (Fazio and Belli 1977, Kellert 1980b). Again size and aesthetics may be relevant to the popularity of both eagles and wild turkeys, but the added dimension of cultural and historic significance (Kellert and Berry 1980) probably provides a better explanation for eagle and turkey popularity. The intuitively developed categories of aesthetic and culturally important species were the most preferred.

The majority of animals in the most preferred groups categorized by factor analysis also appeared to be aesthetically pleasing.

Response to predators was mixed. In a separate question, 10.8% of the respondents agreed that predators should be removed from the Park. Although this number should be lower, the percentage would probably have been significantly higher a couple of decades ago. Education of the values of predators and reduced proportions of people leading rural lifestyles have probably combined to diminish fear of damage to preferred wildlife and domestic animals .

It is less surprising that bats, lizards, and snakes (particularly poisonous ones) were least preferred. These animals possess, in general, several characteristics which would reduce their popularity: predatory tendencies (Collins 1976), threat of biting humans (Kellert 1980b, Bowd 1983), unfamiliar skin texture (Kellert 1980b), heterothermic system (i.e. "cold-blooded") (Collins 1976), or competition with more preferred species (Dawson et al. 1978).

Cades Cove visitors rated domestic horses and cattle 26th and 28th in preference, respectively. The reaction to horses is considered unusual since horses are often very popular animals (Collins 1976, Kellert 1980b, Kellert and Westervelt 1982b). However, Dagg (1974) demonstrated that exotic animals may be less preferred than native animals in specific environments; over one-third of the Cades Cove visitors stated elsewhere in the questionnaire that horses and cattle should be removed from Cades Cove if they were competing with wildlife. Thus, Cades Cove visitors probably treated domestic animals as species not belonging in a national park. The fact that

wild hogs and coyotes are not native to the Smokies and may compete with more preferred animal and plant species probably reduced their popularity; the high variance in visitor response to these two species may have been due in part to their relatively large size and to their higher rating by people visiting Cades Cove for the first time.

Women generally preferred domestic and culturally important species more than men. Kellert (1976) found that sex is one of the most important social differentiators of human attitudes toward animals. He showed that women tend to express strong feelings toward pets, which may be related to their attitudes toward domestic and cultural animals such as the horse. The fact that women rated some "hazardous" animals lower than men rated them is not unexpected since the psychology literature shows that women tend to withdraw from dangerous situations more than men (Maccoby and Jacklin 1974).

Hunters tended to be more interested in several prized game species and less interested in domestic and aesthetic animals than others. These preferences may be related to Kellert's (1978, 1980b) "dominionistic" attitude displayed for animals used in sporting situations.

Explaining differences in preferences between repeat and new visitors is difficult. Perhaps repeat visitors live closer to Cades Cove resulting in stronger biases toward certain game species and against predators, commonly feared animals, and pests. Their stronger dislike for coyotes and wild hogs may reflect knowledge that these species are not native to the Park and therefore may be competing with native and more desired species; the Park provides considerable

information to the public on damage produced by wild hogs.

Summary

Visitors to Cades Cove were asked during interviews what wildlife they had seen in the Cove, and what wildlife they had wanted and expected to see in the Cove. They were also asked in a mail-back questionnaire how much they would like to see each of 33 animals. At least 38 species of wildlife were observed by visitors, the most common being white-tailed deer (91.0%). Animals commonly seen outside of the Park or not immediately perceived as wildlife were often not reported until visitors were shown a list of animals. Rankings of visitor preferences, expectations, and observations of wildlife were all correlated with each other. Interview participants expected to see white-tailed deer more than other species, but stated a preference for bears. The most preferred animals for questionnaire respondents were deer, bears, turkeys, eagles, and raccoons. The least popular animals included snakes, bats, and lizards. Different analyses revealed that preferred groups of animals were often aesthetic or important culturally and historically. Commonly feared and domestic animals were least preferred.

CHAPTER VII

VISITOR ATTITUDES

The preceding chapter developed a framework for the following discussion of attitudes; preferences toward species and types of species help identify attitudes toward wildlife. But how important are wild animals and wildlife viewing to the public in their pursuit of recreational opportunities in the area? How potent a force is wildlife in bringing people to Cades Cove and providing potential learning experiences? What are the prevalent attitudes about wildlife management in the Park? How does the public feel about current and potential actions of the National Park Service regarding information about wildlife and management of wild animals? What would visitors like changed? The purpose of this chapter is to answer these questions.

Importance of Wildlife and Wildlife Viewing

Managers need to know which park features attract visitors to an area and how these features influence satisfaction. This does not mean that parks must be managed for their most gratifying characteristics, but park personnel can deal with resources and visitors better if they understand the various reasons that people visit or return to a specific site.

To answer some of these questions and issues, 12 items were designed to evaluate the importance of wildlife as a factor in visiting Cades Cove and the Park, while four additional items surveyed

the effect of wildlife on trip satisfaction. A 5-point Likert scale ranging from Strongly Agree to Strongly Disagree was used on eight of the 20 items; the remaining questions required open-ended or Yes-No responses. Paired t-tests were used to evaluate differences in means.

The expectation of seeing wild animals was a major factor in visiting Cades Cove for 73.7% of the respondents, and at least a minor reason for visitation with 92.3% of the visitors. Respondents visited the Cove more because of scenery than for viewing wildlife (Table 16) ($t = 4.93$, $P < 0.001$), although some people may consider wildlife to be a part of the scenery. Seeing wildlife was a significantly more important reason for visiting Cades Cove ($P < 0.001$) than any of the other five reasons listed (seeing historical features, for the drive, camping or hiking, listening to bird calls, by accident). Even when wildlife viewing is not the major reason for visitation, it may be a major contributor to trip satisfaction (Lime and Cushwa 1969).

In the previous chapter, it was established that almost all visitors saw wildlife in Cades Cove, and many people observed animals which they preferred. In addition, at least 38 species of wild animals were seen by visitors. Being able to observe this variety of animals probably influenced participation in wildlife observation and visitor satisfaction. The greater the diversity of wildlife, the greater its capacity to provide opportunities for obtaining aesthetic values (Lewis 1951) and the higher the probability of wildlife watching and photography (Hay and McConnell 1979).

Some visitors may have responded positively toward wildlife being a reason for their visit because the survey was obviously about

Table 16. Visitor response to possible reasons for visiting Cades Cove, GSMNP, 1983.

	Mean[1]	Percentage (n = 295)				
		SA[2]	A	U	D	SD
Scenery	1.32	68.3	31.7	0	0	0
Wildlife	1.54	57.2	35.1	4.5	2.9	.3
Historical features	1.89	38.1	44.5	9.0	7.1	1.3
For the drive	2.72	19.9	38.5	5.5	22.3	13.8
Camping or hiking	3.03	19.0	19.7	14.9	32.5	13.9
Bird calls	3.58	3.5	18.2	16.4	40.2	21.7
By accident	4.65	0.4	2.5	2.8	20.3	74.0

[1] For calculation of means, SA = 1 and SD = 5.
[2] SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly disagree.

wildlife; that is, a few may have responded the way they thought the author wanted them to react. However, many visitors behaved in a manner congruent with their statements on the importance of wildlife. Over half of the visitors (58.1%) left their vehicles specifically to observe wildlife, while 46.2% admitted approaching wildlife. More than half of the visitors (56.1%) also photographed wildlife, while 50.0% reported photographing other aspects of the Cove. An average of 7.3 photographs of wildlife and 5.1 pictures of other aspects of Cades Cove were taken by each visitor. Wildlife photography may be one of the most economically significant wildlife observation activities (More 1979).

Visitors reported that seeing wildlife was very important to the enjoyment of their trip to Cades Cove (92.1% agreement) and to the Great Smoky Mountains National Park (91.8%) (Table 17). Only 23.8% felt disappointed in the type or lack of wildlife they saw. Over three-quarters (77.9%) reported that the expectation of seeing wildlife will be a major factor in returning to the Cove. This response was significantly higher than from those acknowledging that wildlife was a major factor in going to the Cove on the day of the interview ($t = 2.03$, $P = 0.043$). Thus, viewing wildlife appeared important to trip satisfaction.

Visitors who were disappointed with the type or lack of wildlife in Cades Cove saw significantly fewer species than those who were not disappointed ($P < 0.001$). Those who believed that the hope of seeing wildlife will be a major factor in returning saw significantly more wildlife than others ($P = 0.002$). People who said that wildlife were

Table 17. Visitor response to statements of satisfaction with wildlife in Cades Cove, GSMNP, 1983.

		Percentage (n = 317)				
	Mean[1]	SA[2]	A	U	D	SD
Seeing wildlife was very important to the enjoyment of my trip to Cades Cove.	1.46	67.4	24.7	2.2	5.7	0
Seeing wildlife was very important to the enjoyment of my trip to GSMNP.	1.55	58.2	33.7	3.1	5.0	0
The hope of seeing wildlife will be a major factor in returning to the Cove.	1.95	46.1	31.9	5.0	14.8	2.2
I was disappointed in the type or lack of wildlife I saw in Cades Cove.	3.67	5.3	18.5	7.5	41.1	27.6

[1] For calculation of means, SA = 1 and SD = 5.
[2] SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly disagree.

very important to the enjoyment of their trip to Cades Cove also saw more species ($P < 0.001$), but the same was not true for satisfaction of the trip to GSMNP ($P = 0.083$). Although wildlife in Cades Cove appear valuable to the entire Park experience, viewing these animals appears most important to the Cove area. Overall satisfaction during a wilderness or other wildland receation experience depends on a variety of factors, with wildlife often being an important component (Fuhriman and Crozier 1974, Steinhoff 1980, Flewelling and Johnson 1981).

Flewelling and Johnson (1981) found that sighting wolves or bears improved satisfaction levels for certain aspects of backcountry trips in Mount McKinley National Park. Observing bears was especially influential in their study. To test the association of individual species with visitor satisfaction in Cades Cove and Great Smoky Mountains National Park, five of the more popular animals were used (deer, bear, turkey, groundhog, and raccoon). Visitors who saw deer were significantly more likely to report wildlife as being very important to the enjoyment of the trip to the Cove than visitors who did not see deer ($P = 0.002$). Similar responses held for those who saw bear ($P = 0.015$), groundhog ($P = 0.014$), or raccoon ($P = 0.030$); however, association with the trip to the Park in general was only maintained for deer ($P = 0.020$). Seeing deer ($P = 0.003$), turkey (0.003), groundhog ($P = 0.016$), or raccoon ($P = 0.032$) was associated with less disappointment, and seeing deer ($P = 0.003$) or turkey ($P = 0.005$) may have increased the probability of returning to Cades Cove. Unexpectedly, seeing deer seemed more closely tied to trip

satisfaction than seeing a bear. However, direct comparison was confounded because most visitors (90.6%) who saw bears also observed deer.

Attitudes toward Management Issues

Wildlife managers make numerous decisions of a potentially controversial nature. In addition, wildlife researchers often use research methods which are occasionally criticized by either the public or managers or both. This section analyzes a few of these issues. Both individual items and indices constructed from these items are used (Appendix I).

Marking of Deer

Several species in GSMNP have been tagged or radio-collared during the last 10 - 15 years. These free-ranging research animals are often visible to the public. Knowlton et al. (1964) found that color-coded streamers, ear tags, and collars may be seen up to 366 m (400 yds) away without the aid of field glasses.

A controversy periodically surfaces over the use of visible markers on wildlife in wilderness areas. For example, Craighead (1979) reported that officials of Yellowstone National Park believed markers offended visitors, especially photographers. Some park managers and researchers feel that visitors are largely opposed to the use of visible markers on wild animals. Therefore, a portion of this study was designed to assess this issue.

Three questions evaluated how visitors felt about seeing collars on deer. This was a meaningful issue because deer were being radio-collared in the Cove at the time of the interviews and 93.2% of the respondents were seeing deer along the Cove's loop road. Of major interest was the response of visitors to brown collars blending with the pelage color of deer vs. collars of more visibly contrasting colors, and if opinions were affected by knowledge of the purpose of the collar. Responses were recorded on a 5-point Likert scale (from Very Much to Not at All) as to how negatively visitors reacted to these hypothetical deer-marking situations. A conservative statistical approach was used because the questions were so similar that they may not have been independent of each other. Differences in response to the three situations were evaluated using the Cochran Q test; other differences were tested with the chi-squared test.

Most respondents were not disturbed by collars on deer (Table 18). Visitors were more tolerant ($Q = 62.230$, $P < 0.001$) of a brown collar when informed of the research purpose. Visitors preferred colored collars over brown collars only when they were told of the research purpose ($Q = 24.934$, $P < 0.001$), but were less tolerant of colored collars when the purpose of both were explained ($Q = 17.857$, $P < 0.001$).

Petko-Seus et al. (1985) found that most GSMNP campers were not offended by radio-collars, ear tags, or small ear streamers on bears. The obvious conclusion from these two surveys is that most GSMNP visitors do not mind research markers on wildlife in the Park. Wildlife observers appear most tolerant of smaller, less obvious

Table 18. Visitor response to research use of deer collars in Cades Cove, GSMNP, 1983.

	Response[1]					
	Very much/Much Bothered[2]		Neutral		Not much/Not at all Bothered[2]	
Color of collar/ information on purpose	n	%	n	%	n	%
Brown/not informed	104	31.0	60	17.8	172	51.2
Brown/informed	25	7.5	33	9.8	278	82.7
Brightly colored/informed	59	17.6	40	11.9	237	70.5

[1] Degree to which visitors reacted negatively or were bothered by hypothetical situations.

[2] Two variables are combined.

markers, especially when informed of the marker's purpose. Contor (1978, p 88) found that when the purpose of an action is given, "the public is more willing to yield their rights to wildlife benefits than most managers realize." Assuming public tolerance exists in most areas, why is there so much discussion among wildlife researchers and managers about adverse public reaction to markers? There are at least three possible answers to this question. First, some researchers and NPS personnel have been known to attach unusually large streamers or "flags" to wildlife while others have painted huge numbers or symbols on the sides of animals. While some instrumentation and marking not only provides a useful means, and sometimes the only means, of obtaining certain data, researchers must be as discreet and sensitive as possible to the values of users (Wauer 1975, Hendee and Schoenfeld 1978, Schoenfeld and Hendee 1978). The second reason is that only a few people complaining loudly enough can give the false impression that most users agree with them. Bultena et al. (1981) explained that, with large use levels, even a small percentage of disgruntled people can establish considerable opposition, and that opponents tend to be more aggressive than proponents. The third reason is that scientists, managers, and other natural resource personnel often have different preferences and attitudes than the general public (Hendee and Harris 1970, LaHart and Tillis 1974, Lucas and Stankey 1974, Peterson 1974, Peyton and Langenau 1985). For example, Hendee and Harris (1970) found that wilderness managers are often more "purists" than their users, and believe that the users typically hold purist points of view similar to their own. Having differences of opinion

from users is not necessarily counter-productive, but wildlife workers must recognize the existence of these alternative views in order to be most effective (Peyton and Langenau 1985).

There are two user groups of particular interest to this discussion: photographers and hunters. Almost half (43.4%) of the respondents entered Cades Cove expecting to photograph wildlife. There were no significant differences between those who expected to photograph wildlife and those who did not for responses to any of the three questions on response to collars. However, reaction may be different among professional wildlife photographers.

As mentioned in the Visitor Profile, hunters comprised 37.1% of the respondents, 44.2% were nonhunters, and 18.7% were past hunters. Hunters and nonhunters responded similarly to brown collars when informed of their purpose ($x^2 = 0.022$, $P = 0.882$). Hunters were more tolerant than nonhunters of brown collars when not informed of their purpose ($x^2 = 4.789$, $P = 0.029$), and of brightly colored collars ($x^2 = 4.996$, $P = 0.046$). Knowledge that wildlife in GSMNP cannot be hunted may have contributed to hunters being less annoyed with collars. However, J. W. Lentfer (pers. commun., letter) stated that most polar bear hunters were curious, rather than offended, about markers. Some hunters may be more tolerant of research techniques than nonhunters because experience has told them that marking and studying animals is rarely harmful to wildlife populations and may be helpful. In addition, some nonhunters may be more sensitive to an unnatural context associated with wildlife.

When the three collar variables were combined into an attitude index, the mean score was 11.590 (15.0 representing the most positive score on a scale of 1.0 - 15.0) with a standard deviation of 3.165 and a reliability coefficient of 0.752. None of the seven major background variables (sex, age, occupation, hunting orientation, residence before 16th birthday, and previous experience in Cades Cove) seemed to influence the attitude index.

Reintroduction of Extirpated Species

A number of wildlife species have disappeared from the Great Smoky Mountains since the intrusion of European man. Mountain lions, peregrine falcons, elk, bison, river otters, wolves, fishers, and probably beaver were eliminated from the area (LaFollette 1974). The Smoky madtom (*Noturus baileyi*) was also extirpated from the Park in the late 1950's, and the brook trout (*Salvelinus fontinalis*) was severely reduced in numbers (USDI 1984). Beaver returned on their own to some peripheral areas, and unconfirmed cougar sightings are occasionally reported. In addition, peregrine falcons and river otters have recently been reintroduced, brook trout are being re-established in some formerly occupied streams, and fisher and madtoms may eventually be returned (USDI 1984).

Reintroductions can be highly controversial, particularly for large animals capable of killing livestock and popular wildlife species, or endangering humans and their crops (Trefethen 1975, Hendee and Schoenfeld 1978, Manski et al. 1981, Singh and Rao 1984). Even the National Park Service once supported the reduction or elimination

of some species (e.g. wolves, grizzlies, and mountain lions), creating a later need for reintroductions (Wauer and Supernaugh 1983). Thus, a portion of the questionnaire was designed to evaluate visitor attitudes toward reintroduction of six former native species. In addition, visitors were asked whether they agreed that American buffalo should replace horses and cattle in Cades Cove as domestic animals. A 5-point Likert scale was used for all seven items.

The most popular species was the elk, with river otter scoring a close second (Table 19). Reintroductions of wild bison and peregrine falcons were also supported. However, domestic bison, wolves, and mountain lions were less preferred.

These results are largely what might be expected based on preferences reported in the preceding chapter. In particular, the two large predators were expected to be relatively unpopular. However, the adverse reaction to bison placed in the Cove as domestic animals was somewhat surprising. Perhaps many people do not believe that wildlife should be domesticated.[1]

When responses to the six wild species were combined into an index, the mean score was 14.930 (1.0 representing the most positive score on a scale of 1.0 - 30.0). The standard deviation was 4.234

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[1] However, construction and placement of the statement may have also affected the results. Some respondents may not have wanted horses and cattle removed from the Cove. Others may have responded differently had this statement been placed prior to that of bison being reintroduced as wild animals; some visitors were probably influenced by this item placement. This matter should be studied in further detail.

Table 19. Visitor response to possible species reintroductions in GSMNP, 1983.

		Percentage (n = 273)				
	Mean[1]	SA[2]	A	U	D	SD
Elk	1.98	29.5	53.9	8.2	7.5	0.9
River otters	2.07	21.3	52.1	20.0	5.7	0.9
Bison (as wild animals)	2.24	27.7	44.6	11.3	12.3	4.1
Peregrine falcons	2.25	19.7	49.2	18.2	9.1	3.8
Mountain lions	3.08	10.8	24.4	20.9	31.2	12.7
Wolves	3.32	9.5	16.7	23.0	31.9	18.9
Bison (as domestic animals)	3.33	9.1	17.9	21.4	36.5	15.1

[1] For calculation of means, SA = 1 and SD = 5.
[2] SA = Strongly Agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly Disagree.

with a reliability of 0.769. Former hunters responded more favorably (P = 0.015) toward reintroductions than either hunters or nonhunters. Also, people over 50 years old were less in favor of reintroductions than people in any of the three younger categories (P = 0.022). Also, those who had visited Cades Cove 10 or fewer times supported reintroductions more than those who had frequented the area more often (P = 0.003). The latter group probably consisted of a more local group of people, and locals are generally less supportive of reintroductions than people living farther away (Cobus 1972).

Because predators, and especially large predators, sometimes attract more public attention than other animals, an additional index was formed from the four predators (mountain lions, peregrines, river otters, and wolves). These predators produced a mean score of 10.714 (1.0 representing the most positive score on a scale of 1.0 - 20.0), with a standard deviation of 3.223 and a reliability of 0.759. Significant influencing background factors were: previous experience (P = 0.012), hunting orientation (P = 0.027), age (P = 0.004), and education (P = 0.025) (Appendix J, Table 30). Again, the most experienced visitors (> 10 visits) were more opposed to these reintroductions than were people with no visits or 1 - 10 visits. Nonhunters were more opposed than former hunters. In general, the older people were, the less they supported the return of extirpated predators, with those 50 years or older being significantly less supportive than those under 30 years of age. These results may be explained by younger people being less exposed to predatory depredations and more exposed to pro-predator information through more

extensive education. A general trend was also found in higher education resulting in more favorable attitudes toward reintroducing predators, with those experiencing graduate work being significantly more favorable than those with high school, technical school, or less education.

The two largest and least popular predators (e.g. mountain lions and wolves) were examined separately. The same relationships with background variables occurred with wolves as with the four predators discussed above, except that hunting status was no longer relevant and the most educated visitors (graduate work or degree) were less opposed to these reintroductions than any less educated group.

The only background variable significantly influencing responses to mountain lions was hunting status. Both current and former hunters were more favorable toward reintroducing cougars than nonhunters. These results are somewhat perplexing in light of alleged hunter criticism of agencies managing mountain lions. Perhaps a few hunters are so vocal as to create a false impression of hunter attitudes. Some hunters and former hunters may be more perceptive of the ecological benefits of cougars and of their relatively non-threatening nature, than nonhunters. Some current hunters may also hope to establish future opportunities to hunt these animals.

The literature provides a number of suggestions for conducting reintroductions. Wilson et al. (1975) listed several major factors for consideration prior to re-establishment of desert bighorn: historic site selection, enclosure location and construction, behavior, capture techniques, transport, and method of release. Most

of these factors apply to reintroduction of other species in GSMNP. Agencies should guard against the spread of disease (Hendee and Schoenfeld 1978), and select the best season and range to maximize survival (Cowan 1974). Sound taxonomic knowledge is also essential if re-establishment is to be conducted with animals of ancestral genotype, or the most similar genotype to the ancestral one (Cowan 1974, Nichols 1975, Hendee and Schoenfeld 1978), as is the case in most NPS reintroductions.

Early attempts by the National Park Service to reintroduce species were largely unsuccessful because no one investigated why the animals disappeared. A number of species would still have the same problems now that originally led to their demise. Agency personnel should consider resistance to disease, climatic adaptation, and changing vegetation patterns (Wauer and Supernaugh 1983). Adequately large range must also be procured or protected even surrounding a park because some animals cannot meet all of their needs within a park's boundaries (Trefethen 1975, Robbins 1984).

Another matter of considerable importance is people. The public can greatly influence the success of a reintroduction program. Such efforts should be accompanied with information and education programs, especially for species which tend to conflict with human economic interests (Demarchi 1975, Trefethen 1975, Doughty 1978, Singh and Rao 1984). In most cases, educational efforts should be centered on the people living in or near the potential habitat and not on urban areas that are only emotionally involved. Re-establishment of many species cannot be justified from a consumptive point of view, particularly in

national parks; but these species may enhance the recreational potential of an area and therefore improve local economy (de Vos 1967). In addition to information and education programs, regulations must be enforced to protect the species from undue disturbance and especially poaching (Doughty 1978, Singh and Rao 1984).

NPS management concerns. It is interesting that only 29.2% of the respondents in this study realized that NPS policy supports reintroduction if certain conditions are met. Species re-establishment is one of the major concerns of the National Park Service (Wauer 1975). However, official NPS policy (USDI 1978b) stipulates that reintroduction should only be conducted if: (1) adequate habitat exists in the park or adjacent public lands and waters to support the species, (2) the species, based on an effective management plan, does not pose a serious threat to the safety of park visitors or park resources, or to persons or property outside of park boundaries, (3) the species being reintroduced approximates as closely as possible an extinct subspecies or race, (4) the species disappeared or was substantially diminished because of human-induced change (either directly or indirectly) to the ecosystem, (5) confinement of the animals by fencing will be permitted only until they become thoroughly accustomed to the new area or they have become established sufficiently that threats from predators, poaching, disease, or other factors have been minimized, and (6) such programs will be conducted in cooperation with other affected parties and agencies.

The National Park Service considers reintroduction within GSMNP

possible for species tested in this study's questionnaire. It has already been mentioned that efforts are underway to re-establish populations of peregrine falcon and river otter. In addition, the Park Service (USDI 1984) believes that bison and elk could provide aesthetic, biological, and historical advantages to the livestock situation currently managed in Cades Cove. Although there is concern that these species might become overpopulated or compete too much with white-tailed deer, the NPS realizes the tremendous potential of these animals for nonconsumptive viewing. The Park Service also appears open to the possibility of reintroducing the eastern cougar and the gray wolf, but is fully aware that the public could prevent the return of large predators. Re-establishment attempts on wolves would probably require constant monitoring, protective regulations within (but only within) National Park Service and perhaps National Forest Service lands, and use of special collars for sedating the animal whenever desired. However, Murray (1970) has demonstrated how a properly written publication can change attitudes toward wolves, and Maurice Hornocker (Turbak 1985) has shown how mountain lion myths can be dispelled through not only long-term study, but also by publication of popular as well as scientific articles.

Cades Cove is a logical site to release a number of extirpated species. The Park Service (USDI 1984) suggests that reintroductions in this historic zone could be justified by adjusting the historic period to include times when extirpated species existed in the Cove. Bison and elk, in particular, could be integrated into the present cattle and haying operations. Other adjustments, such as removal of

some fences, could be made without diminishing the character and viewing popularity of the Cove.

Exotic Species

Exotic species have been introduced throughout the United States. Most exotics are unable to survive the ecological stresses of new environments. However, a few wild species multiply rapidly when released into areas with abundant food and few competitors or predators. Usually, islands (Van Tyne and Berger 1976) and habitats which have been disturbed (Walter 1978) have larger ratios of exotic species. Although some wildlife can fill empty niches and be appreciated by most people (e.g. ring-necked pheasant (Phasianus colchicus)), all too often they become pests and disrupt ecosystems (e.g. English sparrows (Passer domesticus), starlings (Sturnus vulgaris)) (Van Tyne and Berger 1976, Walter 1978).

The introduction of non-native animals is becoming a serious problem for many parks. The National Park Service (USDI 1978b, p IV-11) has defined exotic species as those "that occur in a given place, area, or region as the result of direct or indirect, deliberate or accidental introduction of the species by humans." Native species are defined as "species which presently occur, or once did occur prior to some human influence, in a given place, area, or region as the result of ecological processes that operate and have operated without significant direct or indirect, deliberate or accidental alteration by humans" (USDI 1978b, p IV - 11a). Introduction of non-native species is no longer permitted in national parks (except for some highly

controlled domestic species). Where exotics have become established or threaten invasion, they are to be controlled whenever feasible (Wauer 1975). However, elimination procedures can sometimes cause more problems than the exotic animal (Schoenfeld and Hendee 1978). One such problem which managers confront is the dispute with the public on whether exotic wildlife should be removed.

Several exotic animals exist within GSMNP. The most publicized species is the wild hog. The European wild hog (Sus scrofa) was first introduced into the mountains of North Carolina in 1912 (Benda 1984). They entered the Park in the late 1940's (USDI 1984), and have often interbred with feral hogs. Wild hogs now number about 1,000 - 2,000 in the Park. Because of damage to flora (including rare and endangered plants) and competition with native fauna, the ultimate management goal is eradication of hogs from the Park (Benda 1984).

A less common exotic species is the coyote (Canis latrans). Although this animal has been moving eastward from the Mississippi River for several years, it was not reported in the Park until the early 1980's. It has not yet created a major problem, but is considered exotic because its expansion is aided through deliberate relocations (Pelton 1984). It may be controlled in the future.

Only one questionnaire item directly addressed the question of exotic species. Item #25d asked how much the respondent agreed (on a 5-point Likert scale) with the statement, "Wild hogs should be removed from the Park since they are not native to the area." Almost half felt that hogs should not be removed; 35.3% disagreed with the statement, while 11.1% strongly disagreed. Only 28.3% agreed or

strongly agreed with hog removal, while over one quarter (26.3%) were undecided. This reaction was somewhat unexpected because wild hogs were ranked 23rd of 31 wild species in preference. However, the issue of hog removal is controversial in GSMNP. Many people do not believe that any animals should be destroyed, especially in national parks; the issue of killing burros (Equus asinus) in Grand Canyon National Park is a notable example (Stocken 1980, Stottlemyer 1981). Other people believe that GSMNP makes an excellent breeding ground for a favorite game animal. Humans have helped the dispersal of hogs by deliberate releasing in unoccupied ranges; this action may continue to thwart extirpation efforts by the National Park Service (Pelton 1984). Visitor hunting status ($P = 0.002$) and sex ($P = 0.033$) were two important background factors influencing response to hogs; hunters and males were, as expected, more favorable toward seeing hogs in Cades Cove. In addition, those with no previous experience in Cades Cove wanted to see hogs more than either group with more experience ($P = 0.012$) and least wanted hogs removed from the Park ($P = 0.021$). Occupation was also a significantly related factor ($P = 0.023$) with craftsmen/foremen/operatives being more favorable toward seeing hogs than unemployed visitors who were more favorable than clerical/sales people.

Coyotes ranked 24th of 31 wild species. Visitor age ($P = 0.001$) and previous experience in Cades Cove ($P = 0.040$) were the only significant background factors of the seven variables tested. The oldest group preferred these exotics significantly less than the two youngest groups (< 30, 30–39). In addition, first-time visitors were

more favorable toward coyotes than the most experienced people (> 10 visits). These results may reflect to times when many animals may have been considered potential competitors by a more rural community than exists today.

Park managers in GSMNP are well aware of the controversial nature of species removal and the improbability of totally removing a species as resilient as hogs (Coleman 1984, Tate 1984, Wauer 1984). Managers are currently trying to educate the public on why hogs should be removed, while also evaluating the best methods to reduce as many hogs as possible. Hunting and trapping appear to be the best methods of eliminating the animal at this time (Pelton 1984), although chemosterilants may be useful in the future when applied in conjunction with hunting and trapping, and especially during stressful periods (e.g. mast failure) (Jensen 1984). What was not pursued in the questionnaire was the reaction to removal of exotic fish (e.g. rainbow trout (Salmo gairdneri), brown trout (Salmo trutta)) in areas where brook trout are being re-established. If continued, this issue would probably not evoke the public wrath that burro shootings caused in Grand Canyon (Kiningham 1980), but the subject should be studied with the fishing visitors in mind.

Overpopulation of Deer

Populations of species have frequently exceeded carrying capacity in many areas of North America. Natural regulation often eliminates this problem through such phenomena as starvation, disease, and increased predation. Where natural predators are few or absent,

management agencies often use people (e.g. hunters) to prevent overpopulation. However, hunting is rarely allowed in national parks, leading managers to seek alternate solutions for addressing the problem.

Overpopulation is frequently reported in ungulates, and the problem can be particularly acute in GSMNP. Although the white-tailed deer is the only native animal which presents a major problem in the Park, concentrations of this species in Cades Cove have resulted in browse damage to native plants, alteration of a unique community structure, and disease outbreaks (Bratton 1980). In addition, cattle may be affected (Burst 1977). In 1971, 52 deer and 11 cattle were found dead in the Cove. Fox and Pelton (1973) estimated that the mortality rate of deer may have been as high as 86%. A previous but poorly documented die-off occurred in 1959 (USDI 1984). More importantly, researchers have predicted a repeat of the habitat degradation and epizootic event if no management action was employed to prevent overpopulation (Burst 1977, Burst and Pelton 1978, Kiningham 1980).

A potential problem for managers trying to control deer populations is public reaction. Therefore, attitudes toward management actions were assessed by asking respondents how much they agreed with each of seven alternatives for managing overpopulation of deer in Cades Cove (Questionnaire Item 23).

Most respondents (62.9%) believed that some deer should be relocated to populate areas outside of the Park for eventual hunting (Table 20). About one third (32.1%) believed that some deer should be

Table 20. Visitor response to possible NPS actions to manage overpopulation of deer in Cades Cove, GSMNP, 1983.

		Percentage (n = 305)				
	Mean[1]	SA[2]	A	U	D	SD
Transport some to populate other areas for eventual hunting	2.61	21.3	41.6	11.0	7.4	18.7
Establish a feeding program	3.34	7.9	20.4	25.3	22.0	24.4
Transport some for immediate hunting off of the Park	3.44	9.1	22.9	14.7	21.9	31.4
Reintroduce large predators that were removed by people years ago	3.49	8.3	17.9	23.8	16.6	33.4
Do nothing	4.22	3.7	7.0	15.1	27.2	47.0
Destroy some of them	4.48	1.3	4.0	4.6	25.8	64.3
Allow hunting in Cades Cove	4.56	3.3	3.0	4.0	13.5	76.2

[1] For calculation of means, SA = 1 and SD = 5.
[2] SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly disagree.

transported for immediate hunting off the Park. Few respondents felt the Park Service should establish a feeding program (28.3%), reintroduce large predators (26.2%), or do nothing (10.6%). Almost no one felt Park Service personnel should allow hunting in Cades Cove (6.3%) or destroy some deer (5.3%).

Only one background factor was considered particularly relevant to this discussion: hunting orientation. Relocating deer to populate areas for eventual hunting was the most preferred alternative for hunters (79% agreed), former hunters (59%), and nonhunters (47%). However, hunters were significantly more favorable than either of the other two groups for this option and for allowing hunting in Cades Cove. Hunters were also more favorable than nonhunters toward the NPS doing nothing or transporting deer off the Park for immediate hunting. Nonhunters were significantly more agreeable to establishing a feeding program than hunters, and less favorable toward reintroducing large predators than former hunters. Hunting orientation did not appear to influence response to whether the Park Service destroyed deer; all three groups strongly rejected this option.

The famed Leopold Report (Leopold et al. 1963) listed four major alternatives for reducing ungulate populations in national parks: (1) natural predation, (2) trapping and transplanting, (3) shooting excess animals that migrate outside of parks, and (4) shooting animals within parks. Results from the present study suggest that transplanting would meet the least public resistance for GSMNP, particularly if the deer were used to establish populations and were not immediately hunted. Dlutkowski (1985) reported that approximately 450 deer were

relocated from 1980 to 1984. Burst and Pelton (1978) suggested removing deer at a similar sex ratio as is found in the Cades Cove population, while Cowan (1974) recommended taking predominately young males in polygamous species, or old males no longer able to maintain a position in the breeding hierarchy. Kiningham (1980), on the other hand, suggested transporting mostly females to decrease fawn recruitment. A potential problem with this approach is that many visitors want to see fawns. However, people also desire viewing bucks with obvious antlers, so the public reaction might be balanced while decreasing reproduction.

Kiningham (1980) proposed two additional alternatives: (1) elimination of cattle grazing and hay mowing in portions of Cades Cove to reduce deer habitat through reforestation, and (2) development of education and research potentials of the Cove. Kiningham recommended the latter proposal. The former would probably be met with stiff opposition from the public because of the aesthetics of highly visible wildlife and a relatively open valley amid forested mountains. Oral anti-fertility agents have also been proposed, but appear unreliable (Matschke 1977).

The objectives of the deer management program in GSMNP are: "to encourage a population of naturally-regulated deer within the various portions of the park," to provide "the opportunity for visitors to see deer within these outdoor settings," and "to continue certain monitoring activities to document the population" (USDI 1984, p 23.3-3). Although specific NPS recommendations are pending further study, it appears appropriate from the standpoint of the present study

to encourage wildlife viewing and research while removing an appropriate number of deer each year. As previously mentioned, it might be best to relocate mostly females, but the reproductive behavior of the remaining population should be monitored. While these management activities are being conducted, the NPS should develop education programs to reduce opposition to other appropriate alternatives, such as reintroduction of extirpated predators. Results from this study demonstrate which groups should be targeted during these programs in order to alter attitudes countering management goals.

Wildlife Information

The National Park Service provides information about wildlife through several media sources in GSMNP and Cades Cove. A wildlife brochure is provided at various locations in the Park. This general pamphlet is well written, but contains almost no information on Cades Cove---the center for wildlife viewing in the Park. However, information specific to Cades Cove is broadcast on a short-range radio station located in the Cove. A small exhibit is located at the entrance to the Cove with one sign depicting the Cove's wildlife. Bulletin boards reflect some wildlife information and are located near the Visitor Center on the western side of the Cove and near the store on the eastern end. Other sources of Park Service information may be obtained by attending interpretive talks or by asking NPS employees about wildlife.

The relationship between all of the major information sources and the public's knowledge and attitudes concerning wildlife were approached through Yes-No questions on media sources and indices of knowledge and attitudes. The most common source of wildlife information for Cades Cove visitors did not originate from the National Park Service, but instead from people that the respondents knew (63.6%) (Table 21). The NPS source most used by visitors (42.3%) was the exhibit at the Cove entrance; one of the displays provides limited wildlife information. The least noted NPS category was a naturalist talk on wildlife (12.1%). The "other" category was checked even less and will be absent from further analysis (unless otherwise stated) because of low sample size.

Almost three-quarters of the respondents (71.3%) had used at least one of the six NPS sources of wildlife information (Table 22). About 30% had observed three or more sources.

Attitudes toward Wildlife Information

Almost two-thirds (64.5%) of the respondents agreed that the National Park Service should put more emphasis on explaining wildlife in the Cove, while only 14.4% disagreed (Table 23). Most visitors (89.3%) indicated that wildlife information should be included in the Cades Cove Auto Tour Guide which currently emphasizes cultural history. They also agreed (93.4%) that a brochure on the wildlife of Cades Cove should be made easily available at the entrance to the Cove, which was a significantly more positive response than that for inclusion in the Auto Tour Guide ($t = 2.52$, $P = 0.012$). The most

Table 21. Number and percentage of respondents receiving each type of information on wildlife of Cades Cove, GSMNP, 1983 (n = 338).

Type of Information	Respondents	
	n	%
Wildlife information from people they knew	215	63.6
Exhibit at entrance to Cades Cove	143	42.3
Bulletin board	123	36.4
Cades Cove radio message	109	32.2
Wildlife brochure	105	31.1
Verbal answer from NPS employee	82	24.3
Wildlife naturalist talk	41	12.1
Other	38	11.2

Table 22. Number of NPS sources of wildlife information used by Cades Cove visitors, GSMNP, 1983 (n = 338).

Number of Sources	Respondents	
	n	%
0	97	28.7
1	67	19.8
2	74	21.9
3	45	13.3
4	30	8.9
5	17	5.0
6	8	2.4

Table 23. Visitor response to possible interpretive changes regarding wildlife in Cades Cove, GSMNP, 1983.

	Mean[1]	Percentage (n = 318)				
		SA[2]	A	U	D	SD
A brochure on the wildlife of Cades Cove should be made available at entrance.	1.65	43.9	49.5	4.1	2.5	0
Wildlife information should be included in the Cades Cove Auto Tour Guide.	1.74	38.8	50.5	8.5	1.9	0.3
The National Park Service should put more emphasis on explaining wildlife in Cove.	2.26	25.5	39.0	21.1	13.5	0.9

[1] For calculation of means, SA = 1 and SD = 5.
[2] SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly disagree.

common response to the open-ended question, "What would you like to see the National Park Service do to explain wildlife in Cades Cove better than at present?" was to make literature on the Cades Cove wildlife available (38.7% of responses), with another 4% suggesting wildlife additions to the Auto Tour Guide.

A person's initial experience with a species provides information which helps form a perception about that species (More 1977). Subsequent experiences modify the perception; they can strengthen the present perception or alter it. Several species of wildlife at Cades Cove are often visible to the public. Thus, Cades Cove provides an opportunity to present accurate information and to show how an animal fits into its ecosystem the first time that a person sees that animal, thus forming an accurate perception. If the animal has been seen before, Cades Cove provides an opportunity to strengthen accurate perceptions and to alter inaccurate ones.

More (1977) described 3 major types of wildlife experiences: direct natural experiences (e.g. Cades Cove), direct artificial experiences (e.g. zoo), and vicarious experiences (e.g. indirect through media). Direct artificial experiences are not available in Cades Cove and many other natural areas since they would violate policy for many agencies. However, direct natural experiences occur daily between visitors and a number of species. Viewing animals in their natural habitat can be very educational. This education may be aided by media, and should emphasize predictable behavior and life history (Cooper and Shaw 1979). Such information not only increases viewing opportunities, but may improve awareness and appreciation of

wildlife and wildlife ecology (Sharpe 1976). Brochures, radio messages, bulletin boards, etc. can help visitors to understand more about what they are seeing and how animals fit into nature. This survey demonstrates that many people visit Cades Cove in order to view wildlife and many of them want more information to be available, particularly in the form of literature. Geist (1975, p 96) said it best when he stated that "no nonconsumptive management program is worth the effort without a well written and well illustrated booklet available to the public, which tells them what they may expect to see at each vantage point at different seasons..." The opportunity is available to form appropriate first impressions, strengthen accurate former perceptions, and alter inaccurate ones. Therefore, a brochure should be developed and made readily available at the Cove entrance specifically on the wildlife of Cades Cove, or at least wildlife information should be added to the Auto Tour Guide. In addition, wildlife media should be edited by qualified wildlife biologists. Information which appears accurate, but is not, may be more detrimental than no information.

As shown previously in Table 22, visitors used a varying number of NPS sources of wildlife information. However, attitude indices did not correlate well with the number of different information sources used by visitors. There was no relationship between the number of sources and visitor attitudes toward marking of deer, reintroduction of wild animals, or preference for exotics at $P < 0.05$. Significant, but almost meaningless correlations, existed between number of sources and attitudes toward removing wild hogs ($r = 0.107$), destroying deer

if overpopulated (r = 0.113), establishing a feeding program (r = 0.141), reintroducing predators (r = - 0.140), and reintroducing mountain lions/wolves (r = - 0.112). Notice that the last two correlations were negative; the more sources used, the less people supported reintroduction. However, it should be emphasized again that the correlations are too minor to consider further.

Student's t-tests were performed on each media source with each attitude index and each item on exotics and deer management. There were no significant differences at $P < 0.05$ for any of the attitude indices or items between those who did and did not listen to the Cove's radio message, examine the exhibit at the Cove's entrance, or ask an NPS employee about wildlife. Attitudes were more negative toward seeing hogs for people who read the parkwide wildlife brochure ($P = 0.016$) and more positive to removing hogs for those who heard a naturalist speak on wildlife ($P = 0.031$). In addition, visitors who read about wildlife on a bulletin board were more negative about reintroducing predators ($P = 0.031$), and more agreeable to the Park artificially feeding deer ($P = 0.008$) than others. Park management is trying to convey to visitors the negative aspects of wild hogs; thus, the attitudes toward them are understandable. Attitudes toward reintroduction of predators and artificial feeding is less clear. Only six of 96 t-tests were significant; perhaps some of the differences were due to random error. In any case, none of the six information sources appeared very effective in altering attitudes. Park managers and interpreters should probably put more effort into using information sources to change attitudes toward wildlife and

wildlife management. The author realizes that attitudes are not easy to change in a short period, but improving and combining several information sources could help. The author also recognizes that information and education can be turned into propaganda; this is not a proposal for such an alternative, but instead a suggestion that the information sources can probably be used more efficiently to educate people not only that something exists (e.g. predators), but why it should exist (e.g. to keep other animal populations in balance) and how the Park Service is managing it. In other words, teaching attitudes may be more important than teaching facts.

Summary

Visitor attitudes were studied in three major areas: (1) importance of wildlife and wildlife viewing to visitors, (2) attitudes toward several specific wildlife management issues, and (3) attitudes toward and influence of NPS wildlife information. The results demonstrated that the opportunity to view wildlife was a very important factor in Cades Cove visitation, and was also a significant factor in influencing trip satisfaction for many people; therefore, wildlife viewing should probably be stressed more without disrupting the current historical promotion of the area. Analysis of specific management issues demonstrated that: (1) most people would not object to markers on deer, particularly if the reason for the markers' existence was explained by the NPS and/or the color of the markers blended with the pelage color; (2) most people supported reintroduction of some animals (e.g. elk, river otters, undomesticated

bison, and peregrine falcons), while being less enthusiastic toward re-establishment of wolves and mountain lions; (3) although exotic species such as wild hogs and coyotes were not preferred animals for viewing, they were not as universally rejected by the public as the Park Service might hope; and (4) more people supported the present NPS management of overpopulated deer (i.e. transport out of the Park for populating other areas for eventual hunting) than any other alternative. Additional analysis demonstrated that attitudes were not highly influenced by NPS wildlife information, that a wildlife brochure should be developed specifically for Cades Cove, and that all information sources should try to improve attitudes toward wildlife and wildlife management as well as provide knowledge. This chapter also prepared for correlation of attitudes with knowledge, and further testing of the model within the next chapter.

CHAPTER VIII

VISITOR KNOWLEDGE

Environmental educators, whether in the classroom or in the field, base their programs on information transfer. Thus, it is important for agencies to know the knowledge level of their users and to what degree agency media may have affected that knowledge. In addition, many educators hope that increased knowledge will influence attitudes toward general or specific ecological issues. The purpose of this chapter is to measure the level of knowledge which Cades Cove visitors possess, how this knowledge may be influenced by National Park Service media, and how knowledge is related to visitor attitudes.

Knowledge about Wildlife and Wildlife Management

Due to the orientation of this project, most knowledge questions refer to issues specific to the area (e.g. "Approximately how many cattle are killed each year by bears in Cades Cove?") as opposed to more generic knowledge questions appropriate for nationwide sampling (e.g. "How many legs does a spider have?"). Twenty-two questions (one from the interview and 21 from the questionnaire) were used to investigate visitor knowledge. Nine indices were developed on knowledge of wildlife and wildlife management. Because of the management implications of bears and deer, six indices focused on knowledge of these species and their management; however, the three indices involving white-tailed deer were eliminated because they were considered unreliable. Of the remaining six indices, one pertains to

wildlife management, one to wildlife in general, three specifically to bears, and one to wildlife/wildlife management questions (Appendix K). Two of the 21 knowledge questions were removed from these indices because removal substantially increased reliability. Answers to each index item were recorded as 1 for a knowledgeable answer and 0 for incorrect or undecided answers. In the case of Likert scale answers, Strongly Agree and Agree were combined, while Strongly Disagree and Disagree were also combined.

Bears

Visitors were asked to indicate which bear species occurred in Cades Cove. Nine of every 10 respondents (89.6%) correctly answered "black bear." Only 0.6% checked only grizzly bear but 5.7% checked both black bear and grizzly. Fortunately, no respondent checked polar bear, which supports the assertion that respondents were taking the questionnaire seriously. It is encouraging from a management perspective that only about 6% of the respondents thought grizzlies occurred in Cades Cove. Petko-Seus (1985) and Petko-Seus and Pelton (1984) reported similar results from backcountry interviews in GSMNP, but had somewhat lower scores from frontcountry campers (75.5% correct). Perhaps the difference between Petko-Seus' sample and this study's sample exists because frontcountry campers may have been less knowledgeable than average Cades Cove visitors, or because Petko-Seus' data were collected entirely from interviews, providing her respondents with less time to consider their response.

Visitors knew much less about the number of bears in GSMNP (Appendix L, Table 31). Only 29.0% correctly identified 400 - 600 as the appropriate answer. A larger number of visitors (44.1%) admitted that they did not know the answer. This aspect of knowledge should be relatively easy to improve through education.

Only 22.3% of the respondents realized that no cattle were killed by bears in the Cove on an annual basis (Appendix L, Table 32). A majority (58.5%) admitted that they did not know the answer. Although bears have killed calves in the Cove, it is important that visitors realize such instances are rare in order to dispel the belief that black bears are highly dangerous to livestock in this area.

When the three bear questions were combined into a knowledge index, the mean score was 0.446 (1.0 representing a perfect score) with a standard deviation of 0.360. The influence of seven background variables (age, sex, occupation, education, hunting status, previous trips to Cades Cove, and type of area resided in before 16th birthday) and time of day when visiting Cades Cove were examined. Education was the only factor related to knowledge variance ($P = 0.018$). In general, the more educated the visitor, the more knowledge of bears he or she possessed. Burghardt et al. (1972) also found that other GSMNP frontcountry visitors with at least some college education were more knowledgeable about bears than visitors with no college experience. Young (1980) found increased education to be the most important demographic factor influencing environmental knowledge, although he explained that formal education may not have been the direct source of information. Better educated people may have been more widely read

and have had broader interests than those with less education.

Bear Management

Knowledge of bear management was approached through the issue of why bears are not seen in the Park as often as they were a few years ago (Table 24). The majority of respondents realized that neither the National Park Service nor disease/starvation have been killing large numbers of bears. Poachers are a problem in GSMNP, but less than 45% realized that poachers were not responsible for the decline in bear sightings. Fortunately, a majority (64.2%) recognized that the Park Service has been relocating nuisance bears in areas where they are not readily visible, and almost half (48.7%) realized that less visitor food is a major factor.

An important finding here is that few respondents believe the NPS is deliberately destroying large numbers of bears; this has been a major public relations problem in at least two national parks in the past (i.e. Yellowstone and Yosemite National Parks). However, both researchers and managers are uncertain as to the mortality rate of relocated bears.

From an educational point of view, it is more impressive that large numbers of respondents were undecided regarding the five questions (17.9 - 37.9%). Uninformed visitors may be easier to teach than misinformed visitors, provided that the former are interested in the subject material.

Table 24. Visitor response to possible reasons why bears are not seen in GSMNP as often as they were in previous years.

		Percentage (n = 310)				
	Correct Answers[1]	SA[2]	A	U	D	SD
The Park Service has been killing large numbers of them.	79.5	1.3	1.3	17.9	33.6	45.9
The Park Service has been moving the nuisance bears where they are not being seen.	64.2	24.6	39.6	22.0	9.3	4.5
Disease and/or starvation has killed large numbers of them.	60.2	1.0	5.9	32.9	38.2	22.0
Less visitor food is available for bears, so there are less nuisance bears to be seen.	48.7	12.3	36.4	19.2	22.4	9.7
Poachers have killed large numbers of them.	35.9	7.0	19.2	37.9	22.6	13.3

[1] Refers to the sum of either Strongly Agree and Agree or Strongly Disagree and Disagree, depending on which pair is correct.

[2] SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly disagree.

When the five statements were combined into a single bear management index, the mean was 0.555 and SD = 0.161. Occupation was the only background factor related to bear management (P = 0.044). Service workers, laborers, and similarly employed people scored significantly lower than professional, technical, and managerial people. Time of day also appeared important; those interviewed in morning sessions were significantly more knowledgeable about bear management than other visitors (P = 0.020). It is logical that the more knowledgeable wildlife viewers would also be those who knew that morning was an excellent time to view wildlife and would therefore be interviewed at a disporportionately higher rate in the morning.

General Bear and Bear Management Index

The Bear/Bear Management Index was constructed from the 8 variables mentioned above (i.e. a combination of the Bear and Bear Management Indices). The mean response was 0.522 with a standard deviation of 0.233. The existence and management of bears in the Smokies result in critical management problems for the Park Service. Managers would undoubtedly prefer that visitors know considerably more than half of the information behind key issues. Because of the popularity of bears, many interpretive sources already emphasize this species, but improvements are still needed. Suggestions for these enhancements will be presented in the chapter section regarding the influence of information and education on visitor knowledge.

As expected, occupation (P = 0.043), education (P = 0.047), and time of day (P = 0.005) were the factors associated with overall

knowledge of bears and bear management. Again, service workers, laborers, and similarly employed people scored lower than professionals, technical persons, and managers. This finding may be tied to education because persons belonging to the latter group are generally better educated than persons employed in the former category, and occupation and education were somewhat correlated ($r = 0.45$). There was a direct relationship between each successive level of education and knowledge about bears (i.e. the higher the education, the more knowledgeable about bears), although no education group was significantly higher than any other educational group. Also, morning visitors were more knowledgeable than those interviewed in afternoons or evenings.

General Wildlife

Questions about bears constituted only three of 11 general wildlife items. Two questions pursued people's ability to identify animals. When asked in the questionnaire whether they saw any type of wildlife they could not identify, only 8.9% answered "Yes"; however, some of those answering "No" may have been incorrect in some of their identifications. A more specific identification question was presented during the interview; a color photograph of a groundhog (i.e. woodchuck) in a common bipedal position was shown to each participant who was then asked to identify it. The question was employed in the interview rather than the mail questionnaire in order to assure the quality of a large photograph without major expense. Most visitors (85.5%) correctly identified the photograph, while the

most common incorrect answers included prairie dog (5.0%), chipmunk (2.8%), and beaver (2.3%). Dagg (1974) also tested identification knowledge and found that 49% of urban residents correctly identified the groundhog; of the 16 wild animals which Dagg tested, raccoon was best recognized (90%) and grackle (Quiscalus sp.) was least commonly identified. Cades Cove visitors probably recognized groundhogs more frequently than Dagg's participants because the Cove groundhogs were more in context and many of the visitors were residing in areas more likely to be inhabitated by these animals than Dagg's urbanites.

Several additional questions related to knowledge about specific animals. Only 10.3% incorrectly believed that beaver were common in Cades Cove. Very few beaver live within the Park, and then probably only near the boundaries. Unfortunately, 40.1% were undecided.

Visitors were more often correct on whether eagles or vultures were more likely to be seen in Cades Cove. An occasional golden eagle is observed during winter months, but the turkey vulture is much more common. Almost two-thirds (64.9%) of the respondents realized this fact, while only 5.4% claimed that eagles were more prominent. Again, a large group of people (29.7%) admitted that they were unsure.

Because of the prevalence and popularity of white-tailed deer in the Cove, three questions were designed to test knowledge about this species. Most visitors (87.5%) correctly identified white-tailed deer as the only deer species occurring in Cades Cove. Another 0.6% believed the mule deer (Odocoileus hemionus) was the only deer inhabiting the Cove, while 5.4% believed that both species were found there.

Exactly one-third of the respondents conceded that they were unaware of the Cades Cove deer population size in mid-summer (Appendix L, Table 33). Only a few more (37.5%) correctly checked 200 - 500. Wathen et al. (1984) estimated the deer population during this study's general interview period of 1983 to be 0.40 deer/ha, or 400 deer if the Cove is assumed to be 1,000 ha.

An additional deer question referred to what people would do if confronted with a solitary fawn in or beside the road. Fawns are sometimes brought to administrative offices by well-meaning, but poorly informed, visitors who are quite disturbed that a mother deer would permanently "abandon" its fawn. Knowledge of deer behavior would demonstrate the improbability of this event. Of the four response choices presented for this question, almost two-thirds (64.2%) stated that they would report it to a ranger and another one-third (34.3%) said that they would leave it alone without reporting it. No visitors admitted that they would take it home, but 1.5% reported that they would take it to a ranger. This actually occurred in the Cove during the interview period; the ranger had the visitors show him where to return the animal in hopes that the mother would accept it again.

An additional question involved historical knowledge about wildlife. Only 12.4% of the respondents incorrectly believed that the present wildlife situation in Cades Cove is very similar to what it was in the mid-1800's. However, another 31.7% reported not knowing the answer, leaving only slightly more than half correctly answering the question. The human population of Cades Cove was recorded as 132

households and 685 people in 1850 (Shields 1981). Along with this heavily populated pioneer situation were land uses different from today and a general lack of laws protecting wildlife. This information could be presented to the public in conjunction with the Cove's historic program.

When nine of the general wildlife variables above (including the three bear questions, but excluding the questions on whether there were animals they could not identify and what should be done with fawns) were combined into an index, the mean was 0.574 with a standard deviation of 0.252. Four of the eight background variables were related to the general wildlife knowledge index: time of day ($P < 0.001$), education ($P = 0.023$), sex ($P = 0.012$), and number of prior trips to Cades Cove ($P < 0.001$). Morning visitors were again more knowledgeable than afternoon or evening visitors. In general, increased education was associated with higher wildlife knowledge scores; those who attended and/or finished college scored higher than either group that did not advance beyond high school or technical/vocational school, although those who conducted graduate work did not score significantly differently than any of the other three groups. Males scored significantly higher than females. In addition, those who had visited the Cove more than 10 times were more knowledgeable than visitors with less experience.

Wildlife Management

Examination of visitor knowledge of wildlife management was approached largely by questioning respondents on their knowledge of

bear and deer management. The bear management questions have already been discussed. The deer questions involved the reasons why the deer population in Cades Cove is high in number of animals (Table 25). A majority of the respondents (59.6%) appeared to realize that the Park Service does not artificially feed deer in Cades Cove. Almost everyone recognized that the high populations were due to restrictions on hunting (93.2%) and because the pastures mixed with forest provided adequate food and shelter (96.5%). However, less than 20% apparently understood that deer in Cades Cove harbor disease and parasites. Although these organisms were probably not hindering the deer population very much during 1983, several were found in blood samples (e.g. bovine virus diarrhea, infectious bovine rhinotracheitis, bluetongue), and numerous researchers have demonstrated the effects of population crashes in Cades Cove or warned of future crashes (Fox and Pelton 1973, Prestwood et al. 1974, Burst 1977, Burst and Pelton 1978, Wathen et al. 1984).

A separate question asked if any of the wildlife in Cades Cove were brought in by the Park Service for the purpose of public viewing. Only 6.2% of the respondents incorrectly answered Yes, but 50.9% admitted that they did not know. Of those who answered Yes, nine people stated that deer were brought in for viewing, three stated turkey, two stated groundhogs, and one each stated wolf, buffalo, bear, eagle, wild hog, osprey, and hawk.

Respondents were also asked whether Park Service policy supports the idea of reintroducing animals that were removed by white man if

Table 25. Visitor response to possible reasons for the relatively high deer population in Cades Cove, GSMNP, 1983.

		Percentage (n = 310)				
	Correct Answers[1]	SA[2]	A	U	D	SD
The pastures mixed with forest provide plenty of food and shelter.	96.5	56.6	39.9	2.6	0.6	0.3
They are not hunted.	93.2	52.4	40.8	3.6	1.3	1.9
The Park Service artificially feeds them.	59.7	3.0	14.5	22.8	36.6	23.1
The deer do not have much disease or parasites.	19.2	7.6	24.8	48.4	14.2	5.0

[1] Refers to the sum of either Strongly Agree and Agree or Strongly Disagree and Disagree, depending on which pair is correct.

[2] SA = Strongly agree, A = Agree, U = Undecided, D = Disagree, SD = Strongly disagree.

certain conditions are met. Only 29.2% correctly answered Yes. However, most people admitted not knowing the answer (66.7%).

When these questions were combined into an index (along with the bear management items), the mean score was 0.555 with a standard deviation of 0.246. Time of day ($P = 0.003$), education ($P = 0.004$), and sex ($P = 0.027$) were significantly influencing variables. Morning visitors and males scored higher than afternoon and evening visitors. Also, people with college or graduate work scored higher than either group with less education (i.e. < high school, high school degree or tech/voc school).

General Wildlife and Wildlife Management Index

The Wildlife/Wildlife Management Index was constructed of the 20 variables used in the General Wildlife Index and the Wildlife Management Index. The mean response was 0.546 with a standard deviation of 0.235. Although knowledgeable answers exceeded 50%, this could be improved. Visitors to Denali National Park knew 74% of the information requested, with the most knowledgeable group being photographers and the least informed group being hotel guests (Sundstrom 1984). However, LaHart's (1978) students averaged only 46% and Kellert's (1985) participants averaged less than 53%. Bacon's (1974) respondents knew only 48% of the answers to bear-related questions. Obviously, some discrepancies between studies are due to different questions and respondents, but the fact remains that many visitors can use some improvements in information, particularly for the potentially volatile topic of bears.

As expected, time of day ($P < 0.001$) and education ($P = 0.012$) were significant influencing variables. Morning visitors were more knowledgeable about wildlife overall than afternoon or evening visitors. Visitors with less than a high school education and those with high school degrees or technical/vocational training were less knowledgeable than people with college or graduate training. Kellert (1980b) also found higher knowledge scores for more highly educated people.

Those with less experience in the Cove displayed less knowledge than those who had visited the area more often ($P = 0.012$); this relationship was significant for first-time visitors versus those with greater than 10 visits. In addition, males also scored higher than females ($P = 0.012$), which has commonly been documented in the past (Klimstra and Pratt 1964, Burghardt et al. 1972, Bacon 1974, Dahlgren et al. 1977, Pomerantz 1977, LaHart 1978, Kellert 1980b).

Occupation, age, hunting status, and type of residence before the 16th birthday were all poor indicators of knowledge for this all-inclusive index. More importantly, neither age, hunting status, nor early residence was important to any of the six indices. Little comparable information is available in the literature on effect of where people grew up (i.e. rural area, town, or city), but Petko-Seus (1985) found that the area where GSMNP visitors have resided most of their lives did not influence their knowledge about bears. Several investigations have demonstrated that knowledge about wildlife is usually higher for hunters (Burghardt et al. 1972, Bacon 1974, Dahlgren et al. 1977, Pomerantz 1977). In addition, Kellert (1980b)

reported some of the least knowledgeable people to be those over 75 or under 25 years of age, although Burghardt et al. (1972) did not find a consistent relationship between age and knowledge about bears.

The nonconsumptive nature of this study's questions may have influenced the responses; a more consumptive orientation might have led to different results, such as hunting status being more influential and males scoring higher than females on management related indices. It would be useful to develop a questionnaire with both consumptive and nonconsumptive indices for comparison.

Wildlife Information

It was shown in the chapter on attitudes that many visitors would like the Park Service to provide additional information on wildlife in Cades Cove. The most common specific questions which the public wanted the NPS to answer included those on wildlife populations and species, where and when specific animals could be seen, why certain animals were not seen more often, and whether the Park Service planned any particular introductions or reintroductions (Appendix M).

All Pearson correlations between the number of NPS information sources used by visitors and the six wildlife knowledge indices were significant at $P < 0.001$. Correlation was weakest for the Bear Index ($r = 0.210$) and highest for the overall Wildlife/Wildlife Management Index ($r = 0.295$), although none could be considered strong relationships. Unlike correlations with attitude indices, all with knowledge indices were in a positive direction. In other words, the more information sources used, the higher the knowledge scores on all

six knowledge indices. However, a cause-and-effect relationship cannot be automatically assumed. Perhaps those with more wildlife knowledge tended to observe NPS sources more often than others.

Student's t-tests were performed on each media source (i.e. Brochure, Radio Message, Naturalist Talk, Asked an NPS Employee, Exhibit, Bulletin Board) with each knowledge index. There were no significant differences at $P < 0.05$ for any of the knowledge indices between visitors who read the parkwide wildlife brochure versus those who did not. Visitors who heard the wildlife message on the Cades Cove radio frequency scored higher on only one index (General Wildlife Knowledge) than those who did not. All six knowledge indices were significantly higher for visitors who heard a naturalist talk on wildlife in Cades Cove, asked a Park Service employee about wildlife in Cades Cove, read wildlife information at the exhibit, or read similar information on a bulletin board. Burghardt et al. (1972) and Petko-Seus (1985) also found that frontcountry visitors in GSMNP who had attended naturalist talks scored higher on bear questions than other visitors, although Burghardt et al. (1972) also reported that park literature and displays appeared more effective in increasing knowledge than talks.

As was proposed in the chapter on attitudes, these results from knowledge indices also support the development of a wildlife brochure specifically for Cades Cove. The parkwide brochure is not adequate for the Cove or for educating the public about certain key management issues. Resource managers could help interpreters design a Cades Cove brochure which would not only provide interesting wildlife details,

but also facts and appropriate attitudes about wildlife management problems and alternatives for solving those problems.

The inadequacies of the radio message are less critical than those of the brochure because the message is presently designed for more than wildlife information. However, the Park Service might consider a longer, separate radio message strictly for teaching wildlife knowledge and attitudes. If such a message were presented properly and its success closely monitored, then it could not only provide a valuable service to visitors, but also managers of GSMNP and perhaps other parks with future application.

Relationship of Knowledge and Attitudes

The ambiguity in the relationship of knowledge and attitudes was outlined in the Literature Review. Some investigators believe that knowledge strongly influences attitudes, while others believe the influence is weak or even circular; correlations between the variables may actually be demonstrating the influence of attitudes on knowledge as well as vice versa. The model outlined in Figure 2 reflects this weak (correlation range = 0.210 - 0.301) and circular relationship. In order to measure the association within this study, Pearson correlations were conducted between the major attitudes (Appendix I) and the non-specific knowledge indices (i.e. General Wildlife, Wildlife Management, and Wildlife/Wildlife Management).

The attitude index consisting of the three questions on marking wildlife had significant negative correlations with the General Wildlife Index (P = 0.025) and Wildlife/Wildlife Management Index (P =

0.033). Although it was interesting that the associations were negative, the correlation values were too low to be meaningful (-0.104 to -0.111).

The reintroduction index, which included all six wild species, was not correlated with any of the three knowledge indices. However, the reintroduction indices of all predators and of mountain lions/wolves had significant positive correlations with both the Wildlife Management and Wildlife/Wildlife Management Indices. Again, the correlation values were too low to be particularly meaningful (0.107 to 0.144).

Attitudes toward exotics did not correlate well with knowledge indices. A low negative correlation (coefficient = -0.100) was found for wildlife knowledge and preference for seeing hogs.

Of the seven items concerning management solutions to deer overpopulation, only reaction to feeding programs was worthy of mentioning. A positive significant correlation existed for each of the three indices (range = 0.243 - 0.357). The more knowledgeable visitors were about wild animals or management of wildlife, the less they supported artificial feeding of deer as a means of managing overpopulation problems. Although weak, this finding should be encouraging to most managers.

The overall Wildlife Preference Index (i.e. average preference response to all 31 wild species listed in Questionnaire Item 42) was correlated with only one knowledge index---General Wildlife. Again, the correlation value was quite low (0.131).

The conclusion from the above correlations is that knowledge is only weakly related to some attitudes and preferences. Thus, the relevant portion of the model is supported. It is uncertain, however, whether knowledge affected attitude more than vice versa.

Summary

Visitor knowledge about wildlife and wildlife management was studied using over 20 survey items. Six indices were developed from these questions; three related to bears and three to wildlife in general (which included bears). In general, visitors were not very knowedgeable in any of the six areas (range = 44.6% - 57.4%). The most influential variables associated with knowledge were time of day and educational background. Visitor age, hunting orientation, and type of area where the respondent grew up were not related to any knowledge index. Reading the parkwide wildlife brochure also appeared ineffective in significantly increasing knowledge for the items investigated. Knowledge was, at best, weakly correlated with attitudes toward wildlife and wildlife management.

CHAPTER IX

PROVISION OF WILDLIFE VIEWING OPPORTUNITIES

This dissertation has provided considerable information on visitor perceptions about wildlife. Past studies have provided data specifically on the wildlife resource in Cades Cove and the surrounding area. It would be useful to the National Park Service to integrate what is known about wildlife with what is known about visitor perception of wildlife in order to establish a program for viewing wild animals. It could be even more useful to other agencies (e.g. U.S. Fish and Wildlife Service, U.S. Forest Service, U.S. Bureau of Land Management, state and private organizations) to develop a prototype plan for viewing wildlife in an area such as Cades Cove, without necessarily adhering to NPS restrictions. Thus, the purpose of this chapter is to demonstrate how wildlife viewing can be advanced by integrating social and biological data. The chapter is organized such that the results of this survey are first integrated with data on the wildlife resource in the area and then with various alternatives for managing wildlife viewing from the literature, followed by final selection of specific recommendations for Cades Cove. In the proposed prototype situation, some regulations and policies will be altered to accommodate wildlife viewing in the Cove, while many regulations (e.g. those preventing consumptive wildlife activities) will remain unchanged.

Wildlife Resources

A large portion of information provided to the public should be specific to the area and based on research (Lime 1975). As previously mentioned, several studies have been conducted on wildlife in Cades Cove (Fox and Pelton 1973, Burst 1977, Keeler 1978, Taylor 1979, Bratton 1980, Kiningham 1980, Goldsmith 1981, Rabinowitz 1981, Tate 1983, Wathen et al. 1984, Dlutkowski 1985), and the surrounding area (Beeman 1975, Eubanks 1976, Garshelis 1978, Eagle 1979, Eiler 1981, Cook 1982, Quigley 1982, Carr 1983, Hastings 1983, Wathen 1983). Over half (11) of these studies were conducted on black bears, six on white-tailed deer, two on raccoons, and one each on groundhogs and striped skunks. Although much information is still needed, data from these studies can help managers direct wildlife programs and interpret wildlife more thoroughly based on research findings.

Combining available research information from the site with what visitors want to know can be very helpful to the viewing of wildlife. The questionnaire item most pertinent to this subject asked respondents to list three questions they would most want the NPS to answer about wildlife in Cades Cove (Appendix M). Of the 340 questionnaire respondents, 555 questions were generated. The most common type of question concerned population sizes of various animals, particularly of the more popular species. As discussed in the Knowledge chapter, 37.5% of the respondents correctly identified the number of deer in the Cove, and only 29.0% realized the number of bears in the Park. The deer estimate of 200 - 500 animals originated

from Burst (1977) and Kiningham (1980), and was later confirmed for the interview period by Wathen et al. (1984). The estimate of 400 - 600 bears in the Park was extrapolated from more localized studies with an understanding that bears are not populated at the same density throughout the Park (M. R. Pelton, pers. commun.). Other animal populations in Cades Cove have been estimated at about 120 raccoons (Keeler 1978, Rabinowitz 1981) and about 800 - 1735 groundhogs (Taylor 1979).

Many visitors wanted to know what kind of wildlife and how many different species exist in the Cove. Answers to these questions are not immediately available, but many of the mammals, birds, reptiles, amphibians, and fish described for the Park (Stupka 1963, Huheey and Stupka 1967, Mathews 1978, Linzey and Linzey 1981) frequent the Cove. More detailed listings can be found in the Study Area chapter of this dissertation. Visitors reported observing at least 38 different species of wildlife during interviews.

A number of visitors also wanted to know what types of wildlife were introduced, reintroduced, or native in the Cove. Respondent curiosity was probably aroused by other questionnaire items dealing with these issues. The Park Service has not introduced exotics directly into the Cove, although introduction of a few non-native trout was probably aided by the agency decades ago. An occasional native animal, such as an injured but rehabilitated raptor, has been set free in the Cove. Ten river otters were reintroduced in the Cove during 1986. Six fledgling peregrine falcons were hacked in the Park during 1985 (R. Spahr, pers. commun.), and Tennessee Wildlife

Resources Agency personnel hope to release 18 - 20 more peregrines in the Park over the next few years (W. Yambert, pers. commun.). The National Park Service is re-establishing brook trout in some of its former range and considering reintroduction of other species (USDI 1984).

Many visitors wanted to know where they could see certain popular species of wildlife, such as bear and deer. Knowing where to look for animals requires some knowledge of their habitat, especially food resources. Petko-Seus (1985) documented that about half of GSMNP campers did not realize that black bears eat mostly plant material along with some animal matter. Such limited knowledge of bear foods is not conducive to sighting non-panhandling bears. In the spring, bears use herbaceous matter and squawroot (Conopholis americanus) (Eagle 1979, Beeman and Pelton 1980); squawroot is associated with oak. Blueberries and huckleberries are heavily used during summer, and are also associated with open oak/pine and cove hardwood forests (Carr 1983). In the fall, white oak (Quercus alba) acorns become very important to reproduction of black bears (Wathen 1983).

Cherry (Prunus spp.) and serviceberry (Amelanchier laevis) occur in the area and are highly preferred foods for several species of wildlife such as black bears (Beeman 1971, Eagle and Pelton 1980). Grapes (Vitus spp.) may also be important (Carr 1983), particularly during a failure of hard mast. Most of these plants provide nesting habitat for some wildlife. Each is native and could be planted in Cades Cove to increase wildlife habitat and diversity.

Few visitors appear to realize that bears can often be observed feeding or even resting in trees. The author has noticed a pattern along Cades Cove roads of bears eating new leaves on trees (e.g. ash (Fraxinus spp.)) during the spring, cherries in summer, and acorns in fall with relatively little time when they do not use trees for feeding. This type of information should be passed along to visitors to help them view these animals eating natural foods.

White-tailed deer can best be seen in the open fields, but often are overlooked in the forested areas, where they spend much of their time during daylight hours. Deer are particularly prevalent in wooded areas during autumns with heavy mast crops. Both raccoons and skunks use available culverts as day beds during daylight hours (Goldsmith 1981). Raccoons also can be found in the woodlands during the day (Rabinowitz 1981). Groundhogs can be observed in open fields and along edges; they prefer hay fields more than pastures (Taylor 1979).

Knowing where to find wildlife also involves knowing when to look. Numerous visitors asked when certain popular species could be seen. During the summer, raccoons in the Cove are mostly nocturnal (Rabinowitz 1981), groundhogs are mostly diurnal but a little crepuscular (Taylor 1979), skunks are largely nocturnal (Goldsmith 1981), and non-panhandling bears are somewhat crepuscular but more diurnal than nocturnal (Eubanks 1976, Garshelis 1978, Quigley 1982, Carr 1983).

Many respondents wanted to know why they had not seen or heard more wildlife, particularly bears. Most people probably did not know where and when to look. In addition, resource management has reduced

the number of highly visible bears---the panhandlers---by moving them to other areas. Over one-third of the respondents was unaware that this was a reason that bears are not seen as often as in past years. This information should be explained to the public better than at present.

Several visitors were interested in dangers posed by wildlife. For example, some people wanted to know how dangerous black bears were. About one-quarter of GSMNP campers did not realize that black bears occasionally injure visitors (Petko-Seus 1985), which is surprising considering National Park Service emphasis on the dangers of human-bear interactions.

Other visitors wanted more information on the dangers of poisonous snakes. Rattlesnakes and copperheads are the only poisonous snakes in the area (Huheey and Stupka 1967). They are also the two least preferred of 33 species tested; 41.0% of the respondents even felt that poisonous snakes should be destroyed whenever seen in Cades Cove, and another 12.6% were undecided on this issue. Obviously the value of these species to their ecosystems should be emphasized in educational programs more than at present.

Some visitors wanted to know if wildlife are artificially fed in Cades Cove. None are purposefully fed, although hay and salt licks intended for cattle are probably utilized some by deer and other species.

Several visitors asked about wildlife diseases. As mentioned in the Attitudes chapter, the deer herd was relatively healthy, although infectious disease was present (Dlutkowski 1985). The same is true

for bears in the Park; Cook (1982) found the bear population to be in generally good condition, but also reported the presence of several viruses and parasites.

Several questions arose relating to interaction between wildlife and cattle or other wildlife species. Less than one-fourth (22.3%) of the respondents realized that no cattle are killed on an annual basis, although this event has occurred on a much less frequent schedule. Groundhogs often leave hay fields after invasion by cattle (Taylor 1979). Deer and cattle are known to transmit diseases to each other, usually to the detriment of deer (Fox and Pelton 1973, Burst 1977). It is interesting that only about one-third (35.1%) of the visitors felt that cattle and horses should be removed from the Cove if they were competing with wildlife.

Less is documented about interaction between different wildlife species, although hogs may compete with deer, turkeys, bears, squirrels, chipmunks, skunks, raccoons, opossums, foxes, and bobcats as well as preying on smaller fauna (Tate 1984). Bears and various sciurids may be major competitors (Cherry and Dearden 1975). Competition between species is an area needing more research, particularly in unique ecosystems such as exist in Cades Cove.

A number of additional questions on management, natural history, behavior, and ecology were asked by respondents. Although a seemingly large number of wildlife studies have been conducted in Cades Cove and the surrounding area, few species have been studied in detail. Nevertheless, this section demonstrates that data on wildlife resources and human perceptions can be integrated in such a manner as

to aid the interpretation and management of wildlife for improved viewing experiences.

Alternatives for Providing Wildlife Viewing Opportunities

Guidelines for Providing Wildlife Viewing Opportunities

Several factors should be considered when attempting to provide wildlife viewing opportunities in wildland areas. Managers must first realize that whatever the primary purpose of a land management plan, a secondary purpose can generally be accommodated (King 1947). This view does not necessarily imply a true multiple-use concept for all wildland areas (e.g. national parks), but simply means that most sites have multiple features worth promoting or interpreting. Driver and Brown (1978) recommended that managers not attempt to manage everything, but to concentrate on the most appropriate resources in a given area. Cades Cove presently features an excellent historical program; however, this use should not preclude advancement of wildlife viewing in the area, because Cades Cove provides one of the best opportunities in the southeastern United States for viewing and learning about free-ranging wild animals.

Shaw and King (1980) outlined the major guidelines for managing wildlife for viewing opportunities. They listed the two major wildlife management options as: (1) to provide habitat requirements, and (2) to attract wildlife for viewing. Major human management options were subdivided into Design and Information. Design options included: (1) to bring people to wildlife, and (2) to minimize impacts on wildlife. Information options included: (1) to make

people aware of wildlife and (2) to enhance enjoyment of wildlife. Management options for Cades Cove will be discussed largely in two parts: (1) management of wildlife and wildlife viewing through habitat alteration, and (2) interpretation of wildlife and wildlife management through design of roads, trails, and provision of information. However, Shaw and King (1980) also demonstrated that before any wildlife management plan can be implemented, managers need to know how much interaction with people different species will be able to tolerate and what the aesthetic values are for wildlife viewing opportunities. While many species can readily adapt to human presence, some cannot and therefore should receive extra protection (Hendee and Schoenfeld 1978). Combining the biological and behavioral assessment of each species' tolerance with the appraisal of human preferences can allow managers to identify which animals are most suitable for various management options (Cooper and Shaw 1979).

Habitat Management

Cades Cove could be managed somewhat differently than at present. The wildlife habitat is already highly manipulated by people, but not for the direct purpose of promoting wildlife. Instead, it is largely managed for history and perhaps scenery, which indirectly provide habitat for a number of wildlife species and opportunities for viewing many of these animals. With a few alterations to the habitats, viewing could be further improved.

Neil Reid (1967), the former Chief of the Wildlife Management Branch of the National Park Service, proposed that managers use a

holistic, or whole ecosystem approach, and simply include humans as a part of the ecosystem when managing for wildlife viewing. Many others have also supported the ecosystem approach to managing wildlife, whether for viewing, hunting, or research (Cobus 1972, Geist 1972, Stearns 1974, Talbot 1975, Martyr 1978). In order to provide a holistic wildlife management plan, a number of occupational fields might be utilized, such as: wildlife management, resource management, forest management, range management, watershed management, recreation management, social science (e.g. environmental perception, human attitudes), interpretation, law enforcement, engineering, landscape architecture, design and planning, economics, politics, private groups, and laymen (Davey 1967, Reid 1967, Clark 1974, Maestro 1974, Stearns 1974, Lennartz and Bjugstad 1975, Cooper and Shaw 1979, Cooper 1982, Shaw et al. 1985).

The more diverse the ecosystem, the more stable it is (Bart 1972). In addition, diversity of habitat is essential to diversity of wildlife (Maffei 1978). In fact, much of wildlife management is based on the conservation, creation, or improvement of habitat (Tevis 1959, Leopold et al. 1963, DeGraaf and Thomas 1974, Masyk 1975, Wauer and Supernaugh 1983). Managing for wildlife diversity would not be counterproductive to present management policies in an area such as Cades Cove. In fact, only two of 33 animals (rattlesnakes and copperheads) were considered undesirable for viewing by more than half of the respondents in this survey, and many species were highly desired. Thus, the opportunity to view almost any wildlife species could be satisfying, and hopefully educational, to most visitors.

In addition, habitat improvement for some species (e.g. highly preferred animals) often provides habitat for many other species (Gill et al. 1974).

Wildlife are largely by-products of vegetation, and thus manipulation of vegetation can greatly affect the type and diversity of wildlife (DeGraaf and Thomas 1974). In an area such as Cades Cove, alteration of vegetation alone could undoubtedly be effective because plants provide both food and cover. Water is probably not a major limiting factor for most typical viewing species found there at present, but creation of a few small ponds might increase waterfowl for viewing or concentrate certain other species for viewing. Everglades National Park uses the presence of natural water bodies and boardwalks in interpretation of wildlife.

The "edge effect" is important to many species and often to wildlife diversity (Gill et al. 1974, Schneegas 1975). Fortunately, Cades Cove is already designed with considerable edge between different types of habitat. The surrounding forest juts wooded "fingers" into the open meadows. The numerous streams and branches also provide abrupt edge changes throughout the Cove. Even the transition from pastures to hay fields provides some edge. However, additional edge and habitat diversity is possible. Natural boundaries and gradients (e.g. water bodies and topography) can be used in creating new habitat (Stearns 1974). Thus, more vegetation could be planted along small streams and fences. Streams can serve as movement corridors for wildlife (Shoesmith and Koonz 1977); thus, the banks of even small branches should be well vegetated. In addition, vegetation

can reduce erosion, and prevention of erosion has improved aquatic habitat in Cades Cove in the recent past (Mathews 1978). When well vegetated, fence rows also serve as corridors for some animals, such as small mammals. Plants that provide more than one aspect of habitat or serve several species should be considered. For example, hedgerows and clumps of shrubs can produce food, cover, and nesting sites (de Vos 1967, Hooper et al. 1973, Maffei 1978). Although large animals are often highly preferred, many visitors also want to see and hear songbirds; 21.7% of the respondents reported "to listen for bird calls" as a reason for their trip to Cades Cove. Breeding and nesting habitats are so important to these species that emphasis may need to be placed on providing habitat for their relevant seasons (Gill et al. 1974, Cooper and Shaw 1979).

Where possible, planting should consist of native vegetation (Lennartz and Bjugstad 1975), or match cultural history, such as apples (Malus spp.) or domestic plums (Prunus spp.) in Cades Cove (W. Minser, pers. commun.). Similar native woody vegetation could include crabapples (Pyrus spp.), hawthorns (Crataesus spp.), wild plums (Prunus spp.), and persimmons (Diospyros virginiana).

If livestock have access to hedgerows, the shrubs may be destroyed. Livestock numbers may need to be reduced. In addition, movement corridors or travel lanes may need to be widened for both mammals and birds. Thus, double fences (about 6 m wide) on each side of creeks and pastures (without removing existing trees) and areas between fences could be plowed often enough to remove non-native grasses and allowed to grow back naturally or planted in desirable

species. Blackberries (Rubus spp.), and sumac (Rhus spp.) are likely candidates. To prevent lanes from changing to trees, bushhogging about 1/2 - 2/3 m above the ground every three years might be necessary. If woody vegetation persisted, occasional mowing about 1/3 m above the ground could help. In addition, large fields could be subdivided into smaller ones (8 - 20 ha) with more travel lanes, and field corners could be fenced, plowed, and used for wildlife habitat. Subdivision of land into smaller fields would simulate historical reality more than the current situation (W. Minser, pers. commun.).

Critical food species should be identified and supplied (Lucas and Stankey 1974). As mentioned previously, several tree species in GSMNP (e.g. oaks, cherry, serviceberry) produce preferred food for bears and may have other food sources, such as blueberries, associated with them (Beeman 1971, Eagle and Pelton 1980, Wathen 1983). Many are native and could be planted in Cades Cove to increase wildlife habitat and diversity.

The American chestnut tree (Castanea dentata) once provided a large, dependable source of fall mast for numerous wildlife, including bears. Unfortunately, the chestnut blight killed most of the Park's chestnut trees during the 1920's and 1930's (LaFollette 1974). The American chestnut can be replaced by the exotic Chinese chestnut (Castanea mollissima) in many areas other than national parks (de Vos 1967), but the few sprouts from American chestnut near Cades Cove could be innoculated annually against the blight until a more permanent and less expensive system is devised for returning this native species to the area.

Fertilizers could also be applied to attract wildlife where desirable (Morriss 1954, Ream 1979) if restrictions were relaxed. Where the presence of certain indicator species demonstrates calcium deficiencies, lime could be added (C. Hastings, pers. commun.) With some species it may be possible to manage habitat close to people, such as along roads, trails, streams, campgrounds, and picnic areas (Gill et al. 1974), or beside nature and visitor centers (Hooper et al. 1973). For others, planting should be conducted at adequate distances from roads and trails to still promote wildlife viewing, but not to harass wildlife or encourage public feeding. In some situations, natural buffers or barriers might be needed to prevent people and wildlife from getting too close (Reid 1967, Stalmaster and Newman 1978).

Nutrients (e.g. salt licks) could be used to aid some wildlife species (Lime 1976, Buech et al. 1980). They could also be used to strategically concentrate wildlife wherever desirable. Supplemental feeding has also been suggested in order to enhance wildlife viewing (Gill et al. 1974, Buech et al. 1980), but should probably be avoided in national parks and wilderness areas (Leopold et al. 1963, Hendee and Schoenfeld 1978). Wildlife can become too dependent on people, causing numerous problems outlined in the Literature Review chapter.

A common method for providing diversity in wildlife habitat is creation of small openings, especially in dense, even-aged stands (Hooper et al. 1973, de Vos 1967, Lucas and Stankey 1974, Schneegas 1975). This would probably not be necessary at Cades Cove unless open habitat for animals less habituated to man is desired, or a wildlife

management demonstration area is desired. For example, small openings can be created within close walking distance of campgrounds and picnic areas, with interpretive signs or literature made available. If such openings were formed at Cades Cove, or, more importantly, at other sites within the Park, care should be taken that den trees and good mast producing trees be spared (de Vos 1967). Tree snags are also essential to some species (Schneegas 1975), and should be spared when creating openings, or could actually be created. One solution might be to create small open strips through rhododendron or laurel thickets (Morriss 1954).

Controlled burning can be a very effective tool in establishing wildlife habitat (Leopold et al. 1963, de Vos 1967, Lucas and Stankey 1974, Masyk 1975, Hendee and Schoenfeld 1978, Cooper and Shaw 1979). For Cades Cove, small spot-burns could be used to create openings, occasionally reverse succession, and/or demonstrate to the public how fire can aid wildlife. It might be possible to use an area along the loop road to demonstrate a series of successional patterns developed with fire, and interpret the type of wildlife that benefit most from each sere.

Another suggestion for habitat alteration within Cades Cove is to fence certain areas to keep wildlife from destroying natural sites or threatened/endangered plants (Tate 1984, Wauer 1984). Exclosures within Cades Cove could also aid research efforts, particularly on the wild hog (White 1984), but also on the extent of deer browsing. Some have felt that fences were too distasteful in areas of a national park frequently used by visitors (Wood 1984). If conducted properly,

however, fencing can be used as an important interpretive tool by placing informative signs on exclosures and directing the public to compare areas inside and outside the fence (Tate 1984). A hog exclosure in the western portion of Cades Cove presently displays small, but informative, signs explaining its existence.

An additional consideration is that management of wildlife viewing should not be concentrated entirely on wildlife (Fuhriman and Crozier 1974). Managers should maximize other aesthetic features (e.g. mountains, streams, fields, historical points) and minimize stressful features (e.g. agency housing, waste treatment facilities, picnic areas). Visitor satisfaction, even in a wildlife viewing area, will probably be influenced by a number of factors, some of which have nothing to do with wildlife. Fortunately, the current design of Cades Cove already meets most of these requirements. Although 92.3% of the visitors reported wildlife viewing as a reason for going to the Cove, 100% reported enjoying the scenery as a reason for their trip. Many visitors enjoy the landscape pattern of open fields mixed with forested areas. Only 28.0% felt that the Cove's historic status should lead to half or more of the current fields being placed in crops. Thus, habitat alterations should probably be conducted with caution in some portions of the Cove until the preferred size of fields and the optimum mix of forest and field are determined. Some of the larger open fields should probably be left as they are now. In addition, visitor response to the planting of small gardens should be evaluated; gardens could improve both wildlife and historic programs, and might meet with considerable approval by visitors.

Half (50.3%) of the respondents did not want to see the cattle and horses removed from Cades Cove, even if livestock were competing with wildlife. Livestock numbers should be reduced in Cades Cove, but sudden and total elimination might be met with considerable public resistance.

As discussed in the Attitudes chapter, some wildlife may also need to be reduced in Cades Cove to prevent habitat destruction. Currently, wild hogs are removed because they are exotic and destroy much native vegetation, and may compete with other fauna (Benda 1984). White-tailed deer are also reduced almost annually to prevent overpopulation and the corresponding habitat damage or disease outbreaks (Bratton 1980).

Interpretation of Wildlife and Wildlife Management

It is a truism that one of the most important aspects of wildlife management is people management (Leopold 1943, Bacon 1974, Clark 1974, Glimski 1976, Hendee and Schoenfeld 1978, Kellert and Brown 1985, Snepenger and Ditton 1985). With management of wildlife viewing, this often means channelling visitor use and enforcing regulations. However, education of the public can often reduce the need for more negative management practices. If knowledge and attitudes about wildlife and wildlife management in Cades Cove were improved, then knowledge and attitudes toward natural resources and management might also be improved. Two major interpretive methods of aiding this process will be discussed: (1) design of roads, trails, and structures, and (2) design of information systems.

Roads, trails, and structures can be constructed in such a manner as to greatly help visitors view wildlife and managers control visitors. When designing this process, the quality of the observation should be considered at all times (Reid 1967); that is, wild animals should be viewed undisturbed in a relatively natural environment. They should not be found "begging" for food along the roadside.

Roads. An ideal road through a wildlife viewing area should be designed for slow speeds, one-way traffic, and opportunities to pull off the road (Reid 1967, Lime 1976, Singer 1978, Cooper and Shaw 1979). In addition, the road should traverse through a variety of wildlife habitats. Traffic should flow with regularity and minimal unexpected disturbances so that animals will habituate to people and not avoid useful portions of their habitat (Geist 1972, Cowan 1974, Tracy 1977). The road system in Cades Cove already meets most of these requirements. The 18 km road is smoothly paved and wide enough to accommodate virtually all recreation vehicles. One-way traffic and numerous pull-offs prevent the need for the road to be broadened, although a few of the present gravel pull-offs could be paved and lengthened in prime wildlife viewing sections; 58.1% of the respondents left their vehicles to see wildlife, indicating the necessity of good pull-offs. The road system is constructed such that a number of habitats are already observable from the paved road, two 2-way unpaved roads dissecting the Cove, two 1-way unpaved roads exiting the area, and two short spur roads. Thus, the road system is adequate at present. A mass transit system with bus drivers trained

to interpret for visitors is a possibility (Tracy 1977), but Divine et al. (1976) recommended against it in Cades Cove. Limiting use is another alternative if visitation is too high (Reid 1967). Other methods to improve wildlife viewing along roads would largely involve habitat alterations discussed in the previous section and provision of information to be discussed later. A word of caution is that improved access to wildlife can lead to increased poaching unless properly controlled (Tracy 1977).

Trails. Several trailheads for hiking and horseback riding already exist in Cades Cove. Non-motorized trails are very important to national parks and should be properly routed and maintained (Reid 1967, Houston 1971). However, none of the main trails features wildlife as the major point of interest. Almost half (46.2%) of the respondents approached wildlife outside of their vehicles. Interpretive trails and quiet walkways could be designed to go into, instead of away from, the Cove. It would be much easier to construct short paths near wildlife habitat than to route a road near the same area. Trails and corresponding educational materials would need to be designed such that wildlife would not be overly disturbed, and that people would stay on the paths; 53.0% of visitors approaching wildlife reported animals fleeing. Nevertheless, such trails could be very useful interpretive tools by helping visitors see and understand wildlife, wildlife habitat, and wildlife management techniques, probably to a greater degree than roads. Trails can also be designed

where evidence of wildlife is easy to see (e.g. mud bars along streams for animal tracks) (Lime 1975).

Horse trails would need to be more restricted because horse parties are more difficult to screen from other visitors, and probably cause more adverse environmental impacts. Horse trails should probably not extend beyond their present use.

Bicycle trails may be more practical than horse trails. Large numbers of people use bikes in the Cove, but conflicts with other traffic are common during the warmer months. Studies are currently being conducted to resolve some of these problems. A narrow 1-way bicycle trail running parallel to the loop road would allow both bicyclists and users of motorized vehicles more time to watch wildlife instead of traffic.

Special structures. Several special structures have been recommended in other areas to aid wildlife viewing without disturbing wildlife or damaging the site. For example, blinds constructed on trails can help both visitors and wildlife (Shea 1973, Lime 1976). Boardwalks in swamps can take visitors into areas not previously frequented (Cooper and Shaw 1979). Towers or other platforms are often used to elevate visitors for better viewing (Lime 1976, Buech et al. 1980, Cooper 1982), and occasionally for protecting viewers from dangerous wildlife such as bears (B. K. Gilbert, pers. commun.). Although there may not be universal support for these facilities, they can be especially useful for special groups, such as the elderly or handicapped (Lime 1976).

Blinds could also be constructed for viewers and photographers in areas of high wildlife concentrations or near dens. A boardwalk through the small marshy area in the far western portion of the Cove could acquaint visitors with a different type of habitat. An elevated platform could be constructed overlooking any area covered with relatively short, dense natural vegetation, such as a blackberry thicket. This would provide an excellent opportunity for interpretation and viewing in an area which might otherwise be considered less than aesthetic by the majority of the public. For example, satisfaction produced by willow patches in some western parks is probably much higher for visitors who realize that they may be able to see moose in the area, particularly if they are in an elevated position. If such platforms were to be constructed in Cades Cove, they would need to be placed in the area of departure from the featured habitat (i.e. where visitors would have already passed the wildlife), because this tends to disturb some wildlife less than activity in an area approaching the habitat (Cooper 1982).

Information Systems. User education is a powerful management tool. Fazio (1979) described it as the most palatable, least controversial, and possibly one of the most effective methods available to managers in a democratic society. It is also one of the least costly tools (Cooper and Shaw 1979). Education and interpretation are not only keys to conservation in general (Erickson 1971), but also to visitor enjoyment and understanding (U.S. Council on Environmental Quality 1972, Shaw and King 1980). In particular,

people want more natural resource information about wildlife (Pomerantz 1977, Hastings and Hammitt 1985).

Managers have a great variety of methods available for interpreting resources. In the previous section, it was discussed how auto tours, trails, and certain structures could aid interpretation of wildlife. Interpretive signs, markers, displays, tape recordings, and radio messages could be effectively used in conjunction with these facilities (Tevis 1959, Reid 1967, Mahaffey 1970, Lime 1976, Cooper 1982, Hill 1983, Peine et al. 1984). Cades Cove currently has one display at its entrance. Unobtrusive markers along the roads and trails could correspond to information within a special wildlife brochure distributed at the entrance.

Wildlife brochures, booklets, and leaflets are important interpretive tools (Reid 1967, Geist 1975, Lime 1976, Wishart 1975, Baptiste 1977). Cades Cove is in need of its own wildlife brochure; the parkwide brochure did not significantly increase visitors' knowledge about wildlife. Visitors appear willing to pay for interpretive brochures in wildland areas (Hendee 1969, Lime 1975), and currently purchase a history booklet and a nature leaflet designed specifically for Cades Cove. Although not always as popular as other interpretive techniques, literature is often saved, providing the potential for later use and greater retention (Mahaffey 1970, Hill 1983). For maximum effectiveness, writers of wildlife brochures should consider brevity, visual flow, spacing, and illustrative simplicity (Fazio 1979). Additional types of literature could include park newspapers, bulletin boards (Peine et al. 1984), maps (Lime 1975,

Buech et al. 1980), and animal checklists (Olendorff et al. 1975). Information should be distributed at area entrances (Fortier 1983), which would be relatively easy to accommodate at the entrance to Cades Cove.

Roads, trails, and literature can aid the interpretation of wildlife for large numbers of people. However, many researchers believe that face-to-face contact with two-way conversation is also very important (Mahaffey 1970, Lime 1976, Baptiste 1977, Moore 1983, Petko-Seus 1985). Common methods include talks, campfire programs, guided tours, night walks, and slide presentations (Reid 1967, Shea 1973, Wishart 1975, Lime et al. 1978, Fazio 1979), and are presently used in Cades Cove.

Nature centers and museums can provide interpretation through both personal contact and exhibits (Lime 1976, Everett 1979). Wildlife displays can teach visitors how to recognize animals (Reid 1967). Movies, videos, and touch-sensitive computer equipment can all be used successfully for interpretive purposes in visitor centers (Lime 1975, Wishart 1975, Baptiste 1977, Fazio 1979, Fortier 1983). Live video taping of animals in their dens could also be an ongoing feature (Reid 1967). Several of the above techniques are used at Sugarlands Visitor Center in the Park. The Cades Cove Visitor Center offers an interesting cultural history program, but little on wildlife. In particular, videos of bears, groundhogs, bats, or raccoons in their dens would probably lead to greater curiosity and more opportunity to teach visitors.

With all of the above information techniques as choices, it may be difficult to decide which to use. Nevertheless, it has been demonstrated that information should be designed to affect both cognitive and affective learning; the more diverse the environmental education, the more likely this objective will be met (LaHart 1978). Visitors have different levels of interest and backgrounds; thus, a variety of learning techniques, if not mass media, will produce the greatest results (Mahaffey 1970, Lime 1976, Moore 1983).

Techniques are not the only considerations in teaching the public about wildlife and wildlife management. What and how material is presented are two very important factors. Education and interpretation of wildlife and wildlife management should take a holistic, ecosystem approach (Houston 1971, LaHart and Tillis 1974, Roth 1974, Lime 1975, Gilbert 1982). The public should understand that each organism depends on a network of other organic and inorganic factors to exist. People should be taught that these factors should be managed for diversity and stability. This is not to say that interpretation should attempt to ignore people's preferences for individual species, but instead to help people understand the importance of native species' existence. In addition, this ecosystem approach can help visitors find wildlife by understanding where to look.

While keeping the holistic approach under consideration, different types of information can be used in different types of programs. However, each program must contain information that is interesting. The wildlife literature is rich with suggestions for

types of information to include: life history, habitat, feeding habits and preferred foods, courtship and breeding activities, seasonal movements, other habits and behaviors, how to view wildlife, where and when to find animals (both daily and seasonally), why animals are where they are, how to identify wildlife sign, how to behave in the presence of wildlife, why animals should not be fed, safety considerations, purpose of markers on wildlife, factors threatening certain species, and additional management problems and alternative solutions for the specific area (Grater 1959, Monson 1966, Reid 1967, Lime and Cushwa 1969, Erikson 1971, Mundy and Flook 1973, DeGraaf and Thomas 1974, Geist 1975, Lime 1975, Lime 1976, Tracy 1977, Dawson et al. 1978, Klinghammer 1978, Lime et al. 1978, Cooper and Shaw 1979, Everett 1979, Fazio 1979, Buech et al. 1980, Cooper 1982, Sundstrom 1984, Petko-Seus et al. 1985). Descriptions of animal behavior might be particularly useful in keeping interpretive sources interesting to the public. In addition, if managers alter habitat (as is being proposed for Cades Cove in this chapter), it is imperative that educational techniques be used to acquire public support for habitat change (Tevis 1959).

Cades Cove visitors desired some of the same information as the literature has proposed to give them (e.g. where and when to see specific animals), but were interested in other points which the literature missed (e.g. which species exist there, population facts, presence of disease and parasites, reasons for markers on wildlife, and plans for introductions and reintroductions). The survey results also demonstrate that some visitor attitudes should be improved (e.g.

attitudes toward removal of exotics, presence of poisonous snakes, absence of artificial feeding programs). By combining information that people want to know with what they need to know, wildlife viewing experiences can become more meaningful for the viewers. In addition, many people receive wildlife information from others (e.g. family, friends) (Petko-Seus 1985). Therefore, exposing visitors to high quality wildlife experiences may positively influence the knowledge, beliefs, and attitudes of other people through later conversations (Moore 1983).

Prototype Management Plan for Wildlife Viewing in Cades Cove

In the previous sections of this chapter, a host of alternatives for managing wildlife viewing in Cades Cove was outlined. In this section, the final proposal for changes will be discussed. It is important to recognize that Cades Cove already provides excellent opportunities for viewing and interpreting wildlife. However, improvements are possible. Some of these could be implemented within National Park Service policy restrictions, while others may not. The following scenario is hypothetical; it provides a potential plan for designing Cades Cove for viewing wildlife while ignoring some current NPS regulations. This approach may be helpful to other agencies or groups to think about how they could improve habitat and opportunities for viewing wildlife resources.

To best organize recommendations, Cades Cove was divided into 12 wildlife viewing units (Figure 9). Specific proposal changes will be made for each unit.

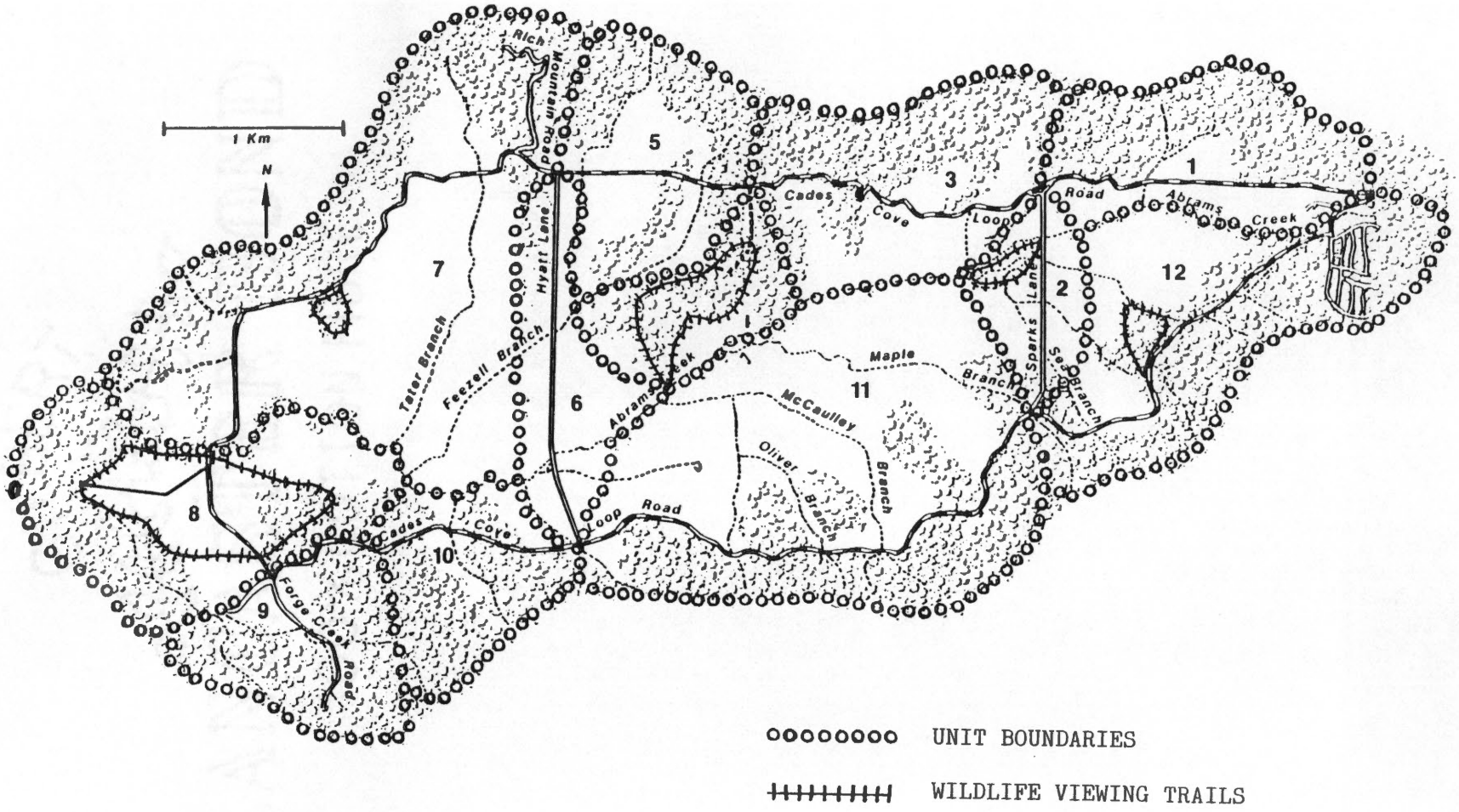


Figure 9. Map of wildlife viewing units within Cades Cove, Great Smoky Mountains National Park.

Entire Cove

Place 6 m double fence on each side of Abrams Creek wherever pastures or hay fields presently exist. Plow interior area and allow to grow back naturally. Bushhog about 1/2 m or closer to the ground every three years to remove woody vegetation. Plant a mixture of wildlife foods in bare or sparse areas on the creek banks.

Reduce cattle by at least one-half. Continue annual removal of deer (no more than 25% of population).

Do not interrupt the promotion and interpretation of cultural history.

Unit 1

Add more wildlife information at the entrance. In particular, offer a brochure on the wildlife of Cades Cove for a nominal price. Use the brochure to interpret wildlife and wildlife management at numerous numbered posts along the loop road. Also add a wildlife bulletin board which changes seasonally. Stress where, when, and how to view wildlife in interpretive media.

Add fences and vegetation along intermittent streams. Avoid planting highly preferred summer bear foods too near the campground or picnic area.

Pave the gravel pulloffs beside the fields.

Unit 2

Allow Sparks Lane to remain with gravel and 2-way traffic. Plant a mixture of wildlife foods along fences running perpendicular to the road in order to increase habitat without obstructing viewing ability.

Plant a few wildlife food trees (e.g. cherry and persimmon) along the road.

Create a quiet walkway originating at the junction of Sparks Lane and Abrams Creek. Also add a gravel pulloff on the southern side of Sparks Lane near the edge of woods and fields.

Unit 3

Add a wildlife travel lane through the large meadow south of the loop road. Pave the gravel pulloff south of the loop road at the last meadow to improve wildlife viewing.

Unit 4

Allow road to Primitive Baptist Church to remain gravel. Develop a loop wildlife trail starting about 2/3 distance to the church. Use the trail to traverse a variety of habitats including forest, stream, hay fields, and pastures.

Unit 5

Disallow cattle use in this area.

Plant shrub-types of wildlife foods (e.g. serviceberry, hawthorn, crabapple) along intermittent stream. Subdivide field north of the loop road. Create travel lanes with relatively short vegetation.

Pave two gravel pulloffs beside open fields.

Unit 6

Plant a mixture of wildlife food and cover plants along the banks of Feezell Branch and beside fence rows running perpendicular to the road. Plant a few wildlife food trees in bare areas along the road.

Unit 7

Provide wildlife information at the large overlook. Fence both sides of Tater Branch, plow, and allow natural vegetation to replace the previous grasses. Plant hedgerows along fences between hay fields. Do not subdivide further at this location because of its popularity for viewing open scenery in the foreground with mountains in the background.

Create a quiet walkway in the wooded area south of the loop road. Also pave one of the gravel pulloffs near the hog exclosure along Abrams Creek. Current signs are adequate for its interpretation.

Unit 8

Begin a wildlife loop trail at the Abrams Creek Trailhead. Develop it through a variety of habitats including stream, marsh, hay fields, early successional field of native plants, forest, and pond (located near the trailhead). Use a boardwalk through the marshy area. Construct a small platform that will blend into its surroundings on the eastern-most portion of the trail. Have the platform situated such that it will overlook the large field to the north. Plant this field with a few wildlife shrubs, but allow most of it to grow naturally to non-woody native plants. Bushhog it every three years. Provide interpretive information at the trailhead.

Unit 9

Add an additional room to the Cades Cove Visitor Center for interpretation of wildlife. Use continuous slide show of Cades Cove wildlife and how to view them.

Use open areas along Forge Creek Road for wildlife habitat. Use both shrubs and smaller vegetation.

Unit 10

Remove small pines in hillside meadow south of the loop road, and replace with wildlife shrubs. Plant wildlife foods along stream branch.

Unit 11

Fence the stream branch beside the Dan Lawson Place and plant wildlife shrubs and trees along it. Construct double fences and wildlife travel lanes along all branches and in areas currently single fenced. Reduce cattle in this area.

Unit 12

Plant wildlife shrubs and trees along stream branches. Avoid planting highly preferred bear foods too close to picnic area and campground.

Create a quiet walkway in the wooded area northwest of the road. Increase wildlife information within picnic area and campground.

Summary

Existing data on the wildlife resource in Cades Cove were integrated with information generated by this survey on visitor preferences and needs for wildlife in order to develop wildlife viewing programs. The major questions of visitors (e.g. when and where to see different species) were answered using results of past

research in Cades Cove on such animals as bear, deer, raccoon, groundhog, and skunk. Numerous alternatives for providing wildlife viewing opportunities were outlined from integrating results of this survey with a review of the literature on management and interpretation of wildlife. Suggested interpretive methodology included roads, trails, special structures, types of information, and types of interpretive techniques. The most notable recommendations for Cades Cove included providing more wildlife habitat along streams and fences, subdividing some fields, developing two short wildlife loop trails and three quiet walkways, adding a few paved pulloffs in key wildlife viewing areas to avoid traffic jams, and increasing emphasis on wildlife in the interpretation of Cades Cove. While some of the recommendations might be difficult in a National Park Service historical zone, most are justifiable under present NPS policies and objectives.

CHAPTER X

IMPLICATIONS AND CONCLUSIONS

1. The results of this study indicate that wildlife viewing is a very significant motivator for visitation of Cades Cove. The presence of wildlife is also important to satisfaction of trips to Cades Cove and to Great Smoky Mountains National Park. It is concluded that wildlife viewing can be important to trip satisfaction in most natural areas, and can be managed more effectively than at present.

2. Almost all study participants reported seeing wildlife, and most visitors observed several species. Remarkably large percentages of visitors observed several highly preferred species. These results, in conjunction with the author's experience in Cades Cove during other seasons, imply that Cades Cove has potential far beyond its present status for becoming one of the most valuable wildlife viewing areas in the United States. More emphasis on wildlife within management and interpretation of the area could greatly improve the Cove's usefulness as a free-ranging wildlife resource for public viewing.

3. The data indicate that there is a complex relationship between the wildlife that people want to see, expect to see, and actually observe. Preferences for specific animals may affect expectations which, in turn, may result in visitors' looking for certain species more than others. However, the opposite may also

be true; wildlife which are observed may affect expectations for future viewing and may influence what people report as preferred wildlife.

4. Most visitors want to see almost any wildlife, with the notable exception of poisonous snakes. Other commonly feared and domestic animals were not highly preferred; aesthetic and culturally important species were the most preferred animals in Cades Cove. These results would probably hold true in many other wildlife viewing areas.

5. The results indicate that most people are not opposed to markers on wildlife. Even less opposition exists when markers blend with the animal's coat color, or the reason for markers is explained to visitors. A parallel study found that size of markers influences public response. It is concluded that markers should be used whenever necessary but made as difficult for visitors to observe as the study objectives allow, and the public should be informed of their purpose. More importantly, it is concluded that explaining the utility of research and management techniques to the public can often improve both knowledge and attitudes.

6. The data indicate that many extirpated species could be reintroduced into a national park with relatively minor opposition. However, many people would likely object to reintroduction of large predators (e.g. wolves, mountain lions). These reactions would probably occur in most areas of the

country. The successful re-establishment of many species may depend on altering people's perceptions of these animals. If people are provided information explaining that these animals are not as dangerous as previously thought and that property damages would be compensated, perceptions could be changed enough to alter human behavior toward both the species and efforts to reintroduce them. It is concluded that these changes will take time, but can be accelerated by intense interpretive efforts from sources considered reliable.

7. Responses to only two exotic wildlife species (wild hog and coyote) were examined. The results indicate that exotics are not universally disliked, even when some of their destructive tendencies are known. This implies that many other exotics perceived as beneficial would likely meet with considerable approval in GSMNP (e.g. rainbow trout, brown trout) and other wildland areas (e.g. ring-necked pheasant). Educational media will need to be improved to change public attitudes toward exotics when agency managers conclude that a species is sufficiently destructive to warrant expensive eradication measures.

8. The data indicate that the current management practice of relocating portions of an overpopulated deer herd in order to re-establish herds elsewhere meets with more public approval than other control options presently available. It is concluded that this practice should be continued, but that management plans

should be developed for future situations; there may not always be areas to send excess deer. It is also recommended that public attitudes toward issues in other wildland areas be evaluated using a similar technique (i.e. listing a series of management options including the one presently in use).

9. The results indicate that visitors need more information on wildlife and wildlife management. Although knowledge and attitudes do not appear highly related, it is concluded that certain information could not only improve visitor knowledge but also their beliefs, thereby more efficiently altering attitudes over time.

10. The major changes needed in Cades Cove involve greater emphasis on interpretation of the wildlife resource and management for wildlife viewing. Recommendations include development of a wildlife brochure for the Cove, more emphasis on improving attitudes as well as knowledge about wildlife in all of the Park's information sources, higher usage of animal behavior in interpretation of wildlife, formation of wildlife trails and quiet walkways near prime habitat, habitat improvements, and evaluation of the effectiveness of these techniques. It is concluded that application of these methods could improve knowledge and attitudes not only with visitors, but also with their relatives, friends, and acquaintances.

11. Although the model (Figure 2) was not intended to be rigorously tested by this study, some results relate closely to it. More importantly, the model is available for future studies designed to test it. The model implies that experiences and information can indirectly influence human values, preferences, and attitudes toward wildlife by directly affecting knowledge and beliefs. These altered perceptual components can be combined with social pressures to develop behavioral patterns toward wildlife. It is therefore concluded that wildlife experiences, park information, and NPS regulations encountered in Cades Cove are extremely important to both perception of and behavior toward wildlife. It is also concluded that visitors who have developed appropriate attitudes and values toward wildlife may help control behavior of other visitors either directly through peer pressure or indirectly through improving other people's attitudes toward wildlife.

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APPENDICES

APPENDIX A

INTRODUCTORY TABLES

Table 26. Species known to have been studied in human-wildlife interaction projects.

Brown/Grizzly bear (*Ursus arctos*)	Chester 1976, 1980 Tracy 1977 Jope 1982
Black bear (*Ursus americanus*)	Chester 1976, 1980 Jordon 1976 Eagar and Pelton 1978,1979 Tate 1981, 1983 Hastings et al. 1981, 1986 Hastings 1982 Herrero 1983 Tate 1983 Tate and Pelton 1983 Petko-Seus 1985
Wolf (*Canis lupus*)	Grace 1976 Chapman 1977
Coyote (*Canis latrans*)	Chester 1976 Aune 1981
Red fox (*Vulpes vulpes*)	Tracy 1977
White-tailed deer (*Odocoileus virginianus*)	Behrend and Lubeck 1968
Mule deer (*Odocoileus hemionus*)	Chester 1976 Freddy 1977 Aune 1981
Elk (*Cervus canadensis*)	Chester 1976 Schultz and Bailey 1978
Caribou/Reindeer (*Rangifer tarandus*)	Thomson 1972 Tracy 1977 Dean and Tracy 1979
Moose (*Alces alces*)	Cobus 1972 Chester 1976 Tracy 1977 Aune 1981
Bison (*Bison bison*)	Aune 1981

Table 26. Continued.

Bighorn sheep (*Ovis canadensis*)	Chester 1976 Elder 1977
Dall sheep (*Ovis dalli*)	Tracy 1977
Mountain goat (*Oreamnos americanus*)	Singer 1975, 1978 Bansner 1976
Gray squirrel (*Sciurus carolinensis*)	Manski et al. 1981
Bald eagle (*Haliaeetus leucocephalus*)	Shea 1973 Stalmaster and Newman 1978
Least terns (*Sterna albifrons*)	Blodget 1975
Other migratory shorebirds	Blodget 1975
Goose species	Cooper 1982 Dick 1982
Duck species	Dick 1982
Songbirds	Cooke 1982
Pigeons	Dick 1982
Butterflies	Dick 1982

Table 27. Species of mammals known to inhabit Cades Cove (from Linzey and Linzey 1981, Rabinowitz 1981).

Common Name	Scientific Name
Black bear	Ursus americanus
White-tailed deer	Odocoileus virginianus
Groundhog (Woodchuck)	Marmota monax
Gray fox	Urocyon cinereoargenteus
Red fox	Vulpes vulpes
Bobcat	Lynx rufus
Striped skunk	Mephitus mephitus
Spotted skunk	Spilogale putorius
Eastern gray squirrel	Sciuris carolinensis
Eastern chipmunk	Tamias striatus
Eastern cottontail	Sylvilagus floridanus
European wild hog	Sus scrofa
Mink	Mustela vison
Muskrat	Ondatra zibethicus
Southern flying squirrel	Glaucomys volans
Opossum	Didelphis marsupialis
Cotton deermouse	Peromyscus gossypinus
Pine mouse	Microtus pinetorum
House mouse	Mus musculus
Eastern woodrat	Neotoma floridana
Common cotton rat	Sigmodon hispidus
Little short-tailed shrew	Cryptotis parva
Hairy-tailed mole	Parascalops breweri
Eastern mole	Scalopus aquaticus
Eastern pipistrelle	Pipistrellus subflavus
Little brown myotis	Myotis lucifugus
Silver-haired bat	Lasionycteris noctivagans
Red bat	Lasivrus borealis
Eastern lump-nosed bat	Corynorhinus rafinesquii

APPENDIX B

INTERVIEW QUESTIONS

Questionnaire No. ____

WILDLIFE IN CADES COVE - 1983

Date:_____ Weather:_____

Temperature:_____ Humidity:_____Other:_____

Party Size - Adults - Children:_____ # Qu.:___ Rating: _____

1. What kinds of wildlife did you see in the Cove today?_____

   _____

2. What kinds of wildlife were you wanting to see before you came into the Cove today? _____

3. What kinds of wildlife were you actually expecting to see before you came in today?_____

4. (Show Photograph.) We took this photograph here in Cades Cove, and a lot of people cannot recognize what the animal is. Can you identify it for me?_____

5. (Show List of Animals.) Do you see anything else on this list that you might have seen today, and didn't think to mention?

   _____

6. About what time did you start at the beginning of the Cove?

   Starting time_____

   Finishing time_____

7. Name:_____ Age:_____ Sex:_____

   Address:_____

   City:_____ State:_____ Zip:_____

APPENDIX C

QUESTIONNAIRE

Questionnaire No. ____

Please complete at your earliest convenience. Although some of the questions may not apply to you, please give your best estimate for each question that does. Throughout the questions, wildlife refers to wild fur-bearing animals, birds, and reptiles.

We are interested in what happened between you and wildlife during the trip when you were interviewed. Please check the appropriate box for each item.

	YES	NO
1. Did you see any wildlife during the trip in Cades Cove when you were interviewed?	( )	( )
2. Did you get out of your vehicle specifically to see wildlife?	( )	( )
3. Did you approach wildlife outside of your car?	( )	( )
4. If yes, how close did you get to each one that you approached? _____ ft.		
5. What animal was it? _____		
6. Did it run away (or fly away)?	( )	( )
7. Did you do any photography in Cades Cove?	( )	( )
8. If yes, about how many pictures of wildlife in Cades Cove did you take? _____		
9. How many pictures of other aspects of Cades Cove did you take? _____		
10. Did you expect to photograph wildlife?	( )	( )
11. Did you expect to feed wildlife?	( )	( )
12. Did you see any type of wildlife that you could not identify?	( )	( )

People have a lot of different reasons for coming to Cades Cove. We are interested in ranking the importance of these reasons. Please check the box that shows how much you agree with each of the following statements.

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
13. Seeing wildlife was very important to the enjoyment of my trip to Cades Cove.	( )	( )	( )	( )	( )
14. Seeing wildlife was very important to the enjoyment of my trip to the Great Smoky Mountains National Park.	( )	( )	( )	( )	( )
15. I was disappointed in the type or lack of wildlife I saw in Cades Cove.	( )	( )	( )	( )	( )
16. The hope of seeing wildlife was a major factor in my going to Cades Cove.	( )	( )	( )	( )	( )
17. The hope of seeing wildlife will be a major factor in my going back to Cades Cove.	( )	( )	( )	( )	( )
18. The reason I came to Cades Cove was: *(Please Check an Answer for Each Statement Below.)*					
(a) to enjoy the scenery.	( )	( )	( )	( )	( )
(b) to see wildlife.	( )	( )	( )	( )	( )
(c) to camp or hike.	( )	( )	( )	( )	( )
(d) just for the drive.	( )	( )	( )	( )	( )
(e) to see the historical farms, churches, mills, etc.	( )	( )	( )	( )	( )
(f) to listen for bird calls.	( )	( )	( )	( )	( )
(g) by accident.	( )	( )	( )	( )	( )
(h) other _____	( )	( )	( )	( )	( )

The next few questions relate to changes, if any, that you would like to see in how the Park Service explains wildlife in Cades Cove. Please check the box that shows how much you agree with the following statements.

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
19. The National Park Service should put more emphasis on explaining wildlife in the Cove.	( )	( )	( )	( )	( )

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
20. Wildlife information should be included in the Cades Cove Auto Tour Guide.	( )	( )	( )	( )	( )
21. A brochure on the wildlife of Cades Cove should be made easily available at the entrance to the Cove.	( )	( )	( )	( )	( )

In order to advise the Park Service on how to explain wildlife in Cades Cove, we need to ask some questions about your opinions and knowledge. Please do not feel that you are being tested. Please check the box that shows how much you agree with the following statements.

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
22. The deer population in Cades Cove is relatively high because: *(Check Each Statement.)*					
(a) the Park Service artificially feeds them.	( )	( )	( )	( )	( )
(b) they are not hunted.	( )	( )	( )	( )	( )
(c) the pastures mixed with forest provides plenty of food and shelter.	( )	( )	( )	( )	( )
(d) the deer do not have much disease or parasites.	( )	( )	( )	( )	( )
23. If deer become overpopulated in Cades Cove, the Park Service should: *(Check Each Statement.)*					
(a) destroy some of them.	( )	( )	( )	( )	( )
(b) transport some for immediate hunting off of the park.	( )	( )	( )	( )	( )
(c) transport some to populate other areas for eventual hunting.	( )	( )	( )	( )	( )
(d) allow hunting in Cades Cove.	( )	( )	( )	( )	( )
(e) reintroduce large predators that were removed by people years ago.	( )	( )	( )	( )	( )
(f) establish a feeding program.	( )	( )	( )	( )	( )
(g) do nothing.	( )	( )	( )	( )	( )

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
24. Bears are not seen in the Park as often as they were a few years ago because: *(Check Each Statement.)*					
(a) the Park Service has been killing large numbers of them.	( )	( )	( )	( )	( )
(b) the Park Service has been moving the nuisance bears where they are not being seen.	( )	( )	( )	( )	( )
(c) disease and/or starvation has killed large numbers of them.	( )	( )	( )	( )	( )
(d) poachers have killed large numbers of them.	( )	( )	( )	( )	( )
(e) less visitor food is available for bears, so there are less nuisance bears to be seen.	( )	( )	( )	( )	( )
25. How much do you agree with each of the following statements? *(Check Each Statement.)*					
(a) Predators should be removed from the park.	( )	( )	( )	( )	( )
(b) The wildlife situation at present in Cades Cove is very similar to what it was in the mid-1800's.	( )	( )	( )	( )	( )
(c) Horses and cattle should be removed from Cades Cove if they are competing with wildlife.	( )	( )	( )	( )	( )
(d) Wild hogs should be removed from the park since they are not native to the area.	( )	( )	( )	( )	( )
(e) Poisonous snakes should be destroyed whenever seen in Cades Cove.	( )	( )	( )	( )	( )
(f) Beaver are common in Cades Cove.	( )	( )	( )	( )	( )
(g) Since the Cove is a historic area and crops were more common than grass during early settlement, at least half of the fields there should be in crops.	( )	( )	( )	( )	( )

26. The following animals were once common in the Great Smoky Mountains. Although the Park is not suggesting for them to be reintroduced, we want to know what your opinion is concerning their being placed back in the Park. *Please check the box that shows how much you agree with the following statements.*

	STRONGLY AGREE	AGREE	UNDECIDED	DISAGREE	STRONGLY DISAGREE
(a) Mountain lions should be reintroduced into the Park as natural predators.	( )	( )	( )	( )	( )
(b) Peregrine falcons should be reintroduced into the Park as natural predators.	( )	( )	( )	( )	( )
(c) Elk should be reintroduced into the Park.	( )	( )	( )	( )	( )
(d) American buffalo (i.e., bison) should be reintroduced into the Park as wild animals.	( )	( )	( )	( )	( )
(e) American buffalo should replace the horses and cattle in Cades Cove as domestic animals.	( )	( )	( )	( )	( )
(f) River otter should be reintroduced into the Park as natural predators.	( )	( )	( )	( )	( )
(g) Wolves should be reintroduced into the Park as natural predators.	( )	( )	( )	( )	( )

27. If certain conditions are met, does Park Service Policy support the idea of reintroducing animals that were removed by white man?

_____ Yes
_____ No
_____ Don't know

28. What species of bear occur in Cades Cove? *(More Than One May Be Checked.)*

_____ Grizzly Bear
_____ Black Bear
_____ Polar Bear
_____ Don't know

29. Approximately how many bears are there in the Great Smoky Mountains National Park? *(Check Only One.)*

_____ None
_____ 50-200
_____ 400-600
_____ More than 800
_____ Don't know

30. Approximately how many cattle are killed each year by bears in Cades Cove? *(Check Only One.)*

_____ None
_____ 1-10
_____ 10-50
_____ More than 50
_____ Don't know

31. Which of the following deer occur in Cades Cove? *(More Than One May Be Checked.)*

_____ White-tailed deer
_____ Mule deer
_____ Don't know

32. Approximately how many deer are there in Cades Cove in mid-summer? *(Check Only One.)*

_____ None
_____ 1-50
_____ 50-200
_____ 200-500
_____ More than 800
_____ Don't know

33. If you saw a baby deer in or beside the road by itself, what would you do with it? *(Check Only One.)*

_____ Take it home.
_____ Take it to a ranger.
_____ Report it to a ranger.
_____ Leave it alone without reporting it.

34. Are any of the wildlife in Cades Cove brought in by the Park Service for the purpose of viewing by the public?

_____ Yes _____ No _____ Don't know

35. If yes, what species? _____

APPENDIX D

COVER LETTER

The University of Tennessee
INSTITUTE OF AGRICULTURE

Department of Forestry, Wildlife, and Fisheries
P. O. Box 1071
Knoxville, Tennessee 37901-1071
Telephone: (615) 974-7126

Dear Cades Cove Visitor:

The University of Tennessee is conducting a wildlife/visitor study on Cades Cove. The Cove is one of the most important areas in the Southeastern United States for the viewing of wildlife by the public. Information from this questionnaire is intended to help the National Park Service explain these wildlife to visitors.

The verbal interview that you participated in at Cades Cove was kept very short, since we did not want to take up much of your recreation time. At that time you agreed to complete a longer questionnaire. You are one of a small number of people invited to participate in this study. Therefore, your point of view is very important. Please take a few minutes to fill out the questionnaire.

We want to emphasize that your answers are confidential. The questionnaire number is used only to match you verbal interview form with your written form. Your name will not be included in any report, nor will it be given to any of the agencies involved.

Please return the completed questionnaire in the enclosed self-addressed envelope as soon as possible. Return postage has already been paid.

We shall be happy to answer any questions you might have and also provide information concerning this study. Please call or write. The telephone number is 615/974-7126.

Thank you for your help in making certain that this important study represents the needs and desires of visitors of the Great Smokies and other national parks.

AGAIN, THANKS

William E. Hammitt Bruce Hastings

Dr. William E. Hammitt and Bruce Hastings
The University of Tennessee

THE UNIVERSITY OF TENNESSEE IS AN EQUAL OPPORTUNITY EMPLOYER

APPENDIX E

FOLLOW-UP REMINDERS

Dear Cades Cove Visitor:

About two weeks ago we handed you our mail questionnaire concerning your recent trip through Cades Cove in the Great Smoky Mountains National Park.

This postcard is a reminder that as of yet we have not received your completed questionnaire. If you can not find the questionnaire, please let us know and we will send you another.

If you have already returned the questionnaire, please accept our thanks. Your views are important and we look forward to receiving them.

Sincerely,

William E. Hammitt & Bruce Hastings

William E. Hammitt & Bruce Hastings
University of Tennessee
615/974-7126

Dear Cades Cove Visitor:

WE STILL NEED YOUR HELP! As of yet we have not received your questionnaire concerning your trip through Cades Cove and your views on wildlife.

Please return it in its self-addressed stamped envelope as soon as possible. It is important that we include your information in our study. Thank you.

Sincerely,

William E. Hammitt Bruce Hastings

William E. Hammitt & Bruce Hastings
University of Tennessee
615/974-7126

APPENDIX F

BACKGROUND CHARACTERISTICS

Table 28. Categories of background characteristics used for analyzing attitude and knowledge indices.

Characteristics	Categories
Age	< 30 30–39 40–49 50+
Sex	Male Female
Education	< High school High school or technical/vocational school Some college or completed college Graduate work or degree
Occupation	Professionals, technical workers, managers, officials, proprietors Clerical, sales, similar workers Craftsmen, foremen, operatives Service workers, laborers Unemployed
Residence Before 16th Birthday	Rural Town City (25,000 or more)
Previous trips to Cades Cove	None 1–10 10+
Hunting Status	Hunter Nonhunter Previous hunter

APPENDIX G

LIST OF COMMON ANIMALS SHOWN TO VISITORS DURING INTERVIEWS

Table 29. List of common animals shown to visitors during interviews.

DEER
BEAR
SQUIRREL
RACCOON
SKUNK
GROUNDHOG
OTHER FUR-BEARING ANIMALS
TURKEY
CROW
VULTURE (BUZZARD)
OTHER BIRDS
SNAKE
LIZARD
TURTLE
FISH

APPENDIX H

ANIMALS USED FOR INTUITIVELY DEVELOPED CATEGORIES

Animals used for intuitively developed categories (number of animals):

AESTHETIC (11): Fox, otter, mink, eagle, deer, raccoon, bear, rabbit, trout, owl, chipmunk.

IMPORTANT TO LOCAL CULTURE OR HISTORY (7): Eagle, deer, turkey, raccoon, bear, horse, cattle.

COMMONLY TAKEN FOR SPORT AND FOOD OR FUR (15): Fox, otter, mink, coyote, beaver, deer, turkey, raccoon, gray squirrel, wild hog, bear, bobcat, rabbit, opossum, trout.

MOST COMMONLY SEEN IN CADES COVE (11): Deer, turkey, raccoon, gray squirrel, groundhog, bear, horse, vulture, skunk, cattle, other birds.

PREDATORY (17): Fox, otter, mink, lizard, eagle, coyote, bat, raccoon, hawk, rattlesnake, copperhead, weasel, bobcat, non-poisonous snake, trout, owl, frog/toad.

"PESTY" (11): Fox, mink, coyote, bat, beaver, rattlesnake, copperhead, weasel, groundhog, wild hog, non-poisonous snake.

DOMESTIC (2): Horse, cattle.

COMMONLY FEARED (7): Bat, rattlesnake, copperhead, bear, non-poisonous snake, skunk, coyote.

APPENDIX I

ATTITUDE INDICES

Attitude Indices

Marker (3 variables; alpha = 0.752): Questionnaire items 37, 38, and 39.

Wild Species Reintroduction (6 variables; alpha = 0.769): Questionnaire items 26a, 26b, 26c, 26d, 26f, and 26g.

Predator Reintroduction (4 variables; alpha = 0.759): Questionnaire items 26a, 26b, 26f, 26g.

Lion and Wolf Reintroduction (2 variables; alpha = 0.788): Questionnaire items 26a, 26g.

APPENDIX J

BACKGROUND FACTORS AND PREDATOR REINTRODUCTIONS

Table 30. Relationship of attitudes toward reintroducing predators and significantly influencing background factors of Cades Cove visitors, GSMNP, 1983.

Factors	Mean[1]
Previous trips to Cades Cove	
None	10.61
1-10	10.44
10 +	11.74
Hunting status	
Hunter	10.81
Nonhunter	11.32
Former hunter	9.92
Age	
< 30	10.43
30-39	10.53
40-49	10.72
50 +	12.32
Education	
< High school	11.60
High, technical, and/or vocational school	11.35
College work or degree	10.57
Graduate work or degree	9.69

[1] 1.0 represents the most positive attitude score on a scale of 1.0 - 20.0.

APPENDIX K

KNOWLEDGE INDICES

Knowledge Indices

Bear (3 variables; alpha = 0.403): Questionnaire items 28, 29, and 30.

Bear Management (5 variables; alpha = 0.461): Questionnaire items 24a, 24b, 24c, 24d, and 24e.

Bear and Bear Management (8 variables; alpha = 0.510): Questionnaire items 24a, 24b, 24c, 24d, 24e, 28, 29, and 30.

General Wildlife (9 variables; alpha = 0.555): Interview Q. #4; Questionnaire items 25b, 25f, 28, 29, 30, 31, 32, and 36.

Wildlife Management (11 variables; alpha = 0.591): Questionnaire items 22a, 22b, 22c, 22d, 24a, 24b, 24c, 24d, 24e, 27, and 34.

Wildlife and Wildlife Management (20 variables; alpha = 0.697): Interview Q. #4; Questionnaire items 22a, 22b, 22c, 22d, 24a, 24b, 24c, 24d, 24e, 25b, 28, 29, 30, 31, 32, 34, and 36.

APPENDIX L

ADDITIONAL KNOWLEDGE TABLES

Table 31. Visitor estimates of the number of bears living in Great Smoky Mountains National Park, 1983.

Number of bears	Percentage of respondents (n = 338)
None	0.3
50-200	21.9
400-600	29.0
More than 800	4.7
Don't know	44.1

Table 32. Visitor estimates of the number of cattle killed each year by bears in Cades Cove, GSMNP.

Number of cattle killed	Percentage of respondents (n = 340)
None	22.3
1-10	17.1
11-50	2.1
More than 50	0
Don't know	58.5

Table 33. Visitor estimates of the number of deer living in Cades Cove, GSMNP, in mid-summer, 1983.

Number of deer	Percentage of respondents (n = 339)
None	0
1-50	4.7
51-200	15.6
201-500	37.5
More than 800	8.9
Don't know	33.3

APPENDIX M

RESPONSES TO QUESTIONNAIRE ITEM #40

Table 34. Types of questions asked by Cades Cove visitors, GSMNP, 1983 (Q # 40).

Type of Question	n	%
How many?	48	8.6
What kind of / How many species?	45	8.1
Are there _____ in the area?	23	4.1
Species reintroduction and introduction questions.	23	4.1
Why didn't we see / hear more (non-ursine) wildlife?	23	4.1
Where can we see _____?	20	3.6
Why aren't there more bears?	20	3.6
Danger to humans (e.g. interactions, poisonous snakes)?	20	3.6
I & E questions.	20	3.6
Are wildlife artificially fed?	18	3.2
When can _____ be seen?	17	3.1
Native wildlife questions.	16	2.9
Hunting questions.	14	2.5
Poaching questions.	14	2.5
Disease and other veterinary questions.	11	2.0
How many cows are killed by bears? (And other farming-wildlife interaction questions).	11	2.0
Questions on interactions between different wildlife species (including competition).	9	1.6
Wildlife research questions.	9	1.6
What habits does _____ have?	7	1.3
How long do _____ live?	3	.5
Additional management questions (e.g. enforcement, policy, etc.).	92	16.6
Additional natural history and behavior questions.	33	5.9
Additional ecology questions (e.g. habitat).	29	5.2
Additional wildlife population questions.	20	3.6
Other wildlife-related questions.	10	1.8
Total	555	99.7[a]

[a] Total percentage is not equal to 100 due to rounding error.

VITA

Bruce C. Hastings was born in Siloam Springs, Arkansas, on July 31, 1953. He graduated from North Hall High School in Gainesville, Georgia, in 1971. In 1973, he completed the requirements for the Associate degree at Gainesville Junior College and then entered North Georgia College, Dahlonega, Georgia. He graduated Cum Laude with a Bachelor of Science in Chemistry and a minor in Biology in 1975. The following year, he completed a second major in Psychology, entered the Experimental Psychology program at Utah State University, and married Nancy K. Evanoff. In summer of 1977, he transferred to the Wildlife Science Department at Utah State and began his Master's thesis on human-bear interactions in the backcountry of Yosemite National Park. Prior to receiving his Master of Science degree in 1982, he moved to Knoxville, Tennessee, (fall of 1980) to investigate the ecology and behavior of problem bears in the backcountry of Great Smoky Mountains National Park. In spring of 1983, he began this dissertation and received the Doctorate of Philosophy degree in August 1986.