An Assessment of Visitor Use Experience with the Implementation of the First-Year Cadillac Mountain Summit Road Vehicle Timed-Entry Reservation System in Acadia National Park, Maine

Rebecca D. Stanley
University of Maine, rebecca.stanley@maine.edu

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AN ASSESSMENT OF VISITOR USE EXPERIENCE WITH THE IMPLEMENTATION OF THE FIRST-YEAR CADILLAC MOUNTAIN SUMMIT ROAD VEHICLE TIMED-ENTRY RESERVATION SYSTEM IN ACADIA NATIONAL PARK, MAINE

By

Rebecca D. Stanley

B.S. Northland College, 2016

M.S. University of Maine, 2023

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Advisory Committee:

Dr. John J. Daigle, Professor of Forest Recreation Management, Thesis Advisor

Dr. Adam W. Gibson, University of Maine External Graduate Faculty

Dr. Sandra de Urioste-Stone, Associate Professor of Nature-based Tourism
In 1916, the National Park Service (NPS) was established to preserve and protect the national parks for future generations, as stipulated in the Organic Act of 1916. Since then, the national parks have become a prominent tourist attraction in the United States (U.S.) and continue to draw significant numbers of visitors annually. Among these parks, Acadia National Park (ANP), located in the northeast corner of the U.S., stands out as a particularly distinctive example, having been founded in 1901 by private landowners with the aim of preserving the land. Cadillac Mountain, one of Acadia’s main visitor attractions, is the tallest mountain on the northeastern seaboard. The popular section of the park attracts numerous visitors, causing the parking lots at the top of Cadillac Mountain to become full, resulting in traffic congestion on both the lots and the summit road network. In 2015, ANP managers began planning efforts to create a Transportation Management Plan (TMP), with the assistance of the public, to provide a document that identifies the optimal means of offering secure and effective transportation services and a range of high-quality experiences for visitors, to protect park resources and values.
 Implemented in May 2021, the Cadillac Mountain timed-entry reservation system regulates personal vehicle usage on the Cadillac Summit Road during peak season through designated date and time entries. Since the start of the timed-entry reservation system, it has had a significant impact on traffic congestion and visitor experience. By regulating the number of personal vehicle entries daily, the managed access system has helped reduce traffic volume, alleviate most of the parking congestion, and enhance the safety of the visitor experience in parking lots. The system allows visitors to plan their trips in advance, enabling a better experience for those who plan ahead and prepare. This system, however, is not without tradeoffs; the reservation process requires cellular connectivity or wireless internet to book a reservation, there may be limited availability during the peak season, and traffic congestion at the summit still may exist during certain times causing vehicles to spillover and park along the roadside.

The purpose of this paper is to analyze how the reservation system affects visitors’ user experience and to provide park managers with valuable insights to make adaptive management changes to the system. Two objectives guided the study: first, to identify key areas of importance from the visitor experience, such as parking availability and safety, that the reservation system was intended to address. Second, to examine the relationships between visitor experience quality and first-time and returning visitors, and between those who experienced issues with the managed access system and those who did not. The study used a multistage cluster sampling design to systematically sample Cadillac Mountain visitors. The survey was administered using two main techniques: on-site through an in-person questionnaire and by email using the Qualtrics survey platform. The results provide insight into visitor satisfaction and importance to the reservation system and highlight areas for improvement.
The top three rated attributes visitors were most important and satisfied with were the opportunity to explore at their own pace, an unobstructed view of the scenery from the summit, and finding a parking spot at the summit. Visitors rated finding a parking spot as more important than their sense of safety and the number of visitors. The study highlights that the timed-entry reservation system addresses a long-standing issue of parking and congestion and is a favorable alternative to no management action. However, our study acknowledges that tradeoffs occur with a managed access system. These tradeoffs may initially have visitors reject the notion of access but will quickly find these attributes to be an asset to their visit. The evidence suggests that visitors now have a more satisfying experience on Cadillac Mountain because of the managed access system. This study gives valuable insights for park managers regarding visitor satisfaction with the reservation system. The results indicate that visitors prioritize exploring transportation-related attributes over social-related attributes. These findings can be used to inform future managed access systems and improve visitor experiences at Cadillac Mountain.

*Keywords*: visitor use, visitor experience, parking, congestion, managed access system, reservation system, rationed use system, Cadillac Mountain, Acadia National Park
DEDICATION

This research project was made possible by the contributions and support of many individuals and organizations, and I am grateful for their invaluable assistance. I would like to express my sincere gratitude to my loving husband, Timothy W. Stanley, and our daughter, Sophia Stanley, for their unwavering support and self-sacrifice throughout this long journey. Particularly Tim’s encouragement, guidance in navigating challenges, and ongoing moral support helped make it possible for me to pursue this endeavor – I love you. I would also like to thank my parents, Cathy, and Gerald Flesh, for their ongoing assistance and countless hours of help when I needed it most. My in-laws, Connie, and Ed Stanley deserve special thanks for their continued support and encouragement. Between my parents and in-laws, their belief in me and my abilities helped me to stay motivated and focused on achieving my goals. Moreover, I would like to express my gratitude to Mr. Charlie Jacobi, Dr. Adam W. Gibson, and Ms. Stephanie Clement have been essential mentors for my emerging social scientist career. Their steadfast support, expertise, and ability to take me under their wings were critical to the success of this research project and my career. I am deeply grateful for their mentorship and friendship. I want to express appreciation for my high school science teachers and mentors, Ms. Michelle Corlew, Mr. Michael Wegrzyn, and Mr. Jeff Schmela, deserve my heartfelt gratitude for sparking my scientific curiosity. Additionally, I am deeply grateful to Dr. Jonathan Martin and Dr. Sarah Johnson, my college professors, for fueling an even stronger passion for higher education and the study of natural science. Finally, I want to thank everyone who has assisted me in any way throughout my journey. Your contributions and encouragement have been invaluable, and I am grateful for your kindness and support.
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Acadia National Park (ANP) located in the Downeast region of Maine has become an increasingly popular tourist destination in the New England area of the United States (Figure 1.1). Cadillac Mountain (Cadillac) is one of the most visited attractions in Acadia and is the highest mountain on the northeastern seaboard rising 1,530 feet (466 meters) above sea level. The mountain has a history of visitor use at the summit starting in the late 1880s. Back then, to reach Cadillac Mountain visitors boarded a cog railway from Eagle Lake to reach the summit. In those days, the summit was a hotspot for the Green Mountain Hotel and the stunning views it offered. The hotel is no longer there as it burned down in 1895 (NPS, 2021). The 3.5-mile Cadillac Summit Road was surfaced with pink granite and was one of the first roads constructed under the new inter-bureau agreement with the National Park Service and the Bureau of Public Lands (Foulds, 1993). Today, visitors can drive up the asphalt-paved summit automobile road to the top of the mountain and admire the breathtaking views of Frenchman Bay's coastal islands.
Figure 1.1: Maps of Maine, Mount Desert Island (MDI), and the Eastern Portion of Acadia National Park on MDI

At the top of Cadillac, the current facilities include a small souvenir shop, flush-toilet restrooms, and an antenna array. In addition, a large main parking lot accommodates both personal vehicles and coach buses, as well as a west-facing auxiliary lot that accommodates both cars. The parking lots provide 157 designated parking spaces for automobiles and approximately
six spaces for motor coach buses. For those looking to hike, there are various trails that lead from
the base to the summit area. At the top of Cadillac, The Summit Loop Trail is a popular trail that
spans a half-mile in length. It wraps around a specific area of the summit, providing visitors with
stunning views of the ocean and forest landscapes. Along the Summit Trail are wayside exhibits
that offer information about various features in the viewshed, local geology, and ecology to
enhance the visitors’ knowledge of Acadia.

Due to the rising popularity of Cadillac over the years, in 2015, a National Park Service
(NPS) interdisciplinary workgroup was formed to address issues related to visitor carrying
capacity, public safety, vehicular distribution, and visitor experience in many areas of Acadia,
including Cadillac Mountain (ROD, 2019). During the planning process, heavy traffic congestion
resulted in the closure of Cadillac Summit Road on several occasions (Jacobi, 2016). Eventually,
the NPS workgroup devised the Acadia National Park Transportation Management Plan (TMP),
which was signed and approved in 2019 to address these concerns. The TMP prescribes an
adaptive management approach to evaluate visitor use, including monitoring selected indicators
and thresholds for particular attributes and continuing to refine solutions using best management
practices. An eighteen-day dry run of the vehicle reservation program was conducted in October
2020. This was to help understand the feasibility of implementing the TMP on Cadillac
Mountain and the Ocean Drive Corridor. This pilot study was used to identify additional
facilities and operational services needed before full implementation of a reservation system
starting in May 2021.

Prior research indicates that a lack of proper traffic transportation systems can negatively
influence the public’s overall experience (Strother, 2003; Manning, 2007). Additionally, negative
impacts of natural resources and social factors could be deemed unacceptable to visitors
Management goals are to evaluate and monitor these factors in order to provide a high-quality visitor experience to users in Acadia. In 2021, ANP attracted 4.07 million estimated visits (NPS, 2021), the sixth most visited of the U.S. National Park sites (NPS, 2022) and is a densely visited national park (Pettengill et al. 2012) among others like Cuyahoga Valley, Gateway Arch, Hot Springs, and Indiana Dunes National Park.

Prior to 2020, there were only two parks within NPS that had a timed-entry reservation system for popular sites, including Haleakala National Park and Muir Woods National Monument. During the COVID-19 pandemic, visitors changed the way they recreate in protected areas due to health and safety concerns. Post-2020, more than six national parks implemented a timed-entry reservation system because of prior visitor demand. While reservations were normalized during this time, the managed access systems are here to stay. Despite the growing number of managed access systems, there is limited research in assessing the visitor experience within these systems. During this time, Acadia visitors were avoiding popular destinations and

Figure 1.2: Acadia National Park 2011-2021 Traffic Counts (NPS, 2022)
sought out alternative locations away from crowds. Now, with the implementation of a timed-entry reservation system, this displaces visitors from one area of the park to another (McCool, 2001). Previously visitors were relocating because of health and safety concerns; the reservation system is now displacing users because of transportation congestion factors.

Acadia’s high visitation demonstrated the need to meet current demands and reinvigorate traffic management plans accordingly (Hallo, 2008). Under the current managed access system, the ANP management team monitors for indicators and standards, verifying adaptive management practices are met, and analyzing success (Manning et al., 2011). This demonstrates that visitor use management is an iterative process. Acadia National Park implemented a Cadillac Mountain Summit Road vehicle reservation system for motorized vehicles only from May through October. The managed access system does not completely restrict access to the mountain. Visitors are encouraged to use alternative methods to reach the summit, such as hiking on the trails and biking on the road, at no additional charge to their park pass. We researched all travel methods and their subsequent visitor experience.

The objective of our visitor study was to gather information to evaluate the success of the Cadillac Mountain vehicle summit road reservation system during its first year of implementation. This survey tracks specific metrics of the visitor experience relating to their preferences for the Cadillac Summit Road vehicle reservation system.

Goals: Develop comprehensive baseline research measurements through which Acadia National Park can make management decisions for the current summit road reservation system area.

- Gain insight into the characteristics of Cadillac Summit Road reservation system users at Acadia National Park, including prior trip history, group size, demographic information, and their willingness-to-pay;
• Investigate the reasons and methods visitors use the summit road reservation system, assessing the importance and satisfaction of their experience, as well as evaluating the issues they encountered during their purchasing of a reservation permit;

1.2. Survey Methods

To help understand visitor attitudes towards the Cadillac Mountain Summit Road vehicle reservation system, two identical survey questionnaires were given to visitors through: in-person on-site interception and e-mail contact cards for the online Qualtrics survey. Informed consent and confidentiality were reviewed, and several precautions were taken to ensure the participant data was kept confidential and anonymous. This was completed through safeguarding of paper surveys in a locked room and data storage on password-protected computers only accessible by the private investigators of the survey.

1.2.1. Sampling Strategies

We contacted visitors on and around the Summit Loop Trail from June through August 2021. After the initial pre-testing period (June 2021), there were minor changes to the protocols and survey. The pre-test in June was used to evaluate study weaknesses, question formatting, question phrasing, and survey format. There were many advantages to running the pre-test for this questionnaire. To combat drop-off rates for this survey, it was critical to keep the survey short by using skip logic, instilling page breaks, limiting the number of open-field texts, and leaving sensitive questions until the last page (i.e., demographics and income). Our approach was to use a subset of the population to conduct a systematic random sampling methodology. We sampled all transportation mode types, with personal vehicles as the most common mode by survey respondents.
Our study aimed to include both visitors who had purchased a vehicle reservation permit and those who had not. Non-personal vehicle users include: those who hiked on a trail, rode a bike, walked on the road, took a taxi, rode the Island Explorer bus then hiked a trail, or took a bus tour to the summit. These transportation mode types do not require a reservation permit. We then moved into participant selection; to choose the first visitor we used a random number generator. Thereafter, we interviewed every third visitor. After each participant consented to the study, they had to meet a minimum criterion. Each participant had to be at least 18 years or older and needed to have been on the summit of Cadillac Mountain for 15 minutes or more to take the survey (VSP, 2009).

1.2.2. Season of use

The Cadillac Summit Road is open to motor vehicles from mid-April until the beginning of December. Through the off-season, the summit road can only be accessed by walking, hiking, biking, and different forms of winter recreation. The summer season is classified as June, July, and August, but July and August are the most popular period by volume of visitors to Acadia (NPS, 2021). The 2021 Cadillac Summit Road vehicle reservation system lasted a total of 148 days, with our study sample period encompassing 46%, or 67 days, of that reservation collection period. Dates of collection were from June 22nd, 2021, until August 31st, 2021.

1.2.3. Questionnaire procedures

There were several methods of survey responses from selected visitors. First, there was the in-person paper survey which participants filled out on-site. The second option was an email survey where participants gave the researcher their email address and a survey was sent at a later time through the Qualtrics online platform (Qualtrics, 2021). The third option allowed visitors to submit their email address through a Quick Response (QR) code link from their mobile device.
(Appendix A). To avoid duplicate responses, participants were asked if they had already submitted their email through the QR code link. If they had already provided their email, they were given the option to either complete the in-person survey and forego the online survey through the QR code, or to only take the online survey and not participate in the in-person survey. Visitors who had chosen to complete the in-person survey were introduced to the study background and were handed a Cadillac Mountain visitor survey instrument (Appendix B).

The survey took visitors an average of 15-20 minutes. The longest duration was recorded by a participant that took 45 minutes while waiting for their family. Respondents who purchased a reservation permit were asked more questions than those who took other modes of transportation to the summit. If a selected individual in a group of visitors did not consent to take the survey, then the survey was completed by the willing adult who had the earliest birthday closest to that survey date.

The survey requested information about their visit on that survey day, including questions about their length of visit, type of group, size of the group, prior-trip history to Cadillac, visitor experience on Cadillac Mountain based on importance and satisfaction levels, visitor experiences associated with the reservation system, reservation area fees (willingness-to-pay), and visitor demographics. For willing respondents, email addresses were collected separately from the survey for the raffle drawing of one of five Friends of Acadia one-time annual memberships ($35 value). The drawing was completed in September and October 2021.

Several methods were used to increase the response rate across the sample period (Dillman, 2000 & 2014). Surveys were deployed using open-ended, multiple-choice, and Likert scale. In a 5-point Likert-style scale for importance, ratings were categorized: 1, “Not Important
at all”; 2, “Slightly Important”; 3, “Neutral”; 4, “Important”; 5, “Extremely Important.” In a 5-point Likert-style scale for satisfaction, ratings were categorized: 1, “Extremely Dissatisfied”; 2, “Dissatisfied”; 3, “Neither dissatisfied nor satisfied”; 4, “Satisfied”; 5, “Extremely Satisfied” (Vagias, 2006). The sample size of this research was calculated based on the pre-pandemic visitation figures from 2019. The statistically significant sample size was measured at 385 respondents with a 95% confidence level and 5% margin of error (Vaske, 1984). This is based on the number of estimated visits to Acadia in 2019 (3.43 million according to NPS, 2021).

1.2.4. Recruitment and Participation

A total of 1,501 surveys were completed by respondents, with a majority completed on-site (n=1,278). Additionally, 16 incomplete surveys were excluded from this total. There were 203 on-site refusals of the survey, with 45% of males refusing and 55% of females refusing. The most cited reasons for refusal were lack of time, weather conditions, survey length, the need to use the bathroom, and tiredness. Despite the refusals, most visitors who were invited to participate did so. There were 503 who requested to complete the survey through an email online platform rather than on-site. They were given up to three reminders and this yielded a 44% (n=223) response rate. Survey respondents indicated they accessed Cadillac Mountain summit by personal vehicles (n=1,250), hiking on a trail (n=140), taking a bicycle (n=60), concessionaire bus passengers (n=31), or another transportation type (n=21).

The list of sampling locations at the summit was selected through previously conducted visitor use studies (RSG, 2016). The list of locations (Figure 1.3) was used strategically based on hiking trails entry/exit, commercial operator-based transportation drop-off/pick-up, Summit Loop Trail exit points, and facilities with concessionaire services. The Cadillac Mountain Eco-Store was seldom used as a survey interception point. Specifically, the hiking trails which lead to
the Cadillac Summit include Cadillac North Ridge Trail, Gorge Path, and Cadillac South Ridge Trail. Commercial Use Authorized transportation, primarily in the form of buses, is often used for organized tours, including those for cruise ship passengers. However, due to COVID-19 restrictions, there were only a few cruise ships that visited Bar Harbor, Maine in 2021. During this time, concessionaire bus companies were particularly helpful in collecting passenger email contact cards during their scheduled summit stops.

To ensure inclusivity and capture a range of user types, the visitor survey was conducted during various time slots on each day, with the specific schedule varying across sampling days. Respondents who took the survey in June were included in the analysis, as the formatting changes made to the survey were minor. For July and August, a sample schedule (Appendix C) was developed, and adjustments were made as needed due to adverse weather conditions, important work obligations, and planned absences of the research team.
Figure 1.3: Cadillac Mountain Summit Sampling Locations using Google Earth, 2022

1.2.5 Questionnaire Design

The questionnaire was developed through a collaborative process between the University of Maine faculty, Friends of Acadia staff members, and Colorado State University faculty. The survey requested information about their visit that day, including length of visit, type of group, size of the group, prior-trip history to Cadillac, visitor experience on Cadillac Mountain based on importance and satisfaction levels, visitor experiences associated with the reservation system, reservation area fees (willingness-to-pay), and visitor demographics. For willing respondents, email addresses were collected separately from the survey for the raffle drawing of one of five Friends of Acadia one-time annual memberships ($35 value). The drawing was completed in September and October 2021.
1.2.6 Data Analysis

Responses were organized into general categories to analyze these data; then, statistical tests were performed on personal vehicle visitor survey responses only. All other transportation modes were extrapolated out of the data set. Then using the IBM Statistical Package for Social Science (SPSS), the team conducted statistical tests to examine the descriptive statistics of the survey, including the frequencies, mean, standard deviation, and variances. Finally, to assess the differences in visitor responses, the team treated the 5-point Likert scale responses as means and conducted an analysis of variance (ANOVA) to test for any significant differences in the averages.

1.3. Survey Results and Analysis

In our survey of visitors to Cadillac Mountain, those who used the Summit Road vehicle reservation system perceived it as having a positive impact on their overall experience. It is important to note that our results section only includes visitors who took their personal vehicle to the Cadillac Mountain Summit. The goal of this report was to develop comprehensive baseline research measurements through which Acadia National Park can make management decisions for the current summit road reservation system area. Part of this goal was also to gain insight into the characteristics of Cadillac Summit Road reservation system users at Acadia National Park, including prior trip history, group size, demographic information, and willingness-to-pay. Lastly, to investigate the reasons and methods visitors use the summit road reservation system, assessing the importance and satisfaction of their experience, as well as evaluating the issues they encountered during their purchasing of a reservation permit.
1.3.1. Visitor Use Characteristics

Understanding the characteristics of the visitors allows Acadia NP managers to better tailor the reservation system to meet their needs and preferences over time. In addition, this also helps to understand the potential impacts of the reservation system on different groups of visitors. For example, if visitors who arrive by personal vehicle have different perceptions of the reservation system compared to those who arrive by an alternative mode of transportation, managers may need to take a different approach to address concerns and improve their overall experience. Finally, capturing visitor characteristics allows us to track changes in visitor behavior over time. This information can be used to evaluate the effectiveness of the reservation system and to identify areas for improvement.

1.3.1.1. Demographics

Out of the 1,501 participants, 1,447 disclosed their gender identity, resulting in a response rate of 96% (Table 1.1). The table shows that ~61% of the respondents identified as female, 39% as male, <1% identified as non-binary, genderqueer, or genderfluid, and reported their gender identity was not listed, or written in the category as "other". These findings are consistent with a recent study by Horne et al. (2018) which surveyed several locations in Acadia and found that 59% of respondents identified as female, 40% as male, and 1% preferred not to reply.
<table>
<thead>
<tr>
<th>Visitor Profile</th>
<th>2021 Respondents</th>
<th>2018 Respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Composition (%)</td>
<td>Composition (%)</td>
</tr>
<tr>
<td></td>
<td>(N=)</td>
<td>(N=)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td>59 (858)</td>
<td>59</td>
</tr>
<tr>
<td>Male</td>
<td>39 (557)</td>
<td>40</td>
</tr>
<tr>
<td>Other</td>
<td>1 (13)</td>
<td>N/A</td>
</tr>
<tr>
<td>Prefer not to respond</td>
<td>1 (19)</td>
<td>1</td>
</tr>
<tr>
<td>Age range</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18-30</td>
<td>20 (281)</td>
<td>10.5</td>
</tr>
<tr>
<td>31-50</td>
<td>35 (503)</td>
<td>34.1</td>
</tr>
<tr>
<td>51-70</td>
<td>38 (545)</td>
<td>49.4</td>
</tr>
<tr>
<td>71 and over</td>
<td>7 (91)</td>
<td>6</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than high school</td>
<td>&lt;1 (2)</td>
<td>3.8</td>
</tr>
<tr>
<td>High School diploma or equivalent (e.g., GED)</td>
<td>3 (89)</td>
<td>3.8</td>
</tr>
<tr>
<td>Some college</td>
<td>6 (40)</td>
<td>9.6</td>
</tr>
<tr>
<td>2-year associate degree or trade school</td>
<td>3 (51)</td>
<td>35.9</td>
</tr>
<tr>
<td>4-year college degree</td>
<td>33.5 (503)</td>
<td>50.7</td>
</tr>
<tr>
<td>Advanced degree beyond a 4-year college degree</td>
<td>48.5 (727)</td>
<td></td>
</tr>
<tr>
<td>Prefer not to reply</td>
<td>1 (20)</td>
<td>N/A</td>
</tr>
<tr>
<td>Travel group</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self</td>
<td>4 (62)</td>
<td>4.4</td>
</tr>
<tr>
<td>Family</td>
<td>60 (897)</td>
<td>84</td>
</tr>
<tr>
<td>Friends</td>
<td>10 (155)</td>
<td>10.6</td>
</tr>
<tr>
<td>Partner/Boyfriend/Girlfriend</td>
<td>14 (200)</td>
<td>Co-workers: 0.8</td>
</tr>
<tr>
<td>Organized Tour</td>
<td>1 (10)</td>
<td>Other: 2.7</td>
</tr>
<tr>
<td>Combination</td>
<td>11 (162)</td>
<td></td>
</tr>
<tr>
<td>First time to Cadillac Mountain</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>47.6 (705)</td>
<td>61.2</td>
</tr>
<tr>
<td>No</td>
<td>52.1 (771)</td>
<td>38.8</td>
</tr>
<tr>
<td>I do not remember</td>
<td>0.3 (4)</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Out of the 1,501 participants, 1,420 provided their age demographics, yielding a response rate of 96%. The survey results indicate that 38% of the respondents were between the ages of 50 and 70, whereas 20% were between 18 to 30 years old. The mean, median, and mode of the age of the respondents are 47, 48, and 51, respectively. In comparison, a study by Resource Systems Group (2016) reported different age ranges for visitors, with 31% falling in the age range of 35 to 54 years old, 21% were under 18 years old, 18% were 55 to 64 years old, 16% were 65 years old or older, and 14% were 18 to 34 years old. We are showing this because our study is consistent with the data sets presented. Our survey indicates a higher percentage of younger visitors compared to Horne et al. (2018); one thought is that this is the product of a younger generation who understands technology better than possibly the older generation where this may be a challenge.

Table 1.1 compares the group types of the 2021 Cadillac visitor study to those of the 2018 study conducted by Horne et al. (2018). According to the table, around 60% (n=897) of the Cadillac respondents were traveling with family, 14% (n=200) were with a partner, boyfriend, or girlfriend, 11% (n=162) were traveling with a combination of group types. Among the various combinations, the most common was family and friends, followed by partners and friends. Additionally, 10% (n=155) of the respondents were traveling with friends, 4% (n=62) were traveling alone, and 1% identified as traveling with an organized tour. The comparison of these studies provides valuable insights into understanding the evolving preferences of travelers and can aid managers in developing effective strategies to cater to the needs of diverse visitor groups.

The survey results indicate that the majority (82%) of the Cadillac visitors were highly educated, holding a 4-year college degree or higher, whereas 9% had some college and/or a 2-year degree, 3% had a high school diploma or less, and 6% preferred not to respond. The results
from the 2018 study by Horne et al. (2018) also show high levels of education, with approximately 80 to 85% of respondents holding a degree higher than a high school diploma. Similarly, the study conducted by Daigle and Zimmerman (2003) showed that 85% to 90% had high school diploma or higher, and RSG (2016) demonstrated that 60% to 65% hold degrees higher than a high school diploma.

Our survey respondents' income levels were reportedly high in comparison to other previous studies. The RSG (2016) study showed a lower percentage (15%) of respondents earning $200,000 or more. In contrast, our study recorded twice as many participants that had this high annual income level (30%). According to Beckles and Truman (2005 and 2009), higher income is positively related to education levels, living standards, and access to leisure-time activities. According to Census.gov, Maine's median household income in 2019 was $57,918. However, this higher number with respondents because many visitors are coming from out of state.

![Figure 1.4: Annual Household Income of 2021 Cadillac Mountain Survey Respondents](image1)

![Figure 1.5: Survey Respondents Annual Household Income $200,000 or More by State](image2)
Cadillac Mountain is a popular destination for visitors from both the United States and international countries. The majority of respondents were from Massachusetts (11.5%, n=161), followed by New York (10.4%, n=147), Pennsylvania (8.4%, n=120), New Jersey (6.9%, n=97), and Maryland (4.4%, n=62). Visitors from Ohio and Virginia each comprised 4% of the total, while smaller proportions came from states such as Maine, North Carolina, and Connecticut (Table 1.2). A small percentage of respondents (0.5%) were international visitors from Denmark, France, and Germany. The COVID-19 border restrictions could have discouraged international visitors to Acadia, and subsequently Cadillac Mountain.

<table>
<thead>
<tr>
<th>U.S. State</th>
<th>Number of visitors (N=1,401 individuals)</th>
<th>Percentage of total respondents (The sum equals 100%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Massachusetts</td>
<td>161</td>
<td>11.5</td>
</tr>
<tr>
<td>New York</td>
<td>147</td>
<td>10.5</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>120</td>
<td>8.6</td>
</tr>
<tr>
<td>New Jersey</td>
<td>97</td>
<td>6.9</td>
</tr>
<tr>
<td>Maryland</td>
<td>62</td>
<td>4.4</td>
</tr>
<tr>
<td>Florida</td>
<td>60</td>
<td>4.3</td>
</tr>
<tr>
<td>Ohio</td>
<td>58</td>
<td>4.1</td>
</tr>
<tr>
<td>Virginia</td>
<td>58</td>
<td>4.1</td>
</tr>
<tr>
<td>Maine</td>
<td>56</td>
<td>4.0</td>
</tr>
<tr>
<td>Connecticut</td>
<td>54</td>
<td>3.9</td>
</tr>
<tr>
<td>North Carolina</td>
<td>54</td>
<td>3.9</td>
</tr>
<tr>
<td>Texas</td>
<td>50</td>
<td>3.6</td>
</tr>
<tr>
<td>Michigan</td>
<td>35</td>
<td>2.5</td>
</tr>
<tr>
<td>New Hampshire</td>
<td>35</td>
<td>2.5</td>
</tr>
<tr>
<td>Illinois</td>
<td>33</td>
<td>2.4</td>
</tr>
<tr>
<td>Washington</td>
<td>32</td>
<td>2.3</td>
</tr>
<tr>
<td>Georgia</td>
<td>31</td>
<td>2.2</td>
</tr>
<tr>
<td>California</td>
<td>27</td>
<td>1.9</td>
</tr>
<tr>
<td>Wisconsin</td>
<td>21</td>
<td>1.5</td>
</tr>
<tr>
<td>Tennessee</td>
<td>19</td>
<td>1.4</td>
</tr>
<tr>
<td>Indiana</td>
<td>18</td>
<td>1.3</td>
</tr>
<tr>
<td>Vermont</td>
<td>18</td>
<td>1.3</td>
</tr>
<tr>
<td>Delaware</td>
<td>18</td>
<td>1.2</td>
</tr>
<tr>
<td>Minnesota</td>
<td>16</td>
<td>1.1</td>
</tr>
<tr>
<td>Other 25 states</td>
<td>116</td>
<td>8.2</td>
</tr>
<tr>
<td>International</td>
<td>6</td>
<td>0.4</td>
</tr>
</tbody>
</table>
The size of visitor groups on Cadillac Mountain varied greatly; the majority of groups were composed of two to four individuals (Figure 1.6), with two-person groups representing the largest proportion at 43.4%. Single-person groups comprised 4.2%, while three-person and four-person groups made up 11.3% and 23.2%, respectively. Groups of five to eight people made up 14.9% of respondents, while groups of nine or more accounted for 3%. The mean, median, and mode group sizes were 4, 3, and 2, respectively. RSG (2016) showed a higher percentage of two-person groups, but a lower percentage of groups with four or more members across multiple sampling sites. Our study’s increased in the number of visitors in a group of four or more in a group coincides with our study’s results pertaining to the prevalence of visitors with their families.

Figure 1.6: 2021 and 2016 Visitor Group Sizes
*percentages do not equal 100 due to rounding
2021 CAD study: (N= 1,485) visitor groups - 2016 RSG study: (N= 733) visitor groups
1.3.1.2. First-Time and Repeat Visitors

In this survey, 53% of respondents reported visiting Cadillac Mountain for the first time, while 47% had been there before. A visitor who is coming for the first time may be more inclined to go through the trouble of securing a reservation, whereas a returning visitor who has already been here might prefer to avoid the hassle of obtaining a permit. According to Table 1.3, when looking at average ratings, a top priority for first-time visitors is the opportunity to explore the area at their own pace. When visitors are able to explore the area freely, they can take their time to appreciate the natural beauty, read the interpretative signs, and engage with other visitors. This can lead to a more meaningful and enjoyable experience for visitors, which can ultimately result in a positive, high-quality visitor experience. The current reservation system allows visitors to freely explore the summit at their own pace, as it only requires them to arrive at a designated time and does not monitor their activities or duration on the summit once they enter the system.

Table 1.3: Importance Satisfaction – First-time and Returning Visitor Experiences

<table>
<thead>
<tr>
<th>Attribute</th>
<th>First-Time Visitors</th>
<th>Returning Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unobstructed view of the scenery from the summit</td>
<td>4.4</td>
<td>4.4</td>
</tr>
<tr>
<td>Number of visitors on Cadillac Mountain</td>
<td>3.6</td>
<td>3.8</td>
</tr>
<tr>
<td>The ease/difficulty of finding your way around the summit area</td>
<td>3.6</td>
<td>3.6</td>
</tr>
<tr>
<td>The sense of safety while visiting</td>
<td>3.9</td>
<td>3.8</td>
</tr>
<tr>
<td>The ability to participate in a variety of activities</td>
<td>2.9</td>
<td>2.9</td>
</tr>
<tr>
<td>Freedom to explore the summit</td>
<td>4.3</td>
<td>4.3</td>
</tr>
<tr>
<td>The opportunity to explore at own pace</td>
<td>4.5</td>
<td>4.5</td>
</tr>
<tr>
<td>Alternative transportation options available</td>
<td>2.6</td>
<td>2.7</td>
</tr>
<tr>
<td>Overall experience to your entire ANP visit</td>
<td>3.9</td>
<td>4.0</td>
</tr>
</tbody>
</table>
One of the highest importance and performance average ratings for first-time visitors was their ability to find a parking spot at the summit (Table 1.4). Monitoring this metric of visitor capacity is crucial, especially since this is highlighted in the Transportation Management Plan as very important to park managers and visitors alike. The Cadillac Summit Road vehicle reservation system currently provides visitors with the opportunity to park at two summit lots upon arrival, the east lot and the west lot. The ability to acquire a permit allows visitors easier access to the summit. Returning visitors indicated that access to the summit and the acquisition of a reservation permit was very important to their experience. Visitors provided open-ended comments that highlighted the positive impact of having a system that allows for assured access, which was previously unpredictable at times.

Table 1.4: Importance Satisfaction – First-time and Returning Reservation Visitor Experiences

<table>
<thead>
<tr>
<th>Attribute</th>
<th>First-Time Visitors</th>
<th>Returning Visitors</th>
</tr>
</thead>
<tbody>
<tr>
<td>The time it takes to get through the Cadillac Mountain entrance booth</td>
<td>3.4  4.5</td>
<td>3.4  4.5</td>
</tr>
<tr>
<td>Rate of traffic flow on the roadway</td>
<td>3.6  4.5</td>
<td>3.8  4.5</td>
</tr>
<tr>
<td>Feeling safe on the roadway to the summit</td>
<td>4.1  4.5</td>
<td>4.1  4.5</td>
</tr>
<tr>
<td>Assured access to Cadillac Mountain when otherwise not possible due to road closures to the summit</td>
<td>3.8  4.1</td>
<td>3.8  4.2</td>
</tr>
<tr>
<td>Finding a parking spot at the summit</td>
<td>4.3  4.4</td>
<td>4.3  4.4</td>
</tr>
<tr>
<td>Assurance of having a reservation permit to visit Cadillac Mountain</td>
<td>4.2  4.4</td>
<td>4.2  4.4</td>
</tr>
<tr>
<td>Safety in the parking lots at the summit</td>
<td>4.0  4.5</td>
<td>4.0  4.5</td>
</tr>
</tbody>
</table>

1.3.1.3. Travel Modes.

Table 1.5 displays the breakdown of visitors' modes of transportation used to reach the summit of Cadillac Mountain. For analysis purposes in the remainder of this report, Personal
Vehicle and Motorcycle users were combined (83.5%), bicycle and electric bicycle were combined (4%), and hiking on a trail and the option of using the Island Explorer then hike were also combined (10.4%). Most survey respondents reported using their personal vehicle (83.2%) among the nine available options during their trip to Cadillac Mountain. Approximately 9% of visitors indicated they were hiking on a trail and approximately 4% stated they were biking on the road. Taking a bus on a tour operator bus was a less frequently used mode of transport among the available options (3.5%). A combination of transportation modes was reported by less than 1% of visitors.

<table>
<thead>
<tr>
<th>Mode of Transportation</th>
<th>Number of Respondents (n=)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personal Vehicle</td>
<td>1,250</td>
<td>83.2</td>
</tr>
<tr>
<td>Hiking on a trail</td>
<td>140</td>
<td>9.3</td>
</tr>
<tr>
<td>Bicycle</td>
<td>60</td>
<td>3.9</td>
</tr>
<tr>
<td>Tour Operator</td>
<td>31</td>
<td>2.1</td>
</tr>
<tr>
<td>Island Explorer then hike</td>
<td>17</td>
<td>1.1</td>
</tr>
<tr>
<td>Motor Coach/Small buses</td>
<td>4</td>
<td>0.3</td>
</tr>
<tr>
<td>Motorcycle</td>
<td>3</td>
<td>0.2</td>
</tr>
<tr>
<td>Electric Bicycle</td>
<td>1</td>
<td>0.1</td>
</tr>
<tr>
<td>Combination</td>
<td>15</td>
<td>0.9</td>
</tr>
</tbody>
</table>

*does not round to 100, some visitors selected multiple answers

Nearly all survey respondents (96%) reported that they took their preferred mode of transportation to reach Cadillac Mountain. The remaining 4% indicated that they did not take their preferred alternative modes of transportation. Table 1.6 presents a crosstabulations report of two variables: group size and mode of transportation used to reach Cadillac Mountain. Solo travelers were more likely to use alternative transportation modes to Cadillac summit over their personal vehicle. One respondent, an outlier in the survey, who used an electric bicycle, stated that their group size of nine or more was an organized tour bicycle group. Table 1.6 illustrates a comparison of group sizes of visitors between the current study and the RSG study conducted in 2016. We broke down these metrics further between first-time and repeat users. For first-time
visitors, the breakdown of group sizes was as follows: 2.7% were solo travelers, 44% were in
two-person groups, 10.7% were in three-person groups, 24.1% were in four-person groups,
14.6% were in groups of five to eight people, and 2.6% were in groups of nine or more. Among
returning visitors, 4.7% were traveling alone, 40.3% were in two-person groups, 11.6% were in
three-person groups, 25.5% were in four-person groups, 15.2% were in groups of five to eight
people, and 2.7% were in groups of nine or more. Overall, metrics of group size between first-
time and repeat users are almost identical, with a higher percentage of solo travelers and groups
of five or more among repeat visitors.

*Table 1.6: Mode of Transportation and Visitor Group Size *rows do not add up to 100% due to rounding*

<table>
<thead>
<tr>
<th>Group Size</th>
<th>% Personal Vehicle</th>
<th>% Hiking</th>
<th>% Bicycle</th>
<th>% IEX then hike</th>
<th>% Tour Operator</th>
<th>% Electric Bicycle</th>
<th>% Motor Coach/Small bus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>50.8</td>
<td>17.5</td>
<td>27</td>
<td>3.2</td>
<td>1.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>85.2</td>
<td>9.5</td>
<td>2.5</td>
<td>0.8</td>
<td>1.9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>79.8</td>
<td>14.9</td>
<td>3.6</td>
<td>0.6</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>86.6</td>
<td>8.4</td>
<td>2</td>
<td>0.6</td>
<td>1.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5 to 8</td>
<td>88.2</td>
<td>7.3</td>
<td>2.7</td>
<td>0.5</td>
<td>1.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9+</td>
<td>77.8</td>
<td>6.7</td>
<td>2.7</td>
<td>8.9</td>
<td>2.2</td>
<td>4.4</td>
<td></td>
</tr>
<tr>
<td>Average*</td>
<td>78%</td>
<td>10%</td>
<td>7%</td>
<td>1%</td>
<td>3%</td>
<td>&lt;1%</td>
<td>&lt;1%</td>
</tr>
</tbody>
</table>

Figure 1.7 illustrates the self-reported length of stay by visitors on Cadillac Mountain. On
average, visitors spend 1-2 hours at the summit. Tour operators typically spend no more than one
hour at the summit, which is in line with their timed tours. For example, a basic package tour
may spend only 15-20 minutes at the summit, while more extended tours may spend 45 minutes
to one hour at the summit (Oli’s Trolley, 2021). The average length of stay of one to two hours is
primarily attributed to personal vehicle usage, while those who spend three hours or more at the
summit are typically hikers on Cadillac’s hiking trails.
In 2019, prior to the implementation of the Cadillac Summit Road vehicle reservation system, the average length of stay for personal vehicles was calculated by Acadia staff using a trail camera. The camera took photographs in 1-minute intervals during sunlight hours from May to October 2019. The highest percentage of visitors staying for longer than one hour were during the mid-afternoon timeframes (10:00 am to 2:00 pm) n=809, 9.4% and mid-evening (2:00 pm to 6:00 pm) n=540, 6.3%. However, in our research, many visitors self-reported a longer duration of stay on the summit (Figure 1.7), with the most frequent reported length of stay was two hours. According to the 2019 study, the average duration of stay was 35-45 minutes (Figure 1.8). It should be noted that the 2019 camera study did not consider the total time it took visitors to drive up the summit road or make additional stops prior to reaching their final parking place, which are factors visitors might consider when self-reporting.

Figure 1.7: 2021 Total Self-Reported Hours Spent on Cadillac Mountain Summit
Figure 1.8: Duration of Stay (in hours) - 2019 Cadillac Summit Parking Lot Camera Study
1.3.1.4. Important and Satisfaction Attribute Analysis

The popularity and growth of Acadia as an attraction has surged automobile traffic usage. Specifically, on Cadillac Mountain, this has raised several issues related to visitor safety, transportation, and access, all of which can impact visitor satisfaction in Acadia. Respondents expressed strong importance for their safety on the summit road, rating it as a matter of “extremely important” (33%) or “important” (50%), and reported “extremely satisfied” (55%) or “satisfied” (40%) as seen in Figures 1.10 and 1.11. The introduction of National Park Service entrance booths has helped regulate vehicular flow on the summit road, resulting in a short delay between vehicles ascending the summit road. Respondents rated the flow of traffic on the summit road as “extremely important” (17%) or “important” (54%) and reported their experience
as “extremely satisfying” (54%) to “satisfied” (40%). As seen in Figures 1.12 and 1.13. Visitor comments revealed that safety concerns were a major issue prior to the implementation of the vehicle reservation system. One visitor stated,

"[w]e went to the summit for sunrise last year before the reservation system, and the line of parked cars extended well down the road from the summit. I could see how this is a safety issue and why the reservation system is needed [...]”.

Despite the challenges of high visitation, the reservation system has a positive impact on visitor safety during peak times and is important to visitors.

![Figure 1.10: Level of Importance – Sense of Safety on the Roadway](image1.png)

![Figure 1.11: Level of Satisfaction - Sense of Safety on the Roadway](image2.png)
The importance of assured access options to the Cadillac Summit Road was also highly rated highly by respondents. The visitors indicated that assured access was deemed as “extremely important” (23%) to “important” (43%), and their satisfaction ranking was “extremely satisfied” (41%) to “satisfied” (33%) as seen in Figures 1.14 and 1.15. Respondents also rated the number of visitors to the summit as “extremely important” (20%) to “important” (50%) and expressed this variable as “extremely satisfied” (29%) to “satisfied” (41%) as seen in Figures 1.16 and Figure 1.17.
Visitors indicated that the variety of activities was “important” (28%) to “extremely important” (7%) to their visit (Figure 1.21). Additionally, respondents rated their satisfaction with the variety of activities as "satisfied" (33%) to “extremely satisfied” (18%), as seen in
The availability of alternative transportation options was highly rated by visitors (Figure 1.20 and Figure 1.21). This aligns with previous research indicating that visitors generally support alternative transportation systems, but still prefer to use their personal vehicles within Acadia National Park (Pettebone, 2011). It is worth noting that in 2021, the percentage of visitors entering Acadia in personal vehicles was as high as 98%, compared to 90% in pre-pandemic times (IRMA, 2021).

Figure 1.18: Level of Importance - Variety of Activities

Figure 1.19: Level of Satisfaction - Variety of Activities

Figure 1.20: Level of Importance - Alternate Transportation Options Available

Figure 1.21: Level of Satisfaction - Alternate Transportation Options Available
1.3.1.5. Method of Learning

Our study examined visitors' perceptions of the managed access system from the time they learned about it until the time of their purchase. This analysis seeks to identify opportunities for improving pre-trip planning and outreach efforts by Acadia National Park managers. Out of the 1,092 respondents (Figure 1.22), the majority of visitors reported that they became aware of the vehicle reservation system through the Acadia National Park website (46%), followed by word of mouth (22%). Additionally, 119 comments fell under the "other" category, in which visitors reported that NPS park rangers informed them about the vehicle reservation system. Furthermore, signs along the roadway were noted as playing a role in educating visitors about the permit required to enter the managed access system. These findings provide insights into the various channels through which visitors learned about the reservation system. This information can guide the park in developing its outreach and communication strategies.

Figure 1.22: Percent of Reservation Holders Learning Methods of the Reservation System
1.3.1.6. Method of Learning and First-Time Visitors

First-time users of Cadillac (N=511), 44% (n=225), learned about the managed access system primarily through the ANP website (Figure 1.23). Mixed-mode learning accounted for 19.4% (n=99) of the cases, mainly a combination of the ANP website, word of mouth, and other sources. Furthermore, word of mouth was the primary source of information for 17.8% (n=104) of first-time visitors learning about the vehicle reservation system. The remaining 21.7% (n=133) of first-time visitors learned from other sources, including the ANP Visitor Center, lodging establishments, social media, calling ANP phone lines, multimedia, and newspapers/press.

Figure 1.23: Percentage of Returning and First-Time Visitors Learning about the Reservation System

*Numbers do not add up to 100% due to rounding
1.3.1.7. Learning and Purchasing a Reservation Permit

According to Figure 1.24, reservation holder users reported learning about the Cadillac Summit Road vehicle reservation system between 1 to 3 weeks (19%) and 1 to 2 months (26%) before their trip, as a part of their pre-trip planning. On average, visitors purchased the permit for within the 0 to 23 hours (29%) and 24 to 47 hours (29%) windows before their trip. This is in line with when Acadia releases its permits, 30% ninety days ahead of time and 70% are available for purchase at 10 (ET) two days in advance of the reservation date. These self-reported figures are consistent with the 2021 data from www.recreation.gov, which shows that on average 42% of permits for Cadillac were purchased on the same day (recreation.gov, 2021).

Table 1.9 displays the percentage of visitors who learned about the reservation permit, with conditional formatting colors indicating higher percentages as darker and lower percentages as lighter colors. Results show that within the 0 to 23 hour timeframe, visitors rely heavily on the Acadia NP website, the visitor center, and "other" sources, which mainly refer to ANP ranger information exchange. However, within 24 to 47 hours, visitors tend to rely more on visitor

![Figure 1.24: Percent of Reservation Holders Learning and Purchasing Cadillac Mountain Reservation Permit](image-url)
centers and "other" sources. As visitors prepare for their trip, the word-of-mouth column shows an increase as Acadia releases 30% of the reservations up to 90 days in advance. These findings suggest that visitors seek information well in advance of their trip, and the Acadia National Park website is the primary source where they can obtain information and plan their visit accordingly. Thus, the park could consider strengthening its website content and design to ensure visitors have access to the information they need. Additionally, it may be beneficial to leverage word-of-mouth through social media or other channels to enhance outreach efforts and encourage visitors to plan their trip with ease.

Table 1.7: Cross Tabulations: Method of Learning and Time Learned about Reservation System (Percent)

<table>
<thead>
<tr>
<th>Method</th>
<th>0-23 hours</th>
<th>24-47 hours</th>
<th>2 days - 6 days</th>
<th>1 - 3 weeks</th>
<th>1 - 2 months</th>
<th>3+ months</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANP Website</td>
<td>3.4%</td>
<td>3.5%</td>
<td>3.7%</td>
<td>11.1%</td>
<td>14.2%</td>
<td>9.7%</td>
<td>45.6%</td>
</tr>
<tr>
<td>Word of mouth</td>
<td>2.3%</td>
<td>2.4%</td>
<td>2.6%</td>
<td>4.1%</td>
<td>4.7%</td>
<td>3.5%</td>
<td>19.5%</td>
</tr>
<tr>
<td>Other (Figure 1.29 pie chart)</td>
<td>3.7%</td>
<td>1.2%</td>
<td>0.9%</td>
<td>0.3%</td>
<td>0.9%</td>
<td>1.4%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Mixed modes</td>
<td>0.7%</td>
<td>0.6%</td>
<td>0.9%</td>
<td>0.9%</td>
<td>2.4%</td>
<td>2.6%</td>
<td>8.2%</td>
</tr>
<tr>
<td>ANP VC</td>
<td>3.2%</td>
<td>1.1%</td>
<td>0.6%</td>
<td>0.5%</td>
<td>0.1%</td>
<td>0.1%</td>
<td>5.5%</td>
</tr>
<tr>
<td>Social Media</td>
<td>0.3%</td>
<td>0.4%</td>
<td>0.3%</td>
<td>0.7%</td>
<td>1.1%</td>
<td>2.0%</td>
<td>4.8%</td>
</tr>
<tr>
<td>Lodging Establishments</td>
<td>0.5%</td>
<td>0.5%</td>
<td>0.6%</td>
<td>1.0%</td>
<td>1.6%</td>
<td>0.5%</td>
<td>4.5%</td>
</tr>
<tr>
<td>Newspaper/Press</td>
<td>0.2%</td>
<td>0.0%</td>
<td>0.1%</td>
<td>0.3%</td>
<td>0.5%</td>
<td>0.6%</td>
<td>1.7%</td>
</tr>
<tr>
<td>Multimedia (YouTube, blog, etc.)</td>
<td>0.2%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.3%</td>
<td>0.2%</td>
<td>1.0%</td>
</tr>
<tr>
<td>Calling ANP</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.1%</td>
<td>0.0%</td>
<td>0.2%</td>
<td>0.2%</td>
<td>0.8%</td>
</tr>
<tr>
<td>Total</td>
<td>14.6%</td>
<td>9.9%</td>
<td>9.9%</td>
<td>19.1%</td>
<td>25.9%</td>
<td>20.7%</td>
<td>100.0%</td>
</tr>
</tbody>
</table>
Regarding prior experience with vehicle reservation systems, most respondents (66%) reported that they had not entered another managed access system in a U.S. National Park prior to their visit to Cadillac. This may be attributed to the fact that, prior to 2020, there were only two managed access systems in the NPS. As a result, reservation systems are new to both the NPS and the general public. Consequently, there is limited research on the visitor experience within a managed access system. Additionally, 32% of respondents reported prior experience with other managed access systems, while two percent were unsure if they had ever entered a reservation system before. These findings underscore the importance of examining visitors’ perceptions of the reservation system, as well as identifying opportunities for improvement in pre-trip planning and outreach efforts.

1.3.1.8. Issues with Obtaining a Reservation Permit

According to our survey of reservation-holder respondents, more than half (58%) indicated no issues obtaining a reservation permit (n=634), while the others (42%) reported issues, as seen in Table 1.8 (n=449). As respondents were allowed to select multiple options, the total percentage exceeded 100%. Of all the reported problems, the unavailability of their preferred time slot or day was the most frequent issue encountered (42%). Specifically, visitors with one issue to report were more likely to mention that their first choice of time slot or day was unavailable. In Acadia National Park, cellular service is very limited. In saying this, it is not surprising, the second most common problem was related to limited cellular service (31%). Third was “other” (Figure 1.25). More specifically, the category "cellular data was limited" was the most frequently mentioned from 6 am to 6 pm, an all-day issue. A majority of visitors claimed one issue (63%) and the remaining (37%) claimed two or more issues with obtaining a reservation. Over one hundred respondents selected other issues regarding permits. Most of these
comments are variations of the options mentioned, expressing their emotions about the permit acquisition process, difficulties printing the reservation QR code for entry, limited availability around the sunrise reservation, and purchasing multiple permits to ensure a spot.

Table 1.8: Respondents Issues to Obtaining a Reservation for Cadillac Mountain

<table>
<thead>
<tr>
<th>Issues (N=449)</th>
<th>n</th>
<th>%*</th>
</tr>
</thead>
<tbody>
<tr>
<td>First choice of time slot or day was unavailable</td>
<td>276</td>
<td>42</td>
</tr>
<tr>
<td>Limited cellular data</td>
<td>208</td>
<td>31</td>
</tr>
<tr>
<td>Other</td>
<td>118</td>
<td>26</td>
</tr>
<tr>
<td>The Recreation.gov website did not work for me</td>
<td>64</td>
<td>10</td>
</tr>
<tr>
<td>Missed my time slot</td>
<td>53</td>
<td>8</td>
</tr>
<tr>
<td>Was not able to find information about the reservation system</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>Obtained wrong information about the reservation system</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>The Recreation.gov website was frustrating</td>
<td>1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

*Percentages exceed 100%; some visitors reported multiple issues

Figure 1.25: Top Comments Relating to “Other” Visitor Issues with Obtaining a Reservation
Many visitors had positive feedback on the timed-entry reservation system, citing the convenience of purchasing ahead of time and avoiding long lines of traffic. However, some expressed disappointment in not being able to secure a reservation for their preferred time, especially for the popular sunrise block. Acadia had anticipated this outcome as part of their strategy to redirect visitors from high-traffic times to other periods, thereby distributing visitors more evenly throughout the day for a safer and more enjoyable experience. Below are examples of written comments provided by these visitors.

“It was a very frustrating experience to try to get (and never get) sunrise tickets.”

“Would like more availability for sunrise/sunset.”

“Cadillac Mountain is the most important place to visit at ANP. I was disappointed not to be able to get a sunrise reservation.”

“I appreciated the reservation system because I appreciated not having to deal with a line of traffic up the mountain and knowing that when I got to the top, I could park and enjoy my time before the sunrise than worrying about whether I would find a parking space. I also liked that some permits were not released until 2 days prior to the intended visit so that people like me, who didn’t even know I could come to Acadia until less than a month before our visit, still had the possibility to visit the summit.”

Despite these barriers to obtaining a reservation permit, visitors still found ways to enjoy their experience. Additionally, some visitors appreciated the flexibility of the reservation release times, which allowed them to plan their visit even on short notice. Based on internal figures from www.recreation.gov, the 2021 season saw high demand for sunrise block reservations, with 99.5% sold, and a majority of daytime block reservations sold, with 83% sold overall and 94%
sold between 10:00 and 19:00. Figure 1.30 and visitor comments also suggest that many visitors are interested in experiencing the sunrise and sunset at Cadillac, which are in high demand. Connectivity issues were a significant challenge for visitors in obtaining reservations, as noted in the visitor comments.

“I had trouble getting a sunrise pass so we took the next best slot at 6:30 AM. Our internet wasn’t great at our rental so filling out the form was problematic and there was so much to fill out on the site to complete registration. A suggestion is to inform a guest they should register oneself well in advance of securing a time slot. Also, the 10 AM registration time is inconvenient if one wants to hike early because there is no internet in the park. We really had to work around the registration time.”

According to the survey, visitors who had been to Cadillac Mountain before indicated visiting once prior to their current trip (36%), twice (12%), three times (9%), four to six times (16%), seven to ten times (8%), and more than eleven times (19%). The majority of respondents who reported more than eleven visits mentioned being a local, having visited for many years, or residing in the area. In the case of visitors who reported visiting Cadillac Mountain multiple times, 40% indicated an improvement in their experience during their last visit (Figure 1.30), citing reasons such as better parking, reduced congestion, less crowding, and an overall improved experience. Conversely, 43% reported their experience remained the same, while 13% stated their visit did not improve from prior visits (Figure 1.31). Notably, 4% of respondents did not recall their experience. Visitors who experienced a decline in their visit attributed it to factors such as inclement weather, parking difficulties at trailheads, excessive crowding, and dissatisfaction with the Cadillac Summit Road timed-entry vehicle reservation system, which is beyond the control of National Park Service managers.
The present study analyzed open-ended comments from visitors comparing their previous trip to Cadillac Mountain with their most recent visit within the managed access system. A word cloud (Figure 1.26) was generated using 97 comment themes. The results indicate that most visitors (n=23) found the Cadillac Summit Road reservation system to be beneficial, making their visit easier by reducing congestion, traffic on the road, and providing a favorable reservation experience. Additionally, visitors reported that the parking situation was more manageable (n=22) and there was less crowding (n=16), which contributed to their positive experience. Some visitors also expressed appreciation for good weather (n=7), the opportunity to spend time with others (n=3), and the scenic beauty (n=3) during their visit.

*Figure 1.26: Word Cloud Positive Themes: Visitors Comparing their Last Trip to this Trip (N=97)*

On the other hand, the word cloud analysis (Figure 1.27) of negative visitor experiences within the managed access system revealed that visitors reported a less enjoyable experience due to a range of factors. The most frequently cited reasons for dissatisfaction was the perceived crowding at Cadillac Mountain Summit (n=9) and difficulty obtaining a reservation permit (n=6). Other negative factors included unfavorable weather conditions (n=5), general...
disapproval of a timed-entry reservation system (n=5), excessive traffic (n=3), heightened stress levels (n=3), parking difficulties (n=2), safety concerns for cyclists (n=2), and objection to reservation fees (n=1). It is important to mention that the number of positive comments was more than twice the number of negative comments. Some negative comments, such as those about the weather, were beyond the control of park management.

Additional visitor comments do elaborate on a few key concepts from Figure 1.31. The negative theme visitor comment “no safety for cyclists” has voices, mainly from repeat cyclists that, are in conjunction with driver distracted driving. These comments below give examples where drivers made cyclists feel unsafe with their actions, therefore concerned for their personal safety. Many comments suggested more signs and having park rangers tell visitors to watch for bicyclists.

“I biked up to Cadillac Mountain. Some cars were respectful; others went too fast and did not consider the 3 feet. [...] More E-bikes are on the road and most of them have never
ridden a bike. So some stupidity going downhill. Becoming dangerous whether on a bike or E-bike.”

“I think there could be improved road signage on the road to the summit reminding cars to "share the road" with cyclists (and around the park loop road in general). At least on the scenic pullouts on the summit road, a sign that reads something like "look for cyclists/pedestrians before pulling in/out" would help me feel safer. I cannot tell you how many times a car has just pulled out of one of those without looking first, and I have had to swerve out of the way or slam on my brakes. [...]”

The issue of driver hostility towards cyclists remains a significant problem, compounded by a lack of awareness of cyclists' legal right to use the entire lane. On the park loop road, the real danger is posed not by cyclists but by numerous drivers distracted by taking photographs while driving, texting on their phones, or passing cyclists in blind corners. A greater understanding of how drivers and cyclists can safely share the road is needed among both park staff and visitors. Despite concerns about safety, many bicyclists reported having a positive experience, with many citing the benefits of the reservation system, such as "fewer cars on the roadway" and "respectful drivers." For instance, one visitor commented,

“Rode bike up to the top with my daughter-- have done this before- Appreciated the spacing of car traffic (due to the reservation system) as a safety measure of benefit to road bike riders.”

“A great system. The second time, we biked up during daytime, and the cars coming up and down the road were intermittent and not much of a bother, which was amazing. The crowds
at the top were manageable. This was a huge change from years past, when we would hike Cadillac to avoid the road, and spend very little time at the summit because of the crowds.”

1.3.1.9. Time Slot and Number of Visitors

Our research investigated the relationship between the time-of-day visitors were present at Cadillac Mountain and their satisfaction level regarding the number of visitors at the summit. This measure is particularly important since the reservation system only regulates the number of vehicles accessing the summit road and not the number of people. The findings revealed that visitors who arrived during the sunrise block reported feeling "extremely satisfied" (30%) to "satisfied" (44%) with the number of visitors they encountered. Visitors who came after sunrise, so between 6 am and 10 am, also reported feeling "extremely satisfied" (43%) or "satisfied" (45%) with the number of visitors. Conversely, visitors who arrived between 10 am to 2 pm, which is typically a busy time in Acadia, reported feeling less satisfied with the number of visitors, with their ratings as "extremely satisfied" (27%) to "satisfied" (47%).

Visitors who arrived between 2 pm to 6 pm expressed high levels of satisfaction with the number of visitors as "extremely satisfied" (32%) to "satisfied" (50%). Finally, visitors who arrived between 6 pm to sunset also reported feeling "extremely satisfied" (37%) to "satisfied" (40%). Overall, the results suggest that visitors are generally more satisfied with the number of other visitors during low usage times, such as mid-morning from 6:00 am to 10:00 am and mid-afternoon from 2:00 pm to 6:00 pm, while the busiest times, including sunrise, mid-day, and sunset, tend to have lower satisfaction ratings.
1.3.1.10. Willingness-to-Pay (WTP)

Participants were requested to indicate their level of willingness-to-pay (WTP) and maximum willingness-to-pay (MWTP) for a one-time reservation permit to Cadillac Mountain. This metric did not include the Acadia National Park entry pass that is required for all visitors entering the managed access system. The WTP and MWTP were assessed through two questions that were presented to the respondents. The first question pertained to the visitor's hypothetical WTP and presented a predetermined nominal expense ranging from $10 to $40 (Appendix A). The cost of a one-time reservation permit, which includes the reservation for Cadillac and the administrative fee for recreation.gov, is $6 in total, regardless of the selected time slot.

The travel cost method (TCM) is a way to determine the value of a recreational site by considering both the transport cost and opportunity costs associated with traveling to the site (Arin & Kramer, 2002). The value of recreation is influenced by factors such as visitor demographics, distance from home, substitutability, and available infrastructure. If a visitor lives further away, their WTP must exceed their opportunity cost. When visitors arrive at Acadia, they reveal their preference to pay the amount required to access the Cadillac Summit Road. Pratt (1996) notes that people are often willing to pay more for a reduction in risk, such as improved parking availability and safety at the summit of Cadillac. Maximum willingness-to-pay (MWTP) refers to the highest amount an individual or group is willing to pay for a particular good or service. In the case of the Cadillac Mountain Summit Road Vehicle Reservation System, visitors' total WTP is divided between their travel costs to Acadia and the reservation fee for access to the summit road.
The data in Figure 1.28 indicates the percentage of personal vehicle (PV) users who reported their WTP for a one-time reservation permit. The results show that around 80% of PV visitors are willing to pay $10, about 70% are willing to pay $15, approximately 50% are indifferent to paying $20, and less than half are unwilling to pay between $25-$40 for the reservation permit.

A survey conducted by the Worcester Polytechnic Institute (WPI) gathered responses from 99 visitors on their WTP for a proposed reservation system. The study revealed that the average amount visitors were willing to pay (WTP) per reservation was $5, although some respondents...
indicated a willingness to pay as much as $20, with the highest submitted amount being $50. In 2017, the distribution of visitor willingness-to-pay was evenly spread, with 22% of visitors unwilling to pay a fee, 24% willing to pay $5, 23% willing to pay $15, and 12% willing to pay $20 or more.

A survey conducted by the Worcester Polytechnic Institute (WPI) gathered responses from 99 visitors on their WTP for a proposed reservation system. The study revealed that the average amount visitors were willing to pay (WTP) per reservation was $5, although some respondents indicated a willingness to pay as much as $20, with the highest submitted amount being $50. In 2017, the distribution of visitor willingness-to-pay was evenly spread, with 22% of visitors unwilling to pay a fee, 24% willing to pay $5, 23% willing to pay $15, and 12% willing to pay $20 or more.
As we see in Figure 1.29, hikers have a lower WTP than those who took their vehicles to the summit. It is worth noting that the lower WTP of hikers may be due to a number of factors, including their perceived value of the experience and the level of physical effort required. Additionally, the fact that personal vehicle users are the only transportation type that requires a permit to reach the summit may contribute to the higher WTP of this group, as they are willing to pay for the added convenience and exclusivity of being able to drive to the top. However, it is
important to keep in mind that the higher WTP of vehicle users may also be influenced by other factors such as income level and travel distance. Further research could explore these factors in greater depth to gain a more comprehensive understanding of visitor WTP at Cadillac Mountain.

1.3.1.1. Maximum Willingness-to-pay by Income (MWTP)

Research has shown that WTP tends to increase with household income as a normal or luxury good (Baumgartner et al., 2017). Table 10.1 shows that for Cadillac visitors' maximum willingness-to-pay (MWTP), as MWTP increases, so does the annual income. When focusing on the shading in the $10 to $35 row, it is clear that, on average, most visitors are willing-to-pay more than the current permit price, regardless of income level. The income bracket of $0 to $99,999 has the highest percentage of $0 and $1 to $9, whereas the income bracket of $200,000 or more has a greater number of responses in the $40 or more category. For reference, a $10 permit is just under twice the value of the current permit price, which is $6. Visitors are clearly indicating with their spending that they are willing to pay to enhance their experience when visiting Cadillac Mountain.

| Table 1.9: Cross-tabulation results of Income and Maximum Willingness-to-Pay (N=1,094) |
|---------------------------------------------|-----------------|-----------------|-----------------|
| MWTP/Salary                                | $0 to $99,999   | $100,000 to $199,999 | $200,000 or more |
|                                            | (n=351)         | (n=377)          | (n=366)         |
| $0                                         | 8.5%            | 7.7%             | 4.6%            |
| $1 to 9                                    | 14.2%           | 12.2%            | 11.5%           |
| $10 to $35                                 | **70.1%**       | **71.1%**        | **69.9%**       |
| $40 and over                               | 7.1%            | 9.0%             | 13.9%           |
In regard to visitors’ WTP for a reservation permit, many respondents indicated a WTP of zero dollars (N=87), with the most common reason being that they “already pay through other means” (n=41). Other reasons included objecting to the method of payment through a per vehicle user fee (n=13), not wanting to place a dollar amount (n=12), stating their perceived value (n=2), and providing other reasons (n=19). The "other" comments featured various themes, such as suggesting an all-inclusive price with the summit road reservation system and the ANP park pass, using alternative transportation that is naturally reservation fee-free, and concerns about equity regardless of their ability to pay extra fees.

In terms of visitor demographics, Figure 1.30 shows that first-time visitors (n=633) and returning visitors have similar maximum WTP thresholds. However, returning visitors (n=734) had a higher percentage of lower fee maximums, such as $0 to $6, while first-time visitors had a higher percentage of maximum fees between $15 to $30 overall. Additional research could investigate the potential effects of various pricing strategies based on variables determined by ANP managers. An example of such a pricing model is congestion pricing, where a surcharge is applied during peak periods of demand.
1.4. Management Implications

Our study indicates that the reservation system provides a safe and enjoyable experience for most Cadillac Mountain visitors. The system ensures that park resources and values are protected while visitors are enjoying a high-quality experience at the summit. Various visitor groups prioritize different experiences, such as natural surroundings, personal, and social interactions, while others prioritize elements such as the natural environment, exploration, and solitude. According to Manning's (1999) definition, satisfaction results from the consistency between expectations and outcomes. An analysis of "importance-satisfaction" demonstrates that many of the primary experiences rated as very important elicited a similarly high satisfaction rating. Acadia managers appear to be catering to diverse interests and abilities by providing a well-rounded mix of recreational experiences.
In relation to transportation-related attributes, most visitors’ satisfaction ratings consider their sense of safety as being “extremely important” (33%) or “important” (50%) and satisfaction as “extremely satisfied” (55%) and satisfied (40%). Most visitors rated finding a parking spot as “very important” (48%) or “important” (44%) and satisfaction as “extremely satisfied” (52%) and satisfied (41%). In relation to social-related attributes, most visitors’ satisfaction ratings consider their ability to explore at their own pace as “very important” (58%) or “important” (39%) and satisfaction as “extremely satisfied” (67%) and satisfied (30%). Most visitors rated the numbers of visitors on Cadillac Mountain as “very important” (20%) or “important” (51%) and satisfaction as “extremely satisfied” (32%) and satisfied (47%). The highest proportion of “slightly important” or “not at all important” ratings by visitors were a variety of activities (30%) and alternative transportation options available (40%). Overall, a high percentage of visitors rating their overall trip experience in the reservation system as “very satisfying” (54%) or “satisfying” (38%) should be encouraging to management and future visitors to the site. This level of visitor satisfaction supports the importance of stewardship in protecting this valuable resource for the people of Maine and many who come from away to visit.

More than half of the participants in our study were first-time visitors. In response to the increasing number of first-time visitors, measures are being implemented to facilitate easy access to the Cadillac Summit for both new and returning visitors. As transportation to Cadillac Mountain requires logistical planning, providing visitors with more access options, such as guides, may help in attracting more visitors. Our study revealed that first-time visitors primarily learned about the reservation system through the ANP website (44%), word of mouth (20%), or a combination of both (20%). A slightly higher proportion of first-time visitors learned about the reservation system through the Hull’s Cove Visitor Center, word of mouth, and their lodging
accommodations compared to returning visitors. This is expected as most first-time visitors seek advice from friends and family before their trip or inquire at their accommodations after arriving.

Our study identified several specific management implications for improving the visitor experience at the Cadillac Summit. Numerous visitors, including first-timers and returning visitors, have requested improvements such as better cellular coverage to access the recreation.gov interface and increased availability of time slots during peak hours.

The results indicated that 40% of returning visitors to Cadillac Mountain reported an improvement in their experience compared to their previous visit. These visitors specifically noted better parking, reduced congestion, less crowding, and an overall superior experience as reasons for their increased satisfaction. The fact that visitors are acknowledging positive changes in the transportation system is encouraging, as it aligns with the objectives of the transportation management plan that was implemented. Conversely, 43% reported no change in their experience, while 13% stated a decline in their experience during their most recent visit. It is worth noting that 4% of respondents could not recollect their experience. Visitors who reported a decline in their experience attributed it to factors such as inclement weather, parking difficulties at trailheads, excessive crowding, and dissatisfaction with the summit road reservation system. However, it should be noted that the National Park Service managers do not have control over the reservation system, thus limiting their ability to mitigate visitor dissatisfaction.

Some visitors will accept more departure from pristine and natural conditions than others considering Cadillac is considered front-country. Clearly, most visitors prefer the amenities available at the summit such as the Eco shop with flush toilet bathrooms and water fountains. There is more disparity among visitors who hike on a trail to the summit versus those who drive
with the satisfaction of the number of visitors seen at the summit. The hikers rated their satisfaction ratings as “very satisfied” (12%) or “satisfied” (39%) as compared to personal vehicle users with “very satisfied” (32%) and “satisfied” (47%). Hikers expressed higher levels of dissatisfaction in the number of visitors they saw at the summit compared to personal vehicle reservation holders. Despite these differences in satisfaction, it is important for managers to consider the preferences and needs of all visitors to ensure a positive experience for everyone while also protecting the natural resources of the area. This may involve balancing the provision of amenities with efforts to minimize the impact of visitor use on the natural environment, and providing information and education to visitors about the importance of responsible recreation practices like the Leave No Trace principles.

1.5. Research Implications

A crucial research implication of this study underscores the significance of establishing baseline data during the initial year of implementing the vehicle reservation system and monitoring visitors' experiences at the summit of Cadillac Mountain. Conducting regular visitor surveys at Acadia National Park can provide a better understanding of the visitors' experience. Especially after implementing policy changes within the reservation system or adding additional managed access systems to Acadia. Our analysis of the survey data offers novel perspectives on the reservation system's initial implementation and recommends potential tactics to amplify visitors' recreational experience.

Future research opportunities lie in comparing the types of experiences and recreational opportunities that are significant to diverse visitors with the desired attributes of their experience. Mathematical techniques such as factor analysis can aid in reducing a large number of correlated
variables into a few latent dimensions or factors (Kass and Tinsley 1979). Cluster analysis is another useful method that can identify experience dimensions or segment the set of factor scores associated with reasons for visiting into statistically homogenous groups. Understanding what various visitor groups find important about their visits to the area can aid in comprehending their trip planning, management preferences, and other characteristics that can help managers plan and cater to their visitor’s needs (Collum and Daigle, 2015).

As previously mentioned, a visitor use survey for Cadillac Mountain has been conducted, along with a recent assessment that identified areas on the summit where visitor accessibility and safety can be improved. The visitor survey may aid in prioritizing areas for rehabilitation, particularly along the road and summit walkways with high usage during the season. These study findings can help improve the understanding of acceptable variations and maximize transportation management objectives within the reservation system on Cadillac Mountain.

The information gathered from visitors on their expenses at Cadillac Mountain is highly informative and deserves further scrutiny to differentiate between the economic expenditures of local residents in Maine and nearby New England states from those traveling from distant locations. The survey results demonstrate significant economic benefits from visitors paying for access and park fees, lodging, and spending on gas, food, and shopping in the neighboring communities. These outcomes must be taken into account when interpreting the survey’s willingness-to-pay and maximum willingness-to-pay metrics. However, the economic impacts outlined in this report may be underestimated due to the possibility of visitors reporting individual instead of group expenses. Future analyses can refine the data based on visitor feedback and adjust the survey questions to obtain more precise economic data.
1.6. Visitor Comments

For this section, the focus was to understand the range of visitor perceptions on the effectiveness of the reservation system. These comments highlight the positive and negative components as well as impactful and relevant comments that make the planning procedure for Cadillac successful, or in places of improvement. In total there were 717 total general comments made by visitors at the end of the visitor survey. Coding was used to categorize and condense comments then identify categories into themes (Creswell, 2013). In Saldaña (2013), the first coding phase is used to label sentences from visitor comments into categories. Next, deductive pattern coding was used to categorize into broader themes (Miles et al., 2014). The Cadillac Mountain visitor comments were aggregated into 12 themes and 25 categories. The categories and number of comments were: Facilities and Maintenance (n = 20), Facilities and Services needed (n = 15), Reservation (n = 297), Resource Management (n = 27), Fees (n = 20), Transportation (n = 20), Interpretive Services (n = 32), Scenery (n= 91 ), General Impressions (n = 158 ), Personnel/Staff (n = 14), Researcher comments (n = 17), and Concessions/Tour Operator Bus Tours (n = 6). Utilizing software to analyze comments we created “word clouds” to give a sense of different elements within the different themes. The larger the word or phrase within the word cloud represents frequency or magnitude of the element shared by visitors within the theme.

Visitors also recognized that parking was an issue in other areas of Acadia, such as Jordan Pond, which was particularly crowded with little turnover. The implementation of a reservation system has been found to displace visitors to other areas of the park with more crowd-tolerant visitors (Gramann, James 2002). Another visitor also acknowledges the benefits of the summit road reservation system stating,
“[i]t was very challenging finding parking in other parts of the park. I like how the reservation system meant we didn't have to circle the lot for 10 min to find a parking spot.”

Despite this, some visitors acknowledged the benefits of the summit road reservation system as it eliminated the challenge of finding parking in other parts of the park, which can be time-consuming and frustrating.

Both first-time and returning visitors rated "their time through the Cadillac Mtn. entrance booth" (Figure 1.13) as of low importance, yet achieved high performance. Similarly, the rate of flow on the roadway was another attribute of low importance but high performance, with vehicles being naturally spaced out due to the time between each car entry at the base booth. One visitor's comment summarized this succinctly:

"I think the reservation system is good to prevent congestion on the road in the parking lot, and around the summit."

1.6.1. Visitor Experience

Figure 1.31 is the first word cloud that represents the majority of visitors who shared additional information on the visitor survey labeled reasons for a quality visitor experience in the reservations system.

Figure 1.31: Word cloud - Quality Visitor Experience in the Reservation System
What is unique with the elements within the word cloud associated with general impressions are overall positive with transportation-related words throughout. Some representative quotes shared by visitors include the following:

“The system is just organizing what we would do anyway. We have 4 screaming kids and this was much better than waiting in an unpredictable line”

“After the frustrating crowds below, it was nice to have some peace and freedom to enjoy the majesty of this place!”

“More civilized than the last couple of years. It was a zoo trying to park and this is much better”

“The reservation system is much better. Reminiscent of what it once was years ago.”

“Already the crowds are so much less - a huge improvement to the overall experience.”

“The reservation system relieves the chaos on the summit.”

“Great place, well run.”
1.6.2 Reservation General Impressions

Figure 1.32 is the word cloud that represents the majority of visitors who shared additional information on the visitor survey labeled reasons for a more negative quality visitor experience in the reservations system.

![Word Cloud - Negative Comments](image)

*Figure 1.32: Word cloud - Negative Comments*

What is unique with the elements within the word cloud associated with general impressions are overall negative relating to items management cannot control like weather and crowds. Some representative quotes shared by visitors include the following:

“The need for reservations to visit Cadillac mountain is sad and we were not happy to find this out when arriving at 4 AM to see sunrise. The ability to obtain a reservation was very limited and we will consider other vacation destinations if there continues to be more restrictions. We have came here for 30+ years and this was the most disappointing because of reservations.”

“The reservation system for 48 hours before relies on reliable internet- which is difficult when traveling.”

“I have mixed feelings about the reservation system. While I like that the parking lot was not packed when we arrived due to the reservation requirement, I was very disappointed that we had
to reserve a day or more in advance. Weather is very unpredictable and we unfortunately choose a bad weather day. It was so foggy at the top of Cadillac Mountain that we could not walk out along the paths and rocks like we normally do. If we didn't require a reservation we would've chosen a different day or time. It was pretty pointless to go up the mountain when you can barely see 10 feet in front of you.”

“Adding the entrance fee and requiring the Parks Pass will definitely change our future plans to no longer include Cadillac.”

“I don’t mind paying a little extra but it’s the availability of going when we want that is frustrating.”

1.6.3. Resource Management

Figure 1.33: is the word cloud that represents the majority of visitors who shared additional information on the visitor survey labeled under comments for the theme of resource management.

Figure 1.33: Word cloud - Resource Management
What is unique with the elements within the word cloud associated with resource management, it is evident visitors appreciate Cadillac’s beauty and protection of the resource. Some representative quotes shared by visitors include the following:

“I support a fee on Cadillac Mt. I feel it is a necessary step to limit “human impact” on a valuable and fragile resource.”

“What a tremendous national resource, thanks for helping to keep it in good shape for future generations.”

“Very cool experience, would love to see info about which indigenous tribes land we’re on!”

“Highly value NPS & Preservation of our National Parks.”

“This is a wonderful resource. Thank you for preserving it!”

“Represents “The Great State of Maine”

“Thank you for protecting this area.”
CHAPTER 2

AN ASSESSMENT OF VISITOR USE EXPERIENCE WITH THE IMPLEMENTATION OF THE FIRST-YEAR CADILLAC MOUNTAIN SUMMIT ROAD VEHICLE TIMED-ENTRY RESERVATION SYSTEM IN ACADIA NATIONAL PARK, MAINE

2.1. Introduction

Acadia National Park (ANP) encompasses 35,000 acres across two counties along the mid-section of Maine’s coast in the northeastern United States. Despite its significant size, Acadia is relatively small compared to other national parks across the country (Manning & Anderson, 2012). The park consists of three components, sections of Mount Desert Island (MDI) and Isle Au Haut, and on the mainland, Schoodic Peninsula. The tallest mountain on the northeastern seaboard is on the MDI coast, Cadillac Mountain, a subalpine summit environment. Acadia preserves wildlife, plants, intertidal flora, fauna communities, and diverse forested zones like wetlands and meadows. Annual visits to Cadillac Mountain crest 800,000 visits per season.

Acadia National Park's small size, diverse recreational opportunities, and unique boundaries pose complex management challenges due to its high visitation rate. In fact, it is the most visitor-dense national park per acre in the United States. Managing visitors has become one of the most critical issues for park managers and staff (Manning, 2009). These challenges manifest in traffic congestion, unsustainable visitor behavior, and adverse effects on the park's natural and cultural resources. Additionally, the park must make difficult decisions to define new functions for its existing resources. The United States national parks have grown steadily due to their popularity and proximity to many northeast metropolitan areas. In 2021, U.S. national parks topped 297 million estimated visits (NPS, 2021). Acadia National Park is one of the most visited national parks in the U.S., with four estimated million visits in 2021 (NPS, 2021). This is an
increase of forty-five percent from the 2014 estimated 2.5 million visits. Most of Acadia’s visitation is observed from June through October. Annual visits to Cadillac Mountain crest 800,000 visits per season.

2.1.1. National Park Service Dual Mission

The National Park Service’s dual mission is to preserve and protect natural and cultural resources while providing opportunities for public enjoyment and education. This mission is based on the Organic Act of 1916, which established the National Park Service as a bureau within the Department of the Interior. The national parks and other protected areas hold a dual mandate to fulfill the founding NPS mission by protecting natural and cultural resources and providing for the public’s enjoyment. These both come as opportunities and challenges. Giving free and unrestricted access to the public means park ecosystems usually suffer as a result (Manning, et al., 2017). The implications of this dual system touch on the quality of visitor experience and that quality of experiences must be contained at a high level to preserve the efforts of public enjoyment while not compromising the protection of natural and cultural resources (Manning, R. et al., 1995; Fennell, 2015; Newsome, et al., 2013; Pearce, J., and Dowling; R., 2019). This challenge requires active multi-method strategies and intensive management from park managers.

A study conducted on Cadillac Mountain demonstrates that while visitors may not be in favor of a particular management action, visitors are willing to tolerate those management actions to achieve resource protection goals (Lawson & Manning, 2002; Newman et al., 2005; Bullock & Lawson, 2007). Similarly, with a managed access system, where visitors may initially reject the notion reduced access, they ultimately accept the management action to assist with transportation-related objectives like reducing congestion and greater opportunity to park at the
summit (Vande Kamp et al., 2005). Overall, national park managers aim to balance visitors’ needs with protecting and preserving natural resources to ensure that future generations can enjoy national parks.

2.1.2. Challenges of managing in Acadia.

The demand from visitors to access the top of Cadillac Mountain for breathtaking views and experiences is extremely high, leading to significant congestion along the road corridor and in the summit parking lots. A survey conducted by Manni et al. 2009, stated that 75% of visitors who come to Acadia National Park visit Cadillac Mountain during their trip. In the summer of 2017, the park conducted pilot tests to alleviate traffic and parking management issues on the summit. However, during these tests, the number of vehicles parked along the roadway exceeded the available parking spaces, resulting in 49 closures of Cadillac Summit Road. These closures varied in duration, lasting from 15 minutes to over 2 hours, with an average closure lasting approximately 63 minutes. It is likely that had similar strategies been implemented in previous years, similar levels of closures would have been required in 2014, 2015, and 2016 (Transportation Management Plan, 2019). Considering various aspects of intensive use management is essential in the context of a long-term vision for managing park resources to avoid negative impacts on the visitor experience due to overcrowding and depletion of resources.

2.1.3. Management Planning

Acadia’s General Management Plan (GMP) is a comprehensive document that outlines the long-term vision for managing the park’s resources and visitor use (NPS, 1992). The GMP identified the need to reduce traffic congestion, crowding in high visitor-use areas, decrease the number of private vehicles, and establish a system of visitor use with public transportation. From this, the Island Explorer bus system was provided as fee-free alternative transportation
throughout Acadia on Mount Desert Island and Schoodic Peninsula from June to October. The Island Explorer buses do not serve the summit of Cadillac Mountain.

In 2019, Acadia National Park completed a Transportation Management Plan (TMP) using adaptive management strategies that evaluate current conditions, making recommendations for the best outcomes. “The purpose of the transportation plan is to outline a comprehensive approach to providing safe and efficient transportation to visitors to Acadia National Park while ensuring that park resources and values are protected, and visitors can enjoy a variety of high-quality experiences” Plan (TMP, 2019, p. iii). The environmental impact statement assesses various management possibilities that cater to the need for enhancing road safety, addressing the issue of visitors walking along park roads, decreasing congestion, overcrowding at critical visitor destinations, and pinpointing transportation infrastructure upgrades to enhance safety and resource stewardship.

Managers, public comments, and community members identified what features of the TMP require attention, what issues must be dealt with in a site and system-wide setting, and areas of concern the public consider important. These steps encouraged an understanding of resource management through priority issues and concerns. To address more direct management of private vehicles exceeding parking lot capacity within Acadia, the Cadillac Mountain reservation system was implemented in May 2021. The reservation system helps to manage the number of vehicles at the summit, which can get crowded during peak season and reduces the environmental impact of too many vehicles at the summit.

The future of managing visitor expectations is crucial as the transportation plan may lead to alterations in their planned experiences in Acadia, such as extended wait times for entering the reservation system and reduced parking alternatives. Park managers communicated these
changes so visitors can appropriately manage their expectations and minimize potential frustration. The NPS website (NPS, 2022), local chamber of commerce (Bar Harbor, n.d.), and local newspapers, among other sources (Broom, 2021), were utilized by park managers to disseminate reservation information. Additionally, the TMP provides a comprehensive strategy to mitigate traffic congestion issues in Acadia National Park, while ensuring visitors can enjoy the park's natural and cultural offerings. The TMP's initiatives are designed to promote sustainable transportation and visitation practices, safeguard the park's resources, and enhance the visitor experience by reducing road congestion and increasing parking capacity.

National parks in the United States face many challenges when it comes to balancing visitor access with safety concerns. As the popularity of national parks continues to grow, many parks have implemented reservation systems to manage visitor traffic congestion and improve safety. The TMP emphasized the crucial role of safety in the visitor experience. Before the reservation system, there were significant numbers of visitors who traveled to Cadillac Mountain in their personal vehicles during peak season, which posed challenges for emergency responders when there is an urgent incident. Additionally, visitors would abandon their cars on the summit road, creating a safety hazard. However, the reservation system has been implemented and limits the number of vehicles entering, ensuring visitor safety, reducing risk of accidents, and congestion which enables emergency vehicles to move through the reservation system with ease. The entrance booth at the base of Cadillac naturally manages traffic flow, creating a safe environment for visitors to find parking spots with clear signage at designated parking areas. As more and more people seek to visit Acadia, park managers will continue to face the challenge of managing visitor access while ensuring the safety of all who visit.
Visitors prefer unrestricted access and protection of resources from high use congestion but for this to occur a tradeoff is required for management to step in, visitors appear to prefer a rationed use system over other management strategies (Newman et al., 2005; Lawson et al., 2003; Jakus & Shaw, 1997). For example, in Yosemite National Park wilderness backpackers were more favorable to getting a permit if improvements on characteristics impacted by congestion were made even if the backpacker had less of a chance of obtaining a permit. These same visitors were willing to deal with increases in management policies to have a high-quality recreation experience (Newman et al., 2005). In another study conducted in Rocky Mountain National Park visitors stated their preference for access restrictions to reduce congestion as there were limits to high-use parking areas that lead to damage to vegetation along the roadside (Pettebone et al. 2011). The message of these studies demonstrates tradeoffs as a necessary element of using the rationed use system. National parks demonstrates that if this management practice of implementation of a reservation system reduces congestion, an important variable to visitors, the rationed use system can lead to greater visitor experience quality.

2.1.4. Intensive Use management

Intensive management of a popular destination refers to the balance of preserving park resources with the demands of increasing visitation and recreational use. As visitation to parks increases, managers need to develop management strategies to address the negative impacts of intensive use on the environment and visitor experience. Park managers must consider the ecological, social, and economic impacts of park use and make informed decisions about managing these impacts while still providing high-quality visitor experiences. Some strategies include limiting visitation through permits for a reservation system, managing trails and campsites to minimize environmental damage, and implementing educational programs to
encourage responsible visitor behavior (Park, 2008). A shift in park management from focusing on resource preservation to a more holistic approach that considers the complex interactions between visitors, the environment, and park management policies. Intensive management is required in park and outdoor recreation management when dealing with intensive use (Manning, et. al, 2017; Daigle, 2019).

2.1.5. Experience Use History (EUH)

Experience Use History (EUH) or past experience (Hammitt & McDonald, 1983; Hammitt et al., 2004; Hammitt et al., 2009) refers to the amount of experience visitors have had with a particular site or activity, which is typically measured in terms of visit frequency and total years of use. Research conducted in remote settings indicates that experienced users tend to have greater knowledge of the area and a richer cognitive basis for evaluating the recreation setting (Ewert, 1998). There seems to be a positive relationship between the degree of past experience with an area and visitor behavior, even in all types of recreational areas and environmental sites (Arnberger & Brandenburg, 2007; Ditton et al., 1983; Graefe et al., 1984; Kuentzel & McDonald, 1992; Schreyer et al., 1984; Watson et al., 1991; Westover & Collins, 1987).

With its high recreational use, Cadillac Mountain presents specific visitor management challenges and expectations due to past instances of depreciative visitor behavior (Sterl et al., 2008). A significant number of visitors to Acadia stay at accommodations nearby and frequently visit for daily activities such as walking, hiking, biking, or joy riding, leading to the development of emotional, symbolic, and functional ties to the site (Eder, R., and Arnberger; A., 2012). Therefore, investigating the link between experience use history and changes in site management could be beneficial in effectively managing Cadillac Mountain.
2.1.6. Reservation System

While overall visit experiences have been extremely positive, a study from Littlejohn 1999 stated that what Acadia respondents liked least about their visit to the National Park were the crowds, the vehicular traffic, and the congested parking lots within Acadia. High competition for available resources, like parking spots, is limited by the amount of space at the attraction site (Eagles, P., Hemessen, W., & Legault, M., 2013). As a result of high demand and low supply, vehicles began to park in undesignated areas along the roadside. This damages the natural environment produces visitor safety problems and does not allow first responder personnel in an emergency. The result of too many vehicles on the Cadillac Summit before the reservation system shows that visitors who experience extreme congestion could have a negative overall quality experience; this detracts from the overall utility received from their outdoor recreation (Manning, et al., 2017).

The implementation of a reservation system was prompted by the need to address traffic congestion and overcrowding during peak tourist season at the summit. Various techniques were evaluated to mitigate park-wide access issues caused by high demand and congestion. Both site-wide and system-wide management alternatives were examined with input from management and the public. Ultimately, it was proposed to introduce a time-entry reservation system for Cadillac Summit Road, the Ocean Drive corridor, and the Jordan Pond North Lot during peak season. The TMP advocates for adaptive management as an ongoing management approach through annual monitoring and data collection. By adopting this reservation system, the park can manage visitor capacity, safeguard its natural resources, and enhance the visitor experience by reducing overcrowding and traffic congestion.
2.1.7. Other Parks with Managed Access Systems

Congestion challenges are not confined to Cadillac Mountain or the Park Loop Road in Acadia. As of 2022, seven U.S. National Parks required advance reservations for Muir Woods, Yosemite, Rocky Mountain, Haleakalā, Acadia, Glacier, Arches, and Shenandoah National Park. One of the challenges in Acadia is that there are many uncontrolled access points on Mount Desert Island for entry and exits. Other parks have similar congestion issues, but some parks do not have the same visitation levels or are larger in area than Acadia. To deal with the issue of traffic congestion, Cadillac Mountain had a rationed-use system prior to the current reservation system, which is a first come, first serve management system. This proved challenging for management during the peak of the visitor use season. There has been a long-term issue with visitors attempting to find parking on Cadillac Mountain.

To address the direct management of private vehicles within Acadia, the Cadillac Mountain reservation system was implemented in May 2021. Useful management tools, like a managed access system, are vital to improving the quality of the visitor experience while meeting visitor expectations and shifts in preferences over time. Although in the past, reservation systems were met with concern over restricted use of a site; other studies show that visitor attitudes toward a rationed use system like a reservation system are more acceptable than other alternatives (Stankey, 1973). This creates the understanding that when visitor use levels increase, managers can add facilities to accommodate the higher demand or regulate visitor use (Lucas, 1980). Visitors from other studies indicated that they increasingly prefer management strategies that limit the number of people, which in turn limits congestion. Historically any management of high-use areas was frowned upon, but studies are finding that these methods should be considered first to help create a better visitor experience (Newman et al., 2005; Jakus & Shaw,
1997; Lawson et al., 2003). Now, this is an understatement in the shift the National Park Service is seeing with the ability of parks to limit use and access to popular sites.

2.1.8. How Does Cadillac Mountain Reservation System Work?

Visitors are granted access to Cadillac Summit Road to enjoy their trip experience without encountering prolonged or recurrent traffic congestion. Furthermore, visitor numbers are monitored annually through adaptive management to avoid traffic congestion and parking issues. Cadillac Summit is overseen so that visitors with reservations can have access to parking upon arrival to the summit lots. Acadia National Park cannot guarantee parking spaces at the top of Cadillac Mountain. During peak periods, some visitors may exceed the average stay duration, sometimes resulting in fewer available parking spaces for later visitors.

The Cadillac Mountain reservation system requires an advance reservation to drive up the Cadillac Summit Road during the peak season. It is worth noting that the reservation permitting system only applies to private vehicles. Visitors can still access the summit via the park's hiking trails, on the summit road by bicycle, and through an authorized concessionaire to the mountain summit. Thirty percent of the reservation permits are available to visitors 90 days before the entry date. Seventy percent of reservations are available at 10 a.m. Eastern Time two days before the entry date. Visitors may arrive thirty minutes before their designated entry time and must leave before 10 p.m. when gates at the base close for the night. Other than the gate closure at 10 p.m., there are no restrictions to personal vehicle length of stay at the summit. Visitors are encouraged to use the recreation.gov application on their phone, screenshot the QR code attached to their email, or print the QR code for reservation confirmation.
2.1.9. Tradeoffs of the Reservation System

The Cadillac Mountain Reservation system in Acadia National Park provides various benefits, such as reduced congestion and improved visitor experiences. However, managers should also consider the tradeoffs with the implemented changes of the new managed access system. The system requires visitors to plan and book their visit in advance. Last-minute reservations can add stress and reduce the spontaneity of the trip using a personal vehicle if all permits are sold out. Some visitors may be unable to secure a reservation due to limited slots, and the park’s Island Explorer fare-free shuttle system does not serve the top of the mountain, limiting their access to the mountain summit. Moreover, reservation holders may face weather-related issues, requiring them to modify their visit. Furthermore, Acadia National Park cannot guarantee parking spaces at the top of Cadillac Mountain. During peak periods, some visitors may exceed the average stay duration, sometimes resulting in fewer available parking spaces for later visitors. Nevertheless, despite these challenges, the reservation system and reduced congestion should still enhance the overall visitor experience as seen in our study.

According to Bullock's 2006 study, visitors to national park sites may be more receptive to management actions that limit use, as compared to backcountry visitors who may find these actions unsuitable for certain backcountry areas. Front-country visitors prefer management actions that regulate impacts on resources, while wilderness and backcountry visitors prefer an uncontrolled experience free from management actions (Cole, 2001; Hendee & Dawson, 2002; Lawson & Manning, 2003). However, several studies indicate that visitors in the backcountry and wilderness areas support management actions that enable use limits in overcrowded areas (Manning, 1999). Irrespective of whether they are front or backcountry visitors, most visitors to
protected areas favor some form of park resource management actions (Lawson & Manning, 2002; Newman et al., 2005).

2.1.1. Expectancy Theory

What makes a high-quality visitor experience? According to Bultena and Klessig 1969, a quality experience is a congruence between expectations and the perceived reality of experiences when visitor outcomes are met or exceeded. The understanding of satisfaction within the visitor experience is a multidimensional concept. Variables of a visitor’s experience quality will vary within the visitor population and depend on what is expected from their recreation experience. The temporal nature of tourism is so that what a quality experience is today for visitors may not be so tomorrow or ten years from now (Jennings 2006). This idea of a high-quality visitor experience is an iterative process as it is being reinterpreted, reframed, and reconstructed at a managerial and visitor level (Ryan 1997).

The conceptual basis for measuring visitor satisfaction in outdoor recreation is cemented in expectancy theory (Vroom 1964, Lawler 1973, Fishbein and Ajzen 1975, Mackay and Crompton, 1990; Burns et al. 2003, Tian-Cole & Crompton, 2003, Brunke & Hunt, 2007). Expectancy theory alludes to visitors having an expectation that their actions will achieve a specific need, motivation, or desired benefit. Visitor Use Management touches on the measurement of satisfaction as a multidimensional concept with many potential variables and is proven to be a complex attribute of the visitor experience (La Page 1963, La Page 1968, Propst and Lime 1982, La Page 1983a, b, Noe 1987, Williams 1989). For example, a study asked respondents who were fishing and returned to camp with empty creels about their experience of the day. These authors found that an empty creel was one aspect of their trip and did not necessarily create a dissatisfactory experience; in this, the researchers hypothesized there were
multiple motivations entangled in the visitor’s outdoor recreation experience (Bultena and Taves 1961). Similarly, a study of hunting participants considered a multiple satisfaction approach to outdoor recreation in which a hunter’s experience involved more than just the count of game bagged but different dimensions of satisfaction and motivations (Hendee, 1974).

Visitors engaged in outdoor recreation expect the outcomes of their experiences to be known and valued (Atkinson and Birch 1972, Lawler 1973, Fishbein and Ajzen 1974). In the case of Acadia National Park, visitors have performance expectations for their visit based on information available on the park's website. For instance, visitors to Cadillac Mountain expect to easily purchase a reservation permit and present it to a park employee or an automated system at the mountain's base. Once they gain entry, visitors expect to find parking spots at the summit lot, walk the summit loop trail, enjoy the scenic views, and possibly visit the Cadillac Eco-store before leaving the mountain without presenting the permit again. Expectancy theory assumes that visitor behavior is driven by goals, and their choices are rational and based on their outdoor recreation activity or reservation site (Pierskalla and Lee, 1998; More and Kuentzel, 2000; More, 2002). Satisfaction arises when visitor expectations and their perceived outcomes from the experience align, whereas when there is a difference between the expectation and reality, dissatisfaction occurs, also known as discrepancy theory (Bultena and Klessig, 1969; Oliver, 1980). A crucial aspect of preserving outdoor recreation experiences at specific sites is to recognize the various elements of the visitor experience and understand the attributes that visitors consider essential (Daigle, 2019).

2.1.1. Objectives of the Study

Despite the growing number of managed access systems, there is limited research in assessing the visitor experience within these systems. To understand the impact of the
reservations system on the visitor experience, we assessed respondents ratings and feedback on attributes addressing issues the reservation system was supposed to address. This research utilized the expectancy theory and experience use history to understand the quality of the visitor experience within the reservation system. The results provided insights into visitor behavior, important aspects of the visitor experience, and corresponding satisfaction levels in relation to the first-year Cadillac Mountain reservation system.

Two associated objectives of the study were to:

1. identify key areas of importance from the visitor experience; with a particular focus on experiences the reservation system was supposed to address, like the ability to find parking, levels of safety on the road and parking lots;

2. examine experience use history and the quality of the visitor experience based on factors like first-time and repeat visitors.

2.2. Survey Methods

2.2.1. Multi-Cluster Analysis

Two sampling methods ensured that participants using various reservation time slots were well-represented among the visitors. A multistage cluster sampling design was used to sample Cadillac Mountain visitors systematically. To select the survey sample, a three-stage cluster sampling strategy was used. In the first stage, 15-20 sample days were randomly selected each month, including both weekdays and weekends. The second stage involved choosing one location from the four possible sampling locations at Cadillac Summit for each sample day. Outbound traffic was used to direct contact with visitors at these popular locations. Different time blocks were selected in the third stage to sample different transportation user types.
Feedback from both reservation and non-reservation holders was used to identify the best times to capture different visitor types. The survey was administered using two main techniques: on-site through an in-person questionnaire and email using the Qualtrics survey platform. The same multistage cluster sampling design described above was used to recruit all types of visitors to the mountain summit. The locations were: adjacent to the bus concessions parking lane near the Cadillac North Ridge trail, along the Cadillac Summit Loop Trail, and at the confluence of the Cadillac South Ridge trail and the Cadillac Mountain Eco-Shop.

2.2.2. Survey Design

Cadillac Mountain offers various means of transportation to reach the summit. This survey included transportation options like personal vehicles, hikers, bicyclists, and bus riders from ANP bus concessions. The survey attempted to capture all user types. However, the majority of respondents in the survey obtained a reservation permit and used their personal vehicle to reach the summit. We aimed to collect feedback from all users of the transportation modes, regardless of whether they used the reservation system. Therefore, we designed the survey to include skip logic for questions that did not apply to visitors based on their mode of transportation to the summit. The questionnaire was structured to understand variables like first-time site or repeat users and assess their experience. In addition, visitors who obtained a reservation permit for their personal vehicle were asked additional questions in the survey.

We structured the survey to gather comprehensive feedback from visitors and incentivized participation. The first section evaluated visitors' experiences at the summit that day, including their transportation mode and group composition. In the second section, we assessed visitors' prior trip history and experience, if applicable, and asked them to rate their experience relative to previous visits. The third concept evaluated various visitor experience
attributes at the summit, such as the number of visitors, the freedom to explore, and opportunities for self-paced exploration. The fourth section specifically addressed the experience of visitors who used the reservation system, asking about their associated experiences by rating various attributes like the ease of finding parking, the flow of traffic on the roadway, and safety in parking lots. In addition, visitors without a reservation permit were directed to the fifth section, using skip logic, focused on willingness-to-pay and basic sociodemographic information. An open comment section was provided at the end of the survey to allow visitors to provide additional feedback. Finally, we structured the survey and offered an incentive at the end of the survey (Appendix B).

2.2.3. Expectancy Theory

To further assess the quality of the visitor experience, we used the expectancy theory to study attitudes toward the first-year Cadillac Mountain reservation system. The theory posits that an individual’s attitude towards a behavior is influenced by the perceived value of the outcomes associated with the behavior, as well as the strength of the connections between them (Fishbein, 1967; Fishbein & Ajzen, 1975). This evaluation of attributes is directly proportional to the visitor’s subjective probability that the effort to reach the summit within the reservation system will produce their desired outcome (Driver and Knopf, 1977; Haas et al., 1981; Manfredo et al., 1996). The questionnaire evaluated variables linked to expectancy theory, such as visitor experience quality of their visit, importance, and satisfaction on variables like the freedom to explore at their own pace, safety on the road, safety on the summit parking lots, and finding a parking spot at the summit. In survey sections three and five, the questions were asked twice, once for importance and once for satisfaction. Eligible participants were asked to rate their importance and satisfaction level for 16 attributes on a 5-point Likert scale within a matrix series.
These attributes were added to provide a comprehensive list of experiences that may have been important to the reservation and non-reservation-holding users. Visitor attribute importance was set on a five-point scale from not important (1), slightly important (2), neutral (3), important (4), and extremely important (5). Visitor attribute satisfaction was also set on a five-point scale from extremely disappointed (1), disappointed (2), neutral (3), satisfied (4), and extremely satisfied (5).

2.2.4. Total Design Methodology (TDM)

The total-design method (TDM) is a standardized methodology that includes questionnaire construction and survey implementation to reduce errors and improve data quality. This method was used as Dillman (2000, 2008, & 2014) outlined. An incentive was used as a recruiting technique for all respondents who finished the questionnaire. The questionnaire began with clear and comprehensible questions and organized related questions based on their subject matter. There is a series of repeat items and single-item questions throughout the survey. The first three sections applied to all respondents, then later skip logic was used based on the transportation type of the visitor. Liebe et al. (2016) discovered that it is crucial to acknowledge and evaluate the potential impact of sequencing attitude-related questions and choice tasks when designing a questionnaire. This is because respondents' stated preferences and willingness-to-pay estimates may be influenced by the order in which these components are presented. Knowing this, our survey prompts respondents to evaluate their attitudes before responding to the willingness-to-pay choice task. Finally, questions pertaining to socio-demographic questions about age, education, gender, and income are posed at the survey’s conclusion (Dillman, 2014).
2.2.5. Sampling

To participate in the survey, respondents needed to be at least 18 years old and had to have been on Cadillac Summit for at least 15 minutes before answering specific questions about their experience on the mountain. Upon selection, visitors were welcomed to Cadillac Mountain, briefly introduced to the study’s purpose, and invited to participate in the questionnaire. Those who consented were asked questions through a 10–15-minute survey to determine the experience quality of their visit, importance, and satisfaction. The survey was administered using two main techniques: on-site through an in-person questionnaire and email using the Qualtrics survey platform (Daigle & Zimmerman, 2004). Upon completing the on-site questionnaire, all respondents were instructed to deposit it in a survey box.

If a visitor did not have time for a paper survey or preferred the online platform for participating in the survey, they were given a contact card. We used mixed modes of data collection (paper surveys and web-based surveys) to increase the response rates and willingness to participate in the study Olson et al. (2012). This contact card recorded the first name and email address of the visitor. After the initial email with a link to the Qualtrics survey, emails were grouped into two-week bins for the contact/reminder schedule. The contact card helped us gather contact information to send an invite to the online questionnaire and up to three reminders to complete the self-administered online questionnaire (Dillman, Smyth, & Christian, 2014). The online questionnaire using Qualtrics took 10-15 minutes. Visitors who filled out a contact card received one invite email. Suppose the visitor has not responded after this email. In that case, they will be sent a first email with the survey link, a reminder, and a second and final reminder if they still have not responded to the invitation or previous reminders. These reminders were sent two weeks apart, as Dillman, Smyth, & Christian (2014) recommended. Contact ceased with a
response to the survey or after the third reminder. The reminders started two weeks from the initial contact date; this allowed visitors to have the experience and have time to reflect on their experience.

2.2.6. Survey Administration Figures

A total of 1,501 surveys were completed by respondents of the 2021 Cadillac Mountain survey, with a majority (N=1,278) completed on-site. Sixteen surveys were incomplete and excluded from this total. There were 203 on-site refusals of the survey, with 45% of males refusing and 55% of females refusing. The most commonly cited reasons for refusal were lack of time, weather conditions, survey length, the need to use the bathroom, and tiredness. Despite the refusals, most visitors who were invited to participate did so. There were 503 who requested to complete the survey through an email online platform than on-site; this yielded a 44% (N = 223) response rate from respondents. Participants who submitted their questionnaire via the online platform Qualtrics were given up to three reminders to complete the survey. Combined survey respondents from on-site and email (N=1,501) indicated they accessed Cadillac Mountain by personal vehicles (n=1,250), hiking on a trail (n=140), taking a bicycle (n=60), concessionaire buses passengers (n=31), or another transportation type (n=21) to the summit.

To ensure that the research findings accurately represent the population being studied, conducting a non-response bias check is a critical step. This study utilized Pearson's chi-square test for categorical data and one-way ANOVA to analyze differences between visitor segments for the online survey respondents. There were not enough incomplete paper surveys to run this analysis. All statistical tests utilized a significance level of p<.05 for rejecting the null hypothesis. To comprehend the disparities between the first and last waves of personal vehicle email survey respondents, the data was separated into these two groups. It was discovered that
the late respondents exhibited resemblances with those who did not respond (Armstrong & Overton, 1977). This gives confidence to our research data by understanding those who did not participate in the survey were still represented by the sample. The term "first wave" refers to survey responses obtained within 14 days of the initial email, while "last wave" refers to responses obtained 15 or more days after the initial email, including those obtained after two reminder emails. In our study, we compared five variables of interest between these groups and revealed no significant differences. Specifically, there were no significant differences between first and last-wave email survey respondents regarding age ($\chi^2=2.341$, 5 df, $p=.800$), gender ($\chi^2=.293$, 2 df, $p=.864$), education ($\chi^2=2.092$, 3 df, $p=.553$), income ($\chi^2=7.119$, 10 df, $p=.714$), or first- time and returning visitors ($\chi^2=0.197$, 2 df, $p=.906$).

2.2.7. Data Analysis

Responses were organized into general categories to analyze these data; then, statistical tests were performed on personal vehicle visitor survey responses only. All other transportation modes were extrapolated out of the data set. Then using the IBM Statistical Package for Social Science (SPSS), the team conducted statistical tests to examine the descriptive statistics of the survey, including the frequencies, mean, standard deviation, and variances. Finally, to assess the differences in visitor responses, the team treated the 5-point Likert scale responses as means and conducted an analysis of variance (ANOVA) to test for any significant differences in the averages.

2.3. Visitor Survey Results

2.3.1. Background

This results section examines the visitors who acquired a Cadillac Mountain Summit Road vehicle reservation permit.
2.3.1.1. Survey Demographics

The respondents were predominantly out-of-state visitors (97%) from 47 states and four foreign countries; the most significant number of respondents were from Massachusetts and New York. The survey sample had a higher proportion of female respondents (61%) than male respondents (37%), and the remainder preferred not to reply. Most respondents (88%) identified as the ethnic group White/Caucasian, were in the age group of 40 to 60 years old (40%), with the average age being 47.35 years old. Visitors were highly educated, with most (86%) having completed four-year college or graduate studies, and a significant proportion (47%) of the respondents reported a household income greater than $150,000 annually. Our analysis of the demographics revealed that they closely resembled other studies conducted in Acadia (Horne, et al., 2018; RSG 2016, and Manni et al., 2010). Studies show that visitors who are ethnically White/Caucasian and have a high socioeconomic status exhibit a significantly greater tendency to visit U.S. national parks than other groups (Aultman-Hall, et al., 2018; Bultena & Field, 1978; Johnson et al., 1998; Lawton & Weaver, 2008; Rodriquez & Roberts, 2002; Weber & Sultana, 2013; Xiao, Aultman-Hall, et al., 2018; Xiao, Manning et al., 2018). This trend is evident in the case of Acadia National Park, where white affluent individuals are overrepresented in terms of park visitors. This should be considered when looking at the survey results.

2.3.1.2. Travel Characteristics

Respondents reported traveling with family (63%), a partner or significant other (13%), Friends (10%), a combination of group types (11%), and a small number of visitors who traveled alone (3%). The most common combination involved family and friends (9%). While group size ranged from one person to 17 or more, some visitors reported traveling with larger groups to Acadia but using personal vehicles to access Cadillac Mountain separately. Based on the survey
findings, most groups visiting the site comprised two individuals (44%), followed by four-persons in a group (24%). The mean, median, and mode group sizes were 3.48, 3, and 2 people, respectively. Other researchers (RSG, 2016) observed a rise in the number of two-person groups, while there was a reduction in the count of groups comprising four or more members in comparison to our study.

Ninety-seven percent of respondents followed through with their first-choice mode of transportation to access Cadillac Mountain. Meaning, if they intended to take their personal vehicle to the summit, they were able to do so. Although, some visitors (3%) stated they wish they could have hiked to the summit instead of using their personal vehicle. Survey respondents were asked in the survey instrument, “Have you visited Cadillac Mountain in the past, prior to this trip?” Of the respondents to this question, a higher percentage were first-time users (53%) of Cadillac Mountain than returning visitors. Oppermann (1997) defines first-time visitors as individuals who have never been to a destination before, while repeat visitors have visited a destination more than once. Wolf et al. (2015) state that a satisfying national park experience can influence visitors to return for multiple visits, typically observed at Acadia National Park. Both categories of visitors are crucial in maintaining Acadia's visitor base. Compared to studies that report higher percentages of returning visitors, our study has a slightly higher percentage of first-time visitors; however, they are comparable, and this difference may be due to external factors like COVID-19 (Littlejohn, 1999; Daigle & Zimmerman, 2002; Holly, 2009; Manni, 2010; Taff et al., 2022). The Downeast and Acadia region, along with the Maine Highlands, is among the top destinations favored by first-time visitors (Maine Office of Tourism, 2018). Taff et al. (2022) reported that the COVID-19 pandemic led to more first-time visitors to protected areas, potentially due to visitors feeling safer outdoors than indoors. This finding may partly account
for the slightly higher number of first-time visitors to Cadillac Mountain during this research period.

2.3.1.3 Visiting a National Park with a Managed Access System

Understanding the reservation system is crucial for first-time visitors to Acadia National Park, as reservation systems are new to the National Park system and can differ among parks. A substantial portion of the respondents in our survey (66%) reported never having visited a National Park with a managed access system, excluding campground reservations made through www.recreation.gov. When we examined the relationship between first-time and repeat users, we found that 35% of these first-time users of a reservation system had never been to Cadillac Mountain or any National Park with a reservation system. In comparison, 31% had visited Cadillac Mountain before the reservation system was established. Among returning visitors to Cadillac, 16% had never been to any National Park with a reservation system before, comparable to the 15% of returning visitors who had used the reservation system in Acadia or visited a National Park with a reservation system. Since managed systems are a newer addition to national parks, some visitors found it difficult to obtain reservation system permits.

2.3.1.4. Issues Obtaining Permits

According to our survey of reservation-holder respondents, more than half (58%) indicated no issues obtaining a reservation permit (n=634), while the others (42%) reported issues, as seen in Table 2.1 (n=449). As respondents were allowed to select multiple options, the total percentage exceeded 100%. Of all the reported problems, the unavailability of their preferred time slot or day was the most frequent issue encountered (42%). Specifically, visitors with one issue to report were more likely to mention that their first choice of time slot or day was unavailable. In Acadia National Park, cellular service is very limited. In saying this, it is not
surprising, the second most common problem was related to limited cellular service (31%). More specifically, the category "cellular data was limited" was the most frequently mentioned from 6 am to 6:00 pm, an all-day issue. A majority of visitors claimed one issue (63%) and the remaining (37%) claimed two or more issues with obtaining a reservation. Over one hundred respondents selected other issues regarding permits. Most of these comments are variations of the options mentioned, expressing their emotions about the permit acquisition process, difficulties printing the reservation QR code for entry, limited availability around the sunrise reservation, and purchasing multiple permits to ensure a spot.

Table 2.1: Visitor Issues in Obtaining Reservation Permit

<table>
<thead>
<tr>
<th>Issues (N=449)</th>
<th>n</th>
<th>%*</th>
</tr>
</thead>
<tbody>
<tr>
<td>First choice of time slot or day was unavailable</td>
<td>276</td>
<td>42</td>
</tr>
<tr>
<td>Limited cellular data</td>
<td>208</td>
<td>31</td>
</tr>
<tr>
<td>Other</td>
<td>118</td>
<td>26</td>
</tr>
<tr>
<td>The Recreation.gov website did not work for me</td>
<td>64</td>
<td>10</td>
</tr>
<tr>
<td>Missed my time slot</td>
<td>53</td>
<td>8</td>
</tr>
<tr>
<td>Was not able to find information about the reservation system</td>
<td>36</td>
<td>5</td>
</tr>
<tr>
<td>Obtained wrong information about the reservation system</td>
<td>26</td>
<td>4</td>
</tr>
<tr>
<td>The Recreation.gov website was frustrating</td>
<td>1</td>
<td>&lt;1</td>
</tr>
</tbody>
</table>

*Percentages exceed 100%; some visitors reported multiple issues

On average, personal vehicle users who reported having issues obtaining a reservation permit purchased a permit zero to 48 hours before entry and often cited cellular connectivity problems regarding their purchase. Visitors who made their reservation even two to six days prior to entry saw a significant decrease in reported issues. As expected, those who purchased the reservation permit 3+ months in advance had the least reported problems with obtaining a reservation permit.

Of the previously mentioned time slots, sunrise, mid-morning, mid-day, mid-evening, and sunset. Additionally, during the mid-morning and mid-day hours (10:00 am to 2:00 pm)
visitors experienced issues with the recreation.gov website not functioning correctly. On average, visitors with multiple issues cited visited between mid-morning (6:00 am to 10:00 am) and mid-evening (2:00 pm to 6:00 pm). This makes sense as the visitors who could not get a sunrise reservation booked at the next earliest slot, which is mid-morning (6:00 am to 10:00 am).

Similarly, visitors who desired a sunset reservation (6:00 pm until dusk) and who found permits but were sold out made reservations in the mid-evening time slot (2:00 pm to 6:00 pm) as that was the next opportunity before sunset. In some cases, visitors who had booked mid-evening (2:00 pm to 6:00 pm) reservations stayed at the summit for several hours and waited for the sunset. Visitors who purchased a parking permit for the sunset time slot were unable to find available parking spots and had to park elsewhere along the roadside, causing vegetation damage. This suggests that there was an inadequate turnover of vehicles from visitors who had bought reservation permits earlier in the day to those who arrived with a reservation for the sunset period.

Specifically, individuals in the 18-29 and 30-44 age groups reported more issues with missing their time slots, while those in the 45-59 age range had more problems with the recreation.gov website. In addition, visitors aged 60 and over reported difficulties obtaining accurate information or locating information about the reservation system. With a push to make reservations to Cadillac digital a portion of park visitors who have trouble with technology may find the new system inaccessible. For example, people who may rely on others to secure park information, make their reservation(s), or may not have technology available at home.
2.3.2 Objective 1

2.3.2.1. Assessing Visitor Use Experience Outcomes of the Reservation System

The reservation system was implemented to help address transportation-related issues, and these elements are an important part of the visitor experience on Cadillac Mountain. Visitors were asked to rate their level of importance and satisfaction across transportation, social, and managerial attributes related to their experience. Table 2.2 presents the results, which show that the top three attributes deemed most important by respondents, in order of importance, were the opportunity to explore at their own pace, an unobstructed view of the scenery from the summit, and finding a parking spot at the summit. Visitors rated their opportunity to explore at their own pace as “extremely important” (58%) or “important” (39%), and most visitors rated this variable as “satisfied” (3%) or “extremely satisfied” (96%). In addition, visitors rated their unobstructed view of the scenery from the summit as “extremely important” (60%) or “important” (33%) and most visitors rated this variable as “satisfied” (4%) or “extremely satisfied” (92%). Finally, visitors rated their ability to find a parking spot as “extremely important” (48%) or “important” (44%) and most rated this variable as “satisfied” (40%) or “extremely satisfied” (53%). Most respondents rated these attributes as extremely important and highly satisfactory.

The ranking order presented in Table 2.2 is like another study that surveyed respondents in Acadia National Park to identify the most important features of scenic national park roads. In a survey by Halo and Manning (2009), the participants ranked the following categories "scenery," "access to important park sites and attractions," and "traffic volume (among traffic on the roadway)" in order of priority. Furthermore, additional research on the visitor experience at Cadillac Mountain has shown that visitors prioritize aesthetics and the enjoyment of viewing the natural scenery. This is consistent with previous studies demonstrating the importance of connecting to nature and deriving pleasure from the outdoor recreational experience (Bullock et
al., 2007; Davenport et al., 2002; Littlejohn, 1999; Patterson et al., 1998; Vande Kamp et al., 2004). By exploring these attributes, managers can enhance the visitor experience and meet the objectives of the reservation system.

From this research, we concluded that the reservation system at Acadia National Park effectively tackles visitor safety concerns. Various measures were implemented prior to the reservation system to enhance the visitor experience by providing designated parking spaces with clear markings and maintaining safe driving conditions on the road leading to the summit. With the addition of two Cadillac Mountain Entrance Stations, visitors are able to enter the Summit Road where vehicles have an even spacing between vehicles, on average. From oral and written comments, visitor groups like bicyclists stated the reservation system made them feel safer on their way to the summit. This aligns with expectancy theory, where visitors expect outcomes of their visit, for example, safety, to be known and valued (Atkinson and Birch, 1972; Lawler, 1973; Fishbein and Ajzen, 1974). The satisfaction ratings for safety-related items on the survey rated higher than other social factors like the ability to participate in various activities and the number of visitors on Cadillac Mountain. This demonstrates the relative importance of safety to visitors in relation to their satisfaction with their entire experience.
Table 2.2: Visitor Attribute Ranking by Mean Importance and Satisfaction

<table>
<thead>
<tr>
<th>Attributes</th>
<th>n</th>
<th>%</th>
<th>Mean Importance Rating (out of 5.0)</th>
<th>Importance Std. Deviation</th>
<th>n</th>
<th>%</th>
<th>Mean Satisfaction Rating (out of 5.0)</th>
<th>Satisfaction Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The opportunity to explore at your own pace</td>
<td>1,211</td>
<td>96.9</td>
<td>4.55</td>
<td>0.567</td>
<td>1,210</td>
<td>96.8</td>
<td>4.63</td>
<td>0.588</td>
</tr>
<tr>
<td>Unobstructed view of the scenery from the summit</td>
<td>1,211</td>
<td>96.9</td>
<td>4.47</td>
<td>0.787</td>
<td>1,210</td>
<td>96.9</td>
<td>4.50</td>
<td>0.808</td>
</tr>
<tr>
<td>Finding a parking spot at the summit</td>
<td>1,125</td>
<td>90.0</td>
<td>4.36</td>
<td>0.743</td>
<td>1,119</td>
<td>89.5</td>
<td>4.40</td>
<td>0.757</td>
</tr>
<tr>
<td>Freedom to explore the summit</td>
<td>1,210</td>
<td>96.8</td>
<td>4.34</td>
<td>0.688</td>
<td>1,208</td>
<td>96.6</td>
<td>4.55</td>
<td>0.628</td>
</tr>
<tr>
<td>Assurance of having a reservation permit to visit Cadillac Mountain</td>
<td>1,121</td>
<td>89.7</td>
<td>4.18</td>
<td>0.807</td>
<td>1,120</td>
<td>89.6</td>
<td>4.39</td>
<td>0.785</td>
</tr>
<tr>
<td>Feeling safe on the roadway to the summit</td>
<td>1,124</td>
<td>89.9</td>
<td>4.09</td>
<td>0.839</td>
<td>1,121</td>
<td>89.7</td>
<td>4.51</td>
<td>0.597</td>
</tr>
<tr>
<td>Safety in the parking lots at the summit</td>
<td>1,124</td>
<td>89.9</td>
<td>4.02</td>
<td>0.849</td>
<td>1,116</td>
<td>89.3</td>
<td>4.50</td>
<td>0.593</td>
</tr>
<tr>
<td>The sense of safety while visiting</td>
<td>1,210</td>
<td>96.8</td>
<td>3.90</td>
<td>1.015</td>
<td>1,210</td>
<td>96.8</td>
<td>4.52</td>
<td>0.59</td>
</tr>
<tr>
<td>Assured access to Cadillac Mountain when otherwise not possible due to road closures to the summit</td>
<td>1,114</td>
<td>89.1</td>
<td>3.79</td>
<td>0.968</td>
<td>1,103</td>
<td>88.2</td>
<td>4.14</td>
<td>0.842</td>
</tr>
<tr>
<td>Number of visitors on Cadillac Mountain</td>
<td>1,215</td>
<td>97.2</td>
<td>3.76</td>
<td>0.972</td>
<td>1,211</td>
<td>96.9</td>
<td>4.06</td>
<td>0.839</td>
</tr>
<tr>
<td>The ease/difficulty of finding your way around the summit area</td>
<td>1,221</td>
<td>97.1</td>
<td>3.72</td>
<td>0.939</td>
<td>1,210</td>
<td>96.8</td>
<td>4.43</td>
<td>0.649</td>
</tr>
<tr>
<td>Rate of traffic flow on the roadway</td>
<td>1,126</td>
<td>90.1</td>
<td>3.69</td>
<td>0.992</td>
<td>1,121</td>
<td>89.7</td>
<td>4.48</td>
<td>0.645</td>
</tr>
<tr>
<td>The time it takes to get through the Cadillac Mountain entrance booth</td>
<td>1,128</td>
<td>90.2</td>
<td>3.39</td>
<td>1.107</td>
<td>1,129</td>
<td>89.6</td>
<td>4.54</td>
<td>0.658</td>
</tr>
<tr>
<td>The ability to participate in a variety of activities</td>
<td>1,215</td>
<td>97.2</td>
<td>2.93</td>
<td>1.171</td>
<td>1,210</td>
<td>96.8</td>
<td>3.67</td>
<td>0.805</td>
</tr>
<tr>
<td>Alternative transportation options available</td>
<td>1,207</td>
<td>96.6</td>
<td>2.63</td>
<td>1.217</td>
<td>1,200</td>
<td>96.0</td>
<td>3.37</td>
<td>0.77</td>
</tr>
</tbody>
</table>

2.3.2.2. Transportation Factors

Concentrating on transportation-specific attributes like the availability of parking, safety on the roadway to the summit, and overall safety in parking lots, visitors rated their experience in the range of important to extremely important and, correspondingly, satisfied to extremely satisfied. This indicates that the TMP is effectively meeting the needs of visitors and park managers by prioritizing transportation-related concerns over social factors (TMP, 2019). One visitor pointed out the stark contrast in parking availability between Cadillac Mountain and other areas of the park, noting.
“[it] was night and day. Jordan Pond was particularly crowded, and we could not visit.

*The other areas had available parking only because they had converted one lane of the loop road to parking. Cadillac Mountain had adequate parking.*”

Nonetheless, it is worth stating that multiple factors influence a high-quality visitor experience, and some attributes rate more important to visitors than other attributes (Manning, 1985 and Daigle & Zimmermann, 2004). Therefore, assessing each visitor’s experience can provide management with valuable insights regarding which transportation-related attributes to prioritize.

2.3.2.3. Social Factors

In addition to transportation-related attributes, social factors are still worth considering as many attributes we tested for ranked high in importance and satisfaction. In a study by Bullock and Lawson (2007), it was found that visitors to Cadillac Mountain are willing to accept a certain level of crowding at the summit and that the presence of many people does not necessarily diminish their overall satisfaction. Our study similarly found that visitors rated the attribute "number of visitors on Cadillac Summit" as the eleventh most important and expressed their satisfaction with this attribute (mean: 1.06, std. 0.839). In our study, the average importance ratings of finding a parking spot (mean: 4.36, std. 0.743) and safety on the road (mean: 4.09, std. 0.839) measured beyond the average ratings of social factors such as assured access to Cadillac when otherwise not possible due to road closures to the summit (mean: 3.79, std. 0.968) and the number of visitors (mean: 3.76, std. 0.972) at the summit. While some social factor importance levels remained lower, our study demonstrated that visitors remained highly satisfied with variables like assured access (mean: 4.14, std. 0.842) and the number of visitors on Cadillac Summit (mean: 4.06, std. 0.839). While social factors did not rank as high in importance to
visitors as transportation-related issues, their satisfaction levels with these variables were still rated high. In this, these attributes should not be overlooked when considering the overall visitor experience within the managed access system.

2.3.2.4. Implications of Findings

Respondents rated the study attributes, which the reservation system was set out to address, as important and overall satisfying experiences within the reservation system. The importance of finding a parking spot was more important than the number of visitors seen during their visit to the summit. Our research demonstrates that the reservation system improves the experience, particularly around parking and congestion. Moreover, the reservation system allows visitors to plan their trips in advance, ensuring access to the summit when otherwise not possible due to traffic-based road closures. This more equitable distribution of vehicles spread throughout the day ensures that everyone has a greater opportunity to find a parking spot in lots, even during busy periods of the day. Table 2.3 demonstrates that the reservation system, managing a specific number of entries per day, has proven effective in managing the past issues of parking, traffic congestion, and safety at the summit.

It was initially thought that the reservation system may limit the flexibility of visitors, as they may be required to stick to a pre-determined schedule and miss out on spontaneous trips to Cadillac Summit with a personal vehicle. Despite these potential drawbacks, our study indicates that the reservation system improved visitors' experiences by managing the park's number of vehicles to Cadillac Summit and, through that, reducing overcrowding, specifically certain timeslots allowing visitors to find parking when in the previous years may not have been, and giving visitors a greater sense of safety at the summit.
In a study by Anderson et al. 2009, visitors were asked a series of questions about their visit to Acadia. In one series, visitors were asked to list problems at individual sites in Acadia. These respondents indicated the extent to which they perceived problems at high and low-use sites. While several potential problems were listed for each site, the research had a common thread through the seventeen Acadia locations: difficulty finding a parking place, vehicles parking illegally, and crowding in this park area. Those who cited concerns and anxiety about visiting a site were first-time visitors at a high-use site. The TMP and Cadillac Mountain Summit Road Vehicle Reservation System were able to address concerns around visitors’ top problems related to traffic congestion and parking-related factors. Cadillac’s managed access system did not decrease the visitor experience when addressing concerns related to their visit.

2.3.2.5 Tradeoffs

All reservation permit holders were asked in the survey instrument if they had issues obtaining a personal vehicle reservation. Based on their responses, comparisons were made in terms of satisfaction with their experiences on Cadillac Summit (Table 2.3). Getting a reservation permit for Acadia National Park requires visitors to put in extra effort, time, and research before arrival. As stated before, little under half of the respondent’s reported issues; the highest percentage of that sample demonstrated that not getting their desired time slot was a reason they had issues obtaining a reservation permit. Visitor comments stated they could not get a reservation they wanted, and the sunrise block was commented on most frequently; here is an example:

“Cadillac Mountain is the most important place to visit at ANP. I was disappointed not to be able to get a sunrise reservation.”
While visitors at times may not have been able to find parking, our results demonstrate that those who were not as satisfied with finding parking still have a level of acceptability and satisfaction with their experience. Other visitors who could not reserve a sunrise ticket stated they hiked to Cadillac Summit instead and received a reservation to drive on a different date/time. Visitors understand the reservation system benefits and are satisfied despite known barriers. Some visitors appreciated the virtual queue of the reservation system so that they knew there was a place for them at the summit instead of an unanticipated wait or being denied access if there were too many vehicles; here is an example:

“I appreciated the reservation system because I appreciated not having to deal with a line of traffic up the mountain and knowing that when I got to the top, I could park and enjoy my time before sunrise than worrying about whether I would find a parking space. I also liked that some permits were not released until two days before the intended visit so that people like me, who did not even know I could come to Acadia until less than a month before our visit, could still visit the summit.”

More pre-planning was necessary for visitors who wanted to access the summit in the early morning sunrise block. Although some visitors were dissatisfied with the limited access to the summit at sunrise, more visitors are using alternative modes of transport to the summit. In addition, reserving a permit for sunrise is very difficult with 157 spots and upwards over 400 visitors attempting to acquire a permit for that time. Visitors expressed their concern with cell phone service when attempting to obtain the reservation permit for sunrise. Management can take steps to improve the visitor experience in other ways, such as having kiosks or signage at locations with connectivity to assist visitors to obtain a reservation. Visitors noted to connect to
the reservation system, they needed to create an account, have access to Wi-Fi or cellular connectivity, input their information and wait until they received confirmation.

On the recreation.gov website, the park service does not explicitly say there is limited cellular connectivity; however, it does give visitors different cellular ranges based on visitor reviews of their carrier. Additionally, the cellular signal on recreation.gov may not accurately reflect the difficulty of using data services in specific park areas with "dead zones." Visitors reported that cellular connectivity was a significant barrier to obtaining a reservation permit. While the allotment allows management to control the number of permits two days prior, our research shows this creates last-minute issues for visitors to obtain a permit, resulting in a less satisfying experience. However, once the visitor who had problems getting a reservation entered the system, their experience was overall positive experience.
### Table 2.3: Visitors Who Reported No Issues and Reported Issues Obtaining a Reservation Permit and their Average Satisfaction Rating

<table>
<thead>
<tr>
<th>Attribute</th>
<th>Mean Satisfaction Rating (Out of 5.0) N</th>
<th>Std. Deviation</th>
<th>Mean Satisfaction Rating (Out of 5.0) N</th>
<th>Std. Deviation</th>
<th>f</th>
<th>Sig. (p-value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Issues</td>
<td></td>
<td></td>
<td>No Issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>The opportunity to explore at your own pace</td>
<td>627</td>
<td>4.67</td>
<td>0.533</td>
<td>494</td>
<td>4.59</td>
<td>0.652</td>
</tr>
<tr>
<td>Unobstructed view of the scenery from the summit</td>
<td>625</td>
<td>4.57</td>
<td>0.772</td>
<td>496</td>
<td>4.45</td>
<td>0.839</td>
</tr>
<tr>
<td>Finding a parking spot at the summit</td>
<td>616</td>
<td>4.44</td>
<td>0.732</td>
<td>488</td>
<td>4.34</td>
<td>0.785</td>
</tr>
<tr>
<td>Freedom to explore the summit</td>
<td>628</td>
<td>4.58</td>
<td>0.585</td>
<td>490</td>
<td>4.53</td>
<td>0.674</td>
</tr>
<tr>
<td>No Issues</td>
<td></td>
<td></td>
<td>No Issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assurance of having a reservation permit to visit Cadillac Mountain</td>
<td>617</td>
<td>4.52</td>
<td>0.611</td>
<td>488</td>
<td>4.22</td>
<td>0.938</td>
</tr>
<tr>
<td>Feeling safe on the roadway to the summit</td>
<td>616</td>
<td>4.54</td>
<td>0.566</td>
<td>490</td>
<td>4.49</td>
<td>0.621</td>
</tr>
<tr>
<td>Safety in the parking lots at the summit</td>
<td>614</td>
<td>4.54</td>
<td>0.566</td>
<td>487</td>
<td>4.47</td>
<td>0.614</td>
</tr>
<tr>
<td>The sense of safety while visiting</td>
<td>627</td>
<td>4.54</td>
<td>0.585</td>
<td>494</td>
<td>4.52</td>
<td>0.575</td>
</tr>
<tr>
<td>No Issues</td>
<td></td>
<td></td>
<td>No Issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assured access to Cadillac Mountain when otherwise not possible due to road closures to the summit</td>
<td>610</td>
<td>4.21</td>
<td>0.791</td>
<td>478</td>
<td>4.04</td>
<td>0.895</td>
</tr>
<tr>
<td>Number of visitors to Cadillac Mountain</td>
<td>627</td>
<td>4.15</td>
<td>0.818</td>
<td>495</td>
<td>4.01</td>
<td>0.836</td>
</tr>
<tr>
<td>The ease/difficulty of finding your way around the summit area</td>
<td>626</td>
<td>4.48</td>
<td>0.625</td>
<td>496</td>
<td>4.38</td>
<td>0.662</td>
</tr>
<tr>
<td>No Issues</td>
<td></td>
<td></td>
<td>No Issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rate of traffic flow on the roadway</td>
<td>618</td>
<td>4.5</td>
<td>0.632</td>
<td>488</td>
<td>4.46</td>
<td>0.655</td>
</tr>
<tr>
<td>The time it takes to get through the Cadillac Mountain entrance booth</td>
<td>617</td>
<td>4.57</td>
<td>0.61</td>
<td>488</td>
<td>4.52</td>
<td>0.696</td>
</tr>
<tr>
<td>The ability to participate in a variety of activities</td>
<td>626</td>
<td>3.72</td>
<td>0.805</td>
<td>495</td>
<td>3.65</td>
<td>0.806</td>
</tr>
<tr>
<td>No Issues</td>
<td></td>
<td></td>
<td>No Issues</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alternative transportation options available</td>
<td>621</td>
<td>3.41</td>
<td>0.741</td>
<td>489</td>
<td>3.33</td>
<td>0.798</td>
</tr>
</tbody>
</table>

### 2.3.3 Objective 2

#### 2.3.3.1 Experience Use History and an Assessment of the Visitor Experience on Cadillac Mountain

One of our initial hypotheses was that repeat visitors would report an increased satisfaction rating on the attribute “finding a parking spot” and other transportation-related factors based on their evaluation of their prior experience (Table 2.4). Cadillac has a history of...
traffic congestion and parking issues during the height of the summer season. We compared first-time and repeat user’s average importance (mean 4.36, std .742) and average satisfaction levels (mean: 4.39, std .757) when finding a parking spot. We found that between the two groups, there was no statistical significance. In the context of Experience Use History, it was possible that both sets of visitors, particularly first-time users, may have experienced traffic congestion elsewhere before entering Cadillac Mountain. Whether where they live when they are not traveling or even before entering the managed access system in places like Jordan Pond or Bass Harbor Head Lighthouse. In addition, all personal vehicle users find a parking spot and the reduced congestion an important aspect to their high-quality experience. The reservation system played a key role in improving the visitor experience on Cadillac Mountain. Both visitor use types were able to find parking easily and avoid congestion, which was an important attribute for them regardless of their use history.

As seen in Table 2.4, first-time visitors reported an overall satisfying experience across all variables except “variety of activity options available” and “alternate transportation options available.” Visitors rated these two variables as “neutral” to “satisfying” experiences. Visitors who reported issues rated the importance of “freedom to explore the summit” on average higher than “finding a parking spot at the summit” compared to those with no issues obtaining a reservation permit. This is important because it indicates that visitors prioritize their experience of freedom and access over parking-related attributes. There are differences between mean satisfaction on a single attribute, but they are minute. Our study showed a slight difference between first-time and returning visitors’ satisfaction ratings but was not statistically significant; satisfaction was high among both sets of visitors. The reservation system addresses important experiences for both groups. This means that first-time and repeat users who did or did not experience issues obtaining a reservation permit had a highly satisfactory experience regardless of their ratings of the attributes stated.
<table>
<thead>
<tr>
<th>Attribute</th>
<th>Visitor status</th>
<th>n</th>
<th>Mean Importance Rating (Out of 5.0)</th>
<th>Std. Deviation</th>
<th>n</th>
<th>Mean Satisfaction Rating (Out of 5.0)</th>
<th>Std. Deviation</th>
<th>n</th>
<th>Mean Importance Rating (Out of 5.0)</th>
<th>Std. Deviation</th>
<th>n</th>
<th>Mean Satisfaction Rating (Out of 5.0)</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>The opportunity to explore at your own pace</td>
<td>FT</td>
<td>663</td>
<td>4.49</td>
<td>0.617</td>
<td>FT</td>
<td>664</td>
<td>4.59</td>
<td>0.661</td>
<td>Repeat</td>
<td>790</td>
<td>4.5</td>
<td>0.662</td>
<td>786</td>
</tr>
<tr>
<td>Unobstructed view of the scenery from the summit</td>
<td>FT</td>
<td>668</td>
<td>4.42</td>
<td>0.804</td>
<td>FT</td>
<td>664</td>
<td>4.45</td>
<td>0.867</td>
<td>Repeat</td>
<td>785</td>
<td>4.41</td>
<td>0.882</td>
<td>786</td>
</tr>
<tr>
<td>Finding a parking spot at the summit</td>
<td>FT</td>
<td>546</td>
<td>4.34</td>
<td>0.787</td>
<td>FT</td>
<td>542</td>
<td>4.35</td>
<td>0.776</td>
<td>Repeat</td>
<td>623</td>
<td>4.32</td>
<td>0.794</td>
<td>621</td>
</tr>
<tr>
<td>Freedom to explore the summit</td>
<td>FT</td>
<td>663</td>
<td>4.26</td>
<td>0.75</td>
<td>FT</td>
<td>663</td>
<td>4.49</td>
<td>0.661</td>
<td>Repeat</td>
<td>789</td>
<td>4.31</td>
<td>0.733</td>
<td>785</td>
</tr>
<tr>
<td>Assurance of having a reservation permit to visit Cadillac Mountain</td>
<td>FT</td>
<td>544</td>
<td>4.18</td>
<td>0.766</td>
<td>FT</td>
<td>542</td>
<td>4.38</td>
<td>0.734</td>
<td>Repeat</td>
<td>621</td>
<td>4.16</td>
<td>0.869</td>
<td>622</td>
</tr>
<tr>
<td>Feeling safe on the roadway to the summit</td>
<td>FT</td>
<td>547</td>
<td>4.08</td>
<td>0.823</td>
<td>FT</td>
<td>544</td>
<td>4.5</td>
<td>0.622</td>
<td>Repeat</td>
<td>622</td>
<td>4.09</td>
<td>0.867</td>
<td>621</td>
</tr>
<tr>
<td>Safety in the parking lots at the summit</td>
<td>FT</td>
<td>545</td>
<td>4.02</td>
<td>0.815</td>
<td>FT</td>
<td>541</td>
<td>4.49</td>
<td>0.61</td>
<td>Repeat</td>
<td>622</td>
<td>4.00</td>
<td>0.896</td>
<td>618</td>
</tr>
<tr>
<td>The sense of safety while visiting</td>
<td>FT</td>
<td>665</td>
<td>3.85</td>
<td>0.991</td>
<td>FT</td>
<td>663</td>
<td>4.51</td>
<td>0.602</td>
<td>Repeat</td>
<td>787</td>
<td>3.85</td>
<td>1.08</td>
<td>787</td>
</tr>
<tr>
<td>Assured access to Cadillac Mountain when otherwise not possible due to road closures to the summit</td>
<td>FT</td>
<td>544</td>
<td>3.79</td>
<td>0.949</td>
<td>FT</td>
<td>536</td>
<td>4.09</td>
<td>0.838</td>
<td>Repeat</td>
<td>614</td>
<td>3.79</td>
<td>0.983</td>
<td>611</td>
</tr>
<tr>
<td>Number of visitors to Cadillac Mountain</td>
<td>FT</td>
<td>668</td>
<td>3.65</td>
<td>1.037</td>
<td>FT</td>
<td>664</td>
<td>3.96</td>
<td>0.886</td>
<td>Repeat</td>
<td>788</td>
<td>3.63</td>
<td>1.046</td>
<td>787</td>
</tr>
<tr>
<td>The ease/difficulty of finding your way around the summit area</td>
<td>FT</td>
<td>668</td>
<td>3.62</td>
<td>0.949</td>
<td>FT</td>
<td>665</td>
<td>4.37</td>
<td>0.673</td>
<td>Repeat</td>
<td>789</td>
<td>3.81</td>
<td>0.936</td>
<td>785</td>
</tr>
<tr>
<td>Rate of traffic flow on the roadway</td>
<td>FT</td>
<td>546</td>
<td>3.62</td>
<td>1.034</td>
<td>FT</td>
<td>544</td>
<td>4.47</td>
<td>0.667</td>
<td>Repeat</td>
<td>625</td>
<td>3.77</td>
<td>0.942</td>
<td>621</td>
</tr>
<tr>
<td>The time it takes to get through the Cadillac Mountain entrance booth</td>
<td>FT</td>
<td>549</td>
<td>3.37</td>
<td>1.101</td>
<td>FT</td>
<td>544</td>
<td>4.52</td>
<td>0.664</td>
<td>Repeat</td>
<td>624</td>
<td>3.42</td>
<td>1.102</td>
<td>620</td>
</tr>
<tr>
<td>The ability to participate in a variety of activities</td>
<td>FT</td>
<td>668</td>
<td>2.91</td>
<td>1.171</td>
<td>FT</td>
<td>662</td>
<td>3.63</td>
<td>0.789</td>
<td>Repeat</td>
<td>789</td>
<td>2.91</td>
<td>1.201</td>
<td>786</td>
</tr>
<tr>
<td>Alternative transportation options available</td>
<td>FT</td>
<td>663</td>
<td>2.62</td>
<td>1.226</td>
<td>FT</td>
<td>661</td>
<td>3.37</td>
<td>0.771</td>
<td>Repeat</td>
<td>785</td>
<td>2.68</td>
<td>1.248</td>
<td>778</td>
</tr>
</tbody>
</table>
2.3.3.2. Returning Visitors and the Reservation System

The most significant factor that affects the duration of a visitor's stay in an area and their likelihood to return for future visits is their ability to access a site and the quality of their visitor experience (TMP, 2019). A positive experience can lead to increased intentions to return, while a negative experience may result in negative recommendations to others (Anastasopoulos, 1992; Oppermann, 1997; Petrick et al., 2001; Um et al., 2006). Previous research suggests that first-time visitors may have a different perspective of a destination compared to repeat visitors, who are more likely to focus on different attributes of their visit (Fakeye & Crompton, 1991; Petrick, 2004). As a result, the factors influencing the expectations of first-time and repeat visitors may differ. Of the returning visitors, 40% said their experience improved from their last trip to Cadillac. Those that felt their experience improved compared to their previous visit commented on the parking, congestion, less crowding, and an overall better experience as the main reasons for the improvement (N=97). Comparing first-time (mean: 4.33) and repeat visitor (mean: 4.29) satisfaction averages, our study demonstrates that both groups hold similar values on their improved visit experience.

Of the respondents, 43% stated that their experience compared to the last visit remained the same. Then, for those who had a prior visit, 13% said their visit could have improved from their last trip. Those that felt more negatively compared to their prior experience commented on the weather as one of the main factors, which National Park Service managers cannot control. Additional comments mentioned parking trouble at trailheads, perceived crowding, not obtaining the reservation permit they desired, and discontent with having a managed access area (N=36).
2.3.3.3. Parking and Satisfaction

Both first-time and repeat users reported high levels of importance and satisfaction with finding a parking spot. Visitors rated their experience as “important” (48%) to “extremely important” (44%) and “satisfied” (40%) to “extremely satisfied” (53%). There was no significant difference ($p = 0.489$) in satisfaction ratings between the two groups of the attribute finding a parking spot. As stated before, when respondents were asked if their current visit to Cadillac had improved from their last visit, 40% felt more positive about their experience. In the open-ended comments section for this question, many stated it improved because of their ability to park, less traffic congestion, and overall better experience. However, additional oral and written comments for those whose experience did not improve (13%) indicated they had trouble finding a parking spot despite the reservation system addressing this issue for most visitors. In saying that, our survey was not able to deduce if they had trouble parking in the east or west lot. Regardless of the parking lot, most visitors recognize the benefit the reservation system has on this transportation factor.

One of the primary goals of preserving the outdoor recreation experience is to recognize multiple layers of the visitor experience and understand those attributes visitors deem important (Manning, 1985; Daigle, 2019). Cadillac Mountain offers a multi-faceted visit, with the quality of experience varying based on individual ratings of visitor experience attributes. Our study found that finding a parking spot was among the top three most important attributes of their visit. However, it was not the most important attribute to visitors, and this means other aspects of their visit were deemed more important. Each experience contributes to a multidimensional view that is not solely based on one attribute that defines the entire visitor satisfaction on Cadillac Mountain.
2.3.3.4. Experience Use History

Experience Use History (EUH), as seen in many studies throughout the outdoor recreation space, is an important concept for understanding visitor experience. Visitors’ EUH can shed light on their values and behaviors within a protected area, like Acadia. Experienced visitors tend to be more sensitive to other visitors’ behavior, social, and ecological impacts than first-time visitors in high-use areas (White et al., 2008). The EUH concept varies among visitors and has behavioral implications for parking and congestion management on Cadillac Mountain.

Visitors to natural areas or cities may have encountered traffic congestion and parking problems before their current trip to Acadia. For instance, first-time visitors may have been aware that Cadillac is a popular destination and anticipated it to be crowded. Schreyer and Lime (1984) highlight that a person may be a novice in one environment, yet have experience in other areas. This could explain why there was no significant difference in parking satisfaction between first-time and returning visitors. Both of these groups find their ability to find parking and avoid traffic congestion to be an important value to their experience regardless of their past trip history to the summit.

2.3.3.5 Time Slots

In addition, visitors who drove up the Cadillac Summit Road self-reported an average length of stay of 2 hours. Of the respondents, 32% stated their length of stay on Cadillac was one hour or less, 38% stated 1.25-2 hours, 16% stated 2.25-3 hours, and 14% stated they stayed 3.25 hours or greater. Visitors in a study by Cole (2008) revealed that their self-reported time in a specific area or activity actually differed from their observed time by the research team. We found that people who could not get their desired reservation for sunset were displaced to other time slots or different days. It was anticipated that visitors would be redistributed from high-use
times, like sunset, to alternative time slots. In some instances, visitors would ‘cheat the system’ by purchasing a permit for the early evening (2 pm to 6 pm) time and staying past the average length of stay until after sunset. This sometimes resulted in up to 30 extra vehicles that were parked in undesignated areas along the roadside. When visitors were redistributed from their preferred time slot to an alternative time slot, our research demonstrated that this displacement cut down on parking issues while keeping visitor satisfaction levels high (Table 2.5).

A primary concern for visitors was that the permit system dampens the spur-of-the-moment type of user and removes spontaneity within their recreation experience in Acadia. However, through our survey findings, 29% self-reported purchasing their reservation the same day as their visit, and through the 2021 recreation.gov figures, 42% of permits were purchased on the same day of their visit. Despite the growing pains of a new managed access system, visitors accept the reservation system despite reporting issues.
Table 2.5: Visitor Reservation Time Slot and Parking Satisfaction Ratings

<table>
<thead>
<tr>
<th>Rating</th>
<th>Before sunrise</th>
<th>Mid-morning</th>
<th>Mid-day</th>
<th>Early evening</th>
<th>Sunset</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>60</td>
<td>63</td>
<td>43</td>
<td>50</td>
<td>63</td>
<td>56</td>
</tr>
<tr>
<td>4</td>
<td>38</td>
<td>30</td>
<td>43</td>
<td>44</td>
<td>31</td>
<td>37</td>
</tr>
<tr>
<td>3</td>
<td>0</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>5</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>&lt;1</td>
<td>0</td>
<td>&lt;1</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>

2.4. Limitations of the Study

Like any research, this study has some limitations and suggests areas for future research. One limitation is that the data collection took place during the summer season, which may not provide a complete picture of off-season visitor behaviors. To address this limitation, future research could expand the seasonal distribution of data collection to include spring and fall, which historically have slightly different visitor demographics than the summer season. Furthermore, the study focused solely on visitors who went to Cadillac Mountain. Further research could be conducted for those that did not use the managed access system and went to another location instead. If future researchers were to continue this project, we would suggest a triangulation of methods, increased sample size, follow-up surveys, and longitudinal studies. Lastly, direct open-ended questions could give a greater scale and scope to existing qualitative data on user experiences. One limitation of this study is that visitors were not asked to specify if they found parking in the east or west lot when rating their parking experience. As a result, it is unclear whether their ratings were influenced by the capacity of the lots or their lack of knowledge of available parking in other areas. Additionally, the number of non-vehicle user surveys was limited compared to vehicle user surveys, and a larger sample size of non-vehicle users would provide valuable insights for management. These limitations highlight the need for more comprehensive data collection to better understand changing visitor preferences. Incorporating these ideas into future research would be beneficial for improving the study's methodology.
2.5 Conclusion

The Cadillac Mountain Summit Road vehicle reservation system can be labeled as effective in its first year of implementation based on visitor survey responses. However, there are still areas for improvement to make the vehicle reservation system easier for visitors. The survey conducted on Cadillac Mountain visitors yielded a high response rate and provided valuable insights into visitor demographics, behaviors, and preferences. Most respondents were highly educated and identified as the ethnic group White/Caucasian, with a higher proportion of female respondents. The survey also revealed the top three most important attributes to visitors, including exploring at their own pace, an unobstructed view of the scenery, and finding a parking spot at the summit. The top reported issue with obtaining a vehicle permit was the unavailability of preferred time slots or days, with the sunrise block being the most frequently mentioned.

Managed access systems address transportation factors that were cited as an important element of the visitor experience.

Contrary to historical recommendations, managed access systems need not be considered a last resort. In fact, our survey indicated that visitors had a satisfying experience with many transportation and social factors within the timed-entry reservation system. This research aims to provide Acadia National Park managers with information on important elements of the visitor experience and satisfaction ratings based on their use of the Cadillac Mountain reservation system. Despite initial concerns that the timed-entry reservation system would dampen the spur-of-the-moment entry and remove spontaneity from the recreation experience, our survey results show that many visitors purchased their permits within 48 hours of their entry. Moreover, the reservation system has addressed most long-standing parking and congestion issues and has not significantly decreased visitor satisfaction. A primary emphasis of this report is to highlight that
while tradeoffs occur in having a managed access system, it did not significantly decrease the satisfaction levels of visitors – it did just the opposite.

We hypothesized that there would be expected differences between those who experienced Cadillac prior to the implementation of the reservation system and those who did not. We perceived this based on Cadillac’s prior traffic and parking congestion history. While we expected to see differences between first-time and repeat visitor satisfaction in relation to multiple attributes, we did not see any statically significant differences. One reason this may be the case is understanding visitor’s Experience Use History. While a first-time visitor may be a novice while visiting Cadillac, this does not mean they have not experienced traffic and parking congestion outside of the park. We found both groups find similar attributes equally important in regard to transportation and social factors.

Future research is still needed to survey visitors who decided not to go to Cadillac as part of their visit to Acadia. Understanding their attitudes and behavior would clarify their reasoning for not obtaining a reservation permit. With these future research avenues in mind, one could investigate the equity implications of the reservation system permit fee. Then current and future stakeholders could explore the possibility of charging a higher permit fee to personal vehicle users to offset the cost for alternative transportation options to Cadillac Summit. With this, the park could optimize the current system and integrate technology, like License Plate Readers. Data collected from these technologies could allow a better understanding of external factors like weather, visitor length of stay, and overall demand, and give managers more tools to enhance the visitor experience. The integrated technology could impact the 70% of allocated permits issued by ANP resource managers in the 48-hour window prior to the reservation date. Lastly,
surveying visitors once every 3-5 years to gauge differences in experience attribute ratings and consider visitor feedback on current conditions could be beneficial.

Visitors to managed access systems are trading the freedom of access for the certainty of access to Cadillac Mountain. Prior to the Cadillac Mountain reservation system, visitors could drive the summit road whenever they desired, but the ability to park was not guaranteed. Now, the managed access system gives visitors a more predictable experience at the summit. Acadia continues to provide no-reservation access to Cadillac Mountain through a range of transportation options like taking a concessions bus, hiking on trails, and biking on the road. Visitors appreciated the benefits of the managed access system, including the virtual queue, which eliminated the need to wait in a line or risk being denied access. To alleviate stress for visitors looking for parking in the larger lot, a straightforward sign on the outbound lane of the east lot, visible to visitors as they attempt another loop, indicating the availability of additional parking 100 yards away, could be implemented. Finally, we suggest that Acadia conducts additional market research to identify which demographics are facing the most challenges in obtaining a permit and which groups require the most technical support.

Previous studies have highlighted the importance of public access to popular destinations; managing visitor use remains a challenge to minimize resource impacts at the summit of Cadillac. This study suggests that visitors had a positive, high-satisfaction experience which indicates that the park's management team should consider the managed access system a success. Looking ahead, stakeholders and park managers should use this study and future research results to continue to improve the visitor experience within the reservation system on Cadillac Mountain.
BIBLIOGRAPHY


Help us understand how the reservation system is impacting your Cadillac Mountain experience!

https://umaine.qualtrics.com/jfe/form/SV_40QdWyXAas3HyQe

Scan the code above the camera application on your smartphone, or go to the website listed, to participate in our study by entering your email address.

The School of Forest Resources at the University of Maine is interested in how park visitors are experiencing the Cadillac Mountain reservation system. Please consider taking part in this research by scanning the QR code above with the camera app on your smartphone. Contact Dr. John Daigle (jdaigle@maine.edu) with questions.
APPENDIX B: Visitor Survey instrument
Cadillac Mountain Survey
Summer 2021

This survey was developed by University of Maine in cooperation with Friends of Acadia to learn more about users of the Cadillac Mountain Reservation system. This research will help Acadia National Park (ANP) to better understand the types of visitors who enjoy Cadillac Mountain. This survey is voluntary and will remain confidential. Your cooperation is appreciated to ensure the survey results are comprehensive, accurate, and timely. After this survey, there is the opportunity to enter a raffle for a one-time Friends of Acadia membership ($35 value).

Section 1: Today's Visit

1. What mode of transportation did you use to visit Cadillac Mountain today? Please mark all that apply.

☐ Personal vehicle/Rental vehicle  ☐ Motor Coach/Small buses
☐ Bicycle  ☐ Tour Operators (e.g., Oli’s Trolley/ANP Tours)
☐ Motorcycle  ☐ Rideshare (Uber/Lyft)
☐ Electric Bicycle (E-Bike)  ☐ Taxi service
☐ Hiking on a trail  ☐ Other (Please specify): ______________________________
☐ Island Explorer bus then hike

2. Was this mode of transportation your first choice to access Cadillac Mountain? Please mark one response.

☐ Yes
☐ No, the original plan was to (Please specify): ______________________________

3. How many people are in your group today, including yourself? Please write in a number next to each category that applies.

_____ Children (5 years or younger)
_____ Children (6-17 years)
_____ Adults (18-64 years)
_____ Seniors (65 years or older)

4. On this visit, what type of group are you with? Please mark all that apply.

☐ Alone
☐ Family
☐ Friends
☐ Partner/Boyfriend/Girlfriend
☐ Organized Group
☐ Other (Please specify): ______________________________
5. On this trip, how many total hours or days do you plan to spend visiting the following places? Please list partial hours or days as 0.25, 0.5, or 0.75. Please write in a number next to each category that applies.

a) Mount Desert Island
   ________ Number of Hours (if < 24 hrs.)   ________ Number of Days (if > 24 hrs.)

b) Acadia National Park
   ________ Number of Hours (if < 24 hrs.)   ________ Number of Days (if > 24 hrs.)

c) Cadillac Mountain
   ________ Number of Hours

Section 2: Prior-trip history
1. During this trip to ANP, was Cadillac Mountain one of your main destinations?
   □ Yes
   □ No

2. Have you visited another national park with a reservation system (non-campground/ranger program)?
   □ Yes
   □ No

3. Did you make a reservation to visit Cadillac Mtn in October 2020, or earlier this year in 2021?
   □ Yes
   □ No

4. Have you visited Cadillac Mountain in the past, prior to this trip? Please mark one response.
   □ Yes
   □ No – please skip to the next page (Section 3: Visitor Experience on Cadillac Mt.)

   a. Approximately how many times have you visited Cadillac Mountain prior to this trip?
      Please write a number: ________________

   b. What was the year of your most recent visit to Cadillac Mountain prior to this trip?
      Please write a number: ________________

   c. What time of year was your most recent visit to Cadillac Mountain prior to this trip?
      □ Winter (Dec – Feb)  □ Spring (Mar – May)  □ Summer (June – Aug)  □ Autumn (Sept – Nov)

5. Do you think overall experience improved from your last trip to Cadillac Mountain?
   □ Yes
   □ Remained the same
   □ No
Section 3: Visitor Experience on Cadillac Mountain

We would like your response to the following statements about Cadillac Mountain. This information will assist the National Park Service to better understand the general visitor experience.

1. The following questions ask about how **important** the following statements about the visitor experience on Cadillac Mountain are to your experience today. *Please mark one response per statement.*

<table>
<thead>
<tr>
<th>How important was...</th>
<th>Not Important</th>
<th>Slightly Important</th>
<th>Neutral</th>
<th>Important</th>
<th>Extremely Important</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Unobstructed view of scenery from the summit</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>B. Number of visitors on Cadillac summit</td>
<td></td>
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<tr>
<td>C. The ease/difficulty of finding your way around the summit area</td>
<td></td>
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<tr>
<td>D. The sense of safety while visiting</td>
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<tr>
<td>E. The ability to participate in a variety of activities</td>
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</tr>
<tr>
<td>F. Freedom to explore the summit</td>
<td></td>
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<tr>
<td>G. The opportunity to explore at my own pace</td>
<td></td>
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<tr>
<td>H. Alternative transportation options available</td>
<td></td>
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<td></td>
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<tr>
<td>I. Overall experience to your entire ANP visit</td>
<td></td>
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</tbody>
</table>

2. The following questions ask about how **satisfied** you are with the following statements about the visitor experience on Cadillac Mountain are to your experience today. *Please mark one response per statement.*

<table>
<thead>
<tr>
<th>How satisfied were...</th>
<th>Extremely Dissatisfied</th>
<th>Dissatisfied</th>
<th>Neutral</th>
<th>Satisfied</th>
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<tbody>
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</tbody>
</table>
Section 4: Visitor experience associated with the reservation system

We would like your response to the following statements about Cadillac Mountain reservation system. This information will assist the National Park Service to better understand the visitor experience. The following questions ask about your experience with details of your reservation system booking experience.

1. Where did you learn about the Cadillac reservation system? Please mark all that apply.

☐ ANP Website
☐ Social Media (e.g., Facebook, Instagram, Twitter, etc.)
☐ Calling ANP over the phone
☐ Lodging establishments
☐ ANP Visitor Center
☐ Word of mouth – from public, family, friends, etc.
☐ Newspaper/Press
☐ Multimedia (Television, YouTube, Radio, etc.)
☐ Other (Please specify):

2. When did you find out that you needed a Cadillac Mt. reservation prior to entry? Please mark one response.

☐ 0 – 23 hours
☐ 1 – 3 weeks
☐ 24 - 48 hours
☐ 1 - 2 months
☐ 2 days – 6 days
☐ 3+ months

3. When did you purchase today’s reservation prior to entry? Please mark one response.

☐ 0 – 23 hours
☐ 1 – 3 weeks
☐ 24 - 48 hours
☐ 1 - 2 months
☐ 2 days – 6 days
☐ 3+ months

4. Which of the following issues, if any, did you experience when obtaining a reservation permit for Cadillac Mountain? Please mark all that apply.

☐ None
☐ Obtained wrong information about the reservation system
☐ Limited celllarar data
☐ Was not able to find information about the reservation system
☐ Missed my time slot
☐ Recreation.gov website did not work
☐ First choice of time slot or
day was unavailable
☐ Recreation.gov website was frustrating
☐ Other (Please specify): _____________________________
5. The following questions ask about how **important** the following statements about the visitor experience on Cadillac Mountain are to your experience today. **Please mark one response per statement.**

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<td>☐</td>
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<td>☐</td>
<td>☐</td>
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</tr>
<tr>
<td>B. Rate of traffic flow on the roadway</td>
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<tr>
<td>C. Feeling safe on the roadway to the summit</td>
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<tr>
<td>D. Assured access to Cadillac when otherwise not possible due to road closures to the summit</td>
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<tr>
<td>E. Finding a parking spot</td>
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<td>☐</td>
<td>☐</td>
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<tr>
<td>F. Assurance of having a permit to visit Cadillac Mountain</td>
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<td>☐</td>
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<td>☐</td>
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<tr>
<td>G. Safety in the parking lots at the summit</td>
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<td>☐</td>
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</tbody>
</table>
Section 5: Reservation area fees

Increased reservation area fees to Cadillac Mountain would improve visitor safety, access, and overall experience in Acadia National Park.

1. Would you pay $___________ (USD) to use Cadillac Mountain one time (does not include Acadia Park pass)? Please mark one.
   - Yes
   - No

2. What would be the maximum price you would pay to use Cadillac Mtn. one time (does not Acadia Park pass)?
   
   Please write a dollar amount: $____________ (USD) – Why? ________________________________

3. If your answer to question #2 is zero, which of these reasons best describes why you answered the way they did? Please mark all that apply.
   - I already pay through other means
   - I object to the per vehicle user fee
   - I do not want to place a dollar value
   - This is what I feel it is worth
   - Other (Please specify): ____________________________________________

Section 6: Demographics

The last few questions will help us learn more about the visitor population. Again, please keep in mind that all your answers will remain confidential and will only be used to summarize characteristics of visitors. Participation is voluntary. You may stop at any time and skip questions.

1. Your current gender identity? Please mark the option that best describes you.
   - Male
   - Female
   - Transgender female/ trans woman (or Male-to-Female (MTF) transgender, transsexual, or the trans female spectrum)
   - Transgender male/trans man (or Female-to-Male (FTM) transgender, transsexual, or the trans male spectrum)
   - Non-binary, genderqueer, or genderfluid
   - Gender identity not listed: __________________________
   - Prefer not to reply

2. What is the year you were born? ______________________

3. What is the Zip Code of your PRIMARY residence? ______________________
4. With which racial group(s) do you identify? Please mark all that apply.

☐ White/Caucasian
☐ Native American
☐ Asian
☐ Black/African American
☐ Hispanic
☐ East Indian
☐ Prefer not to reply

5. Are you a summer resident of Mount Desert Island area or the Schoodic region?

☐ Yes
☐ No

6. What is the highest level of education that you have achieved? Please mark one response.

☐ Less than high school
☐ High School diploma or equivalent
☐ Some college
☐ 2-year associates degree or trade school
☐ 4-year college degree
☐ Advanced degree beyond 4-year college degree

7. What is your approximate annual household income before taxes? Please mark one response.

☐ Less than $10,000
☐ $10,000 to $24,999
☐ $25,000 to $49,999
☐ $50,000 to $74,999
☐ $75,000 to $99,999
☐ $100,000 to $124,999
☐ $125,000 to $149,999
☐ $150,000 to $174,999
☐ $175,000 to $199,999
☐ $200,000 to $224,999
☐ $225,000 to $249,999
☐ $250,000 and higher

Is there anything else you would like to tell us about your visit to Cadillac Mountain?

______________________________________________________________________________
______________________________________________________________________________

Please return the survey to the cardboard box.

Thank you very much for your time.

University of Maine
Parks, Recreation and Tourism Program
5755 Nutting Hall
Orono, ME 04469-5755
This survey was developed by University of Maine in cooperation with Friends of Acadia to learn more about users of the Cadillac Mountain Reservation system. This research will help Acadia National Park (ANP) to better understand the types of visitors who enjoy Cadillac Mountain. This survey is voluntary and will remain confidential. Your cooperation is appreciated to ensure the survey results are comprehensive, accurate, and timely. After this survey, there is the opportunity to enter a raffle for a one-time Friends of Acadia membership ($35 value). Your name and email address will not be given to any other group or used by us beyond the purposes of this study. This survey will be destroyed at the end of the study.

University of Maine  
Parks, Recreation and Tourism Program  
5755 Nutting Hall  
Orono, ME 04469-5755

To participate in the Internet survey please provide:

FIRST NAME: ___________________________ EMAIL: ___________________________

APPENDIX C: Testing Period Sampling Schedule

<table>
<thead>
<tr>
<th>Day of Week</th>
<th>Date</th>
<th>Sunrise - 05:59</th>
<th>06:00 - 09:59</th>
<th>10:00 - 13:59</th>
<th>14:00 - 17:59</th>
<th>18:00 - Sunset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tuesday</td>
<td>June 26th</td>
<td>-</td>
<td>-</td>
<td>X</td>
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<td>-</td>
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<tr>
<td>Sunday</td>
<td>June 27th</td>
<td>-</td>
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<td>X</td>
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<td>-</td>
</tr>
<tr>
<td>Monday</td>
<td>June 28th</td>
<td>X</td>
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<tr>
<td>Tuesday</td>
<td>June 29th</td>
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<tr>
<td>Wednesday</td>
<td>June 30th</td>
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<td>X</td>
<td>X</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Day of Week</th>
<th>Date</th>
<th>Sunrise - 05:59</th>
<th>06:00 - 09:59</th>
<th>10:00 - 13:59</th>
<th>14:00 - 17:59</th>
<th>18:00 - Sunset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thursday</td>
<td>July 1st</td>
<td>-</td>
<td>-</td>
<td>X</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Friday</td>
<td>July 2nd</td>
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<td>X</td>
<td>X</td>
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<td>-</td>
</tr>
<tr>
<td>Saturday</td>
<td>July 3rd</td>
<td>-</td>
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<td>-</td>
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<tr>
<td>Sunday</td>
<td>July 4th</td>
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<tr>
<td>Monday</td>
<td>July 5th</td>
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<tr>
<td>Tuesday</td>
<td>July 6th</td>
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<td>X</td>
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<tr>
<td>Wednesday</td>
<td>July 7th</td>
<td>-</td>
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<tr>
<td>Thursday</td>
<td>July 8th</td>
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<td>Friday</td>
<td>July 9th</td>
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<tr>
<td>Saturday</td>
<td>July 10th</td>
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<td>X</td>
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<tr>
<td>Sunday</td>
<td>July 11th</td>
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<tr>
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<tr>
<td>Wednesday</td>
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<tr>
<td>Day of Week</td>
<td>Date</td>
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*Table A.3. August 2021 Survey Sampling Plan - Cadillac Mountain*
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BIOGRAPHY OF THE AUTHOR

Rebecca Stanley, a native of Metairie, Louisiana, was born on September 24, 1994. She spent her childhood in Jefferson, Louisiana from 1994-2005, before moving to Aurora, IL following Hurricane Katrina. In 2012, she was part of the inaugural graduating class of Metea Valley High School. Rebecca earned a bachelor’s degree in Natural Resources with a Forestry emphasis from an environmental liberal arts institution, Northland College (NC) in Wisconsin, in 2016, where she participated in numerous projects that contributed to her diverse range of experiences in the field of natural resources. During her time as an undergrad, Rebecca was one of the, if not the, youngest employee to work as a wilderness intern for the Boundary Water Canoe Area Wilderness in Cook, MN in 2014. This opportunity cemented her passion for the outdoors and inspired her continued dedication to conservation and resource management.

Upon completing her undergraduate studies, Rebecca moved to Bar Harbor, Maine, to work as a Recreation Technician for Friends of Acadia, a non-profit conservation organization. During the off-season, she traveled through Europe and the Middle East to visit friends and hike in protected areas. In 2023, following her graduation, Rebecca will continue her work at Friends of Acadia, focusing on visitor use management research and expanding her expertise in the natural resource management of parks. Rebecca is a candidate for the Master of Science degree in Forest Resources from the University of Maine in May 2023.