
Visitation to national parks has grown substantially in recent years with the period between 2014 and 2015 experiencing an increase of 12 million visits and a record of almost 331 million in 2016. This significant growth has led to increased visitor use challenges, many of which relate to park carrying capacities that affect both visitor experience and the environment. In responding to these challenges, the National Park Service has developed frameworks for guiding visitor use management, but the extent to which they are applied can vary depending on available resources. Thus, many parks find their visitor use management limited and long-term planning has become secondary to maintaining day-to-day operations.

The purpose of this study is to investigate overcrowding and management of a hiking trail located near Washington, D.C. Mixed methods of qualitative stakeholder key informant interviews and quantitative trail observations (wait-time and trail count) were used to gain greater understanding of management challenges. Trail observations occurred over two fall weekends for a total of 24 hours of data collection.

Findings outlined challenges related to capacity and overcrowding specific to the trail’s unique setting on an extremely sensitive habitat, as well as its unique user type due its proximity to the D.C. metro area. Institutional and interpersonal challenges among stakeholders were also discussed, including unclear roles in visitor use management, and issues related to communication between organizations that lead to misunderstandings and conflict, ultimately hindering management of the trail. Trail observations counted approximately 4,000 hikers resulting in an average wait-time of two minutes at a trail chokepoint.
Further findings identify the need for greater implementation and use of management frameworks to guide managers and to improve stakeholder impacts and relationships. Several interventions are recommended to mitigate negative impacts including improved communication, changes to trail use, and limiting groups. The new Interagency Visitor Use Management (IVUM) framework is discussed as a valuable tool for the future of visitor use management in National Parks.
Visitor Use Management on the Billy Goat Trail: Examining Use and Challenges in an Urban-Proximate National Park

by
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DEDICATION

Dedicated to Joseph, Abigail, Lucy, Anna, Calvin, and those yet to come. For a future filled with national parks and all they have to offer.
BIOGRAPHY

Elizabeth Oliphant grew up in Arlington, Virginia, a suburb of Washington DC. She is a 2010 graduate of Brigham Young University in Provo, Utah, receiving a Bachelor of Arts degree in History with a minor in Spanish. Between graduating with her undergraduate degree and starting graduate school, Elizabeth lived in the D.C. area, Salt Lake City, Utah, and Los Angeles, California working for a variety of organizations related to history and public policy.

Elizabeth’s passion for conserving national parks and other protected areas stems from personal experiences visiting historical parks and battlefields growing up, as well as getting to know the national parks of Southern Utah during her time as an undergraduate student. Elizabeth has valued her time at NC State working on several research projects, which have extended her capacity and improved her research, analysis, and writing skills. She has also been involved in the Department of Parks, Recreation and Tourism Management where she served as the Graduate Student Association’s Social and Networking Chair. Additionally, she has worked to bring a student chapter of the George Wright Society to NC State, as well as served as president of the International Association for Society and Natural Resources student group on campus.
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CHAPTER 1: INTRODUCTION

Contextual Background

Past research has demonstrated that urbanization coupled with a reduction in green space in many cities has led to people seeking alternative locations for their recreational activities (see Rossi, Byrne, & Pickering, 2015; Rupprecht & Byrne, 2014). This, in conjunction with a myriad of other factors (such as changes in societal values), has resulted in significant increases in demand for locations such as national parks and has been highlighted through growing attention in the literature (Rossi et al., 2015; Frick, Degenhardt, & Bucheker, 2007; Arnberger and Brandenberg, 2007). Indeed, the National Park Service (NPS) in the United States details that visits to NPS sites grew by more than 12 million visitors between 2014 and 2015 and hit a record of almost 331 million visitors in 2016 (US National Park Service, 2017a). Additionally, they reported that 2016 marked the third consecutive year of record numbers of NPS visitors (Department of the Interior, 2017) and that approximately 1.2 billion people visited the parks during the period from 2014-2017. Much of this growth can be aligned with the countless benefits that national parks provide for users including emotional, spiritual, and physical health benefits, opportunities to get outside and explore provision of activities for families, as well as affordable options for vacations.

Similar to the societal benefits, national parks also provide us with many valuable environmental services. From provision and regulation services like fresh water, pollination, water purification, and carbon sequestration, to the nonmaterial cultural ecosystem services like places of aesthetic beauty for recreation and inspiration, national parks are valuable to the wellbeing of both visitors and non-visitors alike (Wagner et al., 2014).
However, with these benefits, significant challenges emerge as a consequence of higher recreational usage of national parks, and which are often made more complex because of the ‘knock-on’ effects that are generated. In the context of the current literature base, the most widely researched challenges faced by NPS locations are that of the parks’ carrying capacities for visitors, and the subsequent overcrowding that occurs when demand exceeds capacity. Nevertheless, these challenges are not new but are furthering the claims of former directors and researchers of the NPS, such as Conrad Wirth, who in a testimony to Congress in 1954 said that national parks are being “loved to death” (Dilsaver, 1994). Similarly, Robert Manning, an experienced researcher of crowding and visitor use capacity, highlighted that “one of the greatest threats to the national parks is commonly seen as their increasing popularity” (Manning, 2001, p. 95).

Both fortunately and unfortunately, these rising trends in usage are likely to continue as evidenced by a study commissioned by the NPS in 2015 which focused on understanding the relationships between national park visitation and climate change. In this study, conducted by Fisichelli et al., it was found that warming temperatures and the subsequent increase in season length by weeks or even months could increase visitation significantly in the next fifty years. The study found that visitation to some parks could potentially increase by 15% annually, including a 51% increase in low-season visitation.

As a consequence of the current challenges being faced by this growth in usage and the forecasted future demand potential, it is fundamental that national parks are managed in an effective and efficient manner both nationally, and more specifically, locally. At the national level, the NPS, as well as other federal land agencies, have developed agency-wide frameworks which are designed to guide planning and decision-making for the management of visitors, their
experiences and their potential impacts. However, the extent to which these frameworks are implemented in practice at the local level can vary depending on the resources that parks have to devote to planning and implementation (Interagency Visitor Use Management Council, 2016). Thus, many parks at the local level find their current visitor use management limited and with park resources stretched, emphasis is much more reactive than proactive, as long-term planning and monitoring have become impacted by keeping the parks running (Slocum & Curtis, 2016). It is therefore important to understand the nuances that exist locally in order to understand how effective management initiatives can be developed and delivered within existing resources.

The rationale of this research is based around understanding the challenges of an urban-proximate national park unit related to setting and visitors. Specifically, it will seek to understand the realities of crowding and management at the local scale and potential methods and interventions to address these realities.

Furthermore, it investigates the dynamics among partners, stakeholders, and volunteers working on the trail, as well as trail use itself. This research will contribute to the existing body of knowledge by providing a detailed analysis of visitor use management at the local level.

This research is set within a strong theoretical context and analysis, beginning with an exploration of the theory associated with carrying capacities, crowding, and visitor use management. It then builds on this by examining challenges and visitor management systems’ effectiveness including the roles of stakeholder within those systems. It then moves on to an empirical investigation set within a specific national park, before establishing conclusions.

The next section presents the overall aim of the study and the objectives that need to be examined to deliver on the aim. The latter provide a structure for the research through examining
the theoretical components of the thesis and providing an underpinning for the empirical investigation.

**Aim and Objectives**

The aim of this research is to gain a greater understanding of challenges and realities in national parks related to visitor use, capacity, and management in countering and mitigating the impacts of overcrowding. In achieving the aim of this research, the following objectives are utilized.

1. To develop a theoretical knowledge and understanding of visitor use management and associated frameworks and their application in the context of national parks management.
2. To understand the day-to-day challenges related to visitor use on the Billy Goat Trail.
3. To evaluate trail use and crowding through trail count and wait-time observations on a crowded trail.
4. To examine relationships between trail stakeholders, partners, and volunteers.
5. To consider how frameworks and interventions can be used to improve visitor use management on the Billy Goat Trail.

**Thesis Structure**

This research is developed in three different stages. First, the thesis examines the theoretical components of crowding, carrying capacity and visitor use management frameworks (Chapter 2). This chapter includes an overview of visitor use management as it pertains to U.S. National Parks. This chapter also explores the theories and history of visitor use management frameworks as they pertain to resource protection and visitor use. Furthermore, this chapter


outlines theory and literature related to specific management challenges (crowding and wait-time) and approaches (use of stakeholders, partnerships, and volunteers) evaluated in this study.

Chapter 3 outlines the methodological design for this research and a description of the study area. It outlines the qualitative methodology of key informant interviews among stakeholders. This chapter also includes a description of the quantitative methodology to evaluate wait-time on the trail and to count and observe hikers. This chapter documents the steps taken to collect valid data useful for exploration and application to management decision-making.

Chapters 4 and 5 outline the results of the qualitative and quantitative methodologies. Discussion of the findings and final conclusions are within chapter 6.
CHAPTER 2: LITERATURE REVIEW

The following section includes a review of the literature related to visitor use management challenges and the frameworks that have been developed to address them in national parks and other protected areas. Specifically, there will be a review of carrying capacity and crowding in park management as well as four frameworks that have been used to guide decision-making, including the most current framework. Finally, background related to stakeholders in land management, as well as research in urban-proximate national parks will be presented. This literature review supports the study aims by establishing a foundation of how capacity and crowding have been studied in parks and recreation and the approaches taken by parks to address them.

Carrying Capacity & Crowding

A review of parks and outdoor recreation literature suggests that issues related to crowding and high use are recurrent concerns among researchers and practitioners studying visitor use management. The model through which much of this research has been completed is through the concept of carrying capacity. Carrying capacity has been defined by experts in the field as “the amount and type of use that is compatible with the management prescription for an area” (Whittaker, Shelby, Manning, Cole, & Haas, 2011, p. 1). It can relate both to natural resource protection, often called “ecological carrying capacity” (e.g. the number of people an environment can contain without harm) and social experience, “social carrying capacity” (e.g. the number of people a place can tolerate before it negatively affects visitor experience). The genesis of using carrying capacity in recreation research is credited by the NPS to Lowell Sumner, a park service biologist who in 1936 wondered, “how larger crowds can be turned loose
in a wilderness without destroying its essential qualities,” determining it should be kept within a “carrying capacity” (Sumner, 1936; IVUMC, 2016, Appendix p. 93; IVUMC, 2018).

Most literature credits the first study on carrying capacity in the context of the quality of visitor experience to Wagar’s 1964 paper on carrying capacity in wildlands for recreation. Since then researchers have expanded on the role of land managers in determining and evaluating appropriate capacity for the protection of the resources and the benefit of the public (Manning, 2002). Capacity continues to be one of the central tenets of visitor use management, as the type and number of visitors to parks affect the extent of impacts and subsequent management interventions. Carrying capacity alone, however, has several weaknesses: there is no “magic number” to capacity so use levels and impacts must constantly be monitored and evaluated to maintain equilibrium (Haas, 2001). Another limitation to carrying capacity is “[it] is intrinsically a quantitative term, yet, research has shown that many problems of recreational use are a function not so much of numbers of people, but their behavior” (McCool, 1996, p.2). For these reasons, the NPS and other land management agencies have used elements of carrying capacity to establish more thorough frameworks through which they manage visitors.

While capacity and use level are objective measures of the number or density of people, crowding is considered a psychological construct, based on perceptions. It is “a negative and subjective evaluation of a use level” (Manning, Valliere, Minteer, Wang, & Jacobi, 2000, p. 59). In other words, an area could have few actual visitors, but based on expectations and norms by visitors, it could be perceived as being crowded and thus impact experience. The traditional theory behind crowding and norms predicts that a higher density of people in a park leads to more encounters among visitors that then affect perceptions of crowding (Vaske & Donnelly, 2002). The growing visitorship to NPS units is not only an issue for enforcing capacity, but most
likely means increased visitor encounters and a greater degree of perceived crowding (Randall & Rollins, 2013).

Crowding has been found to impact visitor experience. “The notion that there is some level of visitor use beyond which the quality of the outdoor recreation experience diminishes is a recurring theme in the early outdoor recreation literature” (Manning, Valliere, Minteer, Wang & Jacobi, 2000, p. 58). This notion that there is a maximum visitor capacity before which unacceptable environmental degradation occurs and before visitor experience itself is harmed, is the backbone of capacity and crowding literature (Manning, 1999). When visitors perceive parks as being too crowded, there can be negative social impacts such as increased visitor conflict (Vaske & Shelby, 2008), and decreased visitor satisfaction (Manning, Newman, Valliere, Wang, & Lawson, 2001; Randall & Rollins, 2013). Crowding perceptions can also be magnified in smaller, urban-proximate NPS units that serve larger local populations (Arnberger & Brandenburg, 2007). One effect of crowding on trails specifically is that it can cause backups at chokepoints and lead to hikers having to pause their trips to wait their turn.

The literature looking at the value of waiting duration and wait-times in various industries is quite comprehensive. Studies in restaurants, emergency rooms, and grocery stores, have looked at the psychology of waiting and the impact of perceptions and expectations of wait-times on overall satisfaction. Overall, wait-time literature has found that an increase in wait-time generally leads to a decrease in satisfaction (Davis & Volmann, 1990). Wait-time literature has also found that perceived wait-time (or estimated wait-time) can have a greater impact on satisfaction than the actual measured wait-time (Katz et al., 1991; Pruyn & Smidts, 1998).

Wait-time literature related specifically to parks and recreation is limited and mostly related to waiting in line for ski lifts. A study by Ormiston, Glibert, and Manning (1999)
determined that maximum waiting time in lift lines at ski resorts was an indicator of quality for visitors. A 2009 study of South Korean college skiers and snowboarders’ destination choice found that lift wait-time was the second most important indicator in choice, second only to snow quality (Won & Hwang, 2009). These studies show that wait-time can be an important indicator for consideration in the context of crowding in recreation management.

**Frameworks for Visitor Use Management**

To build upon the foundation of the basic premise of carrying capacity, researchers and federal land agencies created various frameworks for evaluating impacts and creating plans for interventions before impacts to resources and experience become off-balanced and too detrimental. Parks and other federally protected land agencies have used management frameworks to guide planning and decision-making since the early seventies, when land agencies realized the importance of planning in the context of visitor impacts and experience.

Due to increasing visitors to parks, and changes in perceptions and acceptability of crowding, federal lands management frameworks have needed to adapt over the years. The key elements to these frameworks are:

1. Determining ideal conditions for resources and social conditions.
2. Creating indicators and standards for resources and social conditions that can be monitored to keep within acceptable conditions.
3. Regular monitoring of indicators and evaluating success in achieving and maintaining conditions.
4. Taking action when conditions are not meeting the established standards (Rees, Cahill, Safford, & Rice, 2006).
The visitor use management frameworks most noted among the agencies include the Recreation Opportunity Spectrum, Limits of Acceptable Change, Visitor Experience and Resource Protection framework, and the new Interagency Visitor Use Management framework.

The Recreation Opportunity Spectrum (ROS), which was developed by Clark and Stankey in 1979, outlines a continuum for recreational experiences based on setting (Figure 2.1) (United States Forest Service, 1979). The ROS ranges from highly developed areas (urban) to much more undeveloped and remote settings (primitive). The ROS setting is important for determining goals and values for the location. Urban-proximate locations, for example, are providing a different type of experience than more primitive, remote settings. ROS offers a framework to understand the relationships between recreational activity and settings.

![Figure 2.1. The Recreation Opportunity Spectrum. Image from USFS ROS primer and field guide.](image)

The Limits of Acceptable Change planning system (LAC) was first developed in 1985 to counter the failure of carrying capacity alone to define and implement effective managerial strategies (McCool, 1996; Stankey, Cole, Lucas, Petersen, & Frissell, 1985). LAC was meant to go beyond the numbers and look at acceptability of impacts to park resources. It demands that specific thresholds of impact be identified, but that managers must also recognize and accept that change is inevitable. According to LAC, the role of managers is to determine how much change
is acceptable and then constantly monitor management outcomes to stay within the determined acceptable levels (McCool, 1996). This method of management requires constant monitoring of data, which can be problematic for a national park system that is struggling with a billion-dollar backlog (Cole, 2006).

Closely related to LAC, but developed more specifically for the National Park Service, the Visitor Experience and Resource Protection framework (VERP) was implemented across the National Park system in 1997 to assist parks manage crowding, carrying capacity, and resource protection issues more specifically focused on National Parks (DOI, 1995; DOI, 1997; Manning, 2001). Similar to LAC, VERP recognizes that “with any use comes some level of impact that must be accepted” (Rees, Cahill, Safford, & Rice, 2007, p. 1) but VERP builds on LAC by focusing on the visitor experience aspect, and the importance in both considering and providing for positive visitor experiences while also protecting natural resources.

![Figure 2.2. The four steps of IVUM. Image from IVUM primer.](image)

VERP forms the backbone of the newest capacity management approach by NPS known as the Interagency Visitor Use Management Framework (IVUM), which takes principles from
ROS, LAC, and VERP and simplifies them. It includes an overall visitor use management guide and two specific guides for establishing visitor capacity and creating indicators, thresholds, and monitoring (IVUM, 2016, IVUM, 2018). The IVUM is “the proactive and adaptive process for managing characteristics of visitor use and the natural and managerial setting using a variety of strategies and tools to achieve and maintain desired resource conditions and visitor experience” (IVUM, 2018). It is meant to be able to scale up or down to help managers efficiently adapt the framework to local situations. “The decisions made within the framework are professional judgements informed by the best available science, staff expertise, and public input” (IVUM, 2016, p. 2). A primary goal of the VUM is to simplify the management process by working with a sliding scale based on the unique needs of each NPS unit, while still maintaining a commitment to federal law and agency policy (IVUM, 2016). The four steps of IVUM (Figure 2.2) focus on the why of a project (e.g. purpose, status, create a plan), the what (e.g. desired conditions, indicators, and thresholds), the how (e.g. strategies, establish capacities), and finally, doing it (e.g. implementation, monitoring, and adjustment).

The value of pre-established visitor use management plans and goals is that parks can manage in a proactive, rather than reactive way, quelling issues before they become problems. The IVUM outlines this as an important consideration in the new framework:

“Clear, purposeful management helps focus action and guards against incremental or haphazard change that may occur when managers are reacting only to the issue of the day. Many managers have learned that once undesirable change has occurred and use has become established, it is exceedingly difficult to alter visitor use patterns” (p.30).

Developed in 2016, IVUM is just beginning to be implemented in NPS units.
These frameworks include considerations for stakeholders and partners in management analysis and the decision-making processes. IVUM requires consideration of stakeholder interest and impact by any management actions, as well as an evaluation of stakeholder support. The degree to which parks must include stakeholders is determined by the scope of the issue and intervention. From the official IVUM guide, “Engaged stakeholder groups are more likely to closely track the [decision-making] process… It is important to build trust and move a decision or action forward through two-way communication with stakeholders, partner groups, and government agencies” (IVUM, 2016, p. 7). Additionally, the IVUM framework values expanded capacity from partners and stakeholders to assist in the decision-making process.

**Stakeholder, Partners, & Volunteers in Visitor Use Management**

“High visitor levels, a more sophisticated and demanding visitor, and park budgetary pressures have demanded a rethink of management approaches, including the benefits of partnerships” (Laing, Wegner, Moore, & Weiler, 2008, p. 101). From its conception, the Park Service has depended on partnerships and philanthropy to advance its mission and support its endurance. Partnerships are valuable as they “enhance the budgetary and human resource capacity of public land management agencies” (McCreary, Seekamp, Cerveny, & Carver, 2011, p. 470).

Collaboration among partners and stakeholders is increasingly viewed as necessary and desirable in tackling difficult public challenges including land conservation and management (Bryson, Crosby, Middleton, & Stone, 2006). Throughout stakeholder literature, the definition of stakeholders has varied, with some proposing it includes only those essential to the survival of the organization (Bowie, 1988) or others who say it is any entity affected by the organization,
living or nonliving (Reed et al., 2009). For the purpose of this paper, the definition of stakeholders used is consistent with the broader definition, including all groups interested and involved in visitor management. Part of examining the roles of stakeholders is a need to establish an understanding of stakeholder interests and characteristics, as well patterns and contexts of interactions between partners or stakeholders in order to define options or potential improvements to stakeholder relationships (Ramirez, 1999).

Examining stakeholder relationships is useful in helping to avoid conflicts in natural resource management in the context of recreation and visitor use as it provides a way to evaluate if stakeholders from different interests feel represented and supported (Grimble & Wellard, 1997). Since the Park Service is mandated with providing for both environmental and social values, including stakeholders and partners specific to both types of interests, and cultivating those relationships can help move all stakeholders towards the broader goals of the NPS. Understanding stakeholder relationships is additionally important as it “acknowledges that power relations and disagreeing interests must be considered” in order to create understanding of differing viewpoints” (Billgren and Holmén, 2008, p.554).

Volunteers are increasingly being seen as valuable partners in park management and conservation efforts. Studies have found that volunteers provide valuable services including support for achieving overarching conservation goals that might not be possible otherwise due to financial constraints (Asah & Blahna, 2013). Studies have determined motivations of volunteers in conservation, including a desire to help the environment, interact socially, and build the community, contribute to their commitment and dedication to the cause, helping parks and other areas compensate for limited resources (Asah & Blahna, 2012, Silverberg, Marshall, & Ellis, 2001). Focusing on these motivations can help “enhance volunteers’ commitment to
conservation stewardship and address the pressing challenge of retaining urban conservation volunteers” (Asah & Blahna, 2013, p. 866). Another interesting finding is that commitment to the environment is less of a factor than personal, social, and community motivations (Ryan et al., 2001). These studies indicate that the experiences that fulfill motivations matter in retaining volunteers in urban conservation efforts.

**Urban-proximate National Parks**

Research is expanding on visitor use in park units that are more proximately located to urban centers (Arnberger & Brandenburg, 2007; Eder & Arnberger, 2012; Harmon, Daniels, Park, & Brayley, 2011). These studies have evaluated crowding perceptions, attachment, and experience in the context of urban-proximate (sometimes called “peri-urban”) natural parks. Earlier studies relating to crowding in more remote parks were characterized by consistent visitor-types and a majority of first-time visitors (Graefe et al., 1984; Stewart & Cole, 1999), but increasing studies in urban-proximate parks can include more of a focus on diverse visitor types and how that affects their experiences. Urban-proximate parks tend to serve local and repeat visitors whose experiences with the park affect their expectations and perceptions related to crowding (Arnberger & Brandenburg, 2007). Studies identify the valuable role that urban and urban-proximate parks play in the lives of local populations and how issues such as crowding and environmental protection are important for considerations to maintain them as such. These studies also identified a need for further research in urban natural areas related to visitor use, perceptions, and crowding. (Eder & Arnberger, 2012; Harmon, Daniels, Park, & Brayley, 2011).
CHAPTER 3: METHODS

Study Setting

This study takes place at C&O Canal National Historical Park (CHOH). CHOH is a National Park (NPS) unit that consists of nearly 20,000 acres and 184 miles of the historical C&O Canal and towpath paralleling the Potomac River from Washington, D.C. to Cumberland, Maryland. The park includes historical and cultural resources as well as natural areas for hiking and rock climbing. In 2017, CHOH was the 12th most visited NPS unit with almost 4.9 million visitors (it was listed as high as the 9th most visited in both 2013 and 2014), making up 1.47% of total visitors to all NPS units. In 2017, there were almost 750,000 more visitors than in 2010 when the park had 4.1 million visitors (US NPS, 2017).

Figure 3.1: Map showing the location of the BGT-A trail in relation to downtown Washington, D.C.

The specific study site is The Billy Goat Trail- Section A (BGT-A) located less than ten minutes from the D.C. city line (see Figure 3.1). It is the park’s most popular hiking trail, accommodating many of the almost 5 million people that visit the park each year. The park
estimates that 50,000 people hike BGT-A every year (US NPS, 2015). The trail traverses a small island known as Bear Island, which is considered one of the most biodiverse and sensitive areas in the country, home to more than 50 rare, threatened, and endangered (RTE) plant and animal species (US NPS, 2018a; Hockett, Clark, Leung, Marion, & Park, 2010). Most of the RTE plant and animal habitat is located towards the center of the island while the trail moves along the outside of the island along the river.

Keeping visitors on the trail and away from the interior of the island is important for protecting habitats from trampling or other impacts. Bear Island is co-owned by the NPS and The Nature Conservancy due to its unique and rare ecology. The urban-proximity of this trail and the extreme sensitivity of Bear Island make it an interesting study for examining how parks work to balance resource protection and visitor use. Park staff and volunteers who work on the trail try many different interventions to keep hikers on-trail and away from the RTEs, including signs and fencing, but with little success (See Figure 3.2).

Figure 3.2. Photo of the BGT-A trailhead and the main signs informing hikers of trail policy, including no dogs allowed and why it is important to stay on trail.

The BGT-A itself is an unexpectedly challenging trail so close to an urban center. It is described as being a “technical and strenuous hike” by the park (US NPS, 2018a) and is
recommended for experienced hikers (See Figures 3.3 and 3.4). The trail connects to the C&O Canal towpath at each end, completing a loop for hikers to return to one of two parking lots (see Figure 3.5). The trail is a 1.7-mile path that meanders through a variety of terrain including rock scrambles, several stream crossings, and large rock formations that are difficult to negotiate, the most famous of which is known as The Traverse.

![Photos of the BGT-A trail terrain, including its proximity to the river.](image1)

**Figures 3.3 and 3.4.** Photos of the BGT-A trail terrain, including its proximity to the river.

![Map of Bear Island and the BGT-A. Provided by C&O Canal NHPS.](image2)

**Figure 3.5.** Map of Bear Island and the BGT-A. Provided by C&O Canal NHPS.

The Traverse is a sharp, Class 3-rated climb, meaning it requires scrambling and handholds, and a fall could potentially be fatal. It also requires hikers to ascend or descend
single-file and one-at-a-time from each direction. Park volunteers have reported that on busy
days wait-time to get through The Traverse can surpass 30 minutes. This crowding has led to the
creation of numerous informal, visitor-created social trails as visitors look for ways to go around
or bypass the crowds (see Figure 3.3). These trails present serious risks to the sensitive habitats
on the island.

![Figure 3.6. Photo displaying the steepness of The Traverse, single-file, use and hikers waiting at the bottom.](image)

![Figure 3.7. Map of social trails on Bear Island.](image)

In an attempt to address the challenges at The Traverse, and particularly to keep visitor
impacts concentrated, in 2016 CHOH staff proposed formalizing an existent social trail the goes
around The Traverse, called The Bypass. Park staff report that many hikers use this trail but that it can be difficult to find, leading many hikers to wander off-trail, trampling plants before locating the path. The goal of The Bypass is to provide an official alternative path for hikers who
do not wish to go through The Traverse, both containing impacts and potentially easing congestion. Some trail stakeholders have concerns that providing an “easy” alternative to The Traverse will only attract more inexperienced or unprepared hikers and increase crowds on the trail overall. The Traverse is not the only difficult section of the trail, so adding a bypass does not mean the trail should be considered any easier overall. The Bypass was approved in 2016 and has yet to be formalized due to bureaucratic processes and resource challenges. Differences of opinions surrounding the potential outcomes of The Bypass trail contributed to the choice of the BGT-A as a location to study how visitor use management is accomplished among stakeholders and to understand the complexities of managing busy urban hiking trails.

**Research Design**

This paper employs both qualitative key informant interviews and quantitative trail observations to gain broader understanding and insight into visitor use management challenges on the BGT-A. Mixed method research designs allow for researchers to tap into the strengths provided from both qualitative and quantitative data collection. Mixed methods designs have been gaining support as the research world is becoming increasingly interdisciplinary, complex, and dynamic and the use of a variety of methods allows for data sets that complement and supports each other in the search for understanding (Johnson & Onwuegbuzi, 2004).

Additionally, mixed methods are valuable as it attempts “to fit together the insights provided by qualitative and quantitative research into a workable solution” (Johnson & Onwuegbuzi, 2004 p. 16). For the aims and objectives of this paper to examine the practical realities and potential solutions to real-world challenges, mixed methods were an ideal research design.
Figure 3.8 outlines the role of these methods in addressing the project’s research objectives. Both methods support each other in exploring Objectives 2 and 5, as they allow insight into the day-to-day challenges on the trail, as well as how frameworks and interventions could help both from the perspectives of interview subjects and based on the on-site observations. The quantitative observations were completed before the interviews to allow any results to assist in the creation of the survey guide and thus be addressed in the key informant interviews. These observations also focused on Objective 3 which evaluated trail use through a trail count and wait-time observation. Beyond understanding the day-to-day challenges and potential interventions, the qualitative interviews addressed Objective 4 which examined stakeholder relationships on the trail.

**Quantitative Approach: Wait-time and Trail Count**

Quantitative data collection included two types of simultaneous trail observations:
1. A measurement of wait-time at The Traverse

2. A trail count, including observed demographics

The wait-time measure evaluated the duration of time it took hikers to begin their ascent or descent of The Traverse after arriving at the section. The overall trail count, with associated observed demographic data, was taken for every hiker who passed a certain pre-established point on the trail.

The Wait-time Observational Protocol

As the literature does not provide any methodology for evaluating wait-time in a natural trail setting, I created a basic wait-time observational protocol based on similar methods used in the service industry (Hwang & Lambert, 2009; Yunus, 2012). The goal of the observation was to evaluate how long hikers must wait before they can move through The Traverse after arriving and to gather any associated temporal data (e.g. if there are patterns related to day of the week or time of day when the wait is longest) related to the wait-time. The length of time is measured from the “arrival” at the section of trail to the “departure” or when the wait has ended, and the hiker has begun to proceed through the section. Both the arrival and departure points needed to be within view of the observer, who was located at a central point.

“Arrival” was determined by selecting and marking with pin flags the point on the trail at which hikers have arrived at The Traverse. This point was pre-determined based on observations about where waiting began for The Traverse (i.e. where people slowed down or stopped due to others in front of them). The arrival points in this study were established (at both the top and bottom) approximately 50 feet from the actual traverse incline or where climbing up or down begins. The “Arrival” point was marked with bright orange or red pin flags (Top: Figure 3.9; Bottom: Figure 3.10)
The “Departure” or end time was determined as the point when the hiker actually begins to move through the section of the trail (i.e. The Traverse). In this case, particular boulders at the top and bottom were selected which hikers had to pass for timing to stop (See Figures 3.11 & 3.12). The location of the observer was selected based on visibility of the start and end points. These locations were all predetermined on visits to the site before the first day of data collection.

Every fifth hiker was observed, with three hiker observations set as the maximum that one observer could keep track of at one time. A tally was kept for every hiker that passed the arrival flag and the times of every fifth hiker was recorded in minutes and seconds. A few notes of description were also recorded to assist the observer in keeping track of the hiker, such as age range (e.g. adult, child, senior), shirt color, hat, etc. (See Figure 3.13).
Figure 3.13. Selection of data on data collection sheet.

The observer would continue to tally every person who passed the start point and record the arrival time for the next fifth individual until three hikers were being observed. The observer would then record the time at which the observed hikers passed the departure point. If there were three individuals being measured at once, tallying would stop in order to make sure to get accurate departure times. Once one of the three departed, the wait-time would be measured for the next individual to enter the “waiting area.” Once there were fewer than three individuals being measured, the tally would restart with the next individual to enter the area.

This method requires the observer to constantly watch both points and keeping track of one to three hikers at a time. Trying to track any more than three hikers was determined to be too difficult and could lead to inaccurate data collection. The reality of data collection on a trail is that it is impossible to control for everything an individual might do. For hikers who stopped for breaks or photos within the waiting area, unless this activity took them back outside of the waiting area or their activity was determined to be a long-term break (e.g. stopping for lunch), their presence and/or wait-times were still counted. This was for two reasons. First, their presence in the area still contributed to crowds within the waiting area, so new arrivals had to navigate around them and second, photos or water breaks were observed many times to be taken due to the backup on the trail (i.e. people see the line and decide to stop for a photo or snack).
The researcher arrived at the observation location early on the days of data collection, set up the pin flags at the arrival location and prepared for observations. Materials needed for the count were data collection sheets, clipboard, pen, cell phone, and a portable cell phone charger. The cell phone was used to track times. An application called Digital Clock which shows the time in hour:minute:second format was installed on the phone and used to evaluate the time (https://play.google.com/store/apps/details?id=com.lightdotnet.digitalclock).

Observations for this methodology were taken during four weekend days in fall 2017. Based on available data and conversations with trail volunteers, the busiest times on the trail were weekends between the hours of about 10:00 am to 4:00 pm, which is when data collection took place. Data collection occurred on both a Saturday and a Sunday for the bottom and the top of The Traverse.

The Trail Count

CHOH is currently in the process of formalizing an existent hiker-created informal trail (the bypass) that goes around The Traverse. The existing social trail has been reported to experience heavy use even though it is not an officially blazed trail. The original goal of the trail count was to evaluate how many hikers were using the bypass trail and how many were using the Traverse, while recoding some other observable characteristics such as gender and direction of travel. In order to observe use of the informal bypass trail, the individual conducting the trail count (the counter) was located, using GPS data provided by the park, tucked away near the intersection of the bypass with the formal trail at either the top or bottom of the traverse, about 100-150 feet (depending on top or bottom) from the Traverse.

The counter recorded seven pieces of data:
Definitions were determined following the SOPARC (Systems for Observing Play and Recreation in Communities) protocol (McKenzie, Cohen, Sehgal, Williamson & Golinelli, 2006; Chung-Do et al., 2011) (See Table 3.3). Gender, race, and age group designations were all based on observer perceptions. Pre-testing of the tool with two observers provided an element of inter-rater reliability. Two observers achieved 100% inter-rater reliability through twenty-five test observations. However, due to resource limitations only one observer actually collected data. While group membership can be difficult to observe, groups of people who appeared to be together at that moment on the trail were recorded together (Hornback & Eagles, 1999). Data was recorded on a data collection sheet (Figure 3.10).

Table 3.1. Definitions of observed variables for the trail count.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Direction of Travel</td>
<td>North: Hiking from Angler’s Inn to the Tavern (upstream)</td>
</tr>
<tr>
<td></td>
<td>South: Hiking from the Tavern to Angler’s Inn (downstream)</td>
</tr>
<tr>
<td>Gender</td>
<td>Male</td>
</tr>
<tr>
<td></td>
<td>Female</td>
</tr>
<tr>
<td>Race</td>
<td>Latino</td>
</tr>
<tr>
<td></td>
<td>Black/African American</td>
</tr>
<tr>
<td></td>
<td>White</td>
</tr>
<tr>
<td></td>
<td>Asian</td>
</tr>
<tr>
<td></td>
<td>Other (if unsure)</td>
</tr>
<tr>
<td>Age Group</td>
<td>Child: From infancy to 12</td>
</tr>
<tr>
<td></td>
<td>Teen: Adolescent 12-20</td>
</tr>
<tr>
<td></td>
<td>Adult: 21-59</td>
</tr>
<tr>
<td></td>
<td>Senior: 60+</td>
</tr>
<tr>
<td>Used bypass trail?</td>
<td>Yes: Was observed either going onto or coming off of the social trail</td>
</tr>
<tr>
<td></td>
<td>around the traverse</td>
</tr>
<tr>
<td></td>
<td>No: Was observed only on the formal trail</td>
</tr>
</tbody>
</table>
Figure 3.14. Example of trail count data collection form.

Data Analysis:

Wait-time and trail count data were uploaded to the data management software EpiData Manager V4.2.0.0. Data were then uploaded to MS Excel for further analysis. Data were cleaned, and every entry double-checked for accuracy. Descriptive statistics, as well as relationships between demographics were recorded. In order to explore the relationship between wait-time and the trail count, data were summarized by hour and then uploaded to IBM SPSS Statistics 24. Spearman correlations were performed on the wait-time data and three aspects of the trail count data to find any correlation. Spearman correlation was used due to non-normal distribution.

Qualitative Methods: Key Informant Interviews

Qualitative data collection is valuable for seeking out the complexities of a situation, beyond numbers and brief survey responses. Qualitative data are connected with interpretivism as a means to understand and interpret reality and the social dimensions and contexts that explain the world around us (Decrop, 2004). Key informant interviewing is a form of qualitative
investigation valuable in research due to its “structured, yet flexible, research design for data gathering” (Tremblay, 1957, p.688) with individuals who are considered to be expert sources of information owing to their position or experiences and able to provide deeper insights and information that others would not have (Marshall, 1996). In order to better understand the management, partnerships, and realities of the BGT-A trail, nine semi-structured key informant interviews were conducted with members of each of the five groups most involved in management of the BGT-A.

Key Informant Backgrounds

Key informants for this project were selected from five groups who play key roles in the management and maintenance of The Billy Goat Trail- Section A (Table 3.2). These groups were identified by the park and other stakeholders.
Table 3.2. Organizations represented by key informants.

<table>
<thead>
<tr>
<th>Organization</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHOH NPS Staff</td>
<td>CHOH staff manage the BGT-A under the direction the National Park Service (NPS) and are the final decision maker for the trail, in charge of keeping the trail in compliance with federal regulations. The NPS serves as the fulcrum for all the stakeholders, balancing the responsibilities and contributions of each group involved.</td>
</tr>
<tr>
<td>The Nature Conservancy (TNC)</td>
<td>TNC, founded in 1951, is a non-profit organization committed to the conservation of lands and waters. It has co-owned Bear Island with the Park Service since 1996. TNC is primarily focused on natural resource and habitat protection, including the RTEs on Bear Island. Currently they have minimal participation in trail management, though their approval must be received before major interventions on the trail.</td>
</tr>
<tr>
<td>Potomac Appalachian Trail Club (PATC)</td>
<td>PATC is a volunteer organization founded in 1927 to help build and maintain the Appalachian Trail. The PATC’s role on the Billy Goat Trail is to maintain the trail, including blazing the route, clearing debris and fixing the trail to ensure its proper function.</td>
</tr>
<tr>
<td>Billy Goat Trail Stewards (Stewards)</td>
<td>The Stewards is a volunteer organization that has been active on the trail for several years. They only work on Section A of the BGT and hike the trail regularly. They are considered the “eyes and the ears of the NPS and TNC” as they monitor the trail. They focus on assisting visitors, teaching Leave No Trace ethics, and helping with first aid needs. The Stewards have the most exposure and interaction with the public on the trail. Stewards hike the trail at their own leisure when they are available and consider it both a service to the community and to themselves to be out on the trail.</td>
</tr>
<tr>
<td>Hikers</td>
<td>Hikers on the trail include all who use it recreationally. Hikers are the most important constituency for park staff to consider in making visitor use-related decisions.</td>
</tr>
</tbody>
</table>

Sampling

The key informants for this project were selected based on their roles within their organization and their knowledge and familiarity with C&O Canal National Historical Park, Bear Island, and The BGT-A. Purposive and snowball sampling were employed in order to contact informants and to gain as comprehensive an understanding of the situation on the trail as possible (Flick, 2014). Contact was first made with CHOH staff who connected me with individuals from the other organizations. The hiker was referred to me by the Stewards as a trail regular. The final
sample included nine key informants representing five groups. Key informants were contacted and invited to participate in the interviews via email December 2017 and January 2018.

**Interview Procedures**

An interview guide was created using the newly developed Interagency Visitor Use Management (IVUM) framework as a guide for how parks approach planning and decision-making (See Appendix B), as well as based on findings and observations from the quantitative data collection. Three of the four themes outlined in the IVUM (Build the Foundation, Define Visitor Use Management Direction, and Identify Management Strategies) were used to build the questions. Questions were also developed related to key informant and organization background. The guide was developed with the goal of gaining understanding of the roles of each organization on the trail. The guide was pretested on two individuals not familiar with the research to ensure coherence, clarity, and neutrality of questions. One of these individuals was a graduate student and the other was a friend less familiar with research processes. Both individuals were read the questions and provided feedback about the terminology and clarity of the questions. Several edits were made to the final guide based on their feedback.

Key informants were asked to respond to opened ended questions divided into four sections: 1) **Organization background and partnerships** 2) **The decision-making process**, 3) **Management goals**, and 4) **Strategies**. The **Organization background and partnerships** section contained questions related to general organizational structures, goals and values, roles in island and trail management, and partnerships. Questions related to **The decision-making process** included the value of the site, management challenges, determining threats and needs for the trail, and the actual process of choosing and approving interventions, including compliance and data use. **Management goals** focused on desired and expected outcomes or conditions for
management interventions, including risks and impact on visitor experience. Finally, *Strategies* examined alternative interventions considered, monitoring and evaluation, and ways to improve management and partner/stakeholder input.

Key informants were contacted via email to set up interviews. The interview guide was provided to participants 2-3 days prior to allow preparation and familiarity with the questions, and to facilitate an ease of conversation. Interviews took place January and February 2018 via Skype video conference or telephone and lasted between 30 and 60 minutes, with an average length of 42 minutes. Participants were read a confidentiality statement at the beginning of the interview to which they provided verbal consent.

Employing responsive interviewing techniques, I followed the prepared interview guide, but maintained flexibility both for participants to speak fully and for any follow-up or probe questions (Flick, 2009). Field notes recorded the overall sense of the interview, including details about the context and additional observations. Research memos with questions, insights and ideas were also created throughout the interview and analysis processes. Reflexivity was incorporated between interviews to maintain neutrality on the findings.

Interview data were also triangulated with secondary materials provided by stakeholders, including: data and observations by and from the Stewards; documents related to NPS trail management and decision-making (the bypass project’s PEPC, Planning, Environment and Public Comment and other proposal documents), and previous plans and agreements between CHOH and The Nature Conservancy. These documents provided additional records to support interview data. Finally, I spent 16 months studying the Billy Goat Trail, including over 30 hours on the trail itself, both hiking it to get a feel for the crowding, challenges of the terrain, and
overall experience, and also observing hikers at The Traverse, allowing for a broader understanding of the on-the-ground realities of the BGT-A hiking experience.

Analysis

Interviews were transcribed verbatim by the researcher and a third-party transcription service. A preliminary code list was created based on open coding for concepts and terms. Member checks were engaged by sending transcripts to informants to allow review and verification that the transcripts reflected their true thoughts as well as to allow for any additional comments. The transcribed interviews were uploaded to NVivo 11.4 software for further analysis and organization. Using a grounded theory approach, open coding (i.e., defining and developing categories) and axial coding (i.e., relating codes to each other), techniques were used to identify key themes and concepts among the data. Coding was approached using the four categories of the interview guide (organization background and partnerships, the decision-making process, management goals, and strategies). Analysis and coding also included field notes, memos, and email correspondence with key informants, as well as the secondary records provided by informants (Halcomb & Davidson, 2006).

Ethical Considerations

Due to the nature and complexity of some of the relationships between stakeholders on the BGT-A, steps were taken to ensure the privacy of individuals participating as key informants. All informants were provided with the interview guide, which included a confidentiality statement that was read out before the interview and to which informants gave verbal consent. Recordings and transcriptions were kept on a secure, password-protected computer to which only
I had access. Three recordings were sent to a third-party transcription service. Names were not connected to those recordings to protect the identity of the informants. These methods, as well as email communications with informants were approved by North Carolina State University’s Institutional Review Board (IRB).
CHAPTER 4: TRAIL OBSERVATION RESULTS

The objectives of the trail observations were to evaluate trail use and crowding through trail count and wait-time, gain greater understanding of the challenges on the trail, and inform considerations for future interventions. Data were collected over four weekend days in fall 2017: September 9 and 10, and October 21 and 22 (See Table 4.1). Data was collected for six hours each day, from 10am to 4pm, for a total of twenty-four hours of data collection. Weather over the four days was relatively similar, with partly cloudy conditions all four days. Temperatures were warmer in September, ranging between 77 and 86 degrees Fahrenheit, while the October weekend ranged between 72 and 77 degrees. Weather was not observed to be a major factor in the trail count or wait-time.

Wait-time Results

Table 4.1. Day and location of observations.

<table>
<thead>
<tr>
<th>Day</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, September 9</td>
<td>Top</td>
</tr>
<tr>
<td>Sunday, September 10</td>
<td>Bottom</td>
</tr>
<tr>
<td>Saturday, October 21</td>
<td>Bottom</td>
</tr>
<tr>
<td>Sunday, October 22</td>
<td>Top</td>
</tr>
</tbody>
</table>

Over the four days of data collection, 379 wait-times were recorded, and the average wait-time was 00:02:01 (See Table 4.2). Figure 4.1 shows the average wait-time per day. The longest average wait-times were measured at the top of the traverse, with the top on the Saturday having the longest average wait of 00:02:16. The next longest average wait was the top on the Sunday with an average wait of 00:02:12. One interesting note is that the average wait-time for the bottom on the Saturday was the lowest at 00:01:37, more than half a minute shorter than the longest average wait, even though it had the highest hiker count that day. The longest single wait-time recorded was almost twelve minutes long (00:11:56).
Table 4.2. Average wait-time (in seconds).

<table>
<thead>
<tr>
<th>Day, day, and location of measurement</th>
<th>Number of wait-times measured</th>
<th>Total number of hikers observed in count</th>
<th>Average wait-time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, Sept 16 (Top)</td>
<td>57</td>
<td>1,008</td>
<td>0:02:16</td>
</tr>
<tr>
<td>Sunday, Sept 17 (Bottom)</td>
<td>104</td>
<td>757</td>
<td>0:01:59</td>
</tr>
<tr>
<td>Saturday, Oct 21 (Bottom)</td>
<td>153</td>
<td>1,167</td>
<td>0:01:37</td>
</tr>
<tr>
<td>Sunday, Oct 22 (Top)</td>
<td>64</td>
<td>1,008</td>
<td>0:02:12</td>
</tr>
<tr>
<td>Total</td>
<td>379</td>
<td>3,940</td>
<td>0:02:01</td>
</tr>
</tbody>
</table>

Figure 4.1. Average wait-time (in seconds).
A look at the average wait-times for all days shows that there is a steady increase in the morning, a post-lunch lull before increasing again (Figure 4.2). When comparing Saturday and Sunday average wait-times, Sunday had a slightly lower average wait-time (by 10.33 seconds) and both days experienced similar post-lunch decreases.

As the trail count data and the total number of wait-times measured show, over all days there were many more hikers travelling southwards and therefore waiting at the bottom of the traverse to climb up it. However, as stated above, the average wait-time for top of the traverse was almost half a minute longer than the bottom. From the data, it appears that the day of the weekend mattered less than the direction of travel.

Having a human observer and not just an automated trail counter or camera also provided some qualitative observations of the trail. There were several points during data collection when there was a Billy Goat Trail Steward at the traverse, though not every day. On two of these
occasions, the Steward attempted to direct traffic at the traverse by telling those at the bottom to wait for a group from the top to go down and to take turns. Neither of these stewards stayed long at the traverse, only about 10-15 minutes. Additional wait-time observations included hikers:

- Stopping for selfies,
- Stopping for water or snack breaks,
- Allowing others to go in front of them,
- With dogs (which are not allowed on the trail),
- Changing their minds after seeing the traverse and turning back,
- Stopping to watch how others navigate The Traverse.
- Cutting the line
- Arriving at The Traverse, seeing the wait and attempting alternate routes up the rock face

These activities were included in the wait-time (as long as they were not part of a long-term stop, such as stopping for lunch).

**Trail Count Results**

**Hiker Count**

Over two weekends almost 4,000 people were counted hiking on the BGT-A trail between the hours of 10 am and 4 pm (Table 4.3).

**Table 4.3.** Total hiker counts.

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Hikers Counted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, Sept 16</td>
<td>1,008</td>
</tr>
<tr>
<td>Sunday, Sept 17</td>
<td>757</td>
</tr>
<tr>
<td>September Total</td>
<td>1,765</td>
</tr>
<tr>
<td>Saturday, Oct 21</td>
<td>1,167</td>
</tr>
<tr>
<td>Sunday, Oct 22</td>
<td>1,008</td>
</tr>
<tr>
<td>October Total</td>
<td>2,175</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td><strong>3,940</strong></td>
</tr>
</tbody>
</table>

Data were collected for a total of 24-hours. That means that 164 people were recorded every hour, or almost three people per minute, passing the count point right before the Traverse: A hiker passed the trail observer every 21 seconds (Figure 5.4). Saturdays had the higher visitor
numbers with a total of 2,175 hikers, which was over 400 more than the two Sundays, which had 1,765 hikers.

**Figure 4.3.** Visualization of the quantity of hikers on the trail.

Temporal data were recorded for every twenty-five hikers who passed the observer (i.e. the beginning and end time for each data form was recorded with a new sheet every twenty-five hikers). Using the mid-points for every twenty-five hikers, an estimate of the total number of hikers counted each hour was established (Figure 4.4).

**Figure 4.4.** Temporal estimate of the total hikers on the trail based on trail count data.
Gender

Male and female hiker ratios were almost equal on the trail, in line with the national population average (Table 4.4) (U.S. Census, 2010).

Table 4.4. Observed gender of hikers.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Total Hikers Counted</th>
<th>Percent of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>1992</td>
<td>49.32%</td>
</tr>
<tr>
<td>Female</td>
<td>2047</td>
<td>50.68%</td>
</tr>
<tr>
<td>Total</td>
<td>4039</td>
<td></td>
</tr>
</tbody>
</table>

When looking at gender in relation to age, there were more adult women than men on the trail and teens were close to parity between the genders. For children and seniors, however, females made up only 38% and 40% for those age groups respectively. There were equal numbers of males and females observed for white and Latino hikers, but for black and Asian hikers, there were more females observed (54% and 55%, respectively).

Race

The trail count observed a much higher percentage of white hikers than any other group, accounting for almost 71% of all hikers (Table 4.5). Asians were the next largest group, comprising 18%. Latinos were the least represented group on the trail, at less than 4%. The percentage of white hikers was much higher than the percent of the D.C. area population that is comprised of white individuals (U.S. Census, 2010). Black or African American individuals make up 25% of the D.C. population, but made up less than 6% of hikers on the trail.

Table 4.5. Observed race of hikers.

<table>
<thead>
<tr>
<th></th>
<th>BGT-A Hiker Count</th>
<th>% of hikers</th>
<th>DC Area % of population</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latino</td>
<td>157</td>
<td>3.89%</td>
<td>15%</td>
<td>-11.11 points</td>
</tr>
<tr>
<td>Black</td>
<td>234</td>
<td>5.79%</td>
<td>25%</td>
<td>-19.21</td>
</tr>
<tr>
<td>White</td>
<td>2850</td>
<td>70.56%</td>
<td>46%</td>
<td>+24.56</td>
</tr>
<tr>
<td>Asian</td>
<td>734</td>
<td>18.17%</td>
<td>10%</td>
<td>+8.17</td>
</tr>
<tr>
<td>Other</td>
<td>64</td>
<td>1.58%</td>
<td>4%</td>
<td>-2.42</td>
</tr>
<tr>
<td>Total</td>
<td>4039</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Age

Adults were by far the most observed age group on the trail (Table 4.6). Over 84% of hikers were observed as being between the ages of 21 and 59, though adults only make up a little more than 27% of the total D.C. area population (U.S. Census, 2010). Children and Teens made up almost 12% and seniors made up only 4%, though they comprise 26% and 18% of the local population, respectively.

Table 4.6. Observed age of hikers.

<table>
<thead>
<tr>
<th>Age group*</th>
<th>BGT-A Hiker Count</th>
<th>% of observed hikers</th>
<th>Merged Group</th>
<th>DC Area Estimates</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Child (0-12 yrs.)</td>
<td>240</td>
<td>5.94%</td>
<td>11.66%</td>
<td>26% (0-19yrs)</td>
<td>-14.34 points</td>
</tr>
<tr>
<td>Teen (13-20 yrs.)</td>
<td>231</td>
<td>5.72%</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adult (21-59 yrs.)</td>
<td>6,408</td>
<td>84.38%</td>
<td>84.38%</td>
<td>57%</td>
<td>+27.38</td>
</tr>
<tr>
<td>Senior (60+ yrs.)</td>
<td>160</td>
<td>3.96%</td>
<td>3.96%</td>
<td>18%</td>
<td>-14.04</td>
</tr>
<tr>
<td>Total</td>
<td>4039</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*These numbers were determined using the SOPARC observational protocol (McKenzie, Cohen, Sehgal, Williamson, & Golinelli, (2006)).

Direction of Travel

There were at least twice as many southern hikers as northern hikers (Table 4.7). Additionally, multiple hikers were overheard saying that they preferred climbing up the traverse (south) rather than coming down it (north), as it was perceived to be safer and less intimidating.

Table 4.7. Total number of hikers based on their direction of travel.

<table>
<thead>
<tr>
<th>Time</th>
<th>Total Hikers Counted</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>South (Ascend the traverse)</td>
</tr>
<tr>
<td>Saturday, Sept 16</td>
<td>719</td>
</tr>
<tr>
<td>Sunday, Sept 17</td>
<td>508</td>
</tr>
<tr>
<td>Saturday, Oct 21</td>
<td>797</td>
</tr>
<tr>
<td>Sunday, Oct 22</td>
<td>695</td>
</tr>
<tr>
<td>GRAND TOTAL</td>
<td><strong>2,776 (68.73%)</strong></td>
</tr>
</tbody>
</table>
The number of hikers traveling south was higher at every hour, except for the last hour of the first Sunday, when even numbers of hikers were recorded hiking in both directions (Figure 4.5).

**Figure 4.5.** Total number of hikers going in each direction by the hour.

**Groups**

For the purpose of this study, “groups” were defined as any hiker or hikers observed travelling together towards The Traverse by the trail observer. There were 1,660 groups (including solo hikers) that hiked the trail over all five days of data collection (Table 4.8). A total of 1,603 groups hiked the trail over the four days. Observed group sizes ranged from solo hikers to 19 individuals. Average group size was 2.43 people and the median size was two people.
**Table 4.8.** Summary of groups observed on the BGT-A.

<table>
<thead>
<tr>
<th></th>
<th># of Groups</th>
<th>Average group size (# of people)</th>
<th>Median (# of people)</th>
<th>Maximum group size (# of people)</th>
<th>Minimum group size (# of people)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sat, 9/16</td>
<td>430 groups</td>
<td>2.35</td>
<td>1.5</td>
<td>16</td>
<td>1</td>
</tr>
<tr>
<td>Sun, 9/17</td>
<td>300 groups</td>
<td>2.52</td>
<td>2</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Sat, 10/21</td>
<td>473 groups</td>
<td>2.47</td>
<td>1</td>
<td>19</td>
<td>1</td>
</tr>
<tr>
<td>Sun, 10/22</td>
<td>400 groups</td>
<td>2.52</td>
<td>4</td>
<td>14</td>
<td>1</td>
</tr>
</tbody>
</table>

Close to half (48.65%) of all hikers were either solo hikers or hiking with only one other person. Almost 94% of hikers counted were in groups of seven or fewer people and only slightly more than 3% of hikers were in groups of 10 or more.

**Age and Group Size:**

43% of adults traveled in groups of two (Figure 4.6). The age group with the highest percent of solo hikers were seniors (17%). Seniors were also least likely to be in larger groups of five or more. Out of all the groups, children (15%) and adolescents (20%) were the most likely to be in a group of six or more. The highest percent of children (25%) were in groups of three.

**Figure 4.6.** Percent of hikers within each age group observed hiking in different group sizes.
Bypass Trail Use and Other Comments

Overall, very few hikers (2.6%) were observed using the informal bypass trail around the Traverse (Table 4.9). The first day of data collection, however, observed 94 individuals, almost 9% of that day’s hikers and 94% of all hikers who used the bypass over the four days, either going off trail or returning to the formal trail from the informal bypass trail. This was most likely because a fence set up by the Stewards, had been partially removed (see Figure 4.7) and hikers were going through the downed fence, which took them to the informal bypass trail. A steward came to the top of the traverse in the early afternoon and fixed the fence, leading subsequent hikers to stay on the formal trail. Excluding the time with the downed fence, only .05% of hikers used the informal trail.

![Figure 4.7](image)

**Figure 4.7.** Snow fencing at the top of The Traverse. The red-circled area shows where the green snow fencing had been removed and hikers were heading in that direction instead of along the official trail (indicated by the blue arrow). Once the trail steward re-tied the green fencing to block that path, the vast majority of hikers followed the official trail.

Overall, among all days of data collection, the number of hikers observed using the bypass to go around The Traverse was insignificant.
Table 4.9. Number and percent of hikers observed on the bypass.

<table>
<thead>
<tr>
<th>Date</th>
<th>Number of hikers who used the informal bypass &amp; percent of total hikers</th>
<th>Number of hikers who stayed on the formal trail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saturday, Sept 16</td>
<td>94 (9%)</td>
<td>914</td>
</tr>
<tr>
<td>Sunday, Sept 17</td>
<td>1 (0.13%)</td>
<td>756</td>
</tr>
<tr>
<td>Saturday, Oct 21</td>
<td>1 (0.09%)</td>
<td>1166</td>
</tr>
<tr>
<td>Sunday, Oct 22</td>
<td>4 (0.4%)</td>
<td>1004</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>100 (2.5%)</strong></td>
<td><strong>3,840</strong></td>
</tr>
</tbody>
</table>

While there was not a significant number of hikers who used the bypass trail, the fact that so many were observed to go off when the fencing was not in place, even though the marked trail went a different direction, is an indication of the challenge that trail managers have of keeping people on-trail on the BGT-A.

“Other” comments collected included, 36 hikers using walking sticks, 22 runners, 11 hikers carrying children either in their arms or in a backpack, and five dogs. One adolescent girl was observed wearing high-heel boots as she hiked towards the traverse.
Correlation: Wait-time & Trail Use

Figure 4.8. Trail time and hiker count by the hour.

Spearman correlation tests were run to determine any relationship between wait-time and:
a) trail count, b) average group size, and c) directional imbalance of hikers (i.e. more hikers
traveling in one direction than the other). Positive correlation was weak ($r$ scores between .20
and .39 are considered “weak”) for all three relationships and none was statistically significant.
Hiker count and wait-time had the highest $r$-value among the three variables tested. More data is
needed to establish clearer relationships among these variables.

Table 5.11. Results of Spearman Correlation.

<table>
<thead>
<tr>
<th></th>
<th>Hiker Count</th>
<th>Average Group Size</th>
<th>Direction Imbalance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wait-time Pearson Correlation ($r$)</td>
<td>+.32</td>
<td>+.26</td>
<td>+.25</td>
</tr>
<tr>
<td>Significance (2-tailed) ($p$)</td>
<td>.12</td>
<td>.23</td>
<td>.23</td>
</tr>
<tr>
<td>n</td>
<td>24</td>
<td>24</td>
<td>24</td>
</tr>
</tbody>
</table>
Validation & Reliability

The wait-time measure was pretested on the trail before data collection. It was during this time that it was determined that keeping track of the wait-time for more than three individuals at one time was not feasible. In order to validate the trail count observations, before any data collection began two researchers observed hikers separately and compared observations on 24 hikers, with 100% interrater reliability for the sampled hikers. Due to limited resources, it was not possible to have two observers for each measure.
CHAPTER 5: KEY INFORMANT INTERVIEW RESULTS

Nine total key informant interviews were completed in order to gain greater understanding of the challenges on the trail, to examine stakeholder relationships, and to inform considerations for future interventions. At least one representative from each of the five identified stakeholder groups was interviewed (Table 5.1). Groups with more involvement on the trail had more members interviewed. Four of the individuals interviewed were female and represented four of the stakeholder groups. Five of the informants were males, representing three of the stakeholder groups. All of key informants interviewed were white.

Table 5.1. Breakdown of key informants.¹

<table>
<thead>
<tr>
<th>Organization</th>
<th>Status</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 National Park Service</td>
<td>Employee</td>
<td>Natural Resources</td>
</tr>
<tr>
<td>2 National Park Service</td>
<td>Employee</td>
<td>Safety</td>
</tr>
<tr>
<td>3 The Nature Conservancy</td>
<td>Employee</td>
<td>Conservation &amp; Land Management</td>
</tr>
<tr>
<td>4 Potomac Appalachian Trail Club</td>
<td>Volunteer</td>
<td>Trail Maintenance</td>
</tr>
<tr>
<td>5 Potomac Appalachian Trail Club</td>
<td>Volunteer</td>
<td>Trail Maintenance</td>
</tr>
<tr>
<td>6 Billy Goat Trail Stewards</td>
<td>Volunteer</td>
<td>Trail Visitor Monitoring &amp; First Aid</td>
</tr>
<tr>
<td>7 Billy Goat Trail Stewards</td>
<td>Volunteer</td>
<td>Trail Visitor Monitoring &amp; First Aid</td>
</tr>
<tr>
<td>8 Billy Goat Trail Stewards</td>
<td>Volunteer</td>
<td>Trail Visitor Monitoring &amp; First Aid</td>
</tr>
<tr>
<td>9 Trail User</td>
<td>Hiker</td>
<td>Recreational Trail Users, Public</td>
</tr>
</tbody>
</table>

Overall, the story that arose through the key informant interviews was the myriad management challenges facing the Billy Goat Trail and the need for more visitor use management planning and interventions. Specifically, challenges related to:

1. The trail’s unique setting and user types

2. The roles and relationships of stakeholders, partnerships, and volunteers

The results of the nine interviews revealed that the Billy Goat Trail is a unique trail faced with many unique and difficult challenges, but also many opportunities for improving and advancing

¹ It should be noted that since the interviews, one of the PATC participants and one of the Stewards are no longer in their same positions.
the conditions of the trail through improvements to visitor use management. This section is divided into three main parts. First, a discussion of the challenges on the trail related to setting and users, second, the institutional and interpersonal relationships between stakeholder, partners and volunteers working on the trail, and third, ideas for improving visitors use management.

Challenges Related to the Trail’s Unique Setting & User Types

The Billy Goat Trail- Section A

Two essential elements for understanding the management of the Billy Goat Trail-Section A, and discussed throughout the key informant interviews, were challenges related to the setting of the trail and the types of users who frequent it (Figure 5.1). Discussion on the setting was in terms of the trail’s location on Bear Island with its critical environmental considerations and difficult terrain, and then its urban-proximity to Washington, D.C. Located only a few miles outside of the city, the trail caters to millions of people living in the greater metropolitan area, including large tour and social groups. Proximity to D.C. also influences the user-types who frequent the trail. Discussion on user-type related to the culture of the D.C. area, the experience level of hikers, and an abundance of “local” users.
Bear Island

The Billy Goat Trail is located on Bear Island, a small area of huge biological diversity and value both in the park and regionally. Discussion around Bear Island centered on the value that informants place on protecting the island and the difficulty of containing visitors and their impacts to the trail, away from protected habitats. As one of the NPS key informant said, “Honestly, Bear Island is one of the most important natural resource areas in terms of protection of rare, threatened, or endangered plant species in the park.” For this reason, The Nature Conservancy (TNC) co-owns and assists in management of the island, so they can, as the TNC informant said, “speak up for the rare plants and rare animals in the area because they cannot speak up for themselves.”
Protecting the island from hikers’ impacts is one of the most important challenges for the park and the stakeholders involved with the trail. From what key informants expressed, very few trail users are aware of the sensitive habitats surrounding the trail or of TNC’s ownership role. One of the Stewards shared their own ignorance on the subject prior to volunteering,

“I didn’t know the Bear Island itself was protected, or that it was a unique in any way. And now, as a Steward, I don’t know if I’ve ever encountered anyone on the trail who is familiar with that, unless they’ve been spoken to before by a steward or a member of the park staff.”

All the key informants spoke about the importance of teaching visitors about the Island’s ecology and keeping them on-trail. However, this has been extremely hard to do. The trail is currently covered in snow fencing, ropes, and small signs directing hikers away from off-trail areas (see Figure 5.2) and informants are always looking for ways to keep people on-trail. These are temporary solutions as larger interventions take park and federal approval, which can be a lengthy process.

Figure 5.2. Snow fencing, signs, and trail blazes along the BGT-A.

Bear Island is also a unique setting in how diverse and challenging the terrain is. The Billy Goat Trail is an unexpected trail in terms of its terrain, difficulty, and the surrounding
ecology for being so close to a major city. Throughout the interviews, the BGT-A was described as “unique,” “surprising,” “dangerous,” “challenging,” “interesting,” and “strenuous.” As one of the CHO informants shared,

“I’ve hiked the Billy Goat Trail many times and while hiking it I’m always looking for safety hazards. I realize it is a hiking trail, a very challenging hiking trail at that, and it’s dangerous to a certain degree and you have to be careful on your own and make sure you don’t make mistakes and get yourself hurt. I would say that we have well over 9% of [the park’s] accidents that occur on Billy Goat A when it comes to visitor accidents.” The difficult terrain of the trail can be a safety issue but that can also be the reason so many hikers come to the trail. As one key informant with years of hiking experience around the world, said:

“It’s a fantastic hiking trail. It’s better than some of the more strenuous trails that I’ve done that are world-renowned, with more interesting terrain changes. My first impression was ‘wow, this is really unique, really special, and I’m really glad that I have access to this. I’m definitely going to go back.’”

**Proximity to Washington, D.C.**

The trail’s proximity to Washington, D.C. also contributes to the challenge of extremely high use rates. As one informant put it, “the number of people, the sheer volume of people is the biggest challenge” to the trail. The visitor rate was described by informants as problematic for the trail both in the context of natural resource protection and for the safety and quality of visitor experience. Informants mentioned risks to visitor safety on busy days (e.g. feeling rushed by hikers behind you, taking longer on the trail than expected without enough water, etc.), as well as
the creation and perpetuation of the many social trails crisscrossing Bear Island. The trail is rarely ever empty. One informant who has been hiking the trail since 1974 and volunteering for five years said, “There’s always someone out on the trail now.”

The urban-proximate location of the trail makes it ideal for group trips. These groups pour a large number of people onto the trail at the same time, so they are all getting to some of the more difficult elements, such as The Traverse, at the same time, leading to congestion and backups. The hiker key informant shared her experiences with larger groups:

“The other issue I see when I drive [into the park] is these huge, huge, huge groups. And I mean groups of 50 to 100, 200 people coming through and hiking, which you’re not going to get in most places. You’re going to get hiking clubs and stuff like that [in other places], but you’re not going to get these regular massive groups because once again, the proximity. And so you get that many people together trying to traverse the same trail at once, you’re going to get a lot more people spread out, being in parts or areas that they shouldn’t be in, especially with kids.”

Several of the stewards also mentioned that when there are large groups on the trail, that is when they observe the largest backups at chokepoints along the trail.

**Unique Users Types**

Beyond the number of trail users, the *type* of users is unique to BGT-A, in large part due to this proximity to D.C. The Washington D.C. area has historically attracted individuals interested and involved in politics and government work, working for the federal government or industries supported by the government (e.g. lobbying, consulting). It is a highly educated,
wealthy, and political population, as several key informants pointed out. This political culture of D.C. area residents can also translate into a different type of hiker on the trail:

“You know, the D.C. area is like all *Type A* people, so Lord forbid somebody has to wait for somebody else! You know, they’ll damn near kill themselves to get around a slow person, whether it’s safe or not.”

When walking the trail and working with users, volunteers reported feeling they must be extra aware and careful with how they interact with visitors. As one volunteer said, “people in this area pick up the phone and call their congressman. It’s like calling your sister.” Additionally, not only are users often more politically motivated and affiliated, but also, they may *be* powerful individuals themselves. One example an informant shared was regularly seeing the Secretary of the Interior (now a former Secretary) hiking the trail. Another informant said, “you never know who you’re dealing with. They’re not always Joe Schmo or Joe Six-pack. Everybody’s somebody apparently.”

Informants also discussed how being surrounded by a large urban population can be difficult for a national park due to local users becoming regulars who see the park more like any neighborhood park, rather than a federally protected area. This challenge is compounded as locals familiar with the trail know there is little to no enforcement of trail policy on BGT-A. As one informant put it,

“‘We have people who are [here] every week from the neighborhood, and they do the same thing all the time and we get to know them. But some of those people are bringing

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2 *Type A* personalities are defined as more competitive, highly organized, ambitious, impatient, highly aware of time management and/or aggressive (McLeod, 2017).
their dogs and they’re off trail and, you know, they’re gonna continue to do it because they know there’s no enforcement.”

Figure 5.3. Two dogs climb up The Traverse on the BGT-A

Applying the rules can also be challenging among users with A-type personalities who might not want a trail volunteer to correct them if they are not following rules. When volunteers try to correct this type of behavior, while some listen, others “laugh at us, flip us off, whatever it might be and say ‘yeah, get a ranger down here and try to give me a $75 ticket. I don’t care because it’s not going to happen.’” Dogs and off-trail hiking, even in small amounts, can be detrimental to sensitive habits, like that which surrounds the BGT-A, so those impacts are exponentially increased when locals regularly engage in such behaviors.

One of the biggest issues related to user types, and that was mentioned in every interview, was how many inexperienced and unprepared people were hiking the Billy Goat Trail (See Figure 5.4). As one informant stated,

“I think on the Billy Goat Trail in particular, because it’s so easy to access, I’ve encountered so many more people who I would say are drastically underprepared for what they’re about to face. The clothes they’re wearing, the shoes they’re wearing, footwear is a really big deal. A lot of people wearing flip-flops or sandals, because there

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3 Dogs are not permitted on Bear Island, the BGT-A, or Olmstead Island within CHOH, but are allowed everywhere else in the park.
was a group of people who thought ‘this could be a fun thing to do,’ and then you stub your toe, or you break your ankle or something. The injuries that the Stewards record reflect those, which are ankle injuries, sprains, things like that are the most common injuries and then heat-related injuries because people don’t drink water, which is crazy to me.”

The BGT-A is less than 2-miles, but its difficulty in combination with heat and high humidity in summer can be very dangerous for unprepared and unfit hikers. One of the NPS informants shared a story about coming across an elderly woman, who had been left behind by her family hiking by herself in a dress and dress shoes.

![A hiker on the BGT-A about to descend The Traverse in sandals.](image)

**Figure 5.4.** A hiker on the BGT-A about to descend The Traverse in sandals.

Even simple trail etiquette is beyond some of the less experienced hikers. “You have experienced hikers who understand what blue blazes are, but you’ve just got a lot of people who come from the city who don’t hike often, and they don’t know what a blaze means.” There are hikers who do not understand the importance of staying on trail or know to wait their turns at crowded sections of the trail, which can lead to interpersonal conflict between visitors or unsafe
behavior. While hiking the trail and observing The Traverse I saw several instances of hikers getting frustrated when people cut the line or when opposing traffic did not yield.

**Challenges Related to the Roles and Relationships of Stakeholders, Partnerships, and Volunteers**

The second major theme that arose throughout the interviews was partnerships and the roles and relationships of the BGT-A’s stakeholders, partners, and volunteers both at an institutional and interpersonal level. Key informants from all five groups represented agreed on the intrinsic value of the trail to its users and shared a commitment to protecting the resources of Bear Island. However, there were disagreements concerning management policies and interventions to achieve these goals. These differences were most connected to roles and communication at the institutional and individual levels. This section will discuss some of the challenges outlined by informants (See Table 4.1).

**Table 5.2.** Identified institutional and interpersonal challenges related to roles and communication among key informants.
Institutional Relationships

Each group represented by the key informants has a different type of relationship with the others. The Park Service is central to all the stakeholder relationship and is responsible for maintaining clear roles for volunteer groups, communicating needs, and overall management. CHOHO is federally mandated to protect the park, provide visitor access, and comply with regulations throughout all its work and is thus the ultimate decision-maker on all issues related to the trail. All of the stakeholder groups recognize this and ultimately want to support the mission of the NPS. As one volunteer said, “I’m very much here to support the park.” Figure 5.5 provides an overview of these relationships: Dashed lines represent very little interaction, thicker lines represent stronger interactions, and red dotted lines indicates some conflicting interactions.

![Figure 5.5](image_url)  
**Figure 5.5.** An overview of the relationships between informant organizations.
Roles

Each stakeholder group plays a different role in visitor use management on the trail. As stated above, CHOH is tasked with the overall responsibility, but partners, volunteers, and even visitors have roles to play. Currently TNC has a very limited role in management of the trail as they have a well-established history with the Park Service and a relationship of trust with the park that they are taking conservation issues seriously. The Stewards play a key role in visitor use management as they are considered, as an NPS key informant said, “The eyes and the ears on the trail” and have the most interactions with visitors. The Stewards’ involvement with larger-scale management is limited, however.

NPS employees are the only individuals who can enforce rules, which was a note repeatedly made clear throughout the interviews. The Stewards, who are on the trail the most, interacting heavily with the public, cannot enforce rules by writing tickets or restraining rule-breakers. The Stewards interviewed generally seemed fine with this role, but there was a sense of frustration that nobody on the trail was enforcing rules. As one Steward said,

“I’ve had intellectual conversations on ‘why have the rule if you’re not going to enforce it?’ If the Nature Conservancy really believes that there are endangered species and they don’t want dogs running around in there, then perhaps we should attempt to prevent dogs from running around down there.”

Decision-making regarding the BGT-A is almost entirely in the realm of the Park Service. As co-owners of Bear Island, CHOH must keep The Nature Conservancy abreast of trail issues and confer with them before any major decisions regarding the island are made, but TNC trusts and supports the Park’s role as primary decisions-maker. If park management decisions begin to move away from the conservation, then TNC will step in. As the informant from TNC said,
“I know that it’s the human-use constituencies that are screaming the loudest, you know the kayakers, the paddle boarders, the rock climbers, the trail runners, all those folks. [TNC] always viewed our role as the organization that speaks up for the rare plants and rare animals in the area because they can’t speak up for themselves, but all the other stakeholders in that area can speak for themselves because they’re human.”

PATC is generally involved in any decision that requires maintenance or changes to the trail, but only to the extent of giving advice and support. The Stewards are almost entirely absent from most trail decisions. This can be difficult to swallow for some Stewards, as they are on the trail the most out of any group (besides users themselves). From the interviews, it appears that Stewards have little opportunity to participate in the creation of policy or interventions that could change BGT-A trail use and experience. As one Steward said, “In theory what the park says is that because we’re out there all the time, they want our input on any decisions affecting Billy Goat A. In practice, no, not at all.” Perhaps, a seat at the table, even if only to share information, as PATC does, would be valuable both for the Stewards and the NPS in decision-making.

Decision-making is primary to getting any interventions or changes made on the trail. However, NPS bureaucracy can be a major hurdle. All changes to the park must go through the NEPA (National Environmental Policy Act) process before it can be approved. There is also public input, getting the time and attention from higher-ups in the NPS to give approval, and the final implementation which can take money and time. PATC was particularly concerned with the difficulty of navigating projects through the system. As a PATC informant said,

“Some of the processes are completely frustrating. Most of the time they’re not, but we’re about to go out there and do some work on another trail this weekend and we can’t do some of our bridge work because cultural resources took a look at it and decided that a
whole bunch of eyeballs need to go out and look at what we’re doing. And it’s crazy time because the bridge we’re talking about, this shitty bridge that was built by people who didn’t know what they were doing and is falling apart, is currently held up with cinder blocks, and the reason it’s held up with cinder blocks is because it was too hard to go through the process to actually bury footings into the creek bed. So it’s the snake eating its own tail sometimes of like ‘this is ridiculous!’ and there are other times when I’m like ‘hey, I completely get it, it’s a super sensitive area so we need to be sure we’re going through everything.’ I can fully understand it and also find it frustrating.”

Finally, the roles of each group are related to their organization. PATC was absent from the trail due to some organizational challenges at the leadership level for almost five years, so the now-active PATC volunteers have to make up for lost time and rebuild their role on the trail. The Stewards, on the other hand, are highly organized and have volunteers out hiking the trail almost every day of the year, reporting encounters and other findings. The Park Service’s organization is based on federal law. Organization is also linked to communication (discussed further in the next section). The Park Service is organized by divisions that the different volunteer groups and partners report to. Some informants identified how this can make communicating needs and getting projects done on the trail difficult. One informant described how there are individuals with whom their organization works well, but due to NPS structure and divisions, those individuals might not have any input or power to assist. It can lead to disconnect and impede groups from getting their work done.

**Communication**

When informants discussed communication or interactions with other groups involved in the trail, it was mostly about the absence of communication or outdated information. Some
members of these groups have never seen or heard from anyone from some of the others. That is not objectively a problem, but a lack of communication can lead to misunderstandings. Within the interviews, there were several instances of informants completely misunderstanding the goals of other groups related to the trail. In one interview, an informant declared that another group wanted to pave over the trail, but an informant from that group had already discussed how their organization wanted to keep the trail as natural as possible. These informants represented groups that have little-to-no communication, thus leading to miscommunication, supposition, and assumption, all impediments to successful cooperation.

The Park Service plays an important role in facilitating any necessary communication between stakeholder groups. From some of the volunteers’ perspectives this could be improved. The Park Service might have many reasons for limiting communication to volunteer groups, but opening up any additional avenues of communication, or including the volunteers on memos related to BGT-A would be valuable for their work. As one of the Stewards said,

“Maybe just having scheduled meetings. That would be nice… to have that sit-down, one-on-one where you have a set agenda of things we want to discuss would I think be one way to improve relationship with the NPS.”

All of the key informants support the park and the overarching goals to protect Bear Island and provide positive visitor experience, but, as one of the volunteers put it, “We’re not on the same team, that’s the problem. We have the same goals and we’re all similar, it’s just not a good thing.” From speaking with each organization, it was clear that they truly are much more similar than different, but a lack of communication or connection has led to a level of mistrust between some of the groups, particularly the volunteer organizations who already have less influence and
ability to improve communication between groups. There were also strong relationships of trust reported as well, specifically between the NPS and TNC.

From the interviews, it is clear that there are some elements of conflict at the institutional level particularly between the Stewards and PATC. A major piece of that conflict appears to be related to the five years when PATC was absent from the trail creating a lack of connection and trust between the now-reactivated PATC representatives and the Stewards. Overall, an increase in communication—both quantity and quality were presented as necessary to overcome some of these conflicts.

Figure 5.6. Example of a trail sign on BGT-A encouraging hikers to help protect Bear Island.

Almost all of these challenges in communication are also applicable to hikers. A theme throughout all nine interviews was how to communicate the sensitivity of the island and thus the importance of staying on-trail, not bringing dogs, and leaving no trace to users. While there is not an absence of communication on the trail, (there are signs at the trailhead and small signs throughout the trail see Figures 5.6 & 5.7), the message does not generally seem to get through to
visitors. Updated signs and messaging could help encourage more compliance with rules and help users understand how vital the health of the Island ecosystem is.

**Interpersonal Relationships**

There were also interpersonal challenges that arose during the interviews. The nine key informants only represent a selection of all of the individuals working on the trail, including the thousands of hikers. Roles and communication were also key themes within interpersonal relationships, including issues related to respect and value of individuals’ expertise and service, experience on the trail, as well as a lack of communication and personality conflicts.

![Example of a trail sign on BGT-A informing visitors of habitat restoration.](image)

**Figure 5.7.** Example of a trail sign on BGT-A informing visitors of habitat restoration.

**Roles**

Each group and participant within that group are valuable to the overall management of Bear Island and the BGT-A. This was a generally agreed-upon notion throughout the interviews. However, there was also an element of friction between some individuals related to the amount of *respect* they receive through their roles on the trail. The Stewards, as already iterated, spend many hours on the trail, which is important to recognize both in terms of the value they provide by assisting trail users, but also because as volunteers they are generously giving of their own
free time to do so. While not official NPS employees, many of the volunteers working on the trail are highly successful professionals in their own fields, who are used to having their opinions valued and considered. It is an interesting dynamic in the park because NPS staff can only provide so many resources for engaging with the volunteers, but it can perhaps be difficult for some volunteers to feel that they are being valued for the service they provide. One example was of a CHOH representative attending the Stewards’ annual meeting. As one Steward recounted,

“[The representative] made an ass of himself and got everyone really pissed off. He informed us that we all work for him. Our response to that was a combination of “we don’t work for anybody,” and “you’re not even in the loop” of who we do work for if you want to call it working for somebody. Every once in a while, and it’s very rare, there is a bad incident with a volunteer and a visitor. There hasn’t been one reported in the last 15 months, but [this representative] made it sound like we’re all collectively guilty of overstepping our bounds, so that part of the meeting was not good.”

This issue was not a theme in every interview, but it came up in several with those who have been actively volunteering on the trail for some time.

An additional element related to respect and value is how much experience on the trail individuals have, both in the sense of total years working with the trail and actual time spent on the trail itself hiking and volunteering. The Stewards, many of whom hike the trail on a weekly-basis rarely meet with NPS staff and have never met with a representative from TNC. PATC is mostly active when needs arise or maintenance projects are finally approved for implementation. This imbalance of experience on the trail related to impact on decisions and management can be frustrating for some volunteers.
Communication

Finally, interpersonal communication between individuals working on the trail was an important theme that arose through several of the interviews. Similar to institutional communication, there is a lack of communication among individuals outside of their own groups. This can lead to assumptions and misunderstanding that hinder the work on the trail and create bad feelings. Additionally, several informants spoke about personality conflicts that have led to challenging personal and institutional relationships. Regarding a previous PATC representative, several informants discussed how this individual’s personality was a major cause of friction and inaction by PATC on the trail for years. As one informant described it, “[This representative] basically saw everyone at the park as an entity to fight with rather than work with.” Another informant talked about how this conflict meant that some were glad when PATC did not show up to do work because, in the informant’s words, “We didn’t have to deal with [them].”

Currently there are interpersonal conflicts between stakeholders on the trail as well. The example of the NPS staff member at the Stewards’ meeting already mentioned is an example of this conflict. One aspect of this is related to the user types discussed in section one, that there are many Type A personalities in the D.C. area. That is also true for some of the volunteer base on the trail. Many volunteers currently have or are retired from highly successful careers, including management positions. This can contribute to the challenge of working together, compounded by unclear roles on the trail and an inadequate network of support from each group.

Differences in management styles can also lead to conflict. One informant spoke about their priority to work with visitors’ natural inclinations to keep them on-trail, rather than try to change their behaviors, as other groups do. The informant mentioned that there were individuals from other groups who were perceived as “combative towards the visitor,” and approaching
visitor use management from a point perhaps more focused on enforcement and limiting access. In response to this conflict, the informant stated, “I think I’ve just decided it’s not worth it… It’s a real challenge, so I’ve decided not to use my energy on that personally.” Personality matters when working together among different stakeholders and has become an impediment for stakeholders and volunteers to work together for the greater good.

Ideas for Improving Visitor Use Management on the BGT-A

Key informants had many ideas about how to best overcome the challenges of the trail, and improve visitor use management based on their experiences and observations. Ideas varied across organizations and individuals, but mostly focused on the need for:

- Better communication to the user base about the trail in terms of the ecological sensitivity, difficulty of the trail, and crowding,
- Increased enforcement of rules and regulations, and
- New policy implementation for trail use.

There is much opportunity for increased communication and education via signs and volunteers. Key informants from every group discussed the importance of communicating through better signage at trailheads and along the path. The hiker interviewed discussed seeing new signs and interventions and how they have helped inform hikers a bit more about why staying on-trail is so important. Getting new signs approved is a lengthy process through NPS bureaucracy, but if it could be streamlined, effective signs could be a valuable, simple, and cheap tool for communicating important messages to hikers.

Another idea was to better engage with the park’s website and social media sites (e.g. Facebook, Trip Advisor, Yelp, etc.) to communicate messages about the trail. This could help
prepare individuals for the challenge of the trail, reminding them to wear proper footwear and bring sufficient water. It could also help to inform visitors of the real-time status of the trail. One of the informants mentioned how the park entrance often closes when the parking lot is full, so for people coming from further away, to get to the park and find out it is closed can be frustrating. Real-time updates could help avoid that type of negative experience and potentially help dispel crowds and impacts.

Enforcement is another important method for improving visitor use on the trail. There are very real time and personnel limitations for getting law enforcement officers out on the trail, but one informant recommended a period of heavy enforcement on the trail, perhaps over the busy summer season, to gain compliance, at least in the short-term. None of the informants was in favor of the Stewards taking on enforcement responsibilities, but if a park law enforcement presence could be more involved on the trail, perhaps visitors would better heed volunteers.

Many informants had ideas for new policy on how to deal with the ever-increasing demand for the Billy Goat Trail. Some of the ideas included requiring permits for all users or just for large groups. There are complexities to creating a permitting system including a high resource demand and, of course, enforcement, but this is an option that would keep visitor numbers to a set capacity. Permitting could also be valuable for limiting large groups to certain times on the trail, times when it is less likely to be busy. Another idea that was discussed among informants was to make the trail one-way. This could be done just for certain times of year or days of the week. A one-way trail would most likely do little to decrease crowds, but it could help the flow of traffic along the trail.

Overall, the key informants had many ideas for how to improve the trail, protect the island, and provide for improved visitor experiences. Resource and legal restrictions make it hard
to implement many of them but discussing these issues and bringing solutions to the forefront is a crucial step to realization. As one of the Stewards said, “

“I think it's great that you're taking the time to look into this because I think that the Billy Goat Trail is unique, and I think that it has some really unique problems too. And we as the Stewards spitball stuff and have conversations and everything, but I think that the more people who come in with different ideas the better opportunity we will have of helping protect the park, but also making sure the visitors have a great experience, which is important.”

There was very little discussion in the interviews about management plans, frameworks, defined goals, or coordinated efforts regarding the BGT-A. When asked, many supported the need for better-defined plans and documents outlining goals and methods to achieve them.
CHAPTER 6: DISCUSSION & CONCLUSIONS

The challenges of visitor use management have long been studied in the context of parks and protected places. Specifically related to challenges of capacity and crowding, the body of literature is rich with discussion and examination of both resource carrying capacity and social carrying capacity. However, many of these studies have been done at the overall park level and in more remote park units (Lawson, Manning, Valliere, & Wang, 2003; Kuentzel, Laven, Manning, & Valliere, 2008). The purpose of this study was to gain a greater understanding of challenges to visitor use, capacity, and management in countering and mitigating impacts of overcrowding by examining trail use and visitor management in an urban-proximate national park. This study sought to achieve this aim by using established theoretical frameworks of capacity and visitor use management to examine reported challenges by stakeholders, as well as through observed trail use data.

By exploring visitor use through interviews with stakeholders and trail observations, this study allowed for greater insight into the day-to-day realities of managing a crowded urban trail. This study provided a simple case of an over-used trail in need of further interventions and visitor use management direction to alleviate impacts and protect resources and visitor experience. Results found that current visitor use management on the Billy Goat Trail is insufficient to address burgeoning user impacts and if suitable interventions are not introduced soon, unacceptable levels of change to the island ecosystem and visitor experience could occur. This chapter includes discussion on the study objectives, as well as limitations, implications, and future research.
Objective 2. Understanding the day-to-day challenges related to visitor use on the Billy Goat Trail

The key informant interviews determined that capacity, related to objective number of people on the trail, group size, and environmental impacts, is the greatest issue facing the Billy Goat Trail. This is in-line with other literature looking at current challenges in parks and protected areas (Manning, 2011; Whittaker, Shelby, Manning, Cole, & Hass, 2010). The overwhelming number of people on the BGT-A is unsustainable in the long-term, both regarding impacts to the trail itself, including dangerous erosion and crowded conditions, and regarding the protection of Bear Island’s habitats. The park needs to start its approach to trail management in terms of ecological and social carrying capacity: how many users the trail and island can sustainably endure, and at what point does the presence of so many visitors begin to affect experience and satisfaction (Bradford & McIntyre, 2007; Graefe, Vaske, & Kuss, 1984). Without an evaluation of this capacity, it is difficult for the park to set goals and monitor impacts to incorporate into additional visitor use frameworks.

This study also found that beyond the numbers of visitors, the unique types of visitors related to the trail’s setting added to the challenge of managing visitors. This finding is valuable to the greater body of literature as many studies looking at capacity and visitor use tend to evaluate “visitors” as a more or less homogenous group, similar across parks. Through the key informant interviews, the results of this study made clear that one cannot study or manage the Billy Goat Trail without addressing the characteristics, needs, and expectations of the users who choose to recreate there. This is potentially true for other urban-proximate parks where the local culture of the urban center creates specific user-types that parks must consider in planning.
All parks and trails cater to a diverse group of users, but the reported challenges from the key informants related to D.C. area locals provides an additional layer of consideration. One of the key informants discussed the need to manage with users in mind, in tandem with their natural inclinations rather than against them. Any negative impacts of thousands of trail users are compounded when they are inexperienced, unprepared, feel the rules do not apply to them, or treat the park like any local park, as many on the BGT-A were reported to do. In a place like D.C. where there are many inexperienced and headstrong hikers on the trails, normal visitor use protocols may not suffice. It is in this type of situation that the ability for parks to adjust visitor management plans is of most value, so they can adjust based on the needs and behaviors of users.

The trail observation data provided objective evidence of the user volume and the subsequent crowding on the trail, with thousands of hikers counted over the four days of data collection. As capacity research has found, a high objective user count influences perception of crowding (Randall & Rollins, 2013; Vaske & Donnelly, 2002). Keeping use rates below a specified capacity will assist in keeping visitor encounters within acceptable norms and thus limit perceptions of overcrowding.

**Objective 3. Evaluate trail use through trail count and wait-time observations**

Beyond the objective number of people and wait-times observed, there are additional elements related to trail use and experience that should be considered in management. While the results of the wait-time measure found that the average hiker only had to wait a few minutes to get through (an average of two minutes compared to the anecdotally reported 30 to 40 minutes), the park cannot underestimate the potential impact of a few minutes’ wait on experience without further evaluation. Many waiting hikers were observed attempting to find alternate routes up the
steep rock and there were instances of impatience and conflict between users. Additionally, an unexpected wait of several minutes could force hikers to go faster later on the hike to make up time, potentially leading to injury, an occurrence reported by several informants. Individuals can get impatient waiting even in places where they expect lines or delays (e.g. restaurants or dining halls) (McGuire, Kimes, Lynn, Pullman, & Lloyd, 2010; Taylor, 1994), so having to wait during a hike when in a hurry or not expecting it, could potentially affect visitor satisfaction.

Crowding and wait-time literature discuss the importance of the context of the wait, including who is waiting, what they are waiting for, where the are waiting, and if a wait is expected (Hwang & Lambert, 2009; Manning, 2000; Tom & Lucey, 1997; Vaske, Donnelly & Haberlein, 1980). These aspects are important considerations in visitor use management, in order to determine the extent to which crowding, or waiting is actually impacting visitor experience. In the context of the BGT-A, its proximity to Washington, D.C. and the subsequent user-types that use the trail could experience the wait in diverse ways. Based on the results of the key informant interviews, D.C. users can have Type-A personalities and not want to wait for anyone. This type of user might not be willing to wait or might get frustrated at even a short wait. However, in a similar vein, these individuals are also used to living and working in a city with millions of people, terrible traffic, and crowded metro cars, so a few minutes’ wait on a trail might not be unexpected or inconvenient.

User expectations are essential to consider in how wait-time impacts experience. Parks and recreation research has found that expectations are related to norms regarding standards for quality recreational experiences (Manning et al., 2002) and that there is a relationship between expectations for crowding and overall experience (Budruk, Schneider, Andreck, & Virden, 2002). Further, studies in urban-proximate parks have found that local users, with more
experience in a place, are actually “more sensitive to social and environmental site conditions” than regional visitors or tourists (Eder & Arnberger, 2012, p. 566). These expectations are important to evaluate, understand, and consider for their relationship to wait time and any impacts on visitor experience on the trail. The incorporation of survey data with objective count data would provide understanding for if and how wait-time is affecting experience on the BGT-A.

There is value to the NPS in further understanding impacts of wait time on visitor experience. For many individuals in urban areas their access to the larger remote national parks is limited and therefore their ability to come to know and value them is also limited. Urban-proximate national parks provide this type of opportunity without needing to travel great distances. Positive visitor experiences have been found to influence environmentally responsible behavior (Nisbet, Zelenski, & Murphy, 2008; Vaske & Kobrin, 2001), instill park loyalty and advocacy (Arnberger, Eder, Allex, Sterl & Burns, 2012; Bielen & Demoulin, 2007; Kyle, Graefe, Manning, & Bacon, 2004), and lead to a sense of place attachment to the parks themselves (Moore & Graefe, 1994). Subsequently, a sense of place attachment, which occurs when a place becomes filled with meaning and creates an emotional tie to a nature resource (Vaske & Kobrin, 2001), has been found to be associated with support for park management actions and interventions (Warzecha & Lime, 2001). As CHOH and the trail expect a continued increase in visitors, there will need more interventions to manage visitor capacity, and having the support of the public in management interventions could be valuable.

The wait-time results were also important as they were incongruent with stakeholder perceptions and anecdotes about The Traverse. In preparing for the study and throughout the interviews, multiple individuals mentioned wait-times from 30-45 minutes long at The Traverse.
While the findings presented here are in no way complete, they provide data for an average fall day, indicating that the extremely long waits are most likely the exception. Managing the trail based on the thinking that a 30-45-minute wait is the norm is not supported by this study, nor is it practical. It is possible that simple interventions could positively affect any impacts to visitor satisfaction by waiting at The Traverse.

The trail count provided further data on who is using the BGT-A. The data supported the notion that the BGT-A is a crowded and busy trail that needs further management oversight. For example, the brief period of time where the snow fencing was down at the top of the traverse and 94 hikers went off-trail, is evidence of the difficulty that staff and volunteers have keeping hikers on-trail and away from the interior of the island. While this study did not look at general off-trail behavior and social trail use, previous studies have mapped the multitude of social trails on Bear Island and found that over 25% of hikers went off trail for one reason or another (Hockett, Marion, & Leung, 2017). Twenty-five percent of 4,000 hikers means that potentially 1,000 hikers, at one point or another, were off-trail.

The trail count also provided an overview of the demographics of BGT-A trail users that can be additionally useful to park management in understanding their users. The percent of female hikers observed on the trail was an interesting result in the context of women in outdoor recreation more broadly. Data shows that women often have more constraints to navigate when it comes to leisure time and recreation, including time stress, lack of opportunity and experience, and fear (Jackson & Henderson, 1995; Shaw & Henderson, 2005; Virden & Walker, 1999). The findings in this study however, promote no such constraints related to gender and hiking on the BGT-A. Further research could examine how motivations or barriers for female hikers might be
different in urban-proximate natural areas compared to more remote areas, and if any of those lessons could be applied to the broader parks and recreation field.

The prominence of white hikers on the BGT-A, while not surprising, is an opportunity for the park to continue to reach out to diverse populations and encourage their participation in outdoor recreation. This study is in line with others that have found limited recreation in natural spaces, including national parks, for minority populations (Adams, Baskerville, Lee, Spruiell, & Wolf, 2006; Carr & Williams, 1993; Taylor, Grandjean, & Gramann, 2011; Weber & Sultana, 2013). Urban-proximate parks in particular could be valuable for promoting outdoor recreation among more diverse populations, exposing individuals to new experiences closer to home. There are movements within the NPS to examine ways to make parks and outdoor recreation more inclusive to diverse populations (US NPS, 2017b).

The observational methodologies put forward in this paper are simple ways that parks can get a snapshot of use and experience on the trail, with minimal invasiveness to visitors. However, it is also valuable to consider other methods of observation, including the use of technology. CHOH has some specific challenges when it comes to using camera traps or video on the trail due to issues of privacy. However, while cameras might not be approved for the trail itself, they could be valuable closer to the center of Bear Island to examine off-trail behavior, including where it is happening most, what type of user is getting off-trail, and perhaps to test out some interventions to discourage such behavior. Cameras further inland and focused on the protected habitat would be more likely to bypass any privacy issues as the only hikers it would capture would be those who should not be there in the first place. Since protecting the RTEs on Bear Island is of paramount importance to all the stakeholders, observing and analyzing the threats with video technology could provide valuable data for resource protection.
Objective 4. Examine relationships between trail stakeholders, partners, and volunteers

Throughout the key informant interviews the value of stakeholders, such as partners and volunteers in the management of the BGT-A was made clear. It was also made clear that there are many opportunities for improving the relationships between these groups to the benefit of both the trail and the individuals involved with it. Stakeholder literature engages with the challenges related to stakeholder participation in natural resources and environmental management as an expected element that needs to be examined and understood for stakeholder relationships to best serve their purposes (Reed, 2008; Reed et al., 2009).

Where possible, the Park Service needs to seek out ways to better incorporate the perspectives, experiences, and skills of partners and volunteers. Collaboration as defined by Gray and quoted in Gray and Wood (1991) is “a process through which parties who see different aspects of a problem can constructively explore their differences and search for solutions that go beyond their own limited version of what is possible” (p. 4; Gray, 1985). As mentioned in two of the interviews with volunteers, there is a sense that the park could take greater advantage of the skills and resources (e.g. time, talents) that volunteers have to offer the park. If parks can find the capacity to do this, it could both add many additional resources to the park’s disposal and potentially attract more volunteers.

The key informant interviews revealed that there is conflict between stakeholders on the trail, and further analysis could be beneficial to understanding how to limit that conflict and bring stakeholders together to work towards their common goals. The nuance in the case of the BGT-A is the addition of interpersonal conflicts and egos that exacerbate any institutional-level conflicts. The Billy Goat Stewards and the PATC have had a tough few years working together due to
inaction of previous leaders, adding stress to relationships between two groups that should otherwise be very much aligned.

In the current study, a lack of communication between partners was one of the major barriers to successful institutional and interpersonal relationships. Some groups had almost no contact between each other, which led to incorrect assumptions about their priorities for the trail (Stewards and TNC). Improving communication is a simple step that could facilitate enhanced institutional and interpersonal relationships among stakeholders.

**Objective 5. Consider how frameworks and interventions can be used to improve visitor use management**

**Recommended Interventions**

Restricting access to national parks through visitor caps or permit requirements can be difficult as they are public lands. These types of interventions can also be difficult to enforce. Results from this study found many potential interventions, ranging from simple to more complex. Listed here are four that I believe, and based on the data, could be valuable for implementation in this park and for consideration for other parks and trail struggling with capacity issues.

1. **Improved Communication**

The need for more and better communication to users came up repeatedly in the key informant interviews. Better communication related to education, trail etiquette, safety, and general trail conditions is an important first step to creating a more informed user base on the trail. Signs are a simple intervention to improve communication, but the strategic use of trail volunteers and digital platforms could provide further potential for improved communication.
The presence of a Steward at The Traverse, directing traffic and assisting visitors with the climb or descent could potentially help the flow of the trail and manage waits. Service industry research has found that wait-time can be related to a variety of factors beyond just objective number of people, such as the environment and service provided. Thus, having a trail representative at the choke point, communicating the difficulty of The Traverse and talking people through it can potentially help visitors feel better about their wait, even if shortening it is not possible, especially since hikers are waiting anyways (Tom & Lucey, 1997).

A 2007 study on the Billy Goat Trail found that when stewards informed visitors about the impacts of off-trail hiking at the trailhead, this behavior decreased from 70.3% to 43.0% (Hockett et al., 2017). This data is also supported by a study in Mt. Rainier National Park that found a uniformed park employee was the most effective treatment for keeping hikers on the formal trail (Rochefort & Gibbons, 1992). If CHOH and the stewards can coordinate to have volunteers or park employees out on the trail at strategic points (e.g. The Traverse, social trails that pass through sensitive locations), they can manage and educate visitors more effectively to keep traffic flowing and visitors on-trail.

2. **Unidirectional Trail**

Based on the data, the vast majority of hikers travel south, and wait-time was shorter going in this direction. During the trail observations, it was overheard several times that hikers preferred climbing up the traverse as opposed to going down it, as hikers would do if they were all hiking south. Based on this evidence, one potential solution the park can consider is changing the trail from a bi-directional route, to a unidirectional route, requiring all hikers to hike in the southern direction. Since the trail ties back to the towpath, all hikers end up making a loop
through the hike anyways. Unidirectional traffic could help the flow, as there would be no need for those climbing up the Traverse to pause to allow hikers from the top to descend.

3. Permitting for Groups

Group size was one of the major concerns in the key informant interviews, as there have been reports of group sizes upwards of 200 on the trail, causing major delays at The Traverse and other sections. While there were several large groups observed on the trail in this study, none was over twenty individuals and the data collected in this study did not find these groups to be so prevalent as to be a major issue for trail management. One potential solution is to require permits for groups of twenty or more and limiting them temporally to low-use hours, including weekdays and early or late in the day on weekends.

4. Encourage dispersal of hikers to Billy Goat B or C or other CHOH trails

CHOH wants the public to visit and enjoy the beauty and history of the park. If capacity on BGT-A is being met or surpassed, the park can take steps to better market to and educate visitors on other trails available in the park. BGT-A is the most famous and visible on social media, but the other trails have great elements as well and could be more enjoyable to the less experienced or prepared hikers. A publicity push for other trails could assist in decreasing crowds on BGT-A while still providing valuable recreational experiences to large numbers of visitors.

Visitor Use Management Frameworks

Parks need more comprehensive visitor use management plans that incorporate goals, needs, assessment and evaluation, and a more proactive approach to getting decisions made and interventions implemented. The new IVUM framework is designed to “be highly flexible and
adaptable to local situations and needs” (IVUM, 2016, p.3), and its introduction of the sliding scale of analysis is meant to simplify decision-making commiserate to the scope of the project, to allow for streamlined, proactive management. Results from the key informant interviews indicated that there is minimal planning related to the BGT-A and that most interventions, such as the small signs, snow fencing, and ropes, are done reactively and by necessity by Stewards, without strategic goals or evaluation. The result is a trail covered in unsightly barriers, peppered with signs, and hikers who still get off-trail either intentionally or not. Without an overarching management plan, and the resources to implement, monitor, and act on it, conditions on the trail can be expected to worsen.

IVUM requires the creation of indicators and thresholds to evaluate conditions. Two indicators that BGT-A could use to manage the trail for ideal conditions would be first, a maximum average wait-time at The Traverse and second, the establishment of a visual visitor capacity for the trail using People at one Time (PAOT). Keeping the wait-time low can be an indicator of acceptable conditions on the trail related not only to the wait itself, but also to traffic flow at the Traverse, indicating that general conditions of crowds, groups, and safety are also being met. From the informant interviews, a clear goal for the trail is to get hikers through safely while also enjoying the experienced. A brief wait at the Traverse could be an indicator that these conditions are being met.

The second indicator, an established visual visitor capacity, will provide the park an understanding of acceptable use-levels for visitors. PAOT is based on visualization and visitors’ views regarding acceptable number of people in one location of a park or trail at a time. It has been used to help land managers understand acceptable conditions for resources and visitor experience in parks like Arches National Park (DOI, 1995; Gibson, et al, 2014; Pettebone, et al.,
2013). Visitor surveys will be necessary to establish the PAOT threshold. Hikers will be given several photos of the same location with a numerical variation of people in them (i.e. no one in the first, three in the second, ten in the third, etc.) to allow visitors to share their criteria for how many people is too many people at one place (Gibson, et al., 2014). This could be useful on BGT-A at The Traverse or viewpoints along the trail where visitors stop to look at the river. Results will provide an idea of acceptable interpersonal conditions for hikers that CHOH can be aware of and work to maintain.

IVUM requires the establishment of social carrying capacities in the parks. The IVUM provides a guide specific to developing visitor capacity, focused on managing both amounts and types of visitors to achieve desired conditions (IVUC, 2018). This guidebook helps define when and where visitor capacity should be established, how to identify it, and how to implement it. The user volume on the BGT-A demands that CHOH determine an appropriate visitor capacity based on overall goals for the trail and then create methods to stay within that number. For the BGT-A the first limiting attribute is the trail itself- both its tread width (keeping it narrow) and its overall length (it is less than 2 miles). The trail can literally only contain so many hikers at any one time, but related aspects such as impacts of crowds on visitor experience and on the environment, must also be considered.

The new IVUM also addresses the role of stakeholders and discusses the importance of building trust, opening two-way communication, and understanding how they feel about or perceive any issues associated with any management intervention. Taking stakeholders into account in decision-making adds depth and perspective to discussions for interventions. It also allows stakeholders to feel more invested in the place and the outcome of any decisions. One limitation to the IVUM is a lack of discussion on the use of volunteers in visitor use management.
strategies. In urban-proximate parks, there is a deep pool of potential volunteers, many with valuable skills and experience that can bolster management and support limited NPS staff. Perhaps future iterations of the framework will include guidance for better volunteer use. In the meantime, however, parks with large volunteer bodies should still consider ways to effectively use them in their planning and implementation.

An additional aspect of management that needs attention, particularly in the context of an increasingly urbanized and diverse population, is for land managers and frameworks to consider how white normativity influences plans and ideals for public spaces. The history of the NPS is full of white men as leaders, decision-makers, and those working in the parks. While this has changed to some degree in the 100 years of the NPS, there are still many opportunities for improvement in considering non-white and non-male perspectives in park planning and management (NPS, 2018b). National parks, particularly the more natural, remote parks, can be perceived as white spaces or places of past abuse or prejudice by people of color (Scott & Lee, 2018; Johnson & Bowker, 2004) and research has found that minority groups often have different recreational or leisure styles that are not always considered acceptable uses for such spaces by the majority population (Shinew, Floyd, & Parry, 2004; Washburne, 1978). Public spaces are often managed based on the history, expectations, norms, and values of the dominant culture, which in the U.S. is white American culture (Gomez, 2002). Managing this way means that input from other populations that would allow for greater inclusion and feelings of belonging in national parks might be missing from the conversation.

The park service plays a key role in making park spaces more welcoming and accommodating to diversity, and for setting examples for how to treat visitors. However, research has found that people of color have been the victims of racial discrimination from parks
and recreation workers, possibly because workers are simply “inattentive to the needs and
ingterests of people of color, which may embolden other visitors to engage in acts of hostility”
(Scott & Lee, 2018, p.77). Additionally, research has found that most white managers in natural
parks and other public lands assume most of their visitors will be white and therefore tailor
interpretation and management to white history and heritage, ignoring other stories (Taylor,
2000). All of this can lead to management that harms minority visitor experiences in and
relationships with parks. In the conclusion of their report on people of color in national parks,
Scott and Lee (2018) recommend that the NPS “dissipate the conservative organizational culture
that discourages new ideas and creates barriers for promoting diversity and inclusion” (p. 79) so
as to open up conversation and ingenuity for how to make parks more diverse and accessible to
all people. Incorporating this type of mindset into the new IVUM framework is an important step
to creating more welcoming spaces in parks for all who wish to visit them. The conclusion of a
2009 survey of NPS visitors determined that,

“experiences gained [in parks] can become lasting personal memories that are shared
with others and influence future behaviors and opinions well beyond those of any
particular visitor. Providing accessible, relevant, and desirable experiences to
underserved populations is a means of sustaining broad public support for national parks
in an increasingly diverse America” (Taylor, Grandjean, & Gramann, 2011, p. 19).

Bear Island and the Billy Goat Trail offer an extremely concentrated example of the
challenge of balancing natural resource protection and recreational use in national parks. The
literature harkens back to this balance repeatedly when examining visitor use challenges in
protected areas (D’Antonio, Monz, Newman, Taff & Lawson, 2012; Kalisch & Klapheke, 2007;
Marion & Reid, 2001; Leung & Marion, 2000). The NPS mandate is to
“conserve the scenery and the natural and historic objects and the wild life 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” (The National Park Service Organic Act, 16 U.S. C. 1).

As this study found, BGT-A is providing for the access of thousands of people daily but the challenge of conserving the scenery, nature, and history unimpaired, and continuing to provide for the enjoyment of diverse visitors, demands further management attention and intervention.

**Study Limitations**

The findings and conclusions of this study must take into account its limitations, including the geography and scope of the study site, resource limitations that constrained data collection, and researcher and coding bias. This study took place entirely on one trail in an urban-proximate national park. While some results are not unique to the BGT-A, the scope of the study was focused on understanding the context related specifically to CHOH and broader generalization of the data may be limited.

Additionally, steps were taken to enforce trustworthiness of the qualitative data and to limit bias. In order to strengthen the trustworthiness of the data, I used Lincoln and Guba’s (1999) four criteria for qualitative inquiry: Credibility, Transferability, Dependability, and Confirmability. Each of these were addressed throughout the collection and analysis process. Credibility was established via prolonged engagement in the site, member checks of interview transcripts, and method triangulation include the trail observations. Transferability was established through purposive sampling of those most closely related to the trail, and through an attempt at thick descriptions of study findings. Dependability was established through a detailed
description of the methodology used. Finally, confirmability was established via memoing that included reflexivity between interviews, important to temper bias and personal values.

The wait-time and trail count data were limited due to minimal resources. Only one observer participated in each measure so there was potential for errors in observations, and trail observations took place during the fall season and does not provide the full scope of trail use. Additionally, the results of the observations are not meant to consider all variables or to explain the cause of wait-times, but to provide an overview of how long users are waiting before proceeding in their hike so managers can consider if experience is being affected and if interventions are necessary.

Implications & Future Research

There will never be any universal answer to visitor use management challenges in national parks. The variables be they social, environmental, or governmental, are too many to be accounted for. However, understanding the challenges and considering how frameworks can support the establishment and introduction of new interventions is valuable to parks. This study provides further evidence of the importance of tackling issues related to crowding and capacity in NPS units before impacts become unacceptable. Additionally, this study provided deeper insights into stakeholder relationships, which are valuable for consideration in park management. As this study found, there are many conflicts between stakeholder groups and individuals that impede the progress of management goals and initiatives. Findings support the need for further stakeholder analysis and collaboration research in NPS management, particularly as parks are increasingly dependent on these relationships for management support.
The new Interagency Visitor Use Management framework provides a renewed opportunity for parks to approach visitor use management strategically, with clear goals and plans to ensure that our parks and protected places endure for years to come. The opportunity to study and evaluate visitor use management before and after parks implement IVUM can provide insight into how this framework is being used, any strengths and weaknesses, and ways to improve it across the NPS. Future research needs to take advantage of the genesis of the IVUM and evaluate its effectiveness in managing capacity.

Additionally, of particular need and value is further research related to recreation in urban-proximate parks and protected areas. Increasing urbanization and demand indicate that these spaces will continue to experience high visitor use and will likely attract increasingly diverse user-types (Rossi, Byrne, & Pickering, 2015). Urban-proximate parks provide different leisure and recreation opportunities to visitors and their characteristics and expectations need to be more deeply understood (Clark & Stankey, 1979). Early research found that areas closer to urban centers may be viewed by visitors with different normative standards and expectations which are important for managers to consider (Ewert & Hood, 1995; Hoss & Brunson, 2000). Additionally, limiting visitor access via user caps and permitting is generally not an acceptable management measure in urban regions (Arnberger & Haider, 2005), therefore alternative interventions for capacity and crowding need to be studied in the context of urban-proximate parks to understand acceptable policies for visitors in these settings.

Overall, there is a need to continue research on capacity and crowding in all national parks and the lack of research specific to urban and urban-proximate parks needs to be addressed. Societal and environmental changes are impacting national parks in different and evolving ways that need to be continually examined. Additionally, interventions need to be
established and studied to address these impacts. The future of national parks depends on
decision-making based in sound science and constant monitoring to maintain the conditions
outlined in the NPS mandate and protect our parks.
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APPENDICES
Appendix A

Email Messages to Interview Subjects

Billy Goat Trail Stewards:

Hello Billy Goat Trail Stewards!

My name is Elizabeth Oliphant and I am the NC State student who has been doing observations on the Billy Goat Trail over the last few months. [Group leader] said that you would be willing to speak with me about your experience as a steward on the BGT-A. Thank you so much for your willingness! The interview will be about 30-45 minutes and I would like to conduct it over skype or another video conference call sometime in the New Year. Questions will be about your time and experiences as a steward, challenges to the BGT-A (specifically at the traverse), experiences with visitors, and perceptions about management strategies. If you could provide some times during the weeks of January 8-15 that would work for you, we can coordinate our schedules.

Interview responses will be recorded but kept confidential.

Thanks for all you do on the trail!

Sincerely,

Elizabeth Oliphant

Nature Conservancy

Dear [NAME],

Good morning, my name is Elizabeth Oliphant and I am a graduate student in the College of Natural Resources at NC State University. I have been doing my thesis research on The Billy Goat Trail- Section A on Bear Island at C&O Canal NHP. I am studying the process related to the park’s decision to add a bypass trail around the traverse section of the trail. I would very much appreciate the opportunity to do a short interview with one or several of your staff about the trail, Bear Island, and the Nature Conservancy’s role in management of the island. Would there be an individual or two familiar with the trail who would be able to speak with me via video conference sometime in January? The interview would take about 30-45 minutes and

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4 Additional contacts at CHOH and PATC were found via snowball sampling and introductions were made in emails through connections with other key informants.
questions would be about the partnership between the Nature Conservancy and NPS, involvement in decision-making, and perceptions about management strategies for the trail. Interview responses will be audio recorded and kept confidential. I appreciate your consideration. Please email me back at elolipha@ncsu.edu. Thank you,
Elizabeth Oliphant
Appendix B

Interview Guide

Name: __________________________________

Date: ___________

Getting started:

Thank you again for agreeing to participate, I’m looking forward to our conversation today about the Billy Goat Trail. My name is Elizabeth Oliphant and I am a graduate student at North Carolina State University studying visitor management in national parks.

Introduction to Interview:

This interview is part of my thesis project to study and understand the decision-making process and criteria used in managing parks and protected places. Today, I want to spend some time getting your insights from your time working with NPS on Bear Island and the BGT-A related to trail and visitor management on BGT-A and the decision-making process for the bypass trail.

Thank you for agreeing to participate in this interview. Your participation is completely voluntary and you may decline to answer any questions that you wish, and you may choose to end the interview at any time. This interview will last approximately 30-45 minutes. I will be recording our conversation today but your responses will be kept confidential (i.e., your name will not be directly tied to any statements).

We are very interested in hearing your thoughts on all of the questions in the interview and we will be transcribing the recorded interviews them to review later. Therefore, to the extent possible, please express your ideas in full sentences so that I might incorporate some of your feedback, quotes and comments into future reports and presentations.

Interviewee Background

1. Could you explain a bit about your educational and professional background? (i.e. what did you study in school? How did you come to work for the park service?)
2. Could you tell us a bit about your position and role in the [your organization]?
3. Can you provide some information on your background working with Bear Island and the Billy Goat Trail?

Topic 1) Background and Partnership/Stakeholders:
1. How would you describe the mission and primary goals for Bear Island and the Billy Goat Trail?
2. How is Bear Island managed?
   a. What is the role of The Nature Conservancy?
   b. What are the roles of the BGT Stewards and the PATC?
3. Could you tell me about any current management plans used for Bear Island and BGT?

**Topic 2) The Decision-making Process**
1. From your perspective, what are the greatest management challenges to Bear Island and the Billy Goat Trail?
2. How was the traverse section of the BGT-A trail determined to be in need of an intervention?
   a. What are the threats to the quality of both resource conditions and visitor experiences at the traverse?
3. What role does the traverse section of the trail play in visitor experience?
4. Can you provide a general overview of the decision-making process for the bypass trail at the traverse and your involvement? (time, people involved)
   a. What kinds of site assessments were performed?
   b. How was stakeholder input gathered? (Including, if relevant, any public input?)
5. What data were used to make the bypass trail decision?
   a. Were there data you would have liked to have but did not have access to?
   b. How are trail conditions, such as crowding, safety, soil erosion or compaction, and plant trampling, assessed?

**Topic 3) The Goals of the project**
1. What are the desired conditions for the traverse section of the trail?
   a. Have indicators and standards been established for evaluation?
2. What are the expected outcomes for this project?
   a. What indicators are you trying to improve?
   b. What indicator or value will define success?
3. How does the park expect the bypass trail to impact visitor experience?
4. What are any risks associated with adding the bypass trail?

**Topic 4) Strategies**
1. Could you discuss some of the other interventions considered to address crowding and social trail use?
2. How will the effectiveness of the intervention be monitored?
   a. Is there a plan to gauge visitors’ reactions to and use of the new route?
3. Have you heard of the new inter-agency Visitor Use Management framework? Is it a part of any planning you are involved with on the trail?
4. How do you think the NPS and TNC could better take advantage of the stewards, PATC, or other volunteer organizations as a resource for improving conditions and protecting resources on BGT-A?

**Topic 5) Wrap Up**
What other comments would you like to provide about the trail that we have not covered yet today?

I will be following up with an email, but you are welcome to contact me at any time if any questions, concerns, or thoughts arise: elolipha@ncsu.edu. Thank you for all your time and input today. It has been a pleasure speaking with you.