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UNDERSTANDING THE COMPLEXITY OF BIKE RECREATION IN A
UNIVERSITY FOREST: THE CASE OF BIKE RECREATION GROWTH IN THE
CLEMSON EXPERIMENTAL FOREST

A Thesis
Presented to
the Graduate School of
Clemson University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
Parks, Recreation, and Tourism Management

by
Taylor Marie Lollar
May 2020

Accepted by:
Dr. Elizabeth Baldwin, Committee Chair
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ABSTRACT

Since the advent of the Mountain Bike in the 1970's, forest and wildland recreation by bike has been growing as a form of exercise, competition and generally a form of wellness and connection to nature. Management related to bike recreation has traditionally characterized this group as one segment of users. As more areas are being developed and existing areas are growing user groups related to bike recreation the differences in types and ways that people engage in bike recreation is evident. Understanding these changes at multiple scales (temporal, spatial, social, and restorative health), along with drivers and impacts are important for the management of any recreation area in order to manage for the complexity of bike recreation. This research focused on an area that has seen growth and change in biking in a forest environment associated with a major public Land Grant University, Clemson University. The Clemson Experimental Forest (CEF) is a 17,000 plus acre multiple use forest managed by Clemson University for timber harvesting, and is used for many types of recreation by both a University affiliated population and the community in the region at large. While originally slated to be used as area for restoration of agricultural wastelands from the 1930s, the CEF today is also a hub for many types of outdoor recreation. This study focused on the growth of one of those activities, bike recreation. In an effort to understand the context for recreation in the forest generally, seventy-one surveys were collected from March 2019-2020 from people at key trailheads to address patterns and establish a way to identify key decision leaders, or informants, in the bike recreation community. Interviews were conducted with seven key informants about bike recreation

in the CEF, in an effort to build knowledge about the complexity of the bike recreation in this setting. Findings from the surveys indicated that bike recreation is a frequent recreational activity at the key trailheads, and at these key trailheads many people participating in recreation in the University Forest are not affiliated with the University. The interviews with managers and key informants suggested that users come from both the local and outside the local community due to word of mouth, the increase in recreational group use and technology supporting trail location for recreation generally and bike use specifically. Both groups of interviewees mentioned the growth of bike recreation in terms of sheer numbers and also the growth of group use and reasons for biking in the CEF. The interviews also indicated that issues regarding safety often relate to gender, that biking can be identity building, and issues of social justice are addressed through bike recreation. These results indicate that the complexity of reasons and experiences people engage in bike recreation cannot be managed as if it is a single user group. Therefore, this study points to the value in managers of natural areas, seeing a growth of bike recreation, look for complexity and ways to manage for this diversity of users so that more people might see this as a possible way to engage with natural areas.

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Additional thanks goes to my parents, whose love, support, and sacrifice are the reason I am here today. To Walt, my favorite riding partner, who first showed me that a life outdoors is a life well lived. From boyfriend to husband, wedding planning to job searching, none of this work would have been possible without his optimism and unwavering faith in me and the work I do.

Many others have also played a part in this thesis and deserve recognition. Taylor Parker, who served as a second advisor to me; Robert Taylor and Austin Souto, who are the reason I came to Clemson in the first place; and my CORE student staff who show me the beauty of recreation and community on a daily basis.

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CHAPTER ONE

INTRODUCTION

Introduction

Bike recreation, specifically mountain biking, is one of the fastest growing sports in world (Hill and Gómez, 2020). With an average of 95 rides per year, for International Mountain Biking Association (IMBA) members, mountain bikers are often committed to their sport, and note a variety of motivations from exercise to enjoyment (Cordell, 2012). For many, bike recreation plays a significant role in their day-to-day life with some riders saying that they "...[mountain biking] 'said a lot about who they were' and ever that their life was 'organized around' mountain bike riding" (Cordell et al., n.d.) It is also noted as a sport that is growing, it can increase health and wellness for people of all ages and genders, and organized groups have helped make this possible. The growth of the sport also has increased pressure on places that can accommodate the sport and expanded new areas (Wilkes-Allemann et al., 2017). Although the demographics are changing, the most common demographic to date is that mountain bikers are young, male and highly educated (Hollenhorst et al., 1995). Due to this demographic, University Forests are an excellent place to study bike recreation as settings where there are highly educated populations, in a rural community, and it provides an opportunity to examine changing complexity in the sport.

University Forests from land grant Universities are associated with Departments of Forestry, and of the 46 schools with a Forestry Department, all but three have a school forest (Coleman et al., 2020 and Burnhardt and Straka, 1988). These forests are linked to the land grant mission of teaching, research and outreach and associated demonstration.

Clemson University is one such university and has and over 17,500 acres of green space available adjacent to the core of campus. The mission of the Clemson Experimental Forest is clear about the forest being a social asset along with serving the university prime mission of teaching and research. The mission is the following:

“The prime directive for the forest is to be a well-managed, self-sustaining, ecologically healthy, living laboratory, classroom and recreation resource for the benefit of the university, commerce and citizenry of South Carolina, vouchsafed with a mandate to protect and promote in perpetuity the forest as an irreplaceable educational, environmental, scientific, and social asset”

(Clemson.edu/public/experimental-forest.com)

The forest is divided, with approximately half of the acreage north of campus, representing a foothills natural environment and the south of campus representing a southern piedmont landscape. On any given day, one can go out to the north or south forest and see various recreational pursuits taking place. However, there is scant data on recreational use in the Clemson Experimental Forest. The exception is a report done by Becco and Hallo (2013), where they surveyed users in the north forest from a single location. They found that 52% of users noted mountain biking as their primary activity in the CEF, and 45% of users have no affiliation to Clemson University. In the survey they conducted, bike recreation was noted, but the context of the bike recreation use and user values were not. This study is a start in that understanding.

The purpose of this research is to both understand the context of the use and values associated with the Clemson Experimental Forest (CEF) and how that has changed over time in relation to experiences people have with the area on bikes. Specifically, the researcher will examine the perceptions of decision leaders through four scales:

1. Temporal scale change by analyzing the perceived history of bike recreation in the CEF.
2. Social scale of bike recreation by examining the different ways in which people experience the CEF by bike.
3. Spatial scale analysis of how different groups use the forest spatially and how this may be changed overtime with predictions for future of this activity.
4. Finally, examine using a restorative health scale to understand how people use the experience of bike recreation as a restorative environment to address mental and change fatigue in their life.

With the four scales listed above and the surveys of recreationalist, identification and interviews of information rich resources, we can address the following research questions:

RQ1: What is the perception of change to bike recreation in the Clemson Experimental Forest?

RQ2: What are the different ways in which people engage with the Clemson Experimental Forest by bike and what is the meaning of these experiences?

RQ3: How do bike recreation decision leaders characterize the future of bike recreation?

Literature Review **Bike Recreation**

In the United States, riding bicycles has long been a recreational activity (Savre, Saint-Martin, & Terret, 2010). However, in the 1970's, a new form of bike recreation emerged- mountain biking (Savre et al., 2010). Looking to escape the, "...criticism and being excluded from cycling competitions because of their long hair, the pioneers of mountain biking were motivated to cycle in less organized, open air forms (Savre et al., 2010)." Thus, the sport of mountain biking was born.

By 1975, in Marin County, California, recreational biking groups began to emerge (Savre et al., 2010). Groups like the 'East Bay Bicycle Coalition' started organizing outings to experience biking in the mountains. As mountain biking begins to take off in popularity, individuals looked to make modifications to the traditional, city bike for their more adventurous usage (Savre et al., 2010). As the pioneers of mountain biking grew more technical in their riding, the act of modifying their city bikes began (Savre et al., 2010). Slowly, individuals like Gary Fisher began adding front and back derailleurs, motorcycle brake levers, and 26-inch tires to their bikes. With these modifications, the first mountain bikes began to emerge (Savre et al., 2010).

With modified bikes and group rides, the pioneers of mountain biking executed the first of 24 Repack Races in October of 1976 (Savre et al., 2010). "All of these first races took place in a spirit of togetherness, of making this type of cycling known...without specific ambitions (Savre et al., 2010)." The races not only brought the growing mountain bike recreationalist community together, but also brought national exposure to the sport. Cyclist in Colorado became interested in the sport of mountain

biking, and by 1978, the Coloradoans and Californians had combined their unique active and festival cultures to form, "...the foundations of the identity of the mountain bike: challenge, rivalry, and sharing in the pleasure of nature in the mountains" (Savre et al., 2010).

Today, mountain biking is one of the most popular forms of bike recreation and adventure sports in the world (Hill and Gómez 2020). With an annual contribution of nearly \$26 billion to the United States economy, mountain biking places a significant role in the outdoor recreation community (Taylor, 2010). The forms have also grown from the original mountain bikes to gravel bikes, fat tire bikes, racing mountain bikes and more, with even children starting "mountain biking" with bikes they also use on city streets.

Restorative Environments

We live in a face-paced society with a plethora of pressures. According to Stephen Kaplan, many of the pressures people face today are a result of three forces: advances in technology, the knowledge explosion, and the increasing world population (1992). While written in 1992, the research supporting Kaplan's ideas of pressure is growing. The increases in technology use is changing human behavior (Fontaine et al. 2008). According to the 2008 Bureau of Labor Statistics' American Time Use Survey, which looks at how Americans are spending their time, "...weekday leisure time for full time university and college students totaled 3.67 hours (2008). Then, with the small amount of leisure, college students are found to have spending nearly half of that time watching television and/or social networking (Fontaine et al. 2008). With the increase

use of technology and ease/access of information, the increased pressures faced by individuals today can lead to problems of mental fatigue (Kaplan, 1992).

While there are many ways to reduce mental fatigue, a significant way is through restorative environments (Kaplan, 1992). According to Kaplan, “natural environments, in providing these deeply needed restorative experiences, play an essential role in human functioning” (1992). However, it is first important to explain the model of a restorative experience in natural environments.

There are four major components: being away, extent, fascination, and compatibility (Kaplan, 1992). Being away is a crucial component of a restorative experience. When experiencing mental fatigue, people often desire to get away from whatever is exhausting them. By going to a different location, one is more likely to shift their thoughts away from what is exhausting them (Kaplan, 1992). The next component of a restorative experience is extent. Being away or in a natural environment does not promise a restorative experience, two properties are examined to make up the extent of the experience: connectedness and scope (Kaplan, 1992). According to Kaplan, for one to be able to experience connectedness, “...various parts of the environment must be perceived as belonging to the larger whole” (1992). This allows for the mind to rest and not have to seek a feeling of connectedness in the details. Scope, along with connectedness, describes that the environment needs, “...to be large enough that one can move around in it without having to be careful about going beyond the limits of the model that one is running” (Kaplan, 1992). Extent applies to both the physical and the mental space that an environment provides. For some, they need to be in both a physical

and mental space for connection, but others are able to create a physical space restorative if their mental space is able to be away from the fatigue and connect that way (Kaplan, Kaplan, and Ryan 1998).

For people that can do this, fascination is a necessary component of the restorative experience model. Fascination or interest is necessary for a place to be restorative. If one is not fascinated or interested in a space, their attention may still be on what is causing them mental fatigue. According to Kaplan, “a fascinating stimulus is one that calls forth involuntary attention. ...it allows one to function without using direct attention” (1992). For those unable to create the mental space in just any physical space, fascination aids in keeping one engaged in the space around them. Not all restorative environments work for the same people; therefore, compatibility is crucial for a restorative environment and the individual. “In a compatible environment...what one wants to do and is inclined to do are what is needed in and supported by the environment” (Kaplan, 1992). The individual needs to have the ability, and feel like they have the ability, to do what the need in the environment.

Kaplan notes that a restorative environment does not have to be one that is found in nature, but natural environments “seem to be particularly restorative” (1992). A crucial component of a natural restorative environment is ease of accessibility. One needs to be able to get away, but also with frequency to connect. This is not as easy for individuals in urbanized areas, but natural spaces naturally fall meet the necessary components of a restorative environment (Kaplan 1992).

Outdoor Recreation and Wellness

As a university, decision makers should be concerned with students' level of stress. Students that perceive themselves to be experiencing high level of stress can experience both physical and psychological impairment (Murphy & Archer, 1996). One way that shows to lower individuals stress levels is time spent in natural spaces. Outdoor recreation and time spent in the outdoors has shown to reduce anxiety and stress levels in individuals (Godbey, 2009). Yet, not all outdoor recreation is the same effect on anxiety and stress levels (Wolsko & Lindberg, 2013). In particular, "individuals who engage in more appreciative activities such as hiking and canoeing are more likely to experience a strong connection with nature and to have psychological well-being (Wolsko & Lindberg, 2013).

In addition to psychological well-being, outdoor recreation contributes to an individual's and community's overall health and wellness through prevention of adverse health conditions (Godbey, 2009).

"...physical health benefits from physical activity such as a lower risk of obesity, heart disease, diabetes; psychological health benefits such as stress reduction; social benefits such as increased social capitals; as well as economic and environmental benefits that may accrue to society resulting simply from the existence of the park in a community." (Bedimo-Rung, Mowen, & Cohen, 2005)

Parks and natural spaces provide areas for the community to interact with leisure-time activities, and studies show that park use is on the rise (Bedimo-Rung et al., 2005). While

outdoor recreation is shown to contribute to overall wellness in individuals, proximity to outdoor or natural spaces plays a pivotal role in levels of use. Proximity and access to natural spaces has a direct effect on use. While one study observed mixed reviews in measuring proximities effect on physical activity, “substantially more positive or mixed associations were observed than nonsignificant relationships” (Kaczynski & Henderson, 2007).

Research Site: Clemson Experimental Forest

The Clemson University Experimental Forest was established during the Great Depression (Sorrells, 1984). At 17,500 acres of land, the history of the forest in South Carolina runs deep. Serving as a beacon for scientific research since the 30’s, the CEF has been the site to various studies from forestry, stream ecology, to recreational use and impacts (Baldwin, 2019). In addition to academic pursuits, the Forest is used for timber extraction and sales. For people in the area, the Forest serves as an important space for them. Our research seeks to better understand not the Forest, but the user. However, having a base understanding of the Forest is important. From timber extraction to forestry management, the Forest has many purposes for the University and the greater community (Sorrells, 1984).

Bike Recreation and the CEF

Over the years, recreational use has grown in the CEF. Mountain bikers, horseback riders, walkers, hunters and trail runners are the most common, but even activities like bird watching, mushroom collecting, and fishing are activities not infrequent in the CEF. While recreation is a part of the mission of the Clemson Experimental Forest, little research has been done to assess visitor use and recreation in

both the North and South Forest. In 2013, Hallo and Becco released a report that examined recreation in the North Forest. This study primarily examined recreation users such as horseback riders, bikers, hikers, and runners (Becco and Hallo, 2013). Through this study, Becco and Hallo identified user demographics, user frequency, and their concerns regarding the Forest (Becco and Hallo, 2013). The key findings of this report were that nearly 45% of users had no affiliation to Clemson University and that trail conditions is the biggest concern to users (Becco and Hallo, 2013). With 45% of users having no affiliation to Clemson University, for many people in the community, the Clemson Experimental Forest is the face of the University. To better understand Clemson's connection and reach in the community, further research should be done to better understand and identify users and recreationalist in both the North and South Forest.

Methods

The purpose of this research to both understand the context of the use and values associated with bike recreation in the Clemson Experimental Forest (CEF) and how that has changed over time in relation to experiences people have with the area on bikes. More specifically, the impact that bike recreation in the CEF has on user's overall wellness. In order to understand the recreation that occurs in the Clemson Experimental Forest and its perceived impact on user wellness, the researcher and team will employ an Explanatory Design-participant selection model to answer three main questions (Creswell & Plano Clark, 2010). This will be done by first conducting a survey for an overview of the phenomenon of study and use this to identify key informants and issues. The

interviews with key informants and managers address both the results of the survey and more importantly the details of change in bike recreation in order to answer the following research questions:

RQ1: What is the perception of change to bike recreation in the Clemson Experimental Forest?

RQ2: What are the different ways in which people engage with the Clemson Experimental Forest by bike and what is the meaning of these experiences?

RQ3: How do bike recreation decision leaders characterize the future of bike recreation?

Organization of Thesis

In Chapter One, the research questions are framed with a literature review to provide an understanding of University forests, especially the Clemson Experimental Forest (CEF), and literature surrounding mental and physical health benefits of time spent in nature. While still addressing bike recreation in the Clemson Experimental Forest, the journal article in Chapter Two is written with broader implications for University forest management from survey and interview data. The journal article is written for future submission to the *Journal of Outdoor Recreation, and Tourism* (JORT), and is formatted in accordance with JORT articles submission guidelines. Finally, in Chapter Three, the research presents a discussion of how the findings from this study were evaluated through the temporal, social, spatial, and restorative health scales. In addition, final thoughts and next steps for research on recreation in the CEF.

Role of the Researcher

An avid outdoor recreationalist from Alabama, I moved to the Carolinas three years ago for the proximity and access to natural spaces. I knew once I started looking at graduate schools that I wanted to stay in the area. Fortunately, upon my acceptance to Clemson University, Dr. Elizabeth Baldwin contacted me about joining the Conservation Social Science Lab. I currently look at recreation in the Clemson Experimental Forest, specifically bike recreation. As a gravel bike rider myself, I am interested in knowing more about why people choose bike recreation and the ways that they engage the CEF by bike.

Study Limitations

There are study limitations and threats to validity within this study. One of the major limitations to our survey data collection is the various trailheads. While there are multiple individuals able to collect data on our team, many of us are constrained on available times to survey. As students, many of us are busy until the afternoon or early evening hours; therefore, we missed data collection on the recreational users that may come in the morning time. In addition to there being various trailheads, there are uncontrollable factors that limit our data collection. For example, weather is a significant hindrance in data collection. With wet conditions, the researcher expects less recreationalist to be out to survey. In addition to study limitations, there are threats to validity. As a researcher that personally recreates in the CEF, I have my own biases attached to the Forest as well as its perceived health impacts.

The validity may also be threatened by evaluation of wellness. This research is not psychologically focused, nor does it have a control group to compare to. We also have no way of knowing if those interviewed for the research understand wellness. However, our study does take those factors into account by looking at users perceived wellness. While the research has taken the wellness factor into question, it still serves as a threat to validity.

Another threat to my research validity that may be faced is how our undergraduate survey data collectors are approaching and presenting the research to participants. For example, some researchers are explaining that the information is for general research, whereas, other people are presenting it as an issue of saving the forest. People react differently when they feel an area or something they use is threatened. This may affect participation in the survey and provide a difference in answers since people are participating with a different lens than based on what the survey was contextualized.

CHAPTER TWO

Understanding the Complexity of Bike Recreation in a University Forest: The case of bike recreation growth in the Clemson Experimental Forest

Abstract

Since the advent of the Mountain Bike in the 1970's, forest and wildland recreation by bike has been growing as a form of exercise, competition and generally a form of wellness and connection to nature. Management related to bike recreation has traditionally characterized this group as one segment of users. As more areas are being developed and existing areas are growing user groups related to bike recreation, the differences in types and ways that people engage in bike recreation is evident yet seldom mentioned or measured. This research will focus on an area that has seen much growth and change in biking in a forest environment associated with a major public Land Grant University, Clemson University. The Clemson Experimental Forest is a 17,000 plus acre multiple use forest managed by the University and is used for many types of recreation by the University affiliated population and the community in the region at large. While originally slated to be used as area for demonstration and teaching, the CEF today is also a hub for recreation. While not the CEF was not initially designed to a hub for bike recreation in the Upstate of South Carolina, it has grown to be. From group use to individual use, gravel bikers to mountain bikers, the CEF is now a well-known bike recreation area seventy-one surveys were collected and twelve decision leader interviews conducted in an effort to build knowledge about the complexity of the bike recreation in the CEF and how it has changed overtime and why the changes have occurred, as well as

data on the varying types of ways people engage in recreation by bike in this setting. Other important factors emerged from this study such as issues regarding safety, identity building, and social justice. This thesis chapter is written in the format of a journal article to be submitted to the *Journal of Outdoor Recreation, and Tourism* (JORT). It is formatted in accordance with JORT articles submission guidelines.

Keywords: Biking, Recreation, University Forest

Management Implications: For management in a multiple-use area like large university forest, a balance between the timber extraction, recreation, and research is hard to strike. With many University Forest plans drawn before the advent of the mountain bike, they do not include management for recreation such as mountain biking. Bike recreation groups in this setting tend to be highly organized, and have a strong sense of community. Working with these groups as partners may prove more successful, especially when multiple avenues for communication are used and they can help support management objectives.

Introduction

Bike recreation in natural areas started on Mt. Tam in the 1970s and has been on the rise in the United States ever since that time (Cordell, 2012). According to the Sporting Goods Manufacturing Association (SGMA), mountain biking participation levels "...increased over 100 percent between 1987 and 1989, from 1.5 million to 3.2 million total days" (SGMA, 1991), and is now considered one of the fastest growing recreational activities in the world (Hill and Gomez, 2020). With an average of 95 rides per year, for International Mountain Biking Association (IMBA) members, mountain

bikers are often committed to their sport and note a variety of motivations from exercise to enjoyment (Cordell et al., n.d.) For many, bike recreation plays a significant role in their day-to-day life with some riders saying that they "...[mountain biking] 'said a lot about who they were' and even that their life was 'organized around' mountain bike riding" (Wilkes-Allemann, 2017.)

Understanding recreationalist motivations and concerns is crucial for managers. Yet, many studies results, "...highlight how many protected agencies are still playing 'catch up' with demand, preferences and diversification of mountain biking in terms of policies, facilities, on ground practices and planning" (Leung & Pickering, 2016). In a study in 1993, managers of forested natural areas reported having extensive to moderate use of their area by mountain bikers, but with no management plans specifically targeting that group (Chavez, 1993). Multiple-use forested areas that accommodate a variety of recreation users, and typically also manage timber for extraction. Many forest plans were developed before much mountain bike activity was taking place (Cordell, 2012; Wilkes-Aleman, 2017). University forests have become an area where uses beyond the original objectives are creating a complex set of management challenges (Straka, 2010).

While stress in college students and adults is rising, many are looking for a way to restore mental fatigue (Kaplan, 1992). The American Institute of Stress reports that nearly "43 percent of adults experience adverse health conditions to acute or chronic stress (2002). College students are particularly prone to stress, and left unaddressed students are at risk of developing mental health disorders and unhealth coping mechanisms (Stowell et al 2019 and Pariat et al., 2014). Today, literature surrounding the

importance of access to natural spaces for individual wellness is growing. A significant component of access is proximity. In 2003, a study found “living in a green environment was positively related to such health indicators as levels of stress and amount of physical activity” (de Vries et al. 2003).

A major forest landowner in the US are colleges and universities. Out of 46 Universities with schools of Forestry, only three do not own a school forest (Coleman et al., 2020 and Burkhardt and Straka, 1988). Most of these forests were purchased or donated to the institutions long before mountain biking was in existence as a recreation activity. These areas also have largely been focused on teaching, research, and demonstration, with recreation being more of a byproduct of the area (Straka, 2010 and Coleman et al., 2020). Yet, with over half of these areas in close proximity to a college or University campus, they are a natural setting for the growth of bike recreation, specifically mountain biking.

In the 1930’s, as part of the nationwide re-settlement act, Clemson University became the manager of 26,000 acres of land. They would grow a forest and a forestry program, now at 17,500 acres of green space, covered in forest roads and trails that are used for research, teaching and recreation of all types that deliver on the mission to promote the social asset of the place and provide a benefit to the citizens of South Carolina. The mission of the Clemson Experimental Forest is,

“The prime directive for the forest is to be a well-managed, self-sustaining, ecologically healthy, living laboratory, classroom and recreation resource for the benefit of the university, commerce and

citizenry of South Carolina, vouchsafed with a mandate to protect and promote in perpetuity the forest as an irreplaceable educational, environmental, scientific, and social asset”
(Clemson.edu/public/experimental-forest.com)

The CEF is a five to fifteen minute drive from campus, and half is north of the campus and half is south. On any given day, one can go out to the north or south forest and see various recreational pursuits taking place. However, there is little data behind recreational use in the Clemson Experimental Forest. In 2013, a report entitled *Clemson University Experimental Forest: Project for Environmentally Sustainable Trail Management*, Becco and Hallo identified user demographics, user frequency, and their concerns regarding the north forest (2013). Two findings from this study were that mountain biking was the primary recreational activity at 52% of users surveyed and also interesting was that 45% of respondents had no affiliation to the University. The current use of the CEF is anywhere from individual to programmatic use, novice riders on a department store bike to competitive riders with thousands of dollars worth of equipment. In addition, there is no data surrounding the visitor experience or the importance of the role the CEF plays in the Clemson community or the surrounding Upstate of South Carolina. The University, adjacent to this large natural area and in a rural setting makes for an excellent site to study the growth and issues related to bike recreation in the forest.

The purpose of this research is to both understand the context of the use and values associated with the Clemson Experimental Forest (CEF) and how that has changed over

time in relation to experiences people have with the area on bikes and those managing the area. Specifically, I will address the following research questions:

RQ1: What is the perception of change to bike recreation in the Clemson Experimental Forest?

RQ2: What are the different ways in which people engage with the Clemson Experimental Forest by bike and what is the meaning of these experiences?

RQ3: How do bike recreation decision leaders characterize the future of bike recreation?

Research Site: Clemson Experimental Forest

This research seeks to take an item often found on a recreation user survey, bike, and explore that one item in depth. Although there are many other ways people recreate in large forested natural areas, the growth and changes associated with bike recreation are notable (Chavez, 1996). The use of bikes to experience the forests of the Upstate of South Carolina has been studied only as part of a large survey, and has not been examined in this area specifically.

The Clemson University Experimental Forest was established during the Great Depression (Sorrells, 1984). At 17,500 acres of land, the history of the forest in South Carolina runs deep. Serving as a beacon for scientific research since the 30's, the CEF has been the site to various studies from forestry, stream ecology, to recreational use and impacts (Baldwin, 2019). In addition to academic pursuits, the CEF is used for timber extraction and sales (Straka, 2010). For people in the area, the Forest serves as an important space for them- it is even anecdotally the reason some professors decide to come and teach at Clemson University. The University forest serves as an excellent

setting because it provides an opportunity for a diverse set of users to recreate in the area, from local community members, and members of the University from students, faculty, and staff. Our research seeks to better understand not the Forest, but the user. However, having a base understanding of the Forest is important.

The Clemson Experimental Forest is broken up into two main sections: The Northern Forest and the Southern Forest. The South forest is a typical southern piedmont environment, while the north forest provides more elevation change since it is a foothills environment. From timber extraction to forestry management, the Forest has many purposes for the University and the greater community (Sorrells, 1984). It has two local schools that back up to the forest, and they use the roads and trails for the cross country team, as well as the environmental club. University classes use the Forest as an extended field based classroom and a site for research projects. There are also community groups that engage with the forest on horse, bike, running, through hunting and walking.

Methods

The purpose of this research to both understand the context of the use and values associated with the Clemson Experimental Forest (CEF) and how that has changed over time in relation to experiences people have with the area on bikes. In order to understand the recreation that occurs in the Clemson Experimental Forest and its growth, an explanatory design-participant selection model was used to answer three main questions (Creswell & Plano Clark, 2010). This will be done by first conducting a survey for an overview of the phenomenon of study and use this to identify key informants and issues.

The interviews with key informants and managers address both the results of the survey and more importantly the details of change in bike recreation in order to answer the following research questions:

RQ1: What is the perception of change to bike recreation in the Clemson Experimental Forest?

RQ2: What are the different ways in which people engage with the Clemson Experimental Forest by bike and what is the meaning of these experiences?

RQ3: How do bike recreation decision leaders characterize the future of bike recreation?

Survey

To collect our data from current forest users, the team wrote a survey with questions that would provide demographic data, recreational usage, and use frequency along with some open-ended questions related to topics like safety, conflicts and motivations. Before conducting the research, a proposal was sent to Institutional Review Board (IRB) in order to ensure ethical research with human subjects. All researchers and data collectors passed and received IRB certification before conducting survey collection. The research team is comprised of a faculty advisor, one PhD student, a fellow Master's student, and eight undergraduate students.

The questions within the survey were open-ended for the participant to complete or ask the participant to circle a time of year or a numerical range. The researcher chose to have open-ended questions to allow for respondents to potentially provide responses that were not anticipated unlike simply checking a box from a list of assorted response

options. The survey data collection began in March 2019 is ongoing to supply continued data on forest recreation in the CEF. This study uses surveys conducted from March 2019 to January 2020. The survey is three pages long and took approximately ten minutes for the participant to complete. The surveys were conducted in both the North and the South sections of the CEF at popular trail heads identified by managers, for all recreation users except hunters; therefore, we currently do not have reliable numbers on hunters. In order to ensure a diversity of user groups, data collection was conducted in the morning, afternoon, and early evening hours on weekdays and weekends. By collecting at various trailheads within the CEF and differing hours, the researcher expects to collect data beneficial in establishing a framework for readers through descriptive statistics.

Survey Data Analysis

Once survey data was collected, the research team input the responses into a Microsoft excel spread sheet to run descriptive statistics. For the purposes of this research, analysis of user activity, affiliation, and years of use to provide a snapshot of users at the manager reported high use trail heads. This can provide a snapshot of trends that can be helpful for future studies, it also provided data to examine in the interviews related to safety, and group affiliations. Once pertinent data was identified, the researcher also identified information rich sources that agreed to participate in interview portion of the study (Patton, 1990).

Interviews

The researcher identified decision leaders by those who indicated willingness for an interview in their survey and those whom identify themselves as a group or

organization leader that utilizes the Clemson Experimental Forest (CEF) specifically related to bike recreation. The researcher also identified and contacted forest management decision leaders for interviews in an effort to examine all angles of bike recreation in the CEF. Interviews were conducted from November 2019 to March 2020, once saturation was found. Eleven decision leaders were interviewed that represented manager, university, business and local bike decision leaders.

The researcher used a semi-structured approach (Seidman, 2012). The interviews lasted anywhere between an hour and a half to three and half hours. While most interviews were conducted in a traditional one-on-one format, some interviews were conducted via email or group interview due to scheduling conflicts. The researcher had a sample size of $n=7$ for the recreationalist decision leaders, as well as a $n=4$ for University decision leaders involved in forest management from 1958-present day. The questions asked of the interviewees covered three main focuses: focused life history with bike recreation, details of the experience, and reflection on meaning (Seidman, 2012). The questions regarding focused life history look to understand the interviewee's history with the Upstate of South Carolina, their history/relationship with the CEF, and their group or organization's experience with the CEF. Next, our questions regarding perception of experience focus on what their experience in the CEF is like and how they perceive the management of it to be.

The researcher conducted all in-person interviews with at least one fellow interviewer for reflexivity and peer debriefing. The interviews were recorded and transcribed by one of the two researchers to conduct analyze on the interviews. All

interviews were anonymous and confidential, and all interviewees were given a code name during transcription. The researcher intended to identify a diverse group of decision leaders to represent the various age groups, bike recreational pursuits, and ethnicities that utilize the CEF. To be considered a recreation decision leader, individuals identifying and interviewing decision leaders, individuals had to have been recreating in the CEF for more than five years. I began my decision leader identification with individuals that identified willingness to be interviewed in the survey and continued interviewing different decision leaders until saturation of names. The researcher was able to identify themes related to current trends, motivations, and concerns for recreational users.

Interview Analysis

Once the interviews were conducted, the interviews were then transcribed and coded. Coding the transcribed data allowed for the researcher to identify common themes among the interviewees and better evaluate the collective experience of the participants and assess data for ability to answer research questions as well as other pertinent information related to bike recreation in the CEF.

Reliability and Validity

An important part to qualitative research is a trustworthy researcher which involves having reliability and validity practices throughout the research process (Rose and Johnson, 2020). The researcher exercised reflexivity throughout the interview and analysis process. During the interviews, the researcher exercised partial member checking and being careful to not offer leading questions to best ensure data validity (Creswell, 2018). In addition, a reliability technique practiced was having fellow members of the

research team transcribed some interviews to provide comparative data and discuss theme development. This aided our practice in reflexivity by allowing peer debriefing (Rose and Johnson, 2020). During theme development, the researcher ensured that the themes were clearly defined to provide consistent findings and presented to the research advisor (Rose and Johnson, 2020 and Miles et al., 2014).

In order to align with best practice in qualitative validity, it is important for the researcher to recognize and express their own social markers (Rose and Johnson, 2020). As a white female from an upper-middle class household, I've have not faced many barriers in the field of recreation. While socioeconomics and time have not been a barrier for my personal recreational pursuits, there are less females presented in the field of outdoor recreation than males. However, through peer briefing and other reflexive techniques, I have tried to mitigate the influence of these biases.

Results

The research sought to better understand the user, not the CEF. In order to better understand the user, a basic knowledge of user's recreation activity, University affiliation, and years of visitation, are important to understanding the context of use and values user associated with the CEF. To provide this framework, the following findings emerged during data collection.

Survey Findings: The survey findings provide a snapshot of different trailheads throughout a full year, and support manager perspectives on users and issues. It provided information to explore with interviewees and presented issues we may not have thought to ask. Three findings from the survey were of interest to examine in the interviews.

First, mountain biking is still a primary activity for recreational users in the CEF at the most popular trailheads, with 45% of the sample participating in a recreation activity by bike. In addition, 61% of the users in the sample had no affiliation to the university. The surveys show us the breadth of time the users have been recreating in the CEF. While a majority of users fell in the 1-10 year range, 14% had been visiting and recreating for over 20 years in the CEF.

Category	Number	Percent
Activity		
Biking	30	45%
Hiking	13	20%
Horses	12	18%
Trail running	11	17%
Affiliation		
Student	15	21%
Associated non-student	13	18%
No association	43	61%
Visitation Years		
0-10	48	68%
10-20	13	18%
20-30	6	8%
30-40	4	6%

Table 1.1: Activity, affiliation, and visitation years , n=71, 66, and 71, respectively

In addition to findings regarding users activities, through interviews and surveys, the survey research was crucial in our efforts to identify groups that utilize the CEF for bike recreation. The groups are listed below:

Group	Group Description
Anderson Mountain Biking Club	A school age biking group for middle and high school students.
Clemson Cycling Club Team	University club sports team that utilizes the CEF for practice and recreation
Greater Clemson Mountain Biking Club	Local club with over 400 members responsible for volunteer trail maintenance
Interscholastic South Carolina Cycling League	State chapter of National mountain biking league- the Upstate team utilizes the CEF for practice
Piney Mountain Group Ride	Informal riding group from Greenville, SC that utilizes the CEF primarily in the winter
South Paw Group Ride	Local bike shop that host weekly group rides in the CEF on Wednesdays
South Paw Night Ride Group	Local bike shop ride that host weekly group rides at night during the winter
South Paw Women's Ride	Local bike shop ride that host a weekly gender specific group ride in the CEF on Thursdays
Upstate Family Orientated Recreation and Therapy (FORT)	Community organization committed to fostering skills, empowerment, empathy, and connection in the Upstate South Carolina region through recreational programs and mental health therapy
Little Girls Ride-modeled from the national Baby Bella group	Monthly group ride that utilizes the CEF to teach and empower young girls through mountain biking

Table 2.1: Bike recreation groups and description

Interviews Findings:

From the coding, five themes were developed, by the primary researcher and then these were examined with two other researchers involved in the interviewing and transcription for discussion based inter-rater reflexivity. After this was done the following five themes were developed and will be discussed and supported below:

1. Bike Recreational Growth- a product of a growing sport and how it is perceived.
2. Pay to Play- timber does not have to be the only currency of the CEF.
3. Perceived Safety- users concerns regarding physical and emotional safety in the CEF.
4. Community- a space to gather and learn.
5. Identity/Escape- a space for personal growth and well-being.

The following sections provides data supporting these five themes and implications for Forest management and University decision makers.

Theme 1: Bike Recreational Growth—a product of a growing sport and how the forest is perceived.

Decision leaders noted that not only had bike recreation in the CEF grown in the last ten years, but that they believe that it will continue to grow. From individual use to group use, the number of recreationalists appears to be growing. The following quotes from decision leaders in the recreation community and forest managers demonstrate their feelings:

“The bicycle thing is a fad I thought would stop, but it is growing.”

“I do see an increase. Now, on a pretty day, I don’t think you can go out without running across multiple people. Especially in the center of the [North] Forest.”

“So, going away and coming back, and ever since it’s gotten some organization, we’ve seen more and more people using it because they feel comfortable to go there. The reputation of the Forest has changed’

In addition to a perceived growth in the number bike recreationalist in the CEF, decision leaders also noted an anticipated growth in types of bike recreationalist and the management implications:

“We will see challenges as new user groups such as E-bikes vie for the same resources and only time will tell if this will be good or bad. In the past I have spoken with land managers from Pleasant Ridge County Park, Paris Mountain State Park and Dupont State Forest and have been told that these areas do not allow E-Bikes on their single track trails. I know folks are riding them there but if the no e-bike regulations were to be enforced they may all get driven to CEF which could potentially be an issue but the other side of that is of the places I ride I think CEFs the least E-bike friendly in terms of how tight the trails are. Historically land managers have taken efforts to keep trail speeds down but now it seems the advocates of bike park style trails have been getting their way. I would love to see the trails at CEF very much as they are now in another ten years.”

“And Electrical bikes, which if you think about accessibility, is really exciting to open to other populations. We definitely integrated into those experiences; you have to teach people how to bike. You can’t assume because they know how to ride a bike, that they know how to mountain bike or that they know how to adjust to the terrain- so that brings me back to Issaqueena, which is not a place you easily go into because it’s changing all the time, because it’s an active forest that is being used for forestry... I think that is really significant and different in this forest that you have to have an appreciation for it as a utility and an agricultural area.”

With the emergence of different types of bikes, like electric bikes, access to the outdoors- for those able to afford it- is only increasing. As noted in a previous statement, this can have major implications for the trails within the CEF. The University could follow actions taken by other recreation lands and provide regulations for electric bike; However, with the lack of a recreation manager or any recreation specific position, those regulations would have to be self-enforced.

Increased bike recreational use in the CEF and diversity of bikes being ridden brings about considerations for managers and University decision makers. As traffic in the CEF seems to increase, what precautions need to be taken for risk management? The bike groups have been managing the trail names in the North Forest and this was noted as an issue by the managers and users. One recreationalist decision leader noted:

“...from a rescue standpoint, is the names at Issaqueena- it’s confusing for any kind of rescue squad. So, Frant’s Grove, the reason you go down there and things are listed like A12, B1- Personally, I don’t think you could get rid of the names at Issaqueena without creating problems there- it’s kind of what gives character to the trails. But, I do think they could add whatever quadrant or section that is on there to make that easier...”

With a perceived increase in the numbers of users from bike recreation leaders, there is an increase in the number of potential accidents. With inconsistent trail signage, users may be at a higher risk of getting lost and can make it potentially more difficult for those needing assistance to be found than other recreation areas with consistent signage and maps. Ultimately, as the CEF becomes a hub for recreation, the diversity of bike recreationalist may have impact to the trails system, visitor experience, and overall management.

Theme 2: ‘Pay to Play’—timber does not have to be the only currency.

Recreational decision leaders understand that the CEF is an active forest-supporting itself through timber harvest. *“...I know that the logging- the Forest has to pay for itself. It has to be self-sustaining, so they harvest the timber for it. I’ve always none that is the priority of the Forest.”* Knowing that the harvesting is the main objective of management, recreation leaders noted that another way to support the CEF, “pay to play.” Decision leaders noted no objections to paying a fee to recreate in the Clemson Experimental Forest. However, only if the management began to provide the trail work

and management that is currently done by volunteers. The following quotes of support demonstrate that sentiment from recreational decision leaders:

“I think if you if feel like you’re getting something back out of it, it’s not as big of a deal. I think it would be a system shocker to the community, initially, because you are use to having free range and access. But, if you start having better trails or facilities, and they’re maintained, and they’re not just relying on volunteers to be out there- there’s actual efforts to maintain the trails and have everything be very user friendly- and they’re making it inviting. Then, I think that kick-back will settle down and it becomes the norm and that’s fine. I think what you’re really charging, and you’re not really seeing a difference- you’re getting the same trails, same experience out of it- what are you paying for?”

“Yes, if I really needed to keep this resource in our community. I would pay some fee but not an exorbitated fee. That would piss me off. But, yes, I would make that concession that maintenance of the Forest requires paid people. With that said, nobody from the forestry department is out there managing or maintain trials. It would have to be financially beneficial...But, as far as maintaining- If you’re going to tell me there needs to be a fee, are you going to managing the trails?”

Of the five themes, the idea of a recreational user fee would be a change in the model of what gets monetized. If the CEF was able to support itself with funds outside of timber harvesting, this could open a new realm of opportunities for recreation, education

and other social assets for the citizens of the Upstate of South Carolina. The Clemson Experimental Forest Management Plan states that “Management of forests for multiple renewal resources has often been called multiple use management. Timber, water, recreation, wildlife, esthetics, clean water, and clean air are some of the useful products with well managed forests” (2013). However, with limited managerial resources, the University is only profiting and leveraging one product in the CEF: timber. By looking at recreation as a leverageable product and resource, the University could truly be a multiple use forest.

While looking at the “pay to play” model as a potential option for management to leverage and profit from recreation in the forest, one decision leader noted the need for the impoverished to be allowed free access to the CEF:

“...Coming back to social justice, I would want to know that any kid that qualifies for free or reduced lunch, they do not have to pay a fee. You know, their family is somehow connected to- You know, our biggest concern in Pickens County is poverty. The average income is like 37,000 dollars, 1 in every 19 kids go to bed hungry.”

If looking to adopt a recreational fee, University decision leaders and forest managers should take social justice and financial barriers into consideration. While many in the outdoor community can afford to pay a recreational day use or yearly fee, this could discourage use of the resource by underrepresented groups. In addition, University decision leaders and managers should consider waving fees for Clemson University

students- potentially allocating a part of their University fees to support the Forest- further leveraging it as an asset to not just the community, but to future students.

Theme 3: Perceived Safety—users concerns regarding their physical and emotional safety in the CEF.

A concern to many, issues regarding safety and wellbeing was continuously noted by 81% of recreational decision leaders. From issues surrounding women feeling uncomfortable, to reckless driving, and difficulties in trail navigations; the concerns surrounding safety and wellbeing among decision leaders is vast. The following quotes convey the concern of recreational decision leaders and are organized by subheadings:

Sexual Harassment:

This was something that was the most surprising to the team and an explanation why many women tend to be in groups. It may also explain why young women typically stop activities related to forest recreation in the teen years, as noted by an interviewee, and thus the focus of the little girls ride. The University has a duty to keep the campus safe and that includes the greater campus of the CEF.

“I have heard stories about men making sexualized comments to women who are biking alone in the Forest or exposing themselves to women who are riding alone in the Forest. So, I think that definitely has been scary for some women and they won’t ride by themselves, as a result.”

“There are some people that have been out there that I just don’t think need to be hanging out in the back of the woods- making people feel uncomfortable when you’re riding by.”

Reckless Driving:

There are times of the year where some key forest roads are opened up to give more access to trailheads and also allows for people to engage in more traditional recreation activities of picnics and campfires in the shelters and at the lake. The access to the forest roads also gives drivers the same place to drive that people are biking, walking and running. This has caused safety concern that came up in the survey and more in-depth with the interviews.

“Generally, the Forest feels very safe, I think that most people would say that it does. To me, right now, it’s seasonal use to the fire roads or the gravel roads out there. I think if those were close to vehicle access year round, I think that makes it a lot safer. I’ve been out there when the SWU track team was out there running and people were in truck revving the engine and driving up on them. And again, you talk about having kids and things out there, you’ve got these trucks- which are mudders- that are doing stuff...From a safety and security perspective. Unless you’re an emergency vehicle or with the University for a class or something, I just don’t think that there needs to be regular access.”

“The Lake Road being open presents a lot of hazard and risk during our mountain bike season. The day that Lake Road is closed off, we are like, “Yes!” It’s the one time all season that we do not worry about our kids being hit by a car. It’s my biggest concern for safety in the forest is that there are wingnuts that come flying down that road in the 4x4 vehicles and don’t consider for a second that a rider might pop out of the woods at any second when their car is going by at 40 mph”

Navigation:

Navigation is a problem for many users, probably most noted by bikers and runners because they can get farther away from the trailheads quickly. The trail map supplied by Clemson University does not have trail names, and the trail names can change depending on the efforts by the Greater Clemson Mountain Bike Club that pays for and maintains trail signs in bike popular locations of the forest. The trails are also found on popular apps like All Trails, and the network of trails marked, short cuts and social trails, with logging operation trails makes for difficulty of navigation and the possibility of being lost. The following quote highlights the finding that women are likely to bike in groups, but also speaks to the navigation challenges and the barrier to experiences that it creates.

“I did a women’s clinic last year and 5 of the women that signed up said that they signed up because they don’t know Issaqueena- and they felt like this would be a way to learn Issaqueena. They live in Greenville, so they know it’s a resource and want to be able to come and use it from Greenville, but they don’t feel comfortable, confident, or competent, in navigating it.”

With nearly 45% of users having no connection to the University, for many, the Forest is the face of Clemson University to many experiencing the trails and forest roads. The experiences of the recreational leaders may, and is likely, the experience of other recreation users of the CEF. Feeling physically and emotionally safe on University property should be at the forefront of decisions made by University decision leaders and forest management.

Many management implications can be made from this information regarding safety and wellbeing. First, two of the concerns regarding safety could be lessened with one action: leaving the Lake Road gate locked year-round. By locking the Lake Road, the concern around reckless driving is nearly resolved. The University should have a fixed gate for classes, projects, and emergency vehicles to still access the resources located along Lake Road; however, should look at alternative ways in which individuals can reach the resources for recreational use. In addition to practically eliminating the reckless driving noted in the interviews, it hopefully restricts the number of people down there making people feel unsafe. Now, individuals would have to walk, run or ride by bike or horseback to access the beloved places like Wildcat or the picnic shelters. While frustrating to some recreationalist, this would aid in keeping individuals from lurking and making others feel uncomfortable.

Theme 4: Community—a space to gather and to learn.

While the Forest may be becoming a hub for recreation, it is also becoming a hub for community. For many, their time in the CEF is much more than time spent in nature.

Time spent in the CEF is time for connection to others and community. The following quotes provide data to portray that sense:

“You know, we do it for community. It’s our group of friends and family- when we’re out there, that’s our social time.”

“When I am there [the CEF], and think about if the bike is important, I often times give gratitude- Thank heavens for these bikes because if it wasn’t for this, I probably wouldn’t see you today or crossed your path- it’s that social vehicle.”

While much of that community is organic in its formation by frequent riders, for others, it is more curated. Different cycling shops, organizations, and recreation groups across the upstate come to the CEF to facilitate community through bike recreation. While unorganized group rides are often comprised of individuals that happen to meet weekly to ride, organized group rides often have objectives like education or providing a comfortable space for others to learn new skills.

“There’s not enough other women in the sport. My answer to that was the girl’s ride. We will build a community from such a young age that it is just an assumption that you belong in that community.”

“Then, I think for us a lot with the group rides is, there is a large educational component. To educate the community and share that passion and help them be

passionate about getting outside and enjoying what we've got around here. So, understanding the right tools and equipment that they need and try to understand the rules and etiquette of the trail, and what tools you need in the forest, and how to navigate around- it's a big part of what we do or what we want to focus on."

Focused on community, education, and service, these organized groups provide an important resource to the Clemson community. Groups like South Paw and Upstate Fort provide space for individuals to learn new skills like technical cycling, Leave No Trace Principles, and trail etiquette. In a multiple use forest, with hikers, bikers, and horses, this type of education can help to prevent trail erosion and user conflict. In addition to the organized group rides, there are organized groups that provide service to the CEF. The Greater Clemson Mountain Biking Club, with 490 Facebook club members, provides nearly all trail building and maintenance to the trail system. The group leaders have built a community, centered around recreation and stewardship, and have put in over 3,000 hours of trail service like clearing fallen trees and cutting encroaching growth.

The CEF brings community together to enjoy where individuals live, work, and play. A great asset to the Upstate of South Carolina, it is important for forest management and University decision leaders to know the impact that the CEF has on individuals. For some recreational decision leaders, it is what holds them to Clemson itself: *"We've had the conversation recently that if the University up and decides to sell off parts of the Forest, would we still want to live in Clemson? And for us, we would need to move. We'd*

lose such an asset that is some important to us in terms of our day-to-day life that we would move.” The community, the access, it is all a part of why people ride. As the University continues to grow and make decisions surrounding the CEF, and its recreational access, it is important for decision leaders to understand the value the CEF holds to so many.

Theme 5: Identity/Escape—a space for personal growth and well-being.

A hub for recreation and community, the CEF and bike recreation serve as an integral part of interviewee’s individual wellness. Providing a space for people to “*escape the daily grind*” and feel “*empowered*” through technical skills, bike recreation in the CEF is more than just biking- it’s a space of refuge. The following quotes provide data to support this finding:

“The bike, for me, was the reminder of who I was because my identity became patient. My identity became a number, or a diagnosis...Being able to keep that in my life, grounded me in who I am and reminding me not to let that be defined by my specific, and hopefully temporary circumstance.”

“Dirt Church. That’s a big part of it...The reason I mountain bike, personally, is the sense of escape, identity, the idea of being away, and going into the woods”

“It’s kind of cool to have that there- that close to us. That’s a big thing- I’ve been all over the place and a lot of places you go to don’t have trails or, if they do, it’s a 5 mile loop and they’re figuring out which way they want to ride it that day. So,

to have something that you can access that quick, that easy, and you can do multiple things in there too. You can go run, you can go hike.”

“If I have what Clemson is to me, it’s that- that’s my tradition. [The CEF] That’s my space that makes it beautiful. I’m no different than anybody else who favors Tiger Town- I just favor Lawrence Trail.”

The University decision leaders and forest managers need to know the impact that the bike recreation has in the lives of Clemson community is important. To know how important individuals find the resources and access to the CEF to be is necessary for all future decisions. As one bike recreational leader said, *“There won’t be another University to create what we have... “What would it be like if you could really get the decision leaders on this experience where this was, perhaps, their favorite currency?”* Having a large area of public forest with open access is special, and its recreationalist recognize that fact. Recreation leaders are willing to pay to pay, move if needed, to have the recreational access the CEF provides. University decision leaders should take this, and other, recreational groups into consideration when making decisions regarding the CEF. When looking at the future of the CEF, maybe recreation and wellness can be the future currency of the forest.

Study Limitations

There are study limitations and threats to validity within this study. One of the major limitations to our survey data collection is the various trailheads. While there are

multiple individuals able to collect data on our team, many of us are constrained on available times to survey. As students, many of us are busy until the afternoon or early evening hours; therefore, we miss data collection on the recreational users that may come in the morning time. In addition to there being various trailheads, there are uncontrollable factors that limit our data collection. For example, weather is a significant hindrance in data collection. With wet conditions, the researcher expects less recreationalist to be out to survey. In addition to study limitations, there are threats to validity. As a researcher that personally recreates in the CEF, I have my own biases attached to the Forest as well as its perceived health impacts.

The validity may also be threatened by evaluation of wellness. This research is not psychologically focused, nor does it have a control group to compare to. We also have no way of knowing if those interviewed for the research understand wellness. However, our study does take those factors into account by looking at users perceived wellness. While the research has taken the wellness factor into question, it still serves as a threat to validity.

Another threat to our research validity that may be faced is how our undergraduate survey data collectors are approaching and presenting the research to participants. For example, some researchers are explaining that the information is for general research, whereas, other people are presenting it as an issue of saving the forest. People react differently when they feel an area or something they use is threatened. This may affect participation in the survey and provide a difference in answers since people are participating with a different lens than based on what the survey was contextualized for.

Conclusion

Mountain biking is a growing sport that many bike recreation decision leaders believe will continue to grow in the Upstate. Survey data shows that mountain biking is still the primary activity in the CEF, and over 60% of users have no affiliation with Clemson University. With the CEF being the face of Clemson for many in the community, it is important for University decision leaders to know about users perceptions and experiences in the forest. The interviews showed us that recreational decision leaders believe that bike recreation has grown in the CEF, and that recreation decision leaders do not believe that is slowing down. While recreation is not the traditional currency of the forest, recreation decision leaders are not opposed to paying a fee to have access to the trails. However, recreational users noted that if the University to decide to institute a user fee that they would expect more trail maintenance and facilities to be available.

As perceived user growth in the CEF continues, University decision leaders should expect more issues with safety. Recreation decision leaders expressed concerns with safety issues in the forest. From reckless driving to sexual harassment, users expressed concerns regarding emotional and physical safety in the forest. With perceived growth of users and concerns of safety, University decision leaders should be aware of the experiences that users are having and have responsive risk management. In addition, the CEF is more than just a hub for recreation and education, it is a hub for community. For many bike recreation users, the CEF is where they ride with friends and different community groups. A health outlet for physical health and social relationships, the CEF

is an integral part of recreational users lives. Recreation decision leaders noted that biking is a part of their escape for the stress of daily life, and even a part of their identity.

For forest managers and University decision leaders, this information can provide representation for recreation users as they move forward in making decisions regarding the CEF. It can also provide information regarding the vehicle for wellness and stress relief that is a part of the campus often not identified to students. The forest could become part of the sport and athletic identity of the university which could include more people and allow the forest to become a driver for health and well-being on campus. It is also another nexus of meeting between the university population and people not affiliated with the University and imagining this as a face of the University is important.

Recreational decision leaders note that recreational use of the forest is strong, and it appears to only be getting stronger. University decision leaders have seen that strong usage and know that it can be difficult to manage. Future research could look to explore a different user groups perception of recreation in the CEF, like horseback riders, and even user conflicts group conflicts. This study provides a representation of bike recreation users perceptions and experiences with the CEF as a starting point for future research.

CHAPTER THREE

DISCUSSION AND CONCLUSIONS

As the research shows, bike decision leaders believe that the future of bike recreation in the Clemson Experimental Forest is not slowing down. The student population also continues to grow at the University by close to two percent a year. As mountain biking continues to grow as a sport in the United States, Clemson University may expect to see recreational use of the CEF increase due to both the university and the sport growth. Maybe once a hidden gem nestled close to campus, the CEF is now believed to be by recreational users a hub for recreational pursuits happening alongside classes, and research sites and with timber harvesting. The research came to understand these perceived changes at multiple scales.

Temporal Scale

After mountain biking made its way to the east coast in the mid-1980's, biking the CEF slowly began to emerge. Looking to expand where they could ride, bike recreationalist wanted more trails. From 1996 to 1998, approximately 1000 hours were put into trail creation and trail maintenance. However, the bike recreationalist was often met with pushback from CEF management. Forest management at the time believed that, "...trails should take you to a destination", but for many in the emerging mountain biking community it was more about the journey. In 1998, 60 people in the CEF biking community decided to form a group to work with forest management and begin building more trails. This group called themselves the Greater Clemson Mountain Biking Club

(GCMBC). Of the group, 25 of the members were in responsible for trail building and current trail maintenance.

Today, the Greater Clemson Mountain Biking Club has 490 Facebook members. This volunteer group is still backbone of the trail maintenance and trail building in the Clemson Experimental Forest. However, the group has had to develop new ways to share the brunt of trail maintenance. With the adopt a trail program, different groups or individuals are taking the charge of trail maintenance in their respective area. With much of the recreational trail maintenance falling to the GCMBC, all recreation groups in the north forest benefit from their time and dedication.

Social Scale

As trail maintenance has improved and miles increased, organized and unorganized groups are utilizing the CEF. With ten bike recreation groups noted in this study, there are likely others that did not emerge in this research. A hub for community and recreation, groups are blending the two to make a hub for recreation education. From night rides to youth cycling teams, groups are organizing around bike recreation to teach technical skills, Leave No Trace, and interpersonal skills.

While social communities appear to have a strong in the CEF, there are groups that face complications with the remoteness of the CEF. For example, the Little Girls Ride is actually based off a national organization called Little Bellas. Little Bellas looks to empower young women, ages 7-16, through mountain biking and female camaraderie (littlebellas.com, 2020). However, Clemson is unable to be an official chapter due to the lack of facilities on the premise. This is not the only group that impacted by the lack of

facilities. While another thing to maintain, some recreationalist may impacted by the lack of facilities, causing a potential barrier to recreation.

As the CEF continues to grow as a hub for community and group users, University decision leaders should consider the impacts that come from a lack of facilities. While it may discourage some from recreating in the CEF, interviewees noted that it places others in an uncomfortable spot of having to expose themselves if needing to use the restroom. Disproportionally, interviewees noted that this affects women and children more their male counterparts due to biological differences. The lack of facilities is an issue that was only brought up in interviews by female decision leaders. University decision leaders should consider how this impacts women's participation and utilization of the CEF.

Spatial Scale

With numerous access points spread across 17,000 acres, the CEF is rather accessible to the public. The perceived growth in popularity of the CEF has meant more people accessing the popular trails, but also some of the less well known. One of the reasons for this may be due to technological advances. Strava, an GPS activity tracking social media platform, is often used among bike recreationalist and runners. Individuals track their activity, and then publish it to a feed of followers once complete. Social media followers of that individual can then see where all that individual has gone to ride, and even follow their previous path or publishing users rides. Other websites, like Mountain Bike Project, also make it easy to find new spaces to explore in the CEF.

While bike recreationalist is often found riding in the north end of the CEF, interviewees noted that there are now users riding in the south forest. The south forest is more traditionally known as a space for horseback riding and hunting. However, especially with hunting in the winter season, interviewees noted, the south forest sees much more use from bike recreationalist. If bike recreation and traffic are increasing in the north forest, it is fair to assume that groups and individuals will look to spread to other parts of the CEF to ride. With potentially more groups dispersing across the CEF, managers may begin to face more difficulties in managing recreation and may see more user group conflict.

Restorative Health

For all recreation decision leaders, biking was more than just a form of physical activity. Phrases like “Dirt Church” and “escape from the daily grind” show just how much the CEF can mean to its users. The CEF for many users can be a restorative space for the mind, body, and soul. With over 40 miles of trails and access to spaces like waterfalls, the CEF is a retreat just a few miles away from campus.

With increased rates of stress among students and adults, Clemson University is not leveraging the CEF as an asset in combating mental fatigue. While other Universities own forest areas, few have the proximity and access to student body like Clemson does. However, the forest as a space of recreation and tranquility could be a new recognized currency of the CEF. Groups like the Little Girls ride and Upstate FORT are already utilizing the CEF as a space to address mental fatigue and health, as well as building empowerment and community through bike recreation. A space for individuals to gather

and to grow, the CEF is one of the greater assets to the Clemson community, and hopefully the University will see its potential soon.

Final Thoughts

This research is partially being written during the pandemic of COVID-19. With various uncertainties as the world adjust to a “new normal”, many natural spaces have seen an influx of users. Individuals are looking to natural spaces to find refuge during this time of great fatigue. Unfortunately, many places, including the Clemson Experimental Forest, have had to restrict access due to the high number of individuals seeking to spaces to recreate in. I believe that this speaks to importance of recreation and access to natural spaces. During times of great uncertainty, nature is a constant for people to turn to for refuge.

A true natural treasure, I hope that undergraduate and graduate researchers continue to study the Clemson Experimental Forest for its recreational and education use and potential. I believe that there are various future research opportunities that can be derived from this study including: qualitative studies on other forms of recreation like horseback riding, user group conflicts and how they have evolved over time, and looking more in depth at women in the sport of mountain and their role in CEF recreation.

APPENDICES

Appendix A

Qualitative Instrument

Clemson Experimental Forest Bike Recreation Interviews

Start recorded interview with an introduction from one interviewer. EX: Today is (DATE), and we are here with (NAME OF INTERVIEWEE). Thank you again for agreeing to talk with me (us) today about your own experience and knowledge of bike recreation in the Clemson Experimental Forest (CEF).

- Life History with topic area
 - How long you have been biking or recreating in the CEF?
 - How did you get your start biking in the CEF and specifically how did you come to know it was available to you?
 - Do you live nearby, the CEF and does your home location determine the places you frequent in the CEF?
 - Do you recreate individually or with a group and why?
 - If in a group, what group do you recreate with and for how long have you been a part of the group?
- Description of Biking in the CEF
 - How often do you bike in the CEF?
 - Where do you bike? Where do you park your vehicle? Does this change throughout the year?
 - What have you noticed related to recreation in the CEF generally and biking specifically?
 - Have you brought others with you or introduced them to the CEF?
 - Are there other areas you use for biking?
 - Are there activities related to biking that you are involved with in the CEF?
- Reflection on biking in the CEF
 - Why do you bike?
 - What does biking do for you?
 - Do you think that biking in the CEF has changed over time?
 - If so, why?
 - What do you understand to be the history of mountain biking in the CEF?
 - How do you believe that biking has changed over time and why?
 - What do you believe is the future of biking in the CEF?

Appendix B

Questionnaire

Thank you for your participation in this survey about the Clemson Experimental Forest (CEF) conducted by faculty and students from Clemson University.

Researcher use only			
Date/Time	Location	Weather	Other important variables

Age	Gender	Race (optional)	Zip code of your permanent address	Zip code of your temporary address

1. How many years have you been utilizing the CEF?
2. What made you aware of the CEF? (Was it a person, a map, have you been going here since you were a kid, etc.?)
3. Is the CEF an integral part of your life now, or has it ever been? If so in what way?
4. Are you affiliated with Clemson University? If so, how are you affiliated?

5. If you're a Clemson University student, please fill out the following sub-questions. Otherwise, proceed to question 6.
 - a. What is your major or area of study?
 - b. How many years have you been a Clemson University student?
 - c. Do your classes utilize the CEF? If so, which classes uses it, and how do they use it?
 - d. Has the CEF been important to your school experience, and, if so, how has it been important (personal and/or professional)?

6. Why was the Clemson Experimental Forest established and what is the intended purpose of the CEF as you understand it? Leave blank if you do not know.

7. Who owns and manages the CEF? Leave blank if you do not know.

8. Do you know what this particular part of the CEF that you're in right now is called?

9. List all activities you do in the CEF, including service projects or school activities?

Activity	How often?	Time of year	Time of day	Location

10. What does being in the Clemson Forest do for you personally?

11. Please list other activities you have seen occurring in the CEF?

12. In your opinion, are any of these activities damaging to the CEF?

13. What safety issues have you noticed, if any?

14. Have you ever been lost in the CEF? If so, please explain.

15. Are you a part of any organized recreation groups that utilize the CEF? If so, please explain.

16. Have you ever paid or been paid to lead people on trips in the CEF? If so, please explain.

17. Would you characterize the CEF as part of the Clemson community? Please explain.

18.

TRAIL HEADS-Where do you usually park (from most often to least often)?	TRAILS-What are common trails that you utilize?

18. Are there specific places that you enjoy and that have a high value for you, such as trails or sites along a trail? If so, please describe them?

Would you be willing to do a follow-up interview? If so, please provide the researcher with contact information, such as an email address or phone number, or write it on this data sheet.

We will not associate your contact information with your data, and it is entirely voluntary for you to participate in any further discussions related to the CEF.

Thank you for your time in answering our survey.
Questions to Betty Baldwin, ebaldwn@clermson.edu

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