

THE EFFECTS OF VOLUNTEERING ON THE DEVELOPMENT OF PLACE  
ATTACHMENT AND STEWARDSHIP OF NATURAL PLACES

A Thesis

by

KATE ECCLES

Submitted to the Office of Graduate Studies of  
Texas A&M University  
in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE

May 2009

Major Subject: Recreation, Park & Tourism Sciences

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Approved by:

Chair of Committee,	Gerard T. Kyle
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## ABSTRACT

The Effects of Volunteering on the Development of Place Attachment and Stewardship  
of Natural Places. (May 2009)

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Chair of Advisory Committee: Dr. Gerard T. Kyle

The purpose of this study was to explore how volunteers engaged in natural-area based projects develop attachments to the resource and act as stewards for these resources. The context of this study was the National Park Service's All Taxa Biodiversity Inventory (ATBI) project. This project recruits citizen scientist volunteers to go out into the field with scientists to help collect and catalogue species in the park in an attempt to generate an all inclusive species inventory. Using data collected during in-depth interviews and notes taken from participant observations, this study found ATBI participants' motivations to volunteer in the project were multifaceted and included (a) an attachment to the park, (b) an attachment to specific species, (c) the social bonds to other volunteers, (d) the bioblitz experience itself, (e) and/or the opportunity to learn about the natural environment. Analysis of the data also found volunteer informants had personal, well defined meanings attached to the resource prior to the inception of the ATBI project. Through participation in the ATBI project, however, the resource was experienced in a new way, with new meanings emerging while other established meanings were refined. It was found that these established, emerging, and refined

meanings formed the foundation of the informants' attachments to the ATBI resource(s), which in turn became the basis for their stewardship of their respective parks, as well as feelings of stewardship for natural areas beyond park boundaries.

## DEDICATION

"The Document" is dedicated to my parents; to my mother for taking me every year to mother-daughter at Liahona and to my father for our many and magnificent family hikes all over the country and Vesuvius.

## ACKNOWLEDGEMENTS

I would like to thank my committee chair, Dr. Kyle, and my committee members, Dr. Shafer and Dr. Peterson for their guidance, support, comments, classes, positive motivation, and above all patience, throughout the course of this research.

Thanks also go to Dr. Bowser whose boundless energy, enthusiasm, and string-pulling abilities got me working on this project and helped facilitate my contacts at my bioblitz parks. Thanks also for teaching me optimalist foraging and keeping me fed.

Thanks to the National Park Service for allowing me to use the ATBI project as my study context and for funding my research.

Thanks to the many friends I have made in BCS, who listened to my woes and offered support, encouragement, and salad throughout the past two years.

Thanks also go to my family. To my dad for helping me decide if graduate school was the right decision for me and suggesting I apply to Texas A&M, to my mother for not coming to visit every weekend, and my brother who is my best friend.

Finally, thanks to my Heavenly Father, for this beautiful earth and all its creations that I have been able to become more familiar with.

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## CHAPTER I

### INTRODUCTION

Past studies of environmental stewardship have focused mainly on the definitions of stewardship along with the attitudes, preferences, and actions of managers of natural resources that can be considered environmentally responsible (Worrell & Appleby, 2000, Burger, 2002). More recently, research has begun to examine environmental stewardship from the public's perspective (Cohn, 2008), and in particular, natural resource volunteers (Evans, Abrams, Reitsma, Roux, Salmonsens, & Marra 2005). It is becoming more common to find studies in the literature focusing on ecological restoration projects and the benefits derived by the resource and the volunteer.

In practice, volunteering in natural area stewardship activities gives value to both the individual who participates as well as the natural area receiving the service (Light, 2000). However, for this particular study, focus was placed on the volunteer, why s/he participates, what meanings s/he attaches to the resource, and his/her sense of stewardship toward natural areas. The context of this study was the National Park Service's All Taxa Biodiversity Inventory (ATBI) project, part of the Park Service's Centennial Challenge. During these activities, commonly called bioblitzes, volunteers go out into the field with scientists to help collect, catalogue, identify, or inventory all the species in the park in an attempt to generate an all inclusive species inventory.

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This thesis follows the style of *Journal of Leisure Research*.

The aim of the project is to engage the American public in activities that get them out in the parks' natural areas with a focus on increasing biodiversity awareness and resource stewardship (NPS, 2007).

Citizen stewardship extends the ethic of stewardship outside natural area boundaries in the protection of biodiversity (Scott, Standiford, & Pratini, 1995). Because an agency's land management responsibilities can be quite large, some projects could not be completed without willing volunteers (Ryan, Kaplan, & Grese, 2001). Through this interaction with the natural environment, it has been proposed that environmentally responsible attitudes and behaviors will emerge and these attitudes and behaviors will be translated to daily activities beyond natural area boundaries (Vaske & Kobrin, 2001). It can also be inferred that if there are more volunteers, there will be more stewards, and more public activists protecting local natural areas and broader environmental ecosystems (Still & Gerhold, 1997; Ryan et al. 2001). Ryan et al. (2001) also propose volunteering to be a self-reinforcing relationship. Current feelings of stewardship may drive the initial volunteer activity participation, which can strengthen the individual's feelings of stewardship, and act as further momentum to motivate continued stewardship practices.

If stewardship is so important for natural resource management, questions concerning how it is fostered, formed, or created become important. In this investigation, the benefits of understanding the factors that lead to environmental stewardship among volunteers, such as place attachment and experiential learning, were explored. While place attachment has occupied a place in the natural resource

management literature for many years, more recent studies have explored the relationship between place attachment, pro-environmental behaviors, and stewardship of natural areas (Berkowitz, Ford, & Brewer, 2005; McMullin, Hockett, & McClafferty, 2007).

Two facets of experiential learning are realized when volunteers participate in environmental projects: interaction with scientists and professionals (Curtis & Van Nouhuys, 1999; McKenzie-Mohr, 2000), and engaging in scientific exploration of questions, often with unknown solutions (Brossard, Lewenstein, & Bonney, 2005). This type of hands-on interaction with the natural world has been found to be both a stronger influence on the development of attachment to natural landscapes (Berkowitz et al., 2005) and the positive changing of attitudes and behaviors towards biodiversity and species habitat (Pattengill-Semmens & Semmens, 2003) compared with passive learning, such as lectures, talks, or reading a book.

Volunteers who are engaged in nature-based projects, now more commonly called citizen scientists (Cohn, 2008), have been found to exhibit stewardship practices (McCaffrey, 2005). These practices can include increased volunteering in nature-related activities (Evens et al., 2005), participation in organizations for residential or community ecosystem management (Cooper, Dickinson, Phillips, & Bonney, 2007), or engaging in the legal or political process in environmentally-related issues (Berkowitz et. al, 2004).

## **Purpose Statement**

The purpose of this study was to explore how volunteers, engaged in ATBI projects, develop attachment to the resource or resource elements (site, activity, species, people, etc.) and develop stewardship for the resource. In so doing, several research questions drove the data collection and analysis:

1. What factors attract citizens to ATBI programs?
2. What are the meanings ATBI volunteers associate with the ATBI resource(s)?
3. How have volunteers' participation in the ATBI program shaped these meanings?
4. Do ATBI volunteers express a sense of stewardship for natural resources?
5. Are the meanings that ATBI volunteers associate with the resource tied to their sense of stewardship?

## *Implications for Research and Practice*

This project takes a preliminary step toward examining and deepening current understanding of how extended volunteer interactions with natural areas help shape the meanings citizen scientists associate with these settings and how these meanings influence feelings of stewardship. This research will also provide insight on volunteer motivations and the link between these volunteer activities and the formation of stewardship. In a more practical sense, using the ATBI as the research context will, for one, assist the Park Service in better understanding if it is meeting its goals of increased citizen stewardship through the ATBI project. This research will be able to provide

managers with insight on the benefits received by the volunteers and the park through the ATBI project, as well as why people are attracted to these activities. Information of this nature could help managers with promotion of the ATBI programs.

## CHAPTER II

### LITERATURE REVIEW

#### **Volunteers**

Citizen science and citizen scientists are becoming more commonly used words in today's environmental literature. Cohn (2008) defines citizen science as engaging public volunteers as assistants in a host of different biologically or ecologically related research to answer real world questions. Those who participate in this type of research are called citizen scientists. The key word in his definition is "volunteer". While the term citizen scientist may be gaining rapport, volunteering in nature-based projects is nothing new. Biodiversity goals, ecological restoration, and conservation projects are mainly human endeavors, aided by the help of volunteers. These projects are started by humans, project progression and design is by humans, and one of the many outcomes of these projects, aside from the biological goal, is to change human behavior so the desired biodiversity, restoration, or conservation practice can be reached (Mascia, Brosius, Dobson, Forbes, Horowitz, McKeen, & Turner, 2003).

Volunteers are an important part of environmental grassroots movements and catalysts for environmental change, for both publicly and privately managed resources. Ryan et al. (2001) go so far as to state that natural resource-based projects could not be done without the help of volunteers. With volunteers, "time, in effort, is spent instead of money" (Jordan, 2000, p. 30). If natural area projects are initiated by land managers and aided by this score of necessary volunteers, what is it that makes volunteers interested in



contributing time and energy in the first place? Additionally, what motivates volunteers to continuing to be a part of these endeavors? Clary and Snyder (1999) proposed that volunteer motivations are as diverse and complex as the types of volunteer pursuits available to them. They claim initial volunteering and continued participation will depend on both "person-based dynamics and situational opportunities" (p. 159) and not just the individual or the situation.

Past research on volunteer involvement in natural resource related projects has focused on motivations for initiating participation, maintaining participation, and the benefits received from volunteering. Some of the reasons given for starting to volunteer are concerns for the environment or a particular species (Brossard et al., 2005; Ryan et al., 2001), a desire to learn more about local environments (Ryan et al., 2001; Schroeder, 2000), or individuals were simply extended a personal invitation (Curtis & Van Nouhuys, 1999). Schroeder (2000) includes the opportunity to be outside and enjoy the outdoors and "being surprised by the new, unexpected, or unusual" things found at their sites as other motivations that get citizens to volunteer in nature-based projects (p.255). Curtis and Van Nouhuys (1999) suggest that certain activities will be more appealing to different individuals. They state that volunteers have certain goals they are looking to accomplish when they seek out volunteer opportunities and they will therefore find the activity that will best fit those personal needs and goals.

In a study of volunteer motivation, Clary and Snyder (1999) proposed six different functions or goals people might be attempting to achieve when looking for that initial project: value, understanding, enhancement, career, social, and protective. Value

relates to the belief that it is important to help others. Understanding refers to an increase in personal knowledge due to hands-on experiences. Enhancement concerns the need to increase feelings of self-worth through service to others. Volunteering for career purposes is seen as a way to help get a foot in the door of a place the individual would like to work. Social motivations relate to knowing and meeting others who are interested in the same things, and finally, protective goals for volunteering are seen as a means of escaping from personal everyday worries and troubles.

The literature suggests that while concern for the environment, a desire to learn more, and a personal invitation are reasons for beginning to volunteer, motivations may change over time to focus more on social interactions and an emotional relationship with nature (Still & Gerhold, 1997). Another study found that volunteers don't look at stewardship projects as just working in the park, but also an opportunity to make friends (Schroeder, 2000) and "to develop and extend their social networks" with volunteers who share their same or similar interests (Grese, Kaplan, Ryan, & Buxton, 2000, p. 277).

Other motivations that encouraged continued participation are spirituality or a chance to reflect (Ryan et al., 2001), being able to take on leadership roles in projects and educate other volunteers (Pattengill-Semmens & Semmens, 2003; Schroeder, 2000), or an increasing fascination with nature (Miles, Sullivan, & Kuo, 1998). Some volunteers expressed that an increased aesthetic appreciation of nature gained through volunteer service drove their continued participation (Schroeder, 2000). One study found volunteers continued to participate in stewardship service projects to enhance their relationships with nature (Grese et al., 2000). In a study looking at volunteers taking

part in a backyard bird survey, Trumball, Bonney, Bascom, and Cabral (2000) observed the motivation for participation from one of their informants was simply "because it's fun" (p. 266).

The benefits of volunteering are also a strong motivation for engaging in such activities. "While some benefits are likely to be common to volunteering in general, other benefits presumably reflect the particular choice of activities, namely environmental stewardship" (Grese et al., 2000, p.266). These benefits from volunteering in stewardship activities can be tangible or intangible. Pattengill-Semmens and Semmens (2003) studied divers helping scientists with fish counts and found volunteer divers benefited from the project with enhanced underwater experiences. On a personal and intangible level, Tuss (1996) states benefits of volunteering can include a more positive attitude and an increase in self-confidence. On a tangible level, volunteers gain a sense of overall satisfaction when they can see visible evidence of change that are direct results from the work they have contributed (Curtis & Van Nouhuys, 1999), whether it be ecological restoration of a site or data collection that helps scientists better understand fragile ecosystems. Schroeder (2000) found satisfaction was achieved through the belief volunteers had that they could put their knowledge into practice in local areas and by so doing truly make a difference.

Both Clary and Snyder (1999) and Miles et al. (1998) explored the concept of volunteer satisfaction. They believe feelings of satisfaction can come from knowing a job has been done well, a sense of accomplishment, knowing they have made a difference, or even from completing a physically challenging task. Those who

participate more often, have more satisfaction (Miles et al., 1998) and these "benefits accrue regardless of the age of the participant" (Ryan et al., 2001, p. 646). In some ways, volunteering is a self-reinforcing relationship (Ryan et al., 2001). After the initial motivation to volunteer has lead someone to participate in an activity, the benefits gained from that activity can act as momentum to motivate continued participation.

### **Resource Attachment**

When it comes to place and place attachment, definitions and delineations abound. Place, as defined by Tuan (1974) is a physical location given meaning. The most common term describing an individual's or group's positive bond and desire to interact with a specific place is known as place attachment (Scannell, 2008). It is the emotional bond people express toward places. Kruger and Shannon (2000) suggest the first component of a place definition comes through media and other forms of communication. However, it is the individual who gives the place value (Payton, Fulton, & Anderson, 2005). It is "when people are drawn to natural areas and experience them, they may develop an attachment to these places" (Ryan, 2000, p. 209). Within place attachment are terms such as place dependence, place identity, and sense of place; the type of attachment formed can vary between individuals and will be influenced by the way the individual uses or experiences the resource.

Place dependence "refers to the ability of a place to satisfy needs and goals, or the extent to which the physical characteristics of the place provide the appropriate resources for one's preferred activities" (Scannell, 2008, p.11). In his research, Ryan

(2005) found it was mainly neighbors and recreational users that manifested place dependence toward a local urban park. The park was close and therefore easily accessible, and offered elements the users desired. The park served a functional purpose related to a specific activity need. In a study of youth restoration volunteers, Vaske and Kobrin (2001) found that place dependence influenced place identity. The youths' continued visitation to the restoration site—place dependence in that they needed this site to perform their volunteer tasks—led to an emotional attachment (place identity) with the site.

Derr (2002) defines place identity as the psychological relationship an individual has toward a place. Included in this psychological connection are the ways in which self-concepts are influenced by the place and how the physical world aids in defining the individual's identity (Scannell, 2008). On a less abstract level, Kruger and Shannon (2000) include personal identification and experience with natural areas as components of place identity. Referring back to Ryan's (2005) study of urban park visitors, those who exhibited place identity were mainly the volunteers, managers or staff, and those with extensive knowledge of the park's natural areas. Place identity goes a step further from seeing a natural area as a functional place, to a site with emotional-symbolic meanings. Some people may be more activity bonded, while others may be more place bonded (Hammitt, Backlund, & Bixler, 2004). An individual can express dependence or identity attachments to a place, or both (Kyle, Graefe, Manning, & Bacon, 2004).

Sense of place can be defined as "the collection of beliefs, attitudes, and perceptions individuals associate with a particular locality. Sense of place thus marks

the intersection of geographic setting with personal experience" (Brody, Highfield, & Peck, 2005, p.201). Some literature suggests the concepts of place identity and place dependence are encompassed within this broader meaning of sense of place, along with feelings of inclusion, ancestral ties to sites, and a need to stay in that place (Scannell, 2008). Evans et al. (2005) propose "knowledge, skills, awareness, and disposition to care" are four main components of sense of place (p.589).

Location, use history, social ties, and resource elements all influence the development of place attachment. As illustrated in Ryan's (2005) work, those who lived close to the urban park were more likely to develop dependence-based attachment. In the study by Brody et al. (2005) it was also illustrated how proximity to a natural area plays "a critical role in determining individuals' views" of the place (p. 202). Closely tied to location is use history. Derr's (2002) research in New Mexico found that many social and cultural traditions of the Latino population are tied to the land (place dependence), and that these activities had been participated in at these specific locations for many generations. Because of the dependence of place for specific cultural traditions, the place became an important part of Latino identity as well.

Use history in relation to forming attachment examines the length of time a person has visited a specific site, the frequency of the visit, length of each visit, and what activities are participated in during each visit. Research suggests the strongest drivers of attachment through use history are frequency and length of time a person has visited a site. There is some dispute as to which is a stronger force for attachment. Custer and Blahna's (2000) research concludes that number of years of use is more influential than

frequency. Alternately, Ryan (2005) found stronger attachment with frequency of use. Either way, it is clear that both play an important role in forming attachments to natural areas. Kruger and Shannon (2000) offer some insight on this debate and propose that there are multiple perspectives and meanings people might give to the same natural areas, and that these views and values are dynamic; two people may view the same natural area differently and that same natural area can mean different things to one individual at different times and under different circumstances.

The effect of social ties is also an integral part of forming attachments. "Social psychological research indicates that individuals are drawn to those with similar likes, values, attitudes, and beliefs" (Payton et al., 2005, p.514). Restoration activities, recreation, and other natural area activities can provide a spatial context in which to meet others with similar interests, whether familial or stranger. In Derr's (2002) research on Latino children's place attachments, one child's sense of place came from the 'genealogic' ties to land. He had worked in a garden with his grandmother and because of the interaction with her in that place, he had developed an attachment to it. Even though his grandmother had since passed away, the boy still cultivated the land to help remind himself of his grandmother, as well as a memorial to her. It was a small patch of ground that had been given meaning because of these important social interactions.

There are also suggestions in the literature that people become attached to place because of the resource elements (geography, flora, fauna) that are present within it. Ryan (2005) suggests people could "have an attachment to a type of landscape...the physical characteristics of the landscape itself" and that there is an "implicit assumption

that learning about local flora and fauna will lead children to form an attachment" (p.6-7). In looking at volunteer motivations, Still and Gerhold (1997) found some tree planters were attached to the tree species and were more interested in planting than beautifying the local urban neighborhood.

### **Experiential Learning**

One of the motivations and benefits of volunteering mentioned above was learning more about certain environmental aspects or ecological processes. While psychologists might take a community-based social marketing approach to behavior change, looking at incentives and disincentives, or positive and negative reinforcements for "sustainable behaviors" (McKenzie-Mohr, 2000), volunteer stewardship activities engage people in experiential learning environments which have the potential to change beliefs, attitudes, and behaviors.

Fishbein and Ajzen (1975) define attitude as "a learned predisposition to respond in a consistently favorable or unfavorable manner with respect to a given object" (p. 6). Environmental education programs at nature centers, land management agency interpretive talks, brochures received in the mail, and other environmentally-related information can increase common knowledge or community awareness about ecological processes (Cooper et al., 2007). Cooper et al. also describe how volunteers involved in "direct manipulation of ecological processes" may also experience an "indirect manipulation of human attitudes" (p. 4). In this instance, this is a direct, hands-on experience. Evans et al. (2005) explain that a year of formal education in a class room



cannot be compared with the knowledge gained from hands on experience of the same subject matter. In their study of volunteers in a large project examining backyard bird habitats, Evans et al. (2005) found a significant increase in participants' general knowledge of birds, bird relationships and behaviors, and backyard bird habitat. In two other studies on knowledge and attitudes of volunteers, Brossard et al. (2005) found participant knowledge about bird biology increased as opposed to the control group, and Trumball et al. (2000) discovered participation in a project led to increased levels of thought about biology and the scientific process.

While the above provides evidence for increases in understanding and changes in attitudes, Berkowitz et al. (2004) suggest "the ecologically literate person may not live more lightly on the earth" (p. 228). What people believe and what people say is not always what they do or how they act (Saunders, Brook, & Myers, 2006). In other words, getting the leaflet in the mail may not be enough to change the desired behavior. McKenzie-Mohr (2000) describes the misguided assumption many people hold about this link and provides evidence of other studies conducted that show the relationship between attitude and behavior are weak or non-existent. One possible reason for this disconnect might be due to the citizen's perceptions that environmental problems are too far away, that there is no tie to their own actions or any association to their own local environment, and thus such issues are dismissed as irrelevant (Gillie, 1997).

One way to combat this disassociation is through experiential learning. "Humans are genetically designed to be active learners; passively absorbing knowledge from an 'expert' teacher just doesn't work. Research proves that the most effective human

learning actually takes place in the context of real-life experiences" (Perelman, 1992, p.129). The difference between classroom or leaflet learning and experiential learning is that the latter is formed around participating in some sort of action under certain circumstances and understanding the consequences of that action, repeating the process multiple times over a variety of different circumstances, and then generalizing the principle (Tuss, 1996). Tuss also suggests that "knowledge is retained better when situated or contextualized in some organizing structure rather than presented as isolated facts" (p.445).

Citizen science is a form of experiential learning where the public is encouraged to participate in scientific endeavors, projects, and experiments (Backstrand, 2003). In a study conducted by Dangerfield and Pik (1999), students collected and took an inventory of organisms in a certain area of a field, then catalogued their findings back in a lab. Through this process the researchers were able to teach concepts and provide the hands-on experience to students of what biodiversity means. Responses from the students who participated in this project reported increased awareness of the difficulties associated with assessing biodiversity, even for the small area they sampled, and how the information learned in the classroom about certain organisms was reinforced through the actual sampling and handling of them. In a similar study, Gillie (1997) found students asked better questions about species they had collected as opposed to something pre-prepared or given to them by their instructor.

Two major themes emerge from the experiential learning literature concerning why it is so successful. The first is the importance of interacting with scientists.

Multiple authors discuss this importance of working with scientists "who give life to the skills, disposition and understanding" (Berkowitz et al., 2004, p.252) and how this contact and communication empowers citizens and is critical to the success of experiential learning (Evans et al., 2005; Main, 2004). In a study conducted by Curtis and Van Nouhuys (1999), participants in a land use restoration project and a control group were asked their reasons for joining or not joining the project. Of those who joined, 31 percent gave some or great importance to the invitation or encouragement they received. Of those who did not join, 26 percent said the fact they did not get a personal invitation from project managers or friends participating in the project was of some or great importance to them. McKenzie-Mohr (2000) reinforces the notion that personal contact is the most effective way to change attitudes and behavior. This concept can be applied within the present study context with the partnerships between citizen and scientist, and citizens and other volunteers.

The second theme relates to engaging this team of scientists and non-scientists in scientific investigations that can and will help solve real world issues (Cohn, 2008). While the potential solutions to these research questions are often unknown, the process of co-discovery provides mutual benefit. There is a certain engagement, excitement, and commitment associated with something that has no solution (Brossard et al., 2005); the citizen scientists are "truly contributing to discovery" (Trumball et al., 2000, p.267). The types of projects can vary from gathering data to investigating questions of research importance. Often, the projects will have some underlying hypothesis or testable assumption. Whatever the situation, Light (2000) suggests there is a feeling of

participating in the endeavor as equals due to the fact that all involved parties are interested in achieving the same goal as a group, eliminating most if not all competitiveness. Involvement in these projects produces not only scientific and educational outcomes, but also attitudinal and behavioral outcomes as well (Cooper et al., 2007).

Working "hands-on" gives experience, cements knowledge, and increases scientific thought. Many environmental educators who rely on experiential education hope that through an increase in ecological literacy, it will empower people with the self-confidence and awareness of achievable conservation objectives and they will act accordingly (Berkowitz et al., 2004, Schwartz, 2006). This interaction and environmentally responsible behavior can occur anywhere. Saunders et al. (2006) state there are "abundant opportunities for meaningful interactions with the natural world in both urban and rural settings" (p.702). If attitudinal and behavioral changes from less environmentally responsible to more ecologically sustainable behaviors are the desired goal, and "intellect grows primarily through interactions with things in and people in the learner's environment" (Tuss, 1996, p. 444), experiential learning is a strategy for attaining that goal.

### **Stewardship**

Increasingly, the term stewardship has begun to replace the term management in environmental, countryside, wildland, and forest literature (Worrell & Appleby, 2000); however, a standard definition in the context of natural resource management (as

opposed to the business field) has yet to appear. Worrell and Appleby (2000) attempt to form a cohesion between the varying definitions for forest, urban, wildland, rural, and environmental stewardship. They propose stewardship as "the responsible use (including conservation) of natural resources in a way that takes full and balanced account of the interests of society, future generations, and other species, as well as private needs, and accepts significant answerability to society" (p.269).

Even in this attempt at a definition of natural resource stewardship, the above leans more towards a definition for natural resource managers and owners. Worrell and Appleby are aware of this bias in their definition and concede that stewardship could be extended to include and have relevance to citizens as well. They propose that through interaction with the environment—consumer actions or recreational activities for example—a broader view of the natural system is awakened and a desire to adhere to sustainable practices will emerge.

In their support of the above definition, Worrell and Appleby (2000) review three central tenants of stewardship. While their focus, again, is mainly toward resource management's stewardship, these three principle concepts can also be applied to citizen's stewardship. The first of these is the notion that stewardship involves looking after something "in trust for someone else" (p. 266). In the current context, this abstract "something" could be a particular ecosystem, a park, a species, or the environment in general, and the "someone" could be society or future generations.

Worrell and Appleby's proposed second tenet of stewardship is looking after something that is not capable of looking after itself. This is easily seen with the

stewardship parents have over their children. However, in a natural resource sense, nature, without the influence of humans, is considered capable of taking care of itself. Therefore, clarification must be made that the second principle of stewardship is aiding natural areas experiencing the impact of human activities and modifications.

The third tenant states stewardship includes "extending moral consideration to entities other than our fellow humans" (p.267). Taking these principles into consideration, stewardship toward natural areas has been quantified in the literature primarily in three ways: 1) changes in attitude toward natural areas, 2) changes in behavior that more strongly reflect environmental responsibility, and 3) a unique examination of willingness to pay for biodiversity.

A heightened or increased awareness of a particular aspect of an ecosystem or the environment is the most commonly listed indicator of attitude change (Cooper et al., 2007; Evans et al., 2005). However, Curtis and Van Nouhuys (1999) are quick to point out that "awareness raising is a slow processes" (p. 104). In an interesting study comparing what land managers and local citizens felt was true stewardship of the local public lands, Burger (2002) discovered discrepancies between the two as to what constituted a true environmental steward. The Department of Energy managers believed protecting human health and the removal of contamination to be the most important way for their staff to show stewardship while the constituents thought stewardship was the wise use of the natural resources and the preservation of the plants and animals. This study helped bridge the gap between the management and their constituents, allowing

both sides to understand each others actions and to collaborate more effectively on management strategies.

With an increase in new knowledge and awareness, Evans et al. (2005) found people can be motivated to change their behavior. This is a second way to exhibit feelings of stewardship toward natural areas. Some research, because of the empirical evidence illustrating the disconnect between attitude and behavior discussed above, suggests the only indicator of true feelings of stewardship are widespread behavioral change (McKenzie-Mohr, 2000). The types of behavior people engage in can vary from more personal everyday activities and local actions to participation in public arenas. Evans et al.'s (2005) discussion of "tangible" ways attitudes were reflected in behavior at local scales include recycling, lawn care habits and practices, and increased volunteering in nature related activities. In one study, a portion of the volunteers in environmental stewardship programs got individuals considering possible career changes into environmental fields (Grese et al., 2000). Jordan (2000) suggests that stewardship can be exhibited when people "spend more time creating intimate wild places in their own neighborhoods" (p.33).

On a broader scale, environmentally responsible behaviors might include participation in community organizations for residential ecosystem management (Cooper et al., 2007) or engaging in the legal or political process (Berkowitz et al., 2004). Ryan (2000) suggests the more attached volunteers become to their specific site, the broader the scope of stewardship to nature within and beyond their specific sites. Included in this broader scale is collaborative stewardship. In a very basic sense, Miles et al. (1998)

describes this as stewards who are highly committed, "taking responsibility for a variety of managerial activities and making decisions regarding how a specific site is managed" (p.30). This idea merges the land managers and local citizenries' ideas of stewardship, which, as Burger (2002) described could be different, into a cohesive, working, management plan. It is also proposed that continued monitoring and interaction with efforts to implement management plans and decisions is also a form of stewardship behavior the public can practice (Keough & Blahna, 2006).

Another study that attempted to quantify stewardship was one conducted by Martin-Lopez, Montes, and Benayas (2007, 2008). They proposed measuring opinions (attitudes) regarding biodiversity by asking people how much money they were willing to pay (behavior) to preserve certain species. In the context of this study, the researchers were asking for monetary amounts. Another way of defining willingness to pay (WTP) is that some behaviors, such as recycling and increased volunteer activity mentioned above, can also be considered a form of payment, not because of monetary costs but because of expenses to personal time, energy, and convenience.

Martin-Lopez et al. (2007, 2008) found a positive and very strong relationship between knowledge of a species, attitude toward it, and WTP to protect the species. However, this study did not physically receive funds from its participants nor monitor their behavior and it therefore is important to note that while this study did find relationships, it does not prove a link between attitudes and behavior. It is easy and desirable to list certain behaviors that changed as a result of attitude change, however,



the idea that stewardship behavior is complex must not be forgotten (McMullin et al., 2007).

### **Linking Volunteerism, Place Attachment, Experiential Learning, and Stewardship**

If stewardship invokes feelings of care and concern for the natural environment and can be measured in terms of attitude or behavior change, questions remain concerning how is it formed, fostered, or created. In the context of this investigation, attention is primarily given to the roles played by place attachment, experiential learning, and volunteer activities in citizen science projects in fostering individual stewardship. People who have higher levels of place attachment or have feelings of personal ownership toward a particular natural area are much more likely to express feelings of stewardship toward these places and adopt environmentally responsible behaviors (McMullin et al., 2007).

In many ways, the relationship between place attachment and stewardship towards that setting is an implicit assumption. For example, while Custer and Blahna (2000) allude to the idea that a sense of stewardship arises from having an attachment or feeling of ownership, Ryan (2005) directly states "attachment is necessary for stewardship" (p. 7). Three examples of studies that looked at these place attachment relationships are enumerated in the following. First, Derr (2002) in her study of Latino children growing up in New Mexico found a common theme influencing place attachment for these children was the sense of safety they felt in their special places.

The children understood they needed to protect these places from harm so that they, the child, might be protected from harm while in their special places.

A second study, conducted by Tanner (1980), further explored the link between place attachment and stewardship by surveying adults' experiences of losing a special natural area when they were children and the repercussions of these events. The desire to not go through such an emotionally upsetting episode again was a strong driver of participants' motivations to participate in volunteer stewardship behaviors as adults, to protect the sites to which they were currently attached. This strong negative reaction or sense of loss of a participants' favorite place is another way in which place attached individuals exhibit stewardship attitudes. This conclusion was supported by Ryan et al. (2001) who found volunteers do have strong attachments to their volunteer sites and will defend those sites from adverse impact.

Another research project examined the effect of place dependence and identity on fostering attachments to natural resources and their effect on stewardship. Vaske and Kobrin (2001) found links between youth participation in restoration activities, developing place dependency and identity, and how these attachments led to environmentally responsible behaviors in day-to-day activities that took place outside the natural area where the restoration activity took place. In a study of hikers along the Appalachian Trail, Kyle et al. (2004a) observed that place-attached recreationists were more inclined to act as stewards along the trail than those less attached to the trail. It is people living in the local community who develop a sense of ownership and attachment

to their surrounding landscapes that are "needed for lasting, sustainable stewardship" (McVicker, 2000, p.3).

Another way to promote stewardship behavior is through experiential learning. There is a basic notion that participation in environmental participatory activities "has scientific, educational, attitudinal, and behavioral outcomes" (Cooper et al., 2007, p.5). Both Pattengill-Semmens and Semmens (2003) and Ryan et al. (2001) found natural resource restoration volunteers gained a deeper sense of the scientific process, how ecosystems functioned, and an increased desire to be resource stewards. The value derived from experiential learning volunteer stewardship activities is a renegotiation of the relationship between the individual and the natural environment, and as Jordan (2000) states, a renegotiation in a positive way.

One contradiction to this was in a study by Haluza-DeLay (2001) who hypothesized that teenagers, after experiencing some sort of wilderness experiential learning activity, would develop a care for the natural world. However, he found that upon returning from the two week project, the teenagers' definitions of what constitutes nature and civilization had only become more separate and distinct. Nature had become something that was "out there" and not found in civilization and there was no reason, therefore, to try to protect their local 'civilization' environment.

Citizen science projects combine the elements of volunteerism, place attachment, and experiential learning in a key way for fostering environmental stewardship. An example of this phenomenon is the Cornell Laboratory of Ornithology's Neighborhood Nestwatch program (Evans et al., 2005). In this study, interested citizens were able to

help collect data on nesting birds in their own backyards. The participants were able to learn more about native bird species and migratory species through observation and self motivation to learn more about the birds (experiential learning). "Even after just one year of participation, the [Neighborhood Nestwatch] program influenced participants' sense of place" (Evans et al., 2005, p. 591). Because of the combining of these elements, awareness of bird behavior increased, as well as a change of behavior in yard care practices to protect backyard bird habitats.

The Neighborhood Nestwatch program is a prime example of the cultivation of "an ethic of conservation stewardship" (Schwartz, 2006, p. 1552). One important aspect of this project was the fact that citizens who volunteered to take part in the study already had responsibility for the site; the areas of observation were the yards of the home owners. McCaffrey (2005) posits that citizen scientists "develop a greater sense of stewardship over the...sites they are responsible for" (p.71). In the Neighborhood Nestwatch, this responsibility was already in place when the project began.

Other restoration projects that draw members of the community out to a natural site may not have a starting base of volunteers with these feelings of attachment or responsibility already in place, but as explained above, working on such projects, it will come. The end result of citizen science, place attachment, experiential learning, and stewardship is volunteers who are public activists for protecting local natural areas and broader environmental ecosystems (Still & Gerhold, 1997; Ryan et al., 2001). Volunteer stewardship activities have the ability to "articulate the terms of our relationship with

particular landscapes, to create values related to these relationships, and to generate emotional commitment to them" (Jordan, 2000, p.32).

## CHAPTER III

### METHODS

#### **Study Context**

Data were collected from volunteers participating in the National Park Service's All Taxa Biodiversity Inventory (ATBI) project. This is a unique venture undertaken by the Park Service as part of their Centennial Challenge. "The role of local government and private landowners in conserving biodiversity has become more critical than ever" (Scott et al., 1995, p. 50). The national ATBI project's aim is to engage the American public in activities that get them out in the parks' natural areas with a focus on increasing biodiversity awareness and resource stewardship (NPS, 2007). It is proposed the ATBI is the type of project that will "integrate biological objectives with social objectives" for the Park Service (Smythe, Bernabo, Carter, & Jutro, 1996, p. 866).

The Park Service realizes the "protection of park resources requires a knowledgeable public" (NPS, 1999, p.11). The Centennial Initiative (2007) proposal lists a number of states and parks that will take part in this endeavor. Data for this project were collected from Acadia National Park (Maine), Big Thicket National Preserve (Texas), Congaree National Park (South Carolina), and Santa Monica Mountains National Recreation Area (California) over the summer of 2008.

## **Data Collection**

Data collection used a combination of participant observation techniques and in-depth interviews employing a Zaltman Metaphor Elicitation Technique (ZMET). The former was comprised of participating on inventory teams in species counting and collection and informal conversations held during the events. This project implemented a ZMET so that important ideas, thoughts, feelings, and/or memories that may have been forgotten could be uncovered. The use of ZMET for this project was also employed because the in-depth interviews were driven by the ATBI volunteer, by the images he or she brought to the interview. Because of this, the informants were "better able to represent their thoughts and feelings and identify issues that are both important to them and potentially unknown to the researcher" (Coulter, Zaltman, & Coulter, 2001, p.4).

### *Participant Observation and Reflexive Journal*

A total of four ATBI events were attended during the summer of 2008. The first bioblitz was in late May 2008 at Santa Monica Mountains National Recreation Area in southern California. This event was sponsored by National Geographic, and drew scientists and taxonomists from all over the country, including Oregon and New York. The event began at noon and ended twenty-four hours later at noon the following day, with a focus on canvassing all species within park boundaries. At this event, species were collected. This event had five different ecosystems inventoried throughout the park, with one of those locations being the base camp. This event had multiple groups of elementary, middle, and high school children participating. There were other booths

set up by the Park Service, other land management agencies such as Bureau of Land Management, and California State Parks, as well as National Geographic sponsored booths. In all, about 6,000 volunteers showed up for this event, with a wide ranges of ages, backgrounds, and races represented. The researcher was able to join two research teams, one Friday afternoon, the other Saturday morning, as well as speak with many of the individuals manning their respective booths.

The second bioblitz was at Big Thicket National Preserve in east Texas. This event took place on a Saturday, with inventory activities in the morning and afternoon. This event drew a little less than 100 volunteers, and the researcher was able to speak to most of them. Many were adults coming on their own, with a few families also attending. The researcher went out with only one inventory team. There were also booths set up at this event representing different non-profit organizations in the area including but not limited to Houston Wilderness, Houston Zoo, and a representative from the North American Butterfly Association. There were three species of interest that were counted and collected at this bioblitz and activities ended mid-afternoon on Saturday.

The third bioblitz was at Congaree National Park in central South Carolina. This event took place on a Saturday, with inventory activities scheduled for the morning and afternoon. However, due to the weather, afternoon inventory forays were cancelled. This bioblitz drew about forty individuals, mainly people participating as families, with young or teenage children. This event's focus was solely on butterflies, and only a count was made, no species were collected in the field. About half the volunteers at this event



were repeat bioblitz volunteers, a fourth were regular visitors at the park, and the remaining fourth had never visited the park before. The researcher was able to go out with one of the inventory groups.

The fourth bioblitz was at Acadia National Park's Schoodic Peninsula on the coast of Maine. This bioblitz was set up as a twenty-four hour inventory with hemiptera the taxa of focus. Teams much smaller than those of the previous three bioblitzes attended by the researcher went out into the field to collect. Species were collected in the field and then brought back to the lab for identification. The researcher was able to visit with most of the participants, accompany quite a few inventory teams, and take an active role in preparing species in the laboratory for identification. This bioblitz drew about fifty volunteers, about eighty percent of which were repeat volunteers, including those who had participated in every bioblitz held at the park.

At each event, enlisting an inventory team involved joining a team of citizen scientists and one expert and participating in anywhere from one to three hours of invertebrate collecting and/or counting. During this time, casual conversation was engaged in with the other citizen scientists in the group and questions were asked about their participation motives, attitudes toward the park, activity, and if they knew others in the group. Casual conversations also took place during breaks for meals, and in the labs. A reflexive journal was maintained to keep a record of both the conversations that took place during the day and themes that appeared during these conversations. Photographs were taken of the different events to supplement the written journal entries. The journal and pictures helped in remembering the differences between the activities attended, as

well as showcasing how the inventory was conducted, how the activity was organized, the types of scientists and citizen volunteers who attended, and other ideas or quotes that arose during the informal chats with volunteers. The pictures and journal were considered data and used in the researcher's analyses.

### *ZMET Rationale*

The structure of the in-depth interviews was guided by the ZMET (Zaltman, 1997). Zaltman, the author of the technique, suggests that metaphors are so basic, that when we represent our thoughts through the use of metaphors, "communicators and audiences alike often are unaware of their use" (p.425). He indicates that because metaphors have this power to be obvious or subtle, hide or reveal our thought, their elicitation must be used as a research method. He posits that this can be accomplished through the use of visual images.

Zaltman (1997) proposes that "most thought, emotion, and learning occur without awareness, [and] probing methods must be developed to bring these experiences to a level of awareness that can be articulated" (p.434). He also states that two-thirds of all stimuli flowing to the human brain is through the visual system and visual images. Christensen and Olson (2002), in a study of mountain bikers, found that each picture the informants brought to the interview was a metaphor conveying one or many significant meanings about mountain biking.

Zaltman (1997) draws on several premises to support the metaphor elicitation process. The first of these is that human thought is based on images, not words. The

second is similar and states that most human communication is non-verbal and therefore a form of non-verbal expression must be included in research design. The third and fourth premises deal with the ideas of metaphorical thought, how metaphors are central to thought processes and how they are important for drawing out hidden ideas. The fifth premise proposed by Zaltman discusses how cognition is embodied—meaning images are "recurring patterns that arise from our bodily movements and manipulation or perceptual interaction with objects" (p.426). The six and seventh premises propose emotion and reason are used simultaneously in decision making and for that latter, that these processes often occur without awareness. The last two premises deal with the formation of mental models, or cognitions or beliefs (Christensen & Olson, 2002), how these mental models influence selection and processing of stimuli, and how "different mental models may interact" (p.428).

*ZMET procedure.* The ZMET "involves semi-structured, in-depth, personal interviews centered on visual images that the informant brings to the interview" (Coulter et al., 2001, p.2). In this way, the interviews were more ATBI volunteer driven and the informant was freer to talk about thoughts and feelings about his or her ATBI experiences. Instructions given to potential participants for gathering images included the importance of thinking about past ATBI activities and then gathering "images from magazines, books, newspapers" (Zaltman, 1997, p. 428), "pieces of artwork, and/or photos taken specifically for this assignment or retrieved from photo albums" (Coulter et al., 2001, p. 4) that specifically expressed what the ATBI meant to the individual and what in those images illustrated their motivations to volunteer.

*ZMET steps.* The actual ZMET interview process generally has eight steps, depending on the study using the method (Coulter et al., 2001; Zaltman, 1997). These steps include storytelling, missed images, sorting, construct elicitation, metaphor elaboration, sensory images, the vignette, and the digital image. The sorting, construct elicitation, vignette, and digital image steps were deemed unnecessary and would not provide additional insight for the purposes of this study and were therefore not included in the semi-structured interviews. For this project, the storytelling, missed images, sensory images, and metaphor elaboration steps only were used. The first step, storytelling, had the informant describe how each picture, individually, related to his or her experiences with past ATBI volunteer activities. "They come to the interview with a particular agenda or story they wanted to tell" (Coulter et al., 2001, p.4).

Step two involved asking the informant if there were any images he or she could not find but had wanted to include (Coulter et al., 2001; Zaltman, 1997). This was beneficial in that the interviewee could talk about ideas and images he or she could not access (Coulter et al., 2001; Zaltman, 1997). The next step was examining sensory images where the ATBI volunteer would be asked about the activity's influence on sensory mediums other than visual: taste, touch, smell, sound, color, and emotion. Coulter et al. (2001) support this step "because sensory metaphors are key mechanisms for discovering unconscious thought [and] offers additional data" (p.5).

The final ZMET step that was used for this project was metaphor elaboration. In this step, the researcher randomly chose two or three images and had the interview participant describe the similarities and differences with respect to ATBI volunteering

(Zaltman, 1997). Also included in this step was the task where the interviewer selected one of the pictures and asked the ATBI volunteer to widen the borders in any or all directions and/or dimensions and describe what was now included inside those borders (1997).

### *Participant Recruitment*

Three weeks prior to traveling to the ATBI activity, contact was made with that particular park's staff member in charge of coordinating the event. This individual was asked if he or she knew of any volunteers who would be returning to participate in the activity with which contact might be made.

After a list of possible volunteers was selected, initial contact was made by either phone or email (depending on contact information given by park staffer) at least two weeks prior to the activity. During this initial contact, the project was briefly discussed and the ZMET process (interview) and requirements (gathering of images) explained. One week before the event an email reminder was sent to the individual, and again two days before the event. All participants were able to decide where and when (though somewhat limited by the researcher's travel schedule) they would be most comfortable for the interview.

If only one possible volunteer was suggested by the park contact, that informant was asked if he or she knew of anyone else who might be interested in taking part in the study. Through this snowball process, four of the ten interview participants were found. Of the ten interview conducted, five informants were female, and five were male. It is

estimated that about seven were younger than forty years of age, and three were older than forty. Four of the participants were college students, both undergraduates and graduates, and two were professors, one in statistics and the other a taxonomist. Of all the informants, only two had formal degrees or training in taxonomy.

All interviews were recorded with the permission of the informant. The interviews lasted between forty-five minutes and an hour and a half. Copies of the images or the actual images themselves were collected, with permission, to be used in the researcher's analyses.

### **Data Analysis**

The purpose of this study was to explore how volunteers, engaged in ATBI projects, develop attachment to the resource and resource elements (site, activity, species, people, etc.) and develop stewardship for the resource. With this as the guide, CDs were made for each interview, all interviews were transcribed, and then listened to and read multiple times. During this processes, metaphorical expressions, and themes were identified. Metaphorical expressions were "the words, phrases, or sentences used to articulate" what the informant was trying to express (Coulter et al., 2001, p.6).

As reoccurring themes and ideas presented themselves in the process of reading and rereading the transcripts, constructs were created to represent specific categories of meaning (Christensen & Olsen, 2002; Vorell, 2003). Passages were identified and color coded that pertained to volunteer motivations, resource meanings, and stewardship. As these lists of quotes grew, a basic outline of topics was developed for each research

question. These outlines were elaborated upon by grouping more specific passages into sub-themes and then placing these sub-themes together under more general categories.

Once a basic outline was developed, the transcripts were re-read to insure that the themes and sub-themes were truly appearing consistently throughout, with some adjustments made to the outline. From this, the summary of volunteers' motivations, resource meanings, and stewardship was drafted. After many iterations of this draft, the images the interviewees brought were included in the text to add emphasis to the themes. Notes from the reflexive journal and photographs taken by the researcher were also included in the analysis of the data.

## CHAPTER IV

### RESULTS

Analysis of the semi-structured interviews and reflexive journal revealed five themes that provided insight on the factors that attract citizens to the ATBI program. Four themes emerged illustrating the meanings ATBI volunteers attach to the resource while only two themes linked participation in the ATBI program and their influence on these meanings. Additionally, an examination of ways in which the ATBI volunteers express a sense of stewardship for natural resources produced four themes. Last, three themes emerged that provided insight on the association between informants' resource-related meanings and their sense of stewardship. Each sub-theme is demonstrated by three or more quotations taken directly from the interviews. Also included are images provided by the informants during the interview, or those the researcher took during participant observation to help illustrate the themes.

#### **Research Question 1: What Factors Attract Citizens to ATBI Programs?**

My first research question examined the factors that attract citizens to ATBI programs. The five themes that emerged from the interviews and their sub-themes are presented below. (Table 1 provides a brief description of the themes and sub-themes for research question one.)



Table 1

*Overview and brief description of the themes and sub-themes for research question 1.*

<b>Research Question 1: What Factors Attract Citizens to the ATBI Project?</b>	
Themes and Sub Themes	Description
The Park Attachment to park, location, species Love of habitat or ecosystem Connection to nature	A general support for the park and park programs, no matter the activity
The Species Seeing, finding, working with Connection with species	Attraction to ATBI because of species being investigated during bioblitz
The Activity Connection with nature Excitement and enthusiasms	The activity as an end in itself; the aspects of the activity
The Camaraderie Social aspect Personal Invitation	The certain degree of sociability of the ATBI activity
Learning Opportunity Learning Interaction with professional	Attraction to ATBI for opportunity to learn from and interact with the professionals

### *The Park*

All the informants included in the semi-structured interview portion of the investigation had some form of involvement with their particular park prior to the ATBI activities. Because of this use history, almost all informants had developed attachments to their respective parks. A theme that emerged during the interviews was a general support for the park and park programs. No matter what was happening at the park, they were going to be there. The ATBI became another activity they attended.

*Attachment to the park, a particular location, or feature of the park.* One sub-theme within the theme of "the park" that emerged was the informants' overall

attachment to the park, or a description of a favorite place or feature of the park. (Figure 1 provides an example of this sub-theme.)

In November 1985 I came to the park...and feel in love with it [informant #2]

[At the park], I kind of like the Blueberry Hill Lookout, there's a lot of different habitat over there; the new [place] is the power line up through the pass through the woods [informant #6]

There's not any other [park] like this in the country [informant #7]

I've been affiliated with the park for about four years now and...for me, and pretty much like everybody else who comes here, just fall in love with Congaree, you know, it's just an amazing forest [informant #8]



Figure 1. *Attachment to the park, a particular location, or resource feature of the park.*

*A love of the habitat or ecosystem within the park.* Often, informants would describe the need or desire they had to be in a certain type of habitat or ecosystem and how they could fulfill this need while inside their park's boundaries.

You've got the water, and those things, all water based, are my absolute favorites in the end [informant #1]

It is what it is, it's just an outstanding example of an old growth deciduous forest, temperate floodplain forest, it's probably the best example of that type of ecosystem in the entire world and it's just, if you know anything about natural history you just get blown away by this place cause it's so wonderful [informant #2]

Getting to go to different places, seeing a completely different biosystem, that's really cool, 'cause that you don't get with other parks, you know, the Big Thicket is so, like they say, diverse, it's got so many different little areas that you get to go to, that's probably the biggest draw [informant #3]

*A connection to nature in the park.* Informants saw the time spent in the park, in whatever capacity, be it recreation, service or volunteering, as a time to connect with the nature in the park and to deepen or strengthen their current attachments to the park.

It's nice to just sit [somewhere in the park] and experience really being hot and uncomfortable, really being cold, really being annoyed by insects, or just, or whatever the situation is, whatever arises and I can have this for myself [informant #2]

This is going to sound silly, but I eat a lot of things that I find in the Big Thicket, like wild blackberries and mushrooms, mint leaves, and just all sorts of things [informant #3]

I feel more connected to nature [while in the park] which is something I lack a lot of feeling [in the city] [informant #4]

Kind of just being closely tied to how dynamically the landscape is changing, and just kind of sort of being immersed within that development [informant #8]

### *The Species*

One unexpected theme that arose during the participant observations, casual interviews, and the semi-structured interviews were participants' attachments to a certain species of flora or fauna. Several informants spoke of how they were drawn to the ATBI activity because their 'species of interest' were going to be included with other species or the only species being counted during the inventory. Some of the informants had traveled many miles from home (across their state, across state lines, across the country) just to attempt to find and study the particular species.

*The enjoyment of seeing, finding, or working with the species.* Informants' previous ATBI experience and scientific knowledge ranged from beginners with no background in a relevant discipline to those who possessed advanced degrees. However, across this broad spectrum of experience, all informants expressed an excitement in finding and counting the species during the activity, or taking them back to a laboratory to get a better look at them under a dissecting scope. (Figure 2 provides an example of this sub-theme.)

The drum of the pileated woodpecker combined with its wild call...the pileated woodpecker call, the big, extraordinarily impressive bird that it is [informant #2]

[The amanita mushroom] is so pretty, it's pretty much why I [physically] picked it, because I really thought it was a really pretty mushroom and I really like mycology [informant #3]

We've been like building up, we'd been hearing [Kentucky warblers], we knew they were there, then we saw it, and it was like hurrah! So that was, and it was a really cute bird too, it was so pretty, it was this little yellow bird [informant #4]



Figure 2. *The enjoyment of seeing, finding, or working with the species.*

There were definitely tons of butterflies just in that small area and the puddling was really neat, there was like 20 butterflies like all on top of each other on something like a spot the size of like a silver dollar, they were all just like crowding around and pushing each other out [informant #8]

*The chance to connect with the species.* This sub-theme differs from the connection to nature, discussed above, in that informants are drawn to the opportunity to gain a better understanding of the species' role in the ecosystem, how these functions affect the informant's world around them and in that sense, connect with the species.

I was trying to get warm [while we were out in the field] and so every time there was a sunny, I would go and just sit in the sunny spot and [my friend] was like 'you're such a reptile' and I've always loved reptiles, I've always loved amphibians, they are my absolute favorite, and so I saw this picture [of the turtle] and I said

that is me; and turtles especially because turtles like to bake in the sun [informant #1]

I was excited, I got all smiley, and I was all by myself so nobody was around and I was like yeah, and I'm like trying to be quiet, I'm like slowly paddling a little bit closer [to the kingfisher] without trying to disturb it and then I saw like another one later [informant #4]

Being better at butterflying, just another way to sort of enhance the experience for folks, you know, good at birds, not bad at trees, and still learning flowers, still learning butterflies, and so, but that's another, another thing that I do, another sort of way I interact with butterflies here [informant #5]

If you came to visit our park you could see the whales...they have a boat tour that takes you out to them...the whales are just amazing...you can get right up close to the whales...you feel like you are swimming with them sometimes...I love the whales" [informal interview]

### *The Activity*

While individual bioblitz events are organized and conducted differently from park to park, each has the same underlying objective, for example citizens and scientists teaming up to inventory species within a given area. For some informants it is neither the park nor the species that attracts them, but the activity itself, the ability to go out in the field and practice different collection techniques and then catalogue what they find. Similar to the informants' who have an attachment to the species, some informants are willing to travel many miles just to participate in the ATBI activity. For them, the activity is an end in itself.

*A connection with nature.* Informants are drawn to participate in ATBI activities because they believe it is an opportunity to go out in the field and to handle collected

specimens. In this way they are able to connect with nature. (Figure 3 provides an example of this sub-theme.)

[The park] has this way of bringing you so close to nature  
[informant #1]



Figure 3. *A connection with nature.*

When I woke up that morning it was a really nice day so I was really excited to be outside and connecting to nature on that morning [informant #4]

I mean, I work in highly anthropogenic, highly disturbed systems, so one of the attractions here is that I have a short window of exposure to more or less natural ecosystems [informant #10]

*The excitement, enthusiasm, and sense of adventure surrounding and during the activity.* Many of the informants were drawn to the bioblitzes because they liked to feel the excitement and enthusiasm the taxonomists and other volunteers at the event bring; this served to magnify informants' own excitement and enthusiasm. For some there was a sense of adventure in going out in the field and looking for and finding things they had never seen before.

[The leader is] just a very enthusiastic and very good at getting all things organized [informant #2]

It was fun, it was exciting when you finally go to the end [of keying out a species] and you knew what [species] you had, but it was getting there that was just daunting, but it was fun [informant #3]

You get the people like in here today doing the microscope stuff, some people sorting stuff coming in, the specialists working on the big identification projects, and somebody writing the stuff down soon as it comes in, keeping tallies and stuff and people coming in and figuring out where spots haven't been [sampled] yet and running back out to get new supplies to get going again, and you know, it's just really getting fired up with that, it's fun, it takes on the enthusiasm that you might find at a ball game sometimes, you know, it's really neat [informant #6]

I like seeing something new all the time [informant #9]

### *The Camaraderie*

ATBI activities are not silent, solitary activities. Many informants noted their desire to continue to volunteer because of the friends they had made in previous years and the non-competitive nature of the events. Some mentioned the ability to connect with other people who shared similar interests as an important aspect of the activity.



There was a certain degree of sociability that drew many informants to the ATBI activities.

*The social dimension of the activity.* Some informants saw the ATBI as a social activity and an opportunity to spend time with other people who have the same or similar interests. (Figure 4 provides an example of this sub-theme.)

Because I go out more for a social reason, you know, it's nice, like it helps the scientific whatever, the science count of it, like it's nice that that helps it but it is more for the social; and then also for the personal learning and connection to nature [informant #4]

For me, as a bug nut, that's what I look forward to, summer is my favorite time of year...I love the chance to get together with other buggy people, because they're not easy to find, it's fun sometimes to tell stories and watch people's faces turn green or whatever, you know, it's fun to get those reactions, but it's also nice to be able to talk the same language with people that have the same enthusiasm, and that is not easy to find typically [informant #6]



Figure 4. *The social dimensions of the activity: finding others who brake for maggots.*

I look forward to it because it gives me a chance to come out here and see all the people who want to do the same thing [informant #7]

For a taxonomist it's always fun to work, for one thing, work with a different, in a different area and another thing, to network with other taxonomists 'cause there are so few of them left now a days [informant #10]

Let's face it, if your hobby is spider taxonomy, you're not going to get far at a regular cocktail party, but you'll be the hit of a bioblitz and will also meet others who you can learn from [informal interview]

*A personal invitation to participate.* Informants who had friends that already participated in ATBI activities were more inclined to begin and/or continue to participate themselves if they had a personal invitation to join the activity.

Oh I would definitely count other species, I like all of them, but I would need somebody to [invite me out], that's kind of a key thing, is that I wouldn't sign up for something [like the bioblitz] on my own [informant #4]

[I was invited] through Maine Entomological Society [informant #6]

[I was invited] through Don Chandler, because he's been identifying a lot of my beetles for me and I save some of the specimens for him that he wants, and he let me know about it, about four months ago really, and let me know that this was being organized...then Andy Hamilton identifies a lot of my leaf hoppers and things like that on bug guide and actually just about three, two or three weeks ago, Andy sent me an email because I had forgotten to register for this and reminded me [informant #9]

### *The Opportunity to Learn*

The final theme providing insight on why ATBI volunteers are attracted to the activity encompassed a transfer of knowledge. Citizen volunteers liked the fact that the

events provided an opportunity for them to learn and gain a better understanding of a species, ecosystem, other projects going on, or even collecting techniques. Also related to this theme is the novelty of being able to work in close contact with scientists, taxonomists, and specialists in a true scientific endeavor.

*The opportunity to learn.* Most informants indicated an interest in increasing their knowledge in a particular species and were attracted to the ATBI for its learning opportunities.

To see some birds and to learn more. I want to be able to identify birds better...I was there to learn how to identify more birds [informant #1]

It really doesn't matter what you [work on] because you're going to learn everybody else's stuff [informant #3]

Quite often [people participate] because they want to learn more [informant #6]

Oh, I'm just a high school biology teacher. I don't know much, that's why I'm here, to learn more about insects [informal interview]

*Getting to work with and being encouraged by a professional.* Many of the informants spoke of the attraction to the ATBI because of the opportunity to be mentored, taught, and encouraged by scientists and taxonomists. (Figure 5 provides an example of this sub-theme.)

[The ornithologist] taught me how to identify birds, and how to watch birds, and how to find birds, it's not immediately obvious how you do it...two of [the ornithologists] were Bob Newman and Henry Stevenson, and I was his, he was my mentor [informant #2]

This is something else I also really love about [the ATBI], but that we have the ability to work with these professionals and these

people that can mentor us, that's really awesome, cause they're all so knowledgeable about what they're doing and so excited [informant #3]

Oh yeah, given [the ornithologist's] legacy, he's certainly been a mentor on these sorts of activities, you know [informant #5]



Figure 5. *Getting to work with and being encouraged by a professional.*

## **Research Question 2: What Are the Meanings ATBI Volunteers Associate with the ATBI Resource(s)?**

The second research question examined the meanings ATBI volunteers associated with the ATBI resource(s). The four themes that emerged from the interviews and their sub-themes are presented below. A few informants explained that a place developed meaning for them by the way it was experienced. (Table 2 provides a brief description of these themes and sub-themes.)

Table 2

*Overview and brief description of the themes and sub-themes for research question 2.*

<b>Research Question 2: What Are the Meanings ATBI Volunteers Associate with the ATBI Resource(s)?</b>	
Themes and Sub Themes	Description
Nature as Natural Naturalness The magic of nature Stimulation of the senses	Nature as distinct from everyday experiences and interactions
Nature as a Place to Recreate A place for adventure A place that is accessible Place dependence	A place dependence-based attachment to the resource
Nature as Escape A haven from the city and development Solitude Peacefulness Spiritual/Meditation	Nature as an escape from the everyday demands and stresses of life
Nature as Part of Identity Connection to nature Contentment, feeling of belonging	Psychological attachment influencing individual self perceptions

### *Nature as Natural*

Informants spoke of how the resource had meaning because it was natural, it was something that they didn't find in their "everyday environments." They spoke of how this knowledge of the difference, of the 'natural', was very important to them. This distinctness from the everyday experiences and interactions gave the resource meaning.

*Naturalness.* On multiple occasions, informants expressed how the resource was different, uncontrived, or not human constructed. The delineation between natural and non-natural gave the natural resource meaning to the informant.

[The park is] as natural as you're going to get in my opinion  
[informant #1]

Cause it, you can hear [the woodpecker] any day of the year here, it's not just a summer sound or a winter sound and the park is such a wonderful place for woodpeckers, cause there's so many amazing big trees and the trees are aloud to grow their natural lives and then fall over dead instead of being cleaned up [informant #2]

When you're out in the swamp it's the mud, mud has a particular smell, you can tell when the ecosystem's healthy, because the mud will have a certain smell...it's a pretty, it's an earthy smell [informant #7]

*The magic of nature.* Informants expressed how there is something sublime, something bigger than the informant, or something magical and mysterious about the resource. This unfathomable quality gave the resource meaning. (Figure 6 provides an example of this sub-theme.)

I mean [the water] almost seems magical when you see it [informant #1]

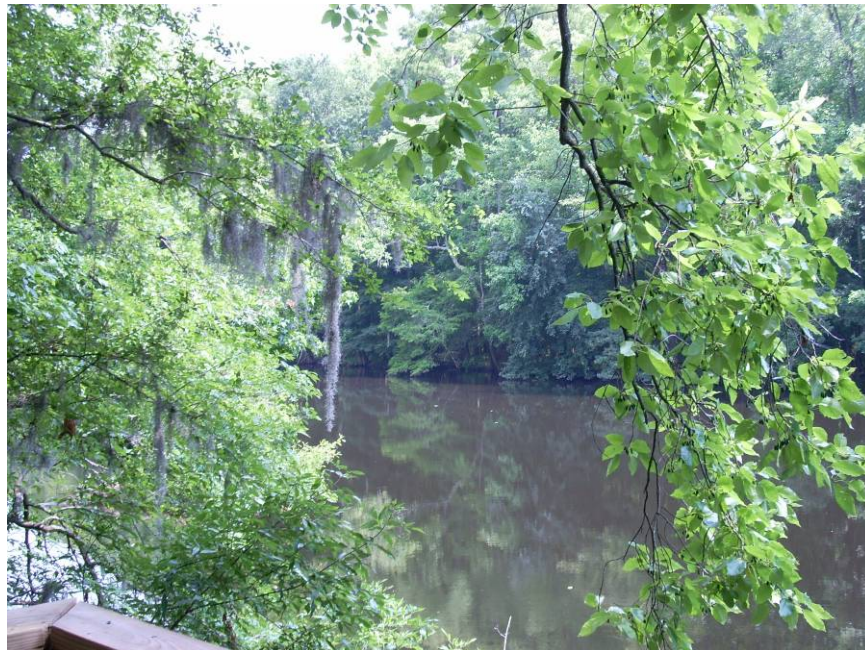


Figure 6. *The magic of nature.*

It's just a magical experience [informant #2]

I keep hearing everybody but now it's time to go [to the park] and see what's there because you know, it conjures up ghosts of the past, ok, maybe just maybe they're still here and maybe there's some other stuff that disappeared, 30, 40, 50 years ago that they haven't seen that's still here so, to me it's like, ok, this is kind of like an oasis [informant #7]

*Stimulation of the senses.* Many informants communicated how they looked forward to the crispness of the air, the smells, sounds, and tastes and how their senses seemed heightened while in nature. Many of the qualities associated with these senses were distinctly non-city which gave meaning to the resource.

I guess what you're not experiencing with these photos...the air is amazing there, it just feels crisp and cool [informant #1]

There's just the real clean kind of smell up there, I'm not used to, I can't put my finger on it, I don't know if it's like a cypressy smell or a tree smell, or something, but it's like that, clean, weird clean smell [informant #3]

After it's raining, I mean you just smell the damp moisture and it's like you can almost smell the trees and so I think a lot of it varies like depending on what the weather's doing, but it's always very, very earthy, natural smell [informant #8]

### *Nature as a Place to Recreate*

A place dependence-based attachment to the resource was often the metaphor used by many of the informants as they discussed the meanings they associated with the ATBI resource. They saw the resource as a place where they could accomplish their resource dependent recreation goals.

*A place for adventure.* The informants saw the resource as a place where they could have an adventure.

There's a lot of room to get lost in this and a lot of room to kind of explore [informant #1]

I used to lead hikes up the mountain and explore new hiking paths that were more interesting and things like that [informant #2]

I really love the Big Thicket and having people there who know what they're doing to get you out, kind of be more adventurous [informant #3]

*A place that is accessible.* The idea of access was brought up by many of the informants. Access was described in two ways. First, there were comments on how the resource was in close proximity to their residence. The second dealt more with the ease of walking through and getting to different places within the park. Both forms of access were important because of the ease it afforded informants to satisfy their recreation goals.

I can be down here anytime of the day or night, and just experience a little touch of wilderness [informant #2]

You know, the very accessible trails system for young kids, between the Sims Trail and the two boardwalk loops and the Bluff Trail and whatever, there were a lot of nice short hikes for families so it's probably something that got us out here early on you know, you know, very family friendly place [informant #5]

It's so neat that you can come out to your backyard and see that as opposed to watching it on national geographic or watching on the discovery channel, but it's like you have that right in your backyard and you're twenty minutes from the town [informant #8]



*Place dependence.* Many informants saw the resource exclusively in terms of a place where they could carry out and satisfy specific needs to recreate or participate in a certain activity, which gave meaning to the place.

Cause there's definitely a place attachment issue going on because I've been there with [birders] and with birding and that's where I've done almost all of the birding that I've done in College Station....so I totally associate [the park] with birding and listening to the sounds [informant #4]

[The picture] looks sunny and hot and of course you associate that with butterflying...[and] a chance to experience the park and the summer heat...I've always liked the hot weather hiking at the park [informant #5]

[I] just go for a beach, and go hiking and climbing a hill [informant #10]

### *Nature as Escape*

One of the more prominent themes emerging from the data analysis addressing the volunteers' resource meanings was the idea of nature as an escape from their everyday places the informants found themselves in and the everyday experiences they had within them. They expressed a desired to escape to the resource. The ability to experience that specific trait gave meaning to the resource.

*A haven from the city or surrounding development.* Informants associated meaning with the resource that was derived from their ability to escape the external pressures and accoutrements that accompany living in the city and to retreat to a place that was free from development.

[The park] is green, it's lush, the wildflowers are going like crazy [informant #1]

Even though it's a small park, a suburban park surrounded by high development in all directions and so forth and so on, it's just a gem [informant #2]

That's the stuff that I like to get away from, telephones, TV's, all that stuff, leave the electronics at home [informant #6]

I think we're fortunate that here we don't have the influence, yet, but I mean, again, they're surrounded, urban areas all around this park that are all expanding on it so I think that right now, at this time, we're really fortunate that a lot of that hasn't had, you know, very strong influence on the park [informant #8]

*Solitude.* Many informants expressed the desire to feel alone, to get away from a crowded city, and the importance of the resource being able to provide for this alone time. (Figure 7 provides an example of this sub-theme.)

I really liked this nook [I found in the park] because I had kind of gotten away from the group of people [informant #1]



Figure 7. *Escaping to nature for solitude.*

I like being by myself because I don't like being on somebody else's schedule or having to take care of people's needs or whatever and it's more of a solitude type thing [informant #4]

Well, I mean, I do like my solo hikes a lot [informant #5]

It's sometimes nice just to get away from the crowd and you know, when it's quiet [informant #6]

*Peacefulness.* Many informants expressed feelings of peace when they were out in nature, often in direct opposition to their everyday life experiences. They expressed the desire to find relaxing environments or settings while in nature. Informants spoke of how nature can provide that relaxing atmosphere and how they could leave feeling refreshed and energized. The ability of the resource to provide this peace gave it meaning.

I do [like this kind of environment] just cause it's kind of peaceful, I mean I enjoyed going and walking around out there...you can feel calm and awakened at the same time and similarly, you can feel calm and energized so I can leave that place and just feel good for the rest of the day [informant #1]

I go...more like relax, relaxation, nature [informant #4]

You sit at Weston Lake and you just sit there and it's just tranquil, you can look over the edge and watch the gars and watch the turtles and you just sit there and you can sit there and before you even know it two hours has gone by cause I've done it before, I sat there one time, watched the Mississippi kites flying around and just flying around doing what they're doing and before I knew, it was four o'clock in the afternoon [informant #7]

It's the quiet, it's the quiet and then just the, it's just the soft bird sounds and just all the different bird sounds you hear and how they kind of come and go, but it's definitely the birds and it's the quiet surrounding of the bird sounds, it's hard to kind of put those two together [informant #8]

*Spiritual/Meditation.* Informants suggested that nature was a place that provided opportunities for experiences that had spiritual qualities. Nature was also a place informants could escape to where they could meditate. The ability of the resource to facilitate these types of experiences gave meaning to the resource.

Peace, tranquility, spirituality, I don't know if that's an emotion but a sense definitely, I feel awakened, I feel calmed, awakened in the sense that I don't, that I'm sensitive to what's going on around me but I also feel a sense of calm [informant #1]

Sometimes I used to go down in the back part of the park where the trail is little visited or maybe even off the trail and just sit there for an hour, and just do nothing, have a Buddhist meditation [informant #2]

I have just taken a car out around the loop before and just stopped where it's pitch dark and there's nobody around, just the, look at the millions of stars that I've never been able to see before in the city lights and, hear the waves pounding as the tide comes in; I did that last year and I just pulled up near the shore where I couldn't see any life from anywhere, except the stars, and that was, the depth I guess of that experience has stayed in my mind [informant #6]

### *Nature as Part of Identity*

Almost all informants expressed contentment and a connection with nature and, more specifically, a place that had become a major part of their lives and their own self identity. For many, this deep attachment extended beyond self perceptions to the desire for others to see the informant as connected with the resource.

*Connection to nature.* Informants expressed a strong sense of connection where they felt being truly part of the resource. They talked of how this was a necessity in their life and how the resource had special meaning only they could understand because of

their own personal interactions and experiences with the resource. Many indicated this connection was something unique to their identity. (Figure 8 provides an example of this sub-theme.)

Mothy, in college I had to, I got the nickname from, a friend that used to stop by and visit my roommate and I, and every time he'd stop in, I would be working on, I just happened to be doing something on bugs...so he'd always come in with a buggy name for me, and one day he came in with Mothra, and it kind of stuck. Mothra was the big, you know, the giant moth from the Godzilla movies I guess, but it got shortened to Mothy and that stuck. I became known as 'Mothy' to the point where I really didn't know my own name, so I'd have to stop and think when I went to sign something what my own name was [informant #6]



Figure 8. *Nature as part of identity.*

Because a lot of people don't realize we're just as much entwined to the earth as everything else out there [informant #7]

Basically I'm a bird watcher and amateur naturalist and I'm driven with that, that's my, the main thing about my life, even though I was a, cause for a while, I was a computer programmer for a couple of decades. I didn't identify myself by my profession but really by my avocation [informant #2]

It's a real important part of my identity, is being connected to nature and I didn't realize how much I missed it, until I, or how much I needed it until I [visited the park], so in a way it's been good because I know how much, how important it is to me now [informant #4]

*Contentment, feelings of belonging, feelings of being at home.* Informants

identified the resource as a place where they felt they belonged. It was so much a part of them that they were completely comfortable and content while interacting with the resource.

I got [to the park] and I immediately felt like, wow, this is a really comfortable place, I feel at home [informant #1]

I'm just, I'm just happy [there] [informant #1]

You get to appreciate forests, I mean, there are trees [in Dallas], there are trees along the river, and prairies are wonderful, don't get me wrong, I really love prairies and deserts, but I declare, when I lived in Dallas, sometimes I got in the car and go drive out I-20 to the east till I got to about Tyler, Texas where the pine trees started [informant #2]

I want to live near the woods, I'm an elf, I'm one of Tolkien's elves [informant #2]

**Research Question 3: How Have Volunteers' Participation in the ATBI Program Shaped Resource Meanings?**

The third research question examined how the informants' participation in the ATBI program shaped the meanings they attached to the resource. The two themes that emerged from the interviews and their sub-themes are presented below. (Table 3 provides a brief description of the themes of sub-themes.)

Table 3

*Overview and brief description of the themes and sub-themes for research question 3.*

<b>Research Question 3: How Have Volunteers' Participation in the ATBI Program Shaped Resource Meanings?</b>	
Themes and Sub Themes	Description
Meaning from the Experience Experience resource in new way Excitement and enthusiasm Repeat experiences	Experiencing the park in a new way through the ATBI
Learning and Teaching Learning and understanding Enjoyment of teaching	Opportunity to learn from professionals and teach others

*Meaning from the Experience*

A prerequisite for recruiting the informants was participation in at least one other ATBI related project. For some informants, it was only their second time to participate, but for others, they had had multiple experiences on an inventory team. However, every individual had many years of experience in a non-ATBI capacity with his or her respective park. Experiencing the park through the ATBI gave new meaning to the resource or enhanced old ones.

*Experiencing the resource in a new way.* For many informants, engagement in ATBI projects allowed them to explore the park in locations they had not previously experienced. The ATBI program also facilitated interaction with park settings at a very intimate scale, such as getting down on their hands and knees for collecting or using specialized technical equipment to identify species. This unique and new approach of experiencing the resource helped shape the meanings informants associated with the resource. (Figure 9 provides an example of this sub-theme.)

The reindeer lichen is that really pretty bright pinkish-red one and I've never seen that before, saw a lot of things this year I'd, that I hadn't seen before [in the park] [informant #3]

[The park] is really the best thing in [the area] so I've renegotiated, yeah, renegotiated my approach to nature in, after living [here], and now I consider [the park] the pinnacle of nature [informant #4]

You know, I've been here camping, but as a kid more, and didn't know the whole lay-out of the entire peninsula, and so it never really dawned on me that we had that stuff...I didn't even realize as long as I've been here and didn't realize that there was fresh water [informant #6]





Figure 9. *Experiencing the resource in a new way.*

*The excitement and enthusiasm of others.* Informants were quick to mention the excitement that permeated the activities. It was almost a novelty, something they had never felt or not felt to the same magnitude in previous interactions with the resource. Also prominent in most mentions of this was an undercurrent of infectious energy and enthusiasm being shared with the other ATBI participants.

Christina came down here and was really enthusiastic about [the bioblitz] and started working up, and I said oh, sign me up coach, and whatever I can do to help, count and help you lead some parties and try to show people butterflies [informant #2]

We were lucky to see the [Kentucky warbler], it was really exciting [informant #4]

I guess the picture that comes to mind is when in the lab, when most of the people are in there and, we're choosing sites you know, and have the big map on the wall and sites and we're deciding which groups are going where and who's getting what, and people are sharing information and a lot of excitement going

on...it was fast paced and everybody's psyched up and, that's the fun stuff [informant #6]

*Repeat experiences.* All of the informants interviewed had previous involvement with the park or natural area and all had previous participation in an ATBI activity. As informants continued to volunteer for ATBI projects, their experiences reinforced existing resource meanings and helped shape new meanings.

I would say that [being in the park and listening for the birds has] really increased since I've [started] doing this, that this, that sort of attention to the sounds, because I know what I'm listening to now, identify different songs [informant #4]

Really the first three years I would do, I mean, I'd go to the Christmas bird count and not do a lot of other birding outside of that, you know, a little observational stuff but not much, but after four, by the fourth or fifth year I was a pretty serious birder [informant #5]

I find myself throwing in my small binoculars along with my birding binoculars and spending more and more time looking at [butterflies] [informant #5]

### *Learning and Teaching*

For many of the interviewees, attaching learning or teaching components to their interactions with the resource was a new concept. The ATBI project provided the opportunity to share knowledge and experiences with other volunteers as well as a chance for the individual to gain a better understanding of the resource. This added a new dimension of meaning to the resource for many informants.

*Learning and understanding enhances appreciation.* Informants expressed how learning more about the natural history of the park or a certain species increased their

appreciation and understanding of the importance of certain cycles and interactions.

Informants also noted the encouragement they received from those who they were being taught by as adding new meaning to the resource.

I didn't really care about insects or birds...and I mean I didn't know the difference between bug and insect and that sort of thing [when I started], and I just really began to appreciate things that are smaller [informant #1]

I thought mushrooms were mushrooms, they came on pizza, you put them in salads and that was that, they were white and they tasted all right, so, I was like, oh, mushrooms are different, I mean, they're, aside from the one you buy in the grocery store, there are others, so then I got really interested in them [informant #3]

So you get a group of people that go out and share that together, and it's fun because there's so much to learn from other people who have been in entomology for a long time and know some great collecting techniques or have some great stuff from their collections or stories to tell [informant #6]

I mean, it's not what you probably define as coolest [thing I learned this weekend] but Andy explained very well why hemiptera and homoptera should be in the same order [informant #10]

*Enjoyment of teaching and watching others learn.* Similar to teaching, many informants had not previously been involved in opportunities that allowed them to teach others within the park and about the park's resources. This was a new experience which gave new meaning to the resource as they saw those who they were working with gain new levels of understanding. (Figure 10 provides an example of this sub-theme.)

That's how I see myself in life, as a pathfinder, someone who really gets a charge out of finding a new way of showing people something they haven't seen before [informant #2]



Figure 10. *Enjoyment of watching others learn.*

I got to spend a whole lot of time teaching the locals how to use the microscope and like this kind of equipment...and it's really awesome and so you get to teach old people and kids as young as eight [informant #3]

I've seen somebody just drop their jaw looking at a moose fly, deer fly, underneath a microscope when they see the beautiful green and purple eyes, you know, it changes your life, you know [informant #6]

#### **Research Question 4: Do ATBI Volunteers Express a Sense of Stewardship for Natural Resources?**

The fourth research question explored the sense of stewardship informants' felt for natural resources. The four themes that emerged from the interviews and their sub-themes are presented below. For this study, stewardship was defined as looking after something in trust for someone else, extending moral consideration to entities other than

fellow human beings, and looking after something that is not capable of looking after itself. Stewardship can manifest itself in beliefs and behaviors. (Table 4 provides a brief description of the themes and sub-themes.)

Table 4  
*Overview and brief description of the themes and sub-themes for research question 4.*

<b>Research Question 4: Do ATBI Volunteers Express a Sense of Stewardship for Natural Areas?</b>	
Themes and Sub Themes	Description
Views of "Them" Others don't appreciate resource Getting others involved	Views of those deemed non-stewards
Passing on the Knowledge Telling stories of experience Importance of teaching others	Desire for scientific knowledge to not be lost
Other Park and Non-Park Stewardship Other volunteer activities Further increase personal knowledge Importance of the ATBI project	Expansion of participation in other stewardship activities
Preservation	Desire to see all resources and species preserved

#### *Views of "Them"*

Often, informants would refer to those who were not environmentally responsible or not land stewards as "those people", "them", or "others". These delineations were employed to help the informant separate his or herself as an individual who was a responsible land steward from those who are not.

*Feeling that others don't appreciate the resource as much as they should.* Many informants compared themselves as resource stewards to those they did not view as stewards by stating how the others were unconcerned about, did not understand, or did not appreciate the resource.

People just don't appreciate it and that's especially true with the management of the park, up until the middle of the 1990s, it's just the old regime was really difficult to work with, they didn't really care, they were just waiting around to retire [informant #2]

Most people understand the idea, I think, behind the biological surveys you know, but very few seem to grasp the idea or the ability even to handle insects or to really take an interest in them, so many people regard them as just something to step on [informant #6]

Just a general appreciation that people have for what they have, that the people take care, that, even just a general appreciation, you know, we've got to appreciate what we have because if we don't, we don't take care of it and the younger generations don't take care of it, we're not going to have it [informant #7]

[The park] just isn't perceived very well by the general public [informant #8]

*Urgency of getting others participating and involved.* There was an urgency apparent in the voices of the informants when it came to getting the 'them', those currently not expressing as much land stewardship as they should, involved in stewardship activities and getting 'them' connected to the land.

It's sad to say, but most people are actually afraid of the woods, and I'm seeing more and more as I've tried to do things to help people appreciate what a wonderful resource we have here [informant #2]

If we don't get these younger people involved, we're not going to have this; that's the biggest problem we're having now, we've got to get these younger people involved [informant #7]

I usually try and get friends to come, this year I couldn't unfortunately, but I usually try to bring friends with me, last year I brought a group of friends, and you know, hopefully next year [informant #8]

*Passing on Knowledge*

There was a strong sense from the informants that if they, the informants, did not pass on what they knew about the natural history, the resources, and the species of the park to the younger generation, it would be lost. This desire for knowledge, and by extension the attachment, to be taken up by the next generation expressed the stewardship ethic of the informants.

*Telling stories of the experience to others.* Informants talked about how they looked forward to sharing with their friends and posterity the experiences the informant had with the resource and how the informant was a steward of the land. (Figure 11 provides an example of this sub-theme.)

You can sit down with people and, maybe I'm old fashioned in that sense in that when I grow old I want to tell, I love sitting down with my family...I don't know if it's going to be so, so different if I have grandkids, I don't know if they're going to be so in the digital world...but I like to think that they would enjoy hearing stories and, about knowing some things that I experienced as a kid [informant #1]

I like looking at everyone else's [pictures from the ATBI], we each have a little file that says, you know, our name and our pictures go in that file, and I like looking at everyone else's and kind of see what they were up to, see what they saw, see if they did something different than I did [informant #3]

We have these personal journal...entries...I do a lot of them and so, but the journal entries, a lot of the time [the entries are about] when I'm just out, when I'm just out walking around the park [informant #5]

There are interesting stories that go along with the collecting, things like that, and if you have any interest in forensic entomology then you also can get into some interesting stories with that also [informant #6]



Figure 11. *Sharing stories of the experience.*

*Importance of passing knowledge on and teaching others.* There was almost an urgency with which many of the informants expressed the need to pass on their knowledge and to teach other so that knowledge of the natural history of the park, the species (especially taxonomy), and other aspects of the resource was not lost.

If I could have what I wanted in life, I would like the ability to pass it on to others, I try, I'm not the best teacher, but I'm not the worst either, I enjoy it, it's my life, I'm the pathfinder [informant #2]

It really has been interesting though because I've, it's kind of made me want to gear my career in another direction, so I think it would be really interesting maybe...to be a professor...kind of introducing the kids to this, something new, I mean...it was just



great that I got to have [scientists at the ATBI] to point things out and kind of teach me, but like a lot of the kids never've been camping [informant #3]

I worry that classical taxonomists, people who actually can identify things, they are somewhat endangered, it wasn't a severe decline, then it kind of bounced back a little bit, I don't know what's next, but certainly classical taxonomy as far as I'm concerned is not as developed as it should be [informant #10]

### *Other Park and Non-park Stewardship Activities*

The literature suggests that "true" stewardship manifests itself when responsible behaviors and feelings of stewardship expand to participation in service and volunteer activities in other park or protected areas, as well as to local community events or to the citizens' own backyard.

*Stewardship and other volunteer activities outside of park boundaries.* Some informants brought pictures to the interview that were not taken inside their respective parks and expressed feelings of stewardship for these places. Some of these informants had participated in natural resource related activities outside the park and expressed a desire to continue exhibiting their stewardship to these places through volunteer efforts.

(Figure 12 provides an example of this sub-theme.)

If I was still living in San Francisco when that oil spill happened I would have signed up to clean the birds and been there like every day and trying to help out because I feel really strongly about that, a lot more strongly about oceans [informant #4]

In Christmas bird counts, well, the real glamorous ones draw on the coast but I never do those, I try to support the local ones [informant #5]

Oh, about once a month I [go out to the park to volunteer], I might go out there more often this summer [informant #4]



Figure 12. *Stewardship beyond park boundaries.*

I've done spider blitz, and I've done that two years, and I've done public lands day for the last four years [informant #8]

Sometimes I'll go out for you know, I may make a little field trip on the weekend, not a whole lot, lot of times it's just even just walking around the yard or someplace in town...on my job I'm driving all through New Hampshire, Vermont, and parts of Massachusetts and a lot of times I'll have extra time during the day, like I call it my lunch break, I'll take a walk, different areas, that I, you know, that there is trails or rivers and stuff like that [informant #9]

This year [our group's activity] was in southern California, so I went there, and four years ago it was in Texas and, I've also gone on smaller group trips with some of my friends to Florida and Colorado, just for butterflies and they're looking for butterflies, I look for everything [informant #9]

*Desire to further increase scientific and personal knowledge.* Many informants expressed a desire to continue in the ATBI program as a way to better understand species and ecosystems, both for scientific and personal advancement.

I'm right now, I'm trying to learn different calls so I can identify [frogs] and go look for them [informant #3]

I'm trying to save up for a [field] book too...I'd like to take the next step and get the gear, like I'm a total beginner, like amateur at this, and I think the next step, I mean, too getting the binoculars will help, and getting a book too [informant #4]

With this butterfly count, I, you know, thought this was another opportunity, I'd been wanting to learn more about butterflies and this seemed like a good organized outlet for learning a bit more about that, you know [informant #5]

*An understanding of the importance of the ATBI project and its scope.*

Informants expressed an understanding of the importance of the ATBI project, why it was being done, why it was necessary, and how their involvement produced tangible results. (Figure 13 provides an example of this sub-theme.)

That's why I do the butterfly count, that and to support the staff here at the park, you see, I mean, you go girl, this is right, this is what you should be doing, more power to you, and it's just, it's just a wonderful thing, so that's why I volunteer for the butterfly walk [informant #2]

I think it's great that, that insects are recognized as worthy of something like this and they are, I mean, ok, we're at the bottom of the food chain, but they affect everything, at the bottom they affect the plants that they feed on and the animals that feed on them and they're a big part of a lot of the symbiotic relationships too with other organisms and I think it's great that we have something like this going on [informant #6]



Figure 13. *Understanding the scope of the ATBI project.*

There's a lot of area and there's a lot of this park they haven't covered yet and they haven't covered, and they still haven't covered a lot of this park in years, it's probably been 30, 34, 40 years that they've covered all this park, and it's been expanding more and more and they get more territories here, but we don't know what's here [informant #7]

Well, [the lab] that's where things happen, you know, you get specimens and you're able to identify them, and it's not, you can, it's more fun when you can get the better [photograph] outside collecting, but the room would explain the purpose of [the bioblitz]...when you catch a bug with a net I don't think it's that explanatory [informant #10]

### *Preservation*

Simply and succinctly, many informants expressed their stewardship through stating a desire to see all resources and species preserved for as long as possible.

Informants expressed their perspective on the need to better understand how ecosystems

functioned, how they were impacted by humans, and how they had a desire to see all resources preserved for as long as possible.

I mean, it is being more and more impacted by human beings [informant #1]

I'd like to see [these natural places] preserved, you know, as long as it can, forever if possible [informant #7]

So this area...filled up with the oil [that spilled] and so I wanted to, and happened to be going to San Francisco, I don't know what it was, and she, they needed help cleaning the birds and so we, one Saturday morning, we were scheduled to go and like help clean birds and clean off the oil from them...it was something important to me [informant #4]

#### **Research Question 5: Are the Meanings ATBI Volunteers Associate with the Resource Tied to Their Sense of Stewardship?**

The final research question explored the relationship between the meanings ATBI volunteers associated with the resource and how those meanings are tied to their sense of stewardship. The three themes that emerged from the interviews and their sub-themes are presented below. (Table 5 provides a brief description of the themes and sub-themes.)

Table 5

*Overview and brief description of the themes and sub-themes for research question 5.*

<b>Research Question 5: Are the Meanings ATBI Volunteers Associate with the Resource Tied to Their Sense of Stewardship?</b>	
Themes and Sub Themes	Description
Past and Future Participation Desire to continue participating Prominent positions in park groups	Attachment led to desire to continue participating and even join park related groups
Desire to Teach and Get Others Involved Desire to get others involved Desire to start new programs	Attachment led to desire to help others understand and develop resource meanings
Preserving Within Park Boundaries Things that don't belong Desire to preserve the park	Attachment led to moral obligation to protect the resource(s)

#### *Past and Future Participation*

This theme emerged as a desire for continued commitment and involvement on a personal level, meaning informants' statements focused more on personal beliefs and behaviors. They demonstrated their stewardship towards the ATBI resource through a long history of past participation and their desire to continue participation in the program. Through past use history at the park and then working at a closer level with the resource through the ATBI project, informants' had developed attachments to those resources. From these attachments came the need to extend moral considerations to these non-human resources. Some informants mentioned how resource attachments and feelings of stewardship led them to take positions of prominence in park related stewardship groups.

*Attachment led to a desire to continue participating in the ATBI.* As noted above, one of the requirements necessary for the informants to be considered for an in-depth interview was participation in at least one other ATBI activity. Many of the

informants had been participating in bioblitzes for many years, exhibiting a sense of pride in their dedication to the project. A general attachment led to a desire to continue to volunteer for as long as they were able.

It's really pretty easy to understand why I do this, cause I've always done it...I'll do it until I can't do it anymore [informant #2]

I would like to go back [to participate] [informant #3]

I believe this is [bioblitz] five [informant #6]

This is my second [bioblitz] [informant #7]

[This is] my third [bioblitz] [informant #8]

That would be my sixth one, I pretty much came to every one [informant #10]

I hopefully do the ATBI some more, I'm hoping to keep up with that [informant #3]

You know I'm a little torn because I like to do the, there's a couple other local counts I'd like to support, and you can only do so many of these [activities] because they're basically an all day endeavor and, you know, if I do more than three or four, you know, that's just, I think retirees could do more than three or four, it's kind of hard for people who work [informant #5]

I'm just glad I found out about [the bioblitz], I'm glad that I'm allowed to participate in it, and, it's really been exciting [informant #6]

*Attachment led to taking on positions of importance in park related groups.* An interesting theme that surfaced during some of the interviews was that of informants taking positions of prominence in park related stewardship groups. Often, it was these informants who encouraged other group member participation in ATBI activities. (Figure 14 provides an example of this sub-theme.)

[I] fell in and became active in the Columbia Audubon Society; I was president of Columbia Audubon Society for a couple years. I became president of the Carolina Bird Club for a couple years, I served a while on the Friends of Congaree friends group, Friends of Congaree Swamp [board] [informant #2]

This is the Friends of Congaree Swamp website, I'm the president of [the friends group] [informant #5]

I was, basically started, I used to be in the president of the Acadia Entomological Society [informant #10]



Figure 14. *Taking the lead of groups going out into the field.*

### *Desire to Teach and Get Others Involved*

The second theme's focus featured fewer references to the personal behaviors of the environmentally minded informants to what the informant could do to help others understand and develop their own meanings for the resource with the hope that they would also develop a stewardship ethic as well.



*Attachment led to a desire to get others involved.* The current meanings informants associate with the resource combined with their moral obligation to protect the resource motivated informants to teach others about the resource and to get them involved in the ATBI program. This encouraged participation was done with the hope that other individuals would foster their own attachment and become the next generation of stewards. (Figure 15 provides an example of this sub-theme.)

She didn't bring pictures, but she brought the next generation [informal interview]



Figure 15. *Three generations participating in a bioblitz.*

I tried [to recruit] a couple [other people], but no other takers, it was just Godofredo [that I recruited], so I was really thrilled...and [we] teamed up together [informant #3]

Anyone who wants to go outside or who thinks that [this area] is a horribly ugly place and they haven't been out to [the park] like it would be nice to like show them that hey, there is kind of a not

horrible, not to bad place to go...and introduce them to [the park]  
[informant #4]

*Attachment led to a desire to start new programs.* In the interviews, a few informants were influential in bringing the ATBI project to their respective parks in an effort to connect citizens with the resource. Other informants had significant roles in bringing or starting new programs at the park, all aimed at involving the public in different stewardship type activities.

I did what I do, which is observing birds and I established a Christmas count, Christmas bird count here in the early 1990s, I got that going here [informant #2]

I started an activity with the Friends of Congaree Swamp called the Dawn Chorus Day, which is a very big kind of event in Europe, one day during the spring you go to a place, a park or something, just before dawn and listen to the dawn chorus of birds as they wake up and so forth [informant #2]

I'm looking forward to some sort of Friends outing that could be organized [informant #5]

I mean, officially, like on my CV, it's that I'm a member of the [original bioblitz] organizing committee [informant #10]

### *Preserving Within Boundaries*

All informants identified a resource to which they had given meaning. Due to this meaning, they felt a moral obligation to protect that resource, whether it fell within or without park boundaries.

*Attachment led to feelings of distaste at finding things that didn't belong in the park.* Some volunteers indicated that finding things that did not belong in the park, that were not natural or native, negatively affected their experience and degraded the site.

I don't like the look of [oil derricks] in the Big Thicket, I don't like the smell of the oil...it's not the first time I've seen them in the areas, but they're just, you kind of see this really pretty forest then, oil derrick, and you know, like, I don't know, kind of like a cleared out area, so that wasn't pleasant...I think I took a picture of one of the oil derricks it's just, you see this really pretty scenery and you see this whole clear cut little patch in the land that doesn't match anything, with this huge, just monstrosity of metal and moving objects in the middle of nowhere, and so it kind of like ruins the whole kind of panoramic view you've got going on [informant #3]

Like dirt bikes, it's horrible, and then you can also hear construction around, they're building all those houses and so and I've noticed that because I've gone [to the park] probably like a couple years now...but even a couple years ago I didn't hear those sounds [informant #4]

[The ranger] asked everyone to turn off their flashlights for a couple minutes just to observe how dark it is and stuff but there was a lot of light shadow from Columbia that day and it wasn't very dark at all, so I mean, I think that was something that can ruin a [park] experience, light pollution [informant #5]

The biggest one that ruins it for me is the hogs, the wild pigs that are out here, that ruins it because they're not natural here, they're not native, you know people that have raised pigs over the years and they've gotten loose and they've just let them go so you know, they become feral pigs [informant #7]

*Attachment led to a desire to preserve the park.* All informants talked about the importance of maintaining and preserving the designated park or protected land areas.

(Figure 16 provides an example of this sub-theme.)

If [my favorite place in the park], if that place...it would be something motorized and I mean I don't even mind people...because I have noticed that they've created more accessible to Roam Point, it was kind of a special place that not many people knew about...and now they have a parking lot...if a train went through there, that would be the antithesis, if they build

a highway, if they developed...it wouldn't be the same [informant #1]

Back in the early 1990s there was a budget scare and there was talk about privatizing some national park lands especially saying well, why don't we get ride of some of the parks and monuments and so forth that are not visited enough...but it became obvious to those of us around at that time that unless there was a strong advocacy group, then there was no guarantee the park would still be here. That was about the time that the friends got organized [informant #2]

You think back to the history that [the park's] gone through, and they stopped logging this in the late 40s and if they wouldn't have done something before then, we probably wouldn't have this, cause there's a lot of timber out there that the logging company would like to get their hands on, but they can't [informant #7]



Figure 16. Attachment led to desires to preserve the park and its resources.

## CHAPTER V

### SUMMARY

The purpose of this study was to explore how volunteers, engaged in the ATBI project, develop attachment and stewardship for natural resources. To accomplish this, five research questions drove the data collection and analysis:

1. What factors attract citizens to ATBI programs?
2. What are the meanings ATBI volunteers associate with the ATBI resource(s)?
3. How have volunteers' participation in the ATBI program shaped these meanings?
4. Do ATBI volunteers express a sense of stewardship for natural resources?
5. Are the meanings ATBI volunteers associate with the resource tied to their sense of stewardship?

The following discussion gives a summary of the research findings and links these findings with other research on the topics of volunteerism, place attachment, experiential learning, and stewardship. The implications of this study for the current literature, as well as for the National Park Service and further study are explained, followed by the study's limitations.

#### **Summary Findings**

Before reviewing the research findings, it is important to emphasize that the participants in this study did not exhibit strong delineations from one another when it

came to their motivations to participate, their resource meanings, or their expressions of stewardship. The informants were not either/or, nor was this study conducted to define individuals as one thing or the other. All the informants had multiple motivations, attachments, resource meanings, and expressions of their stewardship. While some elements were more salient than others for certain informants, it would be incorrect to label an individual as only showcasing that one element.

*Research Question 1: What Factors Attract Citizens to ATBI Programs?*

The analysis of the interviews and reflexive journal entries revealed five main factors that motivated the informants to volunteer. One motivation was to express support for the park. All the informants had prior use histories with the park and had developed some level of attachment toward it. No matter what activity, event, or project was occurring at the park, they were going to be there for it.

The idea of going out in the field to collect, count, identify, and inventory species was also a motivation to volunteer. Some informants noted there were certain species they favored more than others and how their motivation to participate in a bioblitz increased when their species of interest was being inventoried.

Other volunteers were motivated to attend just for the activity itself. Informants talked of the enjoyment found in the structure, objectives, field and lab work of the bioblitz. Some informants had even traveled to other nearby parks, other states, or across the country just to participate in other bioblitz events.

The social dimension of the bioblitz was also a motivating factor for citizens to volunteer for the ATBI. Some had personal invitations from friends already involved, others looked forward to the opportunity to meet people with similar interests, and a few looked forward to spending time in nature with friends.

A final motivating factor for citizens to volunteer with the ATBI was for the learning opportunities, and not just in a general sense. Many informants specifically pointed to the fact that one of the objectives of the ATBI was teaming citizen volunteers with scientists and how the informants enjoyed the opportunity to mingle with and be mentored by the professionals.

*Research Question 2: What Are the Meanings ATBI Volunteers Associate with the ATBI Resource(s)?*

Informants expressed multiple and varied meanings for the resource. One of the most common ideas among the informants was how the resource differed from their normal, everyday surroundings. This was described in how the resource was more natural than what informants came in contact with throughout their everyday life and how there was a certain magic or unfathomable quality to nature, or how the senses were awakened and more keen while in a natural setting.

Dependence on the park as a place where informants could have an adventure or carry out their recreational goals was another theme that expressed the meaning of the resource. A sub-component of their dependence was the accessible quality of the

resource, both in terms of the ease and convenience of the park, as well as the ability to move around within the park without external limitations or restrictions.

Informants also viewed the resource as a place to escape to, a place where they could experience particular physical settings or emotional feelings they could not otherwise achieve without being present in nature. Volunteers talked about experiencing solitude, heightened senses of spirituality, and a general peacefulness from being away from a city and/or development.

For some volunteers, the resource had also become a very important part of their identity. Often this was portrayed in how the informants viewed and spoke of themselves in relation to the resource. Others hoped their deep connection to the resource was apparent to those they came in contact with.

*Research Question 3: How Have Volunteers' Participation in the ATBI Program Shaped these Meanings?*

There is a distinction that needs to be made between the second and third research questions. The second research question explores ATBI resource meanings in general, whereas the third question explores how participation in the ATBI has shaped those meanings. At first, informants found this distinction difficult to articulate, owing to the fact that all had past history with the park and its resources, and many had already well established meanings associated with the resource. However, by getting informants to speak specifically about the ATBI project and bioblitz activities, resource meanings shaped by the project were more easily elicited.



The overarching theme that emerged concerning resource meanings shaped by ATBI participation was associated with how the informant had experienced the resource in a way they had not before. For some, it was a novel idea that there were places and things within the park that they didn't know about, hadn't seen, had never experienced before, or at least not to the degree they did during a bioblitz. There was an excitement and enthusiasm that permeated the activity that was infectious for all who participated. Some were surprised by how much they enjoyed the bioblitz activities and how they realized they had become unintentionally 'hooked'.

One interesting finding was related to the learning and teaching that went on during the bioblitz. The opportunity to learn was already a motivation for volunteers to participate in the first place. However, some of the informants with many years of prior use of the park were surprised that there were certain aspects of the resource they did not know that were learned during the bioblitz. This additional insight into the resource reinforced currently held meanings and fostered a greater appreciation for the resource. Absent from the motivations to participate was the opportunity to teach others. However, during the bioblitz, some volunteers were able to teach other volunteers about the resource. Many found they enjoyed this teaching opportunity, how teaching was a new way in which to experience the resource, and that teaching added another facet to their personal resource meanings.

*Research Question 4: Do ATBI Volunteers Express a Sense of Stewardship for Natural Resources?*

A distinction also needs to be made between research questions four and five. Research question four explores the general sense of stewardship volunteers have for natural resources; the fifth research question more specifically investigates the possibility of the volunteers' sense of stewardship being tied to the meanings they associate with the ATBI resource(s).

The four themes that emerged from the analysis related to the general sense of stewardship volunteers have for natural resources can be separated into two categories: desire for others to adopt similar stewardship ethics and the informants' personal stewardship-related behaviors and beliefs. The former expresses how the informant defined the difference between him or herself as the "true steward" and the "them", the non-steward. Also included is the desire to pass on resource knowledge to the next generation and get the "them" involved more.

When it came to personal beliefs and behaviors, informants spoke of other ATBI type activities, restoration projects, or general volunteering they took part in within natural areas, beyond their respective parks. Included in this theme was an understanding of the purpose of the ATBI project, and a desire to learn more about the resource through the project in order to become better stewards within and beyond park boundaries. Throughout, informants expressed feelings that preservation of natural resources was the moral thing to do.

*Research Question 5: Are the Meanings ATBI Volunteers Associate with the Resource Tied to Their Sense of Stewardship?*

The meanings ATBI volunteers associated with the resource can be broken down into two parts. First, informants spoke about how individual attachments led to feelings of accountability for their own actions. Second, informants told about their efforts to encourage others to form similar attachments to the resource and thereby create the next generation of park stewards.

Attachment to ATBI resources led many of the informants to participate in the ATBI activity for many years. Informants expressed personal pride in the number of bioblitz activities they had previously been a part of and their plans to continue to be active ATBI volunteers. One interesting finding was that a few informants' attachments and feelings of stewardship for the park and its resources were so strong, they began to take on positions of prominence in park related stewardship groups.

Attachments to the resource also manifested themselves in the volunteers' desires to get other people involved with the hope that more people would come to appreciate the resource and ultimately become the next stewards. This was accomplished by promoting the ATBI project to people the informants came in contact with and trying to get them involved. With this desire to increase volunteer numbers in stewardship activities for their respective parks, a small number of informants started or were involved in starting new stewardship type programs in their parks.

Finally, informants expressed an overall desire to preserve the resources in the park. Use history and attachment to the park led many informants to comment on

changes or intrusions within the park, or other distractions and developments that did not belong in the park and had the potential to ruin recreational experiences. They also expressed a strong desire to protect the park and be good stewards of its resources, springing from the strong attachments to the park.

## **Connections to the Literature**

### *Motivations for Volunteering*

While current literature may be touting 'citizen scientists' as the new environmental volunteers, this research begs the question "do the volunteers themselves know what they are doing is considered citizen science?" Of all the interviews that were conducted, formal and informal, only one individual used the expression "citizen scientist". That individual was an academic, however, who works in a human dimensions of natural resources field. In accordance with Cohn's (2008) definition of citizen science—the engaging of public volunteers as assistants in a host of different biological or ecologically related research to answer real world questions—all ATBI volunteers are citizen scientists.

Despite this small nomenclatural disconnect, informants did know that they were volunteers and they understood the scope of the project. Ryan et al. (2001) stated that many natural-resource based projects could not be done without the help of volunteers. His stance however, was from a park management perspective. This study shows that the informants are also aware that their time and talents are necessary for the ATBI to accomplish its goals.

Clary and Snyder (1999) proposed that volunteer motivations are as diverse and complex as the types of volunteer pursuits available to them. This was found to be true for the ATBI volunteers. Volunteers motivated to participate because of a concern for the environment or a particular species supports Brossard et al.'s (2005) findings and desires to learn more supports Ryan et al.'s (2001) findings. One motivation somewhat uncommon in the literature was participation simply because the individual had been extended a personal invitation to volunteer (Curtis & Van Nouhuys, 1999). This particular motivation was found to be a driver in ATBI participation.

In comparing Clary and Snyder's (1999) six goals people have when they volunteer, only value, understanding, and social were found to coincide with ATBI participant motivations. Volunteers believed there was value in helping the park, species, and scientists. They desired to increase their understanding with hands-on experience, and they enjoyed the social aspect of meeting other people who were interested in the same things. In the formal and informal interviews conducted for this study, no informant stated he or she volunteered to enhance their feelings of self-worth or to improve their career marketability. Clary and Snyder's sixth goal is 'protective'; this is where volunteering is seen as a means of escaping from personal everyday worries and troubles. While this was not a motivation to volunteer in the ATBI, the idea of escaping to nature was a meaning many volunteers ascribed to the resource.

Other motivations to participate in the ATBI included the social aspect of the activity. The most common thread in informant responses about the social aspect of the activity was focused mainly on meeting and getting to know people who have "similar

likes, values, attitudes, and beliefs" (Payton et al., 2005, p.514). This finding also supports Schroeder's (2000) work that found volunteering in resource related activities is "more than just working on the land", it also involves making friends (p.255).

For this study, informants were motivated to participate for varied reasons; as the resource was experienced in a new way, new resource meanings were added and in some instances these meanings became the volunteers' motivations to continue to participate (Kyle et al. 2004b). Initial volunteering motivations led to benefits from volunteering. This study supports Ryan et al.'s (2001) suggestion that volunteering is a self-reinforcing relationship. When combined with the new meanings and volunteering motivations, the ATBI project is one that has developed a very loyal following.

Curtis and Van Nouhuys (1999) suggested that volunteers seek out activities that will give them the best opportunity to accomplish their own personal goals. The bioblitz activity in and of itself was a motivating factor for many of the informants. The ATBI is a unique project in that the activity encompasses all the other motivations to participate including the ability to work in the park, to interact with certain species, to meet people interested in the same things, and to learn.

### *Volunteering, Place Meaning, and Experiential Learning*

Informants talked about how their participation in the ATBI project allowed them to experience nature in a different way. Through this novel interaction, nature took on new meanings such as fostering emotional relationships with nature, or taking on leadership roles and educating other volunteers. These meanings support the literature

citing motivations for continued participation in volunteer activities for many years (Still & Gerhold, 1997; Ryan et al., 2001; Pattengill-Semmens & Semmens, 2003).

The ATBI is an example of experiential learning. In contrast to walking through a nature center, hiking in the woods, or reading a brochure, ATBI volunteers are actively involved in a direct, hands-on experience (Cooper et al. 2007). Past literature (Brossard et al., 2005; Evans et al. 2005; Trumball et al., 2000) has found that these types of activities have the potential to change attitudes and behaviors. One of the informants spoke specifically about seeing new volunteers leave a bioblitz with a glimmer more of understanding than what they had when they started. Not only had informants seen these changes happen in others, but they saw marked changes in themselves as well.

The ATBI is an experiential learning project where the public is enlisted in scientific endeavors, projects, and experiments. The proposed success of experiential learning is situated on the two components of the process: interacting with scientists and helping to solve real world issues. This study found two of the motivations to participate were the fact that the individual would be interacting with a scientist or the individual had a personal invitation to take part in the activity. These findings support McKenzie-Mohr's (2000) notion that personal contact, whether before or during, is an effective way to get people involved. Similar to these two components, a couple informants spoke of how everyone was "on the same page", how there was no real attitude, there was no real competition other than that of a playful nature, or expressions of ego during these activities. These observations support Light's (2000) findings that "people tend to participate by and large as equals" in volunteer stewardship activities.

The idea of solving real world issues was present in the form of excitement, enthusiasm, and discovery. There was a certain level of excitement and energy in the work being done during the activity that attracted citizens to the bioblitzes. There was also an excitement and anticipation that accompanied the discovery of species. This discovery occurred on three levels: new to the individual, new to the park/area, or new to science. Starting a project where all involved do not know how it will end, with all working as equals toward the same goal, where the discoveries will have real world implications (Perelman, 1992), encompasses experiential learning and the ATBI project. It must be noted, however, that this process of discovery is somewhat guided.

Volunteers are not wandering aimlessly around their study sites, but they are being mentored by the taxonomists and in some instances other experienced volunteers. Even though the resource is at times being loosely interpreted for the volunteer, the ATBI project is designed with enough latitude for volunteers to create and/or define their own natural resource meanings.

Many informants noted how the more they learned and gained an understanding of the resource through the ATBI project, the more the resource meant to them, or they found new meanings in the resource. It is the individual, and in this study the volunteer, who gives meaning or value to the place through the type of interaction with the place. Supporting Scannell (2008), the informants in this study exhibited place attachment to their respective parks by expressing their desires to interact with the resource. Some informants were more place dependent, needing the park as a place that had certain characteristics appropriate for their desired activity.



Place dependence for some was activity centered, such as the place's ability to provide space for adventure. Others depended on the park as a location to view certain types of species. In an intangible way, place dependence was less activity or species centered and more focused on the emotional and spiritual benefits—such as solitude or peace—the resource provided the individual (Grese et al., 2000). Again, resource meanings were formed and reformed as the resource was experienced in different ways.

This supports Kruger and Shannon's (2000) findings that there are multiple perspectives and meanings an individual might give to the same natural area and that the same natural area can mean different things to an individual at different times and under different circumstances. This was especially prevalent in the sub-theme of "enjoyment of teaching" and watching others learn. The ability to teach others was not something that motivated volunteers to participate in the ATBI but it was something they found themselves doing as part of the activity. It was a new way to experience the resource, which gave new meaning to it. Ryan (2000) found the different types of involvement will lead to different types of attachments. For many, the ATBI project was a different way in which to experience the park, which fostered new meanings for the resource.

Almost all the informants displayed some form of place identity. This was shown in the deeper, psychological relationship the individual had toward his or her respective park (Derr, 2002). This psychological connection can include a personal identification and experience with the natural area (Kruger & Shannon, 2000).

According to Scannell (2008), this experience with that place can help influence individual self-concepts and how the physical characteristics of that place aid in defining

the individual's identity. A strong component of informants' self-concepts was influenced by the place through experiences with nature there. Ryan (2005) found that those with a more extensive knowledge of a park's natural areas were more likely to exhibit stronger place identity than place dependence. Volunteering in ATBI projects provides the opportunity to become more familiar with nature in the parks. Many informants had developed strong feelings of attachment to the resource after many prior years of park use and then participation in the ATBI project.

#### *ATBI Participation, Attachment, and Stewardship*

In their paper on stewardship, Worrell and Appleby (2000) proposed that citizens, through interactions with the environment—such as consumer, recreational, or volunteer activities—can gain a broader view of natural systems, which awakens a desire to adhere to sustainable practices. Through the ATBI project, citizen volunteers are given the opportunity for this interaction with the environment, and ultimately, they develop attachments to the resource from which feelings of stewardship are fostered towards the resource.

Informants adhere to the three tenants of stewardship proposed by Worrell and Appleby (2000): 1) looking after something in trust for something else, 2) looking after something that is not capable of looking after itself, and 3) "extending moral consideration to entities other than our fellow humans" (p.267). First, volunteers realized that they must take care of the resource so future generations could enjoy it. Second, informants had an understanding of human impacts on the resource and how the

ATBI project helped better inform science of those impacts in an effort to become better stewards of the resource. This is similar to Jordan's (2000) idea of stewardship as an exchange. He states that through interaction with an ecosystem, citizens are made aware of the "gifts" nature gives us. For this study, these gifts could be found in some of the meanings informants associated with the resource. Volunteers soon realize that their dedication of time and efforts in stewardship activities offered a way of returning gifts to the ecosystem.

The third tenant, extending moral consideration to non-human entities, is of particular importance to this research. At the outset of this study, the type of the relationship between place attachment and environmental stewardship was uncertain; it was unclear whether stewardship followed place attachment, or place attachment followed stewardship. Now, it is clear in the case of the ATBI project that stewardship was a product of the informants' attachments to the resource. As psychological connection to a place through interaction occurs, volunteers may experience an expansion of their sense of identity in that they are both a part and protector of nature (Grese et al., 2000). This relationship succinctly supports Worrell and Appleby's third tenant of stewardship.

The informants in this study, due to their use history of their respective parks, had already formed attachments to the resource(s) within park boundaries. Ryan (2005) states attachment is necessary for stewardship. Due to these attachments to non-human entities, moral considerations, or a desire to preserve and protect, were extended to the

resource. In this way, the idea that citizen stewardship is gained through volunteer activities as discussed above is supported.

Evans et al.'s (2005) definition of sense of place could also be used as the ATBI's definition of stewardship: having the knowledge, skills, awareness, and disposition to care for the resource. For a few informants, an increase in the four areas above, combined with attachment to the resource, education of other volunteers, and a desire to take on leadership responsibilities were all outward expressions of their stewardship. The latter element corresponds with Miles et al.'s (1998) research on Chicago area volunteers that found highly committed stewards also take on more environmental responsibilities such as directing volunteer activities or becoming more involved in park management decisions. In the case of one informant, participation in the ATBI went past taking on leadership responsibilities to thoughts of possibly changing the direction of her career with the intention to continue teaching others about the resource. In their study, Grese et al. (2000) found some of their volunteers were also "inspired to consider career changes" after participating in a stewardship activity (p.272).

Ryan et al. (2001) proposed that when volunteers have strong attachments to their volunteer sites, they will defend those sites from adverse impacts. In a different study, Ryan (2000) states "people's attachments to natural areas also makes them more concerned about the future of natural areas and more willing to actively protect these areas" (p.215). This was supported by the informants in this study with the sub-theme of attachments leading to feelings of distaste at finding things that don't belong in the park. Most informants spoke out against the negative changes happening within the park such

as feral hogs and oil derricks, or changes surrounding the park, such as encroaching development and light pollution.

Another type of adverse impact to the site could be loss of the site altogether. Schroeder (2000) found that volunteers feel distress and a sense of loss relating to vanishing native plants and animals and the rapid urbanization of the landscape. These feelings added a sense of urgency to volunteer work. Informants in this study also expressed their stewardship through their desires not to lose resources they were attached to. This included a worry about the loss of current scientific knowledge, such as the informant who talked about the endangered taxonomist. These desires were evident as informants spoke of the need to pass on attachments and knowledge to the next generation, mingled with an undercurrent of necessity of getting others involved in some sort of stewardship activities. Included in this were informants' strong feelings about others who did not appreciate the resource as much as they should.

Stewardship behaviors also extended beyond the boundaries of the informants' respective parks. Some expressed desires to get involved in volunteer activities located in ecosystems they felt particular attachments to; others were willing to forgo stewardship activities in more "glamorous" locations in favor of supporting local community stewardship activities. Miles et al. (1998) found that as volunteers gained greater understanding of the ecosystems in which they worked, they could be expected to support other stewardship projects. In his study, Ryan (2000) found "participants expressed a willingness to become environmental advocates to protest changes even where they may have had little or no personal experience" (p.214). This was reflected in

informants' discussions of their desire to become volunteers in other natural area activities or becoming more observant and careful in their own communities or backyards. While past research tended to look more at day to day observances of environmentally responsible behaviors (Berkowitz et al., 2004; Cooper et al., 2007; Vaske & Kobrin, 2001), this particular research looked at general beliefs and expressions of stewardship and the spreading of these ideas and tendencies beyond respective park boundaries.

### **Implications for Practice**

With shrinking budgets, encouraging the services of volunteers may be the only way to accomplish park management goals. McVicker (2000) believes that it is the people who work closely in an area, who interact with it on a deeper level than just passing through, who will develop an attachment and sense of ownership to that landscape. He believes this is vital for lasting, sustainable stewardship. In this sense, the ATBI project is uniquely situated to recruit and retain a loyal and committed stewardship group.

Jordan (2000) in referring to projects similar to the ATBI, says they have the potential to get "millions of people [to] spend more time creating intimate wild places in their own neighborhoods...[and] in the process they will get closer to nature" (p. 33). This has obvious implications for the inner city or even the suburb. The ATBI, as an experiential learning activity, has the ability to "articulate the terms of our relationship with particular landscapes, to create values related to these relationships, and to generate

emotional commitment to them" (p.32). As these values are implanted in the volunteers, the informants showed there is a desire to extend their stewardship ethic outside park boundaries.

Gobster and Barro (2000) argue that the public's desire to interact with nature is stronger than ever and that "environmental educators are increasingly advocating programs that bring urban children into contact with nature" (p.186). The National Park Service's ATBI is the perfect context for fostering a relationship between humans and nature. The ATBI project is designed with such "diversity" that it is able to appeal to a wide range of possible volunteers. The ATBI is a unique experience for many first time volunteers and an activity that may not be available in other contexts (Grese et al., 2000).

It could be argued that the ATBI project is ideal for helping the NPS achieve its dual mandate, "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations" (U.S. Dept. of the Interior, 1916, sec. 1). The ATBI is a way for citizens to enjoy the scenery of the parks, to learn some about the history of the parks, and to interact in a close-up and personal scale with the wildlife; the ATBI is an activity, and a way in which the park and its resources can be enjoyed. During this process, the scientific knowledge gained will help park managers better understand the resource which will aid in resource management decisions.

The importance of extending a personal invitation should not be discounted in the promotion of bioblitz events. Many informants in this study spoke of how they never would have participated had they not been extended an invitation from an individual—friend, spouse, teacher, co-worker—who was already participating in such events. National Park Service employees can encourage current volunteers to extend invitations to those they come in contact with, explaining the significant influence they can have in being able to introduce others to the resource.

From the responses of the informants in this study, particular benefits to the participant of the activity could be highlighted in promotional material the Park Service uses to attract more volunteers. Such benefits could include the ability to improve individual natural history knowledge, interacting with today's leading taxonomists, and the difference between this activity and a "regular" or "everyday" ranger-led walk through the park and point at the trees. Quotes from this study could also be used in promotional material, highlighting the positive experiences of past volunteers. Informants in this study knew the importance of the ATBI activity, they knew their actions and volunteered time was not in vain. Schroeder (2000) talks of the importance of the volunteers knowing that what they are doing is helping the park, is contributing to science, and is making a difference. The inclusion of the "realness" of the science aspect and the help the volunteers would be providing, the fact they are truly making a difference, success of past bioblitz events, and lists of current bioblitz species tallies for each park, must also be included in any ATBI promotional material.



## **Limitations**

This study is not without limitations. It is important to note that the data do not provide information or insights to the Park Service on how to manage the ATBI project, nor how to conduct a bioblitz. Information came from four separate bioblitzes that were conducted in very different ways. Some lasted twenty-four hours, others were a single day or morning of events. Some had a more public outreach and education focus, while others had a more science focus with teams going out in the field. Some physically collected species, others just kept a tally of species viewed in the park. Some looked at multiple taxa, others focused on only one taxa. Some bioblitzes were still in their first years while others had been going on for many years. The events all took place in different states, in different parts of the country, and in varying ecosystems. Because of this wide spectrum of differences, generalizations to all ATBI volunteers, or to volunteers in general, are very loose. In addition, all informants in this study were repeat ATBI volunteers with favorable opinions of the park, park staff, park resources, and the bioblitz activities. Had this study included informants who had negative experiences during a bioblitz and chose not to volunteer again, the results of this research might have been slightly different. Therefore, there is no statement of the typical ATBI volunteer because there is no typical ATBI activity. Caution should be taken with regard to the relevance of these findings to all ATBI contexts.

Despite this, there are certain elements of the ATBI that do hold constant. The ATBI, as a citizen science project, combines the elements of volunteerism, place attachment, and experiential learning in a key way for fostering environmental

stewardship. One of the values of the ATBI is its ability to unite the public with the natural areas (Light, 2000). Further, Light suggests that it is the fact that there is no prescribed set of rules on how a bioblitz should be conducted and the lack of regulating body that makes volunteer stewardship endeavors sustainable. The end result is volunteers who are public activists for protecting local natural areas and broader environmental ecosystems.

There are two very important components to the ATBI project, and neither should overshadow the other. In the title of the project itself, All Taxa Biodiversity Inventory, there is a strong impression of the scientific aspect of the project. However, this project was funded as a citizen science stewardship project. The biology aspect should not lead to involvement of scientists only and the elimination of the public in this project, nor should this become a public event where scientific knowledge is not furthered. The ATBI project is based on a very delicate balance. Light (2000) gets close to this idea of balance between the scientific and the social aspects of restoration projects when he states that "without someone engaging in a restoration, the value produced by the restoration never appears" (p.166). One informant understood the necessity of this balance perfectly and embodied a volunteer who had a strong identity-based attachment to his park from which his continuing desires to express his stewardship through park activities, including the ATBI, sprang.

See, because there's two facets to wilderness; there's the intellectual side, which all this butterfly count, bird count stuff is, learning what it is you're seeing. And then there's the experiential side, and you have to have both; you have to have the intellectual part and the experiential part and you can get both here [informant #2]

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