ABSTRACT

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Visitation demand to parks in the United States has increased over time, but funding has not increased proportionately. This shortfall has led to degradation of park resources and a backlog of maintenance and repair projects. William B. Umstead State Park in Raleigh, North Carolina, has faced increased visitor demand, reaching over one million visitors in the past few years. Currently, there is no entrance fee for NC state parks and government funding only covers part of the expenses associated with park upkeep. Other studies have used stated preference contingent valuation and revealed preference travel cost data as a way to identify visitor benefits from parks. In this study, we use parametric and nonparametric methods to derive visitors' willingness to pay for hypothetical entrance fees that pay for park enhancement projects and found net benefits that were not statistically significant. We also employed a count data travel cost model and found a statistically significant consumer surplus of $31.65 per trip. This derived benefit can inform policy makers and park managers in identifying new sources of funds for conservation of the park's natural resources and infrastructure improvements.

Park Visitors’ Willingness to Pay for Conservation: The Case of William B. Umstead State Park, North Carolina

By

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TABLE OF CONTENTS

LIST OF TABLES iii
LIST OF FIGURES iv

Introduction 1
Literature Review 6
Nonmarket Valuation 6
Travel Cost Method 7
Contingent Valuation Method 7
Current Valuation of Parks 9
Study Site and Data Gathering 10
Study Site 10
Study Population and Data Collection Methods 12
Cognitive Interviews 15
Travel Cost Model 16
Contingent Valuation Model 20
Empirical Results 24
TCM Demographic Profile 24
TCM Results 28
CVM Demographic Profile 32
CVM Results 34
Conclusion 38
Policy Recommendations 38
Limitations 39
References 40

LIST OF TABLES

Table 1. Demographic Characteristics for the Travel Cost Model. 26-27
Table 2. Travel Cost Model Results.. 30-31
Table 3. Demographic Characteristics for the Contingent Valuation Model............................... 33
Table 4. Percent WTP contribution by Stated Amount.. 34
Table 5. Turnbull Estimates of WTP in US$. 34
Table 6. Contingent Valuation Model Results.. 36-37

LIST OF FIGURES

Figure 1. Map of William B. Umstead State Park 11

Introduction

Outdoor recreation can be broadly defined as any enrichment activity that occurs outside. Although activities vary greatly across the globe, participating in outdoor recreation has been a staple in every culture and region throughout history. Countless hours of daylight are spent outside rock climbing, camping, fishing, and hiking. Consumers derive many benefits from outdoor recreation. These benefits include enjoyment from scenic vistas and ecosystem services (e.g., clean air), physical activity, and stress-reduction (Ho et al., 2003). These benefits provide positive welfare to recreationists and justification for conservation of natural resources. Understanding consumers' demand for scarce outdoor recreation space is crucial for current and future management.

Demand for outdoor recreation has increased in recent years (NPS, 2020). This increase can be attributed to many factors including the COVID-19 pandemic, social media, and urbanization. During the pandemic, outdoor recreation at local, state, and national parks, as well as recreation areas increased substantially (Ferguson et al., 2022). For example, a trail map mobile phone application showed an increase in usage of more than 100% during the COVID-19 pandemic (Hirschler, 2020). Other examples include an increased demand for outdoor recreation equipment (OIA, 2021), and hunting licenses sales in some states increased when compared to previous years (Kendal, 2020). Also, in 2021, outdoor recreation accounted for 1.9 percent of current dollar U.S. gross domestic product (GDP) (BEA, 2022). This increase could be largely due to limited indoor activities that could be performed during the ongoing pandemic, which drove people to recreate outside.

In addition to the pandemic, social media has increased demand for outdoor recreation by providing the location of unique resources through geotagging and hashtagging (Doyon, 2020), links to cheap options for outdoor gear, and creating a sense of community around outdoor activities. Specifically, social media challenges like REI's #OptOutside campaign, which started in 2015, have encouraged people to spend more time outdoors and share their experiences on social media (PR Newswire, 2019; REI, 2017). Moreover, social media has also provided new recreationists with "leave no trace" principles and other tips for sustainable outdoor management.

While there are specific points in time, such as the COVID-19 pandemic, that have experienced increasing recreational demand, there is also a natural increase in demand brought about by urbanization. As urban areas continue to grow and become more densely populated, people are increasingly seeking opportunities to connect with nature and enjoy outdoor activities. This is shown in various trends, such as the growing popularity of outdoor recreation activities like hiking and camping, as well as the development of new urban green spaces and parks (Kabisch et al., 2015). Furthermore, research has shown that there is a positive relationship between urbanization and demand for outdoor recreation, as people seek to escape city life and enjoy the benefits of spending time in nature (Zhou & Rana, 2011). As user participation increases, they become more comfortable and familiar with simple and unspecialized activities that nature-based recreation provides. This leads to an increase in future recreationists engaging in more advanced activities because they are more prepared. As generations continue to advance from simple tasks that require minimal skills, like camping, to more advanced activities that require specialized skills, like wilderness backpacking, more demand is placed on natural resources (Krutilla, 1968).

While outdoor recreation provides positive benefits to individuals and communities, there is a potential for an increase in visitor demand to have negative impacts as well. These impacts include loss of plant and animal biodiversity (Larson et al., 2020), soil erosion and compaction from recreators deviating from designated routes (Leung & Marion, 2020), increased levels of trash and other debris, increased water turbidity and nutrient inputs (Leung & Marion, 2020), and increased light and sound pollution from camping and car activity. Negative impacts are present in most natural areas with human activity, but their effects are exacerbated with increases in demand for outdoor access.

Unfortunately, while visitor numbers have increased, funding for nature-based recreation areas has not increased at the same rate. Environmental disturbances from more visitors are likely to result in higher management costs (Smith et al., 2019). As these costs increase, more park funding will be needed from federal, state, and local governments as well as other sources, such as donations, grants, and user fees (Siderelis et al., 2012; Smith et al., 2019). National parks, for example, receive funding through the federal government budget appropriations process, donations from private individuals or foundations, and entrance, camping, and other visitor-related fees. Since the onset of the pandemic, some national parks, such as Yosemite and Glacier National Park, have required all entering vehicles to obtain a vehicle reservation pass. While the vehicle reservation fee is relatively inexpensive compared to the entrance fee, it is an additional revenue stream for parks that simultaneously allows the park to limit the number of visitors that enter each day. Most community parks, such as greenspaces and small urban parks, do not have entrance or parking fees. However, on special occasions, some local parks will require a fee to participate in certain events.

While there are issues with increased demand at local and national parks and recreation areas, this paper focuses on state parks, specifically William B. Umstead State Park (WBUSP) in North Carolina (NC). In general, state parks across the United States are visited and enjoyed by many with little out-of-pocket costs to users. In the past, as demand for state park access increased, state governments increased the number of state parks to 8,500 nationwide, comprising of more than 18.6 million acres (NASPD, 2018). However, the supply of park facilities is not keeping up with rising recreation demand, especially as there are now 807 million visitors to state parks nationwide annually (PERC, 2019). Moreover, state parks represent less than 2 percent of the total outdoor recreation acres in the U.S., but account for over 30 percent of all the visitors to state and federal outdoor recreation areas (NASPD, 2018).

In North Carolina, state parks welcomed over 22 million visitors in 2021, which is three million more than any previous year. Ten parks, including WBUSP, welcomed over one million visitors in 2021 (NC DNCR, 2022). As a point of reference, only seven NC parks welcomed over one million visitors in 2020 (NC DNCR, 2022). In addition, outdoor recreation accounted for 1.8 percent or $11.8 billion of current dollar state GDP in 2021, and since 2020, value added to state GDP from outdoor recreation has grown 22.6 percent (BEA, 2022).

One positive result of the growth in visitors to state parks is that it can help local economies by increasing tourism revenue. For example, in 2010, it is estimated that U.S. state parks generated a total economic impact of more than $20 billion (Joshi et al., 2017). In addition, an increase in the number of visitors can contribute to an improved awareness of the need for conservation and natural resource management. At the same time, this increasing demand can also lead to negative impacts, such as increased wear on trails and facilities, and congestion. Also, if the number of staff does not grow with increased visitation, there are less uniformed personnel to inform visitors of sustainable conservation practices. To address this issue, some state parks in the U.S., including those in Indiana and Virginia, have implemented daily visitor limits or entrance fees. At this time, no NC state park charges an entrance fee, so all park funding comes from state budgets, donations, or other user fees (e.g., boating and camping fees).

In general, U.S. state parks are funded through a range of sources, including state budgets, user or entrance fees, donations, bonds, and federal grants from numerous sources, including the Land and Water Conservation Fund Federal Grant (LWCF) and Parks and Recreation Trust Fund Grant (PARTF Grants; NC State Parks). Specifically in NC, PARTF Grants funded 993 local government projects totaling more than $235 million and LWCF funded 785 local government projects totaling more than $57 million (NC State Parks). Part of a state park's budget comes from state tax revenues which support staffing, park infrastructure, and maintenance. The average annual budget for U.S. state parks in fiscal year 2017 was a modest 0.156% of state appropriations (NASPD, 2018). User fees are also used in some states and are often from camping or parking fees. These fees can supplement state funding and provide support for ongoing park operations. In addition, federal grants can be awarded to state parks to be used for land acquisition, development, and maintenance.

Total funding for state parks may not be sufficient to support all maintenance, repair, and other needs. Research reveals that state park operating expenditures totaled over $2.5 billion in the U.S., which is 50 percent less that what was garnered from state budgets (NASPD, 2018). For instance, Indiana State Parks generate 91 percent of their operating cost through user fees, while tax dollars contribute another nine percent (Indiana Department of Natural Resources). Seven U.S. states require an entrance or user fee to enter their state parks and these fees contributed approximately one-quarter of operating expenses (Walls, 2009). An increase in funding through the state budget or a park entrance fee can serve as a source of revenue to help fund management, maintenance, and repair costs at WBUSP like they have at other parks.

The purpose of this research is to determine visitors' willingness to pay for improvements to WBUSP to support the development of a long-term funding plan for conservation of the resource. This is achieved using the travel cost and contingent valuation methods from the nonmarket valuation literature. The travel cost method is a revealed preference method that infers economic value from the demand for recreation trips. Our results suggest that the mean consumer surplus per trip is $31.65. A stated preference, contingent valuation method was also used. This method infers willingness to pay for the park from visitor responses to hypothetical scenarios about entrance fees that raise revenue to pay for park maintenance and conservation initiatives. We found a net willingness to pay that is not statistically significant.

The paper is organized as follows. The next section reviews literature relevant to this study. Followed by study site and data gathering, study design, and cognitive interviews. We will then present model specifications followed by the results and conclusion.

Literature Review

Nonmarket Valuation

Nonmarket valuation techniques have been used across the world to value environmental resources like clean air, clean water, and in many cases, public parks. These methods allow researchers to quantify the value of goods and services that are not traded in markets, and therefore, do not have an observable price. By valuing nonpriced resources, policymakers can better understand ways to protect and conserve them.

In economics, value is both anthropocentric and instrumental (Flores, 2003), and in practice, is defined in terms of what people are willing to pay or accept for a change in environmental services. Several stated and revealed methods have been developed to monetize the economic value of nonmarket goods and services. Stated preference methods include the contingent valuation method (CVM) and choice modeling. Both methods rely on hypothetical scenarios for valuation and allow for estimation of changes in both direct and indirect values (Schuhmann, 2012). Revealed preference methods include the travel cost method (TCM) and hedonic pricing method (HPM). TCM and HPM rely on observing individual decisions for market goods that are connected to nonmarket goods. By placing structure on the relationship between the marketed and nonmarketed goods, researchers can quantify the value of changes in the nonmarketed good from changes in the demand for the marketed good (Schuhmann, 2012). In the current study, we will use CVM and TCM (Cameron, 1992) to measure the willingness to pay (WTP) for WBUSP.

Travel Cost Method

TCM uses costs incurred traveling to a recreation site as a proxy for the ‘price’ that visitors pay for access to a recreation site. These expenses include out-of-pocket costs incurred during travel and the opportunity cost of travel time (Das, 2013). TCM can be used to quantify the value of recreation site access and the quality change at recreation sites. The functional relationship between travel costs and site trips establishes the demand for recreation that can be used to infer value. TCM allows researchers to understand values associated with recreational use, but it does not allow them to estimate nonuse values associated with site attributes (e.g., existence or bequest values – see Heberling and Templeton, 2008) as well as new sites (Ward and Loomis, 1986), making TCM an important method for state park valuation.

Contingent Valuation Method

CVM elicits WTP from constructed or hypothetical scenarios about changes in environmental quality or access. The valuation question can vary across studies through the elicitation format (e.g., dichotomous choice, open-ended), payment vehicle (e.g., voluntary donation, income tax increase), and bid amount (e.g., $2, $50). For example, a dichotomous choice CV question asks users whether they would vote in favor or against alternative action plans that vary in terms of costs, allowing for a market demand curve to be estimated (Loomis, 1988). Since CVM allows a demand curve to be traced for a good that otherwise would not be tracked by the market, it can be useful to understand the policy implications of resource changes (Hanemann, 1994).

Despite its ability to quantify the total economic value of alternative policy scenarios, it is controversial due to the hypothetical nature of the scenarios posed (Carson et al., 2001). Moreover, defining the appropriate payment vehicle in which participants would actually pay is important and can influence users WTP (Carson et al., 2001). To be incentive-compatible for respondents to report their true values, the payment vehicle must be compulsory (Carson & Groves, 2007) and seen as credible (Carson et al., 2001) by the user. Additionally, if the respondent has no reason to believe that their answers will influence policy or another outcome, then they have no reason to answer truthfully or devote effort to the survey response. For example, Herriges et al. (2010) found that the estimate of economic value from people who viewed the question as consequential were different from those who found the survey irrelevant for policy purposes. Therefore, the truthfulness of a respondent's answer is based on whether they believe their responses will be consequential and influence policymakers' decisions in some way.

Various payment vehicles have been proposed in the nonmarket valuation literature including: voluntary donations, tax redistribution, increase in taxes (state or federal), increase in trip expenditure, entrance fees, or increase in a utility bill (e.g., increase in water bill), but there is no consensus on what vehicle should be used for parks. However, research suggests that voluntary donations should not be used to elicit WTP due to the free-rider problem (Carson, 1997; Kato and Hidano, 2002; Hanemann, 1994). The use of tax redistribution often generates a higher WTP (Bergstrom et al, 2004) and an increase in a user's utility bill is often not plausible for a particular study. For this study, we will use a dichotomous choice elicitation form with an entrance fee payment vehicle to elicit WTP. Although plausible and intuitive, our approach limits are ability to quantify nonuse values and thus should be interpreted as a partial measure of total economic value.

Current Valuation of Parks

Research on the value of state parks is limited, although the value of national parks have been estimated using CVM and TCM. For example, Haefele et. at. (2016) find that national parks have an estimated value of $92 billion, of which $33 billion is for passive use values (i.e., existence and bequest values) and $29 billion is for use values. Additionally, Neher et al. (2013) estimated an average WTP per National Park Service visit to be $102 (2011 $s) systemwide.

State parks are widely visited and have the potential to generate considerable value. Siikamäki (2011) valued U.S. state parks at $14 billion annually by using the time value of nature recreation services. More recently, Cothran et al. (2020) used TCM to find visitor demand for three parks in Georgia, U.S. They estimated visitor demand to be largely inelastic, meaning an increase in the entrance fee would lead to higher total revenues and a minimal decrease in visitation. But, demand was highest among low-income households, suggesting that a fee increase could have undesirable distributional consequences. Kyle et al. (2002) suggests that agencies need to look beyond traditional economic indicators (e.g., household income) in the construction of prices for public land recreation. Currently, Siikamäki (2011) is the only comprehensive study to understand the value of U.S. state parks, so more research is needed.

Study Site and Data Gathering

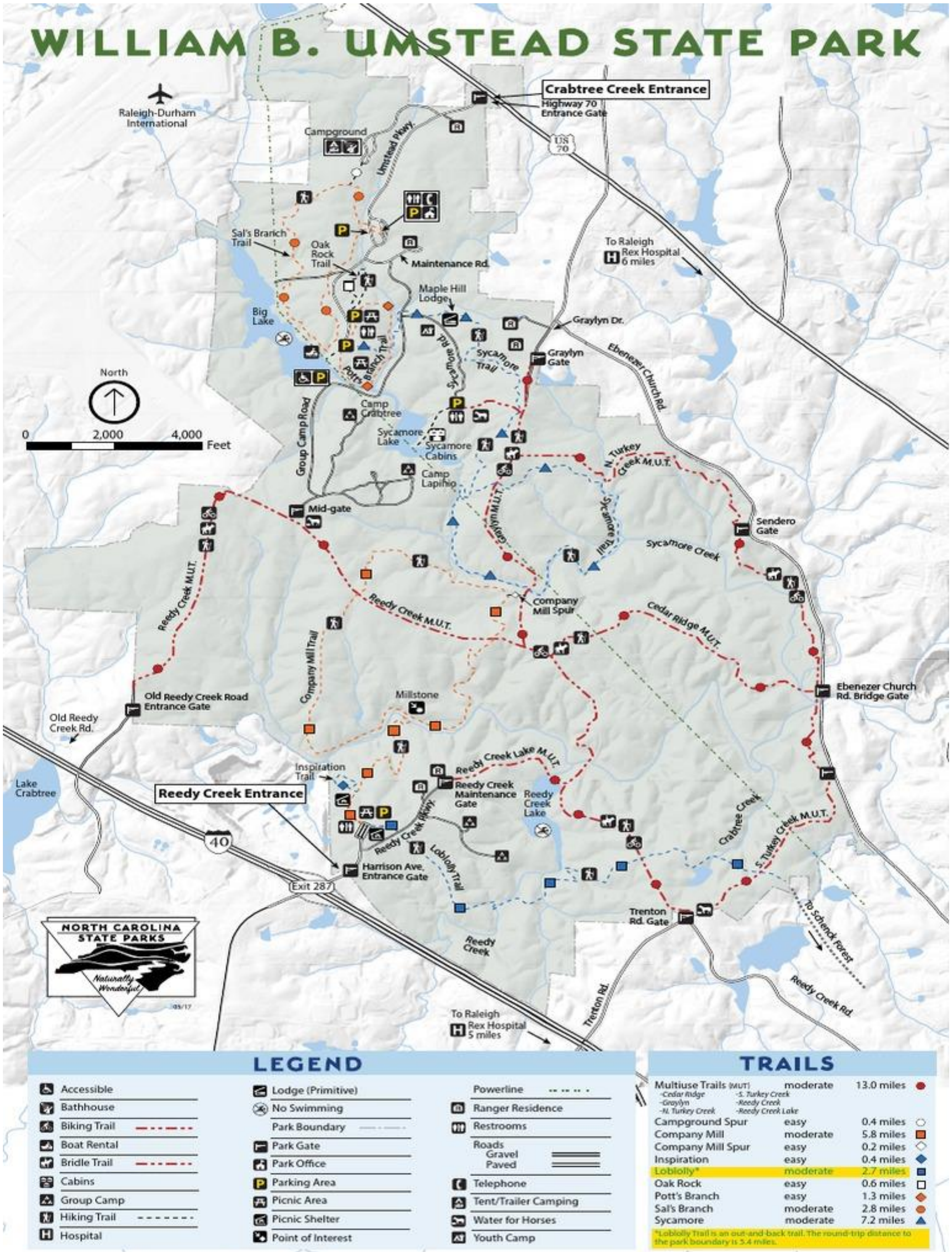
In this section, we will review details of the study site, target population, data collection methods, survey instrument development, and the final questionnaire.

Study Site

The NC State Park system begin in 1916 with the establishment of Mount Mitchell State Park in the western region of the state. Years later, in 1937, WBUSP was established as a part of the state park system. The park is named after William B. Umstead, a former governor of North Carolina who advocated for the creation of the state park system. WBUSP is located in the Triangle region of NC, between Raleigh, Durham, and Chapel Hill. It covers 5,599 acres and includes several lakes, creeks, and miles of hiking and biking trails.

Currently, the park offers hiking, biking, horseback riding, camping, fishing, sightseeing, picnicking, boating, and canoeing. There are over 30 miles of hiking trails in the park, ranging from easy to strenuous, and several trails are also open to mountain biking (13 miles) and horseback riding (13 miles). The park has three manmade lakes (Big Lake, Sycamore Lake, and Reedy Creek Lake) which are popular for fishing and boating. The lakes are stocked with fish and visitors can rent canoes, kayaks, and paddleboats at the park's boathouse. There are two campgrounds in WBUSP, with a total of 28 campsites. The campgrounds are open from April to October and offer amenities such as picnic tables and grills. In addition, park hours vary by season with shorter hours in the winter (8:00 AM to 6:00 PM) and longer hours in the summer (8:00 AM to 8:00 PM). The park has two main entrances: the Crabtree entrance, where the visitor center is located, and the Reedy Creek entrance. Admission is free, although there may be fees for camping, boat rentals, and other activities. Figure 1 presents a map of WBSUP and includes the location of recreation activities in the park.

Figure 1. Map of William B. Umstead State Park (source: NC State Parks)



Like other NC state parks, WBUSP has seen an increase in visitors in recent years. Given its location in the heart of the rapidly growing Triangle region, this growth has been especially robust. Over one million people currently visit WBUSP (NC DNCR, 2022).

Study Population and Data Collection Methods

The target population for this study was visitors to WBUSP during the study period, and data was collected from late-November 2022 through mid-April 2023. Three different flyers were designed to capture visitor's attention (Cata et al., 2013) and encourage participation in the survey. The flyers were pretested during six cognitive interviews, and the flyer that interviewed participants determined was most likely to encourage survey participation was adopted.

A QR code was chosen as the link between park visitors who were exposed to the flyer and the online survey. Harrison et al. (2013) found a higher response rate when using a QR code for an online survey despite limitations with using QR codes. In particular, older people and children are not as familiar with the use of QR codes (Joy et al., 2021). To mitigate this concern, a "call to action" statement was provided on the flyer to ensure visitors knew how to scan the code (Cata et al., 2013). The North Carolina State University (NCSU) logo was printed on the flyer with information regarding NCSU's Institutional Review Board (IRB) to ensure respondents felt safe scanning the code (Cata et al., 2013). The principal investigator's email was also available to respondents to provide an additional layer of safety.

Eight copies of the chosen flyer with QR codes were placed on glass bulletin boards around the WBUSP at both the Glenwood and the Reedy Creek entrances. Flyers were checked regularly to ensure they were visible to visitors and replaced if missing or damaged. During March 2023, the number of flyers was increased to nine due to limited responses prior to this date.

Final Survey Questionnaire

An online questionnaire was designed to collect information about trip behavior and WTP for the study area (see Appendix). The questionnaire was developed and administered using Qualtrics software (Provo, UT). The study questionnaire was divided into four sections: 1) current or most recent trip information; 2) current or most recent park conditions and willingness to return for future trips; 3) a contingent valuation question; and 4) sociodemographic questions.

The first section asked the respondent questions regarding their current or most recent trips. Information obtained in this section included: 1) the number of trips to the park in the past 12 months; 2) the number of years visiting the park; 3) the number of days and hours of their current or most recent trip; 4) a multiple-choice question asking respondents to select all the recreation activities they participated in; and 5) a multiple-choice question asking respondents to select their main recreation activity. The second section asked respondents about the overall quality, cleanliness, and crowding during their current or most recent trip. Based on their responses, additional questions were then asked about increases and decreases in overall quality, cleanliness, and crowding, and their willingness to return based on these changes. The rated values were on a 5-point Likert scale, where 1 corresponded to crowded, not clean or low quality and 5 corresponded to not crowded, clean or high quality. Section two was only presented to those whose main activity involved trails (i.e., hiking, biking, horseback riding), water activities (i.e., canoeing, boating, or fishing), or camping.

The third section contained a hypothetical scenario followed by a dichotomous choice CVM question to elicit respondents' WTP to maintain the park's infrastructure and conserve its unique natural resources. The hypothetical scenario was presented over five separate screens and read:

"Each year the number of visitors to North Carolina State Parks increases. The increase in visitors results in the degradation of trails, campsites, bathrooms, other infrastructure, and unique natural resources. With over one million visitors every year, Umstead State Park will require increased funding to support its maintenance and conservation initiatives. One way to raise more money for the park would be to introduce an entrance fee. Access to Umstead State Park is currently free to all visitors. In neighboring states, however, entrance fees are often used to raise funds to support park initiatives. We want to hear your opinion about a statewide vote that would introduce a daily entrance fee at Umstead State Park. If such a vote were taken, and a majority of NC residents supported the vote, adult visitors to Umstead State Park will pay the daily entrance fee when they enter the park. The revenues from the fee could be used to maintain the Park's infrastructure and conserve its unique natural resources. If a majority voted against, no fee will be charged to access Umstead State Park, and the Park's infrastructure and conservation efforts would remain as they were on your current or most recent trip. There are good reasons to vote for or against the entrance fee. People who support entrance fees often point to how they will benefit from the increased quality of Umstead State Park's infrastructure and conservation initiatives. People who do not support entrance fees point to how they would prefer to spend their money in different ways and how the proposal only impacts Umstead State Park."

In the dichotomous choice question, respondents were asked to accept or reject one of four entrance fees or bid levels. The possible fees included $1, $2, $5, and $10 per person per trip. Bateman et al. (1995) found that respondents experience less uncertainty when they are presented a dichotomous choice question versus and open-ended question; however, how bid hypothetical levels presented may lead to anchoring and affect respondents' choice cannot be ignored. In the existing nonmarket valuation literature, several studies have used entrance fees as a payment vehicle (Brookshire, Randall, and Stoll, 1980; Rowe et al, 1980; Campos, Caparros, and Oviedo, 2007). The last section of the questionnaire included standard demographic questions about race, gender, education, and income.

Cognitive Interviews

Six cognitive interviews were conducted during October 2022. The interviews were 45-minutes in length and conducted over Zoom. Craigslist was used for participant recruitment and a short, Qualtrics online screener questionnaire was used to identify potential participants. To be eligible for participation, respondents had to: 1) be 18 years old or older; 2) be a visitor of WBUSP within the last 12 months; 3) be willing to participate in a 45-minute online discussion; 4) have the ability to use a teleconference software like Zoom or Skype; and 5) have access to a laptop with WiFi. Aside from these screening questions, other questions were asked about race, gender, ethnicity, age, belief in conservation of state parks, and other NC State Parks they have visited in the past 12 months. 60 potential participants filled out the cognitive interview survey from Craigslist. Of those, 25 were eligible, nine were contacted, and seven confirmed. While seven were confirmed, one did not show for their interview, so only six interviews were conducted. Of those not eligible, one respondent did not have access to WiFi and 34 had not visited WBUSP in the last 12 months.

A moderator guide was developed prior to the interviews, which identified important questions in the survey that might be difficult for participants to answer. Responses to specific questions were probed at several points during the interviews. One question in the survey asked respondents about how many people they saw while participating in their main activity at WBUSP. Two participants during the interviews asked if they should include people they saw in the parking lot. Based on this response, we added “please do not consider people you saw in the parking lot to the overall number” at the end of this question. A few interviewees noted the length of the contingent valuation question introduction; therefore, we split the question introduction over five screens. After the completion of interviews, appropriate changes were made, and the survey was tested at length for programming misfunctions and survey flow. When errors were identified, they were immediately corrected, and the survey was tested again. This final instrument was approved by NCSU’s IRB #25160 prior to the start of data collection.

Model Specification

In this section, we will discuss model specifications used for both the travel cost and contingent valuation method.

Travel Cost Model

We limited our analysis to visitors residing within 100 driving miles of WPUSP and assumed their trips were for the sole purpose of visiting the site. A small number of visitors (n=20) reported zip codes that implied further driving distances, but our strong suspicion is that these visitors were visiting the Triangle for other purposes and taking a side trip to WPUSP. The assumption that the sole purpose of the trip is for recreation is essential for travel cost to serve as a proxy for price when using the TCM (Fix and Loomis, 1997). For the local trips, we use PCMiler to measure one-way travel distances, times, and tolls.

The roundtrip driving travel cost was calculated using the following formula:

$$c_i(a,b) = \left(\frac{[(f_i\ + a) * distance(a,b) +\ tolls(a,b)]}{\rho} +\ \beta_i * time(a,b) \right) * 2$$

(1)

where $c_i(a,b)$ is the travel cost estimate for individual i, f_i is the average per-mile fuel cost for respondent i, a is the average per-mile non-fuel out-of-pocket cost (i.e., maintenance, tires, depreciation) for respondent i, $distance(a,b)$ is the one-way driving distance in miles between respondent i's home and the park, $tolls(a,b)$ is the one-way total tolls between respondent i's home and the park, ρ is the weighted average party size for all trips, β_i is the hourly opportunity cost for respondent i, and $time(a,b)$ is the one-way driving time in hours between respondent i's home and the park. The equation was then multiplied by two to reflect roundtrip travel cost.

To operationalize (1), we first calculated the average per-mile fuel cost (f_i) by dividing the average fuel cost in dollars per gallon by the nationwide average per-mile fleet fuel economy. We assume the average fuel cost to be $3.253 per gallon and the nationwide average fleet fuel economy to be 22.9 miles per gallon based on U.S. Department of Transportation (Bureau of Transportation Statistics). Next, we calculated the average per-mile non-fuel out-of-pocket cost, a, by combining maintenance and depreciation costs. The maintenance cost was assumed to be $0.0968 and the depreciation cost was assumed to be $0.3577 (AAA). Following English et al. (2018), the depreciation cost was constructed with the following formula, $depreciation\ = \frac{(\frac{\$1,862}{5,000\ miles}+\frac{\$1,715}{5,000\ miles})}{2}$, where AAA estimated that annual depreciation cost is $1,715 lower for an average sedan that is driven 5,000 miles less than 15,000 miles (i.e., 10k mi/yr) and annual depreciation cost is $1,862 higher for an average sedan that is driven 5,000 miles more than 15,000 miles (i.e., 20k mi/yr) (AAA). Then, $distance(a,b)$, $tolls(a,b)$, and $time(a,b)$ was calculated using the respondent’s reported zip code and PCMiler. Next, ρ, which is the average party size for all trips, was calculated using data from WBUSP survey. Finally, the hourly opportunity cost (β_i) was calculated by dividing reported household income by 2,000 hours worked in a year. Following standard practice in the literature, the wage was then divided by three to arrive at the opportunity cost of time (Czajkowski et al.,2019).

After calculating the travel cost value, a count data model was estimated. Count data models are commonly used in applications where the data are non-negative integers like the number of recreation trips. Parametric versions of these models require that we specify the expectation of the dependent variable (i.e., trips) and use an assumed distribution to estimate the model parameters. A basic count model is written as:

$$Pr(Y = y_i) = f(y_i, z_i\beta), y_i = 0, 1, 2, ...$$

(2)

where y_i is he number of trips taken by individual i to WBUSP during a 12-month time period, and z_i is the travel cost of accessing WBUSP, and β is a vector of covariates that could influence the number of trips to the park.

In our application, four parametric models were considered: Poisson, censored Poisson, censored negative binomial, and negative binomial distribution. The Poisson distribution is attractive due to its simplicity and mean-fitting property. The Poisson probability density function is:

$$Pr(Y = y_i) = exp(- \lambda_i) \frac{{\lambda_i}^{y_i}}{y_i!}$$

(3)

where λ_i is the conditional mean of the distribution. In most travel cost applications, λ_i is assumed to have a log-linear regression form, i.e., $\lambda_i = \exp(x_i \beta)$. A significant limitation with the Poisson distribution is that it assumes equi-dispersion, or that the conditional mean and variance are equal (Greene, 1992). This restriction is often inconsistent with data in practice, and so alternatively, more flexible distributions like the negative binomial are also considered here. The negative binomial probability density function is:

$$f(Y = y_i | x_i) = \frac{\Gamma(y_i + \nu^{-1})}{\Gamma(y_i + 1)\Gamma(\nu^{-1})} \left(\frac{\nu^{-1}}{\nu^{-1} + \lambda_i}\right)^{\nu^{-1}} \left(\frac{\lambda_i}{\nu^{-1} + \lambda_i}\right)^{y_i}, \nu \geq 0$$

(4)

where ν is the over-dispersion parameter, $\lambda_i = E(y_i | x_i \beta) = \exp(x_i \beta)$, and $\Gamma()$ is the gamma function.

Censored versions of the Poisson and negative binomial distributions of the collected trip data were also considered. In particular, respondents reported the number of WBUSP trips in the past 12 months as either a non-negative integer between 1 and 11 or “12 or more.” This censoring at 12 trips implies that we modify the Poisson and negative binomial distributions accordingly (see Greene, 1992, and Bousselmi et al., 2021, for formal derivations). Without accounting for censoring in estimation, we leave the potential for the Poisson and negative binomial models to produce biased and inconsistent estimates (Brännäs, 1992).

Two additional concerns with our data are truncation and endogenous stratification (Haab and McConnell, 2002). Both arise because recreators were recruited into the survey onsite, and as such, all survey participants took at least one trip and those individuals who took more trips are more likely to be in the sample. To address these issues, we use the standard adjustment originally proposed by Shaw (1988) and subtract one from the number of trips in the probability density functions above.

After estimating the various regression models, we calculated the consumer surplus per trip. Assuming a log-linear demand specification, the expected consumer surplus per recreation trip is:

$$CS\ per\ person\ per\ trip = (-1/\beta_{Travelcost})$$

(5)

where $\beta_{Travelcost}$ is the travel cost coefficient. Assuming a double-log (or constant elasticity) specification, the consumer surplus per recreation trip is:

$$CS\ per\ person\ per\ trip = \left(\overline{travelcost}/(\beta_{\ln(travelcost)} + 1)\right)$$

(6)

where $\overline{travelcost}$ is the sample mean of the travel cost to WBUSP and $\beta_{\ln(travelcost)}$ is the coefficient on the natural log of the travel cost variable.

Contingent Valuation Model

Both nonparametric and parametric models were used to estimate WTP for the hypothetical policy that invests in WBUSP through an entrance fee. For the nonparametric model, Turnbull lower and upper bound estimators were employed (Haab & McConnell, 2002). The Turnbull estimators are distribution-free but do not allow for heterogeneity through observable covariates (Turnbull, 1976). The Turnbull estimator was originally used in contingent valuation by Carson et al. (1994) and Haab and McConnell (1997) and has since been used due to its simplicity. The estimator can also solve the problem of negative WTP without using distributional assumptions (Haab and McConnell, 1997).

When using the Turnbull estimator, we assume that if a respondent answers “yes” to a specific bid amount (entrance fee), then they are willing to pay at least that amount. On the other hand, if a respondent answers “no” to a specific bid amount, then they are willing to pay less than the specified amount. A lower bound estimate of mean WTP is calculated as:

$$WTP_{LB} = \sum_{j=0}^{M} t_j (F_{j+1} - F_j)$$

(7)

where t_j is the contribution amount given to respondent j, M is the maximum contribution amount, and F_j is the proportion of respondents who received a particular contribution amount and answered “no.” $(F_{j+1} - F_j)$ is the difference between the amount of “no” responses at a particular contribution amount and the proportion of “no” responses at the next lowest contribution amount, and is the consistent estimate of the probability that WTP lies between t_j and t_{j+1}. An upper bound estimate for mean WTP is given by:

$$WTP_{UB} = \sum_{j=0}^{M} t_{j+1} (F_{j+1} - F_j)$$

(8)

When implementing the Turnbull estimators, we assume WTP is non-negative and bounded by the estimated consumer surplus per trip, i.e.,

$$0 \le WTP_j \le \$31.65$$

The distribution-free Turnbull estimates provide a useful estimate of mean WTP but does not provide insights into how observable demographics affect WTP. To shed insight into this important heterogeneity, we use a regression-based parametric approach that assumes unobserved, idiosyncratic determinants of WTP are normally distributed. The approach employs the Random Utility Maximization (RUM) framework and assumes WTP in respondent characteristics, z:

$$WTP_i = \beta_0 + \sum \beta z_i + \varepsilon_i$$

(9)

where ε_i is the error term that is assumed to be independent of z_i and follows a normal distribution. Under these assumptions, the probability that an individual says yes to the CV question takes the probit form:

$$\Pr(\text{"yes"}) = \int_{-\infty}^{\beta_0 + x\beta} (2\pi)^{-1/2} \exp(-((WTP_i - bid_i)\delta)^2/2) dv$$

where δ is scale parameter of the normal distribution (and equal to the inverse of the standard deviation). If we had instead assumed ε_i has the logistic distribution with scale parameter δ, we get the logit model:

$$\Pr(\text{"yes"}) = \frac{\exp(\beta_0 + x\beta - \delta bid_i)}{1 + \exp(\beta_0 + x\beta - \delta bid_i)}$$

(10)

We used both the logit and probit models to estimate WTP. We assume that mean WTP is calculated as:

$$Mean\ WTP = \frac{-(\beta_0 + \sum \beta \bar{z})}{\delta}$$

(11)

where $\bar{z}$ is the mean value of respondent characteristics. Most of the time, WTP is bounded by zero and the respondent's income; however, if the respondent disagrees with the contingent valuation scenario, regardless of the specified bid price, then negative WTP may be allowed (Bohara et al., 2001).

Empirical Results

TCM Demographic Profile

A total of 378 participants completed the online WDUSP survey. Of those, 282 were deemed eligible for the survey and provided useful information. Of the 96 observations that were not eligible or useful, seven respondents were less than 18 years old, 45 respondents did not consent to participate in the survey, 15 respondents took the survey in less than one minute, 22 respondents did not provide a zip code, four respondents did not answer any questions past the consent, and three respondents reported having more than six people on their trip, which we deemed to be a bus or van. Of the 282 eligible and useful responses, 20 respondents reported starting their trip to WBUSP at a zip code more than 100 miles from the park and were therefore dropped. Table 1 shows the demographic characteristics of the sample, which are split by those starting within 100 miles of the park and those more than 100 miles from the park.

For useable observations who completed the survey in more than one minute, the median completion time for the survey was 10 minutes and 15 seconds and ranged from one minute and 16 seconds to 110 hours and 48 minutes. Of respondents within 100 miles of the park, the average age was about 40 years, and more than half were female (61.45%). Most of the sample identified as white (83.28%) and had at least a four-year college degree (74.97%). The average household income was around $100,000. The majority of respondents hiked at some point during their trip (93.13%), and most considered hiking their main activity (79.40%). Respondents noted frequent visitation with an average of more than 7 trips a year and an average of 6.51 years of experience visiting WBUSP. Of respondents more than 100 miles from the park, trends were similar to those who were located closer to the park. The average age was 42.91 years. More than half were female (60.00%) and identified as white (90.86%). Also, most had at least a four-year college degree (79.23%), and an average income of more than $90,000. Most respondents hiked (95.00%) and 85 percent considered hiking as their main activity. However, in contrast to those within 100 miles to the park, the average number of years visiting was only 2.47 years and 3.20 trips in the past 12 months. This is to be expected with a longer distance to WBUSP from their home. Both groups had an average of about one day at the park on their current or most recent visit.

Some respondents failed to identify key demographic variables like race and income; therefore, we pulled data from the American Community Survey (ACS) by zip code to impute missing values. Table 1 denotes which variables had missing data and how missing data points were added, which allowed us to include more observations in our models.

Table 1. Demographic Characteristics for the Travel Cost Model.

Variable	Variable Description	Input Data for Missing Data	Eligible Respondents ≤100 Miles from WBUSP	Eligible Respondents >100 Miles from WBUSP
N	Number of observations	N/A	262	20
Demographic Variables				
age	Age of the respondent in years; the mid-point of the multiple-choice option	None	40.32	42.42
male	=1 if respondent was male	None	38.55%	40.00%
race_white	>0 if respondent identified as white	Based on zip code from the ACS 2017-2021 5-year running average (n = 43)	83.28%	90.86%
edu_4yr	>0 if respondent has at least a four-year college degree	Based on zip code from the ACS 2017-2021 5-year running average (n = 41)	74.87%	79.23%
income	Gross income of the respondent's household; the mid-point of the multiple-choice option	Based on zip code from the ACS 2017-2021 5-year running average (n = 49)	$101,995	$93,659
Trip Characteristics				
hiking	=1 if respondent participated in hiking on their current or most recent trip to WBSUP	None	93.13%	95.00%
m_hiking	=1 if respondent's main activity was hiking on their current or most recent trip to WBSUP	None	79.40%	85.00%
numyears	Number of years coming to WBUSP	None	6.51	2.47

Table 1 (continued).

numdays	Number of days for current or most recent trip to WBUSP	None	1.05	1.00
numtrips	Number of trips in the past 12 months to WBUSP	None	7.31	3.20
numtrips2	numtrips – 1 to account for endogenous stratification	None	6.31	2.20

TCM Results

Various specifications of the Poisson, censored Poisson, negative binomial, and censored negative binomial models were estimated. Results for a selected set of the specifications are presented in Table 2. All specifications except Specification 7 use the 262 observations of respondents who live within 100 driving miles of WBUSP. Equation 13 nests the empirical specification for the natural log of the conditional mean function used in Table 2.

$$\ln(numtrips2) = \beta_0 + \beta_1(travelcost) + \beta_2(\ln(income)) + \beta_3(age) + \beta_4(age^2) + \beta_5(numyears) + \beta_6(race_{white}) + \beta_7\left(edu_{4yr}\right) + \beta_8(male)$$

(12)

To begin, we compared log-linear (or semi-log) and double-log (or constant elasticity) specifications with the WBUSP data. These results are presented in columns 1 and 2 and suggest the double-log models fit the data better based on the Bayesian Information Criterion (BIC). Since the double-log model in column has a lower BIC (and higher log-likelihood), we used the log-in-price specification for the remaining models.

The results in Table 2 suggest specification 6 – the censored negative binomial model – fits the data best. This is shown by its relatively low BIC (1001.901). As expected, *travel cost* is consistently negative and statistically significant (p<0.001) across the different specifications. The *log of income*, *numyears*, and *race_white* are all positive and statistically significant. These results suggest that as a visitor's income increases, their number of trips increases. Also, as the number of years coming to the park increases, the number of trips taken increases. Similarly, relative to other races, a visitor who identifies as white has an increased number of trips. Finally, the *age* and age^2 coefficients imply older people take more trips, although the effect appears to diminish as people age. The estimated consumer surplus is $31.65 per visitor per trip. This consumer surplus measure is similar to what is found across the other empirical specifications except for when the 20 trips where one-way driving distance is greater than 100 miles are included (Specification 7). Including these more distance trips implies considerably larger trip values, but as suggested previously, it is unlikely that people traveling form more than 100 miles away are taking trips for the sole purpose of visiting WBUSP.

Table 2. Travel Cost Model Results.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
travel cost		-0.0187***	-0.0164***	-0.0196***	-0.0179***	-0.0316***	-0.0021*
		(0.0033)	(0.0032)	(0.0040)	(0.0031)	(0.0051)	(0.0010)
ln(travel cost)	-0.3113***						
	(0.0539)						
ln(income)	0.3585***	0.3676***	0.1665**	0.1944**	0.2038**	0.3337*	0.0397
	(0.0738)	(0.0739)	(0.0802)	(0.0988)	(0.0915)	(0.1981)	(0.0759)
age			0.0461**	0.0512**	0.0485**	0.8748*	0.0527***
			(0.0195)	(0.0234)	(0.0218)	(0.4542)	(0.0199)
age^2			-0.4455**	-0.4810*	-0.4821**	-0.8153	-0.4924**
			(0.2049)	(0.2506)	(0.2265)	(0.4989)	(0.2075)
numyears			0.0257***	0.0316***	0.0303***	0.0802***	0.0334***
			(0.0095)	(0.0114)	(0.0104)	(0.0250)	(0.0098)
race_white			0.4074**	0.4866**	0.3992**	0.7472***	0.4251**
			(0.1667)	(0.1918)	(0.1593)	(0.2895)	(0.1753)
edu_4yr			0.1402	0.1561	0.1980*	0.3812	0.1598
			(0.1151)	(0.1381)	(0.1194)	(0.2474)	(0.1258)
male			0.0524	0.0577	0.0689	0.1535	0.0532
			(0.0796)	(0.1026)	(0.0884)	(0.2124)	(0.0813)

Table 2 (continued).

Constant	-1.3774*	-1.9738**	-1.4468*	-1.8751*	-1.9425**	-4.2123**	-0.5617
	(0.8374)	(0.8482)	(0.8449)	(1.0365)	(0.9482)	(2.0344)	(0.8173)
N	262	262	262	262	262	262	282
Model Fit							
Log-Likelihood	-864.259	-853.677	-813.994	-712.835	-719.539	-473.109	-892.336
Bayesian Information Criterion	1745.224	1724.059	1678.104	1475.785	1494.762	1001.901	1835.449
Model Specification							
Poisson or Negative Binomial?	Poisson	Poisson	Poisson	Poisson	Negative Binomial	Negative Binomial	Poisson
Account for Censoring?	No	No	No	Yes	No	Yes	No
Observations restricted to 100 miles or less from WBUSP?	Yes	Yes	Yes	Yes	Yes	Yes	No
Welfare							
Consumer surplus per visitor per trip in US$	$30.08 [$25.46, $34.70]	$53.58 [$35.25, $71.91]	$61.08 [$38.02, $84.15]	$51.15 [$30.63, $71.67]	$55.78 [$37.02, $74.55]	$31.65 [$24.04, $45.75]	$488.54 [-$0.50, $977.58]

*** p<0.01, ** p<0.05, * p<0.1

Note: Robust standard errors in parentheses

CVM Demographic Profile

Of the 378 respondents who completed the WBUSP survey, 248 were deemed eligible and provided useful data. Of those not eligible or providing useful data, seven respondents were not at least 18 years old, 45 respondents did not consent to participate in the survey, 15 respondents took the survey in less than one minute, and 59 respondents did not answer the WTP question, which is the core response for model estimation. Table 3 shows the demographic characteristics of the sample. The same survey sample was used for both the TCM and CVM analysis; however, do to only including respondents that answered the WTP question in the CVM analysis and not all respondents answered the question, there were more observations in the TCM analysis.

For useable observations who completed the survey in more than one minute, the median completion time for the survey was 10 minutes and 50 seconds with a minimum of two minutes and 36 seconds and a maximum of 52 hours and 16 minutes. Of the 248 useable observations, the average age was about 40 years, and more than half were female (55.24%). Most of the sample identified as white (87.18%) and had at least a four-year college degree (78.00%). The average income was around $100,000. The majority of respondents hiked at some point during their trip (93.34%), and most considered hiking their main activity (78.36%). Respondents noted frequent visitation with an average of more than 7 trips a year and an average of 6.25 years coming to WBUSP. Some respondents failed to identify key demographic variables like race and income; therefore, we pulled numbers from the American Community Survey (ACS) using provided zip codes. Table 3 denotes which variables had missing data and how missing data points were added, which allowed us to include more observations in our models.

Table 3. Demographic Characteristics for the Contingent Valuation Model.

Variable	Variable Description	Input Data for Missing Data	Eligible Respondents
N	Number of observations	N/A	248
Demographic Variables			
age	Age of the respondent in years; the mid-point of the multiple-choice option	None	40.25
male	=1 if respondent was male	None	44.76%
race_white	>0 if respondent identified as white	Based on zip code from the ACS 2017-2021 5-year running average (n = 5)	87.18%
edu_4yr	>0 if respondent has at least a four-year college degree	Based on zip code from the ACS 2017-2021 5-year running average (n = 3)	78.00%
income	Gross income of the respondent's household; the mid-point of the multiple-choice option	Based on zip code from the ACS 2017-2021 5-year running average (n = 12)	$102,390
Trip Characteristics			
hiking	=1 if respondent participated in hiking on their current or most recent trip to WBSUP	None	92.34%
m_hiking	=1 if respondent's main activity was hiking on their current or most recent trip to WBSUP	None	78.63%
numyears	Number of years coming to WBUSP	None	6.25
numdays	Number of days for current or most recent trip to WBUSP	None	1.04
numtrips	Number of trips in the past 12 months to WBUSP	None	7.18
numtrips2	numtrips – 1 to account for endogenous stratification	None	6.18

CVM Results

Nonparametric lower and upper-bound WTP estimates were calculated using the Turnbull estimator. Table 4 shows the bid price offered to respondents, the number of respondents that received that bid amount in the survey, and the percentage willing to pay that bid amount. Using the Turnbull upper- and lower-bound equations and cap on WTP of $31.65, we found a lower bound WTP of $3.41 and an upper bound WTP of $10.64 (Table 5).

Table 4. Percent WTP contribution by Stated Amount.

Bid Price	Number Respondents that Received the Bid Price	Percent WTP (n)
US$1	61	49.18% (30)
US$2	62	48.39% (30)
US$5	62	35.48% (22)
US$10	63	28.57% (18)

Table 5. Turnbull Estimates of WTP in US$.

Bid Price (t_j)	Upper Value	Number offered (T_j)	Number of No's (N_j)	F_j(=N_j/ T_j) % "no"	F_{j+1} - F_j
US$0	US$0.99				
US$1	US$1.99	61	31	0.5082	0.5082
US$2	US$4.99	62	32	0.5161	0.0079
US$5	US$9.99	62	40	0.6452	0.1290
US$10	US$31.65	62	45	0.7258	0.0806
US$31.65				1.0000	0.2742
Lower Bound WTP					**$3.41**
Upper Bound WTP					**$10.64**

Equation 14 nests the alternative specifications of the WTP function used.

$$WTP = \beta_0 + \beta_1(\ln(income)) + \beta_2(age) + \beta_3(age^2) + \beta_4(numyears) + \beta_5(race_{white}) + \beta_6(edu_{4yr}) + \beta_7(male)$$

(13)

A variety of models were estimated with different subsets of the data. Models 1, 3, 5, and 7 use all observations in the sample (n=248) and models 2, 4, 6, and 8 use only observations containing visitors that live within 100 miles of WBUSP (n=228). Across all specifications, the *bidvalue* coefficient is negative and significant as expected. The *numyears* and *edu_4yr* coefficients were found to be negative and statistically significant, although the other demographics, including the *log of income*, were not significantly different from zero.

Importantly, the WTP estimates for the hypothetical park improvement scenario are not statistically different from zero. There could be several reasons for this somewhat surprising result. First, the location of WBUSP is central to many people in the area, but the area also holds numerous potential substitutes for recreationists. Having other options that are similar to WBUSP and "free" could lead visitors to be unwilling to pay (Freeman, 1993; Hoehn and Loomis, 1993). Second, the improvement scenario suggest that the funds raised by the entrance fee would be used for two purposes, park infrastructure and the conservation of its natural resources. Participants might be willing to pay for other improvements, but not the ones listed in the scenario, leading them to be reluctant to pay. Third, the improvement scenario provided vague purposes for the proposed entrance fee (i.e., park infrastructure and the conservation of natural resources). The lack of precision could have resulted in respondents questioning where the additional funding would go, and therefore, led to a null result.

Table 6. Contingent Valuation Model Results.

Variables	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
bidvalue	-0.0641***	-0.0596**	-0.0679***	-0.0638***	-0.1046***	-0.0977**	-0.1120***	-0.1056**
	(0.0236)	(0.0246)	(0.0245)	(0.0257)	(0.0390)	(0.0407)	(0.0412)	(0.0434)
ln(income)	0.0535	0.0267	0.2097	0.1767	0.0887	0.0463	0.3528	0.3006
	(0.1174)	(0.1251)	(0.1409)	(0.1523)	(0.1893)	(0.2025)	(0.2309)	(0.2504)
age			0.0160	0.0229			0.0284	0.0393
			(0.0394)	(0.0406)			(0.0645)	(0.0663)
age^2			-0.1429	-0.2164			-0.256	-0.3732
			(0.4327)	(0.4452)			(0.7084)	(0.7296)
numyears			-0.0480**	-0.0482**			-0.0792**	-0.0790**
			(0.0197)	(0.0211)			(0.0330)	(0.0351)
race_white			0.2244	0.1339			0.3600	0.2117
			(0.2539)	(0.2593)			(0.4145)	(0.4231)
edu_4yr			-0.6121***	-0.6128***			-1.0077***	-1.0087***
			(0.2207)	(0.2316)			(0.3676)	(0.3860)
male			-0.0933	-0.0288			-0.1449	-0.0424
			(0.1690)	(0.1785)			(0.2776)	(0.2948)
Constant	-0.5673	-0.3257	-2.0873	-1.8600	-0.9378	-0.5555	-3.5563	-3.1917
	(1.3357)	(1.4305)	(1.4640)	(1.5778)	(2.1533)	(2.3132)	(2.4093)	(2.6010)

Table 6 (continued).

N	248	228	248	228	248	228	248	228
Model Fit								
Log-Likelihood	-163.354	-149.019	-155.273	-141.872	-163.338	-149.001	-155.240	-141.856
Bayesian Information Criterion	343.248	314.325	360.168	332.608	343.217	314.290	360.101	332.575
Model Specification								
Probit or Logit?	Probit	Probit	Probit	Probit	Logit	Logit	Logit	Logit
Observations restricted to 100 miles or less from WBUSP?	No	Yes	No	Yes	No	Yes	No	Yes
Willingness to Pay								
Mean WTP in US$	$0.90 [-$7.07, $3.32]	-$1.78 [-$12.93, $2.91]	-$0.28 [-$8.89, $3.17]	-$4.25 [-$15.72, $2.80]	$0.11 [-$6.94, $3.35]	-$2.42 [-$12.72, $2.87]	-$0.16 [-$8.42, $3.18]	-$1.59 [-$15.95, $2.85]

*** p<0.01, ** p<0.05, * p<0.1

Note: Robust standard errors in parentheses

Conclusion

Understanding demand for outdoor recreation spaces is fundamental for current and future management. Parks in the U.S often need additional funding, and WBUSP is no exception. As visitor numbers continue to increase, more funding will be needed to keep up with use. An entrance fee has the potential to fund conservation and infrastructure improvements. Our results suggest that the mean consumer surplus per trip is $31.65 per trip and an estimated WTP that was not statistically significant.

Policy Recommendations

States, such as Virginia, have enacted policies that require visitors to pay an entrance or parking fee to all their state parks. Entrance fees into state parks in Virginia have varying rates depending on the activities at the park. Virginia also offers an annual pass that can be used for admission for 12 months, which allows visitors to pay a once-a-year fee instead of at each visit.

While we did not find a significant WTP for WBUSP, we did find a positive and statistically significant consumer surplus. Based on this, an entrance fee to WBUSP alone may bring visitor numbers down and result in increased demand in parks nearby. This could lead to overuse of other local and state parks and result in current and future management issues. A better way to address the lack of funding would be to use a similar policy to Virginia's, meaning every NC state park would require an entrance fee. This would reduce substitution to other state parks since they would all have a fee and would bring in additional revenue for all state parks. However, it is important to note that our sample was mostly white, had an average household income greater than the NC average, and was highly educated. Due to this, our results and policy recommendation may not be generalizable to the NC population and might be regressive to low-income individuals. More research needs to be conducted to find visitors WTP for all NC state parks individually and researchers need to consider gathering a more representative sample.

Limitations

There are several limitations to this study. First, since only visitors had the opportunity to answer the survey, we were not able to measure non-use values, which may be important for the economic value of WBUSP (Heberling & Templeton, 2008). However, due to the many substitutes in the area and an estimated WTP that is not statistically significant, non-use values might not be substantial. Second, CVM is hypothetical in nature and therefore subject to hypothetical bias (Champ, 2003). The method is liable to ‘yea saying’ if a respondent believes the survey favors a yes answer. A large sample size is typically required to identify a distribution of resource values with any degree of accuracy. Due to survey distribution methods, the sample size is small, which is the third limitation of this study.

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