PARTICIPATORY PLANNING FOR RECREATION MANAGEMENT IN ABACO NATIONAL PARK, BAHAMAS

By

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This study involved key stakeholders in recreation management planning for Abaco National Park under the auspices of the Bahamas National Trust. Data were collected using two methods – a stakeholder analysis and personal interviews. For the stakeholder analysis, meetings were conducted with six stakeholder groups: hunters, tourism industry representatives, teachers, business leaders, local community members, and environmentalists. Each meeting involved group members in developing a vision statement for the park and in participatory mapping to spatially identify current and desired future uses of the park. Spatial information was entered into ArcGIS software for analysis of trends and overlap among recreation activities and between recreation activities and nesting sites of an endangered parrot (*Amazona leucocephala bahamensis*). Subsequently, we conducted 31 interviews with a key stakeholder group, hunters, to incorporate data on their current uses of the park, levels of satisfaction, and opinions about future management.

Results from the stakeholder analysis show that birdwatchers and other non-consumptive recreationists use areas along the main road and coastline of the park most often. In contrast, hunting occurs to a greater extent throughout the interior of the park. Each stakeholder group varied in its priorities for future land use planning of the park; however, all groups allocated park area for ecotourism and infrastructure development. Overlap existed among recreational uses and between recreation and parrot nesting sites, indicating that spatial and/or temporal zoning may be necessary to reduce potential conflict.

Consistent with other studies employing the multiple-satisfactions model of hunting, we found that participants are motivated primarily by nonharvest-based factors. Among 19 potential components of hunting satisfaction, respondents rated hunting with a dog, seeing game animals, getting outdoors, and excitement as their top four motivations. However, a regression model showed that seeing wildlife was the only significant predictor of overall satisfaction. Harvest success was not related to overall satisfaction. We also found that hunters were in favor of a variety of management activities. In particular, they recognized the importance of protecting the park ecosystem and are willing to accept management actions that place additional regulations on hunting.

When combined together, we found that conducting a stakeholder analysis in conjunction with personal interviews provides complementary sociological information valuable for park planning.

CHAPTER 1
INTRODUCTION

Abaco National Park was established in 1994 to protect the endangered Bahama parrot (*Amazona leucocephala bahamensis*) and its diminishing pine forest habitat. To date, little infrastructure or management has been developed for the park. The park incorporates a variety of objectives in addition to parrot protection including opportunities for research, recreation, education, and hunting. Long-term achievement of these objectives ultimately will rely on proper management. Prior to the 1970s, park regulations often were determined by park managers (Oh et al. 2005). Today, however, the importance of incorporating public participation as a way of gaining input and support for management initiatives is well documented (Ball 2002; Zurayk et al. 2003).

A variety of different methods exist for involving the public in protected area planning and management. These methods range from surveys and interviews to public meetings, citizen advisory committees, stakeholder analyses, and collaborative efforts (Grimble & Chan 1995; Jacobson 1999; Smith 2003). Although all of these techniques involve public participation, each requires differing amounts of resources and yields unique information. For this study, we combined a stakeholder analysis with interviews with a key stakeholder group.

Stakeholder analyses have been championed for investigating and seeking compromises between different stakeholders who affect or are affected by a management policy or action (Grimble & Chan 1995). In natural resource management, the method has proved successful in understanding conflicts, compatibility, and trade-offs in order to

develop appropriate policy. In addition to conducting a stakeholder analysis, we interviewed local hunters, a large, traditional user group of the park. As a key stakeholder group, hunters' support of park management activities is uncertain but vital to ensuring the area's long-term success. In both methods, we integrated a participatory mapping component. Participatory mapping has been used across disciplines, but has been particularly useful in recreation planning to understand the space utilization of an area by various user groups in order to appropriately direct management efforts (Kliskey 1994; Wing & Johnson 2001; Wing & Shelby 1999).

This study demonstrates the use of participatory methods to obtain the necessary sociological information to make recommendations for a recreation management plan for Abaco National Park. In chapter two, we detail our use of a stakeholder analysis for recreation planning while chapter three focuses on interviews conducted with local hunters. Although each chapter has its own specific objectives, ultimately our goals included (1) identifying stakeholder needs and desires as well as their compatibility with parrot resource needs, and (2) testing the techniques of a stakeholder analysis and interviews for supporting local participation in the park planning process.

CHAPTER 2
USE OF A STAKEHOLDER ANALYSIS IN RECREATION PLANNING

Introduction

Rationale

Natural resource management lies at the confluence of the social, physical and natural environment (Harris et al. 1995). However, in many instances appropriate sociological information has not been collected or incorporated in natural resource planning and management projects. Frequently, this information is regarded as an "add-on" instead of a fundamental component. Human communities that border natural areas, such as national parks, often have historic and significant relationships with those areas (Trakolis 2001). They may depend on the resources of these areas for subsistence, cultural identity, or physical and emotional well-being. Too often, however, the relationships between local communities and protected areas have been ignored and management decisions made without their consideration (Michaelidou et al. 2002). Where this has occurred, inappropriate decisions, displeased communities, and local hostility often prevail. Because protected areas cannot co-exist with neighboring communities that are hostile to them (Trakolis 2001), understanding individual and community needs and desires as they relate to these areas is critical to ensuring an area's long-term success.

With a growing number of local users and the desire to attract more tourists, recreation management in Abaco National Park is essential. Of primary importance is maintaining the quality of the Caribbean pine forest and endangered Bahama parrot

(*Amazona leucocephala bahamensis*) while accommodating the needs of a growing recreational population. Currently, little is known about the various people who use Abaco National Park. Therefore, if an appropriate recreation management plan is to be developed, the characteristics and spatial patterns of a variety of user groups need to be explored. Additionally, investigation into the desires of different stakeholder groups for the future management of Abaco National Park is essential.

Objectives

This study demonstrates the use of participatory methods to obtain the necessary sociological information to make recommendations for a recreation management plan for Abaco National Park, Bahamas. The specific objectives are to:

1. Develop a vision statement for Abaco National Park;
2. Examine levels of participation in and spatial patterns of recreation in the park;
3. Examine stakeholder groups' desired future uses of the park;
4. Identify areas of potential conflict between recreational activities and assess recreational compatibility with parrot resource needs; and
5. Generate recommendations for future management of Abaco National Park.

Background

Local Participation in Protected Area Planning

The first efforts to incorporate humans into protected area planning involved an assessment of what people 'need' by managers and the assimilation of these 'needs' into management decisions (Michaelidou et al. 2002). However, several studies have shown that resource managers possess different perceptions than their stakeholders and have difficulties predicting stakeholders' perceptions and preferences (Absher et al. 1988). In

response to this deficiency, new methods arose, which furthered the integration of human needs into natural resource management.

In recognition of the intimate relationship between man and the environment, the National Environmental Policy Act (NEPA) was passed in 1969 along with other similar initiatives, which mandated public agencies incorporate public opinion into land management decisions. Since then, the theory of incorporating greater stakeholder participation throughout the planning process has progressed, and is now proposed as an alternative for natural resource management (Zurayk et al. 2003). Participatory research seeks to directly involve local people in research so they can become partners in the design of management initiatives from the onset. A variety of methods exist to achieve local involvement; they range from public surveys to citizen advisory committees, stakeholder analyses, and collaborative efforts (Grimble & Chan 1995; Jacobson 1999; Smith 2003; Steiner 1991).

Although participatory research is inherently more complicated, it has several benefits. Unlike earlier techniques, participatory research recognizes that people are capable of identifying and expressing their needs and aspirations themselves (Binns et al. 1997). Additionally, it assumes that local people hold important knowledge that can be accessed through participatory methods and which can complement scientific data (Ball 2002; Zurayk et al. 2003). It is also believed that in order to manage ecosystems in which humans are an important component, we need a better understanding of human behavior, which can be solicited through participatory methods (Younge & Fowkes 2003). Another assumption is that participation leads to more successful outcomes because of increased partnerships and dialogue among stakeholders (Zurayk et al. 2003)

and the fact that people are genuinely concerned about the outcome (Smith 2003) and have a sense of ownership in the final decision or product. Therefore, public participation is thought to ensure cooperation and support for management decisions and be a vital component in developing long-term viable land management strategies (Ball 2002).

Although participatory methods are generally regarded as an improvement over traditional methods, several factors constrain efforts to involve local people in the management of natural resources. In many cases the largest limitation is the lack of overlap between project and community interests (Brandon & Wells 1992). In other words, what the project considers as problems and priorities for the area may not be of interest to local communities. Instead, the community may define a set of needs that conflict with conservation objectives. When the goal of the project is community empowerment over resources, the differences between project and local ambitions can result in communities making decisions that counter conservation objectives (Brandon & Wells 1992). Therefore, many participatory approaches, such as integrated conservation and development projects (ICDP), have drawn criticism from conservation biologists for failing to ensure adequate protection of biodiversity (Browder 2002).

Another constraint of local involvement is that it is often difficult to ensure the participation of all affecting or affected actors in the system. In many situations, people are reluctant to participate in projects due to raised expectations that are not met, greater costs than benefits associated with the program, and a lack of trust (Songorwa 1999). In other cases, decisions may benefit one group and meet conservation objectives, but harm another group. These divisions are often based on class, ethnicity, and gender and may

lead to hostility toward the project (Brandon & Wells 1992). Finally, even in locations where participatory approaches appear to have been successfully implemented, respondents typically do not have a particularly favorable perception of the program (Mehta & Kellert 1998).

Despite these potential pitfalls, participatory methods nevertheless show promise in achieving socially-acceptable natural resource management and protection. The concept remains strong; however, the methods must advance in order to meet the full potential of participatory projects.

Stakeholder Analysis

Although participatory approaches have made advances in developing strategies for community involvement, they do not necessarily give insight into understanding and dealing with potential conflict (Grimble & Wellard 1997). Simply increasing the participation of supporters of a project alone will not guarantee that the effort will be successful. Rather the interests of a range of stakeholders who affect or are affected by the policy or project must be investigated and compromises sought between potential conflicting interests (Grimble & Chan 1995).

Stakeholder analysis (SA) is "an approach and procedure for gaining an understanding of a system by means of identifying the key actors or stakeholders in the system, and assessing their respective interest in that system" (Grimble & Chan 1995, p.114). Here, stakeholders are defined as "any group of people, organized or unorganized, who share a common interest or stake in a particular issue or system" (Grimble & Wellard 1997, p.175). Any management policy will have consequences that affect various groups and individuals differently. Therefore, to better assess the policy, we must identify the possible effects on and likely responses of different groups and

individuals. SA attempts to provide a methodology for the accomplishment of this objective by identifying the different consequences for stakeholder groups due to a particular management action. Ultimately, the objective is development of management policies that best suit society as a whole (Grimble & Wellard 1997).

Although SA emerged in the field of business management, it has been increasingly applied to natural resource management. SA was first proposed in natural resource management on the basis of the weaknesses of conventional methods in the field for dealing with stakeholder interests in policy and project design (Grimble & Chan 1995). It was further supported by the fact that natural resource management situations, in particular, require an understanding of conflicts, compatibility, and trade-offs in order to develop appropriate policy. Typically these situations have been described as a "web" of interests, trade-offs, and interactions between locals, government departments, planners, and consultants (Grimble & Quan 1993). They are further characterized by multiple users, unclear or open access property rights, temporal trade-offs, the presence of externalities, imperfect markets, and geographically widespread problems or issues that traverse social, economic and political institutions (Grimble & Chan 1995; Grimble & Wellard 1997). All of these characteristics make the development of appropriate and equitable policy difficult. However, application of SA can assist in these complex cases by getting to the core of an issue and understanding the conflicts of interest that may preempt the success of a project (Grimble & Chan 1995).

Planning for Multiple Use Areas

The majority of protected areas are managed for multiple uses (Wing and Johnson 2001). Thus, they can have many management objectives including biodiversity conservation, outdoor recreation, tourism, sustainable forestry, hunting, fishing, scientific

research, and environmental education. In many developing countries, neighboring communities rely on the natural resources contained within protected areas to meet basic human needs such as food, fuel, and medicine. Management of these areas can be particularly complex as biodiversity conservation must be compatible with providing for human subsistence needs. Recently, the application of participatory research methods in these cases has augmented and proven to be a promising approach to understanding and balancing human needs with conservation.

Participatory research methods also can assist managers in dealing with conflict in areas where local people do not rely on protected areas for subsistence, but rather to meet needs and desires such as physical and emotional well-being. Typically, these needs and desires are achieved through a variety of recreational activities (Driver et al. 1991). Recreation can be either consumptive or non-consumptive. Consumptive users are typically defined as hunters or anglers who actively extract a resource, while non-consumptive recreationists are considered passive users such as wildlife-watchers and hikers (Duffas & Dearden 1990; Kellert & Brown 1985; Vaske et al. 1982). Although consumptive recreation is typically considered more damaging, over-use by non-consumptive users may be equally or more harmful to the environment (Jelinski et al. 2002). It is commonly believed that the observation of wildlife is harmless, however increasing evidence supports the belief that wildlife viewing can have negative impacts on wildlife including behavioral and physiological stress (Jelinski et al. 2002), decreased reproductive success (Miller & Hobbs 2000), and reduced fitness (Taylor & Knight 2003).

Combining both consumptive and non-consumptive recreation in the same area is generally believed to create more conflict than if the area is only managed for a single type of recreation. According to Jaakson (1988, p.96), "freedom is a central tenet in recreation." Where different users must share the same area, freedom may be compromised, resulting in diminished recreational satisfaction. In particular, consumptive recreation, such as hunting, is thought to reduce the opportunity for safe and satisfying activities by other recreationists.

When a combination of many different recreational uses occurs in the same area, balancing the distribution of these uses can pose considerable challenges for managers and planners. Often these challenges arise when the goals and desires of user groups conflict, creating situations that may compromise resource use for all groups (Wing & Johnson 2001). Management to alleviate or avoid such conflicts requires a large amount of information such as the number and composition of visitors, demands of different user groups, and potential for conflict between different user groups (Dagmar & Becker 2002). However, in many cases this type of sociological information is missing.

Surveys of users provide important information for planners to match park space to local needs and accommodate a growing number of user groups (Hall & Page 2002). Where user needs go unrecognized in the decision-making process, "there is a very real danger that planning will be inefficient, ineffective, and perhaps even misguided" (Jenkins & Walmsley 1993, p.235). As recommended by Moore and Graefe (1994, p.18), "an understanding of how recreationists perceive, choose, and relate to various settings is essential for researchers attempting to understand recreation behavior and managers attempting to provide opportunities for satisfying recreation experiences."

Therefore, sociological assessments are becoming more common as managers seek to understand public and visitor attitudes, preferences, and behaviors (Flood & McCarville 1999).

Incorporating a Spatial Dimension in Recreation Planning

Although the incorporation of sociological information is becoming standard in recreation planning, few have addressed the spatial dimensions of recreation. Just as wildlife do not use the landscape homogeneously, neither do people. Because of the heterogeneous nature of ecosystems, people often cluster their activities based on specific environmental features (Holling 1992). Knowing the spatial distribution of activities and uses is therefore essential when planning for recreation.

Many studies have noted the benefit of collecting and analyzing spatial user information (Heatwole & West 1982; Wing & Johnson 2001; Wing & Shelby 1999). Especially in situations where conflict ensues, mitigation requires an understanding of the time and space utilization of the area by various user groups (Heatwole & West 1982). For example, in protected areas where timber production occurs alongside recreation, management activities such as road closures and harvesting can impact recreation conditions and availability (Brunson & Shelby 1992; Vining et al. 1984). However, if planners knew which roads and trails were most frequented by recreationists, they could avoid potential conflicts (Wing & Shelby 1999). Management that uses zoning to alleviate conflicting uses also requires a knowledge of how and where areas are used to realize this goal (Heatwole & West 1982). Therefore, considering visitor preferences and travel patterns in the planning process can reduce discord between resource users in a variety of different ways (Wing & Johnson 2001). It is also suggested that knowing what

areas are used by which user groups can help direct management efforts (Wing & Shelby 1999).

One significant technological innovation that currently exists to help planners incorporate social aspects of land use into planning is Geographic Information Systems (GIS) (Hall & Page 2002). With the use of GIS software, human behavior can now be described spatially and incorporated into recreation management (Wing & Shelby 1999). One study used GIS to compare models of recreation use patterns and visibility in a forest to determine the scheduling of harvest operations (Wing & Johnson 2001). In a similar study, the results from a recreational trail use survey were combined with maps of potential mountain sheep habitat in a GIS system to determine locations where users may be encroaching on the sheep (Harris et al. 1995). Another study used surveys of visitors to determine geographical variation in wilderness perceptions (Kliskey 1994). Before spatial use patterns can be assimilated into planning and into a GIS database, methods must exist to obtain this information. Common methods have been aerial surveys, analyses of digital photography, and movie cameras (Jaakson 1988). However, none of these methods incorporate public participation.

Participatory Mapping in Recreation Planning

An emerging method of research in recreation management that not only seeks to understand the spatial relationships between people and their environment but also directly involves people in the planning process is participatory mapping. In simple terms, participatory mapping is a method that elicits the relationships between people and their environment by involving community members in drawing maps of their surroundings (Knapp & Herlihy 2001). The foundation for participatory mapping was laid in a seminal study by Lynch (1960) in which he asked a small sample of people in

Jersey City, Boston, and Los Angeles to draw freehand sketch maps of their cities. Results from the exercise helped demonstrate the ability of sketch maps to reveal information about how people perceive their city of residence. Since then, the method has been applied across a wide range of disciplines including urban planning, anthropology, psychology, and agriculture. Recently, tourism and recreation planners have found utility in the method (Kliskey 1994; Wing & Johnson 2001; Wing & Shelby 1999).

From experience, it is known that each person perceives the world very differently than how it exists in reality. According to Walmsley and Jenkins (1992, p.269), "the real world is too big and too complex for people to know it completely." Therefore, people are thought to reduce this complexity by subjectively acquiring, storing, and manipulating information about the environment (Jenkins & Walmsley 1993; Walmsley & Jenkins 1992). Because information is sought in a subjective and purposeful way, each individual's simplification of the real world reflects his or her needs and values (Walmsley & Jenkins 1992).

The simplified images that people construct are known as environmental images, cognitive images, cognitive maps, or mental maps. Simply put, these maps are a summary of an individual's knowledge, preferences, and evaluations of the environment (Walmsley & Jenkins 1992). These mental maps in turn have a significant effect on people's behavior, beliefs, and attitudes regarding places (Jacob & Luloff 1995). For example, recreational day trip behavior is assumed to be dependent upon the cognitive map people form of their spatial environment (Aldskogius 1977). Therefore, a study of recreationists' cognitive maps may lead to a better understanding of day trip behavior and

aid in marketing recreation opportunities of which visitors are unaware (Aldskogius 1977). It is therefore maintained, that in tourism and recreation planning, we need to understand the cognitive maps of those for whom we are planning (Jenkins & Walmsley 1993).

Numerous methods exist to explore an individual's cognitive map. However, as cognitive maps are internal representations, an external form must be obtained to be examined. This external form can be elicited through a variety of participatory mapping techniques. By far the most popular of the techniques involves individuals drawing sketch maps of an area. A criticism of this methodology, however, is that respondents have a broad range of artistic abilities and so the sketch map may not accurately represent the internal cognitive map (Jacob & Luloff 1995). An alternative is to provide participants with a base map consisting of minimal spatial references. A base map reduces the effect of the individual's artistic ability on the representation of his or her cognitive map and provides a structure for the participant's response, thereby making the results more comparable for analysis (Jacob & Luloff 1995). Unfortunately, regardless of the technique used, researchers have no way of knowing how well each map represents an individual's cognitive map. However, an abundance of research supports that these maps do provide important insights into how people acquire environmental knowledge (Downs & Stea 1977).

Methods

Study Site

The area for this study was Abaco National Park on Abaco Island in the Bahamas (Figure 2-1). Abaco National Park encompasses 8,300 hectares of Caribbean pine (*Pinus caribaea)* forest in the southern quarter of the island. The area was first proposed as a

national park in 1983, and established in 1994. The primary reason for establishment was to protect the habitat and breeding area of the endangered Bahama parrot (*Amazona leucocephala bahamensis*) (Jacobson et al. 2005). The Bahama parrot was originally found throughout the Bahamas in large quantities. However, today the parrots are found only on Abaco and Great Inagua islands, numbering less than 3,000. Abaco National Park is of particular importance as it is believed to support a third of the surviving Bahama parrot population.

Abaco Island has a population of approximately 14,000 people. Historically, many residents visited Abaco National Park to hunt wild boar (*Sus scrofa*), duck (e.g. *Anas dicors*), dove (*Streptopelia decaoctu, Zenaida macroura, Zenaida aurita*), and white-crowed pigeon (*Columba leucocephala*). However, in recent years it also has become a popular area for recreation such as birdwatching, hiking, exploring for caves and blue holes, and picnicking. Additionally, many people drive through the park on their way to the southern coast of Abaco Island, to an area called Hole in the Wall, where there is a historic lighthouse. New teacher training, which aims to help teachers bring their classes to the park, also has led to increased interest in the park as a site for environmental education.

Currently, the majority of visitors to the park arrive from the neighboring towns of Marsh Harbour, Cherokee, Sandy Point, and Crossing Rocks. Although tourism to Abaco Island is a large industry, Abaco National Park is not a heavily used tourist destination. To date, there has been only minimal marketing of the park. This, in addition to the poor quality of roads to and within the park coupled with a lack of facilities, inhibit many tourists from visiting the park. However, the opportunity to view

the unique parrots in addition to other Caribbean birds and migrants continues to draw more birders to the park each year. Additionally, the establishment of a new ferry service to Sandy Point (the closest town to Abaco National Park) from Nassau may increase visitation and the need for better management.

Research is another activity conducted in the park. Current scientific research in Abaco National Park includes mapping the vegetation of the park, understanding the ecology of the Bahama parrot population, identifying the impacts of raccoons and feral cats on Bahama parrots, and studying the fire ecology of the park.

Hunting, recreation, research, and parrot protection each make demands on resources within the forest, and their co-existence creates the potential for conflict. Moreover, although Abaco National Park was established in 1994, it does not currently have a recreation or management plan. The Bahamas National Trust (BNT) is the non-governmental agency that oversees the 25 protected areas in the Bahamas. However, a lack of resources has made adequate management of Abaco National Park challenging.

Stakeholder Analysis

This study was executed in collaboration with the Bahamas National Trust. During January of 2004, stakeholder meetings about Abaco National Park were conducted in Marsh Harbour, Abaco. A stakeholder analysis was chosen as the method of study because researchers were interested in assessing the interests and potential conflicts of key stakeholder groups that may respond differently to policy changes of Abaco National Park. In this study, stakeholders were characterized as residents with a strong relationship with Abaco National Park, and were concerned about or affected by its management. The stakeholder groups in this study were identified from a previous study

that used a stakeholder analysis to develop educational materials for the park (Jacobson et al. 2005). The six stakeholder groups included:

- *Hunters* – a group with a long history of hunting in the park and who may have strong opinions on its future management
- *Tourism agency representatives* – includes people who provide services that take tourists to the park or indirectly benefit from tourism to the park and therefore, may be affected by changes to park management
- *Teachers* - a group that may be interested in using the park as an educational resource for their students
- *Neighboring community members* – includes locals from the town of Sandy Point who may enjoy recreational activities in the park and could be influenced by future park decisions
- *Business leaders* – a group that indirectly benefits from tourism to the park and may be affected by changes to its management
- *Environmentalists* – primarily members of Friends of the Environment-Abaco who have previously expressed strong opinions on maintaining the ecological integrity of the park

Stakeholder meetings were conducted with each of the six stakeholder groups. An initial meeting was held with the collaboration of the Friends of Environment – Abaco, with members from all key stakeholder groups in October 2002 to develop park interpretation materials. Representatives of each group were contacted again in 2003 and asked to invite 8-10 members of their stakeholder group to a meeting scheduled for the beginning of January 2004. The meetings were arranged with the help of Friends of the Environment – Abaco and the Abaco Chamber of Commerce. Each group meeting took from 1.5-2 hours. The group meetings were conducted at several locations. Most meetings were held in the conference room of the Ministry of Tourism office. Due to a night-time meeting schedule, the hunter group met at the courthouse and the neighboring

Sandy Point community met at a local restaurant. Refreshments, but no compensation, were provided to participants.

Each stakeholder meeting followed the same format. First, facilitators introduced the purpose of the meeting: A process to seek input from Abaco Stakeholders regarding a vision statement for Abaco National Park, to assess current uses of the park and examine stakeholders' desires for the future of the park. Following this introduction, meetings were divided into four parts: (1) a visioning exercise (15 minutes); (2) an individual mapping exercise (25 minutes); (3) a group mapping exercise (30 minutes); and (4) a follow-up group discussion (20 minutes).

In part 1, we asked participants to think of key words, ideas, and phrases that they would like included in the vision statement for Abaco National Park. Participants were given five minutes to silently write ideas on a pad of paper before sharing. Ideas were shared in a round-robin fashion and recorded on wall charts.

Participatory mapping played a primary role in the meetings. In part 2, a 27 by 43 centimeter topographical map of Abaco National Park was distributed to each participant. Each person was then asked to outline areas in the park they use for different activities. Participants were provided with different colored pencils and asked to use a unique colored pencil for each different activity in which they participated in the park. Additionally, each respondent was asked to complete a short questionnaire for each activity they practiced in the park (Appendix A). Questions focused on the type of activity, frequency of use, and seasonality of use. Information obtained in the questionnaire helped to further qualify and quantify recreational uses of the park.

In the group mapping exercise, a large (61 by 127 centimeter) topographic map was laid on the table between participants. Participants were then asked to discuss and decide upon how they would zone activities in Abaco National Park for the future. Participants could select from five general activity zones (hunting, ecotourism, interpretive center/infrastructure, protection, research) and could add additional zones that they felt were necessary. To visually show how they would zone activities in the park, participants glued 4 centimeter colored squares (which each represented one of the 5 pre-determined zones) onto the large map where they felt that activity zone would be appropriate (Figure 2-2). A total of 107 squares could fit within the park boundary.

The meeting concluded with a follow-up discussion where participants conversed about the activities and management that should take place in each of the zones they included on their group map. Ideas generated for each activity zone were recorded on wall charts.

Data Analysis

Basic user characteristics were entered into an Excel worksheet for descriptive analysis. To analyze data from the individual and group mapping activities we used ArcGIS software. In both cases, a one-by-one kilometer grid system, based on that of the topographic base map, was used as the unit of analysis. Each grid cell on the base map was digitized and given a unique code number. The collection of all grid cells within the park was then saved as a shapefile. For the individual mapping exercise, presence or absence of an activity within each grid cell for each respondent was entered into an Excel spreadsheet using zero and one. Similarly, for the group mapping exercise, presence or absence of each activity zone within each grid cell for each stakeholder group was entered into an Excel spreadsheet using zero and one. The table-based Excel

spreadsheets were then 'joined' to the digitized grid system. Using the Spatial Analyst function, we were able to obtain the overall spatial distribution of each activity conducted in the park, including the intensity in which it is conducted. We then separated the spatial distribution of each activity by stakeholder group in order to compare stakeholder groups' activity patterns. Finally, we created a digital map of each stakeholder groups' desired future distribution of activity zones in Abaco National Park.

Examining the potential for conflict between hunting and the variety of non-consumptive uses in the park was also of great interest. Increasing numbers of non-consumptive recreationists may increase the number of encounters with hunters. These encounters may create an unsafe situation if hunters are not properly trained in hunter safety. Therefore, to identify "hot-spots" of potential conflict, we used overlays of high use hunting areas on popular non-consumptive activities such as birdwatching and other ecotourism activities.

Similarly, to determine compatibility between recreational uses and important ecological areas for parrots, we incorporated spatial data on Bahama parrot nesting sites (Stahala 2005). Parrot nesting was defined by Stahala (2005) as high versus comparatively low or peripheral nesting activity.

Results

A total of 35 people participated in the stakeholder meetings including six hunters, six environmental group members, eight teachers, four business community members, seven neighboring community members from the town of Sandy Point, and four tourism industry representatives. Characteristics and trends of all participants collectively were analyzed as well as each stakeholder group individually for comparison.

Of the 35 participants, the majority (69%) were male and of Bahamian nationality (72%). Other nationalities included American (14%), Canadian (11%), and Guyanese (3%). The average age of participants was 47 years old and the average number of years a participant had lived on Abaco Island was 22 years.

Vision Statement

The 35 participants listed 48 different words, ideas, and phrases they wanted to include in the vision statement for Abaco National Park. These 48 ideas could be grouped into nine major themes (Table 2-1). The top three ideas mentioned were ecosystem protection/restoration (15 times), quality management (12 times), and low impact visitation to enjoy nature (11 times). A full listing of ideas can be found in Appendix B.

When separated based on stakeholder group, we found that every group mentioned ecosystem protection/restoration and quality management at least once (Figure 2-3). Additionally, five out of the six stakeholder groups agreed that low impact visitation to enjoy nature and protection of parrots/wildlife were important to include in the vision statement for Abaco National Park. Visitor education also was mentioned by the majority of groups, with the teacher group stating ideas related to visitor education most frequently. Community involvement was important to both the business and environmental groups while the business and teacher groups valued student education. The tourism, environmental and Sandy Point groups desired including the development of trails in the park vision statement.

Visitation and Recreation Activities

We found that people were either regular visitors of the park (had visited more than 13 times in the last year) or had visited the park very little or not at all (Figure 2-4).

Analyzing visitation by stakeholder group, we found that the hunter group visited the park most often, followed by the environmental and Sandy Point groups (Figure 2-5). Both the teacher and the business groups had only a few members who visited the park more than four times a year. The tourism group was split between people who had never been to the park and those who visited regularly (>13 times/year).

Collectively, participants identified 13 different activities they conducted in Abaco National Park. More than half of the participants (54%) indicated they birdwatched or went to see the Bahama parrot, while 22% hiked, 20% drove the road through the park to access Hole in the Wall (not within the park boundaries), 17% hunted, and 11% explored (Figure 2-6). Frequency of activities differed slightly with people participating in birdwatching the most number of days per year (9), followed by hunting (4.68), hiking (2), exploration (1.76), and driving (1.53) (Figure 2-7).

To facilitate analysis, the 13 park uses were classified into seven categories. Birdwatching, hunting, fishing, camping, and access to the eastern coast of the island/ocean served as their own category. A category labeled "ecotourism" encompassed hiking, exploration, caving and enjoying nature. Birdwatching was separated from the "ecotourism" category because birdwatchers who actively seek out birds and their nests may have a greater impact on bird populations, such as the Bahama parrot. A "driving" category included both driving and driving to Hole in the Wall. An "education" category was composed of both student and visitor education.

In examining the total area of the park used for each activity category, we found that both hunting and ecotourism are conducted throughout the entire park area. In other words, each grid cell was marked at least once for that activity. Participants indicated

ninety-three percent of the park area as birdwatching while education and driving were also denoted in more than half of the park area (Table 2-2). However, this may be misleading if only one person marked the majority of the grid cells. Therefore, our next step was to look at the overall number of grid cells marked by all participants for each activity and then calculate a percentage area of the park used per participant per activity. In doing so, we found that although hunting and ecotourism are conducted throughout the entire range of the park, they are not conducted as intensively as birdwatching. Per person, birdwatching covered the largest percent of the park area, followed by hunting, ecotourism, driving, and education (Table 2-3).

When classified by stakeholder group, we found that the total park area labeled for each activity varied by group (Figure 2-8). Spatially, each group also varied in its distribution of activities (Appendix C). Although all groups reported birdwatching, the tourism group used the largest area for birdwatching, followed by the teacher and Sandy Point groups. All groups also participated in ecotourism; however the hunters conducted these activities over larger areas than other groups, followed by the tourism and teacher groups. The business group covered the largest park area for driving. Hunters hunted in the largest area of the park compared to other groups. Fishing and visits to the ocean were split between the teacher and hunter groups while camping was conducted only by two groups, the Sandy Point group and hunter group. Education was conducted only by the teacher group.

Spatial Distribution of Activities

A collective analysis of individual maps by activity revealed several trends. The highest use area for hunting was indicated in a 4 km^2 area located in the south-central portion of the park (Figure 2-9). Although the majority of Abaco National Park is

composed of Caribbean pine, within this 4 km^2 area lays the only wetland in the park. This wetland serves as good habitat for white-crowned pigeons and ducks as well as a water source for wild boar, making it particularly popular area for hunting. Analysis also revealed a segmentation of moderate use of hunting at both the northern and southern extremes of the park. Although the entire park area is used for hunting, use is not common in the central portions of the park or along the coastline.

To analyze non-consumptive activity patterns, we first examined the spatial distribution of all non-consumptive activities together. In doing so, we found that non-consumptive activity is highest along the main road through the park with use decreasing as distance from this road increases (Figure 2-10). Moderate usage also occurs in the northwestern corner of the park and along the coastline.

To further characterize patterns of non-consumptive use of the park, we mapped the spatial distribution of birdwatching, ecotourism, education, driving, access to the ocean, camping, and fishing individually. Although all seven non-consumptive use categories were spatially analyzed, only trends for those with greater than five participants showed clear patterns and are therefore described below. These use categories included birdwatching, ecotourism, and driving.

The spatial distribution of birdwatching is similar to what we found for non-consumptive recreation overall. Results show birdwatching activity is heaviest in the areas surrounding the access points of the park, especially along the main road from the central portion to the southern end of the park (Figure 2-11). From these access points, use intensity decreases proportionally to the distance from the main road. Moderate use for birdwatching also occurs along the coastline.

Ecotourism is heaviest along the coastline of the park (Figure 2-12). A moderate amount of use exists along the main road, especially in the southern quarter of the park. Use for ecotourism is relatively low throughout the interior of the park.

As expected, park use for driving is highest along the main road through the park with use decreasing proportionally to distance from the main road (Figure 2-13). Therefore, most people drive only on the main road, while a few venture onto the smaller, more rugged roads throughout the interior of the park.

Although education is not currently a major use of Abaco National Park, a new environmental education program on Abaco Island aims to help more teachers bring their students to the park. We examined the areas of the park used currently for education, as they may be increasing and becoming more important in the near future. Use of the park for education is highest in the southern quarter of the park, in a 4 km^2 area in the central part of the park in close proximity to the main road, and in a smaller area near the coastline (Figure 2-14).

Overlap Between Hunting and Non-Consumptive Uses

Because at least some level of hunting occurs in all areas throughout Abaco National Park, we looked at the percent of the park area used for each of the non-consumptive activities to examine the overlap between hunting and other uses (Table 2-2). Ecotourism and birdwatching cover 100% and 93% of the total park area respectively; therefore, they may have the greatest potential for conflict with hunting. Education and driving also may be of concern since they both cover a large portion of the park area (79% and 60% respectively). However, conflict is more likely to occur in areas with high concentrations of users.

First, we examined at the overlap between hunting and non-consumptive recreation overall. In this case, we defined a "high concentration" of non-consumptive recreation as an area with 11 or more people per 1 km^2 grid cell. Eleven was chosen as the cut-off between a high and low concentration of users because it was the approximate mean and median of the total number of respondents who conduct non-consumptive activities in each grid cell. A "high concentration" of hunting was defined in areas with greater than four people per 1 km^2 grid cell. Four people provided an appropriate division for hunting, which is conducted by at least three people in every grid cell in the park. Using these criteria, we found that 22% of the grid cells within the park can be considered as having both high concentrations of hunting and high concentrations of non-consumptive recreation activities (Figure 2-15). Spatially, these areas are located in the northwestern corner, southern quarter, and surrounding the wetland located in the south-central portion of the park.

Next, we examined the overlap between hunting and specific non-consumptive activities including birdwatching and ecotourism. In these cases, a "high concentration" of birdwatching was defined as an area with five or more people per 1 km^2 grid cell while a "high concentration" of ecotourism was defined as an area with three of more people per 1 km^2 grid cell. In each case, the criterion was determined based on examining the mean and median of birdwatching and ecotourism activity in each grid cell. Using this criterion and the criterion above for high use hunting areas, we found that 23% of the grid cells within the park area can be considered as having both high concentrations of hunting activity as well as high concentrations of birdwatching activity. Spatially, areas of potential conflict are located predominately at both the northern and southern extremes

of the park, although both birdwatchers and hunters heavily use the 4 km^2 wetland area in the south-central area of the park (Figure 2-16). When looking at potential conflict sites between hunters and ecotourists, 23% of the park area met our criteria. Spatially, these areas are found in the northern corner of the park, surrounding the wetland in the south-central portion of the park, and along the main road and bordering areas of white coppice in the southern quarter of the park (Figure 2-17).

We did not assess the potential for conflict between driving and hunting, as drivers are not likely to get out of their car and therefore, their conflict with hunters would be minimal if at all. Additionally, because student education is not yet a highly used activity in the park, its overlap with hunting was not assessed.

Temporal Distribution of Activities

In analyzing the temporal distribution of activities in Abaco National Park, we found that hunting occurs most frequently during December and January (Figure 2-18). Although wild boar hunting occurs throughout the year, duck, dove, and white-crowned pigeon season is officially designated from 29 September to 1 March.

In general, we found no overall temporal trend among non-consumptive activities in Abaco National Park. Birdwatching occurs most heavily during the months between March and May and in November. This pattern appears to be consistent with the natural occurrence of bird migration from North America to the island during these months. Other ecotourism occurs most frequently early in the season from the months of January through May, while trips to the ocean peak in both May and December. Driving is fairly consistent year round. Fishing, camping, and education, although not depicted in Figure 2-18, are all practiced in low frequency year round.

Group Mapping: Activity Zone Distribution

Data from the group mapping activity showed that each group varied in the amount of area they allocated for each activity zone (Figure 2-19). Tourism industry representatives, teachers, and Sandy Point community members felt that ecotourism should be allocated the most area in Abaco National Park, while hunters felt that hunting should be the priority in the majority of the park. The business and environmental groups were similar in their distribution of activities, with protection covering more than half of the park, followed by ecotourism. All groups agreed that there should be at least a portion of the park prioritized for infrastructure as well as for ecotourism.

Spatially, many of the group maps showed similarities (Figures 2-20 to 2-25). All but the hunter group allocated areas in the northern quarter of the park for protection. Additionally, the teacher group designated protection areas in portions of the central and southern areas in the park while the environmental and business groups were more generous with protection areas, designating them in the northern 50% of the park as well as in large amounts in the southern half of the park. The Sandy Point, teacher, and tourism groups all allocated large amounts of ecotourism in the central park area. The business and hunter groups allocated a smaller area for ecotourism in the central portion of the park while the environmental group designated ecotourism areas in close proximity to current roads. All but the hunter group wanted ecotourism areas designated on the coastal area of the park. The Sandy Point, teacher, environmental, and business groups all allocated portions of the southern half of the park for hunting. Hunters covered 93% of their map with hunting areas while tourism did not allocate any area for hunting. Groups generally designated at least one infrastructure area somewhere along the major

road to the park, while some groups added additional infrastructure areas along the coast (business) or at the southern end of the park (tourism).

To further quantify the compatibility between stakeholder groups on future activity zones, we created a map depicting areas for each activity zone where there was either "some" or "strong" agreement between stakeholder groups (Figure 2-26). "Some" agreement was defined as areas where three to four groups had placed the same activity; "strong" agreement were areas where five to six groups corresponded on the placement of an activity. Further supporting our initial observations, some groups agreed on placing protection areas in the northern quarter of the park, with groups strongly agreeing only on two 1-km^2 areas for protection within this region. Groups either somewhat or strongly agreed on the placement of ecotourism zones throughout the central two-thirds of the park and along the main road through the park. Hunting zones were somewhat agreed upon in a 6 km block in the southern quarter of the park; there were no strongly agreed upon areas for hunting. Only one 1-km^2 cell was somewhat agreed upon for infrastructure, which is located at the most northern intersection where the main road converges with the park boundary.

Next, we combined the stakeholder group compatibility map with the parrot nesting data. In the high parrot nesting site area, there was some to strong agreement on the majority of this area as protection. Ecotourism was also somewhat agreed upon in this area, while a single 1 km^2 area was designated as infrastructure. For areas with additional, but not high, parrot nesting activity, ecotourism was somewhat to strongly agreed upon in the majority of this area. Areas some groups agreed upon for hunting also fell within this area.

Activity Zone Discussion

Stakeholders shared a variety of ideas about the types of management and activities they would include in each of the activity zones they designated on their group map. For sites labeled as infrastructure, the majority of groups wanted a visitor center, souvenir shops, a place to purchase refreshments, and a ranger station with a permanent game warden (Appendix D). Most groups also cited education, in the form of informational literature, an educational video, children's education, a museum, and library as a priority in these areas. Many groups also desired the necessary infrastructure for dealing with larger crowds in these areas, such as parking lots, improved roads, restrooms, rest areas, and first aid.

When discussing what was desired for areas labeled as ecotourism, passive recreation opportunities both on land and water were cited most. The majority of stakeholder groups agreed that birdwatching would be appropriate in these areas. Similarly, all groups desired some type of trail, whether it be a general trail, a hiking trail, biking trail, or interpretive trail for visitors and locals to enjoy. Many groups also wanted opportunities for guided tours as well as established campsites. A few groups desired amenities such as restrooms, picnic areas, rest areas, and trash cans in ecotourism areas.

In the protection zones, almost all stakeholder groups desired some form of active management to regulate and maintain those areas. Most groups wanted posted regulations and enforcement of protection zones. Some groups wanted regulated use of the areas, while other groups felt that hunting certain species during certain times of the year could be permitted in these areas. All but one group (hunters) mentioned research as an important activity to include in protection zones.

Many groups felt that hunting of wild boar, white-crowned pigeon, ducks and teal were appropriate for hunting zones. A few groups desired management in the form of posted regulations and a game warden for hunting areas. Additionally, a few groups felt that non-consumptive activities such as walking, birdwatching, crabbing, and research could occur in these areas.

Although research was introduced as an activity zone unto itself, only one group (teachers) allocated park area specifically for research. Rather, most groups included research as an activity that could occur in all of the zones.

Discussion

Abaco National Park presented an opportunity to involve local people in management and recreation planning from the onset. Including the public in research and decision-making not only helps ensure their support for the final management plan, but also produces important sociological information that is essential to management planning. Particularly in multiple use areas where demands on resources from different user groups present a challenge to managers, knowledge about user groups and support of these groups can help assure the long-term viability of an area.

This study coupled an examination of basic and spatial user characteristics with participatory methods of research. To obtain the necessary sociological information to make recommendations for a park recreation plan, we used a variety of methods including brainstorming of ideas for a vision statement, participatory mapping, and a group discussion. As little information about stakeholders of Abaco National Park currently exists, the immediate issue was to describe park usage and identify potential conflict among recreational activities and between recreation and parrot resource needs. The next step of recreation planning should include further describing a range of

recreation opportunities that can be provided in the park. One method that exists for doing so is the Recreation Opportunity Spectrum (ROS). The ROS planning framework enables the use of information about user desires and behaviors in determining specific types of recreation opportunities to provide (Driver et al. 1987).

Participatory approaches to recreation planning, including stakeholder analysis and participatory mapping, were strongly supported by this study. In particular, these methods assisted in illuminating planning opportunities in three major ways – through identifying commonalities among stakeholder groups, tapping into local knowledge, and recognizing areas of potential conflict.

Commonalities among Stakeholder Groups

Our goal for conducting a visioning exercise with participants was to understand their priorities for Abaco National Park and formulate a single vision statement for the park that stakeholder groups could rally behind and park management could support. Results from the visioning exercise showed that all six stakeholder groups expressed relatively similar ideas that they wanted included in the vision statement. Regardless of group, people wanted ecosystem protection/restoration, quality management, and low impact visitation, revealing that most people place a high emphasis on maintaining the ecological integrity of the park. From the ideas generated by stakeholders, we have drafted a preliminary vision statement that reads as follows:

> "Recreation management in Abaco National Park should protect the park's unique ecosystem, particularly habitat for the Bahama Parrot, while maintaining and improving quality nature-based recreation opportunities that promote appreciation and education of Abaco's natural resources for local residents and visitors."

Future plans include presenting the above vision statement to stakeholders to obtain their feedback and suggestions for a final vision statement for the park. If groups can find

common ground in these ideas and long-terms goals for Abaco National Park, negotiations concerning specific activities and management of the park may be less contentious.

We also found commonalities in the activities conducted by members of different stakeholder groups. Across stakeholder groups, we found that birdwatching is most popular and covers the largest percent of the park area per person. Birdwatching, in addition to other forms of ecotourism including hiking, exploring, and enjoying nature were conducted by members of each stakeholder group. Revealing these commonalities between stakeholder groups further supports the benefits of using a stakeholder analysis. One way results from stakeholder analyses have been used in the past is to prioritize objectives (Grimble & Wellard 1997). In this case, a primary objective may be management that continues to provide opportunities for birdwatching and ecotourism.

Finally, results from the group mapping activity show that there are a number of similarities in stakeholders' desires for future land use planning of the park. All groups agreed that ecotourism zones and infrastructure are necessary. Spatially, we found that at least three groups agreed on the majority of the middle two-thirds of the park as ecotourism. Strong agreement for an ecotourism zone was reached along the middle half of the main road through the park and along the coastline. The agreement of an ecotourism zone along the park's coastline, in particular, corroborates the information we obtained from the individual mapping exercise, which shows that ecotourism is highest along the coastline. Between three and four groups agreed that infrastructure for the park should be located along of the main road just as it converges with the park boundary. When parrot nesting data was overlaid, however, we found that locating the infrastructure

of the park at that particular site may affect parrot nesting. Therefore, it may be necessary to move the site for infrastructure further south where parrot nesting density is lower, but keep it located on the main road for easy access. Anywhere from three-to-six groups agreed that the northern quarter of the park should be zoned as protection. In addition, hunting was most agreed upon in portions of the southern quarter of the park. Although hunting is conducted throughout the entire park, one of its highest use areas is located in the southern quarter of the park. Therefore, this may be an agreeable area for hunting.

The theory that stakeholder analysis can illuminate commonalities was supported by the results of this study. Revealing commonalities may have several benefits to park planning. First, it can help managers in prioritizing objectives for the park. Another important benefit is fostering positive relations between stakeholder groups. When people from different groups can find similarities with one another, they begin to relate and respect each other, even if their interests in a particular area differ. The ultimate result is a greater willingness of different groups to work together and more successful park planning projects.

Tapping into Local Knowledge

Participatory research is based on the assumption that people are capable of identifying and expressing their needs and aspirations themselves (Binns et al. 1997). Additionally, it presumes that local people hold important knowledge that can be accessed through participatory methods and can complement scientific data (Ball 2002; Zurayk et al. 2003). This study provided evidence that local people can provide quick, reliable, and novel information.

Prior to this study, little was known about when, where and how different stakeholders currently use Abaco National Park. Therefore, results from this study provide the first data on recreational use of the park. We also found that stakeholders were highly knowledgeable about the park ecosystem itself. In the group mapping activity, we noticed that most groups knew approximately where parrots are located and designated those areas as protection. When we overlaid ecological data on parrot nesting sites, we found that high density parrot nesting areas corresponded strongly with the protection zones delineated by the stakeholder groups. This provides further support that local people can provide a valuable resource not only in attaining desired social information, but also in their ecological knowledge of natural areas.

Identifying Potential Conflict and Opportunities for Prevention

In multiple use areas where a number of different activities occur simultaneously, there is the potential for conflict. When the goals and desires of user groups conflict, often the result is adversarial situations that may endanger the resource use for all groups (Wing & Johnson 2001). However, if conflict can be predicted, there is a greater chance that it can be mitigated before reaching this point (Wing & Johnson 2001). Integrating participatory mapping with stakeholder analysis allowed us to reveal both areas and times of potential conflict between different user groups. Additionally, we were able to illuminate areas where parrot resource needs may conflict with recreation by overlaying parrot nesting data with our collected social data. Once areas and times of potential conflict were revealed, formulation of prospective trade-offs for management was possible.

In analyzing participants' spatial maps, we found that the highest use areas for birdwatching were centered upon the main road through the park with use decreasing as

distance increased from this road. Thus, it appears that most birdwatchers spend their time driving along the main road, stopping periodically to get out and birdwatch in relatively nearby locations, while only a few people venture further into the interior of the park. We believe this is a factor of access and the quality of roads within the interior of the park, which are rugged and require a four-wheel-drive vehicle. As birdwatching increases in popularity, management to meet these needs will require consideration of creating one or more birdwatching trails. However, as birdwatching has been linked with negative impacts on bird populations (Sekercioglu 2002), trail placement must coincide with sustaining viable populations of Bahama parrots. When we overlaid parrot nesting sites on the birdwatching distribution map, all areas where people birdwatch overlapped parrot nesting sites to some extent. The majority of areas where birdwatching is heaviest overlap with areas where some parrot nesting occurs, although a few sites of heavy birdwatching exist in the high density parrot nesting area. Therefore, to reduce potential conflict between birdwatchers and parrot resource needs, the best places for these trails would be in the southern half of the park where visitors are likely to see parrots, but where parrot nesting sites are less abundant and less likely to be disturbed or abandoned.

Unlike birdwatching, the most popular place for other ecotourism activities is along the coastline of the park. Thus, management to improve ecotourism opportunities could focus on expanding access to these areas and providing hiking trails and sites for exploration and enjoying nature. Because parrot nesting does not occur along the coastline, potential conflict between recreationists and parrot protection in these areas is low. One foreseeable problem, however, is that to provide access to the coastline a road must be constructed through parrot nesting sites. Additional ecological information may

be necessary before decisions can be reached on management for ecotourism along the coastline.

A stakeholder analysis in 2002 regarding environmental education revealed the desire of teachers to take school groups to Abaco National Park (Jacobson et al. 2005). Therefore, while visitation by these groups is currently low, recreation and management planning require consideration of this future user group. From the few groups that have visited Abaco National Park, it appears that the entire park area could be suitable for education. New environmental education materials developed for teachers focus on exploration of the pine forest and the Bahama parrot. Developing sites suitable for school visits could assist teachers and help manage this user group. Subsequently, access would need to be provided to appropriate areas if not currently available. As educational opportunities expand in the park, attention to their potential conflict with other user groups and ecological factors will be necessary.

Hunting is often perceived as an activity that reduces other recreationists' opportunity for safe and satisfying activities (Jaakson 1988). Thus, examining the spatial distribution of hunting within the park and its overlap with non-consumptive uses was critical. As expected, hunting occurs throughout the entire park area. However, areas of high hunting use only overlapped by 22% with non-consumptive activities overall. More specifically, high use hunting areas overlapped by 23% with both high use birdwatching areas and high use ecotourism areas. Knowing where activities overlap can significantly aid planners in mitigating potential conflict. For example, one 4 km^2 block in the central portion of the park appears particularly important for hunting as all of the hunters who participated in this study marked this area for hunting. Therefore, it appears that this area

would be an important area to manage for hunting. Although birdwatching and ecotourism both share an interest in this location, most of the popular sites for these non-consumptive activities fall outside of this area. Therefore, quality opportunities to birdwatch and conduct other ecotourism activities could be provided in other park areas and still have a high likelihood of meeting the needs of these user groups. Another prime hunting area could be designated in the southern quarter of the park where parrot nesting is less abundant than in the north.

Conversely, temporal management may assist in alleviating potential conflict. We found that although hunting, birdwatching, and ecotourism are conducted year-round, they vary in their temporal patterns. Hunting is conducted most intensely during the winter months, while the most popular times for birdwatching and ecotourism are in the spring and early fall. Therefore, potential conflict sites could be managed for hunting during the winter months and for non-consumptive recreation during the spring and early fall.

Presently, these temporal patterns of recreation are largely compatible with sustaining the Bahama parrot population. Parrots breed from May through September, a time when most recreational activities are at their lowest due to high heat, humidity, and an abundance of insects. Birdwatching is of particular concern since it is noted that the high expectations and excessive enthusiasm of many birdwatchers to see or photograph a bird can have harmful consequences (Sekercioglu 2002). Birdwatchers have been linked to greater nest abandonment, increased predation rates, visitor-related pollution, and habitat destruction (Miller & Hobbs 2000; Sekercioglu 2002). In the majority of studies, birds were most sensitive to disturbance during the breeding period (Gotmark 1992;

Knight & Cole 1995). Therefore, it has been suggested that birdwatching be minimized around nests and young, which can be deserted as the result of disturbance generated by just one person (Larson 1995). In Abaco National Park, high density parrot nesting areas may be managed best by limiting access during the parrot breeding season and monitoring the impacts on parrots by birdwatchers during other times of the year. Encouragement and/or regulation of visitors to birdwatch with a guide may also be preferable as guides can help minimize disturbance of birds by birdwatchers if appropriately trained (Sekercioglu 2002).

Recommendations

One of our objectives for this study was to generate recommendations for a recreation management plan for Abaco National Park. The methods of stakeholder analysis and participatory mapping proved invaluable in achieving this objective. We found them successful in highlighting areas and times of potential conflict among different user groups and between user groups and parrot resource needs. Recognizing these conflicts subsequently allowed us to consider trade-offs that may aid in reducing conflict. Additionally, the methods helped us find commonalities among stakeholder groups that not only signify priorities for management but also provide the basis for a working relationship among the stakeholders. From these results, we suggest the following recommendations:

1. Ensure recreation opportunities do not compromise the sustainability of the Bahama parrot population.

   <u>Actions:</u>

   1. Establish parrot protection zones where humans are excluded at least during the parrot breeding season. Currently, we recommend this zone be placed in the northern third of the park. Further consultation with parrot biologists is

essential to ensure that areas where parrots nest and breed are sufficiently protected.

2. Promote research to continue to monitor the health of the Bahama parrot, other wildlife, and ecological systems in the park.

3. Develop ecological and social standards and indicators to monitor the human impacts on the natural environment.

4. Use local guides with extensive knowledge of the park to lead visitors through sensitive areas of the park.

5. Use on- and off-site education to inform locals and tourists about the park's fragile ecosystem and proper conduct while visiting the park.

2. Enhance birdwatching and ecotourism opportunities.

Actions:

1. Establish birdwatching trails that allow more access to the park by birdwatchers. These may be best placed in the southern and south-central portions of the park where visitors are likely to see parrots, but where less parrot nesting sites are located.

2. Expand opportunities for ecotourism throughout their current range, particularly along the coastal area of the park where results show that a majority of people conduct ecotourism activities.

3. Control visitor numbers and minimize impacts of visitors on parrots by keeping all but a few roads through ecotourism and birdwatching areas unimproved. Those roads which are consistently driven and already highly established (such as the central and south-central interior roads depicted in Figures 2-9 thru 2-14) could be improved for access to birdwatching and hiking trails. Consider closing roads in the northern area of the park, which are located in areas of high density parrot nesting.

4. Monitor the impacts of birdwatchers and other ecotourists on parrots.

5. Expand opportunities for people to view the Bahama parrot by training local guides.

6. Ensure non-consumptive recreationists and hunters do not interfere with each other or cause a safety concern. Use temporal zoning if conflict arises. This could include zoning areas of conflict for hunting between the months of October through February (when bird hunting is legal in addition to boar hunting) and for non-consumptive recreation the remaining months of the year.

3. Expand opportunities for student education.

Actions:

1. Encourage local teachers to use the park as an educational resource to educate their students about the habitat and wildlife of the park.

2. Select areas for student education that meet teacher objectives but avoid parrot nesting sites.

3. Ensure student activities and hunters do not interfere with each other or cause a safety concern. If conflict arises, use temporal zoning in which hunting is permitted during the months of October through February and student activities can occur during the early fall or spring.

4. Maintain opportunities for quality hunting experiences.

Actions:

1. Maintain hunting throughout its current range where it does not conflict with sustaining viable parrot populations. This particularly applies to the wetland area and northern and southern extremes of the park where hunting is most popular.

2. Ensure hunting and non-consumptive recreation do not interfere with each other or cause a safety concern. Use temporal zoning if conflict arises. This could include zoning areas of conflict for hunting between the months of October through February (when bird hunting is legal in addition to boar hunting) and for non-consumptive recreation the remaining months of the year.

5. Develop appropriate infrastructure.

Actions:

1. According to our meetings with stakeholders, people most wanted a visitor center, followed by souvenir shops, refreshment stands, a ranger station, park guides, educational materials, improved roads, and restrooms.

2. Results show that infrastructure would be best placed as far north along the main road as possible without infringing upon high density parrot nesting areas.

3. Ensure facilities do not negatively impact the natural ecosystem by monitoring human impacts.

Limitations

Despite its overall success, we recognize a few limitations in this study. First, we had a relatively small sample size of 35 people among six stakeholder groups. A larger sample size may have provided us greater detail and more accurate information regarding stakeholder use of the park. Particularly in the business and tourism industry representative groups, which only had four people each, a greater level of participation may have revealed different results.

Second, because Abaco National Park is large in size, we used a relatively large grid cell size for our unit of analysis in the participatory mapping activities in this study. Each grid cell measured one kilometer squared, which does not provide a fine scale of detail for planning. However, we were unsure if people would be capable of providing accurate information at a finer scale of detail for areas they go in the park. When using grid cells as a unit of analysis, it may be beneficial to attempt analysis at multiple scales to compare their accuracy and the detail of information they are able to provide.

Finally, it is recognized that there is no way of knowing how well a person's map accurately represents his or her mental map (Walmsley & Jenkins 1992). Therefore, the maps that participants constructed on their current use of the park may not be completely correct in illustrating where they travel in reality. In analyzing participants' maps of driving in the park, we found evidence that these mental maps may not be exact. In particular, it appears that participants perceived the most southern of the interior roads in the park as further south than it is located in actuality (Figure 2-13). Therefore, when applying maps that people construct from memory to planning, consideration of errors is essential.

Conclusion

The results from this study reveal that investigation into local stakeholder groups' current activity patterns in a national park and future desires for management can produce useful information that can be incorporated into the park planning process. Although general information on user characteristics of Abaco National Park proved important, both the individual and group maps that resulted from this study provided a greater contribution to recreation planning in the park. For example, individual activity maps showed that birdwatchers and other non-consumptive recreationists use areas along the main road and the coastline more than any other areas in the park. Hunting, on the other hand, occurs to a greater extent throughout the interior of the park. Knowing where activities are conducted can help in the allocation of resources and appropriate management of those areas. Spatial analysis of use patterns also proved beneficial in identifying areas of potential conflict. As conflicts can create contentious situations that threaten resource use for all users (Wing & Johnson 2001), recognizing potential areas of conflict before they occur can greatly benefit the planning of recreation in Abaco National Park.

When combined together, the stakeholder group maps illuminated areas where the majority of groups agreed on a particular activity. This map strongly corroborated the information we obtained in the individual mapping activity. Finally, when we overlaid parrot nesting data on these maps, we found the resulting map valuable in terms of formulating recommendations for a recreation management plan for Abaco National Park. Although the development of this plan will be an accomplishment in itself, we hope that the methods used in this study can be applied to other national parks in the

Bahamas in need of management planning to protect biodiversity while concurrently providing for a variety of recreational uses and stakeholder interests.

Table 2-1. Vision statement themes.

Vision Statement Theme	Number of Times Mentioned
Ecosystem protection/restoration	15
Quality management	12
Low impact visitation to enjoy nature	11
Visitor education	10
Protection of parrots/wildlife	6
Community involvement	4
Development of trails/tours	3
Student education	2
Research	2

Table 2-2. Percent of park area marked for each activity.

Activity	Percent of Park Area
Hunting	100
Ecotourism	100
Birdwatching/Viewing Parrots	93
Education	79
Driving	60
Access to Ocean	24
Camping	16
Fishing	0.5

Table 2-3. Percent of park area marked per activity per person. Percent grids per person are calculated as grids per person (N=35) over the total number (107) of grid cells in the park.

Activity	Total Number of Grids Marked	Percent of Grids Marked per Person
Birdwatching/Viewing Parrots	502	13.40
Hunting	383	10.23
Ecotourism	299	7.98
Education	159	4.25
Driving	147	3.92
Ocean	23	0.61
Camping	17	0.45
Fishing	10	0.27

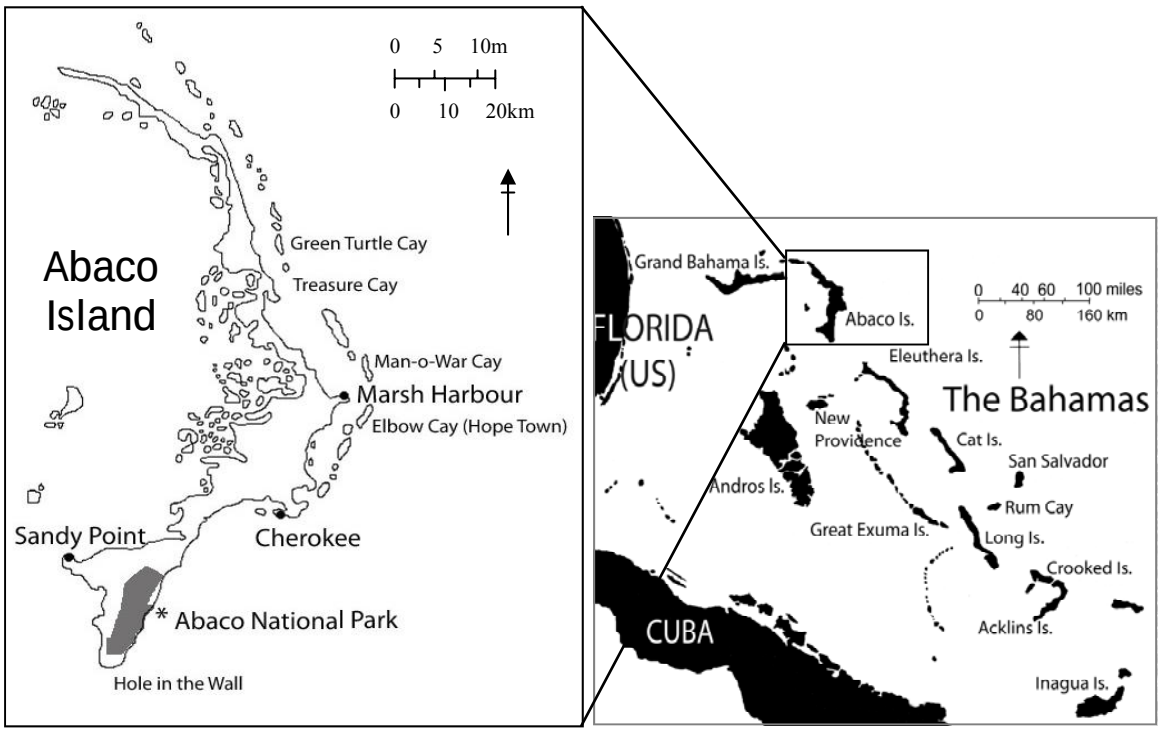

Figure 2-1. Location of Abaco National Park.

Figure 2-2. Group mapping exercise. One stakeholder group decides how to distribute different activity zones in Abaco National Park. Their final map is shown on the right.

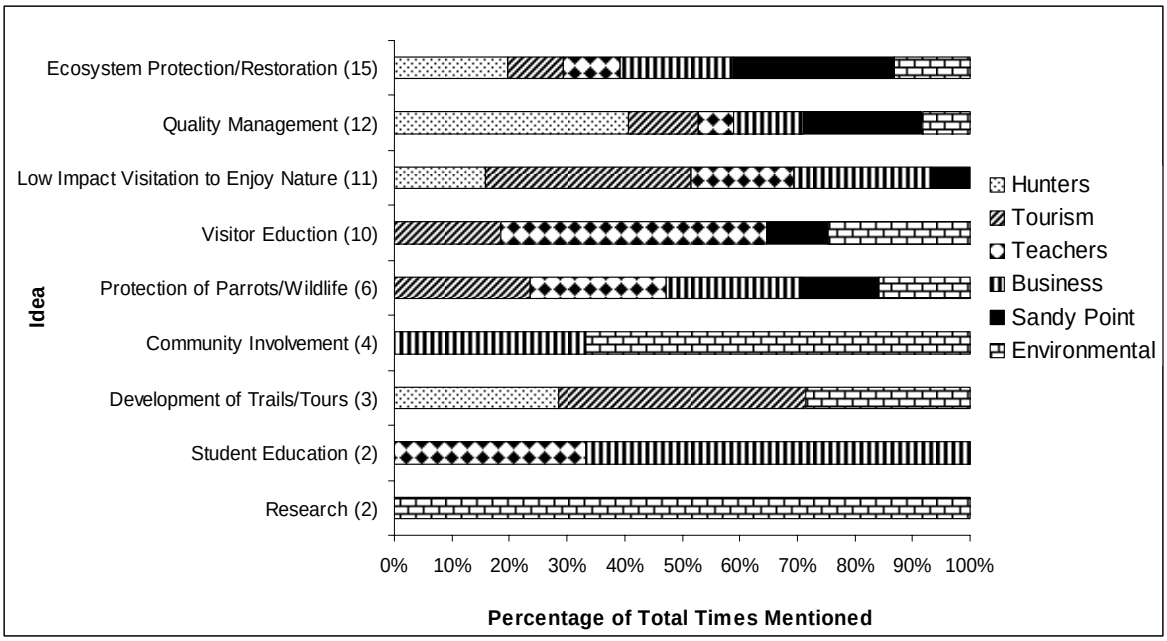

Figure 2-3. Vision statement ideas by stakeholder group (N=35). Numbers in parenthesis indicate the total number of times the idea was mentioned overall.

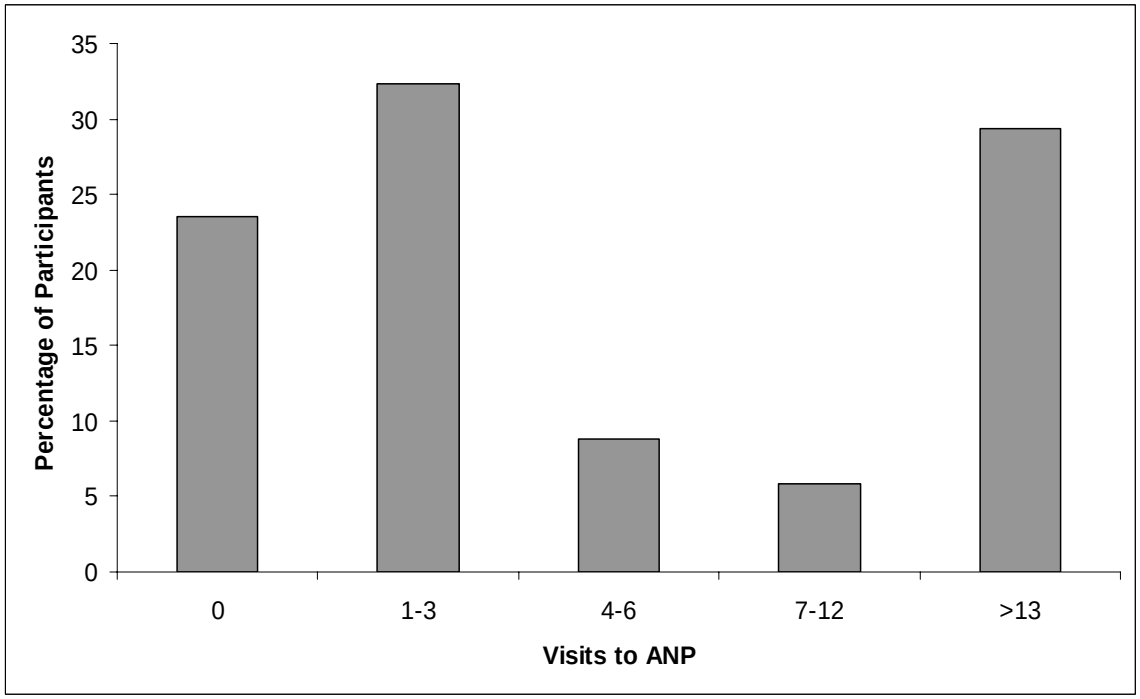

Figure 2-4. Overall annual visitation to Abaco National Park (N=35).

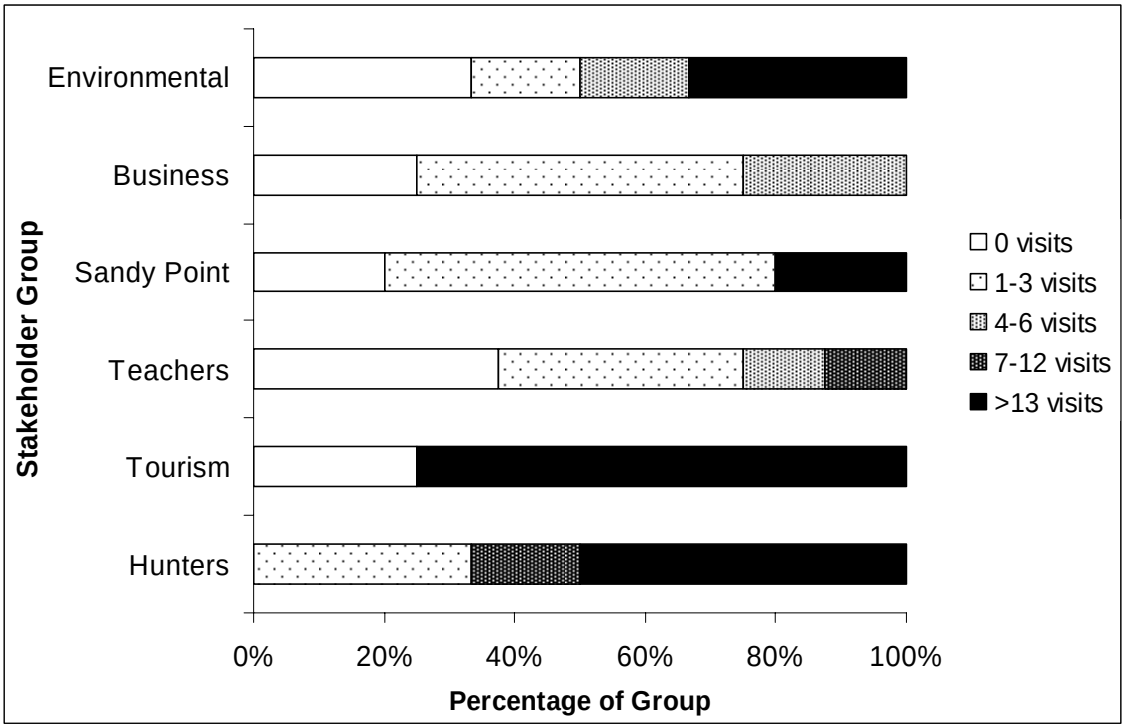

Figure 2-5. Annual visitation to Abaco National Park by stakeholder group (N=35).

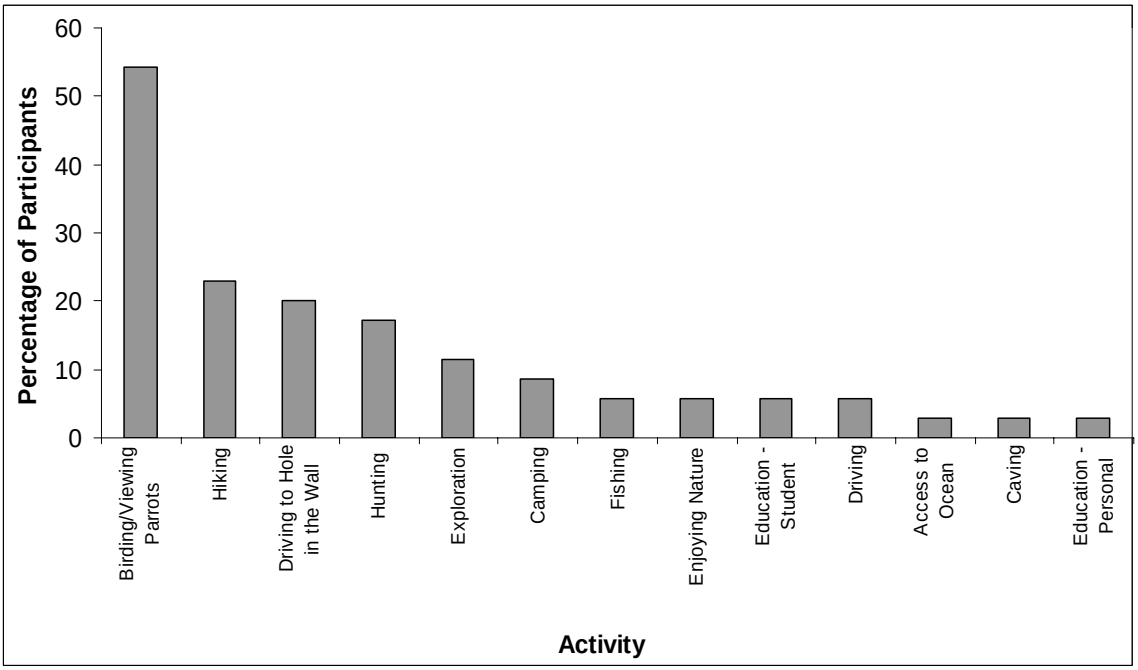

Figure 2-6. Percentage of people participating in each activity (N=35).

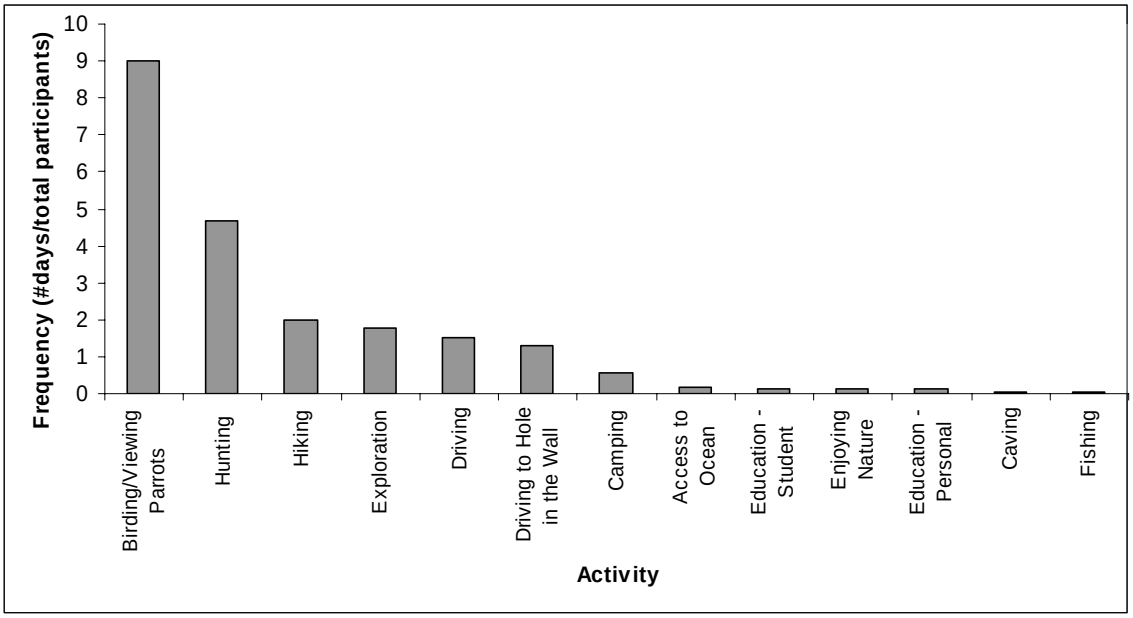

Figure 2-7. Frequency of activities conducted in Abaco National Park (N=35).

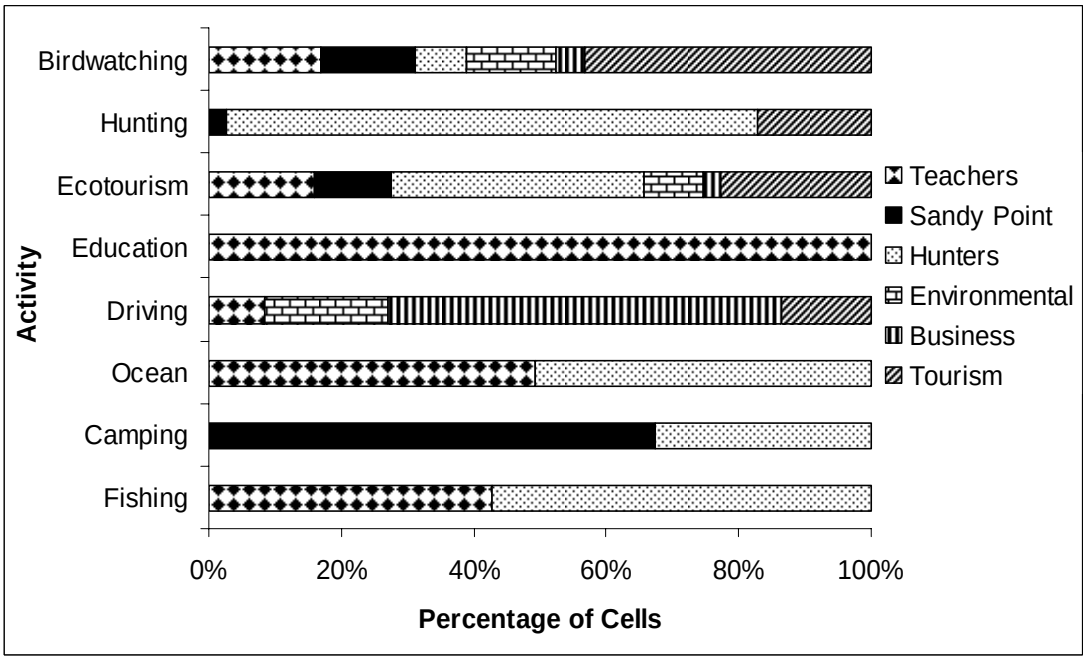

Figure 2-8. Percentage of park labeled for each activity by stakeholder group (N=35) listed in order of total number of cells labeled for that activity.

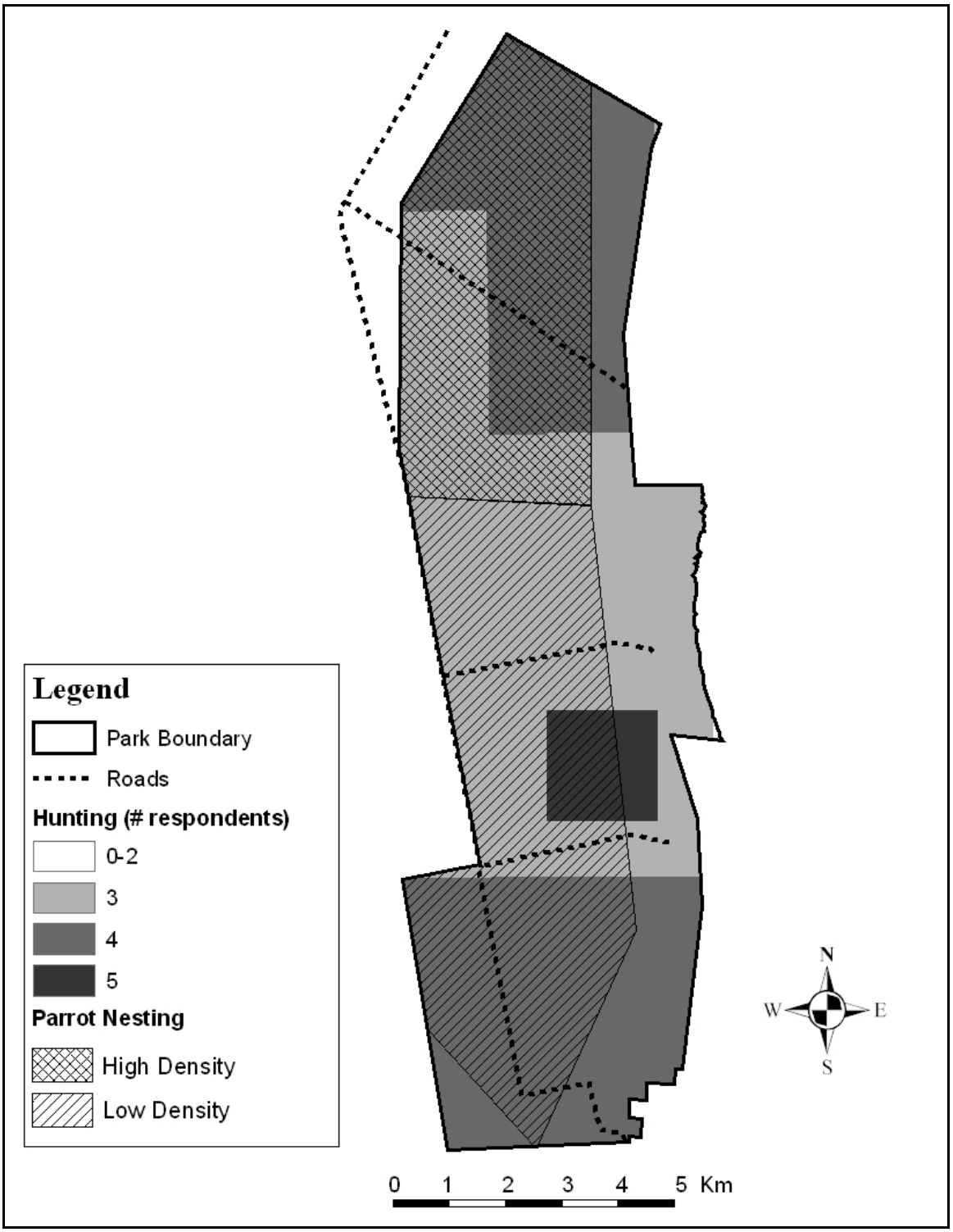

Figure 2-9. Distribution of hunting and parrot nesting in Abaco National Park.

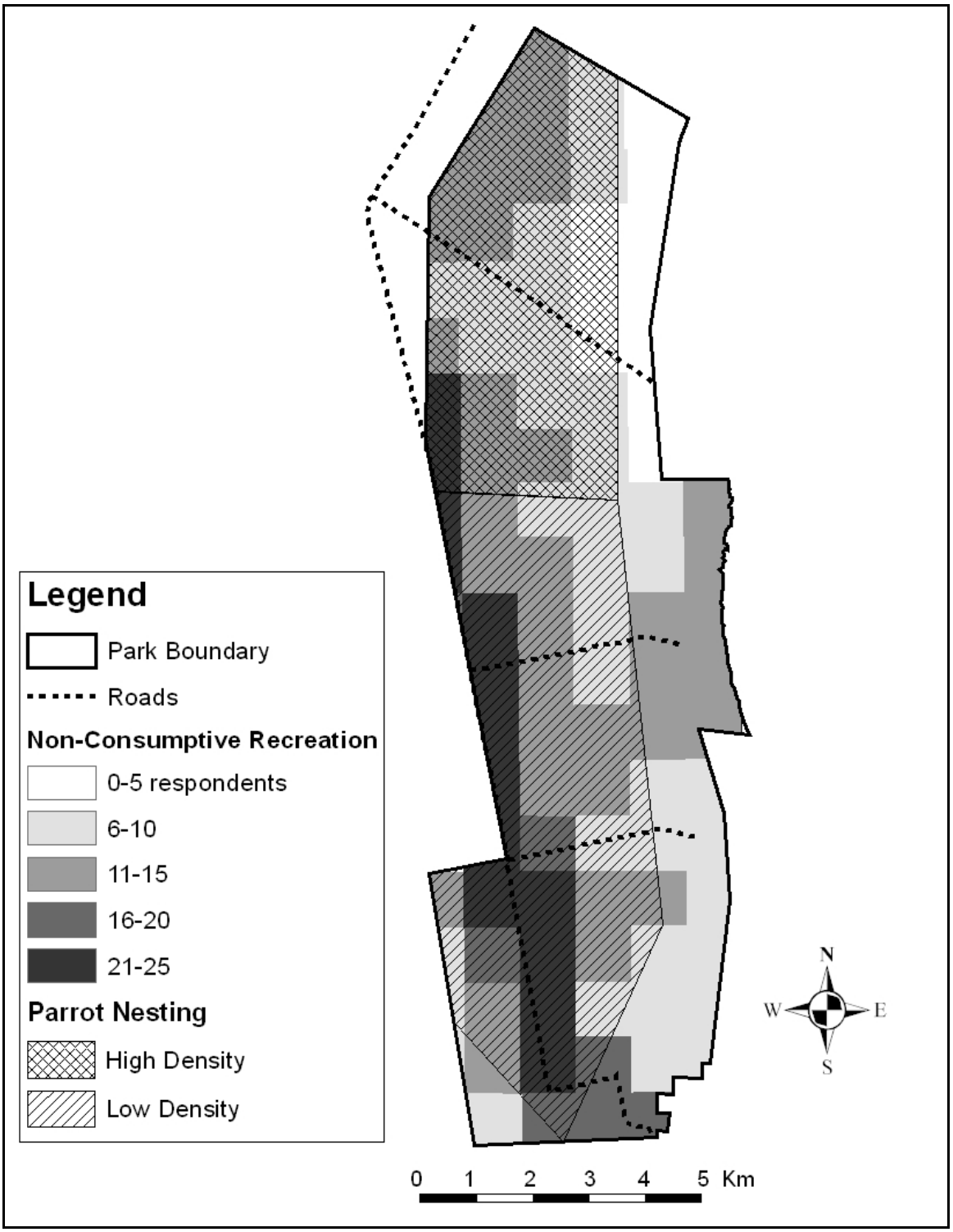

Figure 2-10. Distribution of non-consumptive activities and parrot nesting in Abaco National Park.

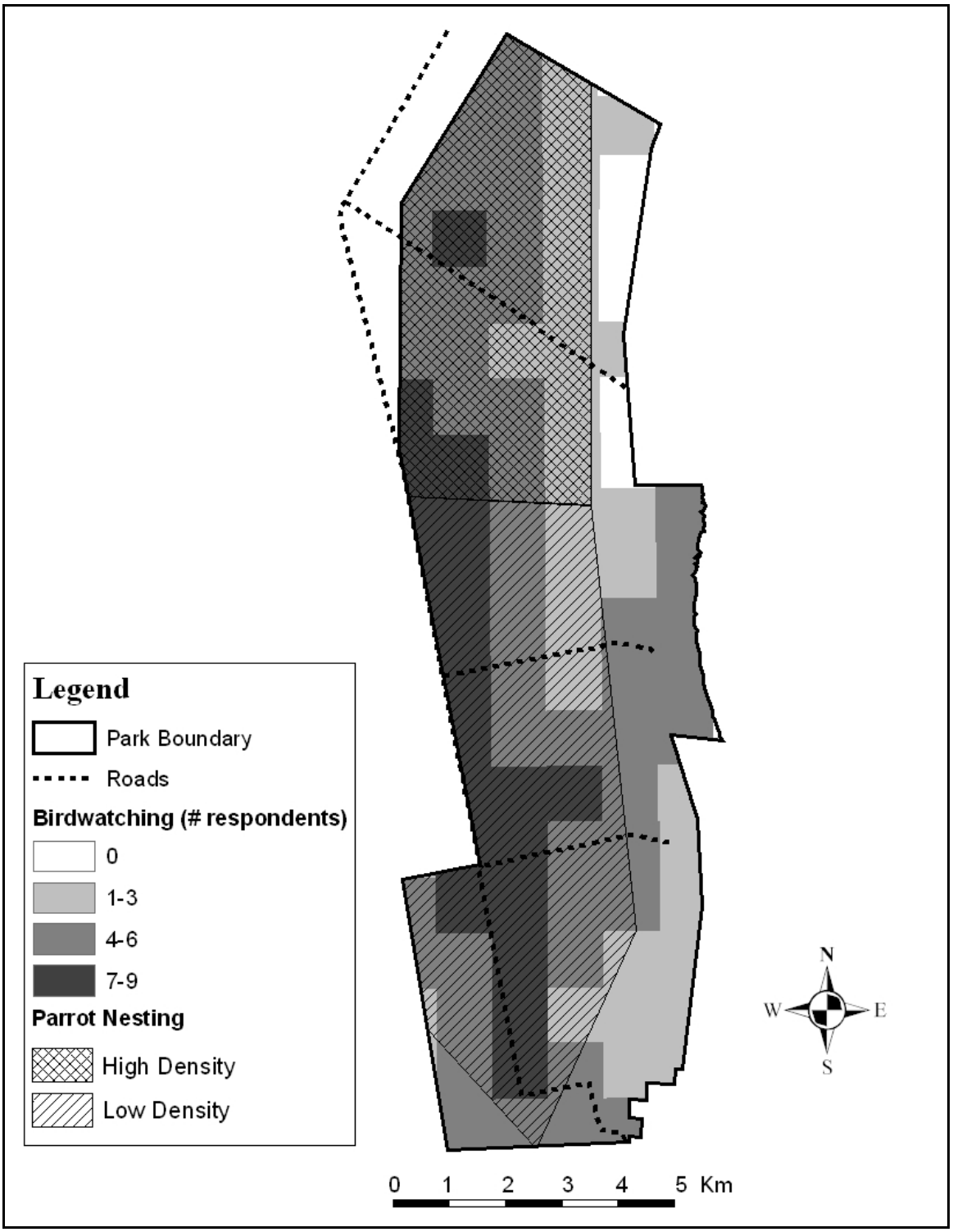

Figure 2-11. Distribution of birdwatching and parrot nesting in Abaco National Park.

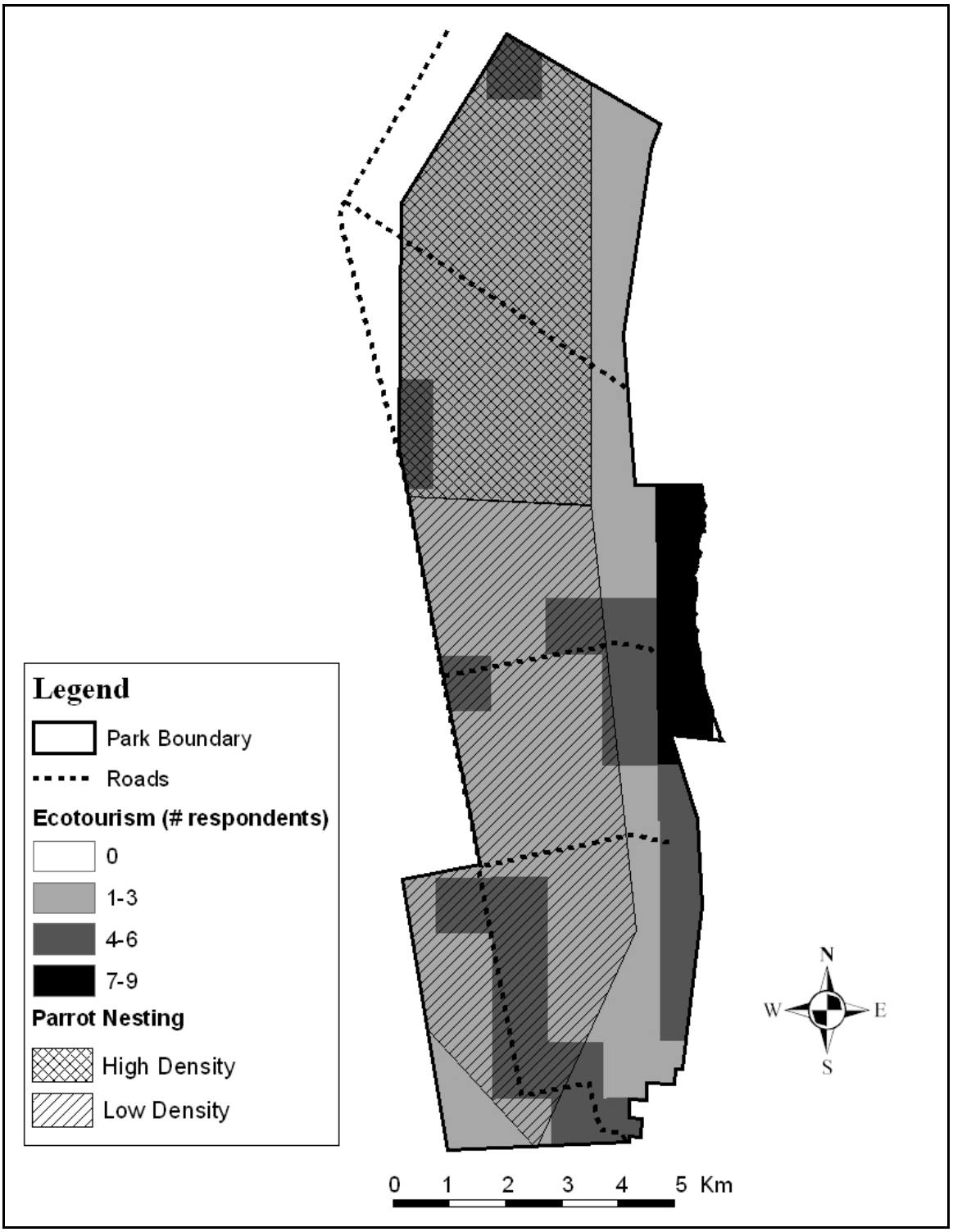

Figure 2-12. Distribution of ecotourism and parrot nesting in Abaco National Park.

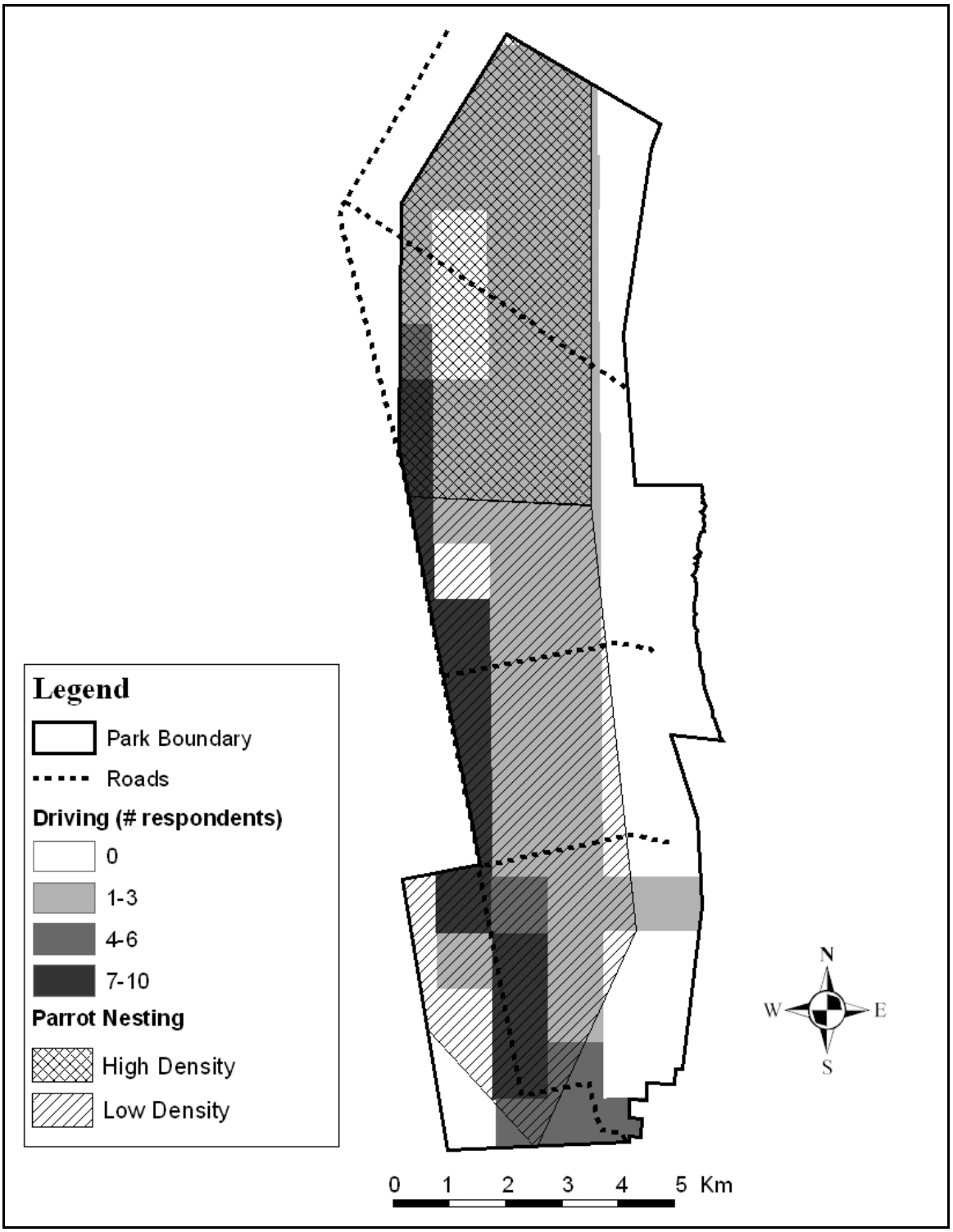

Figure 2-13. Distribution of driving and parrot nesting in Abaco National Park.

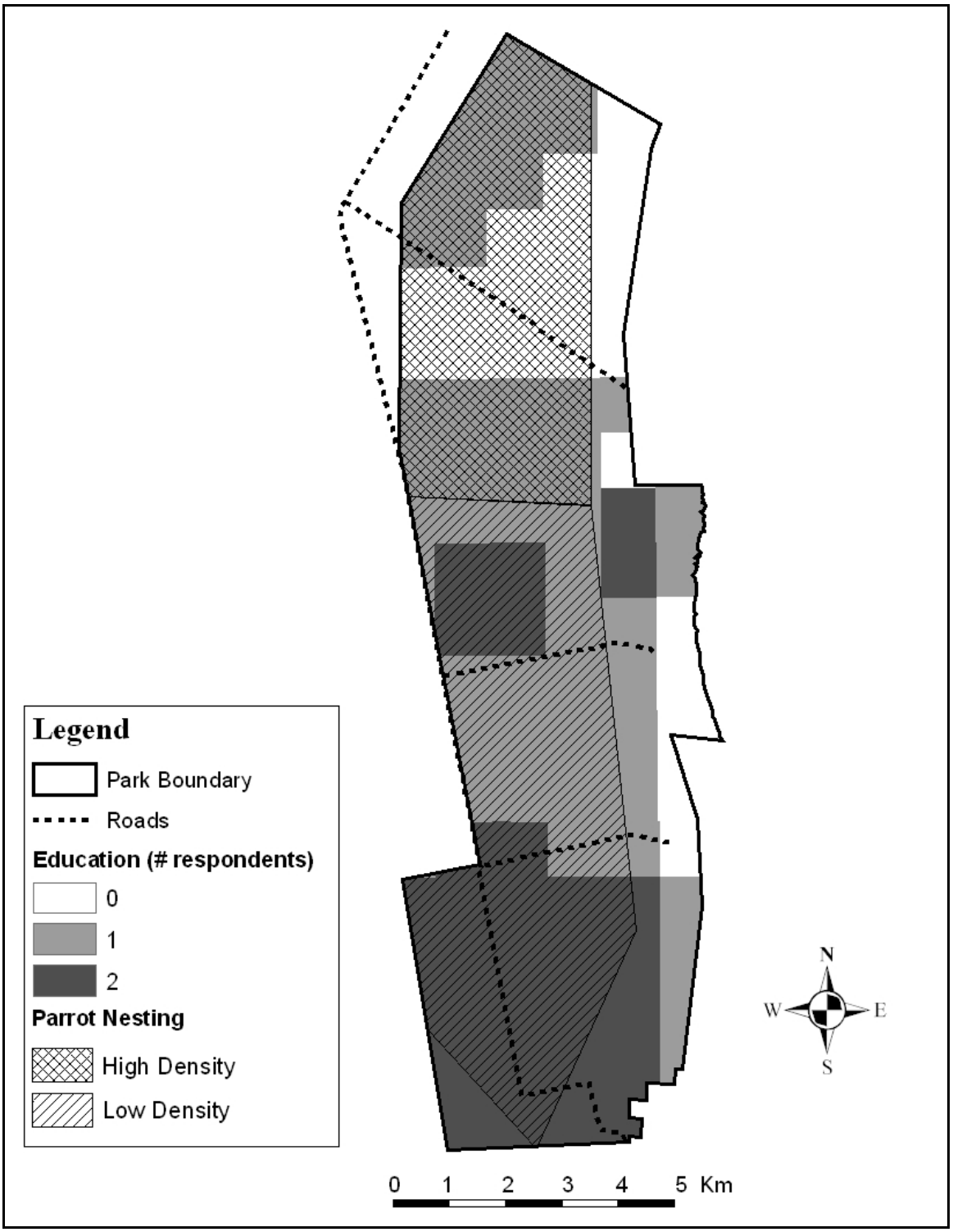

Figure 2-14. Distribution of education and parrot nesting in Abaco National Park.

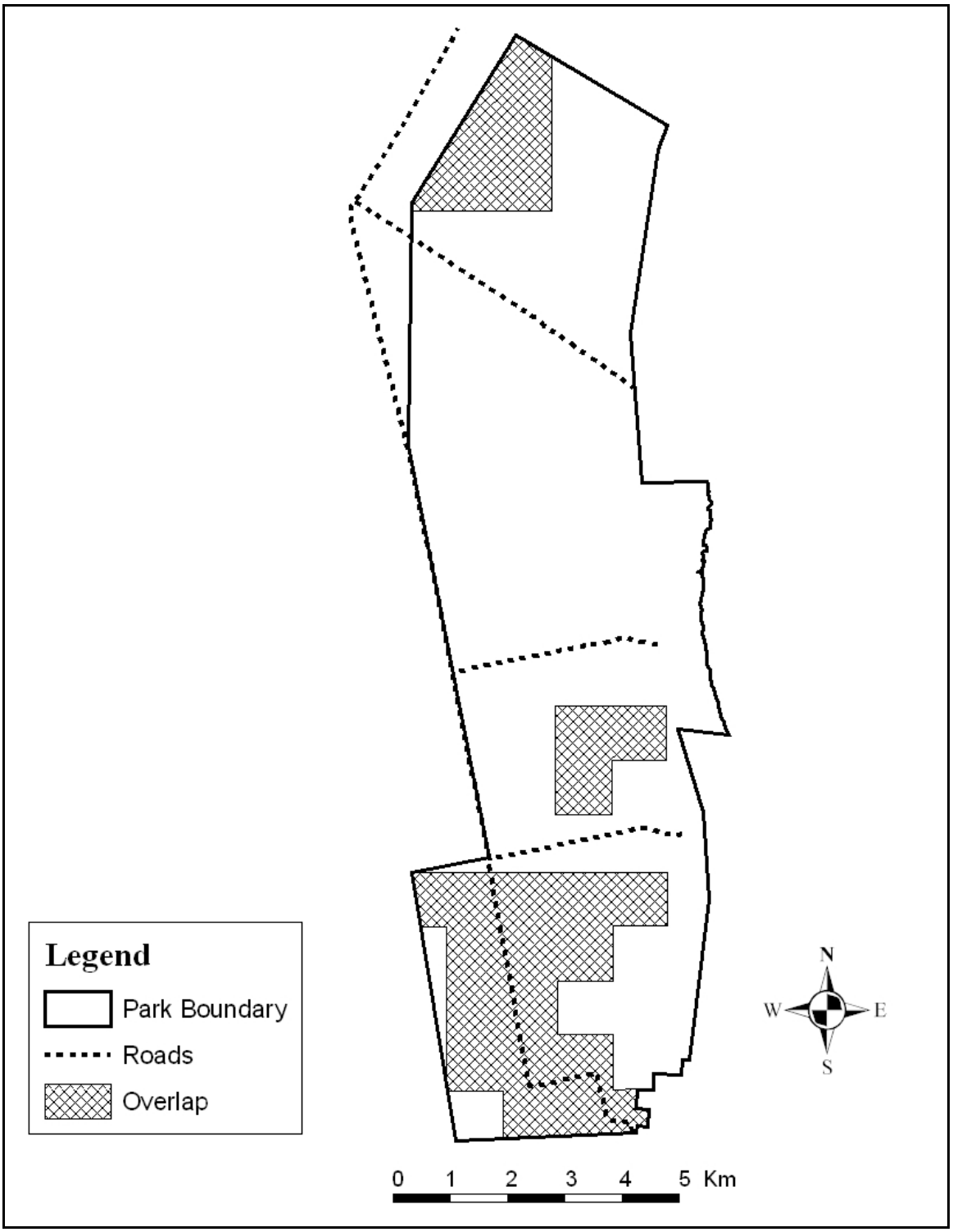

Figure 2-15. Overlap in areas defined as "high density" hunting and "high density" non-consumptive recreation.

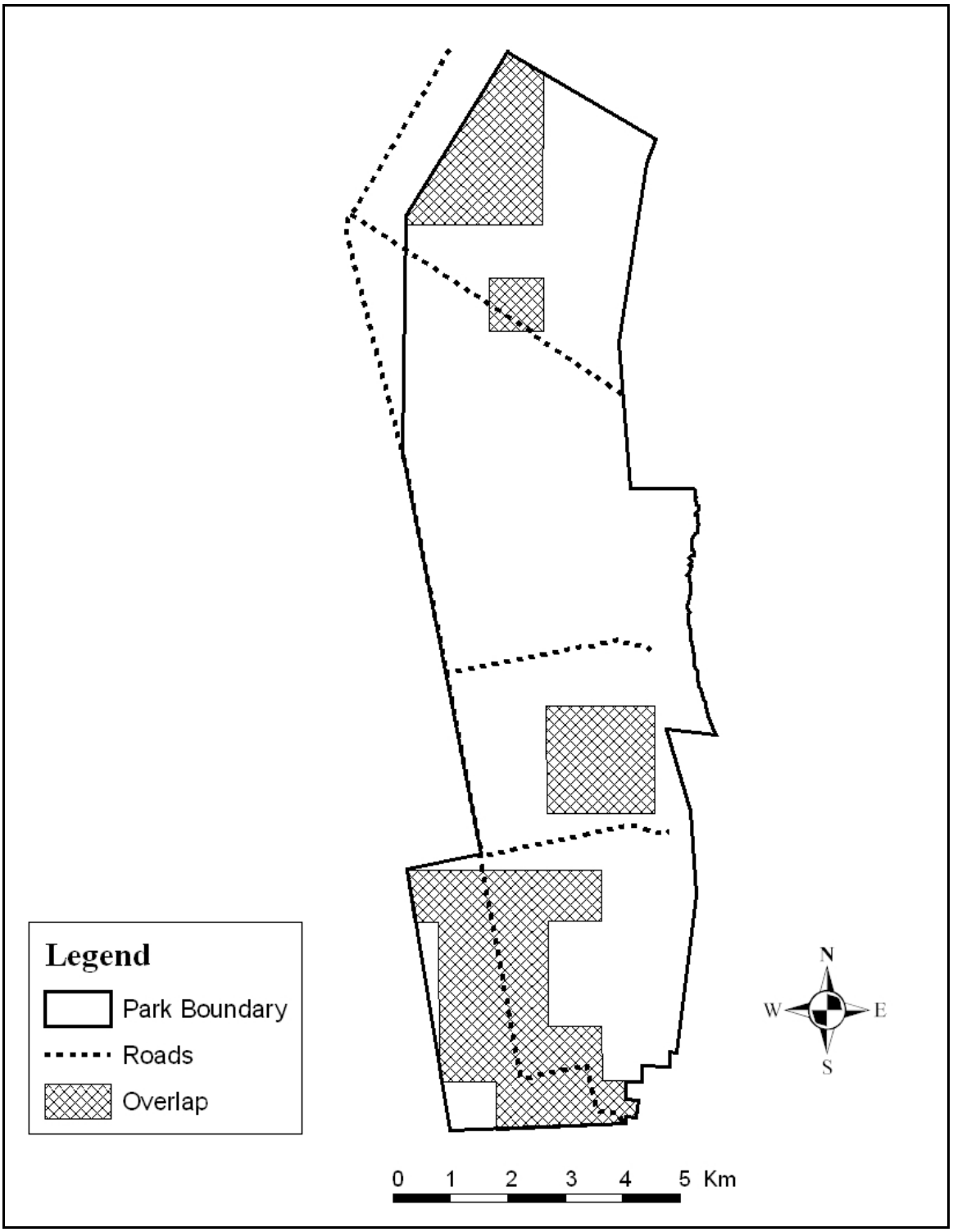

Figure 2-16. Overlap in areas defined as "high density" hunting and "high density" birdwatching.

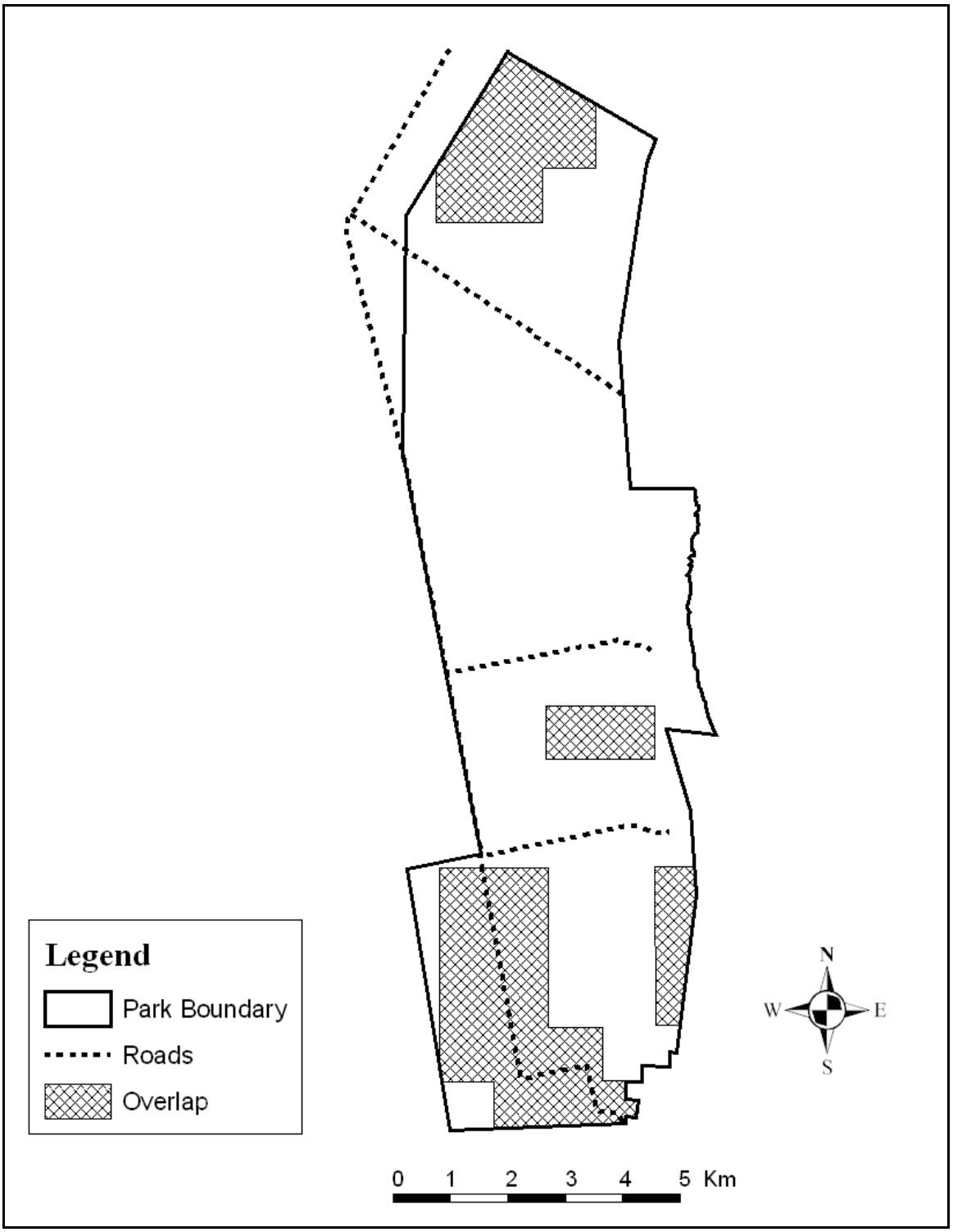

Figure 2-17. Overlap in areas defined as “high density” hunting and “high density” ecotourism.

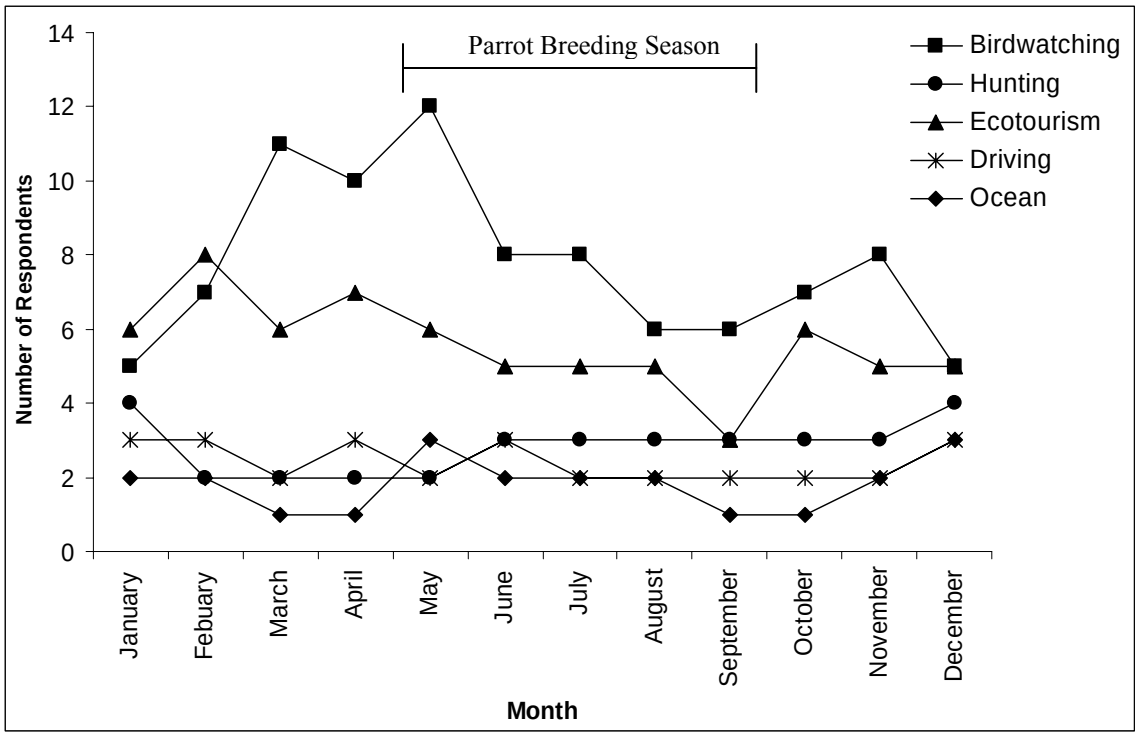

Figure 2-18. Temporal distribution of activities in Abaco National Park.

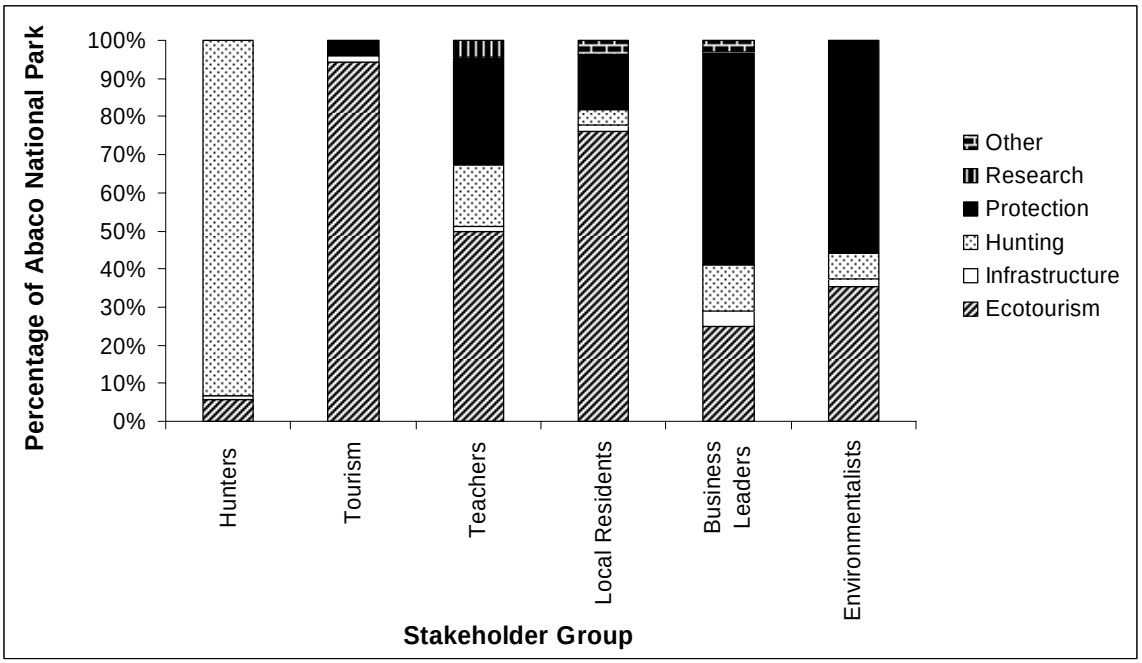

Figure 2-19. Percent of park prioritized for each activity zone by stakeholder group.

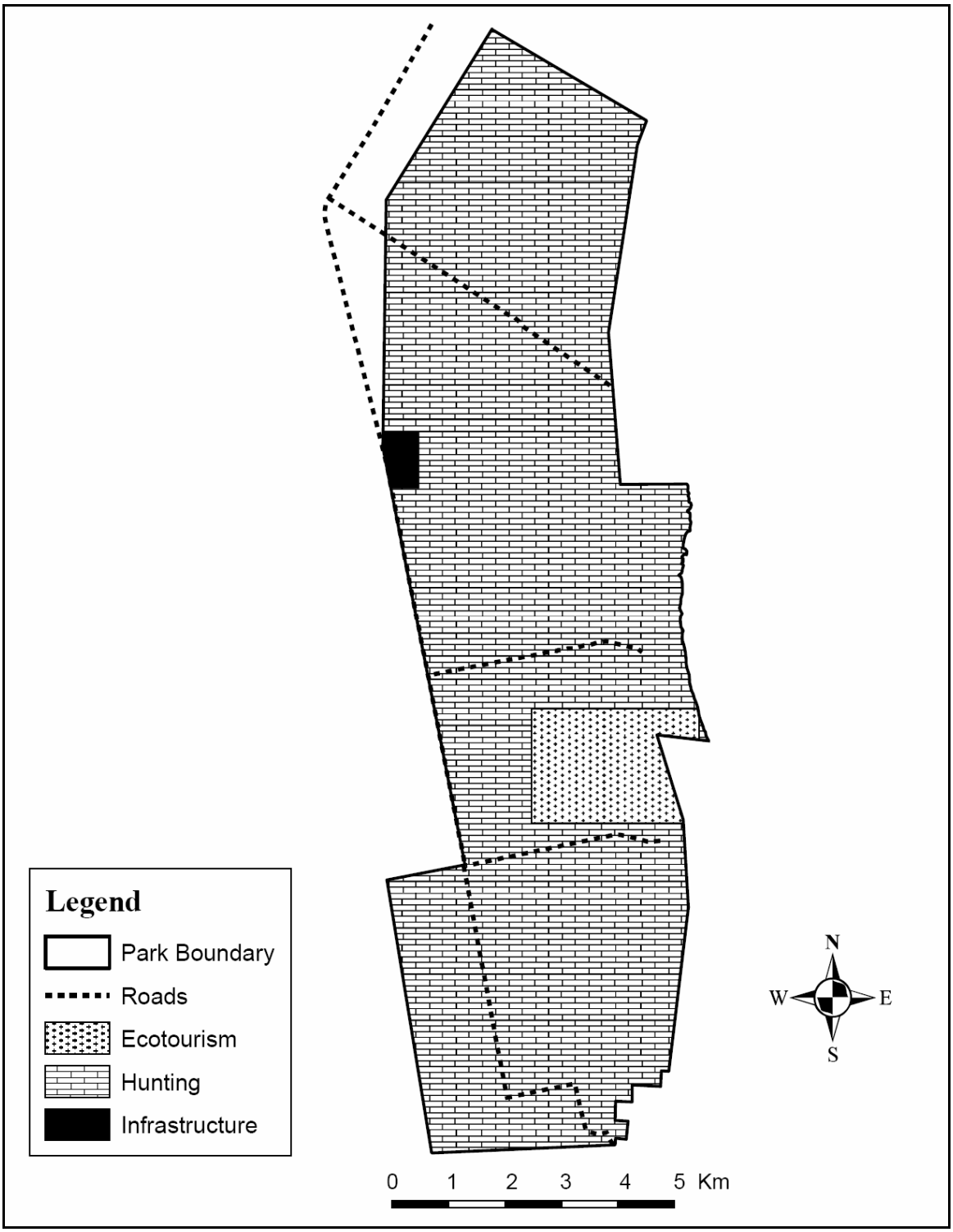

Figure 2-20. Hunter group map of desired future activity zones.

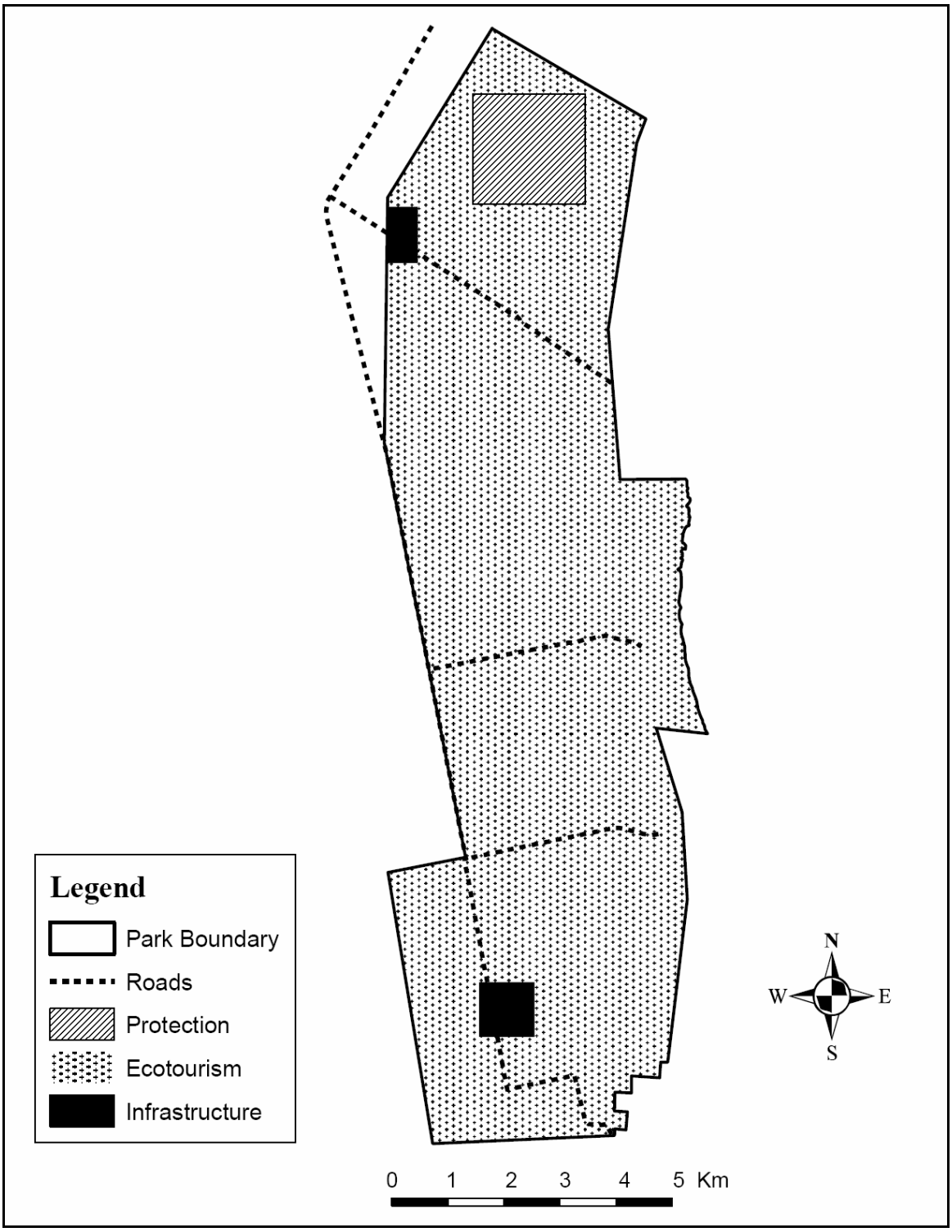

Figure 2-21. Tourism group map of desired future activity zones.

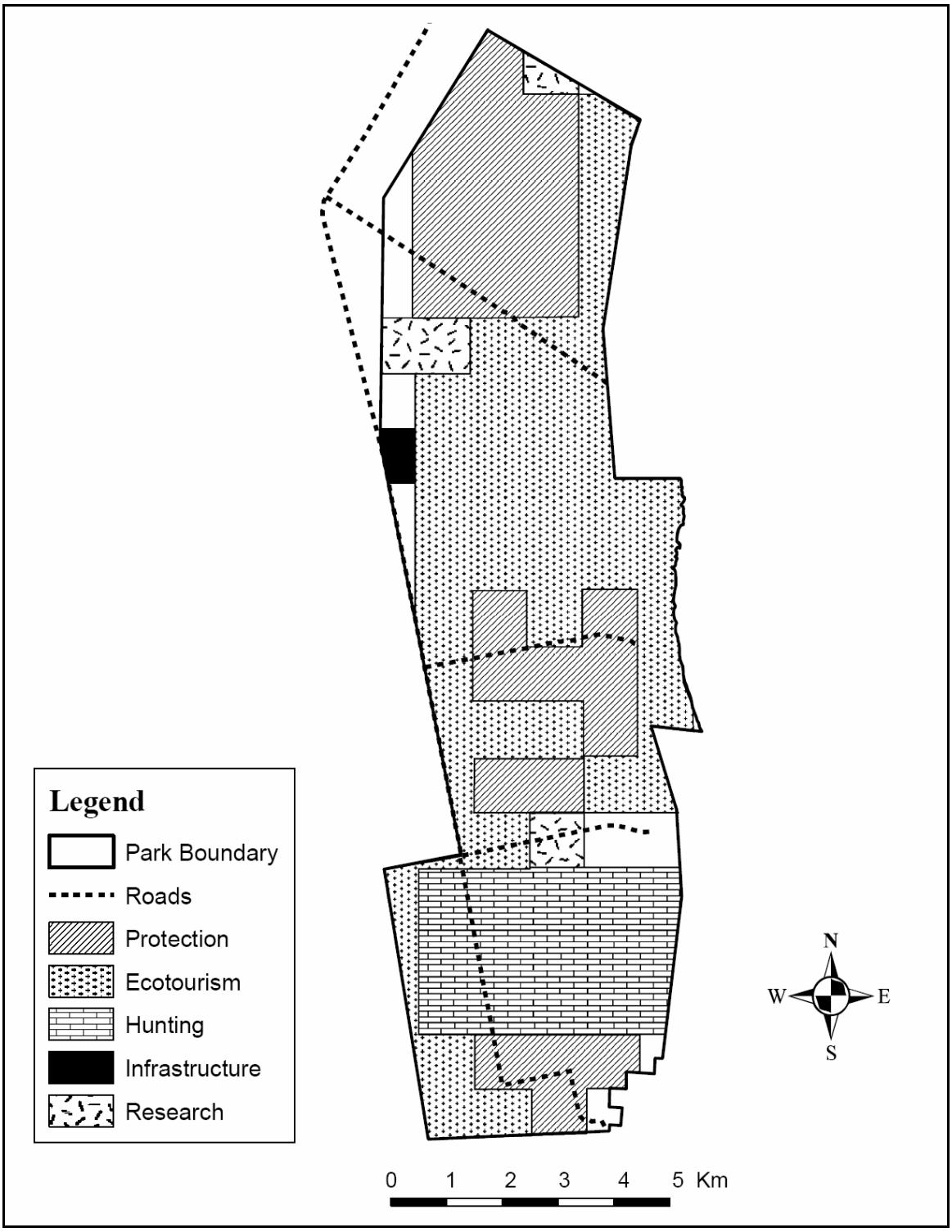

Figure 2-22. Teacher group map of desired future activity zones.

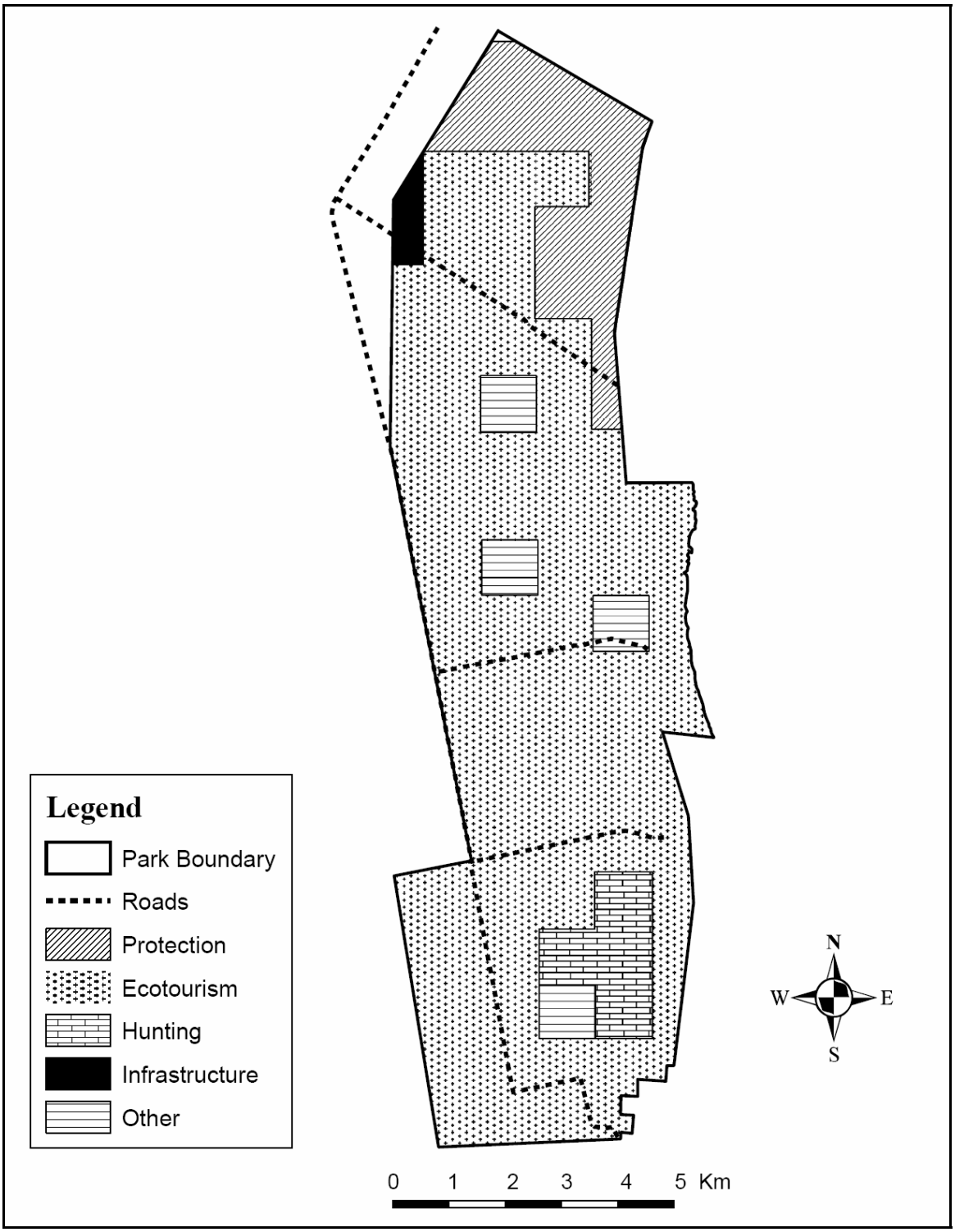

Figure 2-23. Sandy Point group map of desired future activity zones.

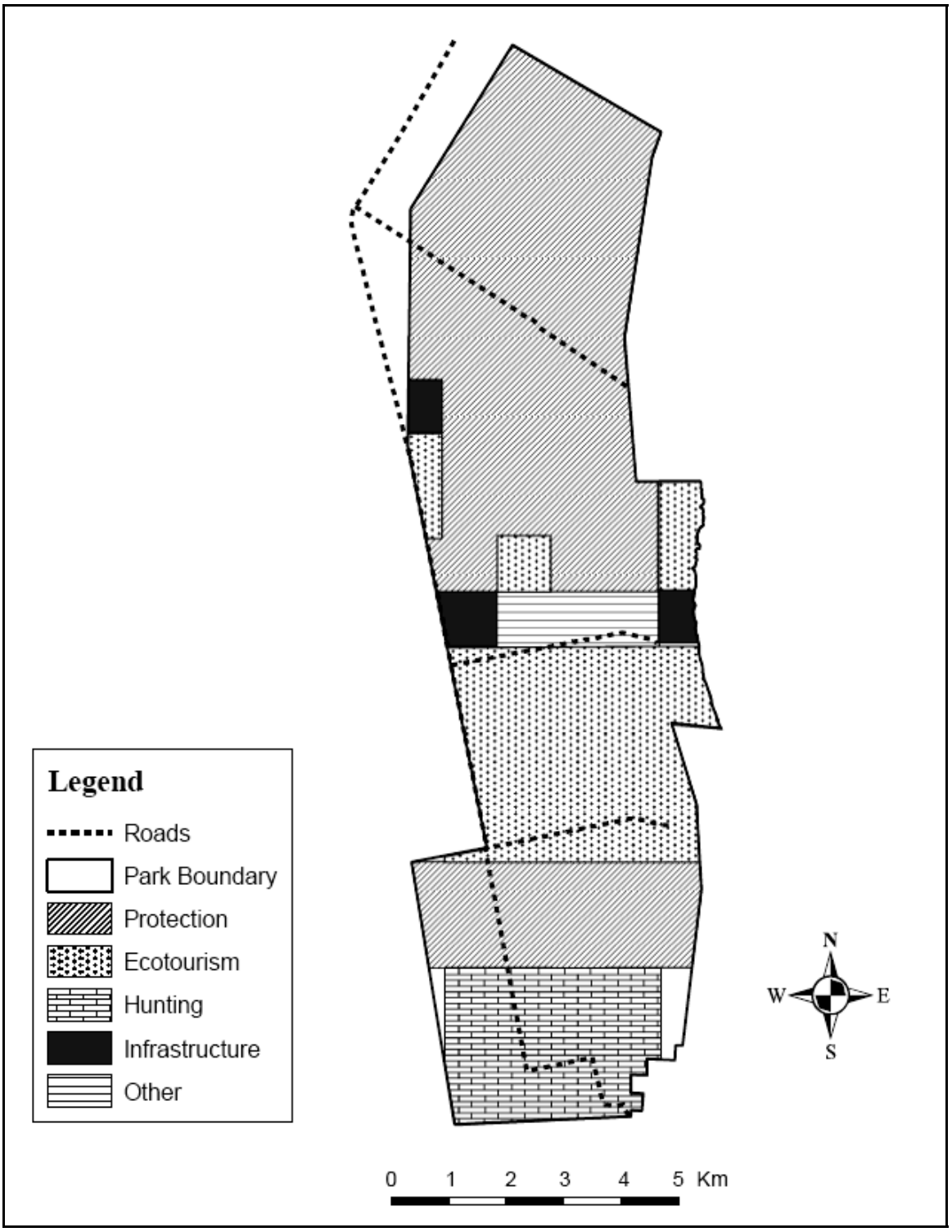

Figure 2-24. Business group map of desired future activity zones.

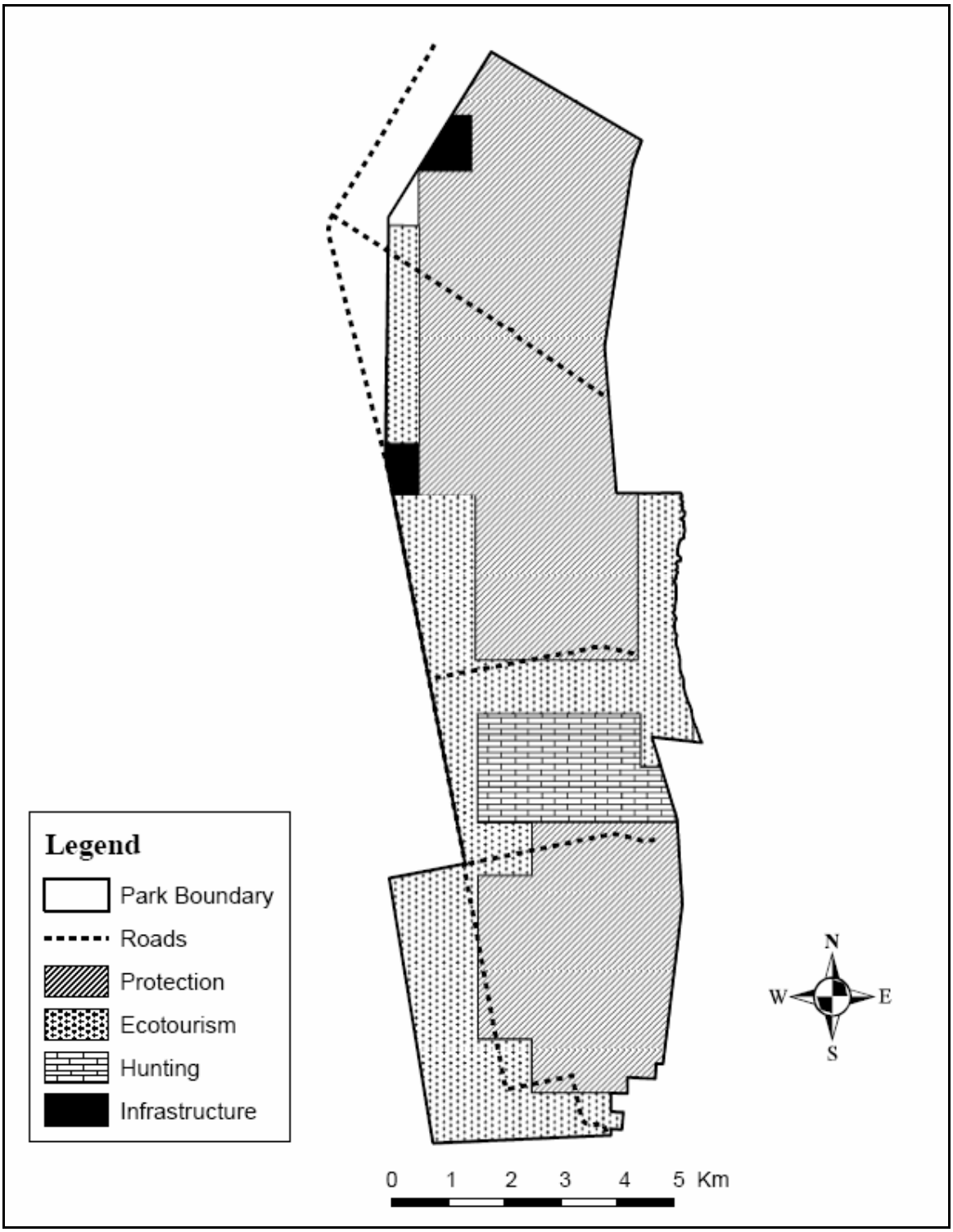

Figure 2-25. Environmental group map of desired future activity zones.

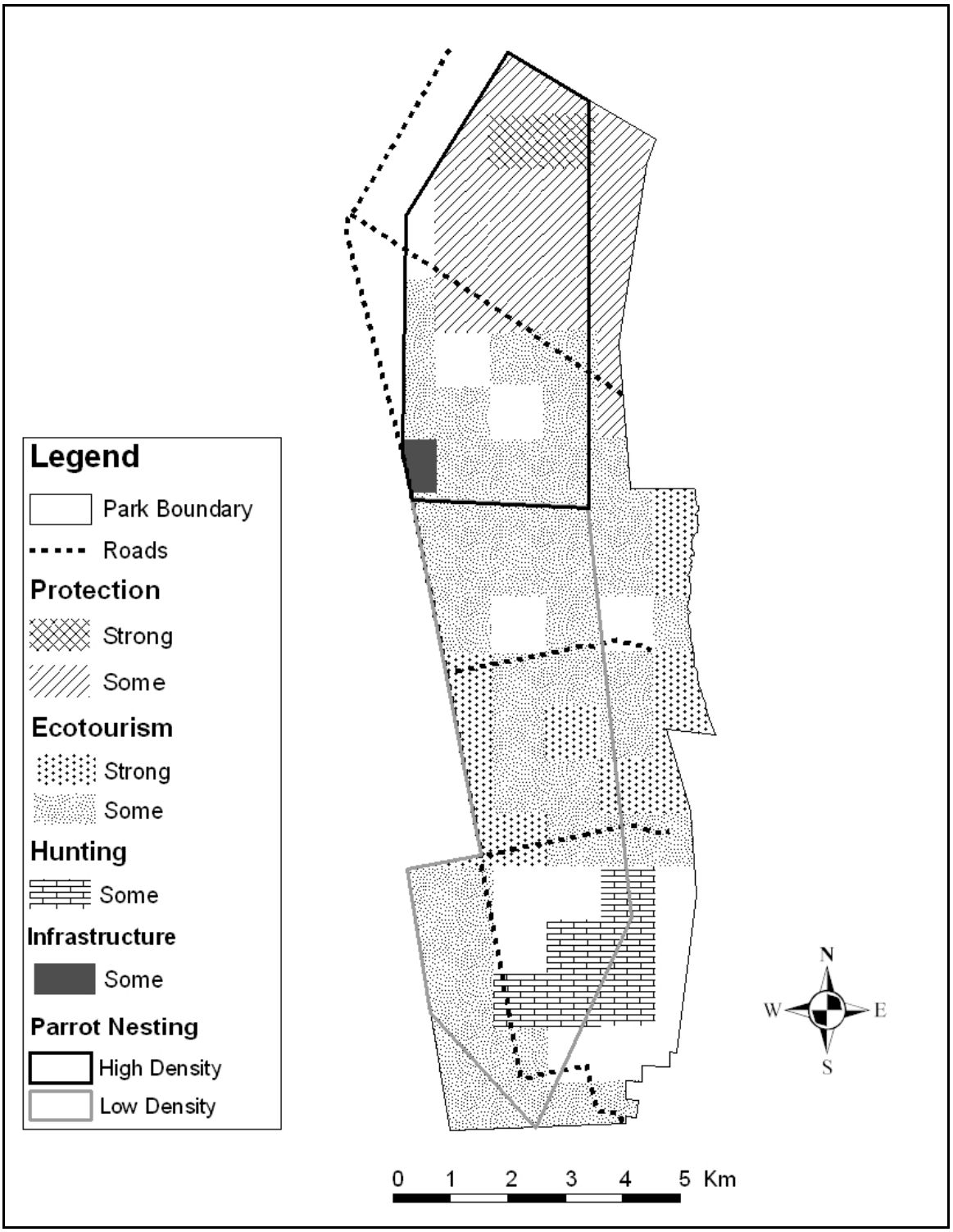

Figure 2-26. Stakeholder group compatibility on future activity zone distribution. "Strong" signifies areas where 5-6 groups agreed; "Some" signifies areas where 3-4 groups agreed.

CHAPTER 3
ABACO HUNTER BEHAVIOR, SATISFACTIONS, AND MANAGEMENT PERCEPTIONS

Introduction

In the struggle to retain the earth's remaining biodiversity, the establishment of protected areas has played a central role. Today, over 12% of the world's land area is protected as national parks and preserves (Chape et al. 2003). However, the designation of a protected area is only the first step toward preservation (Dawson 1985). Ultimately, an area's success will depend on the design and implementation of quality management; if a protected area cannot be managed effectively, then the loss of essential elements of biodiversity is inevitable (Wells & McShane 2004).

Protected Area Management

Early efforts to manage protected areas were based on centralized regulatory control (Weladji et al. 2003) and the exclusion of local people. Although human communities living in close proximity to protected areas often have long-standing relationships with those areas, those attachments were frequently ignored (Trakolis 2001); park management concentrated on keeping people out (Wells & McShane 2004). This method was successful in protecting some endangered species from extinction (Harmon 1987), but local people were often left deprived and hostile. The most extreme cases, typically in developing countries, resulted in disruption of local culture (Callimanopulos 1982), increased poverty due to wildlife depredation, and resource access deprivation (Weladji et al. 2003). Other cases involving reserves with a history of

unrestricted recreational use that suddenly was prohibited resulted in vandalism and disorderly behavior by community members (Dawson 1985). Without receiving the benefits they previously enjoyed, disdain from local communities jeopardized the accomplishment of many conservation objectives.

In the 1980s, conservation and management agencies began pioneering new approaches to protected area management that sought active involvement of local communities and consideration of their needs and aspirations (Weladji et al. 2003; Wells & McShane 2004). Today, public participation is promoted at all stages of protected area administration from planning to decision-making and management. Public participation is regarded as having several benefits. Park and recreation agencies that are charged with addressing the needs and desires of the constituents they serve (Jacobson 2001) can involve the public in social assessments to better understand their attitudes, preferences, and behaviors (Flood & McCarville 1999). Results from these surveys provide valuable data for planners to match park space to local needs and desires (Hall & Page 2002). Likewise, collecting and analyzing spatial user information can assist planners in understanding the time and space utilization of an area by various user groups (Heatwole & West 1982). Public participation also can be used as an approach for planners to gain access to local knowledge, thereby complimenting scientific information (Ball 2002). Finally, participation is believed to increase cooperation and support for management decisions vital to ensuring long-term conservation strategies (Ball 2002).

The majority of protected areas are managed for multiple uses in addition to conservation, such as outdoor recreation, tourism, sustainable forestry, hunting, fishing, scientific research, and environmental education. In many developing countries,

neighboring communities rely on the natural resources contained within protected areas to meet basic human needs such as food, fuel, and medicine. Management of these areas can be particularly complex as biodiversity conservation must be compatible with providing for human subsistence needs. In the recent past, the application of participatory research methods in these cases has augmented and proven to be a promising approach to understanding and balancing human needs with conservation.

Participatory research methods also can assist in the management of areas where local people do not rely on protected areas for subsistence, but rather to meet needs such as physical and emotional well-being. Typically, these needs are met through a variety of recreational activities (Driver et al. 1991). Several agencies have recognized the importance of public participation and sociological data in decision-making concerning recreation management. To appropriately manage a public river area for a variety of user groups, researchers used surveys of recreational rates and preferences for future land use (Burger 2000). Oh et al. (2005) used questionnaires of Texas anglers to collect data on fishing participation, motivations, attitudes, and management preferences. A similar study surveyed people in North Florida to determine public knowledge of a local watershed, attitudes and opinions toward management activities, and recreational use of the area (Appelson 1999). Many studies demonstrate the importance of public surveys and input in protected area recreation planning.

Many protected areas are managed for both consumptive and non-consumptive recreationists. Consumptive users are typically defined as hunters or anglers who actively extract a resource, while non-consumptive recreationists are considered passive users such as wildlife-watchers and hikers (Duffas & Dearden 1990; Kellert & Brown

1985; Vaske et al. 1982). Consumptive users typically are a large focus of management because they play a necessary role in managing the population of some species, are an important funding source for wildlife agencies, and must be regulated in order to avoid overexploitation (Decker et al. 2001). Additionally, in many places, hunting has a traditional cultural value. For these hunters, their families and communities, hunting is not simply a recreational activity but rather an essential part of their social being (Decker et al. 2001). Hunting can be a family or community tradition in which hunting behavior is initiated early in childhood by a family member or friend (Hayslette et al. 2001). In many developed countries, hunting plays an important role in how local residents identify and feel attached to protected areas. Therefore, planners must single out this group when potentially impacting the management of these areas.

Hunter Satisfaction

Like any user group, understanding hunters' beliefs, attitudes, and behaviors is fundamental to protected area management. However, because of hunters' intimate relationship with wildlife management – by providing a funding source and regulating populations of some species – keeping hunters satisfied and involved in hunting also has been of great interest. In order to achieve this additional goal, managers require information on issues such as hunting satisfactions and motivations (Decker et al. 2001).

Over the years hunter satisfaction has been measured in several different ways. Initially, hunting quality was measured largely in terms of harvest. A subsequent approach assumed that as the number of hunters in the field increased, so did the total amount of hunter benefits and satisfaction (Crissey 1971). Within the past 20 years, however, it has become evident that game bagged and days-afield approaches fail to

recognize the social, psychological, emotional, and physical benefits associated with hunting (Daigle et al. 2002; Hammitt et al. 1990).

The idea that hunter satisfaction is derived from multiple determinants was first proposed in the early 1970s (Hendee 1974; Potter et al. 1973). Since then, numerous studies have sought to identify the various factors that contribute to hunter satisfaction and their relative importance. Of particular debate has been the relative importance of harvest-based versus nonharvest-based satisfactions in determining overall hunting satisfaction (Decker et al. 1980). Some studies support that successful harvest and/or related aspects, such as perceived game numbers, continue to dominate hunting satisfaction, while other satisfactions remain secondary (Decker et al. 1980; Gigliotti 2000; McCullough & Carmen 1982; Stankey et al. 1973). Decker et al. (1980) reported that deer hunters who saw fewer deer and shot less than their ideal number rated their experience less favorably. A study involving ratings of hunting quality in Michigan showed that hunter satisfaction was largely influenced by the presence of a deer, seeing a deer, and the success of a member of the hunting party (Langenau et al. 1981). In a similar study, Frey et al. (2003) found that the number of male pheasants seen by hunters was the most influential factor on hunter satisfaction, followed by the number of pheasants harvested.

Other studies have found that nonharvest-based motivations and satisfactions, including companionship, nature, or escape are more important than those related to harvest (Hammitt et al. 1990; Hendee 1974; Vaske et al. 1986). Hunters in Massachusetts reported being more interested in the hunting experience rather than the physical take of an animal (More 1973). Similarly, in a study of Washington hunters, 11

dimensions of hunting satisfaction were identified that differed in importance both within and between game specific hunter groups. Of these, nature, escapism, and companionship were more important to hunters than harvesting, shooting, or obtaining an animal for trophy (Potter et al. 1973). These findings were corroborated by a study of mourning dove hunters in Alabama that found that most dove hunters were more strongly motivated by nonharvest-based satisfactions than by obtaining a bag limit (Hayslette et al. 2001). Hazel et al. (1990) identified seven components of satisfaction among turkey hunters in Michigan, with harvesting a turkey ranking third. Hammitt et al. (1989) found that although seeing and taking shots at a deer were most important to hunter satisfaction for a particular hunt, that satisfaction with the overall hunting experience was equated with environmental and social factors. The relative importance of harvest-based versus nonharvest-based satisfactions also was found to vary with number of years of experience with more experienced hunters being less harvest-oriented than those with less experience (Jackson et al. 1981).

Conflicting results from hunter satisfaction studies validate the idea that satisfaction may be dependent upon a particular area and species (Hayslette et al. 2001). Each type of hunting likely derives satisfaction from different determinants, making investigations into the motivations/satisfactions associated with specific locations and/or species essential for a comprehensive understanding of hunting satisfactions (Gigliotti 2000; Hammitt et al. 1990; Hazel et al. 1990; Vaske et al. 1986). Although species and location specific studies are essential to advancing our knowledge of hunter motivations and satisfactions, past research has focused primarily on deer and waterfowl (Hazel et al. 1990). Additionally, studies are overwhelmingly conducted in the United States.

Study Context

Abaco National Park is one of 25 national parks in the Bahamas. Established in 1994, the primary objective behind designation of the 8,300 hectare area was to protect the endangered Bahama parrot (*Amazona leucocephala bahamensis*) and its rapidly diminishing Caribbean pine forest habitat. The area also has a long history of wild boar (*Sus scrofa*), duck (e.g. *Anas dicors*), dove (*Streptopelia decaoctu, Zenaida macroura, Zenaida aurita*), and white-crowed pigeon (*Columba leucocephala*) hunting. Anxious that their rights to hunt in the park would be abolished, hunters initially opposed the park when it was first proposed in 1983. With the promise that hunting would remain a legal activity in the park, hunters agreed to support the park. More than ten years have passed since the establishment of Abaco National Park, but no formal management or recreation plan has been developed. With a growing number of user groups, formulating a recreation management plan is crucial. However, little is known about the largest and most historical user group of the park – the hunters. Information on their spatial and temporal use of the park, perceptions of potential management activities, current satisfaction with their experiences in the park, and factors that influence this satisfaction are needed before appropriate management can be enacted.

Objectives

The purpose of this study was to gather sociological information in order to make recommendations for a recreation management plan for Abaco National Park. The specific objectives were threefold:

Objective 1: Examine the spatial and temporal use of the park by hunters.

Objective 2: Assess hunter support and preferences for a variety of potential management actions.

Objective 3: Test the multiple-satisfactions model of hunting among Abaco hunters.

Hypothesis 1: There will be significant differences in responses to hunter satisfactions and motivations between hunters who hunt only wild boar and those who hunt both wild boar and ducks, doves, and/or white-crowned pigeon. As past studies have confirmed differences in hunter satisfaction based on species (Hayslette et al. 2001), we hypothesized different satisfactions reported by each group.

Hypothesis 2: Age and experience will be positively associated with non-harvest based satisfactions, such as companionship, tradition, and nature (Hayslette et al. 2001; Hazel et al. 1990; Jackson et al. 1981).

Hypothesis 3: Total number of days spent in the park per year will be positively associated with non-harvest based satisfactions, as people who spend more time in the park may feel less pressure to return with a kill each time.

Methods

Study Site

See Chapter 2.

Interview Design and Implementation

Typically, surveys of hunters are sent to a random or stratified sample of licensed hunters (e.g. Hayslette et al. 2001; Hazel et al. 1990). However, hunters on Abaco Island are not required to have a hunting license. Therefore, a list of 40 hunter names was generated by staff of the Department of Agriculture and other veteran hunters on the island based on their knowledge of hunters in the park. Each of the 40 hunters was mailed a short letter explaining the purpose of the study and the dates when we would be

conducting interviews. These letters were mailed two weeks before we arrived on Abaco. Upon arriving on the island, we contacted all 40 hunters for an interview. However, four people were on vacation or on business trips away from the island and therefore unavailable for an interview. Eleven others, who reported that they had not hunted in the past five years, were eliminated from the study since they were less likely to be concerned about management for hunting in Abaco National Park. Because of an initial sample size of 25 (after excluding those hunters who were unavailable or currently do not hunt in the park), we additionally employed a snowball sampling approach in which each person interviewed was asked if they knew additional hunters who were not on the original list. Using this method, six more hunters were identified and contacted, giving us a total of 31 hunters interviewed. Although a small sample size, we believe there are only approximately 40-45 residents who currently hunt in Abaco National Park. Therefore, we are confident that we sampled a minimum of 70% of the hunter population on Abaco Island.

Interviews were conducted with hunters during July, 2005. The location for the interviews varied based on where the individual resided. Hunters in Marsh Harbour were encouraged to meet us at the Abaco Chamber of Commerce/Friends of the Environment – Abaco office. Those who were reluctant to meet us at this location and those who lived in other towns (Cherokee, Casurina Point, Crossing Rocks) were interviewed at their private residence or business establishment. Interviews lasted approximately one hour.

The interview design was based on a review of previous studies that included: (1) attitudes of local residents towards proposed management, (2) recreation experiences, and

(3) hunter motivations and satisfactions. The final interview comprised 75 questions, which were organized into six sections (Appendix E).

1. **General Background**: This section included five questions (Q1-Q5), which solicited information on the participant's town of residence, years residing on Abaco, age of initial hunting experience, number of years hunting, and prior attendance at a meeting about Abaco National Park.

2. **Current Use**: Fifteen questions (Q6-Q7, Q10-Q14, Q35-Q42) were designed to address participants' current use of Abaco National Park including how many days they spent in the park over the past year, and the number of days they spent conducting each activity per month. Although this measure refers to past behavior, it is generally accepted that participation in outdoor recreation activities is relatively stable over time and therefore can serve as an indicator of probable future behavior (Bissell et al. 1998; Daigle et al. 2002). Respondents also were asked if they were successful in obtaining an animal on their last visit to the park and how many people were in their typical hunting party. Since the population and hunting status of game species in Abaco National Park is currently unknown, we also included six questions that asked hunters their opinions on the population and hunting status of wild boar, white-crowned pigeon, ducks, and doves.

3. **Hunter Motivations and Satisfactions**: This section included 22 questions (Q8-Q9, Q15-Q34). The first two questions (Q8-Q9) asked respondents to rank their satisfaction in regards to their last visit to the park and to their overall experiences in the park on a 5-point scale (1 = very dissatisfied to 5 = very satisfied). Similarly, a 5-point scale (1 = strongly disagree to 5 = strongly agree) was designed to measure the degree to which 19 various aspects affected the respondent's motivations for and satisfactions from hunting. The hunting aspects included those from Hayslette et al. (2001) with some modifications. Three of these statements reflected harvest-based satisfactions (obtaining food, harvesting trophy animals, shooting an animal) while the remaining 16 reflected nonharvest-based motivations and satisfactions (seeing a game animal, exercise, spending time with family and friends, testing hunting skills, getting outdoors, following tradition, becoming closer to one's primitive self, teaching a son or daughter, seeing wildlife, escape, hunting with a dog, education, excitement, solitude). In addition, participants were asked to rank their top three reasons for hunting from the list of motivations/satisfactions provided.

4. **Participatory Mapping Activity**: Questions 43-49 asked participants several questions pertaining to a map of Abaco National Park divided into five north-south segments. Using this map, we asked participants to rank the sections in order, beginning with the one in which they spend the most time hunting. Next, participants were asked which section(s) they had visited on their last trip to Abaco National Park, and in which one(s) they hunt for wild boar, ducks, doves, and white-crowned pigeon. In the final exercise we gave participants a marker and

asked them to locate three specific areas in the park that they most enjoy and record those locations by writing an "E" on the map.

5. **Attitudes toward Proposed Management**: Sixteen questions (Q50-Q64, Q70) were designed to measure attitudes toward park management. The first question solicited participants' opinions on the relative importance of management for parrot protection, protection of the entire ecosystem, and education, hunting, wildlife viewing, and tourism. The next 13 questions asked respondents to rate their level of support for 13 management actions on a 5-point scale (1 = strongly disagree to 5 = strongly agree). The final question asked respondents their opinion on who should oversee management of the park.

6. **Demographics**: The final section of the interview encompassed five demographic questions (Q71-Q75) relating to the respondent's birth place, age, occupation, nationality and education.

Before leaving for Abaco, we obtained expert review on the questionnaire by three social scientists. Comments and suggestions were incorporated into a second draft of the interview. Because the sample size of hunters on Abaco National Park was already very small, we pilot tested the questionnaire only on two Abaco hunters to determine question clarity, neutrality, time to complete the interview, and additional input on interview questions. The feedback received was incorporated into a final draft of the interview.

One set of questions (Q66-Q70), which asked respondents their desired future land uses for the park, was omitted in the analysis due to confusion among interviewees. The deficiency in this question was not detected during our pilot test of the survey.

Data Analysis

Data were entered into an Excel Spreadsheet and imported into a SPSS 12.0.1 software package for statistical analysis. Preliminary analysis included calculations of means, standard deviations, and frequency distributions.

To investigate the relationship between each motivation/satisfaction and a participant's overall satisfaction, we used correlation and step-wise regression analyses. Correlation coefficients between overall satisfaction and hunting motivations were used

to determine which motivations should be included in the regression model. The F statistic was used to identify if the regression model was significant and R^2 value used to determine the percent of variance in overall satisfaction explained by the model. We used t-values to identify which variables in the model were significant and Beta values to determine the relative importance of each variable in their relationship with overall satisfaction. To test for differences in hunter motivations/satisfactions between wild boar hunters and wild boar/bird hunters we used a t-test.

To compare hunter motivations/satisfactions and support of management actions based on age, number of years of experience, and number of days spent in the park per year, we used the Fisher's exact test due to our small sample size. For the analysis we pooled "strongly disagree" and "disagree" responses to motivations/satisfactions statements, as "disagree" and "agree" and "strongly agree" responses as "agree." Likewise, "strongly oppose" and "oppose" responses to management option statements were pooled as "oppose" and "support" and "strongly support" responses were pooled as "support."

Data from the participatory mapping activity in which participants were asked to mark their favorite hunting spots on the map were digitized into ArcGIS software and analyzed using a kernel density measure. More sophisticated methods of spatial analysis were not possible because we lacked spatial reference in our map.

Results

Characteristics of Participants

All 31 hunters interviewed were male and of Bahamian nationality (Table 3-1). Participants were generally middle-aged and experienced in hunting; the majority (58%) were between the ages of 31 and 50 and had hunted an average of 32 years (S.D. =

10.86). The mean age of hunting initiation was approximately 11 years old (S.D. = 4.61). Eighty-one percent of participants were born on Abaco and most have lived on the island for a long time, averaging 43 years. Thirty-two percent of respondents have lived locally for more than 50 years. Almost three-quarters (74%) of the hunters interviewed had not finished high school. The predominant occupations of participants were fishing (39%) and business (32%), while 22% work in construction, and 7% perform manual labor. Thirty percent of participants had attended a previous meeting about Abaco National Park.

Hunting Frequency and Participation in Other Outdoor Activities

The mean number of days participants spent in Abaco National Park over the past year was 27 days (S.D. = 37.01), however responses to this question ranged from 0-150 days. A frequency distribution of number of days spent in the park shows that the majority of participants (71%) spend 25 days or less in the park per year (Figure 3-1).

Respondents identified recreational activities they participated in from a list of 13 choices. With regards to hunting, the majority of participants (87%) hunt wild boar, 35% hunt white-crowned pigeon, 19% hunt doves, and 6% hunt ducks in the park (Table 3-2). The number of people in a respondent's hunting party ranged from 2-6 people; however, the majority (55%) hunt in parties of three people. Twenty-nine participants also checked at least one non-consumptive activity in which they participate in the park; three percent of respondents participate in two non-consumptive activities, 6% participate in four non-consumptive activities and 3% participate in five non-consumptive activities. The most popular non-consumptive activity conducted in the park is driving (23%) followed by birdwatching (10%), visiting the ocean (10%), and exploration (10%). When asked to identify their primary activity conducted in Abaco National Park, 87% cited wild boar

hunting; no participant identified a non-consumptive activity as their primary reason for visiting the park.

Temporally, wild boar hunting is most popular between the months of October and March as each month totaled over 140 person days of hunting (Figure 3-2). Duck, dove, and white-crowned pigeon hunting are most popular during the month of October, the first entire month of legal bird hunting. The total number of person days per month each non-consumptive activity is practiced is much lower than for hunting (Figure 3-3). Most activities are conducted with greatest intensity during the beginning of the year, from January through March. However, birdwatching is most popular during September and camping most popular in April.

When asked their opinion on the population and hunting status of games species in the park, the majority (74%) felt that the population of wild boar was relatively stable. As for the hunting of wild boar, most (61%) thought that more people hunted wild boar today than 10 years ago. Regarding white-crowned pigeon, hunters were divided between those who believed the pigeon population was increasing (26%), those who thought the population was decreasing (32%), and those who were not sure (32%). Most (58%) agreed that the total number of days people hunt white-crowned pigeon has been increasing. Hunters were more uncertain about the population and hunting status of ducks and doves. For ducks, 65% were not sure if the population or hunting of ducks was increasing, decreasing, or unchanging over the past 10 years. Similarly, 48% did not feel confident enough to respond about their opinions on the population and hunting status of doves.

Spatial Patterns of Hunting

To understand where participants hunt, we asked several questions pertaining to a map of the park divided into five north-south segments (Figure 3-4). Ninety-percent of hunters reported hunting in section four. However, the majority of participants hunt wild boar in all sections (Table 3-3). White-crowned pigeon hunting, although practiced in smaller numbers, also is conducted by the greatest percentage of participants in section four. This pattern is similar for duck and dove hunting (Table 3-3).

Ranking the five sections in order of how much time they spend hunting in each, participants again cited section four as the one in which they spend the most time followed by section three, one, five and two. On a subsequent question that asked participants which section(s) they had visited on their last trip to the park we found corroborating results – the greatest number of people had visited section four followed again by section three, one, five and two.

The intense use and importance of section four was confirmed in the final mapping exercise in which we asked participants to identify and mark their three favorite places in the park. Each favorite place was digitized as a point into ArcGIS software. We then calculated a kernel density from the spatial arrangement of hunters' favorite places to show bounded areas where 50%, 75%, and 90% of hunter favorite places fall. Results show a large cluster of favorite places in the center of the park (corresponding to sections three and four) along with a smaller clump in the northern quarter of the park (corresponding to section one) (Figure 3-5).

Hunter Satisfaction

The mean value for hunter satisfaction with overall experiences in the park was 3.93 ± 0.85. When asked about satisfaction with their last visit to the park, mean

satisfaction was 3.50 ± 0.97. Overall satisfaction and satisfaction with a hunter's last visit to the park were positively correlated ($r = 0.526$, $p = 0.002$). A hunter's satisfaction with his last visit to the park did not appear to be affected by his success in obtaining an animal ($t = 1.23$, $p = 0.225$).

In general, respondents disagreed or strongly disagreed with harvest-based satisfactions except for hunting to obtain food, for which respondents were relatively divided (52% strongly disagreed or disagreed, 6% were neutral, and 42% agreed or strongly agreed) (Table 3-4). Most (>60%) agreed or strongly agreed with nonharvest-based satisfaction statements except for becoming closer to one's primitive self, teaching a daughter to hunt, and spending time alone.

Correlations between overall satisfaction and hunting motivations showed that only two motivations – the importance of teaching one's daughter to hunt and the feeling that seeing wildlife is more important than harvesting wildlife – were significantly correlated with overall satisfaction (Table 3-5). These two motivations were entered into a regression analysis to determine the predictability of overall satisfaction based on responses to these two motivations. The regression model accounted for 34% of the variance in hunter satisfaction with overall experiences in the park (Table 3-6). The only significant predictor of overall satisfaction was the opinion that seeing wildlife was more important than harvesting wildlife.

We found positive correlations between several variables (Table 3-5). Most notably, there were strong positive correlations between spending time with family and friends, and teaching a son or daughter to hunt. Likewise, the correlation between escaping the worries of everyday life, learning about game animals, and testing hunting

skills was positive. Harvest-based statements showed an inverse relationship with a number of nonharvest-based statements (seeing game animals, getting exercise, spending time with family and friends, getting outdoors and enjoying nature, teaching a son or daughter to hunt, seeing wildlife, hunting with a dog, and hunting for the excitement). Of these, a significant negative correlation existed only between hunting to harvest a trophy animal and seeing wildlife. Conversely, we found some indication that harvest-based statements were positively related to testing hunting skills, getting closer to one's primitive self, hunting because it is a tradition in one's family, escaping the worries of everyday life, learning about game animals, and being alone. However, the correlation was only significant between hunting to obtain food and learning about game animals.

We found no significant differences in responses to hunter satisfactions and motivations between hunters who hunt only wild boar and those who hunt both wild boar and doves, ducks, and/or white-crowned pigeon (Table 3-7).

Our comparisons of hunter motivations/satisfactions and age show that the importance of harvesting trophy animals differs significantly between older and younger hunters (Table 3-8); 80% of older hunters disagreed with hunting to harvest a trophy animal compared to 42% of younger hunters. There we no significant differences in hunter motivations based on the number of years of hunting experience (Table 2-9). When analyzed based on number of days hunting in the park, we found that the importance of shooting an animal differs significantly between hunters who spend more versus less days in the park per year (Table 3-10); 100% of participants who spend more than 40 days in the park per year disagreed with the importance of shooting an animal while 52% of participants who spend less than 10 days in the park per year disagreed.

Perceptions of Management Practices

As a multiple use area, management of Abaco National Park must meet several objectives including protection of the Bahama parrot and its habitat, protection of the entire ecosystem and its function, opportunities for student and visitor education, tourism, hunting, and opportunities to view wildlife. Working under the constraints of limited resources, each of these components must be weighed in importance relative to the others. To gain insight into which elements hunters felt are most important and should receive the most resources, we asked them to rank each of the above objectives in order of their importance. To this question we found that many hunters interviewed (38%) ranked protection of the Bahama parrot and its habitat as the most important followed by protection of the entire ecosystem (25%), increased opportunities for education (19%), improving opportunities for tourism (9%), improving hunting (6%), and improving opportunities for wildlife viewing (3%).

A variety of management policies and actions exist that can assist managers of protected areas in achieving the goals of both ecosystem protection and recreation. In this study we asked respondents the degree to which they would support or oppose 13 management activities. Participants were supportive of the majority of proposed management actions (Figure 3-6). Respondents were generally favorable towards the expansion of park infrastructure including improving some of the current roads, creating more and improving the current hiking trails, and building a visitor center. In contrast, creating new roads in the park ranked significantly lower than all other proposed management options. Management that may regulate hunting more closely, such as employment of an on-site ranger, the establishment of a hunting season, and the requirement of hunting licenses, also were supported. Sixty-one percent of respondents

either supported or strongly supported setting aside areas for parrot protection where humans would be excluded. This number increased to 87% when these areas would only be restricted during the parrot breeding season.

Only one management option, creating new roads, showed significant differences in responses based on age (Table 3-11). For this proposed management option, younger hunters disagreed more with creating more roads in the park (92%) compared to older hunters (40%). Likewise, participants with less than 25 years of hunting experience were significantly more opposed (100%) to creating more roads compared to hunters with more than 40 years of hunting experience (36%) (Table 3-12). Days spent in the park per year did not significantly affect support of proposed management options (Table 3-13).

Regarding who should oversee management of the park, the majority (58%) suggested a combination of the Bahamas National Trust (the current quasi-governmental managing agency) and local management. Sixteen percent thought the Bahamas National Trust alone should manage the park, while 16% felt management should be conducted solely by locals; 10% did not know or had no opinion.

Discussion

Spatial and Temporal Recreation Patterns

It is clear that the hunters interviewed have strong ties to both Abaco National Park and hunting. Most respondents have lived on the island their entire life and have spent part of their free time since childhood hunting in the park. As the age of hunting initiation for Abaco hunters is approximately 11 years of age, our results support previous studies citing the importance of childhood hunting initiation in developing hunting behavior and reports of initiation rates ≥ 90% before age 20 (Hayslette et al. 2001; O'learly et al. 1987).

The primary reason for examining recreational levels was to determine where and when hunting and other activities occur in the park so management can be designed that best matches these needs. Taking into account the average number of days spent in the park per year and the temporal distribution of hunting trips, one management option to mitigate potential conflict between hunters and non-consumptive recreationists is to temporally zone areas in the park for hunting. In other words, the same area could be managed for hunting during the winter months and for non-consumptive recreation during the remaining months of the year. This same idea could be applied to ecologically sensitive areas. Although the few hunters who hunt regularly year-round may be dissatisfied with this option, it would appear to have little impact on the majority.

Spatially, all participatory mapping exercises supported the same result – participation was highest in section four. This area includes the only wetland in the park and was noted by several hunters as the best place to find wild boar because of the abundant food and water available. Hunters likely return to areas where they have seen a large number of game species and enjoyed a pleasant experience (Frey et al. 2003). Therefore, maintaining access of these areas for hunting, if possible, is essential to sustaining hunters' enjoyment of the park (Thomas et al. 1973).

Hunter Motivations and Satisfactions

Respondents were relatively satisfied with their last visit to the park and overall experiences in the park despite the fact that the park currently has little active management. A hunter's success in obtaining an animal on his last visit to the park did not significantly affect his rating of satisfaction, which conflicts with previous studies that suggest or show a correlation between satisfaction and harvest (Decker et al. 1980; Hazel et al. 1990; Wynveen et al. 2005).

Harvest and Nonharvest Based Determinants

Our results support the multiple-satisfaction model of hunting and confirm past studies that suggest nonharvest-based satisfactions are more important than harvest-based satisfactions (Hammitt et al. 1990; Hendee 1974; Potter et al. 1973; Vaske et al. 1986). In our study, the four highest rated motivations were the opportunity to hunt with a dog, see game animals, get outdoors and enjoy nature, and excitement. Hunters also agreed with statements reflecting satisfactions based on exercise, companionship, skill, tradition, teaching a son or daughter to hunt, seeing wildlife, escape, and education. These reflect similar important non-harvest based satisfactions found in a number of previous studies conducted in the United States (Hammitt et al. 1990; Hazel et al. 1990; Wynveen et al. 2005). Therefore, there do not appear to be large differences between U.S. and Abaco hunters in their agreement with a range of nonharvest-based satisfactions.

Harvest-based satisfactions were relatively unimportant to most hunters as they disagreed with statements relating to harvesting an animal for trophy and shooting or taking shots at an animal. Hunter responses to the importance of hunting for food showed the greatest variation (S.D. 1.26). Although a minority (48%) of respondents agreed or strongly agreed with this statement, 62% of these respondents ranked food as their number one, two, or three reason for hunting. Additionally, the motivation to obtain food was inversely related to ten of the fifteen non-harvest based statements, providing evidence that hunters who are motivated by the desire to obtain food derive relatively little satisfaction from the company or setting while hunting. The non-harvest based statements positively related to obtaining food included items such as testing one's hunting skills, getting closer to one's primitive self, and learning about game animals – motivations that directly contribute to success in bagging an animal for food. Therefore,

it appears that there is a strong division between participants who hunt for food and are motivated by factors that contribute to the success of obtaining food and those who are not. This result is similar to other research findings, which have shown that hunters vary considerably on the importance of harvest variables (Wynveen et al. 2005). While discussing the issue further with hunters during the interview, I found that no hunter interviewed relied on wild meat for subsistence, but those who responded favorably towards hunting for food greatly preferred the taste of wild game over traditional store-bought meat.

Because not all hunters were motivated by the same set of factors – some seek to bring home wild meat while others pursue an opportunity for personal growth or companionship – providing a range of hunting opportunities will result in a broader range of benefits to Abaco hunters.

Predictors of Overall Satisfaction

Our results from the stepwise multiple regression analysis showed that the determinants explained only 34% of the variance in overall hunter satisfaction. This result is not encouraging considering that previous hunter satisfaction models have explained between 30% and 50% of the variance (Hammitt et al. 1990; McCullough and Carmen 1982; Vaske et al. 1986).

Unlike a number of past studies, we did not find an appreciation of the natural outdoors (Hammitt et al. 1990), number of game seen (Frey et al. 2003) or determinants related to companionship (Potter et al. 1973) to be significant predictors of hunter satisfaction. Conversely, we found that we were able to predict the outcome of overall satisfaction only based on a person's motivation to see wildlife. The lack of variation in many of our tested nonharvest-based determinants, including enjoyment of the outdoors,

seeing game animals, hunting with a dog, excitement and being with family and friends, may be one reason these determinants were not significant predictors of overall hunter satisfaction. An additional explanation may be that our results were confounded by our small sample size and large number of explanatory variables. To further understand predictors of overall satisfaction among Bahamian hunters, the sample size could be increased to include hunters throughout the Bahamas.

Determinants related to companionship were positively correlated. Likewise, personal growth determinants, such as escape, learning, and refining skills were positively correlated. This suggests that future studies may need to use only one determinant from each correlated group when testing these motivations.

Although we surmised that harvest-based and nonharvest-based motivations would be negatively correlated, we were only partially correct. Determinants related to companionship and nature showed an inverse relationship with harvest-based statements while personal growth motivations, such as escape, learning, being alone, and testing skills showed a positive relationship with harvest-based statements. This may suggest that hunters who routinely hunt in a group are more concerned with the overall hunting experience, including the setting and company, over bagging an animal. On the other hand, hunters who want to bag an animal, bring home food or display a trophy are interested in nonharvest-based motivations related to personal growth, such as skill building and learning about game animals, which can aid them in the harvest of an animal.

Assessment of Hypotheses

Contrary to our first hypothesis, we did not find significant differences in any component of hunter satisfaction between wild boar hunters and wild boar/bird hunters.

The specific determinants for hunting satisfaction have been shown to differ between species such as deer (Hammitt et al. 1990), dove (Hayslette et al. 1990), pheasants (Frey et al. 2003) and turkeys (Hazel et al. 1990); however, we did not find evidence of significant differences in Abaco hunters. The findings of one study showed that turkey hunters ranked the opportunity to hunt with a dog among the lowest at contributing to their satisfaction (Wynveen et al. 2005). Because turkey hunters derived little satisfaction from hunting with dogs, we suspected that Abaco bird hunters may be less motivated by this element. However, wild boar and wild boar/bird hunters did not differ significantly on this factor. The lack of significant differences between wild boar and wild boar/bird hunters may be due to the small sample size and the overlap in the two categories. We were unable to compare people who hunt wild boar only to those who hunt birds only because all active hunters interviewed hunt wild boar.

Our second hypothesis that age and experience would be positively associated with nonharvest-based satisfactions was only partially correct. For most of the tested motivations/satisfactions, we did not find significant differences as a result of age or experience. Unlike previous studies (Hazel et al. 1990; Jackson and Anderson 1985), we did not find significant differences in satisfactions related to nature based on experience. We did find, however, that older hunters disagreed significantly more with the statement, "I hunt to harvest trophy animals" than younger hunters. It is possible that older hunters already have obtained trophies, such as wild boar tusks, from earlier hunts and therefore, no longer view the attainment of an animal for trophy as a motivation for hunting.

Our third hypothesis that the number of days a hunter spends in the park would be positively associated with nonharvest-based satisfactions was partially upheld. In one

study, hunters who spend more time in the field were more motivated to improve their hunting skills than hunters who spend less time hunting (Wynveen et al. 2005). Our results do not support this finding. The only significant difference we found between hunter satisfactions and the number of days they spend in the park was for the statement, "I must shoot an animal to have a satisfying hunt." As expected, hunters who spend more time in the park may feel less pressured to come home with a kill each time.

Perceptions of Management Practices

The majority of hunters interviewed did not appear opposed to increases in tourism or expanding opportunities for other user groups such as students and ecotourists. Even though the expansion of park infrastructure may increase visitation, hunters showed support for improving the current roads, creating more and improving current hiking trails and building a visitor center. The only management option that hunters opposed was the construction of new roads. Historically, Abaco Island was logged heavily and as a result, old logging roads cover the southern half of the island. Although many of these roads have been overgrown, a number of them are still passable by four-wheel drive vehicles. Therefore, many hunters felt that new roads were unnecessary considering the large number of roads already in the park.

When analyzed based on age and experience, we found that older, more experienced hunters were more likely to support the creation of new roads in the park. Perhaps older hunters can no longer walk the long distances through the park to locate game animals and therefore desire more access via roads throughout the park. Future management should consider that a third of current hunters interviewed are older than 50 and should provide continuing opportunities for those hunters to recreate comfortably in the park.

Further investigation into hunters' attitudes toward several proposed management policies showed that most people are willing to accept restrictions. Hunters were relatively favorable toward increasing hunting regulations such as requiring a hunting license, employing an on-site ranger, and establishing a hunting season. Past studies on anglers have shown that when faced with different management scenarios, people prefer the scenario with the most liberal harvest restrictions (Gillis & Ditton 2002; Oh et al. 2005). Therefore, our results corroborate the opinion that consumptive recreationists often demonstrate long-term concerns for game species by accepting management restrictions.

Out of the 13 proposed management options, hunters were the most supportive of establishing a hunting season. Many hunters believed that a winter boar season would allow the population to recover in the summer months when piglets are born. Although establishing a hunting season would aid in temporal management of the park to reduce conflicts between hunters and non-consumptive recreationists if they arise, it may not be the desired management option ecologically. As an exotic species, wild boar substantially affect natural ecosystems. Rooting by boar for herbs and invertebrates can increase the amount of bare ground, increase the loss of nutrients from the forest, and impede woody plant regeneration (Simberloff et al. 2003). Furthermore, wild boar have been linked to increased incidence of disease (Hone 2002). Consequently, many national parks around the world have enacted management to eradicate wild boar (Hone 2002; Simberloff et al. 2003).

In Abaco National Park, hunters are working towards the opposite goal. They are not only willing to accept the restrictions of a hunting season to increase the boar

population, but some individuals have taken the matter into their own hands by raising wild boar on their own property and then re-releasing them into the wild. This may be an area where education and communication between hunters and managers can help derive management actions that satisfy both parties.

Although only 30% of participants had attended a meeting about the park in the past five years, most hunters acknowledge the importance of protecting the Bahama parrot and the ecosystem of Abaco National Park as the majority of hunters interviewed (63%) ranked these two items as most important to management. A study of Florida residents who have lived in the periphery of a watershed for an average of 30 years showed similar results in which the management activities receiving the highest levels of support by respondents were those related to ecosystem and habitat protection (Appelson 1999). These studies indicate that positive attitudes towards conservation of an area may be related to long-time residency of that area.

Similarly, when asked their opinion on the establishment of areas for parrot protection where humans would be excluded, 42% supported and 20% strongly supported this option. When we added an alternative option of temporally managing these areas so they are restricted only during the parrot breeding season, 55% supported and 32% strongly supported this option. In a number of studies, birds were found to be most sensitive to disturbance during the breeding season (Gotmark 1992; Knight & Cole 1995). Therefore, a reasonable management option might be temporal management of hunting areas around the parrot breeding season – May through September. As these months have relatively fewer total hunting days (Figure 3-2), this may be a promising management solution.

The interview also explored local hunters' views on the managing agency of Abaco National Park. The findings reveal strong support for a new management scheme with the participation of local communities in management. Slightly over half of the hunters interviewed (58%) want to see management as a partnership between the current managing agency, the Bahamas National Trust, and the local community, while 16% want management of the park to be dictated solely by locals.

Conclusion

The Bahamas National Trust is preparing to develop its first management plan for Abaco National Park. From previous experience, managers know that this cannot be done without the involvement of local people. Participation from locals is vital to ensuring that management properly matches the needs and desires of park users as well as generating support for management goals and objectives. In this study, we sought input from a large and historical user group of Abaco National Park – hunters. Prior to this study little was known about their spatial and temporal use of the park, game species hunted, factors from which they derive satisfaction from hunting, and opinions on future management activities.

Through personal interviews, we were able to obtain a comprehensive understanding of this key stakeholder group. We found that despite being a group of all males of Bahamian nationality, Abaco hunters are rather diverse. Hunters range significantly in their age, hunting experience, number of visits to the park each year, species of game hunted, participation in non-consumptive activities, and relative importance of hunting motivations/satisfactions, specifically the desire to harvest animals for food. Future management must be equally as diverse as Abaco hunters to provide opportunities for each type of hunter.

Our results further supported the multiple-satisfactions model of hunter satisfaction and confirmed past studies that have shown the importance of nonharvest-based determinants over those that are harvest-based. Providing for these nonharvest-based satisfactions is much more difficult than implementing management to increase harvest-based satisfactions. As hunters were strongly motivated by getting outdoors and seeing wildlife, management should work to maintain the scenic beauty and ecosystem of the park for social as well as ecological reasons. Additionally, many hunters were motivated by opportunities for interaction among family and friends; managers could provide for this interaction by creating picnic areas where hunters could meet for lunch or instituting family hunting days where families from around the island could gather to enjoy a day of hunting in the park. Further research is needed to further determine how to appropriately provide for the varying motivations of hunters.

Further regarding hunter satisfaction, we found that motivations and satisfactions of Abaco hunters are not largely different from those conducted in the U.S. Because this was one of the first studies of hunter satisfaction outside the U.S., more research on hunter satisfaction in places other than the U.S. are needed to determine if satisfaction determinants vary between country and culture.

Hunters in our study were favorable towards most management options. Most recognized the importance of protecting the Bahama parrot and preserving the entire ecosystem of the park, which may be a factor of local pride in having lived adjacent to the park for an average of 43 years. We also found support for the opinion that consumptive recreationists often demonstrate long-term concerns for game species by accepting management restrictions. Assessing potential hunter restrictions in conjunction

with ecological constraints will further clarify which management activities will benefit both hunters and the park ecosystem.

As management planning for Abaco National Park progresses, hunters continuing involvement needs to be a priority so they are supportive of management decisions vital to the long-term success of the park. Most hunters desire to become partners with the Bahamas National Trust in the management of the park. To do so will require continued communication between the groups as well as compromise. Other stakeholder groups also must become involved and provided with an opportunity to be partners in the management of the park. If all this can be accomplished, Abaco National Park will likely be an example of success in which both human as well as ecological needs are realized.

Table 3-1. Demographic summary of participants.

Category		Percent of Participants
Gender		
	Male	100
Nationality		
	Bahamian	100
Age		
	21-30	10
	31-40	29
	41-50	29
	51-60	19
	61 and over	13
Birth Place		
	Abaco, Bahamas	80
	Nassau, New Providence, Bahamas	10
	United States	10
Years on Abaco		
	0-10	3
	11-20	0
	21-30	10
	31-40	29
	41-50	26
	51 and over	32
Current Town of Residence		
	Marsh Harbour	71
	Cherokee	19
	Casurina Point	7
	Crossing Rocks	3
Education		
	Less than high school graduate	74
	Graduated high school	23
	Attended some college	3

Table 3-2. Participation rates in recreation activities.

Activity	Participation Rate (%)
Consumptive Activities	
Wild Boar Hunting	87
White-Crowned Pigeon Hunting	35
Dove Hunting	19
Duck Hunting	6
Fishing	0
Non-Consumptive Activities	
Driving	23
Birdwatching	10
Visiting the Ocean	10
Exploration	10
Caving	6
Camping	6
Hiking	3
Education	0

Table 3-3. Hunting of species in each park section, reported as a percentage of total respondents.

	Section				
Species Hunted	1	2	3	4	5
Wild Boar	87	81	84	90	84
White-Crowned Pigeon	13	0	19	35	19
Duck	10	13	16	23	16
Dove	0	0	0	6	0

Table 3-4. Mean and percent response to agreement with 19 components of hunter satisfaction.

Statement	Mean (S.D.)	Percent Response				
		Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Harvest-Based						
I hunt to obtain food	2.9 (1.26)	10	42	6	32	10
I hunt to harvest trophy animals	2.4 (1.09)	16	55	0	29	0
I must shoot an animal to have a satisfying hunt	2.3 (1.00)	19	55	6	20	0
I am satisfied if I take shots at an animal	2.2 (0.92)	16	62	6	16	0
Nonharvest-Based						
Hunting with a hunting dog is important to me	4.5 (0.63)	0	0	6	39	55
I hunt to get outdoors and enjoy nature	4.4 (0.50)	0	0	0	58	42
I am satisfied if I see a game animal	4.4 (0.50)	0	0	0	61	39
I hunt for the excitement	4.4 (0.49)	0	0	0	65	35
I hunt to spend time with family and friends	4.3 (0.53)	0	0	3	65	32
If I had (have) a son, it would be important to me to teach him to hunt	4.2 (0.55)	0	0	6	68	26
Hunting is a tradition in my family	4.2 (0.90)	0	10	3	48	39
The exercise I receive during hunting is important to me	4.1 (0.87)	0	10	3	55	32
I enjoy testing my hunting skills against the game I am hunting	3.9 (0.63)	0	6	3	81	10
Seeing wildlife while hunting is more important than harvesting wildlife	3.9 (1.00)	0	16	3	52	29
I hunt to escape from the worries of everyday life	3.8 (0.90)	0	16	0	68	16
I hunt to learn more about the animals I hunt	3.5 (0.99)	0	26	13	52	9
If I had (have) a daughter, it would be important to me to teach her to hunt	3.3 (1.15)	0	39	13	32	16
I hunt to become closer to my primitive self	3.0 (1.05)	6	26	33	29	6
I hunt to spend time alone	2.8 (1.25)	10	48	3	29	10

Table 3-5. Correlation coefficients between motivation/satisfaction statements.

	1	2	3	4	5	6	7	8	9	10
1. Overall Satisfaction	--									
2. Obtain Food	.244	--								
3. Obtain Trophy	-.006	.325	--							
4. Shoot Game	-.136	.261	.142	--						
5. Take Shots	.062	-.183	-.031	.261	--					
6. See Game	.140	-.261	-.188	-.276	-.052	--				
7. Exercise	.143	-.298	-.009	-.221	.263	.220	--*			
8. Be with Family	.191	-.259	-.103	-.336	-.139	.702**	.372*	--		
9. Test Skills	.116	.289	.187	.080	-.147	.083	.073	.259	--	
10. Enjoy Nature	-.013	-.093	.033	-.223	-.068	.398*	.286	.657*	.300	--
11. Family Tradition	.188	.074	.167	.026	-.046	.305	.065	.390*	.373*	.067
12. Primitive Self	.189	.104	.163	.278	.338	.232	.362*	.223	.307	.290
13. Teach Son	.193	-.179	.047	-.037	.174	.485**	.187	.529**	.235	.327
14. Teach Daughter	.356*	-.190	.123	-.262	.257	.403*	.373*	.419*	.161	.210
15. See Wildlife	.582**	-.193*	-.373*	-.284	.125	.592*	.123	.479**	-.007	.189
16. Escape	.247	.105	.106	.011	.086	.220	.319	.313	.571**	.229
17. Learn	.310	.386*	.281	.080	-.079	.107	.410*	.249	.528**	.142
18. Hunt with Dog	-.252	-.023	-.112	-.260	-.080	.128	.095	.267	-.003	.182
19. Excitement	.137	-.106	.087	-.195	-.036	.518*	.231	.623**	.077	.736**
20. Be Alone	.175	.201	.307	.041	-.048	-.144	.048	-.114	.280	-.026

* Indicates values significant at $p \leq 0.05$; ** Indicates values significant at $p \leq 0.01$.

Table 3-5 continued.

	11	12	13	14	15	16	17	18	19	20
1. Overall Satisfaction										
2. Obtain Food										
3. Obtain Trophy										
4. Shoot Game										
5. Take Shots										
6. See Game										
7. Exercise										
8. Be with Family										
9. Test Skills										
10. Enjoy Nature										
11. Family Tradition	--									
12. Primitive Self	.101	--								
13. Teach Son	.431*	.179	--							
14. Teach Daughter	.312	.268	.609**	--*						
15. See Wildlife	.310	.066	.415*	.449*	--					
16. Escape	.075	.360*	.274	.299	-.012	--				
17. Learn	. 364*	.337	.149	.331	.064	.644**	--			
18. Hunt with Dog	-.203	.077	.197	.329	-.162	.144	-.041	--		
19. Excitement	.475**	.304	.392*	.307	.392*	-.017	.140	-.004	--	
20. Be Alone	-.268	-.122	-.050	.128	-.251	.417*	.153	-.004	-.377*	--

* Indicates values significant at $p \leq 0.05$; ** Indicates values significant at $p \leq 0.01$.

Table 3-6. Stepwise multiple regression analysis for high overall satisfaction.

Prediction	R Square	Beta (Standardized Coefficient)	t-value	p-value
See Wildlife	0.339	0.582	3.852	0.001

Note: F = 14.840 (N = 31, p = .001); Overall satisfaction = 1.976 + .498 (See Wildlife).

Table 3-7. Comparison of responses to hunting motivation/satisfaction statements between people who hunt wild boar only (N=17) and those who hunt both wild boar and ducks, doves and/or white-crowned pigeon (N=11).

Statement	Mean (S.D.): Wild Boar Only	Mean (S.D.): Wild Boar and Bird	t-value	P-value
Harvest Based				
I hunt to obtain food	2.9 (1.27)	3.3 (1.19)	-0.83	0.418
I hunt to harvest trophy animals	2.3 (1.05)	2.6 (1.12)	-0.81	0.427
I am satisfied if I take shots at an animal	2.4 (0.86)	2.1 (1.08)	0.79	0.439
I must shoot an animal to have a satisfying hunt	2.4 (1.06)	2.2 (1.04)	0.33	0.663
Nonharvest-Based				
Hunting with a hunting dog is important to me	4.6 (0.62)	4.5 (0.69)	0.52	0.607
I hunt to get outdoors and enjoy nature	4.5 (0.51)	4.4 (0.50)	0.54	0.592
I am satisfied if I see a game animal	4.4 (0.86)	4.4 (1.08)	0.25	0.808
I hunt for the excitement	4.3 (0.47)	4.4 (0.50)	-0.37	0.718
I hunt to spend time with family and friends	4.4 (0.51)	4.2 (0.60)	1.05	0.308
If I had (have) a son, it would be important to me to teach him to hunt	4.3 (0.58)	4.2 (0.60)	0.29	0.770
Hunting is a tradition in my family	4.2 (1.01)	4.1 (0.83)	0.24	0.810
The exercise I receive during hunting is important to me	4.1 (0.99)	4.1 (0.83)	-0.47	0.939
I enjoy testing my hunting skills against the game I am hunting	4.0 (0.35)	4.0 (0.77)	0.00	1.000
I hunt to escape from the worries of everyday life	3.9 (0.83)	4.0 (0.77)	-0.19	0.850
Seeing wildlife while hunting is more important than harvesting wildlife	3.9 (1.03)	3.9 (1.04)	0.08	0.937
I hunt to learn more about the animals I hunt	3.4 (1.00)	3.6 (1.03)	-0.57	0.574
If I had (have) a daughter, it would be important to me to teach her to hunt	3.1 (1.17)	3.5 (1.29)	-0.70	0.492
I hunt to become closer to my primitive self	3.1 (1.14)	3.1 (1.04)	-0.08	0.940
I hunt to spend time alone	2.9 (1.32)	3.0 (1.18)	-0.25	0.808

Table 3-8. Effect of age on hunter satisfactions. Percentage of respondents in each age category that disagreed, were neutral or agreed with the statement. Fisher's exact test p-values ≤.05 indicate significant differences between age categories.

	25-40 years old			41-50 years old			51 and above			
Statement	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	p-value
Harvest-Based										
I hunt to obtain food	16	3	19	13	3	13	23	0	10	.576
I hunt to harvest trophy animals	16	0	23	29	0	0	26	0	6	.024
I must shoot an animal to have a satisfying hunt	29	3	6	26	0	3	19	3	10	.766
I am satisfied if I take shots at an animal	26	0	13	23	3	3	29	3	0	.164
Nonharvest-Based										
Hunting with a hunting dog is important to me	0	6	32	0	0	29	0	0	32	.
I hunt to get outdoors and enjoy nature	0	0	39	0	0	29	0	0	32	.
I am satisfied if I see a game animal	0	0	39	0	0	29	0	0	32	.
I hunt for the excitement	0	0	39	0	0	29	0	0	32	.
I hunt to spend time with family and friends	3	0	35	0	0	29	0	0	32	.
If I had (have) a son, it would be important to me to teach him to hunt	0	0	35	0	6	23	0	0	32	.277
Hunting is a tradition in my family	0	0	39	6	0	23	3	3	26	.228
The exercise I receive during hunting is important to me	6	0	32	0	3	26	3	0	29	.
I enjoy testing my hunting skills against the game I am hunting	0	0	39	0	3	26	6	0	26	.146
I hunt to escape from the worries of everyday life	10	0	29	0	0	29	6	0	26	.512
Seeing wildlife while hunting is more important than harvesting wildlife	3	3	32	3	0	26	10	0	23	.476
I hunt to learn more about the animals I hunt	10	10	19	6	0	23	10	3	10	.556
If I had (have) a daughter, it would be important to me to teach her to hunt	10	6	23	13	0	16	16	6	10	.214
I hunt to become closer to my primitive self	13	10	16	6	13	10	13	10	10	.815
I hunt to spend time alone	29	0	10	10	3	16	19	0	13	.312

Table 3-9. Effect of experience on hunter satisfactions. Percentage of respondents in each experience category that disagreed, were neutral or agreed with the statement. Fisher's exact test p-values ≤.05 indicate significant differences between categories.

	10-25 years			26-39 years			40-50 years			
Statement	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	p-value
Harvest-Based										.
I hunt to obtain food	10	3	16	16	0	19	26	3	6	.237
I hunt to harvest trophy animals	16	0	13	23	0	13	32	0	3	.199
I must shoot an animal to have a satisfying hunt	19	3	6	29	0	6	26	3	6	.821
I am satisfied if I take shots at an animal	19	3	6	26	0	10	32	3	0	.421
Nonharvest-Based										
Hunting with a hunting dog is important to me	0	3	26	0	3	32	0	0	35	.300
I hunt to get outdoors and enjoy nature	0	0	29	0	0	35	0	0	35	.
I am satisfied if I see a game animal	0	0	29	0	0	35	0	0	35	.
I hunt for the excitement	0	0	29	0	0	35	0	0	35	.633
I hunt to spend time with family and friends	0	3	26	0	0	35	0	0	35	.300
If I had (have) a son, it would be important to me to teach him to hunt	0	0	29	0	6	26	0	0	35	.055
Hunting is a tradition in my family	0	0	29	3	0	32	6	3	26	.756
The exercise I receive during hunting is important to me	6	0	23	0	3	32	3	0	32	.409
I enjoy testing my hunting skills against the game I am hunting	0	0	29	0	3	32	6	0	29	.313
I hunt to escape from the worries of everyday life	10	0	19	3	0	32	6	0	29	.457
Seeing wildlife while hunting is more important than harvesting wildlife	3	3	23	3	0	32	10	0	26	.542
I hunt to learn more about the animals I hunt	3	10	16	10	0	26	13	3	19	.595
If I had (have) a daughter, it would be important to me to teach her to hunt	10	3	16	10	3	23	19	6	10	.323
I hunt to become closer to my primitive self	10	10	10	10	10	16	13	13	10	1.000
I hunt to spend time alone	23	0	6	13	3	19	23	0	13	.239

Table 3-10. Effect of number of days hunting in the park per year on hunter satisfactions. Percentage of respondents in each category that disagreed, were neutral or agreed with the statement. Fisher's exact test p-values ≤.05 indicate significant differences between categories.

	0-10 days			11-40 days			41-174 days			
Statement	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	p-value
Harvest-Based										
I hunt to obtain food	19	0	16	19	0	13	13	6	13	.483
I hunt to harvest trophy animals	29	0	6	26	0	6	19	0	13	.586
I must shoot an animal to have a satisfying hunt	19	0	16	19	6	6	32	0	0	.045
I am satisfied if I take shots at an animal	29	0	6	23	3	6	26	3	3	.821
Nonharvest-Based										
Hunting with a hunting dog is important to me	0	3	32	0	3	29	0	0	32	.
I hunt to get outdoors and enjoy nature	0	0	35	0	0	32	0	0	32	.
I am satisfied if I see a game animal	0	0	35	0	0	32	0	0	32	.
I hunt for the excitement	0	0	35	0	0	32	0	0	32	.
I hunt to spend time with family and friends	0	3	32	0	0	32	0	0	32	.
If I had (have) a son, it would be important to me to teach him to hunt	0	3	32	0	0	29	0	3	29	.
Hunting is a tradition in my family	3	0	32	0	0	32	6	3	23	.409
The exercise I receive during hunting is important to me	3	3	29	3	0	29	3	0	29	.
I enjoy testing my hunting skills against the game I am hunting	3	0	32	0	3	29	3	0-	29	.910
I hunt to escape from the worries of everyday life	6	0	29	6	0	26	0	3	29	.300
Seeing wildlife while hunting is more important than harvesting wildlife	3	3	29	10	0	23	3	0	29	.416
I hunt to learn more about the animals I hunt	13	3	19	10	0	23	3	10	19	.591
If I had (have) a daughter, it would be important to me to teach her to hunt	16	6	13	16	3	13	6	3	23	.455
I hunt to become closer to my primitive self	10	16	10	10	6	16	13	10	10	.693
I hunt to spend time alone	16	3	16	26	0	6	16	0	16	.536

Table 3-11. Effect of age on the support of proposed management options. Percentage of respondents in each category that disagreed, were neutral or agreed with the statement. Fisher's exact test p-values ≤.05 indicate significant differences between categories.

	25-40 years old			41-50 years old			51 and above			
Management Option	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	p-value
Create more roads	35	0	3	23	0	6	13	3	16	.049
Improve current roads	13	3	23	13	0	16	3	0	29	.259
Create more walking trails	13	3	23	10	3	16	3	6	23	.758
Better maintain current walking trails	0	3	35	3	0	26	6	3	23	.521
Provide trash cans	3	0	35	0	0	29	6	0	26	.481
Build a visitor center with information	10	6	23	0	0	29	3	3	26	.322
Employ an on-site ranger	6	0	32	0	3	26	0	6	26	.298
Establish areas to protect parrot habitat where humans are excluded	13	0	26	6	6	16	10	3	19	.664
Establish areas to protect parrot habitat where humans are excluded but only during the breeding season	0	0	39	3	6	19	0	3	29	.114
Set up zones in the park where different activities and management should take place	6	3	29	6	3	19	3	6	23	.953
Restrict hunting to certain times of the year throughout the entire park	3	0	35	3	0	26	3	0	29	1.000
Require licenses for hunting	6	10	23	3	3	23	10	6	16	.814
Build rest areas throughout the park	3	13	23	0	3	26	0	16	16	.261

Table 3-12. Effect of experience on the support of proposed management options. Percentage of respondents in each category that disagreed, were neutral or agreed with the statement. Fisher's exact test p-values ≤.05 indicate significant differences between categories.

	10-25 years			26-39 years			40-50 years			
Management Option	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	p-value
Create more roads	29	0	0	29	0	6	13	3	19	.009
Improve current roads	13	0	16	10	3	23	6	0	29	.536
Create more walking trails	13	6	10	6	3	26	3	6	26	.286
Better maintain current walking trails	0	3	26	3	0	32	6	3	26	.705
Provide trash cans	0	0	29	3	0	32	6	0	29	.758
Build a visitor center with information	6	6	16	3	0	32	3	3	29	.389
Employ an on-site ranger	3	0	26	3	0	32	0	10	26	.118
Establish areas to protect parrot habitat where humans are excluded	6	0	23	10	6	19	13	3	19	.826
Establish areas to protect parrot habitat where humans are excluded but only during the breeding season	0	0	29	3	6	26	0	3	32	.662
Set up zones in the park where different activities and management should take place	3	3	23	10	0	26	3	10	23	.401
Restrict hunting to certain times of the year throughout the entire park	3	0	26	3	0	32	3	0	32	.
Require licenses for hunting	3	6	19	10	6	19	6	6	23	.978
Build rest areas throughout the park	3	10	16	0	6	29	0	16	19	.384

Table 3-13. Effect of days hunting on the support of proposed management options. Percentage of respondents in each category that disagreed, were neutral or agreed with the statement. Fisher's exact test p-values ≤.05 indicate significant differences between categories.

	0-10 days			11-40 days			41-174 days			
Management Option	Disagree	Neutral	Agree	Disagree	Neutral	Agree	Disagree	Neutral	Agree	p-value
Create more roads	19	0	16	26	0	6	26	3	3	.217
Improve current roads	6	0	29	10	3	19	13	0	19	.537
Create more walking trails	6	6	23	6	3	23	10	6	16	.906
Better maintain current walking trails	0	3	32	6	0	26	3	3	26	.627
Provide trash cans	6	0	29	0	0	32	3	0	29	.755
Build a visitor center with information	6	3	26	3	0	29	3	6	23	.835
Employ an on-site ranger	3	6	26	0	0	32	3	3	26	.627
Establish areas to protect parrot habitat where humans are excluded	6	6	23	10	0	23	13	3	16	.650
Establish areas to protect parrot habitat where humans are excluded but only during the breeding season	0	6	29	3	0	29	0	3	29	.755
Set up zones in the park where different activities and management should take place	10	6	19	0	0	32	6	6	19	.136
Restrict hunting to certain times of the year throughout the entire park	3	0	32	0	0	32	6	0	26	.511
Require licenses for hunting	3	3	29	13	3	16	3	13	16	.158
Build rest areas throughout the park	0	6	29	0	16	16	3	10	19	.301

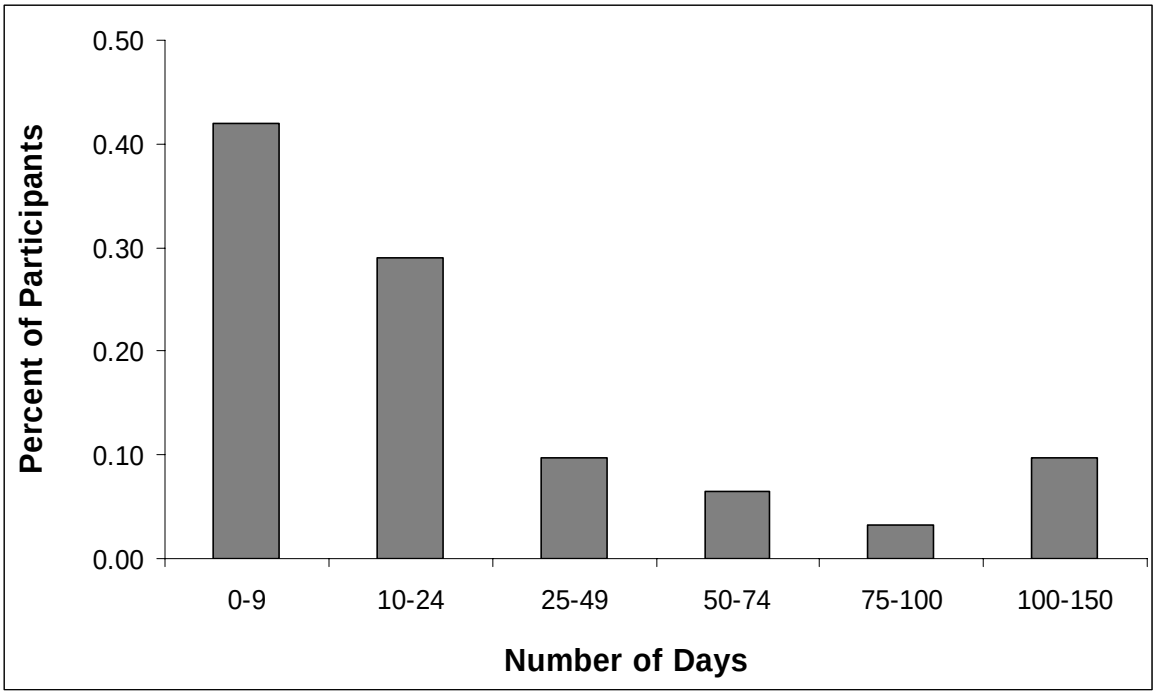

Figure 3-1. Annual visitation to Abaco National Park.

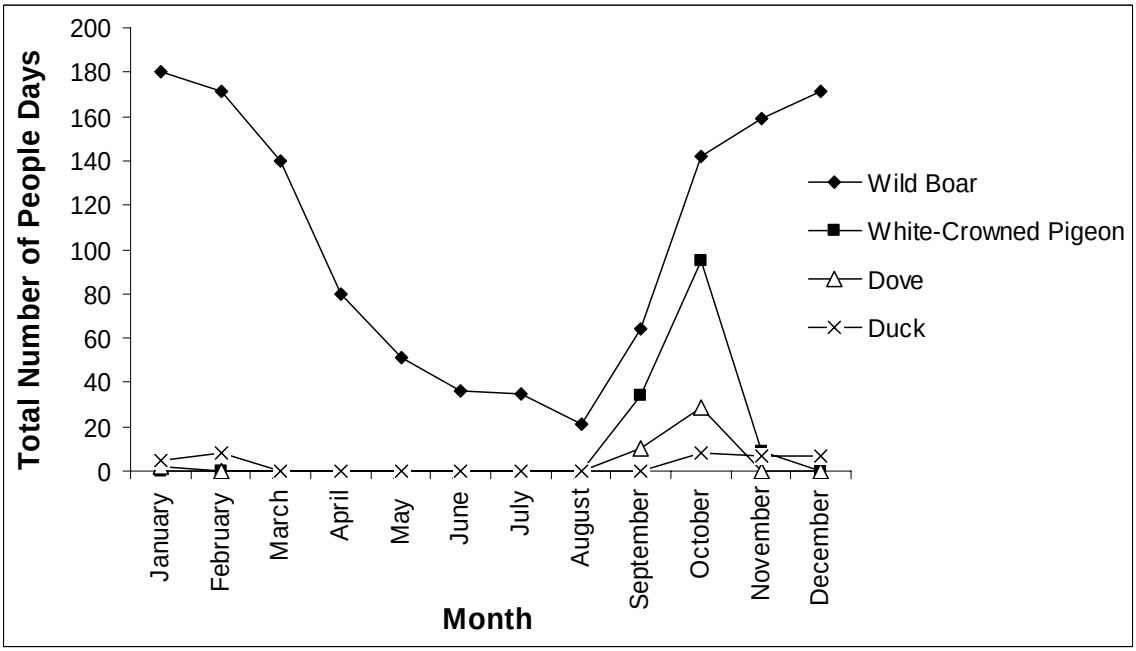

Figure 3-2. Temporal distribution of hunting in Abaco National Park.

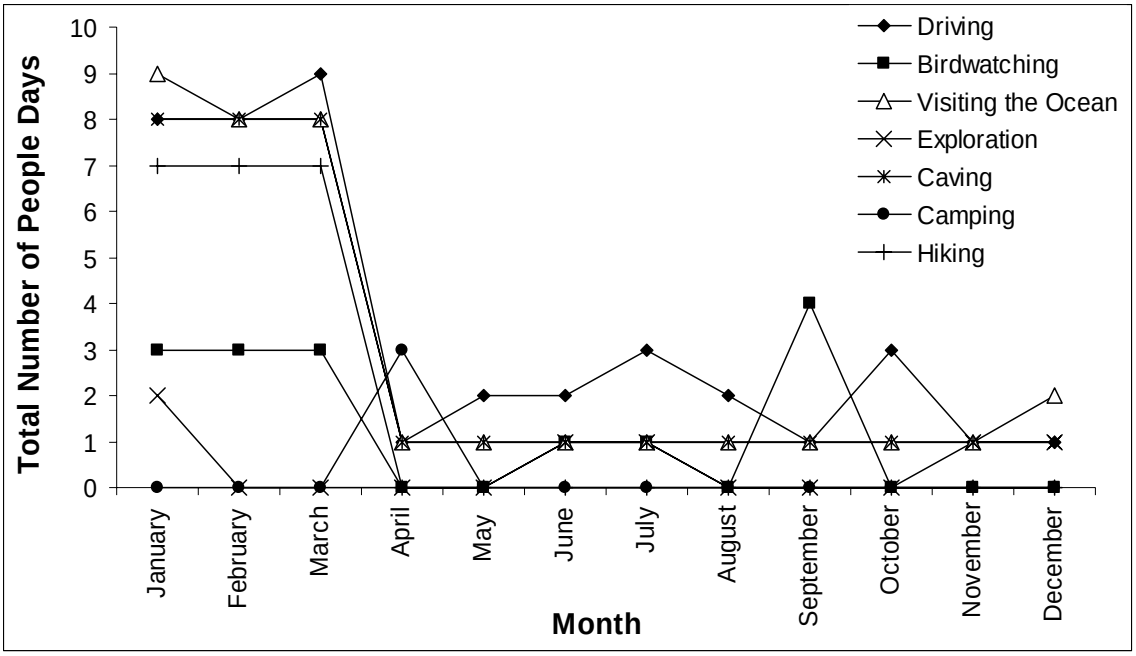

Figure 3-3. Temporal distribution of non-consumptive activities in Abaco National Park.

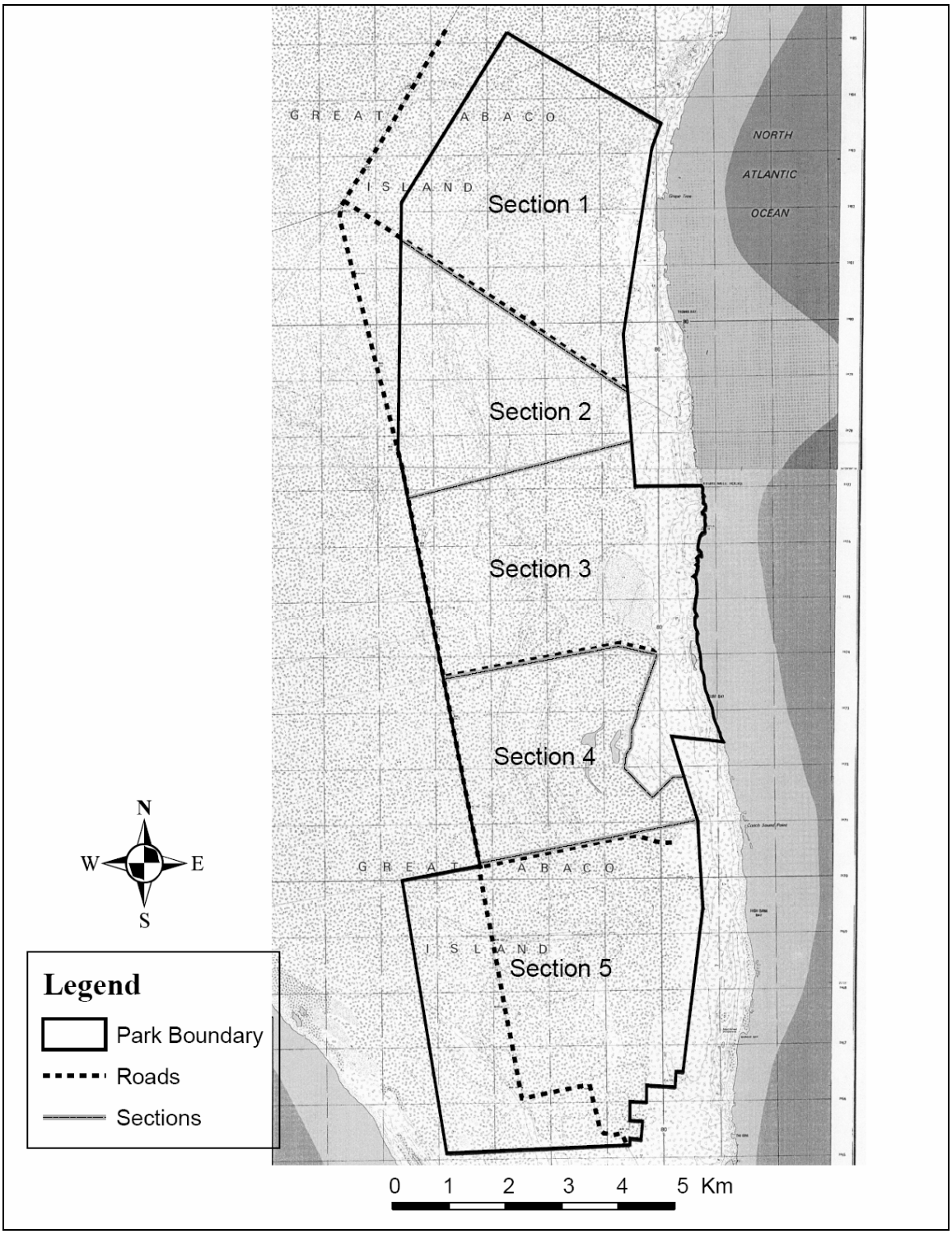

Figure 3-4. Section map shown as a reference to participants in interview questions 43-49 .

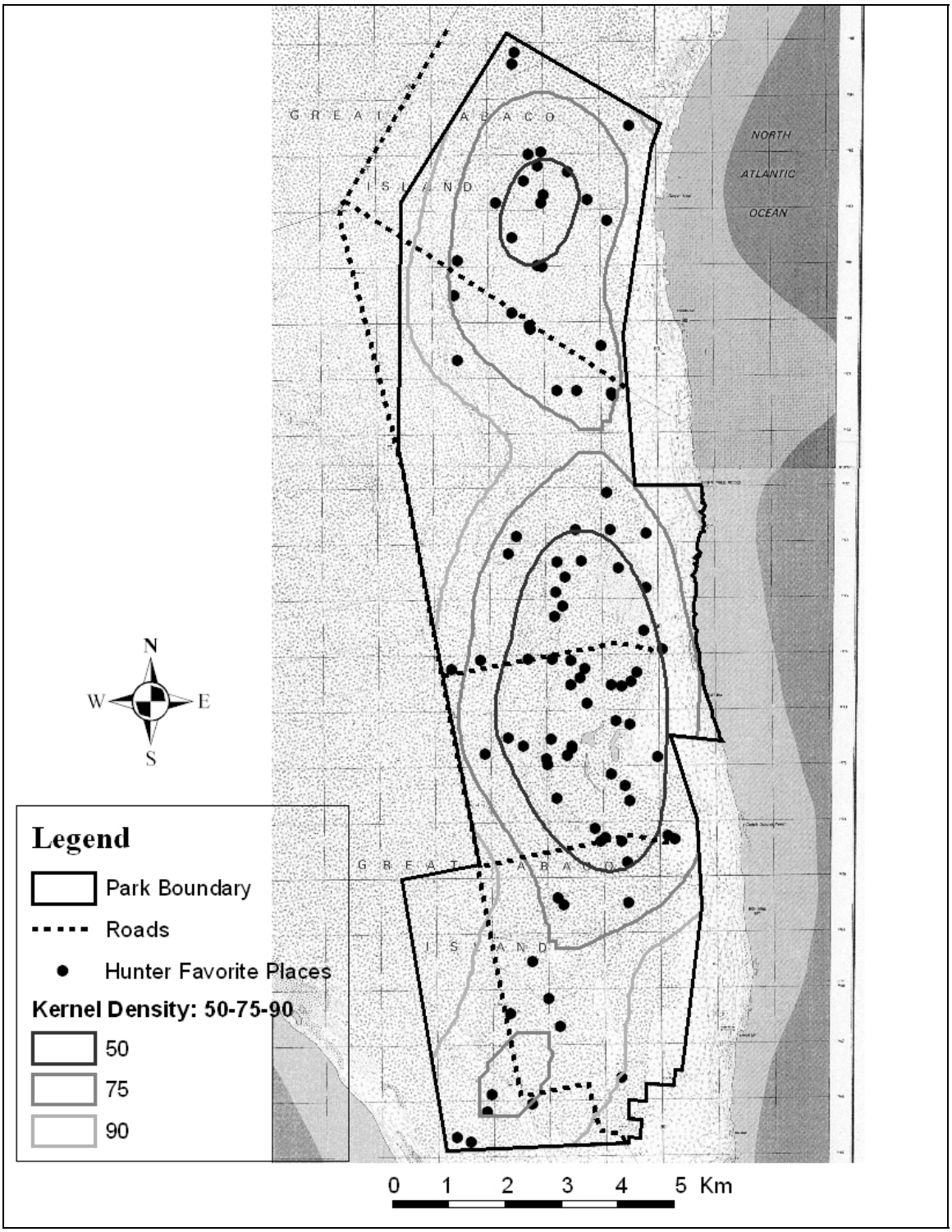

Figure 3-5. Hunter designated favorite places.

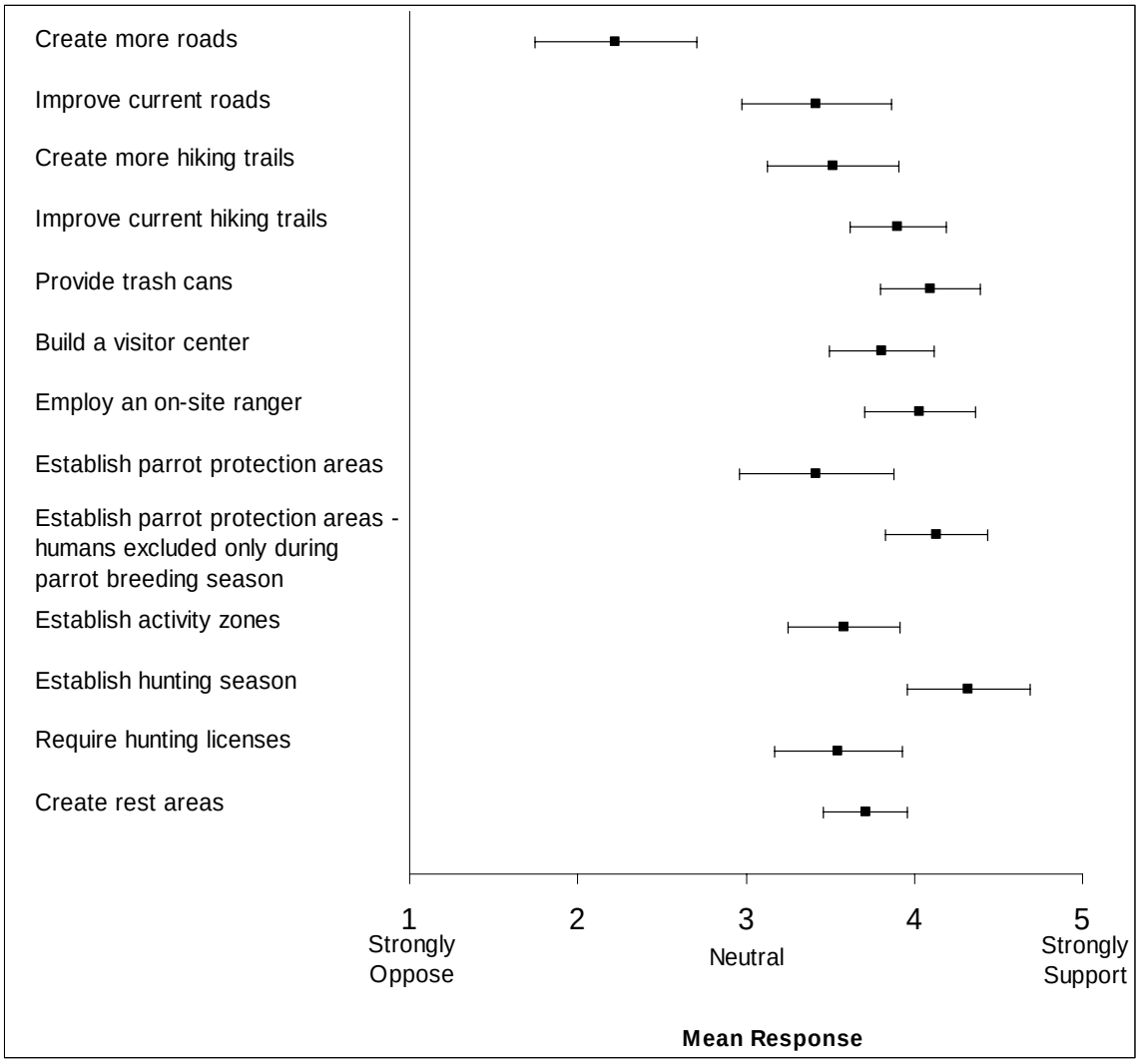

Figure 3-6. Hunter responses to proposed management activities. Given are means ± standard errors.

CHAPTER 4
CONCLUSION

Comparing Methods: Stakeholder Analysis and Interviews

One of our broad objectives for this study was to compare the two methods used – stakeholder analysis and personal interviews – as techniques for incorporating public participation in recreation planning for a national park. Ultimately, we found that both methods have strengths and weaknesses and when combined together, yield a wealth of information. Stakeholder analysis proved particularly useful in soliciting ideas and input from a range of people with different views. The method allowed us insight into commonalities between stakeholder groups, areas and issues of potential conflict, and strategies that can be employed to minimize these prospective conflicts (see below).

When we compared our results from the hunter stakeholder group meeting to those of the personal interviews with hunters, we found that there were strong similarities in hunters' usage maps. In both the stakeholder analysis where we used area data, and personal interviews where we used point-specific data, we found that the south-central portion of the park, including the only wetland in the park, was the most popular for hunting followed by the northern and southern extremes of the park.

Surprisingly, we found that there were discrepancies between the two methods. Although five of the six hunters in the hunter stakeholder meeting later participated in our interviews, we found large differences in responses to a few questions. Hunters in the stakeholder meeting were very outspoken and adamant against restrictions on where they could hunt in the park. This was reflected in their group map, which showed their

reluctance to relinquish more than 8% of the park for other activities. In addition, although hunters stated ideas related to parrot protection and ecosystem preservation in their discussion of a vision statement for the park, they did not include areas of protection on their group map. Finally, while other stakeholder groups wanted a game warden for hunting zones in the park, hunters did not express this desire.

Results from personal interviews with hunters paint a different picture. Data show that hunters supported the use of resources for parrot and ecosystem protection over improving opportunities for hunting. Furthermore, most hunters supported establishing parrot protection areas year-round (61%) or during the parrot breeding season (87%). Finally, when we asked their opinions on a number of potential management activities, we found that most hunters were favorable towards hunting restrictions, such as requiring hunting licenses, establishing a hunting season, and employing an on-site ranger.

Due to these discrepancies, we believe that stakeholder analysis is faulted by an uncertain group dynamic and/or social pressures that exist among group members and have the potential of confounding personal opinions. Conversely, during the personal interviews, hunters may have been more inclined to give answers they thought desirable by the interviewer, such as an affinity for parrot protection, even though the interviewer remained objective throughout the interviews. Despite this possibility, we believe that the results from personal interviews more accurately reflect how an individual feels on a particular issue, however how they behave or act in the presence of others may be more accurately represented by data collected in the stakeholder analysis. Because managers deal with how people act in reality, where they are under social pressures, data from a stakeholder analysis may more realistically represent the issues managers face.

Interviews, on the other hand, proved particularly useful in providing a deep understanding of a particular stakeholder group; however, they required significantly more time than the stakeholder analysis. In total, the stakeholder analysis took approximately 10 hours to complete whereas conducting personal interviews with 31 people took more than 35 hours. Thus, the stakeholder analysis may be more efficient at understanding a range of stakeholder interests when time is limited. When combined together, we believe that these two methods provide complementary information essential to park planning. As stated previously, we hope that the methods employed in this study will provide a useful model for the 25 other national parks throughout the Bahamas and elsewhere.

Recommendations

Our first overarching objective for this study was to identify stakeholder needs and desires as well as their compatibility with parrot resource needs in order to make recommendations for a recreation management plan for Abaco National Park. Prior to this study, little was known about the stakeholders of the park including their relationship, use and opinions of it. Using the information we obtained from the stakeholder analysis and hunter interviews we now feel confident to present a few general recommendations, which we later hope to expand upon and integrate into a complete management plan for the park. The recommendations and suggested actions outlined below include: ensuring traditional recreational opportunities exist while ensuring sustainable parrot protection; continuing opportunities for a diversity of non-consumptive recreation opportunities; continuing opportunities for quality hunting experiences; expanding opportunities for people to visit the park; enhancement of local ownership of

the park; and enhancement of learning opportunities for students and adults. They are dynamic and should be revised as the planning process continues.

1. **Ensure traditional recreational opportunities exist while ensuring sustainable parrot protection.** Abaco National Park was established to protect the habitat and breeding range of the Bahama parrot. Thus, parrot protection should preclude recreation opportunities when and where the two are in conflict.

   Actions:

   1. Establish parrot protection zones where humans are excluded at least during the parrot breeding season. Currently, we recommend this zone be placed in the northern third of the park. Further consultation with parrot biologists is essential to ensure that areas where parrots nest and breed are sufficiently protected.

   2. Promote research to continue to monitor the health of the Bahama parrot, other wildlife and ecological systems in the park.

   3. Develop ecological and social standards and indicators to monitor human impacts on the natural environment.

   4. Use local guides with extensive knowledge of the park to lead visitors through sensitive areas of the park.

   5. Use on- and off-site education to inform locals and tourists about the park's fragile ecosystem and proper conduct while visiting the park.

2. **Continue to provide a diversity of non-consumptive recreation opportunities.** Abaco National Park offers opportunities for both locals and tourists to hike, birdwatch, cave, explore, and enjoy nature in a unique environment. Future management should continue to provide for these types of activities and expand opportunities where appropriate.

   Actions:

   1. Promote ecotourism activities throughout their current range, particularly along the coastal area of the park where results show that a majority of people conduct ecotourism activities.

   2. Expand opportunities for visitors to view the Bahama parrot by establishing trails in non-nesting areas and training local guides.

   3. Develop trails that run through a variety of settings (e.g. pine forest, coppice) and provide a diversity of experiences. Ensure trails are located and designed to have minimal impacts on wildlife and natural systems.

4. Control visitor numbers and ensure opportunities for solitude by keeping most roads through ecotourism areas unimproved. Those roads which are consistently driven and already highly established (such as the central and south-central interior roads depicted in Figures 2-9 thru 2-14) could be improved for access to birdwatching and hiking trails. Consider closing roads in the northern area of the park, which are located in areas of high density parrot nesting.

5. Ensure non-consumptive recreationists and hunters do not interfere with each other or cause a safety concern. Use temporal zoning if conflict arises. This could include zoning areas of conflict for hunting between the months of October through February (when bird hunting is legal in addition to boar hunting) and for non-consumptive recreation the remaining months of the year.

6. Provide detailed maps and brochures of recreation opportunities in Abaco National Park.

3. **Continue to provide opportunities for quality hunting experiences.** Hunting is a historical use of the park and currently practiced by a relatively large number of locals. Furthermore, the park was established under the stipulation that hunting would remain a legal activity. Hunting also is part of the Abaco culture. Therefore, management must focus on maintaining quality hunting experiences.

   Actions:

   1. Maintain hunting throughout its current range where it does not conflict with sustaining viable parrot populations. This particularly applies to the wetland area and northern and southern extremes of the park where hunting is most popular.

   2. Work with local agencies (e.g. Friend of the Environment-Abaco, Abaco Department of Agriculture) to determine appropriate signage, regulations, and seasons.

   3. Ensure hunting and non-consumptive recreation do not interfere with each other or cause a safety concern. Use temporal zoning if conflict arises. This could include zoning areas of conflict for hunting between the months of October through February (when bird hunting is legal in addition to boar hunting) and for non-consumptive recreation the remaining months of the year.

4. **Expand opportunities for people to visit the park.** Currently, the majority of Abaco National Park is inaccessible to most people. Although the main road through the park is travelable, ancillary roads throughout the interior of the park require a four-wheel drive vehicle. Furthermore, there are no recreation facilities to provide opportunities for a wide range of people to enjoy the park. To encourage

more visitation to the park and greater economic revenue to local communities, portions of the park should be made more accessible to the public.

Actions:

1. According to our meetings with stakeholders, people most wanted a visitor center, followed by souvenir shops, refreshment stands, a ranger station, park guides, educational materials, improved roads, and restrooms. Results show that infrastructure would be best placed as far north along the main road as possible without infringing upon high density parrot nesting areas.

2. Improve the main road to the area of infrastructure.

3. Request public comment on all significant infrastructure projects in the park prior to finalizing plans.

4. Ensure facilities do not negatively impact the natural ecosystem by monitoring human impacts.

5. **Enhance local involvement in the park.** As stated throughout this document, local involvement in conservation and preservation efforts is essential to ensuring the long-term sustainability of protected areas. People living adjacent to Abaco National Park have a long-standing relationship with the park and have expressed their interest in helping manage the park. Groups, such as Friends of the Environment-Abaco, the Abaco Chamber of Commerce, and the stakeholder groups discussed in this study should be encouraged to participate in the continuing planning and management of the park.

   Actions:

   1. Provide locals the opportunity to participate in the management of the park. Locals could be involved in future public meetings, surveys, informal interactions, citizen advisory councils, or more directly as game wardens, park guides or through comanagement arrangements. Ensure locals are involved at every stage of the planning and management process.

   2. Encourage local visitation to the park. This includes providing a diversity of recreation opportunities for people with all different skill levels.

   3. Use education and outreach to help inform local communities about the benefits of Abaco National Park.

   4. Establish regular interaction between the Bahamas National Trust and community leaders to assess future community needs and desires.

6. **Enhance learning opportunities for students and adults.** Abaco National Park is a valuable educational opportunity for both residents of Abaco and tourists to

learn about the natural and cultural environment of the area. Management should capitalize on this opportunity.

Actions:

1. Develop on-site education opportunities. This could involve creating a visitor center, interpretive trails and guided trail walks.

2. Distribute off-site educational materials, such as guide books, brochures, posters, teacher resources and a website.

3. Encourage local teachers to use the park as an educational resource to educate their students about the habitat and wildlife of the park.

APPENDIX A
INDIVIDUAL MAPPING ACTIVITY MAP AND QUESTIONNAIRE

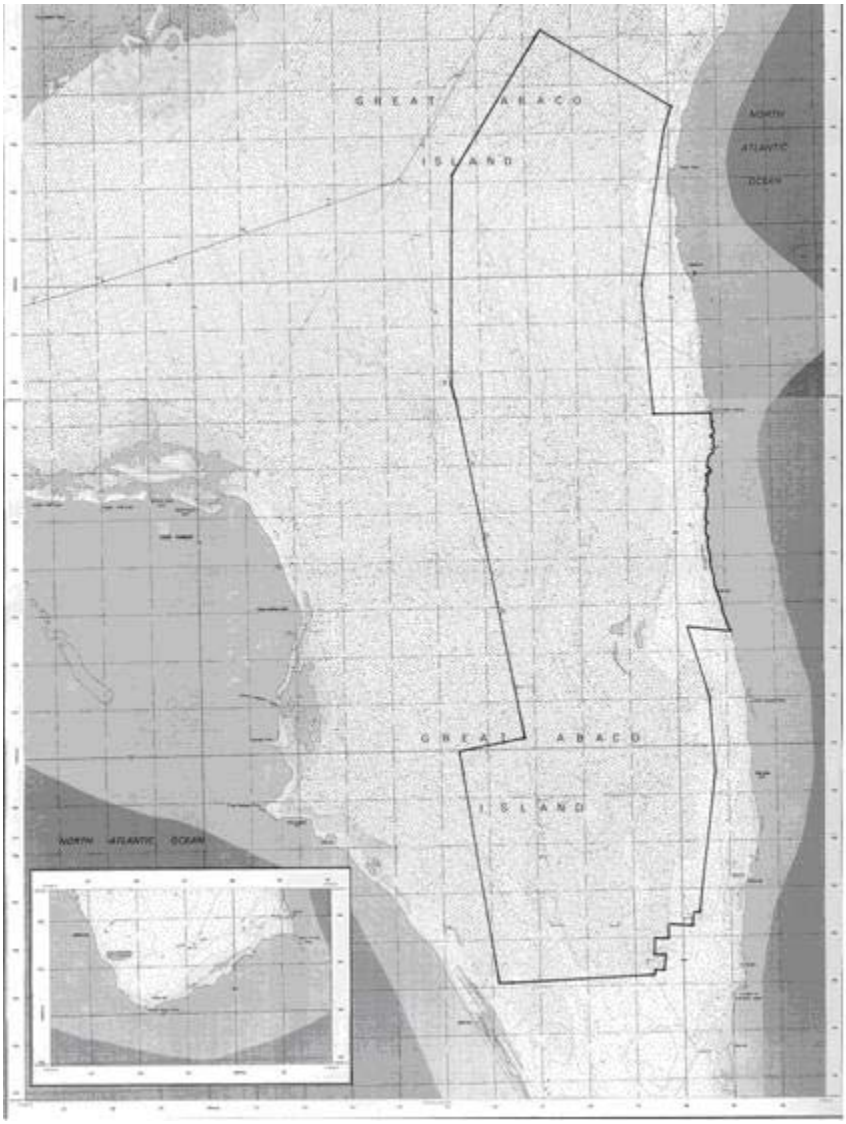

Figure A-1. Base map provided to participants in individual mapping activity.

Supplementary Questionnaire

Map Number _____

Describe Each Map Area

Area Number and Color _____

1. How do you use this area? Describe the type of activity you do in this area.

_____

_____

_____

a. How often do you use this area? _____ times per year

b. What months do you use this area? Please circle all that apply.

Jan. Feb. Mar April May June July Aug. Sept. Oct. Nov. Dec.

APPENDIX B
VISION STATEMENT WORDS, IDEAS AND PHRASES

Part 1: Vision Statement
Question – please list the words, ideas and phrases you think should be included in the vision statement for Abaco National Park.

WORD, IDEA OR PHRASE	H	M	T	S	B	E	TOTAL
Visitor Education							**10**
Education (General)		X					1
Learning center for Bahama parrots			X				1
Training for bird survival			X				1
Educate people before coming to the park			X				1
Education on local flora and fauna			X				1
Create awareness on national heritage			X				1
Ecosystem education				X			1
Adult education					X		1
Trails for learning natural vegetation						X	1
Understand the environmental structure of the park						X	1
Student Education							**2**
Educational field trips			X				1
Kid education					X		1
Protect parrots/wildlife							**6**
A sanctuary for Bahama parrots		X		X	X		3
Conserve migratory birds and butterflies			X				1
Increase the parrot population			X				1
Endemic or endangered species						X	1
Ecosystem Protection and Restoration							**15**
Ecosystem and biodiversity	X		X	X			3
Sustainability			X	X	X		3
Conservation		X				X	2
Wildlife habitat/nature				X		X	2
Park restoration				X	X		2
Keep the island green	X						1
Conserve blue holes and swamps	X						1
Conserve pine trees				X			1
Low Impact Visitation to Enjoy Nature							**11**
Enjoyment of nature	X	X		X			3
Make attractive for both tourists and locals	X	X			X		3

Home away from home		X					1
Low impact visitation			X				1
Restrict/avoid harmful practices on flora and fauna			X				1
Unite traditional culture and ecotourism			X				1
Recreation without abusing the resource					X		1
Research							**2**
Research on parrots						X	1
Research facility						X	1
Development of Trails/tours							**3**
Guided tour	X						1
Develop a walking tour		X					1
Trails, boardwalks for sightseeing						X	1
Community Involvement							**4**
Local community based organization to monitor park activities					X		1
Local expertise						X	1
Management with local oversight committee						X	1
Locally managed organizations and park services						X	1
Quality Management							**12**
Keep the environment safe	X		X	X			3
Clean up litter	X			X			2
Automate lighthouse	X						1
Cell phone communication system	X						1
Clean and maintain roads	X						1
Warning signs		X					1
Watch out for poachers				X			1
Enforcement of mandates					X		1
Office for warden						X	1

H = hunter group; M = tourism group; T = teacher group; S = Sandy Point group; B = business group; E = environmental group.

APPENDIX C
INDIVIDUAL ACTIVITY MAPS BY STAKEHOLDER GROUPS

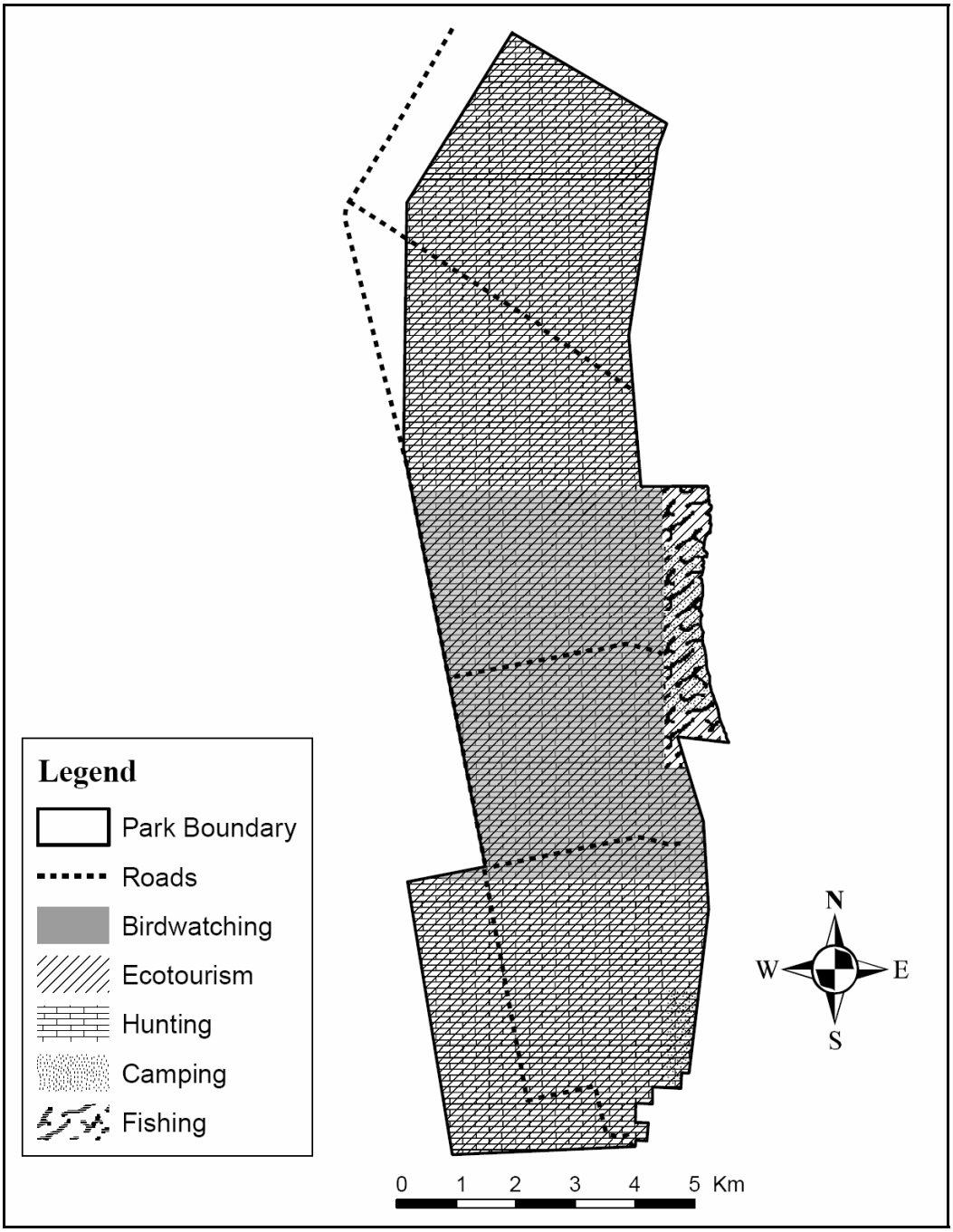

Figure C-1. Activities of hunter group members.

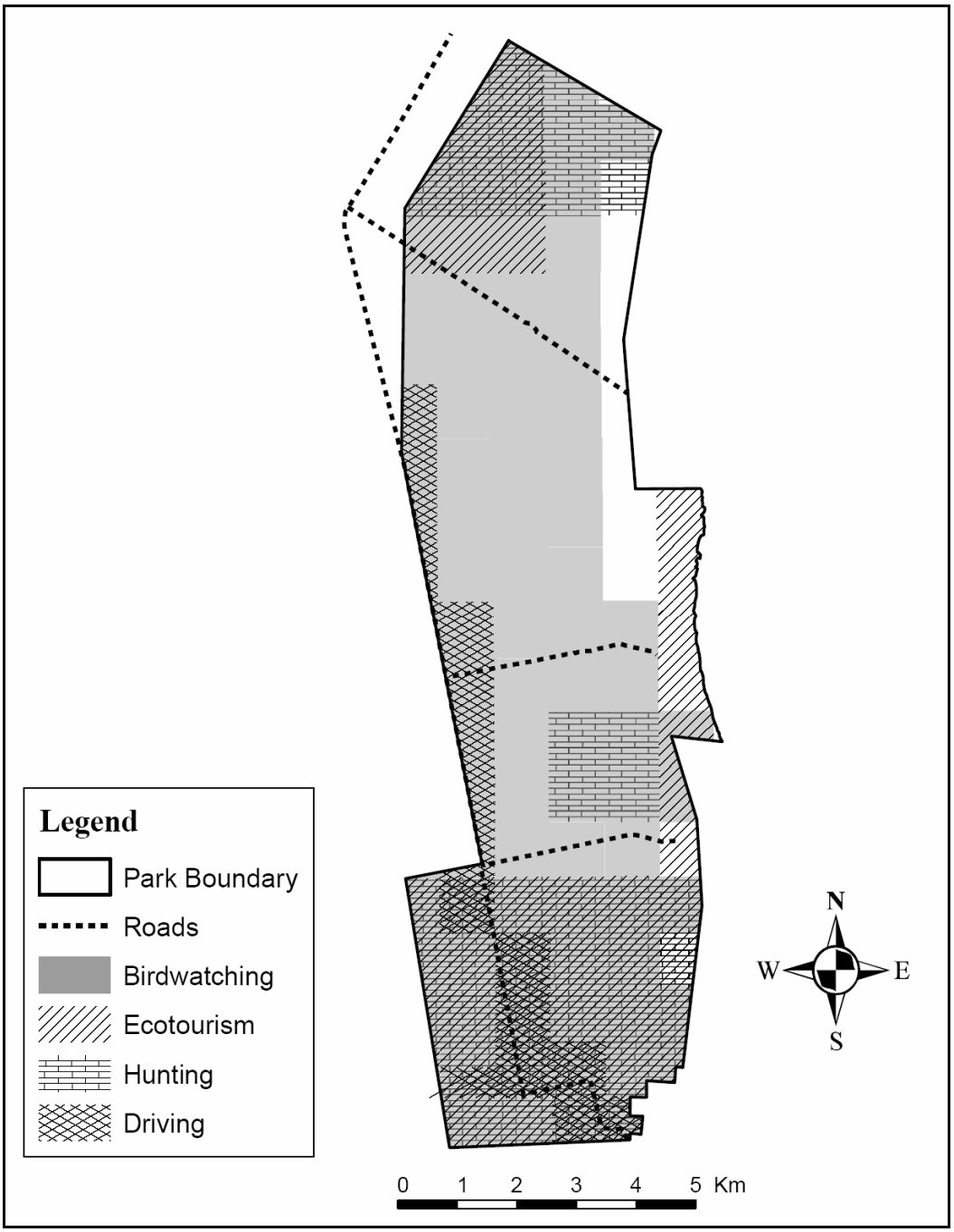

Figure C-2. Activities of tourism group members.

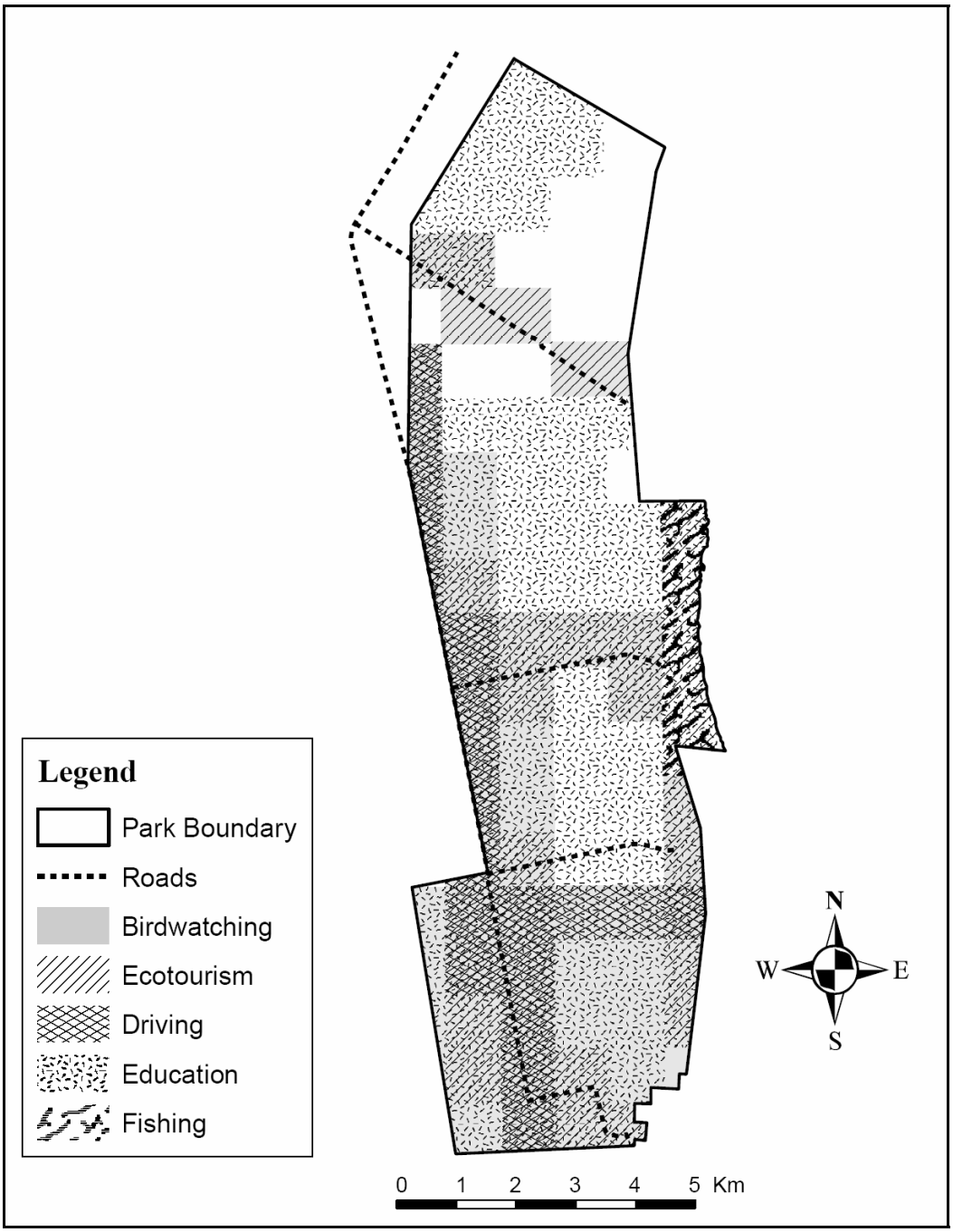

Figure C-3. Activities of teacher group members.

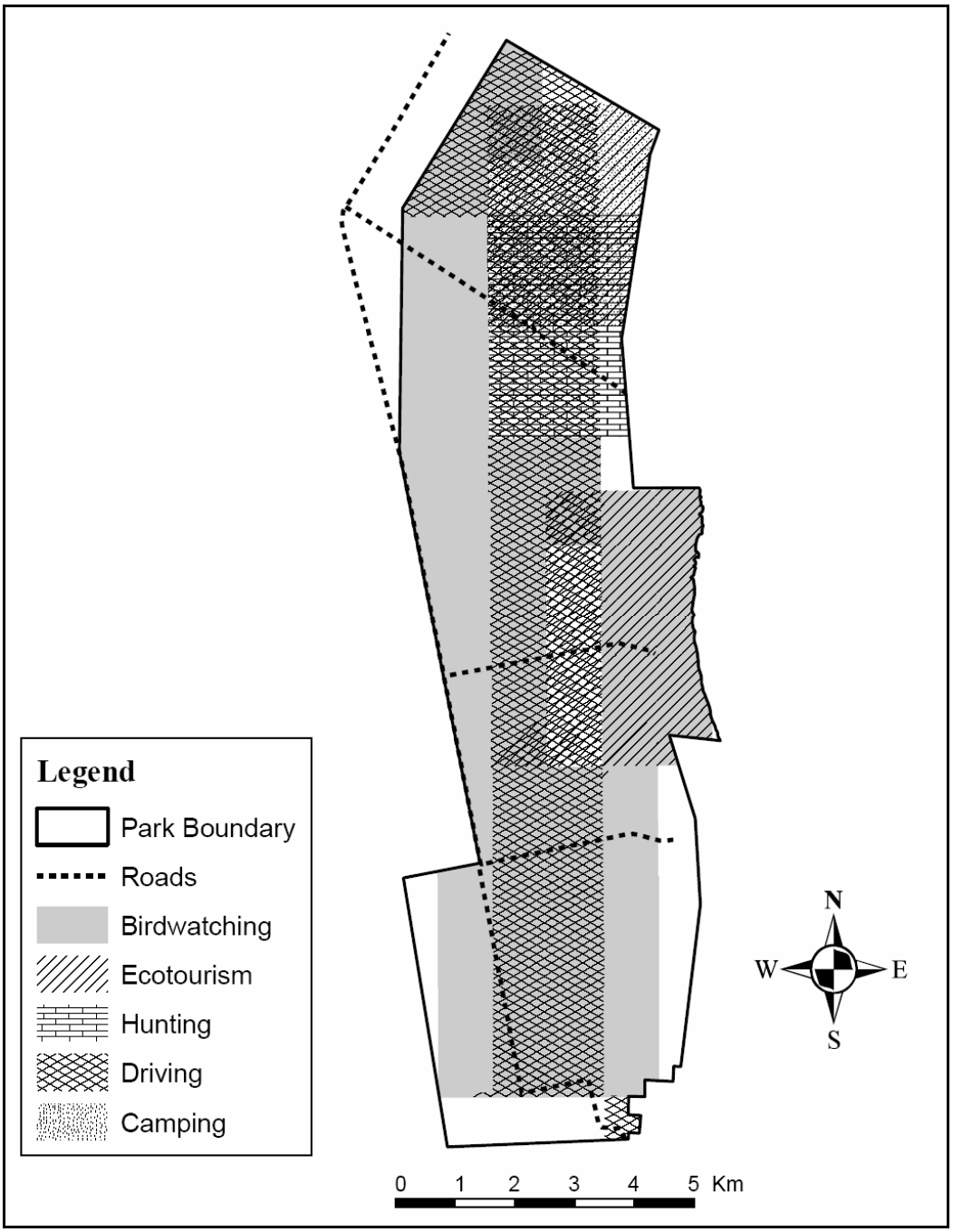

Figure C-4. Activities of Sandy Point group members.

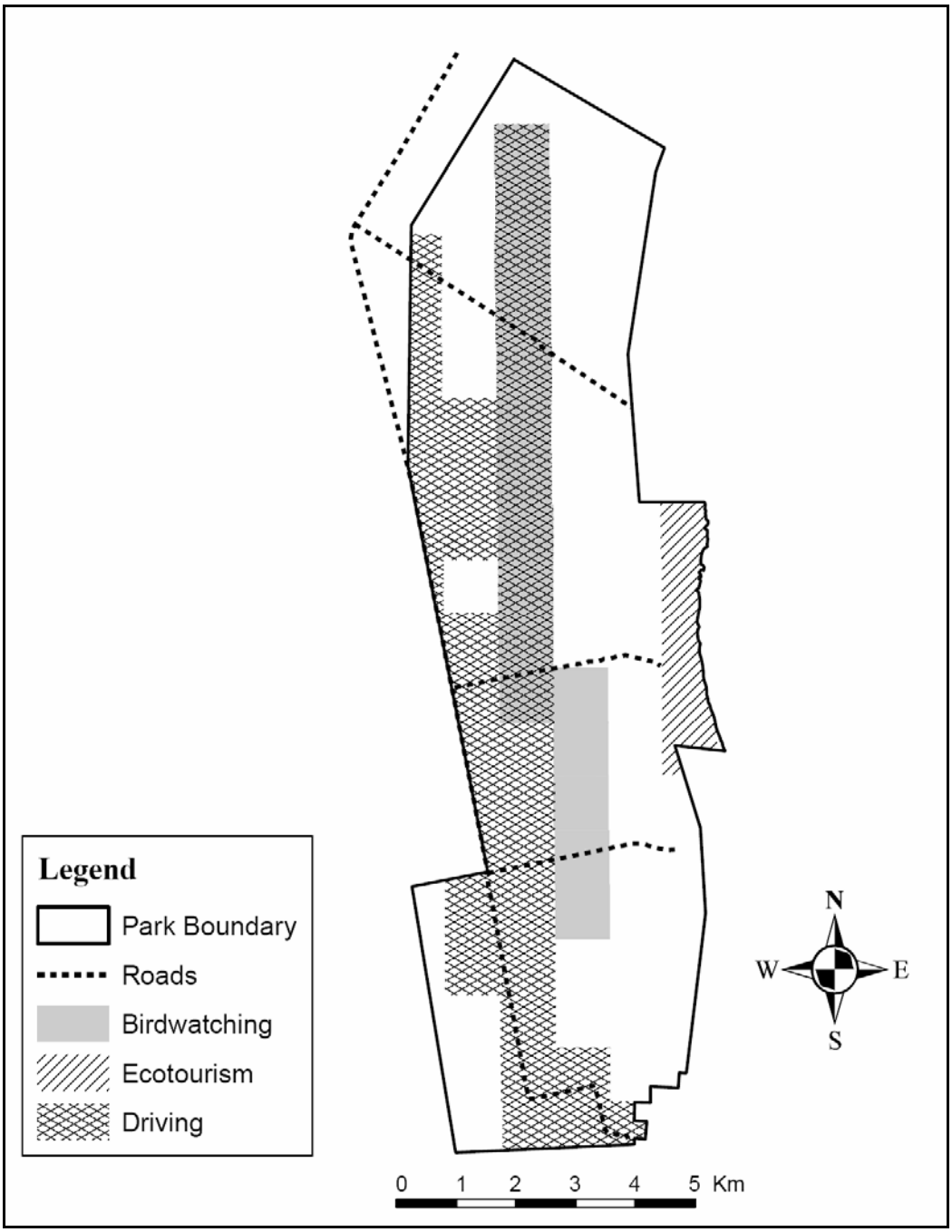

Figure C-5. Activities of business group members.

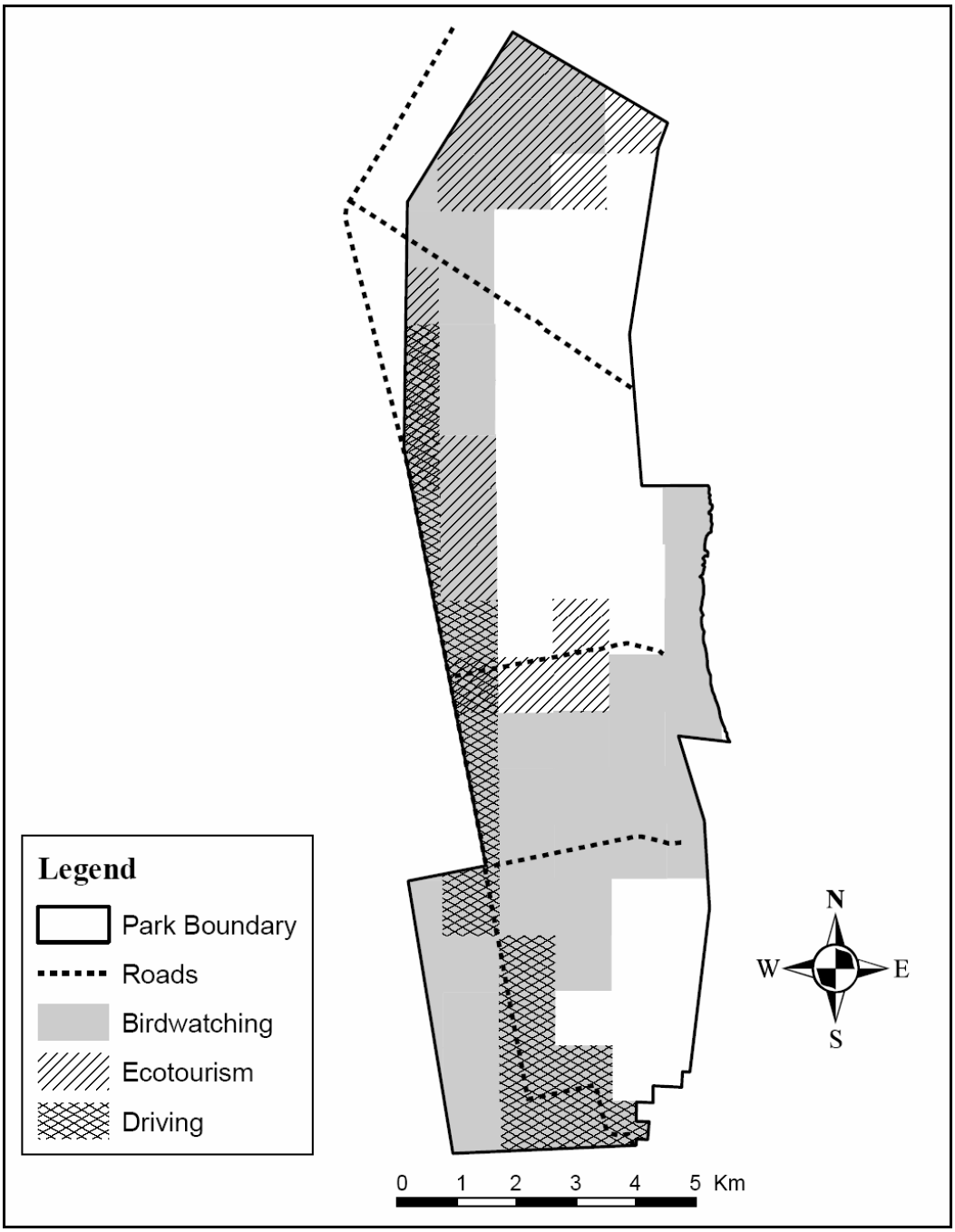

Figure C-6. Activities of environmental group members.

APPENDIX D
ACTIVITY ZONE DISCUSSION IDEAS

Part 4: Activity Zone Discussion
Question – What activities and management activities are appropriate for each of the activity zones you included on your groups map?

ACTIVITY ZONE IDEA	H	TM	TR	SP	B	E
Infrastructure						
Visitor Center	X	X	X	X		X
Souvenir Shop	X		X	X	X	
Refreshments	X		X	X	X	
Ranger Station/Game Warden	X		X	X		X
Guides/Binoculars	X		X	X		
Educational Video			X		X	X
Improved Roads		X	X	X		
Informational Literature			X	X		X
Restrooms		X	X			
Children's Education			X		X	
Research Facility				X		X
Communications	X		X			
Live Animal Display (parrots)	X					
Picnic Areas		X				
Rest Area		X				
First Aid			X			
Parking Lot			X			
Bird Rehabilitation Center				X		
Benches				X		
Beach Facilities					X	
Museum					X	
Recreational Area for Locals					X	
Main Entrance						X
User Fee						X
Solar Panel Construction						X
Meeting Room						X
Open Air Amphitheater						X
Library						X
Self-guided Nature Trails						X
Ecotourism						
Birdwatching		X	X	X	X	
Hiking Trails			X	X	X	

Camping Sites		X	X		X	
Non-motorized Vehicles Only	X				X	X
Restroom/Outhouse	X	X	X			
Guided Tours		X		X		X
Trails (general)		X				X
Educational Materials				X		X
Picnic Area		X	X			
Interpretive Trails	X					
Refreshments	X					
Rest Area		X				
Improved Roads		X				
Trash Cans			X			
Surfing			X			
Scuba Diving					X	
Crabbing					X	
Fishing					X	
Caving					X	
Biking Trails					X	
Research					X	
Safety						X
Signs						X
Hunting						X
Protection						
Posted Regulations and Enforcement			X	X	X	X
Research		X	X	X	X	X
Education for Locals			X			X
Regulated Use			X			X
Predator Control		X				X
Seasonal Hunting				X		
Finance					X	
Hunting of Certain Species Allowed						X
Hunting						
Hunting of Wild Boar	X			X	X	X
Hunting of White-Crowed Pigeon	X				X	X
Hunting of Ducks	X					X
Hunting of Teal	X					X
Research					X	X
Hunting of Dove	X					
Cell Phone Towers	X					
Walking	X					
Birdwatching	X					
Drinking Water	X					

Trash Cans			X			
Communication			X			
Posted Regulations			X			
Hunting in Hunting Areas Only				X		
Crabbing					X	
Bounty of Feral Cats					X	
Game Warden						X
Ecotourism						X
Research						
Research Facility			X			

H = hunter group; TM = tourism group; TR = teacher group; SP = Sandy Point group; B = business group; E = environmental group.

APPENDIX E
HUNTER QUESTIONNAIRE

(Introduce myself) "Hello, I am Lisa Marks, a master's student at the University of Florida. We are working on a project with the Bahamas National Trust to interview hunters who use Abaco National Park in order to help develop a recreation plan for the park. The interview will focus on where and when you currently use Abaco National Park, what factors contribute to an enjoyable hunting experience and how you would like Abaco National Park managed in the future. Your answers will be confidential to the extent provided by law and you will not be identified by name in any report of this interview. You do not have to answer any questions you do not wish to answer. You are free to leave the interview at any time without penalty. There is no more than minimal risk to participating in this interview and you will not receive any direct benefits for your participation. The interview will take approximately 45 minutes. Do you have any questions or is it alright that begin now?"

BACKGROUND INFORMATION:

1. How many years have you lived on Abaco?
2. What town do you currently live in?
3. At what age did you begin hunting?
4. How many years have you hunted?
5. (a) Have you ever attended a meeting about Abaco National Park

   (b) If yes, who sponsored the meeting?

   (c) When was the meeting?

CURRENT USE:

6. How many days did you spend in Abaco National Park over the last year?
7. (a) Please look at the list of activities and tell me how many days, if any, you participated in each of the activities each month over the past year.

   (b) Look over the list one more time and rank the 3 activities that represent the most important reasons why you go to Abaco National Park.

ACTIVITY	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	RANK
Hunting of wild boar													
Hunting of ducks													
Hunting of doves													
Hunting of white crowned pigeons													
Hiking													
Birdwatching/Viewing Bahama parrot													
Access to Hole in the Wall/Lighthouse													
Exploration													
Camping													
Fishing													
Enjoying nature													
Educational outing													
Access to ocean													
Caving													

8. On a scale from 1-5, where 1 = very dissatisfied, 2 = dissatisfied, 3 = neither dissatisfied nor satisfied, 4 = satisfied and 5 = very satisfied, please rate the degree to which you were satisfied with your last hunting experience in Abaco National Park.

9. Using the same scale, how satisfied are you with your OVERALL hunting experiences in Abaco National Park?

10. (a) On your last visit to Abaco National Park, were you successful in obtaining an animal

    (b) If yes, which one(s)?

11. The last time you hunted DUCKS, did you obtain your bag limit?

12. The last time you hunted DOVES, did you obtain your bag limit?

13. The last time you hunted WHITE CROWNED PIGEON, did you obtain your bag limit?

14. How many people are typically in your hunting party?

Here are some reasons people might chose to hunt in Abaco National Park. Please tell me how much you agree with each of the following statements.

STATEMENTS CONCERNING HUNTING	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
15. I hunt to obtain food	1	2	3	4	5
16. I hunt to harvest trophy animals	1	2	3	4	5
17. I must shoot an animal to have a satisfying hunt	1	2	3	4	5
18. I am satisfied if I take shots at an animal	1	2	3	4	5
19. I am satisfied if I see a game animal	1	2	3	4	5

20.	The exercise I receive during hunting is important to me	1	2	3	4	5
21.	I hunt to spend time with family and friends	1	2	3	4	5
22.	I enjoy testing my hunting skills against the game I am hunting	1	2	3	4	5
23.	I hunt to get outdoors and enjoy nature	1	2	3	4	5
24.	Hunting is a tradition in my family	1	2	3	4	5
25.	I hunt to become closer to my primitive self	1	2	3	4	5
26.	If I had (have a son), it would be important to me to teach him to hunt	1	2	3	4	5
27.	If I had (have) a daughter, it would be important to me to teach her to hunt	1	2	3	4	5
28.	Seeing wildlife while hunting is more important than harvesting wildlife	1	2	3	4	5
29.	I hunt to escape from the worries of everyday life	1	2	3	4	5
30.	I hunt to learn more about the animals I hunt	1	2	3	4	5
31.	Hunting with a hunting dog is important to me	1	2	3	4	5
32.	I hunt for the excitement	1	2	3	4	5
33.	I hunt to spend time alone	1	2	3	4	5

34. If you had to pick the top 3 reasons you hunt from this list, what would they be?

35. Over the past 10 years do you think that the number of days people hunt WILD BOAR has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

36. Over the past 10 years do you think the population of WILD BOAR has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

37. Over the past 10 years do you think that the number of days people hunt DUCKS has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

38. Over the past 10 years do you think the population of DUCKS has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

39. Over the past 10 years do you think that the number of days people hunt DOVES has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

40. Over the past 10 years do you think the population of DOVES has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

41. Over the past 10 years do you think that the number of days people hunt WHITE CROWNED PIGEON has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

42. Over the past 10 years do you think the population of WHITE CROWNED PIGEON has been:
___ Increasing
___ Not changing very much
___ Decreasing
___ Not sure

MAPPING:

We have divided Abaco National Park into 5 sections. These sections reflect a variety of resources and uses within the area. Please look at the map and respond to the following questions.

43. Rank the sections in order from the one you spend the most time in (1) to the one you spend the least time in (5).

Section #	Ranking
1	
2	
3	
4	
5	

44. What section(s) did you visit on your last trip to Abaco National Park?

45. In what section(s) do you hunt for WILD BOAR, if any?

46. In what section(s) do you hunt for DOVES, if any?

47. In what section(s) do you hunt for DUCKS, if any?

48. In what section(s) do you hunt for WHITE CROWNED PIGEON, if any?

49. (a) If you had to choose 3 areas you MOST ENJOY, where would these areas be? (Record these on these on the map with an "E").

(b) Why do you enjoy area 1?

(c) Why do you enjoy area 2?

(d) Why do you enjoy area 3?

FUTURE USE/MANAGEMENT:

50. Please rank from 1-6 what you think is the most important to the least important.

___ More effort should be spent on protecting the Bahama parrot and its habitat
___ More effort should be spent on protecting the whole ecosystem
___ More effort should be spent on educating the public about the local environment
___ More effort should be spent on improving hunting
___ More effort should be spent on improving opportunities for wildlife viewing
___ More effort should be spent on improving opportunities for tourism

Please rate the degree to which you support or oppose the following management policies and actions.

MANAGEMENT POLICY/ACTION		Strongly Oppose	Oppose	Neutral	Support	Strongly Support
51.	Create more roads	1	2	3	4	5
52.	Improve current roads	1	2	3	4	5
53.	Create more walking trails	1	2	3	4	5
54.	Better maintain current walking trails	1	2	3	4	5
55.	Provide garbage/trash cans	1	2	3	4	5
56.	Build a visitor center with information	1	2	3	4	5
57.	Employ an on-site ranger/warden	1	2	3	4	5
58.	Establish areas to protect parrot habitat where humans are excluded	1	2	3	4	5
59.	Establish areas to protect parrot habitat where humans are excluded but only during the breeding season (May-September)	1	2	3	4	5
60.	Set up zones in the park where different activities and management should take place	1	2	3	4	5
61.	Restrict hunting to certain times of the year throughout the entire park	1	2	3	4	5
62.	Require licenses for hunting	1	2	3	4	5
63.	Establish rest areas_____	1	2	3	4	5

64. Who would you like to see manage Abaco National Park?

___ Bahamas National Trust

___ Bahamas National Trust and local management -- How would you like local management organized?

___ Local management -- How would you like local management organized?

___ No opinion

Look at the map of Abaco National Park again and rank the activities from 1-5, beginning with the activity you think is most appropriate for that section.

65. Section 1:
___ Hunting
___ Ecotourism such as hiking, exploring, etc.
___ A visitors' center
___ Research
___ Parrot protection
___ Other:_____

66. Section 2:
___ Hunting
___ Ecotourism such as hiking, exploring, etc.
___ A visitors' center
___ Research
___ Parrot protection
___ Other:_____

67. Section 3:
___ Hunting
___ Ecotourism such as hiking, exploring, etc.
___ A visitors' center
___ Research
___ Parrot protection
___ Other:_____

68. Section 4:
___ Hunting
___ Ecotourism such as hiking, exploring, etc.
___ A visitors' center
___ Research
___ Parrot protection
___ Other:_____

69. Section 5:
___ Hunting
___ Ecotourism such as hiking, exploring, etc.
___ A visitors' center
___ Research
___ Parrot protection
___ Other:_____

70. Do you have any additional suggestions for the management of ANP to make your visits more enjoyable?

ADDITIONAL INFORMATION:

71. Where were you born?

72. What is your current age?

73. Are you presently:
___ Employed outside the home -- __ Full time __ Part Time - - Occupation: _____
___ Unemployed
___ Retired -- Previous Occupation: _____
___ Student -- __ Full time __ Part time

74. Which of the following categories best describes your nationality?
___ Bahamian
___ European
___ U.S.
___ Other: _____

75. What is the highest education level you have attained?
___ Less than high school
___ High school diploma
___ Attended business/technical school
___ Some college or 2 year degree
___ Completed 4 year college degree
___ Some graduate work
___ Completed graduate or advanced degree

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BIOGRAPHICAL SKETCH

Lisa Marks was born on August 28, 1981, in Denver, Colorado. She grew up in the small town of Vail, Colorado, where she quickly came to love the great outdoors. Lisa's higher education began at Davidson College, a small liberal arts college in North Carolina, where she earned a bachelor's degree in biology. Through her research in North Carolina, Colorado, Florida and Africa, she was exposed to magnificent wildlife species and landscapes, but also to the realization that many were undergoing rapid human alteration.

In the fall of 2003 Lisa began her pursuit of a master's degree in the Department of Wildlife Ecology and Conservation at the University of Florida. She was married in June of 2005 to the love of her life, a medical student also at the University of Florida. After graduation, Lisa would like to continue to contribute to the conservation of our earth's greatest species, landscapes, and resources.