Congestion Management in Glacier National Park

Acadia National Park Project Site
Glacier National Park Project Site

❖

Submitted by:
Claire Barrameda, Trevor Rizzo, and Thomas Vose

❖

Advised by:
Frederick Bianchi

❖

Sponsored by:
The Crown of the Continent Research and Learning Center
&
Acadia National Park

Submitted Oct 12th, 2018

Abstract

Glacier National Park has seen an overwhelming increase in visitors throughout the past few years. They have been forced to shut down sections of the park to alleviate congestion from overcrowded parking lots. This year the Howe Ridge Fire prevented the team's original date of arrival. The team spent the first half of the term in Acadia National Park, where the project was tailored to their similar congestion situation, while still working towards the goals for Glacier. The objectives focused on alleviating congestion organically by providing park visitors with the information necessary to reduce congestion themselves. In each location, the team determined the current state of congestion management tools and infrastructure, then investigated and compared solutions that best fit each park. The team's recommended solution combines a newly developed webcam network and an easily accessible traffic and congestion page within the NPS website for respective parks.

Acknowledgements

We'd like to thank the many members of the Acadia National Park staff. Thank you to Jay Elhard for providing us with information throughout our time at Acadia and for your contributions to our experimentation. We'd also like to acknowledge John Kelly who also provided us with essential information that shaped our project and guided our research. We're also appreciative of all the input and support provided from other park staff members including Abe Miller-Rushing and Kevin Schneider, as well Stephanie Clement, from Friends of Acadia.

From Glacier National Park, we'd like to send our thanks to Tara Carolin who was fundamental in making this project possible and successful. Mary Riddle also contributed to the development of this project and initial research. We'd also like to thank Ron Lehrman and Daniel Lombardi for providing technical information about Glacier's webcams and website. Also a thank you to the Crown of the Continent Research and Learning Center for providing housing.

Last, but not least, thank you to our professors Frederick Bianchi and Stephen McCauley. Professor McCauley was an amazing source of ideas, encouragement, and guidance while we developed our project in ID 2050. Frederick Bianchi was our outstanding advisor on site who guided us through all the twists and turns of our project.

Table of Contents

List of Tables

List of Figures

Authorship

Sections	Primary Author	Primary Editor
Abstract	Thomas Vose	Claire Barrameda
Acknowledgements	Claire Barrameda	Thomas Vose
Executive Summary	All	Claire Barrameda, Trevor Rizzo
Introduction	Claire Barrameda, Thomas Vose	Trevor Rizzo
Background 2.1	Trevor Rizzo	Claire Barrameda
Background 2.2	Thomas Vose	Trevor Rizzo
Background 2.3	Claire Barrameda, Trevor Rizzo	Thomas Vose
Background 2.4	Trevor Rizzo	Thomas Vose
Background 2.5	Claire Barrameda, Trevor Rizzo	Thomas Vose
Background 2.6	Thomas Vose	Claire Barrameda, Trevor Rizzo
Methodology 3.1	Claire Barrameda	Thomas Vose
Methodology 3.2	Claire Barrameda	Thomas Vose
Methodology 3.3	Trevor Rizzo	Claire Barrameda
Methodology 3.4	Trevor Rizzo	Claire Barrameda
Methodology 3.5	Claire Barrameda	Thomas Vose
Results 4.1	Thomas Vose	Claire Barrameda
Results 4.2	Thomas Vose	Claire Barrameda
Results 4.3	Thomas Vose	Claire Barrameda
Results 4.4	Trevor Rizzo	Claire Barrameda
Results 4.5	Claire Barrameda	Thomas Vose
Discussion 5.1	Claire Barrameda	Trevor Rizzo

Discussion 5.2	Claire Barrameda	Thomas Vose
Discussion 5.3	Claire Barrameda	Thomas Vose
Conclusion	Trevor Rizzo	Claire Barrameda
Appendix D	Claire Barrameda	Trevor Rizzo
Appendix E	Trevor Rizzo	Thomas Vose, Claire Barrameda
Appendix F	Trevor Rizzo	Thomas Vose
Appendix G	Trevor Rizzo	Thomas Vose

Executive Summary

Introduction

Eco-tourism throughout the United States has hit record highs in the past five years. The United States has 59 National Parks protecting over 84 million acres for the enjoyment of present and future generations. Recent congestion poses a unique challenge to parks which want to preserve their lands while still providing access to visitors. Glacier National Park (GNP) is no exception. Its yearly visitation has doubled since 2000, with a one million visitor increase from 2015 to 2017.

The goal of this project is to help GNP alleviate congestion and enhance their current congestion management options. We aim to help the park collect congestion information and communicate it to visitors so they have the ability to solve this issue independently.

Background

Aside from its namesake glaciers, GNP is home to many attractions, such as campgrounds, hotels, boat tours, driving tours, horseback riding, watersports, hiking, and restaurants. These attractions draw large and diverse crowds, from those looking for a quick day hike to those on a weeklong getaway. Glacier National Park saw a record high in visitation last year with over 3.3 million visitors, nearly double the number of visitors from the year 2000.

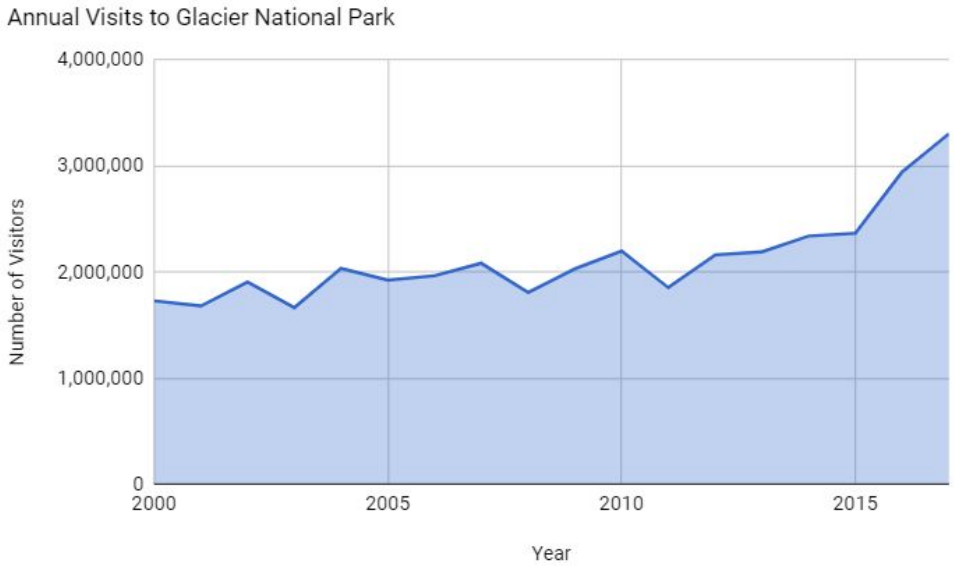


Figure 1: Annual Visits to GNP from 2000 to 2017

Popular sites within the park include Camas, Goat Lick, Many Glacier, Polebridge, Two Medicine, and Saint Mary Ridge Road, shown on the map in Figure 3, below. In 2016, the number of visitors by month to these areas ranges from 2,300 to 70,000 in peak season. The number of vehicles per month visiting or passing Camas, Goat Lick, Many Glacier, Polebridge, Two Medicine, and Saint Mary Ridge Road are displayed in Figure 3, with exact values available in Table 2 of Appendix A (Monthly Public Use Report).

Figure 2: Map of Popular Sites with Car Counters

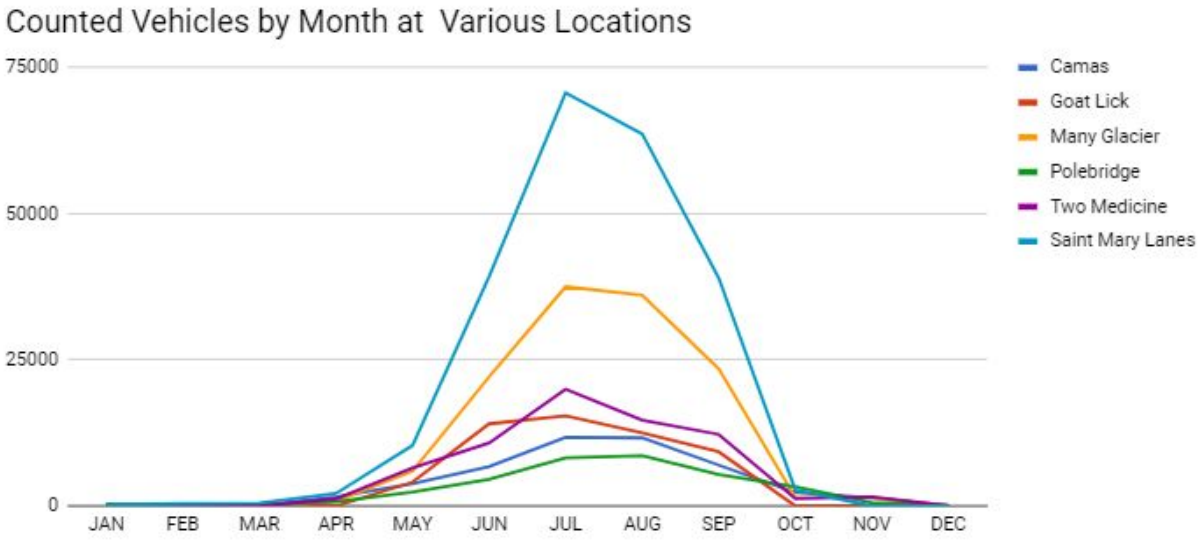


Figure 3: Graph of Counted Vehicles by Month at Various Locations

Since congestion is a fairly recent issue, parks have relatively small toolkits when it comes to handling congestion. GNP uses an assortment of methods for collecting traffic information and communicating to visitors. These tools can be considered a loose congestion response protocol, but are generally informal, undocumented and unstandardized. Existing initiatives to alleviate congestion include signage, ranger and volunteer assistance, shuttle systems, Twitter and Facebook pages, scaled pricing, car counters, and some webcams.

Methodology

Glacier National Park aims to reduce vehicle congestion by improving communication of congestion issues to its visitors, allowing them to make more informed decisions to reduce traffic. In order to do this we investigated the feasibility of a webcam network, which would be used to monitor live traffic conditions, and methods of communicating information to visitors, in order to determine the most effect methods. We broke our project into five objectives:

Objective 1. Identify the existing methods for traffic management and communication

Objective 2. Assess the current state of ANP's & GNP's telecommunication infrastructure

Objective 3. Identify the requirements of traffic webcam systems for ANP & GNP and determine the most favorable webcam for each park

Objective 4. Determine the optimal locations for traffic monitoring webcams

Objective 5. Determine ways to increase communication of congestion information to the public

Our first objective was primarily achieved before arrival at our project sites. Through correspondence with park staff and field observations, we were able to identify the various methods both ANP & GNP use for managing congestion.

Achieving Objective 2 in ANP was very straightforward since most information of relevant infrastructure in ANP was was already compiled during a previous IQP. Gaps in knowledge were filled by correspondence with park staff and field observations. Objective 2 was primarily achieved through correspondence with park staff. In Glacier, we had little knowledge of existing infrastructure even up to our arrival on site. Through email and in person meetings,

we obtained information on including power lines, hard-wired internet, and existing webcams. To supplement information from park staff, we also made field observations.

Objective 3 was separated into two main parts. The first part was to determine what features were needed in a webcam that would be suitable for ANP and GNP. These features determined through analyzing the conditions and infrastructure of both parks. Also, communication with park staff provided additional information on what specifications were necessary for a webcam. The second part of this objective was choosing a webcam based on the features that were deemed most important. Three webcams were considered for potential solutions; an off-the-shelf solution, the webcams each park was already using, and a prototype webcam created by the team.

Completing objective 4 required using information gathered in objectives 2 and 3. Once we knew the infrastructure throughout each park and what webcam we would be focusing on, we could focus on where the cameras would be located. The potential camera sites were assessed on two factors; (1) whether the site had the infrastructure to support the chosen webcam and (2) whether the site provides vital information on congestion. We traveled to sites with both of these features to identify feasible camera mounting locations. Cadillac Mountain camera locations are shown below.

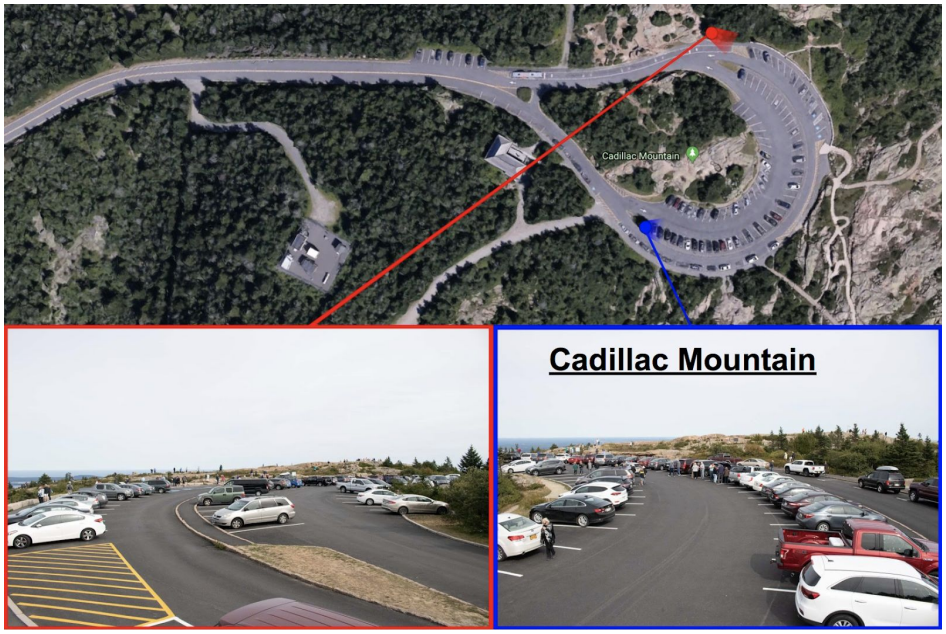


Figure 4: Camera Locations On Cadillac Mountain

The number of webcams necessary to effectively convey congestion at each site was also determined.

Our final objective was to recommend ways to effectively inform visitors of traffic issues in the park. In order to do this, we first researched how visitors plan their trips to learn what resources they use and when they access them. We then dove into analytics of visitation to the NPS websites for ANP & GNP so we could identify how visitors navigate through the website so we can make traffic and congestion information easily accessible to viewers. We also researched how national parks communicate traffic, congestion, overcrowding, and related transportation information. We investigated these characteristics across many national park websites including Acadia, Glacier, Zion, Arches, Mount Rainier and Grand Canyon National Park. The four major aspects we looked into were what information is provided, where the information is located, how it is displayed, and how the information can be accessed.

Results

Regarding results for Objective 1, we gained much more insight on the current state of ANP & GNP's traffic management and communication methods. ANP & GNP use similar tools for managing traffic and congestion. One of the most common tools is signage, notices, and cones which rangers use to inform visitors of changes to traffic and temporary regulations, or to reinforce existing regulations which are often overlooked when congestion is extreme. Other tools include rangers on the ground informing visitors and directing traffic, shuttle systems used to reduce the use of personal vehicles, chalking used for marking parking spaces, park closures used only as a last resort, the Twitter and Facebook pages used to update parking lot statuses, scaled pricing to incentivize visitors to visit out of peak season, car counters used to track the number of vehicles using a road, and webcams (GNP only) used to monitor entrances and parking lots.

For assessing the current telecommunication infrastructure, Objective 2, our team was able to find specific information for each park regarding radio signal, cell coverage, power options, internet options, and existing webcams. We discovered that radio signal is the most reliable and commonly used form of communication within the park. Cellular service was also

common throughout ANP, but virtually non-existent in GNP. Contrastly, GNP was equipped with with more power lines and internet cables than ANP, which had nealy no wired internet throughout the park. Acadia had one functional webcam located at Thunder Hole looking at toward the horizon over the water. Glacier, being the forerunner in national park webcams, has a sophisticated system of 15 webcams that overlook at scenery, roads, and parking lots. Glacier was the first national park to develop a network of webcams and share them with the public on their website.

Regarding Objective 3, we were able to establish the minimum requirements for implementing traffic webcams in ANP & GNP and compare different camera options. The ideal webcam would be low cost, noninvasive, FTP compatible. Additionally, in some areas of the park where there are no power lines or internet cables, solar power and cellular connectivity is a necessary feature for webcams. After analyzing and testing the several webcam options, it was concluded that the webcam prototype developed by the team was best suited as a low cost, non-invasive, seasonal webcam.

Based on our results of Objective 2 and 3 we were able to determine optimal locations for traffic webcams, Objective 4. In ANP, we selected Cadillac Mountain, Blue Hill Overlook, and Jordan Pond as ideal sites for initial implementation. In GNP, we selected Apgar Visitor Center Lot, Saint Mary Visitor Center, and Two Medicine were chosen in GNP. All these sites have the infrastructure to support a webcam system and are key areas of congestion that the parks would like to monitor.

Finally, for Objective 5, we determined ways to increase communication of congestion information to the public. We found that, based off pre-planning trends, the most effective way to reach visitors is through the NPS website. To maximize the number of people reading congestion information, we recommend ANP & GNP create and/or maintain Traffic & Travel tip pages, dedicated pages for displaying information on this subject. To maximize views of this page and make it easily accessible to website users, the parks should post it on both their home page and as a link on the Plan Your Visit drop down menu. Finally, the parks should make creative visuals for quickly communicating important communication. Parks should utilize information and images captured by the proposed webcam network.

Discussion

After compiling all of our results, we discuss limitations of the Raspberry Pi as a solution, future potential for a webcam network, and outcome assessment. Raspberry Pi's offer a noninvasive and affordable option for implementing a webcam network; however, there are some limitations including weather proofing and ease of use. Should the parks implement a webcam system, even one as basic as the Raspberry Pi's, they would gain the the opportunity for automated mass data collection. Webcams are a great way to reliably collect lots of data with minimal labor required after setup. Benefits of this include insightful data on traffic behavior, a reduction in digital storage requirements, and the automation of updates to reduce ranger workload. Lastly, we added our thoughts on assessing the effects of acting on our recommendations and discuss possible alternative methods for collecting images of congested roadways.

Conclusion

Acadia National Park and Glacier National Park are both experiencing significant and increasing congestion. This congestion has prompted parks to look for better methods of monitoring and communicating congestion issues in both parks. Research into each park's current method of monitoring, managing, and communicating congestion was conducted. This research, along with the parks desires, were considered in creating solutions for monitoring and communicating congestion. It was determined that both ANP and GNP have the infrastructure and resources to implement a network of traffic monitoring cameras.

1. Introduction

Eco-tourism throughout the United States has hit record highs in the past five years. The United States has 59 National Parks protecting over 84 million acres for the enjoyment of present and future generations. In 2016 alone, over 331 million visitors flocked to National Parks throughout the states, a population greater than the population of the United States itself. This unprecedented and ongoing increase in visitors poses challenges for national parks and visitors alike. The National Park Service faces increasing environmental impacts from rising maintenance costs while visitors face heavy traffic, increasing prices, and park closures. As overcrowding becomes a more pressing issue, parks are looking for ways to manage congestion, such as reservation systems and more effective communication.

Glacier National Park (GNP) is no exception. Its yearly visitation has doubled since 2000, with a one million visitor increase from 2015 to 2017. On top of increasing popularity, Glacier must also accommodate the seasonal fluctuations of visitors brought on by its long, cold winters that leave a small summer window for visitors. In 2017, over 3 million visitors journeyed through GNP, with 1 million of those visits in July alone. Parking lots reach capacity as early as 9am, causing congestion along connected roads. In order to reduce traffic, GNP frequently closes popular locations such as Many Glacier, the focus of our project.

Roads are scarce in GNP, so visitors headed to Many Glacier only have one option for reaching their destination by car: Many Glacier Road. This narrow two way road takes visitors from the eastern border of GNP 8 miles deep into the Many Glacier region, home to popular trailheads, hotels, scenic views, and more. Since it is the only road for accessing these amenities, there are no alternative routes available for diverting traffic. This magnifies the congestion problem caused by parking shortages.

GNP has conducted several studies on visitor usage, including what locations they visit, their motivations for using the shuttle system, and factors in deciding where to park. Moreover, the National Park Service (NPS) provides all parks with a Congestion Management Toolkit, which provides methods of controlling traffic. However, during peak seasons, GNP staff is overwhelmed by visitors and unable to investigate the issue and conduct research. The park

struggles to monitor vehicle traffic and communicate conditions to visitors. Since staff is unable to quickly detect and communicate issues, like parking shortages, problems go unattended and grow with time.

The goal of this project is to help GNP alleviate congestion and enhance their current congestion management options. We aim to help the park collect live congestion information and communicate it to visitors. Providing better information to visitors, and making this information more accessible to visitors, will help them make better decisions when planning their trips. Our overall goal is to help the park provide the necessary information for visitors to reduce congestion on their own.

2. Background

2.1 Glacier National Park & Increasing Congestion

Glacier National Park, founded in 1910, encompasses over one million acres of carefully preserved land. GNP protects its 26 Glaciers, over 700 lakes, and 151 trails spanning 745 miles (Fact Sheet, 2017). As one of the many national parks regulated by the United States National Park Service (NPS), GNP shares the same mission and core values as its parent organization. The mission of NPS is as follows;

> *"The National Park Service preserves unimpaired the natural and cultural resources and values of the national park system for the enjoyment, education, and inspiration of this and future generations. The National Park Service cooperates with partners to extend the benefits of natural and cultural resource conservation and outdoor recreation throughout this country and the world" (Ammerman, 2016).*

As illustrated in its mission statement, the NPS is focused on the continued preservation of both the ecological and cultural features of its parks. In line with its mission, the NPS's core values are Shared Stewardship, Excellence, Integrity, Tradition and Respect (Ammerman, 2016). Glacier National Park, in addition to its shared principles with the NPS, has its own set of values and purpose.

> *"The purpose of Glacier National Park, part of the world's first international peace park, is to preserve the scenic glacially carved landscape, wildlife, natural processes, and cultural heritage at the heart of the Crown of the Continent for the benefit, enjoyment, and understanding of the public (Ammerman, 2016)."*

In addition, GNP's fundamental values are Glaciated Geologic Landscape / The Miistakis, Clean Water and Air, Diverse Habitats that Support Iconic Wildlife, Tribal

Connections, Variety of Recreational Opportunities, and International Peace Park (Ammerman, 2016). Glacier National Park is focused on the preservation of its land, ecology, water, air, and culture. These values guide parks in all their decisions, including how to manage visitor use and congestion.

Recent congestion poses a unique challenge to parks which want to preserve their lands while still providing access to visitors. Glacier National Park saw a record high in visitation last year with over 3.3 million visitors, nearly double the number of visitors from the year 2000. Annual visitation from 2000 to 2017 is displayed below in Figure 1, with complete data available in Table 1 of Appendix A (Stats Report Viewer).

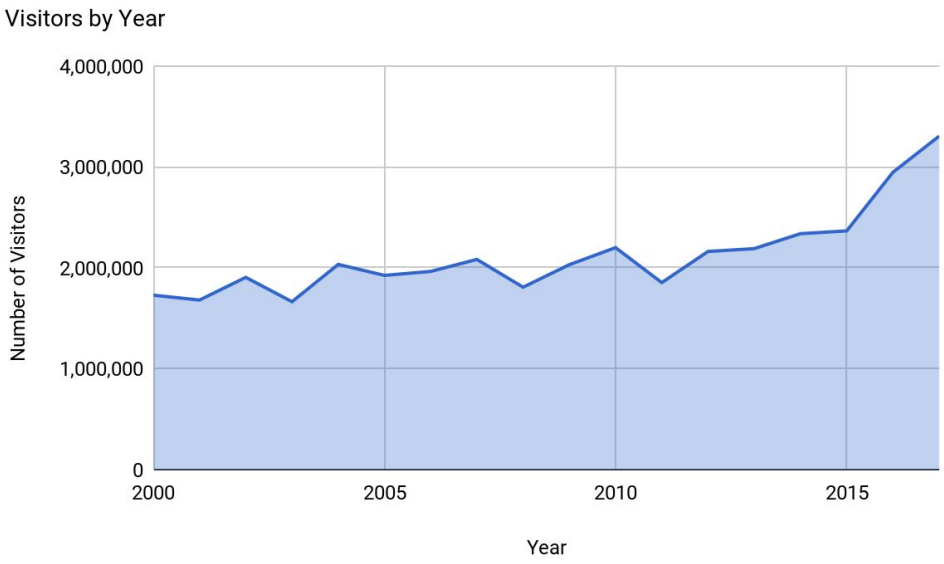


Figure 1: Annual Visits to Glacier National Park from 2000-2017

The central problem GNP faces is more cars wanting to enter the park than there are available parking spaces. This parking shortage results in more problems such as prohibited roadside parking, road congestion, and diversion of park resources (End of Season Report, 2017). When parking lots fill, visitors often begin parking on road shoulders, as shown in Figure 2 below. This is narrows the roads, forcing drivers to lower their speeds and makes it difficult for cars to turn around. As parking lots fill, congestion on the roads builds up. A major limitation to

traffic flow is that most roads throughout the park are only two lanes wide, one lane for each direction (Congestion Assessment, 2017). This means that traffic in one area of a road will affect all areas of the road, especially when roads are congested.

Figure 5: Roadside Parking in GNP, Photo from tripadvisor.com

There are rarely alternative routes for reaching the same destination, so redirecting traffic is not always a feasible remedy to congestion. Roadside parking and vehicle congestion also makes it difficult and dangerous for pedestrians or bicyclists to use roads, and discourages alternative transportation. Finally, congestion issues drain the park's resources, particularly the time of workers. Staff such as the social media team and rangers must drop their work in order to attend to traffic issues (Congestion Assessment, 2017). Rangers are also responsible for managing traffic through tasks like putting up cones and talking to visitors.

Popular sites within the park include Camas, Goat Lick, Many Glacier, Polebridge, Two Medicine, and Saint Mary Ridge Road, shown on the map in Figure 3, below. GNP has tracked vehicle traffic in these areas using car counters set at road and parking lot entrance ways. In 2016, the number of visitors by month to these areas ranges from 2,300 to 70,000 in peak months. The number of vehicles per month visiting or passing Camas, Goat Lick, Many Glacier, Polebridge, Two Medicine, and Saint Mary Ridge Road are displayed in Figure 4, below, with exact values available in Table 2 of Appendix A (Monthly Public Use Report).

Figure 6: Map of Popular Sites with Car Counters

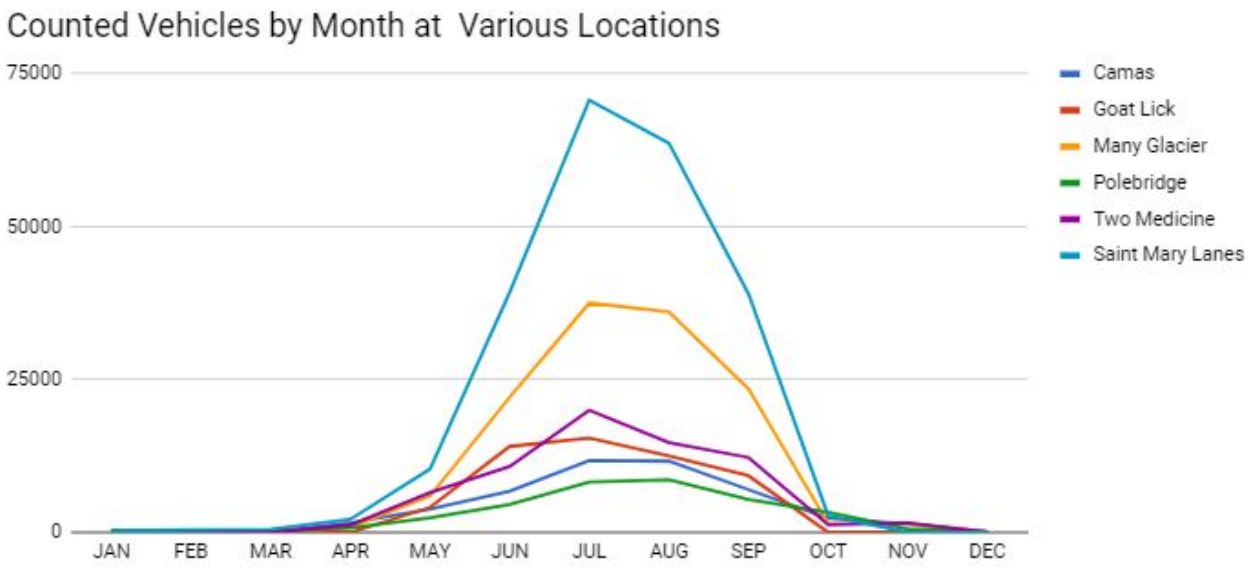


Figure 7: Graph of Counted Vehicles by Month at Various Locations

Another important factor that influences congestion is visit duration. GNP could theoretically accommodate thousands of visitors a day with only a few hundred parking spots, if they were all passing through quickly. In reality, visitors park their cars for anywhere between ten minutes to whole weeks. Longer visits result in fewer turnovers of parking spots and decrease the GNP's daily vehicle capacity. In its busiest month from 2017, GNP had a total of 128,730 overnight stays, the sum of hotel guests, backcountry camping, other tent camping, and RV camping. This is an average of over 4100 overnight stays each night. Making the generous assumption that 4 people share a single vehicle, this still results in over 1000 cars occupying parking spots for long time periods.

While overnight guests are a considerably large group of visitors, they only make up about 11% of annual visits to the park. Overnight stays are rare in winter months, with less than 1% of visitors staying overnight. In shoulder season months, around 8% of visitors are on overnight trips, and in summer months 12-14% of visitors stay overnight (Visitor Total, 2017). Not only does the sheer number of visitors increase during summer months, but we can also see evidence of increased visit duration. These visitation patterns, i.e. increased proportions of

visitors staying overnight, has been consistent over the past 5 years and will most likely stay the same. (The raw data used to determine these statistics can be found in Table 3 of Appendix A.)

While there is a fair amount of data on congestion in GNP, there are still many knowledge gaps, mostly relating to more specific visitor behaviors. For example, car counters set up at entrances track the number of cars entering a site, but not exiting. So GNP can track the total number of visits to a site, but have no means of estimating length of visits and popular times of day. Another set of incomplete and ambiguous data includes records on park closures, since there is no standard threshold for declaring a closure and reactions may be delayed. Furthermore, there are records of when parking lots fill, but not when spots begin to open up and when congestion subsides.

2.2 Congestion in Many Glacier

Many Glacier is a particularly popular and unique region of GNP, which many people consider to be the "heart of the park". This region is officially named the Swiftcurrent Valley, but is more commonly referred to as Many Glacier, since it offers easy access to 5 glaciers. Aside from its namesake glaciers, this region is home to many attractions, such as the Many Glacier Hotel, the Many Glacier Campground, boat tours, driving tours, horseback riding, watersports, hiking, and restaurants. These attractions draw large and diverse crowds to Many Glacier, from those looking for a quick day hike to those on a weeklong getaway.

Like most popular locations in GNP, Many Glacier is opened seasonally, typically from May to October with exceptions for hazardous weather. However, unlike many other popular areas in GNP, Many Glacier is not located along Going to the Sun Road. In order to visit Many Glacier by car, visitors must take Many Glacier Road (officially named Route 3). This road stretches 12 miles from the nearby town of Babb to the Many Glacier Loop, a popular trailhead and parking area 8 miles deep into GNP. With the exception of hiking trails, this is the only way for visitors to access Many Glacier. A map of roads and popular locations in GNP is shown below in Figure 5. Many Glacier sees the same problems seen throughout the park, such as narrow lanes, roadside parking, and limited parking spaces. However, these problems are all amplified because Many Glacier Road is a narrow dead end road. Cars often travel all the way to the end of the road, only to find there is no parking. Moreover, cars that want to turn around are

usually forced to travel the whole loops, since roads are too narrow or congested for U-turns. This means the Many Glacier area retains cars longer and requires more time to dissipate congestion.

Figure 8: Map of Many Glacier

In 2017, Many Glacier was the most crowded area, peaking with 40,815 visitors in July. A distant second and third were Goat Lick with 16,620 in June and then Camas Road with 11,757 in July (Stats 2018). Across the many attractions in Many Glacier, there is an estimated 600 official parking spots. Despite the limited amount of parking, Many Glacier received an average of around 1,200 to 1,300 vehicles per day during the 2017 summer, peaking at an average 1,600 cars in one day in the busiest summer months.

Due to its popularity and unique congestion issues, Many Glacier is particularly difficult to manage. Our sponsor has expressed interest in focusing our project on this region, with the possibility to broaden our scope as we find feasible.

2.3 Initiatives to Alleviate Congestion

GNP has a small toolkit when it comes to handling congestion. They use an assortment of methods for collecting traffic information and communicating to visitors. These tools can be considered a loose congestion response protocol, but are generally informal, undocumented and unstandardized. This section will discuss these methods, known effects, shortcomings, and what is left to be learned about them. The methods discussed are:

Figure 9: Glacier Park Ranger Informing Visitors, From Missoulian.com

2.3.1 Signage, Notices & Cones

In previous years, GNP set roadside signs on several popular highways used to enter the park. These signs warned of congestion within the park with the aim of deterring visitors from entering. In an effort to stop visitors from parking on road shoulders and other prohibited areas, park rangers and employees placed traffic cones around those areas. Visitors who fail to follow parking restrictions receive pink slips on their car, notifying them of their violation. GNP is unaware of exactly how effective any three of these methods are in changing driver behavior, whether it be deterring visitors from entering, lowering their expectations, or preventing harmful parking practices.

2.3.2 Ranger & Volunteer Assistance.

Another way to have information delivered to a traffic jam or congested area are the park's trusted Rangers. The parking staff works tirelessly to inform drivers in congested areas how to park and where to go when it gets congested. They also help enforce the one-car-in one-car-out policy. These are the first responders on congestion issues, responsible for noticing the problem, deciding when to act, and carrying out those

Figure 10: Ranger adding roadside cones in Muir Wood National Monument, California. (Photo by Paul Chinn)

actions. These rangers and volunteers are major stakeholders in our project as they would be tasked following and implementing the recommendations we give them.

2.3.3 Shuttles

There is a shuttle service for people who have already entered the park with their appropriate pass. These visitors are encouraged to park in a shuttle hub parking lot to reduce parking in locations that are limited. The shuttle runs from Apgar Visitor Center to Logan Pass where visitors are required to exit off of the shuttle. Another shuttle runs from Logan Pass Visitor Center to St. Mary Visitor Center, providing access to the eastern half of Going-to-the-Sun Road. The shuttle stops are illustrated in Figure 8, below. Shuttles can still add to congestion as they have to stop frequently, and other vehicles are unable to pass them on the narrow roads.

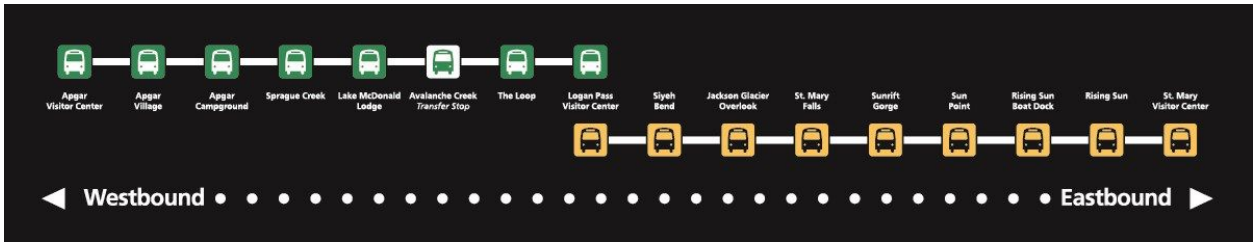


Figure 11. Shuttle Stops on Going-to-the-Sun Road

2.3.4 Chalking

Throughout GNP roads are many small parking lots, designed as pull offs for drivers to take a break and enjoy a scenic view. These small, scattered parking lots are usually paved or dirt lots and often lack the white lines used to guide parking. As a result, drivers park as convenient for themselves, and not necessarily in the most efficient way. GNP rangers or volunteers have recently begun drawing in lines with chalk in order to encourage more orderly parking and, ultimately, fit more cars into this lot. They found visitors were responsive to the chalked lines and the capacity of these small lots was improved (personal correspondence with Tara Carolin). These chalkings fade by the end of the season and need to be redrawn regularly. Alternative methods of organizing parking lots include wooden wheel stops, cement wheel stops, painted lines, or combinations of the methods (Willbee, 2002).

2.3.5 Park Closures & Twitter

In 2017, Glacier had to completely close an entrance due to traffic for the first time. Closing the park is the last resort to combat congestion and Glacier aims to avoid this measure whenever possible. GNP does not track the number of visitors or cars inside the park at a given time, so park closures are declared based on the judgement of rangers and other employees. When the park closes, gated entrances operate on a one-car-in one-car-out policy in order to keep the number of visitors in the park from increasing. The social media team announces these closures through Twitter, however, there is often a delay between when the closure begins and when the posts are made. Moreover, there is no record of when closures end.

2.4.6 Twitter & Facebook

Twitter and Facebook are used as methods of communicating up to date information regarding congestion in Glacier National Park. Specifically, Twitter is the primary mode of communication for this information. Because of the limited connectivity within Glacier, this information primarily reaches visitors outside the park and is inaccessible to visitors in the park. Facebook is generally used for advertising the park, providing beautiful pictures, links for visitation information, and event announcements. GNP has expressed concern that these postings are misleading visitors into thinking the park wants more visitors and is not crowded. GNP management has even been considering posting more “realistic” photos of the park that show gridlocked parking lots, busy trails, and waiting lines (personal correspondence with Tara Carolin and Mary Riddle).

2.3.7 Scaled & Increasing Prices

Like the majority of national parks in the US and other seasonal attractions, GNP uses a scaled pricing that reflects demands at different times of the year. The same way plane flights and hotel rooms cost more during holidays when demand spikes, GNP increases its prices in the more popular seasons. The current cost of entering the park in a private vehicle is $20 in the

winter (November 1 - April 30) and $30 in the “summer” (May 1- October 31). A full list of entrance fees by type and time of year is the Table 1 below.

Table 1: Entrance Fees by Type and Time of Year

Entrance Fees by Type and Time of Year (Effective 2015-Present)		
Entrance Type	Summer Rate (May 1- October 31)	Winter Rate (November 1 - April 30)
Car	$30	$20
Motorcycle	$15	$10
Single Entry	$25	$15
Annual Pass	$45	$45

GNP’s entry fees have also been on the rise over recent years, which is consistent with most National Parks. Prices were last raised in 2015, the first price raise since 2006. The changes in price ranged from no increase to a $13 increase, as depicted in Table 2 below.

Table 2: Fee Increases from 2006 Rates to 2015 Rates

Fee Increases from 2006 Rates to 2015 Rates		
Entrance Type	Summer Rate (May 1- October 31)	Winter Rate (November 1 - April 30)
Car	$5	$5
Motorcycle	$13	$5
Single Entry	$3	$0
Annual Pass	$10	$10

It should be noted that increased pricing was not a direct response to congestion. More accurately, it is a response to increased cost of maintenance, which is due in part to increased visitation.

2.4.8 Car Counters

One of GNP's main methods of visitor use data collection is car counters. Currently, car counters are located at the West entrance, the Saint Mary entrance, the Many Glacier entrance, the Two Medicine entrance, the Camas entrance, the Polebridge entrance, and the Walton/Goat Lick entrance. These car counters are a mix of inductive loop style and pneumatic tube style. All car counters provide monthly totals of how many vehicles have entered each area. To calculate the number of visitors each location receives, the number of busses, which is recorded manually, is subtracted from the total number of vehicles recorded for that month. The resulting number of vehicles is then multiplied by a calculated persons-per-vehicle constant of 2.9, this results in an estimated total of the number of visitors each locations receives in the month. While these car counters provide data on how many vehicles enter each area, there is no way of knowing how many vehicles have exited any of the locations at any given time. Without a count of vehicles that have exited each location, an it is difficult to accurately predict how many vehicles and visitors are in a location at any given time.

2.4.9 Video Cameras

Another method used by GNP to monitor vehicles is the implementation of traffic cameras. Shown by the Schematic of West Glacier Traffic Monitoring, the only traffic monitoring cameras currently in place at GNP are located at the West Glacier entrance gates. These cameras are managed by Professor Jenn Thomsen, a professor from Montana State University. The footage captured by these cameras can only be accessed internally by Professor Thomsen or by GNP employees. Subsequently, GNP visitors do not have access to the footage from the Many Glacier traffic cameras and cannot use them as a method to become aware of congestion within GNP.

2.4 Traffic Monitoring Tools

This section will cover the various types of traffic monitoring tools that are currently available and could potentially be implemented in Glacier National Park.

2.4.1 Car Counters

Using a human to count vehicles requires hiring a person to count the vehicles or taking someone away from their job to count cars. The implementation of car counters in areas where an accurate vehicular traffic data is desired can solve this problem. Car counters are pieces of equipment that count the number of vehicles that have passed a certain point on a road. There are many different types of car counters, but they all accomplish the same basic task of counting vehicles. The different variations of car counters are made for different types of implementations/applications ("Vehicle Counting Equipment"). Additionally, some car counters can record not only the number of vehicles that have passed, but also classify the vehicles by size and record their speed. Table 3 shows the features and benefits of the most common types of car counters.

Table 3: Table of Car Counter Characteristics

("Vehicle Counter Hardware", "TRAFx Vehicle Counter")

Type	Time Span	Portability	Key Benefits
Tube	Temporary		Cost effective/easy to implement
Magnetic	Temporary		Easy to implement/Small Form factor
Inductive Loop	Permanent		Accurate
Piezo	Permanent		Classify by weight/speed
Infrared (Passive)	Temporary		Non-intrusive
Infrared (Active)	Temporary		Non-intrusive

As shown in Table 3, the various types of car counters have unique sets of pros and cons as well as use cases they are best suited for. Once the conditions and desires of GNP are further determine, idea of implementing addition car counters within the park can be explored further.

2.4.2 Traffic Monitoring Cameras

When a live and visual representation of traffic conditions is need one common tool used is traffic monitoring cameras. Traffic monitoring cameras record video footage of vehicular traffic and usually stream the footage locally. In addition, the photoage from the cameras can be streamed over the internet for the public to see, one of the options we may explore in GNP ("TrafficVision Applications", 2018). In addition to providing a visual representation of traffic, the footage from traffic monitoring cameras can be analyzed by software to extract data. The data extracted from the video footage can be recording and also used to provide alerts ("Traffic", 2018). The alerts from the monitoring software can be trigger by events such as accidents or increased congestion. In addition to providing alerts, traffic monitoring software can collect data such as vehicle counts, and the type and speed of the vehicle being recorded. Finally, traffic monitoring software and cameras can be implemented as one system or the software can be added to an existing network of cameras ("Technical Requirements of STA"). Traffic monitoring cameras are a feasible solution that will be assess as a possible building block in creating a congestion management protocol for Glacier National Park.

2.5 Congestion Management & Communication Tools

This section will cover a variety of congestion management and communication tools. Management tools include structures practices like gated entrances or increasing alternative transportation. Communication tools include networks like radio, social media, and signage. These tools are combined, since many congestion management tools have elements of communication built into them, either by design or by nature. For example, a gated entrance may be used to control the number of cars in a particular area, however, it can also communicate to visitors if the area has reached capacity or not.

2.5.1 Kiosks

Kiosks are small structures, much like a payphone, that display information and often can be used to buy tickets, such as subway passes. Below, in Figure 9, are examples of typical kiosks designed for parking lots in which cars must display receipts on their dashboards. According to the Congestion Management Toolkit, a 2014 document provided to National Parks by the NPS, kiosks fall in the moderate price range and are quick to implement. Kiosks can also be used to gather information on visitor use, if they prompt for information such as duration of a parking reservation and location. They can also be used as communication methods if they are to indicate what areas are reaching capacity, expected wait times for parking spots, and more.

Figure 12: Examples of Parking Lot Kiosks

2.5.2 Alternative Transportation

A common response to vehicle congestion is increasing alternative transportation. This can be implemented as a voluntary system, as GNP does now, in which visitors can chose between personal vehicles and alternative transportation. Alternative transportation can also be made mandatory, as done in Zion National Park since 2002, which now prohibits personal vehicles from entering during the busy season of April to October ("Frequently Asked Questions about Zion Canyon" 2012). While GNP already has a shuttle system, they can increase its capacity by increasing the number and size of the busses. A single vehicle transporting many

people is not only fuel efficient, but also space efficient. Shared transportation can be the difference between 100 people spread out in 60 cars or 100 people in two or three busses ("Congestion Management Toolkit", 2014). Fitting more people into less space clears up road space, takes up less parking space, and helps reduce the appearance of congestion. Most importantly, by offering a robust and appealing shared transportation, parks can reduce the number of cars that enter the park or certain areas of the park.

In addition to shuttles, parks with many waterways may consider transportation across bodies of water. The NPS Congestion Management Toolkit, 2014, suggests a ferry service or water taxi" may be useful in diverting some road traffic in these parks. GNP has two lakes adjacent to Going-To-The-Sun Road, one of which spans one fifth the length of the road. A water taxi service could, in theory, alleviate road congestion or lessen the load on the shuttle bus system.

2.5.3 Vehicle Size Management

National Parks are no stranger to vehicle restrictions, whether it be oversized RVs, prohibited boats, or all-terrain vehicles. Vehicle restrictions can help the park utilize its space by encouraging for space efficient vehicles, such as compact cars or motorcycles. Some parks incentivize drivers to carpool, use smaller cars, or use more energy efficient cars by giving them preferred parking or lower entrance fees. This method has been used by many parks and other places, such as New York City which recently designating parking spaces for compact cars and reservations for shared cars (Schmidt 2018). The move to smaller vehicles can also be mandatory, if parks pass restrictions on specific vehicles such as large RVs requiring special permits and reservations. Restricting larger vehicles while promoting and incentivizing smaller vehicles is a feasible way of maximizing available space and reducing congestion.

2.5.4 Highway Advisory Radio

Communicating traffic conditions to the masses can be a difficult task. One solution to this problem, implemented by the federal government, is highway advisory radio (HAR). Highway advisory radio allows governing bodies, such as towns or national parks, to transmit

traffic information over an AM radio frequency designated to them by the Federal Communications Commission (FCC) ("Travelers' Information Stations", 2015). Since AM radio is a live broadcast, it allows for live, up to date, to be communicated to anyone who is listening (Volpe, 2011). This form of communication has the potential to reach a wide variety of visitors in GNP because nearly all vehicles are equipped with AM radios.

2.5.5 Traffic Gates

A common tool used to control the flow of traffic is traffic gates. Traffic gates are gates specifically designed to limit vehicular access to an area. This can be instrumental in controlling traffic to ease congestion or to keep vehicles out of restricted areas. Traffic gates come in several forms depending on the physical method they use to open and their level of automation. In Glacier National Park's case, the level of automation is the most important feature to explore ("Perimeter Security"). As explained by a WPI research team in Acadia National Park, manual gates require constant human interaction by an Employee and are subject to human error, while automatic gates can be controlled remotely or by software and are not subject to human error (Cosmopulos).

2.6 Congestion Management Methods in Similar Settings

This section will discuss similar settings that have implemented traffic monitoring or traffic communication systems.

2.6.1 Acadia National Park (ANP), Bar Harbor, Maine

In 2017, a WPI research team investigated the feasibility of implementing a reservation system and gated parking to manage visitor use in in Acadia National Park, Maine. ANP experiences seasonal fluctuations similar to GNP, as well as an overall increase in yearly tourism. To gather more data on the subject and more closely define the problem, the research team observed the number of cars parked at various locations at various times of the day, in addition to the parking durations of individual cars. The team also conducted visitor surveys to gather data related to visitors' opinions on the reservation system. After analyzing a number of parking congestion solutions a gate system was decided on as the best solution. In addition to

suggesting a gate system, the team suggested that the gate system be automatic to minimize the effect of human interference. Also, the team analyzed which parking lots were best suited for gates based on whether the lots were enclosed and how if the lots had separate entrances and exits. Finally, the team suggested that the gate system be implemented on the chosen parking lots during the busy sunrise hours to analyze its effectiveness. This team's methodology of conducting visitor surveys, as well as collecting visitor use data, was referenced when crafting our own methodology.

2.6.2 Nantucket Island, Massachusetts

A 2017 WPI project team investigated possible parking solutions on Nantucket, a popular summer destination off the coast of Cape Cod, Massachusetts. The island prides itself on preserving its quaint aesthetics and thrives from tourism. Much like GNP, Nantucket sought a parking system that would allow visitors to enjoy the site, without destroying it such that future generation can do the same. The team ultimately suggested three parking management solutions: short-term, medium-term, and long-term.

The short term system, to be implemented in the next year, requires all cars display a yearly parking pass in order to park on the island. The system is simple and easily implemented, however interview and survey responses insinuated that the sticker system would not decrease congestion on the island. Some subject matter experts speculated the system would worsen congestion, as sticker holders would feel entitled to parking spaces. Revenue from the parking pass sales would go towards enforcing the system and could additionally be used to fund public transportation and satellite parking expansion.

The medium-term, to be implemented in the next 2 to 5 years, is timed paid parking with prices scaled to reflect demand. In other words, this system would charge for parking by the hour, with one hourly rate in the off season and a higher rate during the tourist season. The team suggested using radio frequency identification (RFID) stickers on cars in order to facilitate the collection of fees. RFID technology, the same technology used in EZ passes, has been implemented in Vienna, Austria, in order to regulate and charge for parking.

The long term solution, to be implemented in the next 10 or more years, includes repurposing a waterfront property into a intermodal transportation center where visitors can park their cars and find taxis or buses to their destinations. The team also suggests reassessing available technology, for both enforcing parking regulations as well as collecting data.

2.6.3 Yellowstone National Park, Wyoming

A visitor use survey is a combination of data collection and surveys used to accurately determine how visitors use the park. This study takes data from ticket sales, traffic congestion equipment, wildlife cameras, vehicle and fee compliance, as well as many more forms of information gathering tools. Yellowstone National Park completed a 2016 visitor use survey and their findings were surprising. They saw that in their peak months of visitation, the visitors became crowded and did not appreciate the landscape as much as people did on their shoulder months (Visitor Use Survey, 2016).

Glacier National Park has not done a comprehensive visitor use survey in over 30 years. However, due to similar visitor demographics, location, and known visitation trends, Yellowstone's study would be a helpful starting point for designing a visitor use survey in GNP. Moreover, it is likely that GNP and Yellowstone have similar visitor usage. Results of the 2016 Yellowstone study may help us anticipate the kinds of visitor usage at GNP, such as duration of stay, transportation preferences, and planning resources used. The results of this survey portray a long-term overlook on the park as a whole. We are looking to condense this type of information into the peak months and focus on the congested areas.

Our project will mainly utilize the data collected with car counters, ticket sales, and video cameras. We will not be conducting our own visitor use survey for the whole GNP park because this data would need to be collected throughout all of 2018. Nonetheless, we can use this survey as a model of how to approach data collection and subsequently a communication system. Knowing the kind of data that the park would be interested in can direct our survey questions in the right direction. Knowing the intentions of visitors while they are in the park and how they intend to use the land can help model a communication system that will reach all visitors in the most effective way.

3. Methodology

Glacier National Park aims to reduce vehicle congestion by improving communication of congestion issues to its visitors, allowing them to make more informed decisions to reduce traffic. In order to do this we investigated the feasibility of a webcam network, which would be used to monitor live traffic conditions, and methods of communicating information to visitors, in order to determine the most effect methods. We broke our project into five objectives:

Objective 1. Identify the existing methods for traffic management and communication

Objective 2. Assess the current state of ANP's & GNP's telecommunication infrastructure

Objective 3. Identify the requirements of traffic webcam systems for ANP & GNP and determine the most favorable webcam for each park

Objective 4. Determine the optimal locations for traffic monitoring webcams

Objective 5. Determine ways to increase communication of congestion information to the public

3.1 Objective One: Identify the existing methods for traffic management and communication

We started our project by developing a thorough understanding of methods used in ANP & GNP to manage visitor congestion and communicate conditions in the park. National parks use a variety of approaches to manage on site visitor congestion, many of which are previously stated in Section 2.3 Initiatives to Alleviate Congestion.

Upon arrival in ANP and GNP, we continued our research through interviews with park staff and field observations. Important contacts in Acadia National Park include John Kelly, Management Assistant, and Jay Elhard, Interpretive Media Specialist. Kelly was able to inform us on ground level measures taken to reduce congestion while Elhard provided us information on the park website and communication. Moreover, we observed signage, gateways, the shuttle system, and the parks' NPS websites. Since our time in GNP was in the off season with no congestion issues, we were unable to observe many management tools in action. Most of our

foundational information on GNP is from correspondence with Tara Carolin, CCRLC Director, and Mary Riddle, Chief of Planning & Environmental Compliance. Our main contact for technical information regarding webcams in GNP was Ron Lehrman, Network Administrator & Computer Support.

3.2 Objective Two: Assess the current state of ANP's & GNP's telecommunication infrastructure

Through observation and correspondence with park staff, we determined the availability and reliability of various communication methods. We investigated the primary person to person communication methods such as AM radio, walkie-talkies, and phone. We also inquired about electricity, internet, and cellular reception throughout the park. We were able to make most of our inquiries prior to arriving on site, so our primary means of research, once in the park, was observational. We traveled to different locations throughout ANP and GNP to investigate power and connectivity options at locations such as visitor centers and major parking lots.

We also inquired and observed existing monitoring methods in the park, such as webcams and car counters. We asked what data is collected, how it is transferred between devices, and what is done with the data. We observed existing communication that is not technology-based, such as signage and interactions between rangers and visitors, making notes of when and where they are used. Finally, we talked with park rangers to learn how they determine when and how to step in with congestion issues. We identified what the park uses as triggers for necessary action, who makes the decisions, and what preferred actions are.

3.3 Objective Three: Identify the requirements of traffic webcam systems for ANP & GNP and determine the most favorable webcam for each park

After assessing the existing infrastructure in each park, we proceeded to determine the feasibility of a webcam network by looking into what infrastructure and abilities various webcams require. After, we selected several options for webcams and compared them to determine which are most suitable for the parks.

Before we chose specific webcams to be tested and compared, we had to establish the basic requirements for a suitable webcam. The team gathered initial information about Acadia's

desired webcam features through meeting with Jay Elhard. From Jay we also acquired information regarding Acadia's only operational webcam. In Glacier, we met Ron Lehrman to discuss the features of the GNP's webcams which are strewn throughout the park. Additionally, other necessary features were chosen based off the existing telecommunication and power infrastructure in each park. The weather conditions of each park were also considered. Finally, cost also influenced our choices: we did not want our traffic monitoring solution to require a significant financial investment from either park.

When it came to researching and testing webcams for each park, we decided to consider three different options. The first options were the current webcam from each park, one from ANP and two from GNP. This allowed us to consider an option that each park was already comfortable and familiar with. Next, the group considered an off-the-shelf solution. This camera was the Spypoint Link-S, a cellular enabled trail camera. The final webcam option we considered was a prototype webcam developed by the group. The prototype was constructed using a Raspberry Pi and a Raspberry Pi Camera module. Additional research and testing, as well as programing in Python, was required to turn the Raspberry Pi webcam into a functional prototype.

To determine which of the three webcams being considered was best for traffic monitoring, we compared several features and characteristics. The main points considered were;

1. Could the webcam function with only the pre-existing infrastructure ?
2. How invasive would the webcam be?
3. Could the webcam could easily interface with the nps.gov website?
4. What are the initial and running costs of the webcam?

Once all these option were considered we were able to determine which webcam would be best for traffic monitoring in each park.

3.4 Objective Four: Determine the optimal locations for traffic monitoring webcams

To effectively monitor traffic, it is important to not only have the correct webcam, but also to have the correct location and point of view. In each park, the feasibility of camera sites were dictated by two main factors: (1) whether the site had the infrastructure to support the

chosen webcam and (2) whether the site provides vital information on congestion. In ANP, we traveled to the sites of interest and captured images from many available camera mounting locations. To limit the impact of the webcams, existing structures and trees were used as mounting locations. Additionally, in sites where one webcam did not provide sufficient coverage, such as large parking lots, we tested several mounting locations for webcams. With this method, we aimed to get a complete view of an area with the least amount of cameras.

3.5 Objective Five: Determine ways to increase communication of congestion information to the public

Our last objective was to determine ways to communicate information about traffic and congestion to visitors. To do this, we first researched visitor planning behaviors by referencing another Acadia IQP survey results (Investigating options for parking reservation system at glacier national park) and a Visitor Use Survey from Yellowstone National Park. We used this to determine the most effective means for reaching visitors and what information would be most relevant to them, whether it be historical information, forecasts, or live conditions.

We also researched how national parks communicate traffic, congestion, overcrowding, and related transportation information to visitors. We investigated these characteristics across many national park websites including Acadia, Glacier, Zion, Arches, Mount Rainier and Grand Canyon National Park. The four major aspects we looked into were:

1. What information is provided to visitors? Examples include busy locations, busy times, alternative transportation, alternative destinations and times, photos, statistics, effects of congestion, webcam feeds, and parking availability.
2. Where is the information located? This is what page the information is on, whether it be a small mention on a page about hiking or a dedicated page for congestion information. On a lower, but equally important level, location also accounts for where on a page the information is located and where it is located in relation to other information. This is the ordering and structure of information on a given page.
3. How is the information displayed? These are the various media types and visuals used to communicate a congestion information, such as text, photos, videos, and interactive visuals.

4. How can the information be accessed? All information is located on pages which viewers can arrive at through browser search results, home page links, drop down menu items, links off the Plan Your Visit page, and various other links throughout the website.

Finally we looked into website analytics for both ANP & GNP to gain insight on how visitors use the website and what information they are exposed to. These analytics can be found in Appendix B, for ANP, and Appendix C, for GNP. We compared visitation against access points to make predictions on how users prefer to navigate through the website.

4. Results

In this chapter, we will discuss our findings from the research executed in ANP and GNP. Through conferences, interviews, and field research we developed a strong understanding of the congestion issues that arise in peak visitation months. This information allowed us to develop a potential congestion monitoring and communication system within the parks that would allow visitors to independently combat traffic, congestion, and consequential road closures.

4.1 Objective One: Identify the existing methods for traffic management and communication

Our research began with in-depth analysis of congestion management tools available in national parks. This includes methods used on the ground to redirect traffic and mitigate congestion like signage and shuttles; it also includes how information about congestion is shared between rangers and the public. Many of these tools are discussed in section 2.3 Initiatives to Alleviate Congestion. Below is new information ascertained while in the parks.

4.1.1 Signage

Road signs and warnings were used in Acadia with little success. John Kelly explained that at times signs were put up to tell visitors that parking lots were full, but signs were often ignored. Visitors would enter full parking lots and circle around waiting for spaces to open, adding to congestion.

Glacier has attempted to do the same with similar results. Many Glacier, a popular area of the park, is accessed through its own road separate from the rest of the park. A full description of this setup and the issues surrounding it can be found in section 2.2 Many Glacier Congestion. The park previously posted signage outside the entrance to Many Glacier Road which read "Road closed to Incoming Traffic". This signage aimed to stop cars from entering the loop when congestion is extreme. However, many visitors persisted to enter the road and added to congestion (correspondence with Tara Carolin).

4.1.2 Shuttles

Acadia National Park displayed signs recommending that visitors use the free Island Explorer shuttle buses. The signs were very effective and actually resulted in overcrowding on the buses. The overcrowding resulted in visitors becoming stranded at remote sites like Jordan Pond and Sand Beach without a car and without a seat on the bus. Ultimately, the Island Explorer shuttle company contacted park headquarters and requested they remove the new signage (correspondence with John Kelly). The GNP shuttle can also become overburdened at times, resulting in long lines and waits for visitors to get a seat on the bus (correspondence with Tara Carolin).

4.1.3 Ticketing

Parks have the ability to ticket illegally parked vehicles, vehicles without passes, or any other infringements on regulations they set. However, parks want to provide enjoyable experiences to their visitors and prefer not to ruin their day with tickets. Parks tend to avoid giving tickets and creating more regulations that will require such enforcement. This may be because it increases labor, requiring more rangers to enforce more rules, and revenue associated with tickets does not go to the park. Even still, ticketing is still quite common because there are so many visitors and many are either uninformed or apathetic to the rules (correspondence with John Kelly).

4.1.4 Ranger Communication

In ANP, rangers communicate need-to-know information to and from dispatch using hand held radios. Rangers may use radio to notify dispatch of car accidents, serious congestion, or filled parking lots.This communication line is only used for quick, high importance updates, so longer discussions are done through more private phone calls or other correspondence. In ANP, rangers are able to use cell phones for this type of conversation, but this is not an option for GNP. Also in ANP, the park dispatch can receive calls from visitors reporting accidents, full parking lots, or any other kinds of issues (correspondence with John Kelly). This is less

applicable in GNP due to lack of cell reception (Comprehensive Communication Plan Environmental Assessment).

4.1.5 Traffic Webcams

GNP has fifteen webcams, seven of which capture some degree of road or parking lot and eight which focus purely on scenic views. These webcams provide new images to the GNP website every minute, which rangers and dispatch can use to identify traffic issues without being on site (Glacier National Park Webcams). Contrastly, ANP does not have a traffic webcam system.

4.1.6 Visitor Centers

Acadia uses its visitor centers to spread information on parking and traffic within the park. On television screens, they display updates on congestion. These updates come from park rangers and are not automated. The updates are close to real time, but not entirely (correspondence with John Kelly).

4.2 Objective Two: Assess the current state of ANP's & GNP's telecommunication infrastructure

Our team was able to find specific information for each park regarding radio signal, cell coverage, power options, internet options, and existing webcams.

4.2.1 Two-way Radio Coverage

Glacier National Park utilizes a series of radio repeaters throughout the park. These repeaters are smaller than cell phone towers and are less invasive. The radio network covers all of the park. Law enforcement can contact dispatch in all of the places shown below. The shade ellipses in Figure 13 highlight exactly how far each repeater can reach.

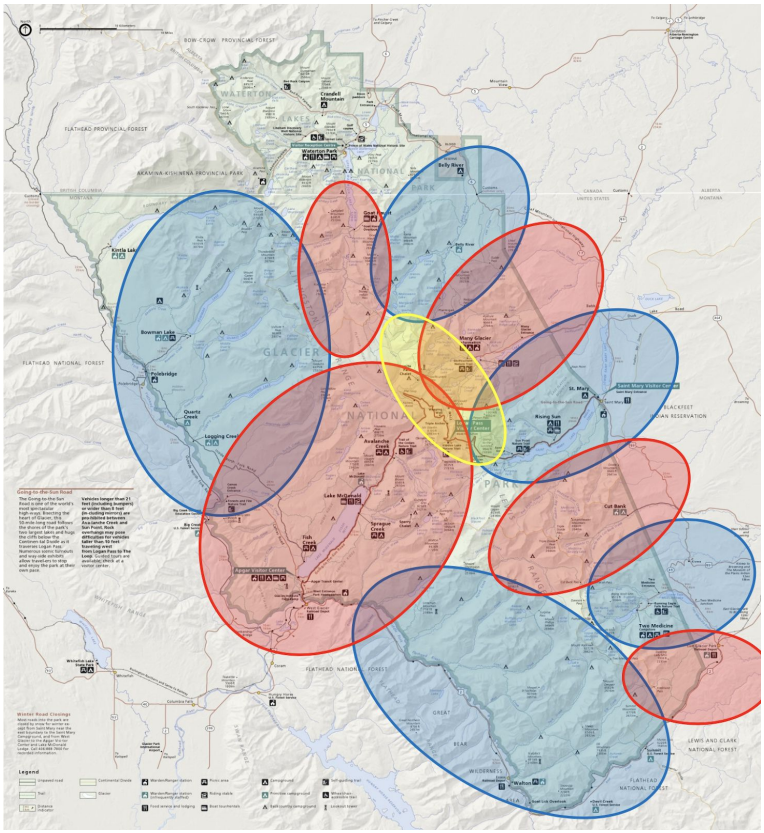


Figure 13: Glacier Radio Repeater Coverage

Acadia is small enough to be covered by a single radio repeater located on the top of Cadillac Mountain. This allows law enforcement to contact dispatch throughout the entire park.

4.2.2 Cellular Coverage

Acadia has significant cell-phone coverage from two carriers, AT&T and Verizon. Bar Harbor, Somesville, and Southwest Harbor are also located on Mount Desert Island along with the park and provide cell-phone service to their towns and villages. This allows most park visitors to access cell-phone service while on top of Cadillac Mountain, Blue Hill Overlook, Jordan Pond, Sand Beach, and Thunder Hole. A 2018 IQP team in Acadia, Cellular Connectivity Status In Acadia National Park, created a heat map of the cellular connectivity in Acadia. They found 14 of Acadia's most visited parking lots had cellular connectivity.

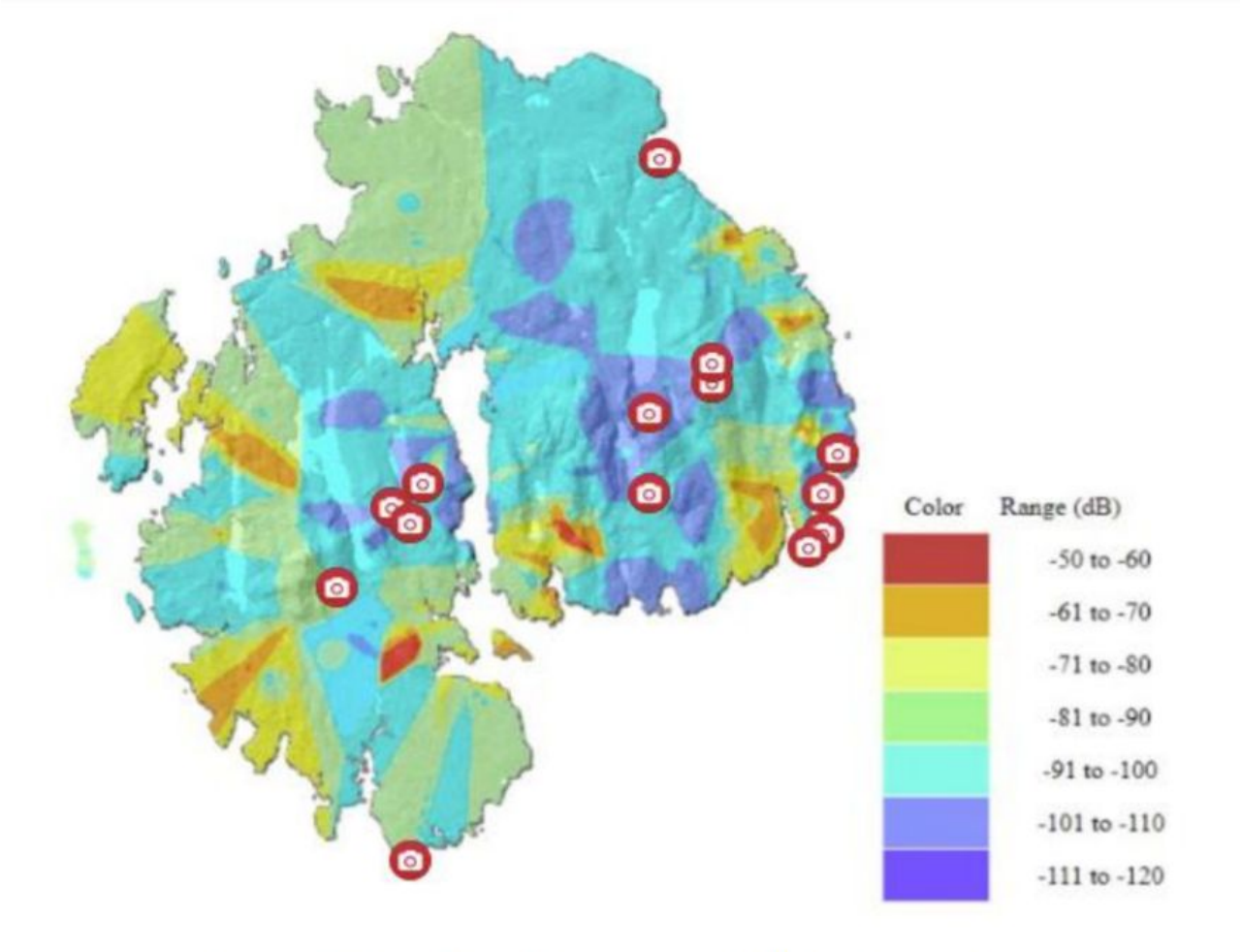


Figure 14: Acadia Cellular Connectivity Heat Map (Bergquist)

Glacier on the other hand, being 20 times larger than Acadia with no cell towers within park boundaries, cannot provide visitors cell-phone service within its interior. The only cell-phone service visitors may find is around Apgar Village and St. Mary Visitor Center as illustrated below (Figure 15) in AT&T's cell service heat map. However, we found it to be a generous overestimate of coverage and ultimately unreliable. This was confirmed by park staff as well.

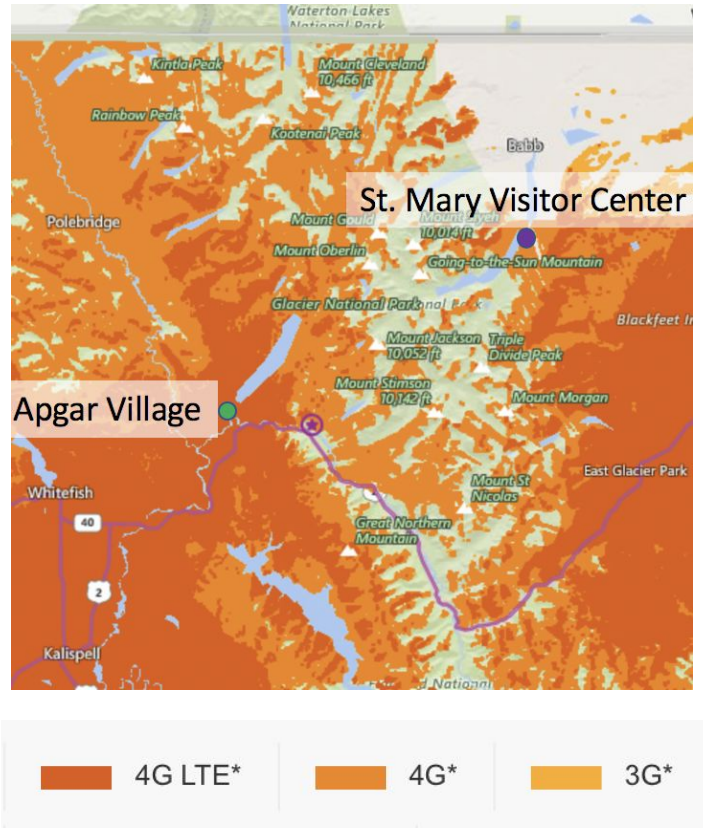


Figure 15: Glacier National Park Cell Signal Heat Map (AT&T Maps)

These two sites, Apgar Village and St Mary's Visitor Center, are located at the edge of the park where cell coverage from bordering towns extends slightly into the park. Many Glacier is connected to internet cables up until the entrance gate but this does not extend to the trailhead parking lots. Cellular service cannot be found on any interior hikes off of Going-to-the-Sun Road.

4.2.4 Power

In Acadia, there are no power lines providing power to popular sites like Blue Hill Overlook, and Thunder Hole. Additionally, the power lines at the summit of Cadillac Mountain do not run beyond the gift shop and radio tower. Thunder Hole does not have power connection and uses a hand carried battery to run the cash register in their gift shop. At Jordan Pond, there is power running to the Jordan Pond House Restaurant and the surrounding parking lots. Sand

Beach also has underground power cables that provide electricity to the bathrooms and a variable message sign for the Island Explorer bus route.

Glacier has power lines running to most of the park's entrances. The St. Mary Visitor Center and entrance is connected to power lines. The Two Medicine Entrance and trailheads are also connected to power lines along with the Apgar Visitor Center located on the west side of the park. Logan Pass is completely off the grid, powered by a generator and solar panels.

4.2.5 Internet Options

Both ANP & GNP have limited internet throughout their parks. In ANP, internet can be found in almost none of the popular locations like Sand Beach, Cadillac Mountain, Thunder Hole, and The Blue Hill Overlook.

In GNP, there is internet cable running to the West Entrance, Apgar Village, Middle Fork of the Flathead River, Two Medicine, West Entrance and Many Glacier. Logan Pass has internet access through satellite. Additionally, GNP has significant experience and success in extending wifi signal from locations with hard wired internet to more remote locations. They do this using a series of repeaters, which are quite small and very noninvasive.

4.2.6 Webcams

The last piece of technology we explored were the webcam networks within the National Parks. Ron Lehrman, Glacier National Park's Network Administrator, explained GNP was the first to put up webcams to display the park's beauty and have been continually extending their camera network. Glacier now includes 15 webcams available to the public on GNP's nps.gov website. The locations are shown on the map below.

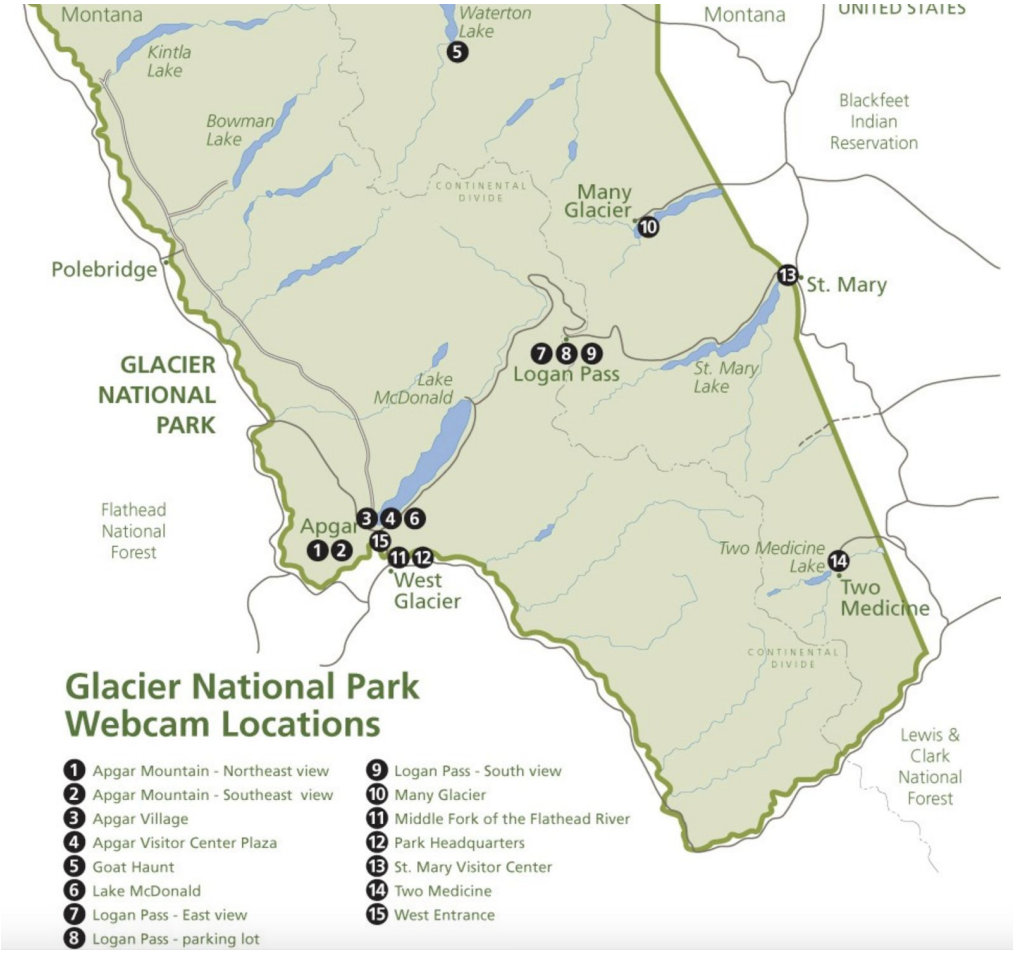


Figure 16: Glacier Webcam Locations (Glacier National Park Webcams)

Most of their webcams are aimed toward scenic views of the mountains like Two Medicine and Apgar Mt. shown in figure 17 below.

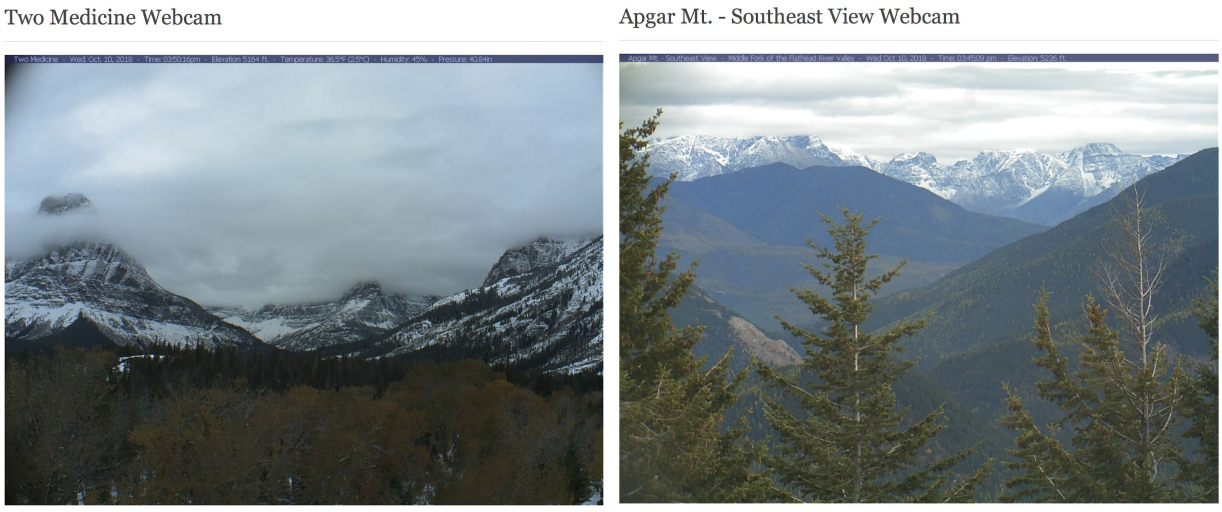


Figure 17: Two Medicine and Apgar Mt. Webcam Views

Although their primary purpose is to provide the public with their breathtaking views of the park, some of the cameras are mounted to show roads and parking lots such as The West Entrance and Logan Pass Parking Lot shown below in Figure 18.

Figure 18: West Entrance and Logan Pass Parking Lot Webcam Views

These cameras use CAT5 cable that is connected to the GNP network and power cables to work. GNP has installed this infrastructure in many locations throughout the park. The camera

shown below, in Figure 19, at Apgar Village can be seen connected the ethernet cable to access the internet.

Figure 19: Apgar Village webcam with ethernet cable

Ron Lehrman, from GNP, and Jay Elhard, from ANP, both explained that the parks are pushing for more webcams. Acadia has been experimenting with its first and only webcam located on the shore of Thunder Hole. More information about this webcam can be found in section 4.3 Objective Three: Identify the requirements of traffic webcam systems for ANP & GNP and determine the most favorable webcam for each park.

4.3 Objective Three: Identify the requirements of traffic webcam systems for ANP & GNP and determine the most favorable webcam for each park

This section discusses the process of how we determined the correct webcams to use, how they would physically work in the parks. We then discuss the advantages and disadvantages of various camera options including the current webcams used in GNP and ANP, the all-in-one Spypoint Link-S, and the custom built Raspberry Pi.

4.3.1 Current Cameras In ANP & GNP

First, we studied what cameras are currently implemented in Acadia. Acadia's only webcam, the North Atlantic Coastline Webcam, is shown in Figure 20. This camera is used to "offer glimpses of sunrise, storms, sailboats, and the occasional seal and seagull, Acadia National Park has developed a remote webcam driven by cellular data connectivity and powered by a solar panel. During daylight hours, a static image refreshes at a rate of about once per minute" (Acadia National Park).

Figure 20: Acadia National Park North Atlantic Coastline Webcam

(Acadia National Park Webcams)

This camera is significantly larger than a normal security camera. It totals about 4 feet by 6 feet and rests on the shoreline rocks. It needs to be hauled inland during storms to escape the crashing waves. Cellular connectivity was found to be the most effective way to send images between the webcam and the NPS website. Since the camera was meant to be low impact, it runs off solar power.

Next, we studied the cameras already used in GNP. These cameras are installed for year-round use are housed in a weatherproof casing. These cameras, worth over a thousand dollars, provide high quality images to the NPS website once a minute minute. The NetCam XL 3MP can be see on the left in Figure 21. It is a fixed camera that takes high quality, 3 megapixel images. The Axis Camera, as shown on the right Figure 21, has similar image quality with the additional ability to be controlled remotely, allowing an operator to zoom and pan.

NetCam XL 3MP		**AXIS V5915 PTZ**	
NetCam XL 3MP	$1,099.00	AXIS V5915 PTZ	$2,398.00
S-Type Ring of Fire	$682.00	Dotworkz D2 Ring of Fire	$780.00
Total	$1,781.00	Total	$3,178.00

Figure 21: Dotworks Cameras Comparison (Dotworkz)

These cameras are expensive and, since they are used year-round, are housed in protective cases. These cases cost around $600 for the NetCam and $800 for the Axis camera. These cases are equipped with a heating element (shown below) which allows them to melt snow and ice off the camera housing. This prevents the camera from shutting down in low

temperatures and prevents snow or ice from blocking the camera's view (correspondence with Ron Lehrman).

Figure 22: Ring of Fire Heating Element

4.3.2 Spypoint Link-S Trail Camera

Our first consideration was the Spypoint Link-S Trail Camera. A previous 2018 Acadia IQP investigated the feasibility of using this webcam for traffic monitoring purposes in ANP.

Figure 23: Spypoint Link-S Trail Camera (Spypoint)

Since the Spypoint is an off-the-shelf hunting camera, it is designed for simplicity of use, not flexibility. The Spypoint Link-S is able to connect to internet via cellular data and it stores images in the cloud. Users must create an account, with monthly fees, in order to view images off the cloud. This makes posting the images online where rangers and the public can view them. It could still be used for dispatch or rangers to monitor traffic, but they would all have to share one account.

This particular model from Spypoint can only be powered by solar, however other models by the same company run on hardwired power and there is the option of buying a larger solar panel. This camera is fairly inexpensive compared to the ones installed in GNP and ANP.

Table 4: Spypoint Price Layout

Spypoint	
Item	Cost
SpyPOINT Link-Evo	$249.99
SpyPOINT Cellular Trail Camera Booster Antenna	$79.99
SpyPOINT 12V Solar Panel	$39.99
12V Battery and Charging Kit	$34.99
12V Power Cable	$14.99
Lithium Battery Pack	$49.99
Total	$469.94

Some major benefits come from the compact off-the-shelf design of the Spypoint Link-S. Since it is designed as a trail camera, it is small and easily be placed on trees. Installation of these webcams would be simple for parks and supporting documentation is easy to find. Easy installation is a key feature for the Spypoint since it would not be used year-round and park employees would need to take them down and reinstall them every year. Being a drop-in solution, the Spypoint also has the benefit of being low impact on the environment. It would not impact wildlife or visitor experience and uses solar power as opposed to running off disposable batteries or other non-renewable power sources.

4.3.3 Raspberry Pi Webcam

The Raspberry Pi webcam option encompassed all of our parameters completely. Shown below is an example of how it would look when in use.

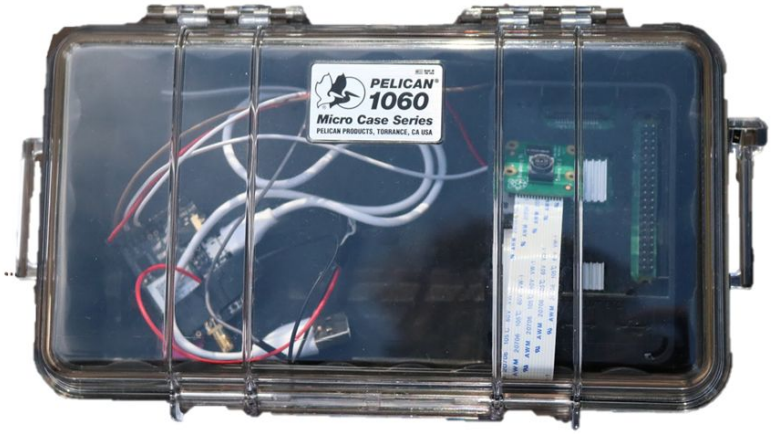


Figure 24: Raspberry Pi Webcam

This camera has the potential to connects to internet through ethernet cable, wifi, or cellular. Moreover, this camera can be powered by a solar panel or through hardwired power cables. This camera is also the least expensive option. Below in Table 5 is a run down of the set up cost for a Raspberry Pi. Note that it includes a SIM card interfacing board which would only be necessary should the park choose to connect to internet via cellular.

Table 5: Raspberry Pi Costs

Raspberry Pi	
Item	Cost
Raspberry Pi 3 Model B	$37.30
Raspberry Pi Camera Module	$25.58
FONA SIM Card Interfacing Board	$79.95
Misc.Cables and Wires	$12.00
Lithium Ion Battery Pack	$35.00
Solar Panel	$75.00
Pelican 1060 Micro Case	$26.19
Total	$291.02

Should the Raspberry Pi be connected through hardwired internet and power, it would require neither the SIM card interfacing board nor the solar panel and battery pack, totalling to a cost just over $100. The BOM, Implementation Guide, and code for the Raspberry Pi webcam can be found in appendices E, F, and G respectively.

4.3.4 Comparing Webcam Options

In both parks, any webcam solution would require the ability to access a FTP server in order to send images directly to their respective NPS websites. Due to proprietary limitations, the SpyPoint Link-S was unable to do that.

In GNP, traffic cameras in many areas could be powered by hardline electricity and connected to the internet through ethernet cables. This makes their current webcams and the Raspberry Pi equally feasible. However, the Raspberry Pi is only a small fraction of the cost, making it more appealing for short time use. Since it requires very little power, it can be powered by a single solar panel module, making it easier to expand their camera network beyond where existing power is.

Although the current cameras in GNP are excellent for year-round views of scenery, the park is not open year-round. This means the park and its visitors have no need for traffic cameras during the colder months when congestion is not an issue. Moreover, cameras for monitoring traffic do not need to be as sophisticated as those used for capturing the ever changing scenery of GNP; there is no need for super high quality images or advanced features like remote operated panning and zooming. A single, stationary camera is sufficient for monitoring traffic. It is worth noting that this would require more effort on the part of park staff, which would have to install and reinstall the cameras each year.

In Acadia, they have almost no hardwired internet access so any cameras used there would also need the ability to connect to internet via cellular network. Moreover, there are fewer power lines running through ANP than GNP, so cameras in many locations would have to be run off the grid. The same seasonal issues apply to cameras in ANP: cameras either need to be weatherproof or need to be taken down and reinstalled each year.

4.4 Objective Four: Determine the optimal locations for traffic monitoring webcams

After investigating multiple potential webcam sites in each park, the team was able to select which sites to focus on. In ANP we chose to focus on the parking lots at Cadillac Mountain, Blue Hill Overlook, and Jordan Pond. All of these sites were heavily impacted by

traffic and congestion. Additionally, these sites all have cellular network signal sufficient enough to upload images to the NPS website. Visiting each of the chosen sites in ANP, and capturing images from potential webcam mounting locations, allowed us to determine how many webcams each site needed to fully capture an area. Four cameras were needed at the Cadillac Mountain parking lot. Of the four locations, three of them were mounted on trees and one was on an informative sign. These locations and camera views are shown in Figure 25.

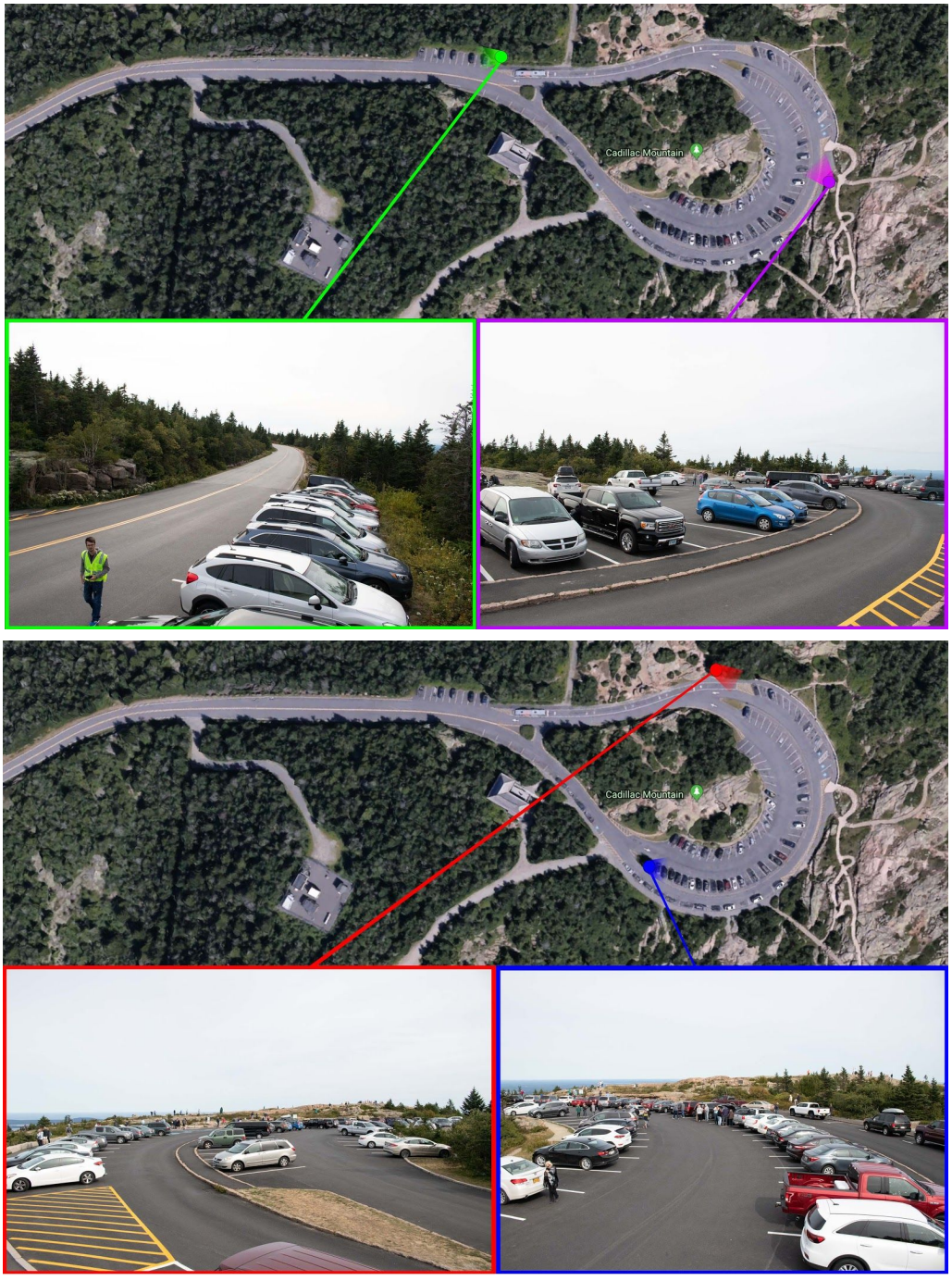


Figure 25: Cadillac Mountain Webcam Locations

Only one camera was needed to monitor Blue Hill Overlook. One of the many trees surrounding the lot gave the camera a vantage point high enough to capture the entire lot. This location is shown below in Figure 26.

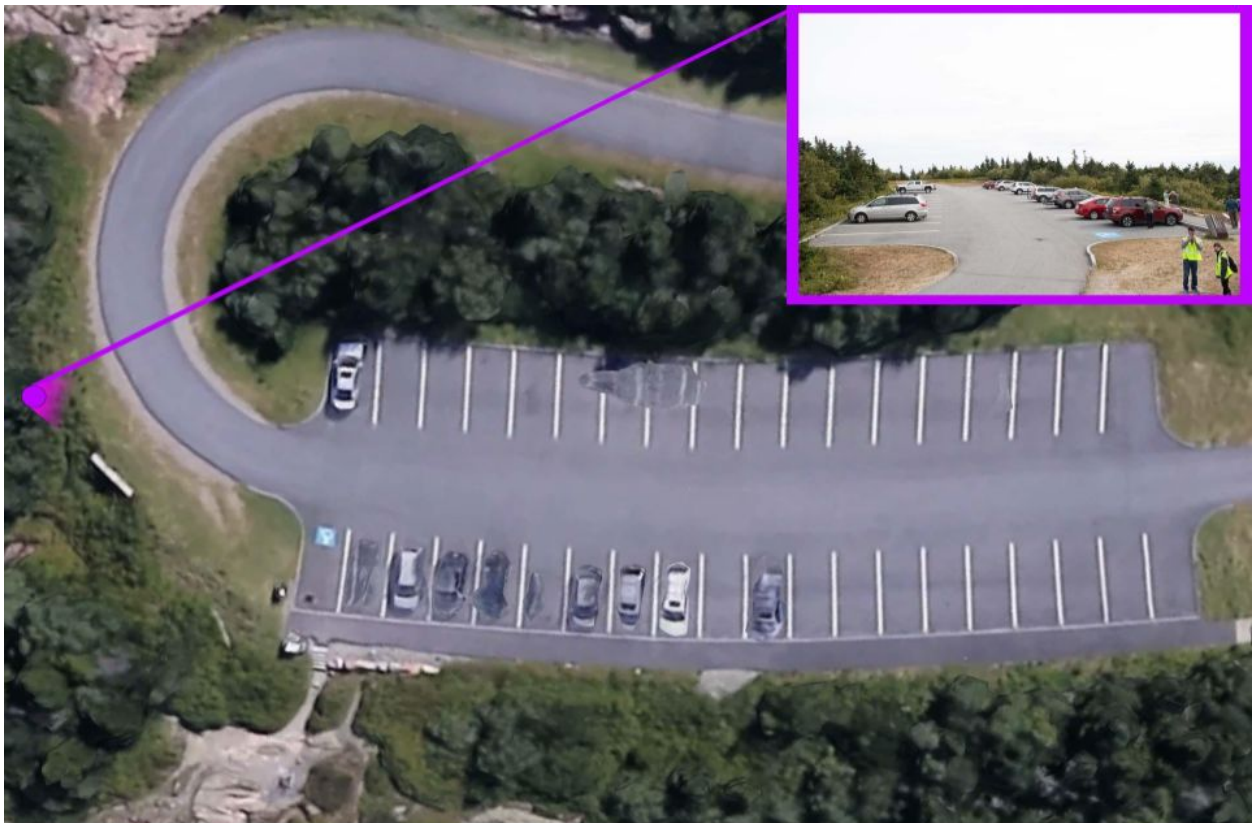


Figure 26: Blue Hill Overlook Webcam Location

At Jordan Pond, three cameras were needed; two in the main parking lot, and one in the first overflow lot shown in Figure 27 below.

Figure 27: Jordan Pond Camera Locations

At Sand Beach, one camera was needed, on the pole of an existing camera that was powered by solar panels. This camera location is shown below.

Figure 28: Sand Beach Camera Location

Finally, we were able to use satellite images, the images capture, and the various camera locations to create graphics detailing the exact location of each potential webcam and the view that each webcam would be capturing.

In GNP, we focused on the Apgar Visitor Center Lot, the Saint Mary Visitor Center Lot, Two Medicine. All of these sites had enough congestion problems to warrant traffic monitoring webcams. Additionally, all of the sites chosen in GNP either had existing webcams or the power and networking needed to support a webcam. This meant that adding webcams in these locations

would not require adding or altering existing infrastructure. The Avalanche Campground and Many Glacier were also considered as potential sites in GNP, but both locations would require significant additions to infrastructure to be able to accomodate webcams.

Due to weather and road closures, we were unable to go to each site an capture images, as we did in ANP. Instead, the group used satellite imagery of the sites to estimate how many webcams each site needed and where they should be located. The locations of the existing infrastructure at each location as dictated the webcam locations. With this information, we were able to create graphics showing the location and orientation of each potential webcam. At the Apgar Visitor Center Lot,only one webcam is needed. This webcam could be mounted on the Apgar Visitor Center because there is already a webcam mounted mounted on the Visitor Center, meaning the infrastructure is already in place for a webcam. In addition, this location would be able to capture a majority of the parking lot as shown below.

Figure 29: Apgar Visitor Center Webcam Location

The St. Mary Visitor Center Entrance and Parking lots would benefit from two camera locations shown below. The red camera is an already existing camera on the building facing west.

Figure 30: St. Mary Visitor Center and Entrance

The Two Medicine Entrance and Trailheads would have three camera locations shown below. One is located at the entrance to watch incoming traffic at the gate and the other two at lower trailhead parking lots.

Figure 31: Two Medicine Camera Locations

4.5 Objective Five: Determine ways to increase communication of congestion information to the public

We found that, based off pre-planning trends, the most effective way to reach visitors is through the NPS website. To maximize the number of people reading congestion information, we recommend ANP & GNP create and/or maintain Traffic & Travel tip pages: dedicated pages for displaying information on this subject. To maximize views of this page and make it easily accessible to website users, the parks should post it on both their home page and as a link on the Plan Your Visit drop down menu. Finally, the parks should make creative visuals for quickly

communicating important communication. Parks should utilize information and images captured by the proposed webcam network.

4.5.1 Pre-planning Trends

According to a thorough visitor use survey done in Yellowstone National Park, 79% of visitors planned the timings of their visit over a month in advance. Of that 79%, 18% planned over a year in advance. Only 11% of visitors planned their visit within a week of their visit, and 3% on the day of. Another IQP which was able to conduct surveys in ANP found 16% of visitors plan more than a 6 months in advance, 38% 3 to 6 months in advance, and 21% 1-3 months in advance. Only 10% of visitors decided on the timing of their visit to ANP within 2 to 4 weeks of visiting and 15% decided the day of their visit. It is worth noting that these surveys were taken in the early shoulder season (late August through early September) and do not necessarily capture the same type of visitor as those that come in the peak season. Shoulder season is more popular to local residents and repeat visitors who are familiar with the park (correspondence with John Kelly). This is important because it means a lot of visitors are determining the time of their visit while they still have access to the NPS website and other online sources.

Moreover, the same study found that 41% of visitors do "some pre-planning" and another 31% do "careful pre-planning". The most common resources used in pre-planning were maps, the Glacier NPS website, and tour books with 60%, 55%, and 37% of visitors using those sources respectively. Based on this information, we determined the most effective ways for the park to reach visitors is through the official NPS website (Yellowstone).

4.5.2 Analyzing Website Usage

Within the NPS website, we looked at visitation trends among different pages from website analytics. Acadia Website Analytics can be found in Appendix B. It's worth noting, the analytics provided were for February 2017 to February 2018 when Acadia did not have their current Traffic & Congestion Page so visitation to that page is currently unknown. However, we were still able to learn about general website usage. To no surprise, we found Acadia's most

viewed page is the home page, where the average user spends 1 minute 31 seconds. Other popular pages for this park included Camping, Maps, Plan Your Visit, Basic Info, and Hiking. While few of the most popular pages were featured on the home page, all are easily found using the drop down menu located at the top of the webpage.

Glacier National Park's website usage, as determined from analytics gathered October 2017 to October 2018, varied greatly from that of ANP's. GNP Website Analytics can be found in Appendix C. GNP's most visited page is its webcam page that is most popular to fans of the park who like to view the scenery and check conditions from home. Sites with the following highest views are the home page, Current Conditions, Plan Your Visit, Maps, Camping, and Basic Info. The Current Conditions page is used to announce weather, location accessibility, campground status, and more recently, links to fire information. This Current Condition page does not provide links from this page to the webcam views, which provide live views of conditions throughout popular sites.

We analyzed how different information can be accessed on the NPS website. The major ways to access NPS webpages are from search results, navigating through the drop down menu, clicking links off the home page, and clicking links from the Plan Your Visit page. One additional way to access pages is by clicking links nested in other pages, however this option was not investigated due to lack of more specific website analytics and the complexity of analyzing correlations between nested links and visitation. So, for the top ten most viewed web pages, based on total views in the previous year, we recorded which access methods as listed above were available to users. A summary of those results is below in Table 6.

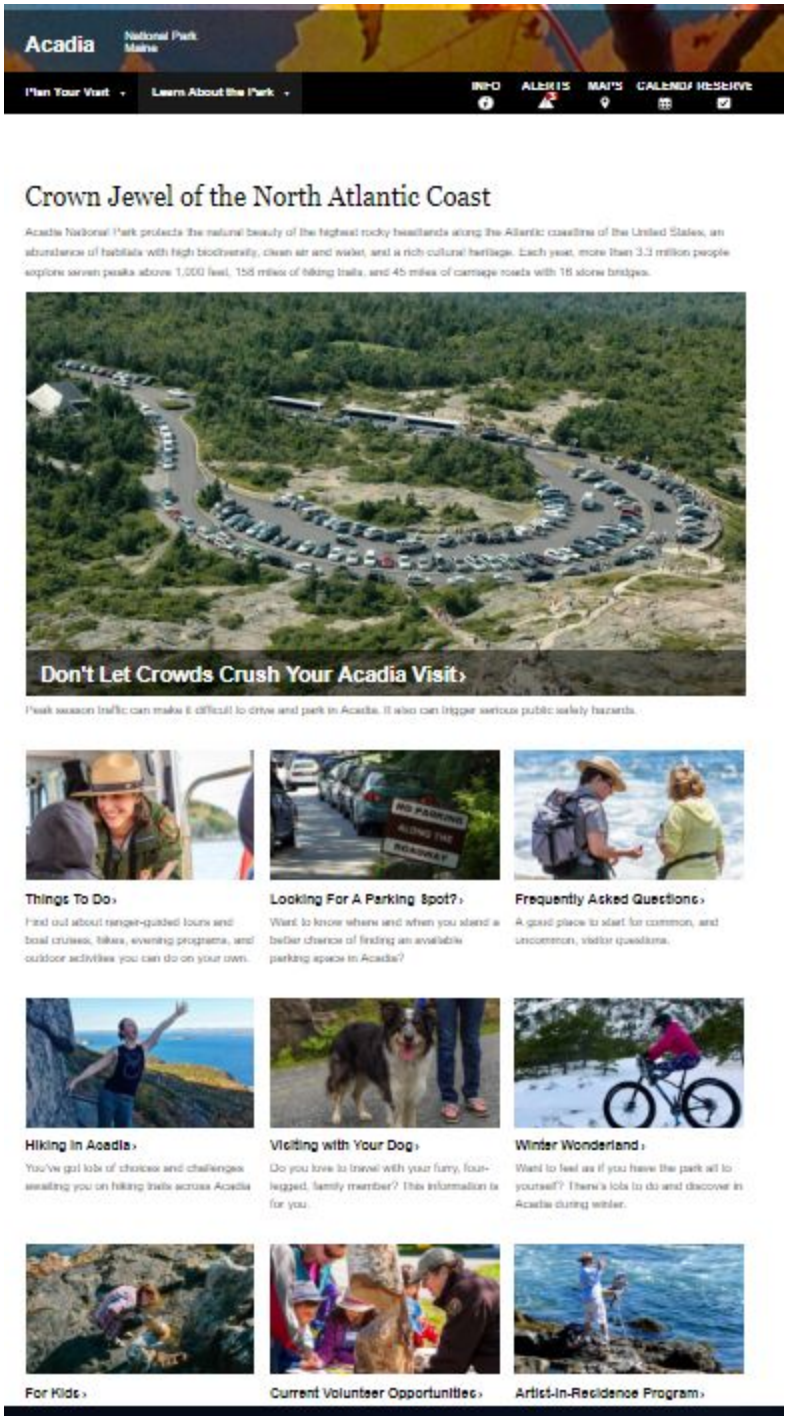
Table 6: Page Visitation vs Access Points.

Site	Total Views	Entrance %	Drop Down Menu Access	Home Page Link	Plan Your Visit Path	Entrances
Webcams	2763668	63%	No	Yes	No	1729865
Home Page	2135539	65%	NA	NA	NA	1380399
Current Conditions	1051932	19%	Yes (Under Basic Information)	Yes	No	203067
Plan Your Visit	662755	21%	Yes	Yes	NA	139553
Maps	520917	18%	Yes (Under Directions & Transportation)	NA	No	95527
Camping	469833	30%	Yes (Under Things to Do)	No	No	140303
Basic Info	415633	6%	Yes	No	Yes	25900
Eating & Sleeping	389547	8%	Yes	No	Yes	31477
GTSR	282992	43%	Yes (Under Directions & Transportation)	No	No	121822
Things To Do	244438	10%	Yes	No	Yes	25157

Based off these findings, it's reasonable to assume the drop down menu is a frequently used tool for navigating the webpage. Adding links to a page on the drop down menu can significantly increase users' ability to find the page and, consequently, can increase visitation of the page.

4.5.3 Organization of Traffic & Congestion Information

Acadia now has their Traffic & Congestion page as the main article on the home page (Figure 31), however it is not accessible through the drop down menu (Figure 32). It can be found as the third link on the popular Plan Your Visit page, as shown below in Figure 33.


Acadia
National Park
Maine
Plan Your Visit
Learn About the Park
INFO
ALERTS
MAPS
CALENDAR
RESERVE
Crown Jewel of the North Atlantic Coast
Acadia National Park protects the natural beauty of the highest rocky headlands along the Atlantic coastline of the United States, an abundance of habitats with high biodiversity, clean air and water, and a rich cultural heritage. Each year, more than 3.3 million people explore seven peaks above 1,000 feet, 158 miles of hiking trails, and 45 miles of carriage roads with 16 stone bridges.
Don't Let Crowds Crush Your Acadia Visit›
Peak season traffic can make it difficult to drive and park in Acadia. It also can trigger serious public safety hazards.
Things To Do›
Find out about ranger-guided tours and boat cruises, hikes, evening programs, and outdoor activities you can do on your own.
Looking For A Parking Spot?›
Want to know where and when you stand a better chance of finding an available parking space in Acadia?
Frequently Asked Questions›
A good place to start for common, and uncommon, visitor questions.
Hiking in Acadia›
You've got lots of choices and challenges awaiting you on hiking trails across Acadia
Visiting with Your Dog›
Do you love to travel with your furry, four-legged, family member? This information is for you.
Winter Wonderland›
Want to feel as if you have the park all to yourself? There's lots to do and discover in Acadia during winter.
For Kids›
Current Volunteer Opportunities›
Artist-in-Residence Program›

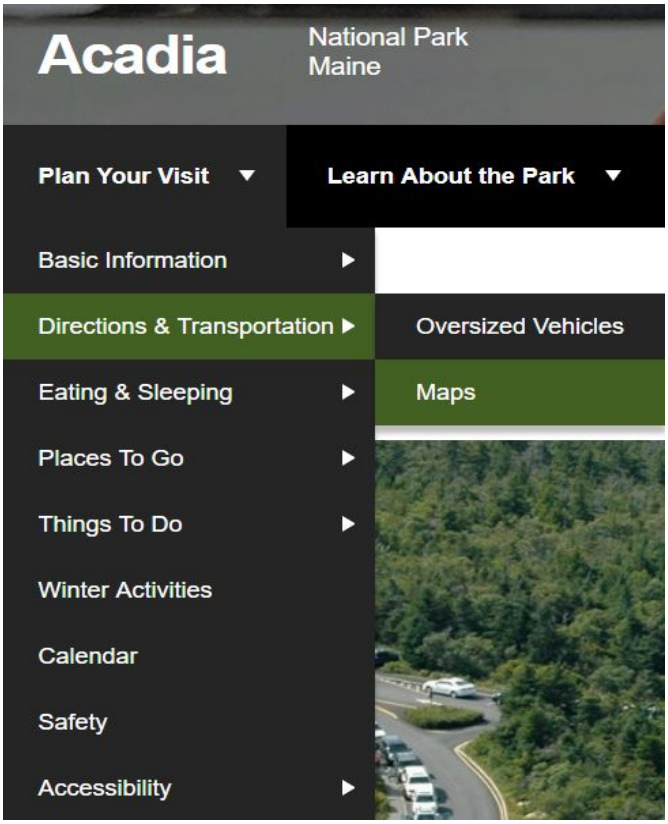


Figure 32 & 33: Acadia NPS homepage & drop down menu

("Acadia National Park (U.S. National Park Service)")

Basic Information ›

Address • Operating Hours • Closures • Rules & Regulations • Permits • Pets

Directions & Transportation ›

Fare-Free Island Explorer • Getting Here • RVs and Oversized Vehicles • Winter Road Access • GPS Coordinates

Traffic & Congestion ›

Low-Impact Transportation Options • Experience Special Places in New Ways

Figure 34: Links as posted on nps.gov/acad/planyourvisit/index.htm

Aside from the dedicated Traffic & Congestion page, this such information is not prominent on the website. It is occasionally mentioned on pages such as the Directions & Transportation page as motivation to use the free shuttle system, shown in Figure 35 below.

Figure 35: Congestion information as seen on nps.gov/acad/planyourvisit/directions.htm

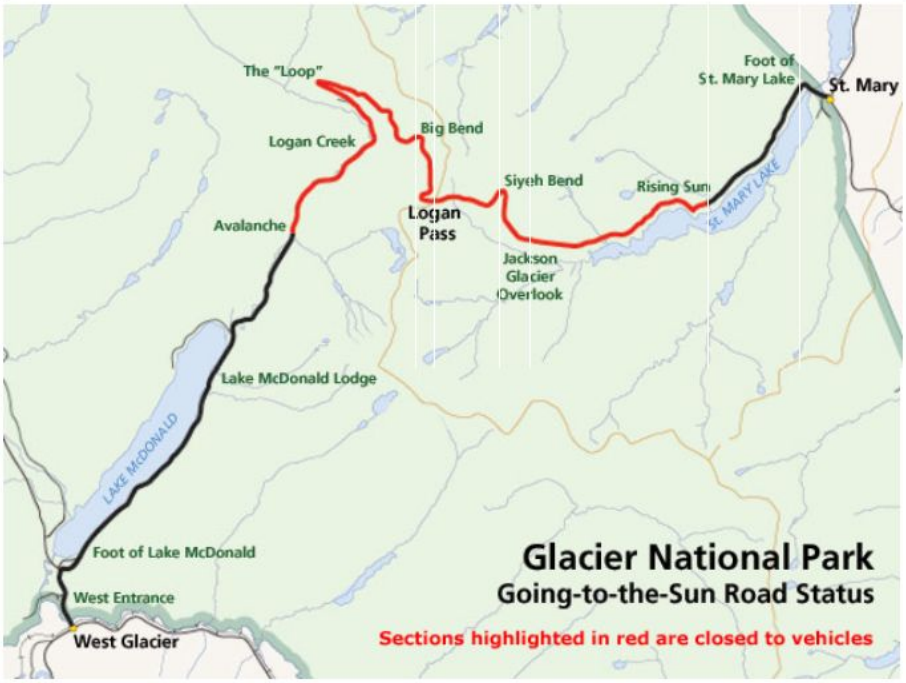
The Traffic & Congestion Page itself contains general information on overcrowding, followed by Parking Legally & Responsibly, Low-Impact Transportation Options, Experience Special Places in New Ways, Make it a Maine Experience, Doing it Without a Car, and Make the Most of Island Explorer Routes. Links to the Island Explorer appear on five different pages, the first of which directs to the Make the Most of Island Explorer Routes section of the page, and the other four direct to the Island Explorer route map, which is outside of the NPS website.

ANP also posts information on parking lot statuses on their Parking page, accessible only through the home page link. The page lists major parking lots including Cadillac Mountain, Echo Lake, and Jordan Pond. It lists the number of available parking spots for regular and oversized vehicles, whether or not the parking lot is currently open for use, and busy times of day for that parking lot. The information is not live, but will provide insight on traffic patterns in the past. An image of this is shown below in Figure 36.

Figure 36: Image of parking lot status from nps.gov/acad/parking.htm

Glacier National Park, while ahead of Acadia in webcams, is behind in congestion communication. GNP lacks a designated web page for traffic, congestion, or over crowding and searching those terms on the website yields only news results. However, Glacier has Getting Around page which ranks 25th most viewed out of all GNP's pages. This page boasts a series of links to status updates including the Road Status page (shown below in Figure 37) which depicts road closures on a map. This page shows some of the most up-to-date information regarding traffic and road access throughout the park and is accessible through the link on Getting Around as well as by clicking a featured link on the home page. Despite it's fairly prominent display, this particular page ranked 292nd most viewed with less than 400 unique viewers, about half of which leave the Glacier NPS website after reaching this page.

Glacier National Park Current Road Status
as of 3:06AM Mountain Time on 10-7-2018



Currently 21.0 miles of the Going-to-the-Sun Road are open for travel.
Visitors can drive 15.5 miles from the West Entrance to Avalanche, and 5.5 miles from the St. Mary Entrance to Rising Sun.

The section of the road between Avalanche and Rising Sun is closed due to the weather. The North McDonald Road remains closed.

Other Park Roads

Mouse-over road name for details and location

Inside North Fork Road
The Inside North Fork Road is currently closed at Logging Creek RS and Fish Creek due to a fire.

Camas Road
The Camas Road is open.

Chief Mountain Road
The Chief Mountain Road is open.

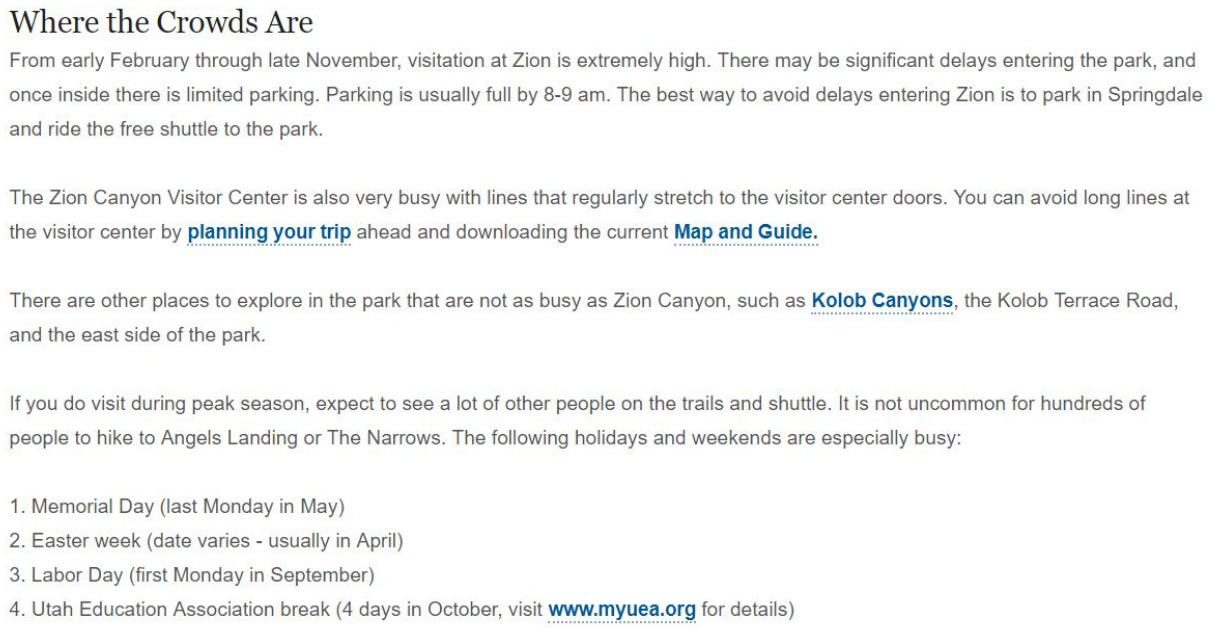
Cut Bank Road
The Cut Bank Road is currently closed at Ranger Station due to the weather.

Many Glacier Road
The Many Glacier Road is open.

Two Medicine Road
The Two Medicine Road is currently closed at Park Boundary due to the weather.

Figure 37: Road Status Page (https://home.nps.gov/applications/glac/roadstatus/roadstatus.cfm)

Many other parks have similar traffic & congestion pages, all with varying names and information. Arches, for example, calls its page the Traffic & Travel Tips page while other parks call theirs “Avoid Summer Congestion” (Mount Rainier) and “South rim Crowding: A Survival Guide” (Grand Canyon). These are are often accessible through the drop down menu, located under Directions & Transportation as well as from a link on the home page. This page aims to inform visitors of when and where the park is most congested and suggests ways to avoid the congestion. Zion National Park, the first and only park to restrict personal vehicles from entering, has a similar approach to Arches on its Traffic & Travel Tips. There is still limited parking available within the park, so Zion still has to fight congestion in select areas. Its Traffic & Travel Tips identifies busy times of day and specific locations to avoid, features photos of crowding, and concludes with advice on how to visit. A section of their webpage can be seen below in Figure 38:



Where the Crowds Are

From early February through late November, visitation at Zion is extremely high. There may be significant delays entering the park, and once inside there is limited parking. Parking is usually full by 8-9 am. The best way to avoid delays entering Zion is to park in Springdale and ride the free shuttle to the park.

The Zion Canyon Visitor Center is also very busy with lines that regularly stretch to the visitor center doors. You can avoid long lines at the visitor center by planning your trip ahead and downloading the current Map and Guide.

There are other places to explore in the park that are not as busy as Zion Canyon, such as Kolob Canyons, the Kolob Terrace Road, and the east side of the park.

If you do visit during peak season, expect to see a lot of other people on the trails and shuttle. It is not uncommon for hundreds of people to hike to Angels Landing or The Narrows. The following holidays and weekends are especially busy:

1. Memorial Day (last Monday in May)
2. Easter week (date varies - usually in April)
3. Labor Day (first Monday in September)
4. Utah Education Association break (4 days in October, visit www.myuea.org for details)

Figure 38: Zion Traffic & Travel Tips page (Zion Traffic & Travel Tips)

4.5.4 Shuttle Advertising

Both ANP & GNP have free, voluntary shuttle systems; ANP offers the Island Explorer and GNP the Going-to-the-Sun Shuttle and the seasonal Hiker’s Shuttle. Within the information

about ANP's Island Explorer can be found by following any of four links on the Directions & Transportation page and is mentioned occasionally on pages for hikes. As explained by park staff, hikers are significant contributors to congestion because they occupy parking spots for long periods of time, making it difficult for the casual day viewers to find short term parking spots.

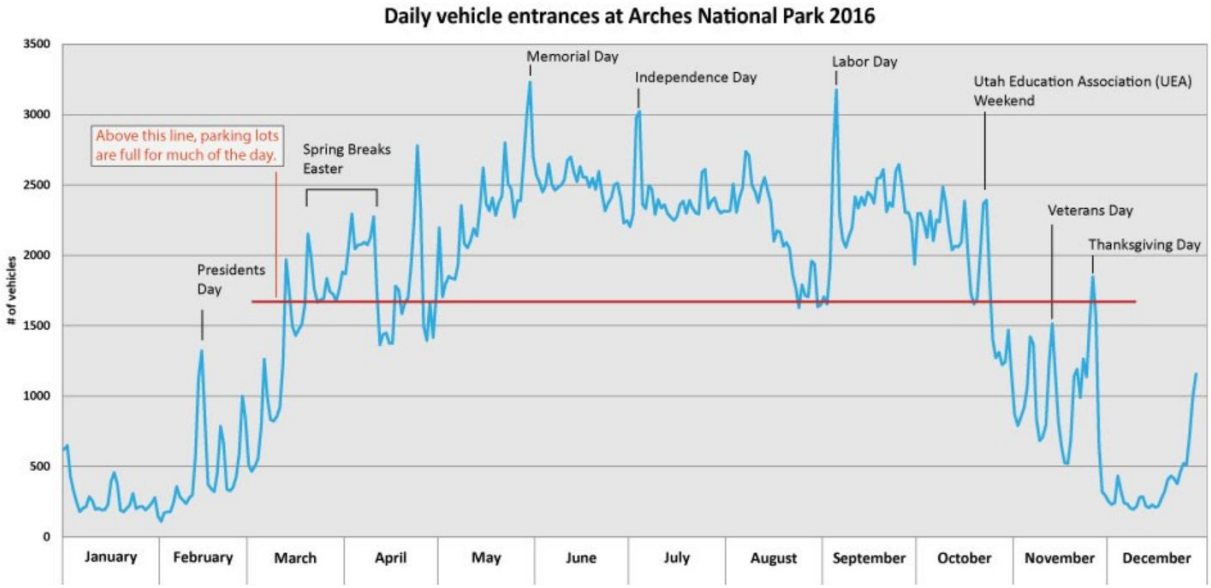
Information for the GNP Shuttle System can be found through a link on the Getting Around page. The official path for locating the Glacier's Shuttle System page shows the page is nested underneath Directions & Transportation; however, the only way to access the shuttle page through Directions & Transportation is by clicking a link that will first take you to Getting Around where you have to locate a link to the actual shuttle page.

Many other parks with shuttle systems display links to this information on the home page, in the drop down menu under Directions & Transportation, and as links on their congestion pages. It is common to see information on car congestion paired with information on the shuttles.

4.5.5 Creative Visuals

Many National Parks, with reputations for taking aggressive congestion management action, have creative visuals on their respective traffic & congestion pages. Examples include charts, interactive images, and webcams.

Arches National Park's Traffic & Travel Tips page boasts a photo of cars lined up outside an entrance gate followed by advice on when to visit. Their most interesting visual though is a Daily Vehicle Entrance Chart, which depicts visitation from 2016 (Figure 39). It contains notes explaining spikes in visitation such as national holidays. They also provide a threshold for when parking lots are at maximum capacity all day, as denoted by the red line and caption.



This chart shows the daily vehicle entrances into Arches National Park throughout the year. Times of heavy visitation include Easter week, Memorial Day, Labor Day, and Utah Education Association (UEA) weekend.

Figure 39: Daily Vehicle Entrances, Arches National Park, 2016

At the bottom of its Traffic & Travel Tips page, Arches offers links to webcams showing car build ups at the main entrance and traffic on a major state road leading into the park. The main entrance camera is managed by the park and can be easily used to determine current conditions for visitors planning when to arrive. This is shown in Figure 40 (Arches). Arches also has a similar parking page to that of Acadia's, which can be accessed from a link on the bottom of the Traffic & Travel Tips page next to the webcam link. This is shown in Figure 40, below.

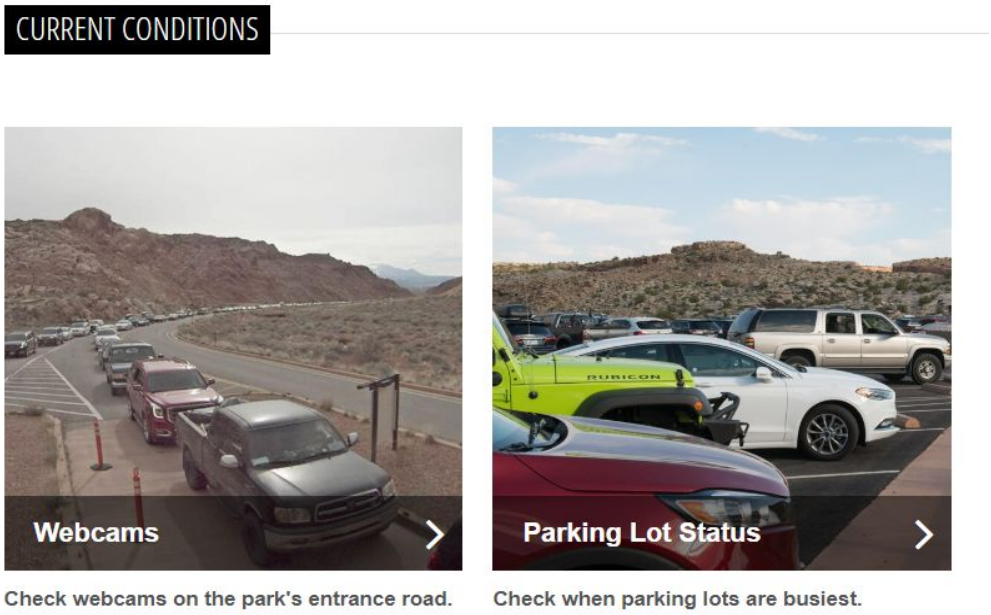
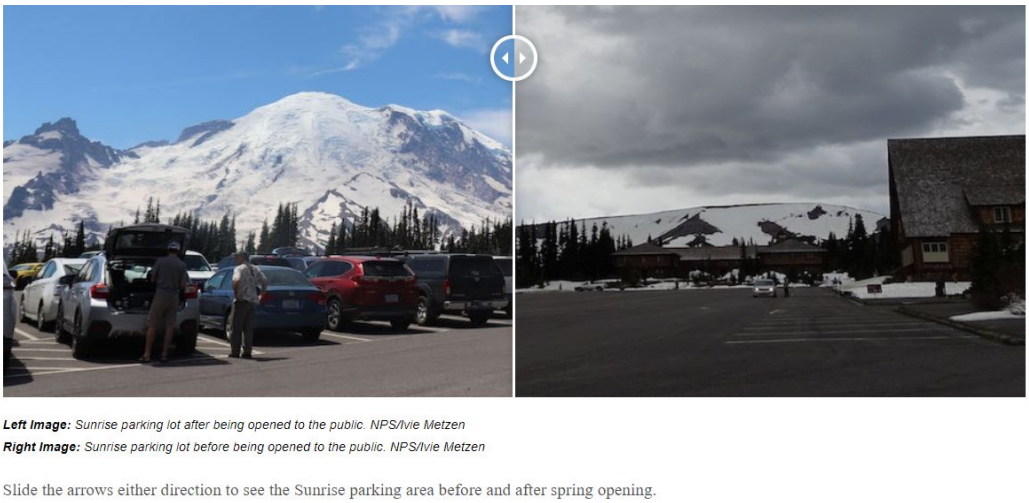


Figure 40: Links to Webcams and Parking Page from the bottom of Arches' Traffic & Travel Tips Page (nps.gov/arch/planyourvisit/traffic.htm)

Zion National Park starts its Traffic & Communication with a four minute video detailing how to use their shuttle system, the only vehicle transportation allowed in the park. This video explains all the information written below on the page such as where shuttles run, places of interest, accessibility, and benefits of implementing a shuttle system.

Mount Rainier displays an interactive image of a parking lot on it's Avoid Summer Congestion page (Figure 41).



Left Image: *Sunrise parking lot after being opened to the public. NPS/Ivie Metzen*
Right Image: *Sunrise parking lot before being opened to the public. NPS/Ivie Metzen*

Slide the arrows either direction to see the Sunrise parking area before and after spring opening.

Figure 41: Mount Rainier Interactive Visual on Summer Congestion Page

Sliding the vertical bar left to right reveals images of a parking lot before and after the park has opened to visitors. It also shows images of crowded parking lots throughout the page, most of which have illegally parked cars.

5. Recommendations

5.1 Implementing Test Webcams

Both ANP and GNP should implement a system of traffic monitoring webcams to provide congestion information to visitors. Additionally, we recommend that each park uses a single site as a proof of concept of the traffic monitoring webcam system.

In ANP we recommend that the test implementation take place at Cadillac Mountain and the Blue Hill Overlook. This site is secluded and only has one access road, which makes analyzing the effectiveness of the cameras simpler. Also we recommend that ANP uses the Raspberry Pi Webcam powered by solar panels and connected to cellular networking as their traffic monitoring webcam.

In GNP we recommend that Two Medicine be used as the test site for implementing a full scale traffic monitoring webcam system. This area is separated from the rest of the park so assess the outcome of the implementation will be more feasible. The financial investment GNP is willing to make for implementing traffic monitoring webcams effects our recommendation of which webcam they use. If GNP would like to temporarily test use webcams to monitor traffic in Two Medicine and do so with minimal financial investment, we recommend using the Raspberry Pi webcam. On the other hand, we recommend GNP continue using the AXIS v5915 PTZ webcams, if GNP would like to implement traffic monitoring webcams permanently and make a more sizable financial investment.

Once the test webcam systems have been implemented, the parks should assess their effectiveness. If the test systems prove effective we recommend that the parks expand their networks of webcams. The parks should also explore adding traffic monitoring webcams in sites with more limited infrastructure, such as Thunder Hole in ANP as well as Many Glacier and Avalanche in GNP.

5.2 Utilizing the website to communicate congestion

This section will cover ways to enhance the ANP & GNP websites in order to better communicate traffic information. It will include suggestions for what information to include to ensure visitors are getting the most useful information, how to display the information to make it easiest for visitors to understand, and how to make it easily accessible to visitors so the most people will see it. By addressing these three points, we can better inform visitors of traffic & congestion issues.

5.2.1 Increasing Page Accessibility

ANP's Traffic & Congestion page is visible, but difficult to access after leaving the home page. To maximize accessibility of the Traffic & Congestion page, we suggest ANP and GNP place their Traffic & Congestion pages on their home pages and, more importantly, on their drop down menus. A logical place to put is us nested under Directions & Transportations as other parks do. However, they may also consider linking this information under Basic Info. A third place to advertise this information is on the Plan Your Visit page.

5.2.2 Structuring a Traffic & Congestion Page

Many of the forerunners in congestion management have dedicated pages to identifying the problem in a way relevant to visitors and providing alternatives. What this means is, information on the page is focused and pre-digested for viewers. It's important to keep in mind, the average time a single person spends on a single page is around one and a half minutes (1 minute 35 seconds on the Acadia website and 1 minute 29 on the Glacier website). Long paragraphs will not convey all the desired information parks want to communicate. A list, or possibly a chart, of areas that crowded, times of year congestion is at its worst, and times of day congestion peaks would be the most fastest way to inform visitors.

Quickly following what not to do, viewers should be informed as to better alternatives. If they cannot see the most popular attractions at the time and date they wanted to, what can they do? Suggesting alternative locations, times, and dates will allow visitors to take action on the congestion information they received. Providing specifics on this such as less popular attractions

within the park, destinations outside of the park, activities in shoulder season, and exact days of the week to visit, and times of day to arrive will be most relevant to potential visitors planning their trips. For example, the Grand Canyon National Park website recommends specific train routes to less popular destinations for visitors seeking sunset views. These recommendations account for the experience the visitor is seeking, the time of day, transportation methods depending on the visitor's starting point, and of course which destinations are less crowded. The exact presentation of this information can be seen below in the snapshot of the Grand Canyon's South Rim Crowding page (Figure 42).

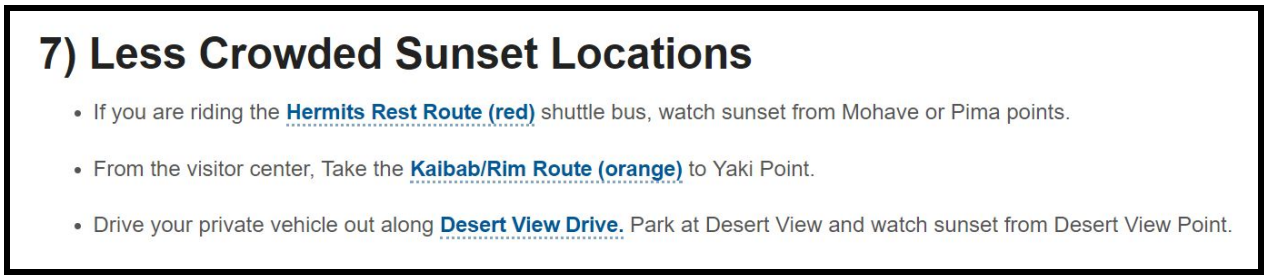


Figure 42: Segment of Grand Canyon's South Rim Crowding: A Survival Guide

Along the vein of alternative transportation, ANP and GNP are able to offer many different options for touring the park without a personal vehicle. The congestion page is an ideal place to provide brief descriptions and links to these options. These options would include the free shuttle systems, concessionaires which provide vehicle tours of the park, carriage rides (for ANP), boat tours, bicycling, and walking. Presenting all these options in a simple condensed list would help visitors quickly see all their options, without scrolling through images and text, and find links to more information.

Any other creative visuals, which will be discussed in the section below (section 5.2.3 Creating Compelling Visuals) should also be displayed on this site or linked to through this site.

A final, small modification worth considering is the title of the congestion page. Presenting the page as a source of travel tips may attract more pre-planning viewers, since calling the Traffic & Congestion page, while accurate, is not fully capturing the information on the page.

A mock up of a basic Traffic & Travel Tips page can be found in Appendix D. This mock up is purely for explanatory purposes and information in it would need to be tailored to the park.

5.2.3 Creating Compelling Visuals

We recommend the park develop visuals using the live feeds and data collected from the webcams. Examples of this would include the live webcam feed, parking lot status, yearly visitation chart, time lapse videos, and an interactive calendar lookup. These can help communicate information quickly to website users once they've reached the Traffic & Travel Tips page.

The first, and possibly simplest, visual to add to the ANP or GNP websites would be access to live feeds of images. This would provide visitors with the most up-to-date information on traffic conditions in the park. This would be beneficial to visitors making final decisions on their plans the day of their trip. It could also be displayed on televisions on visitor centers so visitors already in the park can adjust their plans based on current conditions.

GNP could mimic the Parking page that ANP currently has, which provides parking lot status as described in section 4.4.5 Organization of Traffic & Congestion Information. ANP's information is based primarily on ranger observation and potentially car counter information. However, to make it more accurate parking lots would need to be monitored and tracked hourly. Doing this manually would be hard for the parks since staff is working at full capacity during the peak season. Instead, parks could store images from webcams and refer to them later in the off season, using the images to fine tune congestion information throughout the year and throughout the park.

A simple graphic either ANP or GNP can create is the yearly visitation chart Arches provides on its congestion page, described in section 4.4.5 Organization of Traffic & Congestion Information. This would require car counters that track daily entrances as well as ranger insight or webcam data similar to that used for parking lot status page.

After implementing even a single webcam, ANP or GNP could easily create time lapse videos by pulling images from a webcam off the website. This visual would allow website visitors to see how parking lots fill and congestion forms throughout the day. The movement of a

running video on the Traffic & Travel Tips page would also capture viewers' attention and quickly illustrate the conditions in the park without a single word.

Taking this one step further, ANP & GNP can create interactive databases for webcam images and timelapses. Website users would have the ability to select a date from a calendar, indicating the time they are interested in visiting the park (diagrammed in Figure 43). For example, a user wants to visit GNP on Labor Day. After selecting a date, the page would display a timelapse of various parking lots or roads from Labor day of the previous year.

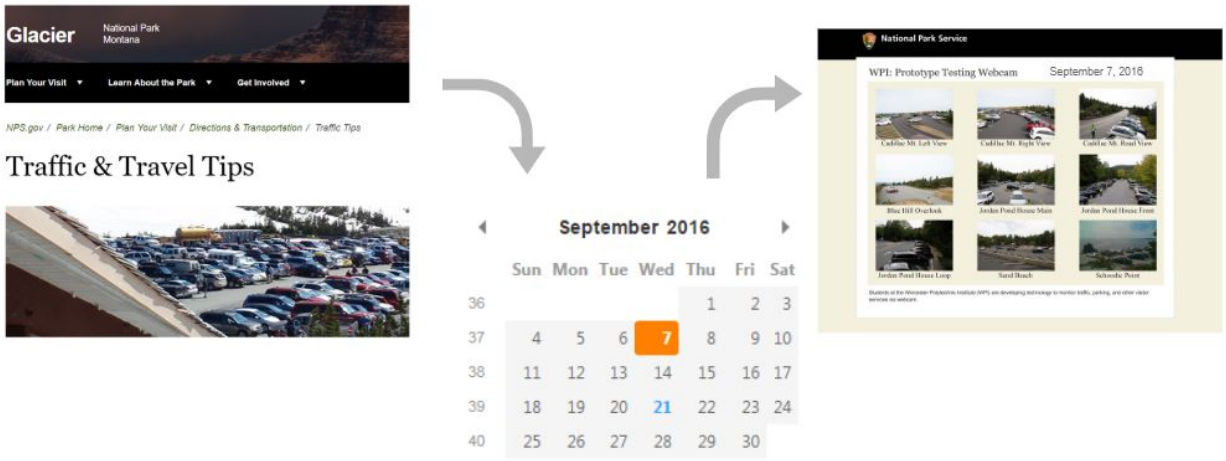


Figure 43: Diagram of interactive database concept

6. Discussion

6.1 Limitations of Raspberry Pi's as webcams

The Raspberry Pi's offer a noninvasive and affordable option for implementing a webcam network; however, there are some limitations including weather proofing and ease of use.

Raspberry Pi's can be easily placed in a waterproof case to protect them from the elements in the summer, but they are not fit for use in the winter. During winters, snow and ice buildup on the camera could impair vision while low temperatures can force the Raspberry Pi to shut down. The park could invest in cases that contain heating elements, but this is an additional cost and would ultimately add little value to the traffic monitoring system. During colder months when a heating element would be required, there is little to no traffic and monitoring is

unnecessary. Raspberry Pi cameras can be taken down at the end of the busy season or mid shoulder season, before winter weather kicks in.

The Raspberry Pi unit is fully programmable, which is both an advantage and a disadvantage. The benefit is parks are able to set them up exactly how they want and make any changes, any time. The downside of this, is that it takes specific programming knowledge to do so. While the Raspberry Pi's program is fairly simple as far as programs go, it isn't user friendly the way a hunting camera would be. This means troubleshooting or making changes to the Raspberry Pi cameras could be difficult for parks if they do not have the required expertise available.

6.2 Future Enhancements

Any webcam network, even one as basic as the Raspberry Pi's, provides the opportunity for automated mass data collection. Webcams are a great way to reliably collect lots of data with minimal labor required after setup. This puts the parks in a great position to do analysis and learn visitor usage and traffic trends.

One way to do this would be through image processing software which will analyze images to derive numerical data. Software, such as TrafficVision, can be implemented on pre-existing webcam systems to do this analysis. Many of these software programs are designed for monitoring moving traffic and have advanced features like detecting stopped vehicles, slow moving traffic, and accidents. Other softwares used for parking lot monitoring, such as PureActiv Vehicle Counting, are able to count the number of cars in a parking lot (Car Counting Solutions). For the sake of analyzing a road where congestion builds up (such as outsides entrance gates in GNP or the road leading to Cadillac Mountain's summit in ANP), the parks could investigate simpler options for image analysis.

Regardless of the exact software used, image analysis will process these images to provide useful information regarding traffic and congestion that can be used for real time updates plus historical data collection. After implementation of a basic webcam system, park rangers and visitors will be able to use live views of traffic to inform their decisions on traffic monitoring and trip planning. However, this requires the user to first view the webcam images, which could be

plentiful if many webcams are implemented, and then to determine whether or not there is congestion. With image processing, a computer will keep unfaltering track of parking lots and roads and could give "predigested" information to rangers and staff. Images with full parking lots or stopped traffic could appear with a status bar that reads "full", "in need of attention", or any other notification. Moreover, this program could automatically send notifications to rangers when there are issues so they only need to check the webcams when an issue is detected. All these forms of automation will help reduce ranger workload and help in taking prompt action against congestion issues.

Another method that could be used to expand the upon the traffic monitoring webcam system is a bus mounted webcam. This solution would be applicable to both parks. Both parks have areas with limited connectivity the could still benefit from being monitored by webcam. Additionally, both ANP and GNP have shuttles that travel along their most popular roads. Webcams mounted on these shuttle busses could capture images while traveling along the park roads. The images would be taken at predetermined GPS locations, such as the entrances to parking lots and frequently congested areas. The images would then be uploaded when the shuttle was in range of WiFi or a cellular network. Using this method areas that do not have the infrastructure to support webcams could still be monitored in near real time.

6.3 Outcome Assessment

A final future consideration is outcome assessment. After implementing the webcam system and website changes for a year or more, parks should consider looking into the outcomes of such changes. Parks should look into the impacts that webcams had on rangers' abilities to respond to congestion issues. Moreover, the park should investigate what impacts changes to the website impacts visitor behavior on the website. Finally, the park should try to determine the effects of providing webcam views and traffic information to visitors. Are visitors changing their behavior after learning the information, if so how? This is a huge undertaking since it requires extensive information about the visitors, but it would be very beneficial for understanding how visitors make decisions and for deciding a future course of action for the park.

7. Conclusion

Acadia National Park and Glacier National Park are both experiencing record numbers of visitors every year. This influx of visitors has created significant congestion. This congestion has warranted the need for better methods of monitoring and communicating congestion issues in both parks. In an effort to alleviate these congestion issues the group developed solution involving monitoring and communicating congestion information. Specifically, we assess the feasibility of various traffic monitoring webcams and explored methods of effectively communicating congestion using the NPS website. Ultimately the goal of the was to provide the public with the information necessary to organically solve the congestion issues the parks are experiencing.

Research into both parks' current methods of monitoring, managing, and communicating congestion was conducted. This research, along with the parks desires, were considered in creating solutions for monitoring and communicating congestion. It was determined that both ANP and GNP have the infrastructure and resources to implement a system of congestion monitoring webcams. Additionally, both parks would benefit from making alterations to their websites. These alteration could provide visitors with additional information regarding congestion as well as make the information easier to access. With these addition to the parks' congestion monitoring and communication, the visitors would be better prepared to s autonomously manage congestion.

6. References

"10 Ways to Enhance Your Community Unleash the Power of Transportation." *Public Transportation*, 1 Feb. 2013, www.apta.com/resources/reportsandpublications/Documents/10ways.pdf.

Acadia National Park Webcams. 2018. https://www.nps.gov/acad/learn/photosmultimedia/webcams.htm

Acadia National Park (U.S. National Park Service). (n.d.). Retrieved September/October, 2018, from https://www.nps.gov/acad/index.htm

Alvarez, Shannon, et al. *Novel Approaches to Parking Management on Nantucket*. pp. 1–78, *Novel Approaches to Parking Management on Nantucket*.

Angela Calvi. *INTELLIGENT TRANSPORTATION IN ACADIA NATIONAL PARK*. pp. 1–50, *INTELLIGENT TRANSPORTATION IN ACADIA NATIONAL PARK*.

"AT&T Maps." AT&T Maps - Wireless Coverage Map for Voice and Data Coverage from AT&T, 2018, www.att.com/maps/wireless-coverage.html.

Avoid Summer Congestion. (n.d.). Retrieved September/October, 2018, from https://www.nps.gov/mora/planyourvisit/congestion.htm

Backus, Perry. "Too Much Love? Glacier National Park Deals with Record Numbers of Visitors." *Missoulian*, 17 Aug. 2017, missoulian.com/news/local/too-much-love-glacier-national-park-deals-with-record-numbers/article_36aca80a-a6ba-50bf-84b3-0a39281222dc.html.

Bates, Scott C. "Visitor Assessment of the Mandatory Alternative Transportation System at Zion National Park." *Environmental Management*, 14 Sept. 2013.

Bergquist, Z., Claudio Palacios, A., & Goklevent, S. (august 2, 2018). Cellular Connectivity Status In Acadia National Park (Rep.).

"Car Counting Solutions." *Car Counting - PureTech Systems*, www.puretechsystems.com/solutions-car-counting.html.

Cormier, Roland. *Inventory and Analysis of the South Boston Parking Freeze*. pp. 1–70, *Inventory and Analysis of the South Boston Parking Freeze*.

Cosmopulos, Eric. *Preparing Acadia National Park for Modern Tourist Congestion*. pp. 1–94

D'Antonio, Ashley. "The Ecological Implications of Visitor Transportation in Parks and Protected Areas: Examples from Research in US National Parks." *Journal of Transport Geography*, Volume 51, 1 Feb. 2016, pp. 27–35.

Dimond, Alison. *Recreational Use of Selected Viewpoints on the Going-to-the-Sun Road*. 3 Mar. 2009, irma.nps.gov/DataStore/DownloadFile/420872.

"Dotworkz D2 Ring of Fire De-Icing Camera Enclosure IP68 with MVP (D2-RF-MVP)." Dotworkz, 2018, estore.dotworkz.com/Dotworkz-D2-Ring-of-Fire-De-Icing-Camera-Enclosure-p/d2-rf-mvp.htm.

Dziuban, William. *Tourist Impact in Acadia National Park*. pp. 1–136, *Tourist Impact in Acadia National Park*.

Fields, Sarah. *The Carbon Footprint of Acadia National Park*. pp. 1–72, *The Carbon Footprint of Acadia National Park*.

Frequently Asked Questions about Zion Canyon. (2012, March 31). Retrieved April, 2018, from https://www.nps.gov/zion/frequently-asked-questions-about-zion-canyon.htm

Glacier National Park. (2018). Comprehensive Communication Plan Environmental Assessment (Rep.).

Glacier National Park Webcams. (n.d.). Retrieved from https://www.nps.gov/glac/learn/photosmultimedia/webcams.htm

Lawson, Steven R., et al. "A Systems-Based Approach to Address Unintended Consequences of Demand-Driven Transportation Planning in National Parks and Public Lands." *International Journal of Sustainable Transportation*, vol. 11, no. 2, July 2016, pp. 98–108., doi:10.1080/15568318.2016.1194504.

Madison, Erin. "Great Falls Tribune." *USA Today*, 14 Aug. 2013.

"Making the Impossible Possible." *National Park Service*, 27 Aug. 2018. https://www.nps.gov/transportation/pdfs/ITS_In_Parks_2011_Update.pdf

Mustaffa, Norlia. "Smart Parking System (SPS) Architecture Using Ultrasonic Detector." *Research Gate*, Volume 6, 3 June 2016, pp. 51–58.

National Park Service • U.s. Department Of The Interi. "Foundation Document." *NATIONAL PARK SERVICE • U.S. DEPARTMENT OF THE INTERIOR Foundation Document*, 3 Oct. 2016, www.nps.gov/glac/learn/management/upload/GLAC_FD_SP.pdf.

Oates, D., Callahan, E., & Hand, A. (2018). Parking Reservation System for Glacier National Park (Rep.).

"Parking Problems - Picture of Swiftcurrent Lake, Glacier National Park." *TripAdvisor*, www.tripadvisor.com/LocationPhotoDirectLink-g143026-d145415-i282265652-Swiftcurrent_Lake-Glacier_National_Park_Montana.html.

Parks, Madison. "You May Have to Pay $70 to Visit the Grand Canyon and 16 Other National Parks." *CNN.com*, 25 Oct. 2017, www.cnn.com/travel/article/national-park-service-fee-proposal/index.html.

Policy, Draft - Not Adopted. "A Seasonal Parking Management Solution for Nantucket." www.remainnantucket.org/assets/files/Managed%20Parking%20Briefing%20Booklet-2-16-11.pdf.

Priddy, M. (2017, May 27). As Summer Looms, Glacier Looks to Mitigate Congestion. Retrieved April 25, 2018, from http://flatheadbeacon.com/2017/05/30/summer-looms-glacier-looks-mitigate-congestion/

Road Tube. (2018). Retrieved May 1, 2018, from http://diamondtraffic.com/technicaldescription/117

Schmidt, Linda. "NYC to Reserve Parking Spots for Shared Cars." *WNYW*, 26 Jan. 2018, 6:07, www.fox5ny.com/news/nyc-to-reserve-parking-spots-for-shared-cars.

South Rim Crowding: A Survival Guide. (n.d.). Retrieved September/October, 2018, from https://www.nps.gov/grca/planyourvisit/sr-tips.htm

"Spypoint® Link-S 12MP Solar Cellular Trail Camera." Www.cabelas.com, www.cabelas.com/product/Spypoint-Link-S-MP-Solar-Cellular-Trail-Camera/2513754.uts?productVariantId=5220408&WT.tsrc=PPC&WT.mc_id=GoogleProductAds&WT.z_mc_id1=04822562&rid=20&ds_rl=1252079&gclid=Cj0KCQjw6fvdBRCbARIsABGZ-vRZImTZhNf8xa0ZKbkonHvaSMEIi-urWYjN9_yh6HZK8RWgKOV7FZEaAuI1EALw_wcB&gclsrc=aw.ds.

Stats Report Viewer. Retrieved April 25, 2018, from https://irma.nps.gov/Stats/SSRSReports/Park Specific Reports/Annual Park Recreation Visitation (1904 - Last Calendar Year)?Park=GLACVisitor Totals. Retrieved from https://irma.nps.gov/Stats/SSRSReports/Park Specific Reports/Summary of Visitor Use By Month and Year (1979 - Last Calendar Year)?Park=GLAC

The Technical Requirements of STA. (n.d.). Retrieved May 1, 2018, from https://picomixer.com/STA-Guide/STA-Technical-Requirements.html

Traffic. (2018). Retrieved May 1, 2018, from https://www.axis.com/solutions-by-industry/transportation/traffic/products-and-solutions

Traffic & Travel Tips. (n.d.). Retrieved September/October, 2018, from https://www.nps.gov/zion/planyourvisit/traffic.htm

TRAFx Vehicle Counter . (n.d.). Retrieved May 1, 2018, from https://www.trafx.net/products.htm#vehicle-counter

TrafficVision Applications. (2018). Retrieved May 1, 2018, from http://www.trafficvision.com/

Travelers' Infomation Stations Search. (2015, December 10). Retrieved May 1, 2018, from https://www.fcc.gov/media/radio/travelers-information-stations-search

THE ULTIMATE GUIDE TO PERIMETER SECURITY. (n.d.). Retrieved May 1, 2018, from https://www.tymetal.com/resources/security-gates/

United States of America, National Park Service, Glacier National Park. 2017 End of Season Report.United States of America, National Park Service, Glacier National Park. Congestion Assessment.Monthly Public Use Report. Retrieved April 25, 2018, from https://irma.nps.gov/Stats/SSRSReports/Park Specific Reports/Monthly Public Use?Park=GLAC

Vehicle Counting Equipment. (2018). Retrieved May 1, 2018, from http://diamondtraffic.com/

Vehicle Counter Hardware. (n.d.). Retrieved May 1, 2018, from https://www.sensourceinc.com/hardware/vehicle-counting-products/

“Visitor Use Management Framework. A Guide to Providing Sustainable Outdoor Recreation.” *Visitor Use Management*, 1 July 2016,

visitorusemanagement.nps.gov/content/documents/VUM_Framework_Edition%201_508%20Compliant_IVUMC.pdf.

Volpe, J. A. (2011, September). Intelligent Transportation Systems in the National Parks System and Other Federal Public Lands - 2011 Update. Retrieved May 1, 2018, from https://www.nps.gov/transportation/pdfs/ITS_In_Parks_2011_Update.pdf

Willbee, Marty. "Designating Parking Areas on Unpaved Surfaces." *Designating Parking Areas on Unpaved Surfaces*, 1 June 2002, www.fs.fed.us/eng/pubs/html/02231314/02231314.html.

"Yellowstone National Park Visitor Use Study." *National Park Service*, 1 July 2016, www.nps.gov/yell/getinvolved/upload/R-YELL_VUS_FINAL-Report.pdf.

7. Appendices

Appendix A: Tables

Table 1: Total visitors to GNP by year

Total Visitors By Year	
2000	1,728,693
2001	1,680,614
2002	1,905,689
2003	1,664,046
2004	2,033,933
2005	1,925,101
2006	1,964,399
2007	2,083,329
2008	1,808,027
2009	2,031,348
2010	2,200,048
2011	1,853,564
2012	2,162,035
2013	2,190,374
2014	2,338,528
2015	2,366,056
2016	2,946,681
2017	3,305,512

Table 2: 2016 Monthly Visitation by Location

Location	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	Peak Season Low	Peak season Low
Camas	0	0	0	1509	3817	6749	11757	11634	6985	2281	1418	0	3817	11757
Goat Lick	0	0	0	0	4044	14041	15418	12503	9259	0	0	0	4044	15418
Many Glacier	0	0	0	776	5900	22066	37518	36062	23499	1440	1405	0	5900	37518
Polebridge	336	121	153	738	2339	4545	8206	8594	5365	3240	580	138	2339	8594
Saint Mary Ln 1	230	284	321	1076	3160	3490	4450	4167	2335	1360	0	0	2335	4450
Saint Mary Ln 2	0	99	156	1050	6403	23092	37553	36780	25378	1382	0	0	6403	37553
Saint Mary Ln 3	0	0	0	0	766	12666	28712	22739	11325	0	0	0	766	28712
Two Medicine	0	0	0	1200	6470	10768	19996	14706	12242	1230	1552	0	6470	19996
West Entrance	5190	5576	7179	14072	32801	75984	131468	122071	79220	17127	6455	4581	32801	131468
Saint Mary Lanes*	230	383	477	2126	10329	39248	70715	63686	39038	2742	0	0	10329	70715
Average	639.6	675.6	867.7	2269	7300	19266.8	32786.4	29917.3	19512	3117.8	1267.8	524.3	7300	32786.4
total	5756	6080	7809	20421	65700	173401	295078	269256	175608	28060	11410	4719	65700	295078

**Saint Mary Lanes is a summation of values in Saint Mary Ln 1, Ln2, and Ln 3.*

Table 3: 2017 Visitation by Month & Type

2017 Visitor Usage by Month & Type						
	January	**February**	**March**	**April**	**May**	**June**
Recreation Visitors	14,690	13,802	19,336	38,323	177,787	620,962
Non-Recreation Visitors	16	27	16	76	220	1,525
Concession Lodging	0	0	0	0	2,628	21,918
Tent Campers	35	10	55	120	4,636	24,835
RV Campers	72	18	99	207	5,061	26,970
Concession Camping	0	0	0	0	0	0
Backcountry Campers	29	30	38	44	442	3,760
Misc Campers	0	0	0	0	25	163
Total Overnight Stays	136	58	192	371	12,792	77,646

2017 Visitor Usage by Month & Type (Continued)						
July	**August**	**September**	**October**	**November**	**December**	**2017 Totals**
1,009,665	908,479	389,137	84,469	15,594	13,268	3,305,512
4,171	4,335	3,731	1,622	43	25	15,807
37,458	36,205	11,019	0	0	0	109,228
43,965	44,609	9,191	145	45	15	127,661
35,412	32,208	11,193	273	81	45	111,639
0	0	0	0	0	0	0
11,553	14,462	3,405	216	11	21	34,011
342	311	39	0	0	0	880
128,730	127,795	34,847	634	137	81	383,419

Appendix B: Acadia National Park Website Analytics

Intentionally Left Blank

Government-Wide Account

NPS Agency Profile (Pilot Program)

GO TO REPORT

Pages

All Users
100.00% Pageviews

Feb 2, 2017 - Feb 8, 2018

Explorer

This data was filtered with the following filter expression: **acad**

Page	Pageviews	Unique Pageviews	Avg. Time on Page	Entrances	Bounce Rate	% Exit	Page Value
	5,126,238 % of Total: 1.00% (514,324,253)	3,999,085 % of Total: 1.01% (397,158,181)	00:01:35 Avg for View: 00:01:39 (-4.37%)	1,492,076 % of Total: 0.90% (165,803,829)	42.11% Avg for View: 45.83% (-8.12%)	30.42% Avg for View: 32.24% (-5.65%)	$0.00 % of Total: 0.00% ($0.00)
1. nps.gov/acad/index.htm	**1,006,938** (19.64%)	767,762 (19.20%)	00:01:31	664,241 (44.52%)	29.85%	31.41%	$0.00 (0.00%)
2. nps.gov/acad/planyourvisit/camping.htm	**297,428** (5.80%)	216,132 (5.40%)	00:04:02	119,845 (8.03%)	39.37%	49.65%	$0.00 (0.00%)
3. nps.gov/acad/planyourvisit/maps.htm	**260,564** (5.08%)	203,469 (5.09%)	00:02:44	53,443 (3.58%)	70.67%	44.98%	$0.00 (0.00%)
4. nps.gov/acad/planyourvisit/index.htm	**235,758** (4.60%)	167,207 (4.18%)	00:00:59	70,755 (4.74%)	23.21%	16.40%	$0.00 (0.00%)
5. nps.gov/acad/planyourvisit/basicinfo.htm	**195,696** (3.82%)	141,843 (3.55%)	00:01:05	9,794 (0.66%)	63.00%	17.62%	$0.00 (0.00%)
6. nps.gov/acad/planyourvisit/hiking.htm	**194,936** (3.80%)	124,344 (3.11%)	00:00:59	26,172 (1.75%)	37.25%	18.65%	$0.00 (0.00%)
7. nps.gov/customcf/webcam/dsp_webcam_image.cfm?webcam=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be0b884a9df3cf999896d515dc94&thumbnail=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be0b884a9df3cf999896d515dc94&refreshrate=30&title=6e938699ecb68a7e58c228869f0db86d55&width=1024&height=576&parkid=glac&alttext=779f9595a9de80791cc73582cd15bc6848d2a6638fbdc5aa92ef229bab0cc961d7fada8b8c9a890bc98104458f90d7ac8249ad137010cd859a43bd&description=6a9a9d81ec898e6c1cc73582cd1fb46d5586e9619eaccfaf9aef0493bc10c95ddafacadabe979a1cc5960545a89f83928854b85f172ccd949806a09abf71af998349d7b88eb0818fb29dd2a380d98e8d179998bcd49da7958afaa9a27785a8934711bf7cfc9e87d283aa0a4dd4ab98ed87b0ba961691af93a2aa3dfb0ba25898879d8051175c87b8ef2fbc9c095f5f4750886dffb39eec86beafa2a6fe88b988cd4757fc68c78354a48edd6fa04eee0d9faaadef861f598a955bf9c7bf4197572644a42390dd3b65a2d9598669c546f19a88efe81b9413978b128cf3b98f5fea823fbff99bbcc753a70498748b87978318cf1ed8848f9b8cb24aaffc85a59650721ec6bc28a1925083bf818da1fa54849e1294cf88ae0d8f89d19eea8eb79aa5b0a3d797559d5b9498f3ab921a9ac6c75ea18307004a12fe8b7ebae97282128fd3a71b91abdd935a131494918a50975edbe6de9b8e88068add185bcf5c19bd529293c690ef99b6d8c9	**183,808** (3.59%)	171,477 (4.29%)	00:00:41	2,636 (0.18%)	48.10%	20.32%	$0.00 (0.00%)
8. nps.gov/acad/planyourvisit/fees.htm	**168,184** (3.28%)	134,832 (3.37%)	00:03:03	53,712 (3.60%)	49.92%	46.39%	$0.00 (0.00%)
9. nps.gov/acad/planyourvisit/conditions.htm	**156,163** (3.05%)	108,482 (2.71%)	00:00:48	12,841 (0.86%)	46.29%	18.27%	$0.00 (0.00%)
nps.gov/customcf/webcam/dsp_webcam_image.cfm?webcam=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be0b884a9df3cf999896d515dc94&thumbnail=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be0b884a9df3cf999896d515dc94&refreshrate=30&title=6e938699ecb68a7e58c228869f0db86d55&width=1024&height=576&parkid=glac&alttext=779f9595a9de80791cc73582cd15bc6848d2a6638fbdc5aa92ef229bab0cc961d7fada8b8c9a890bc98104458f90d7ac8249ad137010cd859a43bd&description=6a9a9d81ec898e6c1cc73582cd1fb46d5586e9619eaccfaf9aef0493bc10c							

10.	95ddafacadabe979a1cc5960545a89f83928854b85f172ccd949806a09abf71af998349d7b88eb0818fb29dd2a380d98e8d179998bcd49da7958afaa9a27785a8934711bf7cfc9e87d283aa0a4dd4ab98ed87b0ba961691af93a2aa3dfb0ba25898879d8051175c87b8ef2fbc9c095f5f4750886dffb39eec86beafa2a6fe88b988cd4757fc68c78354a48edd6fa04eee0d9faaadef861f598a955bf9c7bf4197572644a42390dd3b62a5904cc76f8c5ffcd394a9bb179c1f80d94b94e3b98a57fb8f6becef9bb7c741a74b8e399a91919a0cc35cce8e94998ca015fcb395e9964a6d1291b234ba824cc7ec9c93a3fe4798db0e869696a101c68696c8f68dfe88f9	**145,731** (2.84%)	134,122 (3.35%)	00:00:31	3,022 (0.20%)	47.25%	12.32%	$0.00 (0.00%)
11.	nps.gov/acad/planyourvisit/calendar.htm	**129,724** (2.53%)	95,174 (2.38%)	00:00:48	10,987 (0.74%)	34.16%	13.76%	$0.00 (0.00%)
12.	nps.gov/acad/planyourvisit/things2do.htm	**99,872** (1.95%)	81,205 (2.03%)	00:01:45	22,320 (1.50%)	58.52%	33.37%	$0.00 (0.00%)
13.	nps.gov/acad/planyourvisit/permits.htm	**77,849** (1.52%)	57,313 (1.43%)	00:00:56	3,181 (0.21%)	51.60%	15.17%	$0.00 (0.00%)
14.	nps.gov/acad/planyourvisit/hours.htm	**77,128** (1.50%)	65,224 (1.63%)	00:01:47	20,210 (1.35%)	61.79%	36.36%	$0.00 (0.00%)
15.	nps.gov/acad/private-campgrounds.htm	**69,662** (1.36%)	39,751 (0.99%)	00:03:20	7,888 (0.53%)	26.01%	32.75%	$0.00 (0.00%)
16.	nps.gov/acad/planyourvisit/eatingsleeping.htm	**69,255** (1.35%)	56,294 (1.41%)	00:00:29	2,723 (0.18%)	54.37%	12.45%	$0.00 (0.00%)
17.	nps.gov/acad/planyourvisit/weather.htm	**62,920** (1.23%)	56,411 (1.41%)	00:01:56	38,813 (2.60%)	89.00%	67.64%	$0.00 (0.00%)
18.	nps.gov/customcf/webcam/dsp_webcam_image.cfm?webcam=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be159a489df2d39dc9cbca51c68310&thumbnail=56868082bfc4c0304bc42ac98309ae31419dbf399cbcdfafd8a3179bab09c659daf4ca958a968e13d89a1a00829796d48e57b854520f83919644ac9db439be908e049cc3d2b39681&refreshrate=60&title=689b879bb8919d3f7fd63393880b&width=1280&height=720&parkid=grsa&alttext=689b9185ec989d7051930b8e9e10a97054d28a7395bac9bc&description=689b9185ec989d7051930b8e9e10a97054d28a7395bac9bcd7bc1a95ae0e874e9ebbd8889696db0bc3834d59848cd7d4d90bf0137410c990964aae92bd348d99860cdbd7cdeacad2edc899efd1cdd7c10f83d0ef959cadd9beb5bba36acb87d6411fed7ab59ed7c1dbfd400ed3fedeaddee9a99a1fcfa895f6e071e94eed7d9081879b1f454282acaa69bc8f475f0609579b70bab68ef090b9fde3ebedceecb188575ef373c7b44ea898967bac4fb91195b9fee0d90b1ccba453e893b6408c542657ed1985967e45e1d96f88758157eb9c88aebb3e9010978a1edbf7f7831ecc8e71b5f390f2b75ba7418a	**59,053** (1.15%)	46,485 (1.16%)	00:01:16	4,626 (0.31%)	76.91%	31.78%	$0.00 (0.00%)
19.	nps.gov/acad/learn/photosmultimedia/photogallery.htm	**57,080** (1.11%)	34,084 (0.85%)	00:00:37	4,421 (0.30%)	38.76%	14.81%	$0.00 (0.00%)
20.	nps.gov/acad/planyourvisit/placestogo.htm	**53,066** (1.04%)	45,203 (1.13%)	00:01:58	11,118 (0.75%)	72.23%	35.04%	$0.00 (0.00%)
21.	nps.gov/acad/moderate-trails.htm	**50,637** (0.99%)	42,634 (1.07%)	00:01:46	3,943 (0.26%)	69.53%	28.01%	$0.00 (0.00%)
22.	nps.gov/acad/faqs.htm	**43,905** (0.86%)	38,232 (0.96%)	00:03:07	22,422 (1.50%)	71.63%	55.40%	$0.00 (0.00%)
23.	nps.gov/acad/planyourvisit/directions.htm	**43,742** (0.85%)	34,893 (0.87%)	00:01:40	8,363 (0.56%)	55.94%	32.50%	$0.00 (0.00%)
24.	nps.gov/acad/planyourvisit/pets.htm	**42,208** (0.82%)	37,796 (0.95%)	00:02:42	10,056 (0.67%)	70.86%	39.66%	$0.00 (0.00%)
25.	nps.gov/acad/planyourvisit/duckharbor.htm	**39,574** (0.77%)	34,176 (0.85%)	00:01:59	7,912 (0.53%)	55.65%	33.52%	$0.00 (0.00%)
26.	nps.gov/acad/isle-au-haut.htm	**38,024** (0.74%)	33,329 (0.83%)	00:02:45	7,028 (0.47%)	47.40%	33.19%	$0.00 (0.00%)
27.	nps.gov/acad/learn/index.htm	**37,127** (0.72%)	26,641 (0.67%)	00:00:36	1,248 (0.08%)	40.58%	9.98%	$0.00 (0.00%)
28.	nps.gov/acad/planyourvisit/nearbyattractions.htm	**35,440** (0.69%)	30,164 (0.75%)	00:01:59	1,669 (0.11%)	67.04%	41.39%	$0.00 (0.00%)
29.	nps.gov/acad/strenuous-trails.htm	**34,986** (0.68%)	30,535 (0.76%)	00:02:11	3,511 (0.24%)	73.39%	34.57%	$0.00 (0.00%)
30.	nps.gov/acad/planyourvisit/guidedtours.htm	**34,338** (0.67%)	25,424 (0.64%)	00:02:19	8,275 (0.55%)	40.57%	33.30%	$0.00 (0.00%)
31.	nps.gov/acad/easy-trails.htm	**33,124** (0.65%)	28,814 (0.72%)	00:01:29	2,925 (0.20%)	69.96%	25.02%	$0.00 (0.00%)
32.	nps.gov/acad/planyourvisit/temporaryclosures.htm	**32,951** (0.64%)	26,441 (0.66%)	00:01:03	5,244 (0.35%)	50.46%	21.62%	$0.00 (0.00%)
33.	nps.gov/acad/planyourvisit/schoodic.htm	**32,181** (0.63%)	27,169 (0.68%)	00:01:58	11,506 (0.77%)	56.97%	35.33%	$0.00 (0.00%)
34.	nps.gov/acad/planyourvisit/winteractivities.htm	**31,423** (0.61%)	25,677 (0.64%)	00:02:18	11,165 (0.75%)	61.46%	45.37%	$0.00 (0.00%)
35.	nps.gov/search/?affiliate=nps&sitelimit=nps.gov/acad	**31,300** (0.61%)	24,159 (0.60%)	00:00:33	724 (0.05%)	39.11%	10.68%	$0.00 (0.00%)
36.	nps.gov/acad/planyourvisit/bicycling.htm	**28,948** (0.56%)	22,852 (0.57%)	00:02:20	11,364 (0.76%)	42.62%	43.03%	$0.00 (0.00%)

37.	nps.gov/acad/learn/nature/animals.htm	**27,584** (0.54%)	19,695 (0.49%)	00:01:34	6,899 (0.46%)	37.99%	21.60%	$0.00 (0.00%)
38.	nps.gov/acad/planyourvisit/outdooractivities.htm	**26,215** (0.51%)	16,851 (0.42%)	00:00:43	2,578 (0.17%)	42.48%	11.90%	$0.00 (0.00%)
39.	nps.gov/acad/planyourvisit/wheretoeat.htm	**24,474** (0.48%)	20,788 (0.52%)	00:01:40	2,808 (0.19%)	48.80%	32.21%	$0.00 (0.00%)
40.	nps.gov/acad/planyourvisit/leafpeeping.htm	**24,440** (0.48%)	19,885 (0.50%)	00:01:48	12,476 (0.84%)	34.23%	49.73%	$0.00 (0.00%)
41.	nps.gov/acad/planyourvisit/driving.htm	**23,355** (0.46%)	18,551 (0.46%)	00:01:25	9,139 (0.61%)	45.25%	31.09%	$0.00 (0.00%)
42.	nps.gov/acad/planyourvisit/gettingaround.htm	**21,187** (0.41%)	17,052 (0.43%)	00:01:42	2,060 (0.14%)	42.07%	26.05%	$0.00 (0.00%)
43.	nps.gov/acad/learn/nature/species-list.htm	**18,895** (0.37%)	15,452 (0.39%)	00:02:49	1,588 (0.11%)	72.10%	40.74%	$0.00 (0.00%)
44.	nps.gov/acad/learn/photosmultimedia/index.htm	**17,788** (0.35%)	14,405 (0.36%)	00:00:44	1,898 (0.13%)	65.89%	20.64%	$0.00 (0.00%)
45.	nps.gov/acad/very-easy-trails.htm	**16,221** (0.32%)	14,691 (0.37%)	00:00:57	814 (0.05%)	59.51%	15.45%	$0.00 (0.00%)
46.	nps.gov/acad/planyourvisit/tidepooling.htm	**15,861** (0.31%)	13,528 (0.34%)	00:02:02	5,824 (0.39%)	58.66%	39.85%	$0.00 (0.00%)
47.	nps.gov/acad/learn/photosmultimedia/webcams.htm	**15,703** (0.31%)	10,995 (0.27%)	00:01:25	7,260 (0.49%)	16.79%	47.07%	$0.00 (0.00%)
48.	nps.gov/acad/planyourvisit/birdwatching.htm	**14,854** (0.29%)	11,891 (0.30%)	00:01:02	2,794 (0.19%)	36.36%	19.78%	$0.00 (0.00%)
49.	nps.gov/acad/planyourvisit/justforkids.htm	**14,344** (0.28%)	12,405 (0.31%)	00:01:23	1,791 (0.12%)	47.39%	23.28%	$0.00 (0.00%)
50.	nps.gov/acad/planyourvisit/groupcamping.htm	**13,103** (0.26%)	11,141 (0.28%)	00:01:53	694 (0.05%)	44.00%	30.08%	$0.00 (0.00%)
51.	nps.gov/jela/new-acadian-cultural-center.htm	**12,712** (0.25%)	9,549 (0.24%)	00:01:49	6,839 (0.46%)	50.20%	43.10%	$0.00 (0.00%)
52.	nps.gov/acad/planyourvisit/fishing.htm	**12,574** (0.25%)	10,626 (0.27%)	00:03:13	6,198 (0.42%)	67.86%	57.58%	$0.00 (0.00%)
53.	nps.gov/acad/learn/news/newsreleases.htm	**12,131** (0.24%)	10,663 (0.27%)	00:01:14	1,653 (0.11%)	53.24%	26.81%	$0.00 (0.00%)
54.	nps.gov/acad/contacts.htm	**11,499** (0.22%)	10,051 (0.25%)	00:01:32	3,227 (0.22%)	54.63%	35.32%	$0.00 (0.00%)
55.	nps.gov/acad/planyourvisit/horsebackriding.htm	**11,287** (0.22%)	7,921 (0.20%)	00:01:22	2,337 (0.16%)	64.29%	30.32%	$0.00 (0.00%)
56.	nps.gov/acad/learn/nature/naturalfeaturesandecosystems.htm	**11,196** (0.22%)	8,820 (0.22%)	00:04:11	3,101 (0.21%)	55.13%	36.96%	$0.00 (0.00%)
57.	nps.gov/acad/learn/photosmultimedia/virtualtour.htm	**11,021** (0.21%)	7,826 (0.20%)	00:01:50	857 (0.06%)	55.52%	24.13%	$0.00 (0.00%)
58.	nps.gov/acad/learn/historyculture/index.htm	**10,844** (0.21%)	8,177 (0.20%)	00:00:56	758 (0.05%)	42.86%	14.15%	$0.00 (0.00%)
59.	nps.gov/acad/rangerprotips.htm	**10,588** (0.21%)	9,229 (0.23%)	00:04:58	703 (0.05%)	37.63%	22.51%	$0.00 (0.00%)
60.	nps.gov/acad/planyourvisit/swimming.htm	**10,573** (0.21%)	9,440 (0.24%)	00:01:36	3,827 (0.26%)	69.25%	42.46%	$0.00 (0.00%)
61.	nps.gov/acad/planyourvisit/publications.htm	**10,306** (0.20%)	6,518 (0.16%)	00:01:14	1,347 (0.09%)	36.83%	17.53%	$0.00 (0.00%)
62.	nps.gov/acad/planyourvisit/goodsandservices.htm	**10,192** (0.20%)	9,009 (0.23%)	00:00:53	372 (0.02%)	62.23%	14.26%	$0.00 (0.00%)
63.	nps.gov/acad/planyourvisit/boating.htm	**9,732** (0.19%)	8,792 (0.22%)	00:01:43	1,035 (0.07%)	68.90%	27.61%	$0.00 (0.00%)
64.	nps.gov/acad/learn/historyculture/history-of-acadia.htm	**9,703** (0.19%)	8,279 (0.21%)	00:05:23	3,022 (0.20%)	62.38%	45.70%	$0.00 (0.00%)
65.	nps.gov/acad/learn/management/work-with-us.htm	**9,152** (0.18%)	7,285 (0.18%)	00:03:16	4,044 (0.27%)	34.90%	56.91%	$0.00 (0.00%)
66.	nps.gov/jela/wetlands-acadian-cultural-center.htm	**8,650** (0.17%)	6,497 (0.16%)	00:01:21	2,633 (0.18%)	46.46%	29.46%	$0.00 (0.00%)
67.	nps.gov/acad/learn/nature/index.htm	**8,497** (0.17%)	6,106 (0.15%)	00:00:41	376 (0.03%)	50.80%	9.33%	$0.00 (0.00%)
68.	nps.gov/acad/learn/bookstore.htm	**8,356** (0.16%)	7,109 (0.18%)	00:01:48	1,161 (0.08%)	53.27%	38.08%	$0.00 (0.00%)
69.	nps.gov/acad/planyourvisit/safety.htm	**8,176** (0.16%)	7,332 (0.18%)	00:02:20	1,949 (0.13%)	69.69%	34.82%	$0.00 (0.00%)
70.	nps.gov/acad/learn/management/lawsandpolicies.htm	**7,807** (0.15%)	6,516 (0.16%)	00:02:31	3,427 (0.23%)	52.67%	46.65%	$0.00 (0.00%)

71.	nps.gov/acad/learn/nature/plants.htm	**7,805** (0.15%)	6,372 (0.16%)	00:04:20	3,134 (0.21%)	62.14%	43.25%	$0.00 (0.00%)
72.	nps.gov/zion/planyourvisit/academic-fee-waviers.htm	**7,017** (0.14%)	6,279 (0.16%)	00:01:05	396 (0.03%)	35.59%	11.64%	$0.00 (0.00%)
73.	nps.gov/acad/learn/management/cadillac.htm	**6,954** (0.14%)	6,149 (0.15%)	00:02:13	4,646 (0.31%)	59.18%	55.29%	$0.00 (0.00%)
74.	nps.gov/acad/learn/management/statistics.htm	**6,857** (0.13%)	5,084 (0.13%)	00:02:25	2,533 (0.17%)	40.36%	33.13%	$0.00 (0.00%)
75.	nps.gov/acad/planyourvisit/climbing.htm	**6,127** (0.12%)	5,414 (0.14%)	00:01:29	1,023 (0.07%)	64.74%	25.09%	$0.00 (0.00%)
76.	nps.gov/acad/learn/management/isle-au-haut.htm	**5,904** (0.12%)	5,108 (0.13%)	00:01:48	4,238 (0.28%)	53.11%	50.98%	$0.00 (0.00%)
77.	nps.gov/acad/learn/kidsyouth/index.htm	**5,573** (0.11%)	4,164 (0.10%)	00:01:36	1,522 (0.10%)	40.09%	29.07%	$0.00 (0.00%)
78.	nps.gov/acad/learn/historyculture/fireof1947.htm	**5,550** (0.11%)	5,109 (0.13%)	00:05:17	3,923 (0.26%)	89.67%	74.25%	$0.00 (0.00%)
79.	nps.gov/acad/permits-cua-and-sup.htm	**5,409** (0.11%)	4,911 (0.12%)	00:01:01	515 (0.03%)	37.66%	18.45%	$0.00 (0.00%)
80.	nps.gov/acad/learn/nature/environmentalfactors.htm	**5,369** (0.10%)	4,098 (0.10%)	00:03:39	1,659 (0.11%)	49.40%	34.98%	$0.00 (0.00%)
81.	nps.gov/jela/prairie-acadian-cultural-center-eunice.htm	**5,310** (0.10%)	4,111 (0.10%)	00:01:50	1,913 (0.13%)	47.98%	37.18%	$0.00 (0.00%)
82.	nps.gov/acad/planyourvisit/accessibility.htm	**5,194** (0.10%)	4,419 (0.11%)	00:01:00	819 (0.05%)	27.75%	18.16%	$0.00 (0.00%)
83.	nps.gov/acad/getinvolved/artist-in-residence.htm	**5,153** (0.10%)	4,449 (0.11%)	00:04:07	2,277 (0.15%)	61.20%	58.96%	$0.00 (0.00%)
84.	nps.gov/common/utilities/sendmail/sendemail.cfm?o=4a86dabf94d290b59abd1cbdf416bfa4499366814ca5c2985009&r=/acad/contacts.htm	**5,102** (0.10%)	2,596 (0.06%)	00:02:54	67 (0.00%)	28.36%	29.36%	$0.00 (0.00%)
85.	nps.gov/acad/getinvolved/supportyourpark/artist-in-residence.htm	**5,062** (0.10%)	4,486 (0.11%)	00:02:27	1,433 (0.10%)	46.12%	40.73%	$0.00 (0.00%)
86.	nps.gov/acad/planyourvisit/weddings.htm	**4,930** (0.10%)	4,569 (0.11%)	00:03:24	3,098 (0.21%)	80.85%	68.88%	$0.00 (0.00%)
87.	nps.gov/acad/planyourvisit/feewaivers.htm	**4,879** (0.10%)	4,306 (0.11%)	00:00:54	311 (0.02%)	44.98%	15.27%	$0.00 (0.00%)
88.	nps.gov/acad/learn/historyculture/people.htm	**4,282** (0.08%)	3,216 (0.08%)	00:01:46	232 (0.02%)	48.71%	17.35%	$0.00 (0.00%)
89.	nps.gov/acad/planyourvisit/park-rules-and-regulations.htm	**4,243** (0.08%)	3,598 (0.09%)	00:01:54	217 (0.01%)	61.95%	20.13%	$0.00 (0.00%)
90.	home.nps.gov/acad/index.htm	**4,106** (0.08%)	3,267 (0.08%)	00:02:04	2,674 (0.18%)	39.73%	37.97%	$0.00 (0.00%)
91.	nps.gov/articles/written-in-acadias-rocks.htm	**4,045** (0.08%)	3,542 (0.09%)	00:05:46	2,290 (0.15%)	8.42%	64.03%	$0.00 (0.00%)
92.	nps.gov/customcf/webcam/dsp_webcam_image.cfm?webcam=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be0b884a9df3cf999896d515dc94&thumbnail=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be0b884a9df3cf999896d515dc94&refreshrate=30&title=6e938699ecb68a7e58c228869f0db86d55&width=1024&height=576&parkid=glac&alttext=779f9595a9de80791cc73582cd15bc6848d2a6638fbdc5aa92ef229bab0cc961d7fada8b8c9a890bc98104458f90d7ac8249ad137010cd859a43bd&description=6a9a9d81ec898e6c1cc73582cd1fb46d5586e9619eaccfaf9aef0493bc10c95ddafacadabe979a1cc5960545a89f83928854b85f172ccd949806a09abf71af998349d7b88eb0818fb29dd2a380d98e8d179998bcd49da7958afaa9a27785a8934711bf7cfc9e87d283aa0a4dd4ab98ed87b0ba961691af93a2aa3dfb0ba25898879d8051175c87b8ef2fbc9c095f5f4750886dffb39eec86beafa2a6fe88b988cd4757fc68c78354a48edd6fa04eee0d9faaadef861f598a955bf9c7bf4197572644a42390dd3b62a5904cc76f8c5ffcd394a9bb179c1f80d94b94e3b98a57fb8f6becef9bb7c756ac418b399d9c90891a9d15d382dd9d8cbc4cb2b8c799984d7412aebe3baa964b86ed8699a6e00697951ac78a92bf0a899ed3dbecdef68ff7aba692861c9c518b93b2be9511d48d881fbb8807074701bb9679b0a0758259dd	**4,007** (0.08%)	3,775 (0.09%)	00:00:35	664 (0.04%)	76.17%	23.36%	$0.00 (0.00%)
93.	nps.gov/acad/siteindex.htm	**3,854** (0.08%)	2,482 (0.06%)	00:00:42	92 (0.01%)	52.75%	8.61%	$0.00 (0.00%)
94.	nps.gov/acad/planyourvisit/kayaking.htm	**3,791** (0.07%)	3,233 (0.08%)	00:02:27	2,510 (0.17%)	58.88%	55.61%	$0.00 (0.00%)
95.	nps.gov/customcf/webcam/dsp_webcam_image.cfm?webcam=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7be159a489df2d39dc9cbca51c68310&thumbnail=56868082bfc4c0304bc42ac98309ae31419dbf399cbcdfafd8a3179bab09c659daf4ca958a968e13d89a1a00829796d48e57b854520f83919644ac9db44be8d1d552dac6cdf4928ebed2d4bf9e&refreshrate=60&title=689b879bb8919d3f7fd63393880b&width=1280&height=720&parkid=grsa&alttext=689b9185ec989d7051930b8e9e10a97054d28a7395bac9bc&description=689b9185ec989d7051930b8e9e10a97054d28a7395bac9bcd7bc1a95ae0e874e9ebbd8889696db0bc3834d59848cd7d4d90bf0137410c990964aae92bd348d99860cdbd7cdeacad2edc899efd1cdd7c10f83d0ef959cadd9beb5bba36acb87d6411fed7ab59ed7c1dbfd400ed3fedeaddee9a99a1fcfa895f6e071e94eed7d9081879b1f454282acaa69bc8f475f0609579b70bab68ef090b9fde3ebedceec	**3,706** (0.07%)	3,141 (0.08%)	00:05:24	2,544 (0.17%)	70.35%	66.73%	$0.00 (0.00%)

	b188575ef373c7b44ea898967bac4fb91195b9fee0d90b1ccba453e893b6408c542657ed1985967e45e1d96f88758157eb9c88aebb3e9010978a1edbf7f7831ecc8e71b5f390f2b75ba7418a							
96.	nps.gov/customcf/webcam/dsp_webcam_image.cfm?webcam=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7ab0884469dfad28a90959e20da9a040c929185a4845fb747520e828c8341&thumbnail=56868082bfc4c0304bc42ac98309ae31419dbf398cabcead96a201d7ab0884469dfad28a90959e20da9a040c929185a4845fb747520e828c8341&refreshrate=500&title=7f9e849ba29bcf4955c03493820bfd5c439cbd7389ee&width=1024&height=768&parkid=romo&alttext=7f9e849ba29bcf4955c03493820bfd5c439cbd7389&description=6a9a91d28d929f7652d67db1840ab46b4980e9559ea0d8ab85ef2593b7138c5b92ccdb989a9a965fc5805709899d968f825ef952435c9dd7df11f6ca3b9444dc860993d78ebc9083bd90cdef98d98a96458090a193dee9949abeaaac67c7efd25d1abf7fffca838099a01657d4a89ffc99fcf5911687a282f6892eb70bed699085919d1f544a88b2a027ffc928571747749c75b3fab8a584aeafec87b186a8d0cd7e50e87293d77fa59c8d70a707b94c99affebf864d41cb885abcb3ab4f92576961a429909635169a91568b7ec546f19a88eff70f971a819a538bf3b98a5fe5c76ca4f389f29753bd479160ca8e908208c35cc98d988e9bf358aeb9c7ad8b56794695fb3eab824e82edd288bcf248d6ca4b056f66ef058991d3ccf690f0dcbaaaad9fdf53991eb284f3b69755a6838358aac7751c4e00b7d968bea0758f578a9aa316dfbed1905c5a1bc69d9351801bdeb28b8192844ac399085b8e4717f854da868396f095a7df8e5d81df13a64fcebabf895e94966b6b59a41557889caddd5799ed90ddaf16d73fba0ededaaa5f1b79189fdba56a2339e128e5bb6b9b19fe41f512a1ed984947da989bcf6dbbb85c569a149a0eb5cac87af9e9bbc0af392bad99ab45b82bced1ba3093958d78a0751ac928f5b9684bdba8d983e8efcd7bb969789c685d65d9691484c07ba89b28b8acaddb7d11f8aa71ec68996559c58b6175594a793aa62de85af1310709292f38183b9d5fd523f4b5a6f58db8f8b836dba77914595f547a49813bba193129000d3a47b9fdd6e9faba4cf4b9bf64a3e8591aa9e1287fca2d3b78dd9419c037811403f0caade9a141c5e7c9117c95e5d87da3582115dd9	**3,683** (0.07%)	3,342 (0.08%)	00:03:36	2,624 (0.18%)	80.22%	71.16%	$0.00 (0.00%)
97.	nps.gov/search/?utf8=✓&affiliate=nps&sitelimit=nps.gov/acad	**3,669** (0.07%)	2,788 (0.07%)	00:00:35	56 (0.00%)	40.35%	9.89%	$0.00 (0.00%)
98.	nps.gov/acad/learn/historyculture/stories.htm	**3,636** (0.07%)	2,463 (0.06%)	00:00:30	186 (0.01%)	33.51%	6.35%	$0.00 (0.00%)
99.	nps.gov/acad/learn/news/acadia-national-park-s-2018-annual-pass-contest.htm	**3,580** (0.07%)	3,252 (0.08%)	00:05:00	3,053 (0.20%)	88.34%	84.44%	$0.00 (0.00%)
100.	nps.gov/whsa/planyourvisit/academic-fee-waiver.htm	**3,497** (0.07%)	3,124 (0.08%)	00:00:54	116 (0.01%)	41.38%	10.52%	$0.00 (0.00%)

Rows 1 - 100 of 21674

Government-Wide Account

NPS Agency Profile (Pilot Program)

GO TO REPORT

Top Events

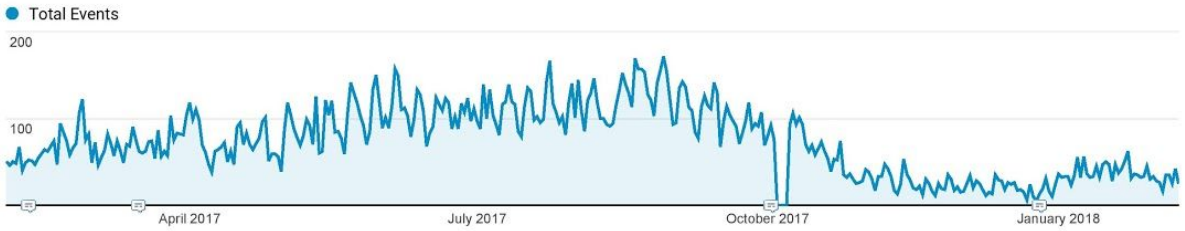
ALL » EVENT CATEGORY: Download » EVENT ACTION: pdf

Feb 2, 2017 - Feb 8, 2018

All Users
14.67% Unique Events

Explorer

Event



This data was filtered with the following filter expression: **/acad/**

Event Label	Total Events	Unique Events	Event Value	Avg. Value
	27,352 % of Total: 0.02% (118,684,887)	25,014 % of Total: 0.03% (93,112,494)	0 % of Total: 0.00% (1,849,229,794,033)	0.00 Avg for View: 15,581.00 (-100.00%)
1. https://www.nps.gov/acad/planyourvisit/upload/CRUMmap.pdf	**12,500** **(45.70%)**	11,652 (46.58%)	0 (0.00%)	0.00
2. https://www.nps.gov/acad/planyourvisit/upload/IsleAuHautCampingReservationFillable.pdf	**4,370** **(15.98%)**	4,043 (16.16%)	0 (0.00%)	0.00
3. https://www.nps.gov/acad/planyourvisit/upload/MDI_Flier_9-27-to-10-10.pdf	**739** **(2.70%)**	693 (2.77%)	0 (0.00%)	0.00
4. https://www.nps.gov/acad/planyourvisit/upload/AccessibilityGuide.pdf	**559** **(2.04%)**	505 (2.02%)	0 (0.00%)	0.00
5. https://www.nps.gov/archive/acad/pdf/firewood.pdf	**544** **(1.99%)**	499 (1.99%)	0 (0.00%)	0.00
6. http://www.nps.gov/archive/acad/pdf/firewood.pdf	**363** **(1.33%)**	335 (1.34%)	0 (0.00%)	0.00
7. https://www.nps.gov/acad/learn/management/upload/TourFeeSchedule.pdf	**361** **(1.32%)**	317 (1.27%)	0 (0.00%)	0.00
8. https://www.nps.gov/acad/upload/StoryOfGlaciers.pdf	**356** **(1.30%)**	317 (1.27%)	0 (0.00%)	0.00
9. https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-9-27-to-10-7.pdf	**326** **(1.19%)**	309 (1.24%)	0 (0.00%)	0.00
10. https://www.nps.gov/acad/learn/management/upload/2017-ACAD-Superintendent-s-Compendium-FINAL.pdf	**313** **(1.14%)**	270 (1.08%)	0 (0.00%)	0.00
11. https://www.nps.gov/acad/planyourvisit/upload/MDI_Flier_9-6-to-9-16.pdf	**303** **(1.11%)**	274 (1.10%)	0 (0.00%)	0.00
12. https://www.nps.gov/acad/planyourvisit/upload/MDI_Flier_8-30-to-9-9.pdf	**294** **(1.07%)**	241 (0.96%)	0 (0.00%)	0.00
13. https://www.nps.gov/acad/planyourvisit/upload/MD1_Flier_8-16-to-8-26.pdf	**283** **(1.03%)**	263 (1.05%)	0 (0.00%)	0.00
14. https://www.nps.gov/acad/planyourvisit/upload/AcademicFeeWaiverRequestFillable.pdf	**264** **(0.97%)**	240 (0.96%)	0 (0.00%)	0.00
15. https://www.nps.gov/acad/planyourvisit/upload/MDI_Flier_8-23-to-9-2.pdf	**216** **(0.79%)**	206 (0.82%)	0 (0.00%)	0.00
16. https://www.nps.gov/acad/supportyourpark/upload/PubCatalogWeb.pdf	**200** **(0.73%)**	185 (0.74%)	0 (0.00%)	0.00
17. https://www.nps.gov/acad/planyourvisit/upload/MDI_Flier_9-20-to-9-30.pdf	**188** **(0.69%)**	165 (0.66%)	0 (0.00%)	0.00

18.	https://www.nps.gov/acad/planyourvisit/upload/Written2005Final.pdf	**186** (0.68%)	144 (0.58%)	0 (0.00%)	0.00
19.	https://www.nps.gov/acad/learn/education/upload/edguide_animals.pdf	**155** (0.57%)	107 (0.43%)	0 (0.00%)	0.00
20.	https://www.nps.gov/acad/learn/kidsyouth/upload/Centennial-Junior-Ranger-Book.pdf	**152** (0.56%)	119 (0.48%)	0 (0.00%)	0.00
21.	https://www.nps.gov/acad/learn/management/upload/GeneralManagementPlan.pdf	**146** (0.53%)	118 (0.47%)	0 (0.00%)	0.00
22.	https://www.nps.gov/parkhistory/online_books/acad/wabanaki_peoples_vol1.pdf	**143** (0.52%)	123 (0.49%)	0 (0.00%)	0.00
23.	https://www.nps.gov/acad/learn/education/development/upload/TFprincipal-approval.pdf	**137** (0.50%)	134 (0.54%)	0 (0.00%)	0.00
24.	https://www.nps.gov/acad/learn/kidsyouth/upload/Log-Sheet.pdf	**132** (0.48%)	110 (0.44%)	0 (0.00%)	0.00
25.	https://www.nps.gov/acad/planyourvisit/upload/french.pdf	**125** (0.46%)	104 (0.42%)	0 (0.00%)	0.00
26.	https://www.nps.gov/acad/learn/management/upload/CampingRegulations.pdf	**116** (0.42%)	90 (0.36%)	0 (0.00%)	0.00
27.	https://www.nps.gov/acad/planyourvisit/upload/firebrochure.pdf	**113** (0.41%)	101 (0.40%)	0 (0.00%)	0.00
28.	https://www.nps.gov/acad/learn/management/upload/WildlandFire.pdf	**112** (0.41%)	103 (0.41%)	0 (0.00%)	0.00
29.	https://www.nps.gov/acad/planyourvisit/upload/german.pdf	**109** (0.40%)	74 (0.30%)	0 (0.00%)	0.00
30.	https://www.nps.gov/acad/learn/management/upload/ACAD_FD_2016_508-2017.pdf	**103** (0.38%)	86 (0.34%)	0 (0.00%)	0.00
31.	https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-8-30-to-9-9-2.pdf	**99** (0.36%)	89 (0.36%)	0 (0.00%)	0.00
32.	https://www.nps.gov/acad/upload/cert_form.pdf	**97** (0.35%)	91 (0.36%)	0 (0.00%)	0.00
33.	https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-9-6-to-9-16.pdf	**91** (0.33%)	86 (0.34%)	0 (0.00%)	0.00
34.	https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-8-23-to-9-2.pdf	**88** (0.32%)	79 (0.32%)	0 (0.00%)	0.00
35.	https://www.nps.gov/acad/getinvolved/upload/20160930-ACAD-RFP.pdf	**87** (0.32%)	83 (0.33%)	0 (0.00%)	0.00
36.	https://www.nps.gov/acad/learn/management/upload/2016-ACAD-Superintendent-s-Compendium-FINAL.pdf	**86** (0.31%)	74 (0.30%)	0 (0.00%)	0.00
37.	https://www.nps.gov/acad/planyourvisit/upload/MDI_Flier_9-13-to-9-23.pdf	**84** (0.31%)	73 (0.29%)	0 (0.00%)	0.00
38.	https://www.nps.gov/acad/learn/management/upload/schoodic_gmpa.pdf	**83** (0.30%)	76 (0.30%)	0 (0.00%)	0.00
39.	https://www.nps.gov/acad/learn/management/upload/FireEcology.pdf	**69** (0.25%)	61 (0.24%)	0 (0.00%)	0.00
40.	https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-9-20-to-9-30.pdf	**69** (0.25%)	68 (0.27%)	0 (0.00%)	0.00
41.	https://www.nps.gov/acad/learn/kidsyouth/upload/GS-Ranger-Certificate.pdf	**68** (0.25%)	47 (0.19%)	0 (0.00%)	0.00
42.	https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-8-16-to-8-26a.pdf	**67** (0.24%)	60 (0.24%)	0 (0.00%)	0.00
43.	https://www.nps.gov/acad/learn/education/upload/fireandice.pdf	**66** (0.24%)	54 (0.22%)	0 (0.00%)	0.00
44.	https://www.nps.gov/acad/learn/management/upload/early_legislation.pdf	**62** (0.23%)	55 (0.22%)	0 (0.00%)	0.00
45.	https://www.nps.gov/acad/learn/news/upload/BeaverLog-11x17-4page-webformat.pdf	**61** (0.22%)	54 (0.22%)	0 (0.00%)	0.00
46.	https://www.nps.gov/acad/learn/management/upload/gpra2008.pdf	**59** (0.22%)	50 (0.20%)	0 (0.00%)	0.00
47.	https://www.nps.gov/acad/getinvolved/upload/RFPfillable.pdf	**58** (0.21%)	47 (0.19%)	0 (0.00%)	0.00
48.	https://www.nps.gov/acad/planyourvisit/upload/ClimbingGroupReservationFillableForm.pdf	**55** (0.20%)	52 (0.21%)	0 (0.00%)	0.00
49.	https://www.nps.gov/acad/learn/education/classrooms/upload/Schoodic-Education-Adventure-Program-Options.pdf	**54** (0.20%)	50 (0.20%)	0 (0.00%)	0.00
50.	https://www.nps.gov/acad/learn/management/upload/schoodic_gmp_body.pdf	**54** (0.20%)	50 (0.20%)	0 (0.00%)	0.00
51.	https://www.nps.gov/acad/upload/MDI-September-October-2016-2.pdf	**47** (0.17%)	45 (0.18%)	0 (0.00%)	0.00

52.	http://www.nps.gov/acad/learn/nature/upload/ACAD_Mercury_FactSheet_2010.pdf	**46** (0.17%)	41 (0.16%)	0 (0.00%)	0.00
53.	https://www.nps.gov/parkhistory/online_books/acad/wabanaki_peoples_vol2.pdf	**46** (0.17%)	38 (0.15%)	0 (0.00%)	0.00
54.	https://www.nps.gov/acad/upload/gg_all.pdf	**44** (0.16%)	36 (0.14%)	0 (0.00%)	0.00
55.	https://www.nps.gov/acad/learn/management/upload/IAHFinalVUMP10_22_14-1.pdf	**41** (0.15%)	39 (0.16%)	0 (0.00%)	0.00
56.	https://www.nps.gov/acad/upload/Foundation-Document-Acadia-National-Park-September-2016-full.pdf	**39** (0.14%)	24 (0.10%)	0 (0.00%)	0.00
57.	https://www.nps.gov/acad/upload/Foundation-Document-Acadia-National-Park-September-2016-overview.pdf	**36** (0.13%)	30 (0.12%)	0 (0.00%)	0.00
58.	https://www.nps.gov/acad/learn/education/upload/FireIce_AgeEarth.pdf	**35** (0.13%)	31 (0.12%)	0 (0.00%)	0.00
59.	https://www.nps.gov/acad/planyourvisit/upload/AnnualTrailClosures.pdf	**34** (0.12%)	30 (0.12%)	0 (0.00%)	0.00
60.	https://www.nps.gov/acad/learn/management/upload/WildlandFireFuelBreakProgram.pdf	**33** (0.12%)	29 (0.12%)	0 (0.00%)	0.00
61.	http://www.nps.gov/acad/parkmgmt/upload/ACAD%20Compendium%202010-2.pdf	**30** (0.11%)	24 (0.10%)	0 (0.00%)	0.00
62.	https://www.nps.gov/acad/learn/nature/upload/ACAD_Mercury_FactSheet_2010.pdf	**30** (0.11%)	27 (0.11%)	0 (0.00%)	0.00
63.	https://www.nps.gov/acad/learn/management/upload/ACAD-Concessioner-FAQ-CC-ACAD001-REVISED-FINAL-11-22-13.pdf	**29** (0.11%)	25 (0.10%)	0 (0.00%)	0.00
64.	https://www.nps.gov/acad/learn/news/upload/Beaver-Log-2010.pdf	**29** (0.11%)	28 (0.11%)	0 (0.00%)	0.00
65.	https://www.nps.gov/acad/planyourvisit/upload/Cadillac-Star-Party-News-Release.pdf	**29** (0.11%)	27 (0.11%)	0 (0.00%)	0.00
66.	https://www.nps.gov/acad/planyourvisit/upload/Winter2012.pdf	**29** (0.11%)	21 (0.08%)	0 (0.00%)	0.00
67.	https://www.nps.gov/acad/learn/education/classrooms/upload/PassamaquoddyKitMaterials.pdf	**26** (0.10%)	23 (0.09%)	0 (0.00%)	0.00
68.	https://www.nps.gov/acad/learn/education/upload/CarRd_TreeID.pdf	**26** (0.10%)	26 (0.10%)	0 (0.00%)	0.00
69.	https://www.nps.gov/acad/learn/education/upload/artifactcatalogue.pdf	**25** (0.09%)	24 (0.10%)	0 (0.00%)	0.00
70.	https://www.nps.gov/acad/planyourvisit/upload/RangerProgram-August2012-Web-2.pdf	**25** (0.09%)	22 (0.09%)	0 (0.00%)	0.00
71.	https://www.nps.gov/acad/learn/education/upload/CarRd_BridgeBuilding.pdf	**24** (0.09%)	24 (0.10%)	0 (0.00%)	0.00
72.	https://www.nps.gov/acad/learn/education/upload/FireIce_PPQuestions.pdf	**24** (0.09%)	23 (0.09%)	0 (0.00%)	0.00
73.	https://www.nps.gov/acad/learn/education/upload/Carroll-Homestead-Activities-and-Lesson-Plans.pdf	**23** (0.08%)	21 (0.08%)	0 (0.00%)	0.00
74.	https://www.nps.gov/acad/learn/education/upload/FireIce_ProtectGeology.pdf	**23** (0.08%)	19 (0.08%)	0 (0.00%)	0.00
75.	https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-8-16-to-8-26.pdf	**22** (0.08%)	22 (0.09%)	0 (0.00%)	0.00
76.	https://www.nps.gov/acad/learn/management/upload/gpra2007.pdf	**21** (0.08%)	21 (0.08%)	0 (0.00%)	0.00
77.	https://www.nps.gov/acad/learn/management/upload/WildlandUrbanInterface.pdf	**21** (0.08%)	20 (0.08%)	0 (0.00%)	0.00
78.	https://home.nps.gov/acad/planyourvisit/upload/CRUMmap.pdf	**20** (0.07%)	16 (0.06%)	0 (0.00%)	0.00
79.	https://www.nps.gov/parkhistory/online_books/acad/guides_guide.pdf	**20** (0.07%)	16 (0.06%)	0 (0.00%)	0.00
80.	https://www.nps.gov/acad/learn/education/upload/edguide_carriage.pdf	**19** (0.07%)	16 (0.06%)	0 (0.00%)	0.00
81.	https://www.nps.gov/acad/learn/kidsyouth/upload/Boy-Scout-Form-fillable-3.pdf	**19** (0.07%)	17 (0.07%)	0 (0.00%)	0.00
82.	https://www.nps.gov/acad/learn/education/classrooms/upload/Carroll-Homestead-Lesson-Plan-2.pdf	**18** (0.07%)	18 (0.07%)	0 (0.00%)	0.00
83.	https://www.nps.gov/acad/learn/education/upload/edguide_carroll.pdf	**18** (0.07%)	18 (0.07%)	0 (0.00%)	0.00
84.	https://www.nps.gov/acad/learn/education/upload/FireIce_SquishedByGlacier.pdf	**18** (0.07%)	17 (0.07%)	0 (0.00%)	0.00
85.	https://www.nps.gov/acad/learn/education/upload/seascholarships.pdf	**18** (0.07%)	18 (0.07%)	0 (0.00%)	0.00

86.	https://www.nps.gov/acad/getinvolved/upload/20170814_BlueDuckRFP_attachment-A.pdf	**17** (0.06%)	13 (0.05%)	0 (0.00%)	0.00
87.	https://www.nps.gov/acad/learn/management/upload/MapsWildlandFireFuelBreakProgram.pdf	**17** (0.06%)	15 (0.06%)	0 (0.00%)	0.00
88.	https://www.nps.gov/acad/planyourvisit/upload/peregrine.pdf	**17** (0.06%)	14 (0.06%)	0 (0.00%)	0.00
89.	https://www.nps.gov/acad/planyourvisit/upload/Schoodic_Flier-9-13-to-9-23.pdf	**17** (0.06%)	17 (0.07%)	0 (0.00%)	0.00
90.	https://www.nps.gov/acad/getinvolved/upload/ANP-Advisory-Commission-Minutes-09122016-Final_as-accepted.pdf	**16** (0.06%)	15 (0.06%)	0 (0.00%)	0.00
91.	https://www.nps.gov/acad/learn/nature/upload/ResearchPermitCatalogingInstructions.pdf	**16** (0.06%)	13 (0.05%)	0 (0.00%)	0.00
92.	https://www.nps.gov/acad/learn/education/upload/FireIce_MagmaToSand.pdf	**15** (0.05%)	14 (0.06%)	0 (0.00%)	0.00
93.	https://www.nps.gov/acad/getinvolved/upload/ANP-Advisory-Commission-Minutes-06012015-FINAL_as-accepted.pdf	**14** (0.05%)	12 (0.05%)	0 (0.00%)	0.00
94.	https://www.nps.gov/acad/learn/education/upload/CarRd_RolePlaying.pdf	**14** (0.05%)	14 (0.06%)	0 (0.00%)	0.00
95.	https://www.nps.gov/acad/planyourvisit/upload/ACADmap2005.pdf	**14** (0.05%)	13 (0.05%)	0 (0.00%)	0.00
96.	https://home.nps.gov/acad/planyourvisit/upload/MDI_Flier_9-27-to-10-10.pdf	**13** (0.05%)	13 (0.05%)	0 (0.00%)	0.00
97.	https://www.nps.gov/acad/learn/management/upload/ANP-Advisory-Commission-Minutes-02062017-Final-as-Accepted.pdf	**13** (0.05%)	13 (0.05%)	0 (0.00%)	0.00
98.	https://www.nps.gov/acad/learn/nature/upload/ResearchPermitACADConditions.pdf	**13** (0.05%)	12 (0.05%)	0 (0.00%)	0.00
99.	https://www.nps.gov/acad/learn/news/upload/June09BLog_Web.pdf	**13** (0.05%)	12 (0.05%)	0 (0.00%)	0.00
100.	https://www.nps.gov/acad/learn/news/upload/SepOct09Final.pdf	**13** (0.05%)	13 (0.05%)	0 (0.00%)	0.00
101.	https://www.nps.gov/acad/planyourvisit/upload/RangerProgram-May2012-final.pdf	**13** (0.05%)	13 (0.05%)	0 (0.00%)	0.00
102.	https://www.nps.gov/acad/upload/The-Rise-and-Fall-of-Cod-MDI-N-SpringuelLayout.pdf	**13** (0.05%)	11 (0.04%)	0 (0.00%)	0.00
103.	https://www.nps.gov/acad/getinvolved/upload/ANP-Advisory-Commission-Minutes-02012016-FINAL_as-accepted_.pdf	**12** (0.04%)	11 (0.04%)	0 (0.00%)	0.00
104.	https://www.nps.gov/acad/learn/management/upload/February-2014-Minutes.pdf	**12** (0.04%)	12 (0.05%)	0 (0.00%)	0.00
105.	https://www.nps.gov/acad/planyourvisit/upload/iahinfo.pdf	**12** (0.04%)	12 (0.05%)	0 (0.00%)	0.00
106.	https://www.nps.gov/acad/planyourvisit/upload/RangerProgram-June2012-web-2-2.pdf	**12** (0.04%)	12 (0.05%)	0 (0.00%)	0.00
107.	https://www.nps.gov/acad/learn/education/upload/Spring2010%20Pawpress.pdf	**11** (0.04%)	11 (0.04%)	0 (0.00%)	0.00
108.	https://www.nps.gov/acad/learn/historyculture/upload/CharlesWEliot.pdf	**11** (0.04%)	7 (0.03%)	0 (0.00%)	0.00
109.	https://www.nps.gov/acad/learn/historyculture/upload/WaldronBates.pdf	**11** (0.04%)	11 (0.04%)	0 (0.00%)	0.00
110.	https://www.nps.gov/acad/learn/management/upload/gpra1998.pdf	**11** (0.04%)	10 (0.04%)	0 (0.00%)	0.00
111.	https://www.nps.gov/acad/upload/bio-Sieur-de-la-Mothe-Cadillac.pdf	**11** (0.04%)	11 (0.04%)	0 (0.00%)	0.00
112.	https://www.nps.gov/acad/learn/education/upload/background3.pdf	**10** (0.04%)	10 (0.04%)	0 (0.00%)	0.00
113.	https://www.nps.gov/acad/learn/management/upload/Isle%20au%20Haut.pdf	**10** (0.04%)	10 (0.04%)	0 (0.00%)	0.00
114.	https://www.nps.gov/acad/learn/management/upload/schoodic_gmp_letters2.pdf	**10** (0.04%)	10 (0.04%)	0 (0.00%)	0.00
115.	https://www.nps.gov/acad/learn/nature/upload/resconditions.pdf	**10** (0.04%)	8 (0.03%)	0 (0.00%)	0.00
116.	https://www.nps.gov/acad/learn/education/upload/background5.pdf	**9** (0.03%)	6 (0.02%)	0 (0.00%)	0.00
117.	https://www.nps.gov/acad/learn/education/upload/Civilian-Conservation-Corps-and-Acadia-National-Park.pdf	**9** (0.03%)	7 (0.03%)	0 (0.00%)	0.00
118.	https://www.nps.gov/acad/learn/education/upload/edguide_island.pdf	**9** (0.03%)	7 (0.03%)	0 (0.00%)	0.00
119.	https://www.nps.gov/acad/learn/education/upload/Hudson-RiverArt-School-in-Maine.pdf	**9** (0.03%)	8 (0.03%)	0 (0.00%)	0.00

Appendix C: Glacier National Park Website Analytics

Government-Wide Account
NPS Agency Profile (Pi... 360

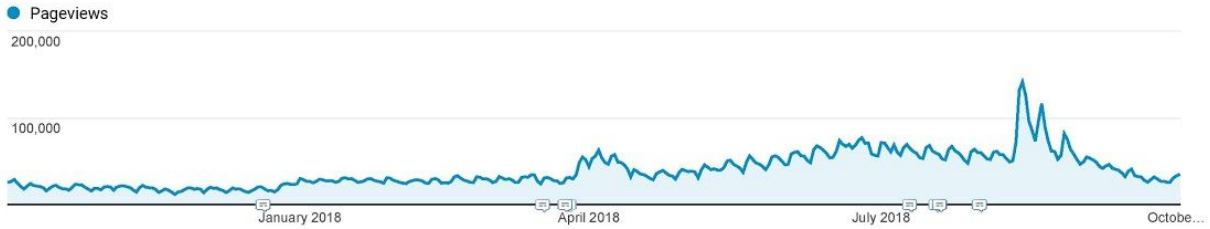
GO TO REPORT

Pages

All Users
100.00% Pageviews

Oct 2, 2017 - Oct 2, 2018

Explorer



This data was filtered with the following filter expression: **/glac/**

Page	Pageviews	Unique Pageviews	Avg. Time on Page	Entrances	Bounce Rate	% Exit	Page Value
	14,137,917 % of Total: 2.86% (494,687,597)	**10,835,940** % of Total: 2.83% (382,911,813)	**00:01:29** Avg for View: 00:01:38 (-9.02%)	**5,079,508** % of Total: 3.14% (161,774,794)	**33.00%** Avg for View: 47.12% (-29.96%)	**27.52%** Avg for View: 32.70% (-15.84%)	**$0.00** % of Total: 0.00% ($0.00)
1. nps.gov/glac/learn/photosmultimedia/webcams.htm	**2,763,668** (19.55%)	2,348,605 (21.67%)	00:00:56	1,729,865 (34.06%)	25.99%	24.33%	$0.00 (0.00%)
2. nps.gov/glac/index.htm	**2,135,539** (15.11%)	1,639,953 (15.13%)	00:00:57	1,380,399 (27.18%)	28.07%	26.80%	$0.00 (0.00%)
3. nps.gov/glac/planyourvisit/conditions.htm	**1,051,932** (7.44%)	785,331 (7.25%)	00:01:35	203,067 (4.00%)	42.03%	30.91%	$0.00 (0.00%)
4. nps.gov/glac/planyourvisit/index.htm	**662,755** (4.69%)	462,804 (4.27%)	00:00:32	139,553 (2.75%)	17.02%	9.79%	$0.00 (0.00%)
5. nps.gov/glac/planyourvisit/maps.htm	**520,917** (3.68%)	360,360 (3.33%)	00:01:58	95,527 (1.88%)	56.75%	32.71%	$0.00 (0.00%)
6. nps.gov/glac/planyourvisit/camping.htm	**469,833** (3.32%)	286,612 (2.65%)	00:04:08	140,303 (2.76%)	26.02%	41.04%	$0.00 (0.00%)
7. nps.gov/glac/planyourvisit/basicinfo.htm	**415,633** (2.94%)	309,942 (2.86%)	00:01:05	25,900 (0.51%)	54.42%	15.94%	$0.00 (0.00%)
8. nps.gov/glac/planyourvisit/eatingsleeping.htm	**389,547** (2.76%)	296,375 (2.74%)	00:02:37	31,477 (0.62%)	42.10%	35.22%	$0.00 (0.00%)
9. nps.gov/glac/planyourvisit/goingtothesunroad.htm	**282,992** (2.00%)	202,196 (1.87%)	00:00:56	121,822 (2.40%)	29.26%	26.23%	$0.00 (0.00%)
10. nps.gov/glac/planyourvisit/things2do.htm	**244,438** (1.73%)	172,103 (1.59%)	00:00:44	25,157 (0.50%)	35.10%	10.77%	$0.00 (0.00%)
11. nps.gov/glac/learn/nature/fire-information.htm	**233,549** (1.65%)	162,862 (1.50%)	00:01:45	94,034 (1.85%)	28.22%	38.92%	$0.00 (0.00%)
12. nps.gov/glac/planyourvisit/gtsrinfo.htm	**220,200** (1.56%)	172,888 (1.60%)	00:02:31	64,646 (1.27%)	43.14%	41.45%	$0.00 (0.00%)
13. nps.gov/glac/planyourvisit/hikingthetrails.htm	**214,941** (1.52%)	123,787 (1.14%)	00:01:13	40,004 (0.79%)	28.77%	17.27%	$0.00 (0.00%)
14. nps.gov/glac/planyourvisit/trailstatusreports.htm	**204,216** (1.44%)	111,766 (1.03%)	00:02:27	39,542 (0.78%)	22.58%	32.24%	$0.00 (0.00%)
15. nps.gov/glac/planyourvisit/permitsandreservations.htm	**161,269** (1.14%)	119,610 (1.10%)	00:02:07	24,481 (0.48%)	28.03%	27.94%	$0.00 (0.00%)
16. nps.gov/glac/learn/news/newsreleases.htm	**158,599** (1.12%)	120,025 (1.11%)	00:00:43	22,895 (0.45%)	34.65%	18.54%	$0.00 (0.00%)
17. nps.gov/glac/planyourvisit/backcountry.htm	**139,146** (0.98%)	98,586 (0.91%)	00:03:52	47,586 (0.94%)	40.63%	40.00%	$0.00 (0.00%)
18. nps.gov/glac/planyourvisit/calendar.htm	**134,710** (0.95%)	108,104 (1.00%)	00:00:48	6,192 (0.12%)	46.65%	13.76%	$0.00 (0.00%)
19. nps.gov/glac/planyourvisit/directions.htm	**127,913** (0.90%)	102,164 (0.94%)	00:02:07	22,828 (0.45%)	64.59%	33.01%	$0.00 (0.00%)

20. nps.gov/glac/planyourvisit/placestogo.htm	**123,927** (0.88%)	81,142 (0.75%)	00:00:54	6,848 (0.13%)	55.35%	13.04%	$0.00 (0.00%)
21. nps.gov/glac/planyourvisit/hikingmanyglacier.htm	**118,215** (0.84%)	93,547 (0.86%)	00:02:38	14,422 (0.28%)	56.36%	27.18%	$0.00 (0.00%)
22. nps.gov/glac/planyourvisit/hikinglakemcdonald.htm	**111,427** (0.79%)	89,409 (0.83%)	00:02:18	9,771 (0.19%)	57.91%	24.35%	$0.00 (0.00%)
23. nps.gov/glac/planyourvisit/weather.htm	**106,935** (0.76%)	81,849 (0.76%)	00:02:31	34,005 (0.67%)	41.86%	43.65%	$0.00 (0.00%)
24. nps.gov/glac/planyourvisit/shuttles.htm	**100,407** (0.71%)	82,429 (0.76%)	00:02:43	31,597 (0.62%)	49.18%	30.79%	$0.00 (0.00%)
25. nps.gov/glac/planyourvisit/gettingaround.htm	**95,846** (0.68%)	71,759 (0.66%)	00:02:35	12,361 (0.24%)	42.02%	27.89%	$0.00 (0.00%)
26. nps.gov/glac/planyourvisit/hours.htm	**82,605** (0.58%)	68,274 (0.63%)	00:01:55	34,902 (0.69%)	48.60%	36.92%	$0.00 (0.00%)
27. nps.gov/glac/planyourvisit/nearbyattractions.htm	**80,611** (0.57%)	66,523 (0.61%)	00:01:33	5,255 (0.10%)	63.88%	29.19%	$0.00 (0.00%)
28. nps.gov/glac/planyourvisit/hikingstmary.htm	**78,157** (0.55%)	61,398 (0.57%)	00:02:34	8,233 (0.16%)	58.83%	26.35%	$0.00 (0.00%)
29. nps.gov/glac/learn/photosmultimedia/podcasts_gtsr4.htm	**74,185** (0.52%)	33,362 (0.31%)	00:00:38	4,289 (0.08%)	54.95%	11.59%	$0.00 (0.00%)
30. nps.gov/glac/planyourvisit/ranger-led-activities.htm	**69,301** (0.49%)	52,042 (0.48%)	00:01:56	13,231 (0.26%)	30.87%	26.07%	$0.00 (0.00%)
31. nps.gov/glac/planyourvisit/backcountry-reservations.htm	**66,909** (0.47%)	42,132 (0.39%)	00:04:03	13,026 (0.26%)	36.28%	38.30%	$0.00 (0.00%)
32. nps.gov/glac/planyourvisit/fees.htm	**66,627** (0.47%)	57,759 (0.53%)	00:02:28	18,268 (0.36%)	57.62%	37.52%	$0.00 (0.00%)
33. nps.gov/glac/learn/photosmultimedia/photogallery.htm	**59,195** (0.42%)	34,039 (0.31%)	00:00:25	5,159 (0.10%)	31.06%	10.20%	$0.00 (0.00%)
34. nps.gov/glac/planyourvisit/guidedtours.htm	**57,671** (0.41%)	37,208 (0.34%)	00:00:31	5,887 (0.12%)	25.24%	7.68%	$0.00 (0.00%)
35. nps.gov/glac/learn/index.htm	**57,664** (0.41%)	42,623 (0.39%)	00:00:33	2,335 (0.05%)	33.23%	8.57%	$0.00 (0.00%)
36. nps.gov/glac/planyourvisit/shuttlestops.htm	**57,102** (0.40%)	49,330 (0.46%)	00:03:44	10,164 (0.20%)	66.01%	39.09%	$0.00 (0.00%)
37. nps.gov/glac/planyourvisit/ais.htm	**56,479** (0.40%)	51,214 (0.47%)	00:01:42	3,683 (0.07%)	75.45%	24.45%	$0.00 (0.00%)
38. nps.gov/glac/planyourvisit/hikingtwomedicine.htm	**55,375** (0.39%)	45,457 (0.42%)	00:02:40	8,210 (0.16%)	58.14%	30.32%	$0.00 (0.00%)
39. nps.gov/glac/planyourvisit/visitor-centers.htm	**53,975** (0.38%)	43,844 (0.40%)	00:01:48	12,554 (0.25%)	45.21%	26.38%	$0.00 (0.00%)
40. nps.gov/glac/planyourvisit/fall.htm	**53,747** (0.38%)	45,792 (0.42%)	00:02:36	25,553 (0.50%)	58.05%	44.13%	$0.00 (0.00%)
41. nps.gov/glac/planyourvisit/lakemcdonald.htm	**53,418** (0.38%)	38,931 (0.36%)	00:01:17	14,547 (0.29%)	47.78%	22.97%	$0.00 (0.00%)
42. nps.gov/glac/planyourvisit/manyglacier.htm	**51,805** (0.37%)	39,540 (0.36%)	00:01:32	14,152 (0.28%)	40.72%	22.48%	$0.00 (0.00%)
43. nps.gov/glac/planyourvisit/boat-trips-and-rentals.htm	**47,094** (0.33%)	37,163 (0.34%)	00:03:03	4,359 (0.09%)	34.45%	33.11%	$0.00 (0.00%)
44. nps.gov/glac/planyourvisit/bears.htm	**44,515** (0.31%)	40,090 (0.37%)	00:06:10	19,094 (0.38%)	68.16%	53.55%	$0.00 (0.00%)
45. nps.gov/glac/planyourvisit/hikingnorthfork.htm	**42,551** (0.30%)	34,805 (0.32%)	00:01:37	1,995 (0.04%)	56.98%	16.01%	$0.00 (0.00%)
46. nps.gov/glac/planyourvisit/loganpass.htm	**40,929** (0.29%)	34,022 (0.31%)	00:01:17	13,044 (0.26%)	40.28%	22.65%	$0.00 (0.00%)
47. nps.gov/glac/planyourvisit/spring.htm	**39,690** (0.28%)	32,669 (0.30%)	00:02:14	13,028 (0.26%)	54.48%	36.25%	$0.00 (0.00%)
48. nps.gov/glac/planyourvisit/bus-tours.htm	**37,376** (0.26%)	27,662 (0.26%)	00:03:16	6,461 (0.13%)	30.12%	37.36%	$0.00 (0.00%)
49. nps.gov/glac/learn/nature/weather.htm	**34,951** (0.25%)	31,861 (0.29%)	00:01:36	2,878 (0.06%)	61.02%	23.34%	$0.00 (0.00%)
50. nps.gov/glac/planyourvisit/twomedicine.htm	**33,501** (0.24%)	25,170 (0.23%)	00:01:22	9,815 (0.19%)	34.86%	22.86%	$0.00 (0.00%)
51. nps.gov/glac/planyourvisit/bicycling.htm	**30,594** (0.22%)	26,226 (0.24%)	00:03:35	11,954 (0.24%)	59.20%	49.11%	$0.00 (0.00%)
52. nps.gov/glac/faqs.htm	**30,364** (0.21%)	25,587 (0.24%)	00:02:53	6,466 (0.13%)	50.32%	33.70%	$0.00 (0.00%)
53. nps.gov/glac/planyourvisit/fishing.htm	**29,935** (0.21%)	25,731 (0.24%)	00:03:53	13,388 (0.26%)	69.57%	51.82%	$0.00 (0.00%)

54.	nps.gov/glac/learn/nature/mammals.htm	**29,726** (0.21%)	23,348 (0.22%)	00:03:03	8,906 (0.18%)	55.20%	36.80%	$0.00 (0.00%)
55.	nps.gov/glac/planyourvisit/guided-hiking-trips.htm	**27,323** (0.19%)	22,414 (0.21%)	00:02:06	4,520 (0.09%)	30.32%	27.52%	$0.00 (0.00%)
56.	nps.gov/glac/learn/news/18-27.htm	**26,770** (0.19%)	23,416 (0.22%)	00:01:03	1,259 (0.02%)	59.14%	19.35%	$0.00 (0.00%)
57.	nps.gov/glac/planyourvisit/goathaunt.htm	**26,317** (0.19%)	20,602 (0.19%)	00:01:21	4,286 (0.08%)	35.35%	15.08%	$0.00 (0.00%)
58.	nps.gov/glac/planyourvisit/pets.htm	**26,275** (0.19%)	24,265 (0.22%)	00:01:39	7,753 (0.15%)	77.18%	37.33%	$0.00 (0.00%)
59.	nps.gov/glac/learn/nature/animals.htm	**25,956** (0.18%)	13,473 (0.12%)	00:00:49	3,875 (0.08%)	19.88%	9.90%	$0.00 (0.00%)
60.	nps.gov/glac/planyourvisit/brochures.htm	**25,220** (0.18%)	17,996 (0.17%)	00:01:39	3,266 (0.06%)	20.82%	19.79%	$0.00 (0.00%)
61.	nps.gov/glac/learn/photosmultimedia/index.htm	**24,569** (0.17%)	19,551 (0.18%)	00:00:22	1,308 (0.03%)	31.51%	8.65%	$0.00 (0.00%)
62.	nps.gov/glac/planyourvisit/photo-tips.htm	**24,058** (0.17%)	19,577 (0.18%)	00:03:11	5,048 (0.10%)	52.53%	35.55%	$0.00 (0.00%)
63.	nps.gov/glac/planyourvisit/stmary.htm	**23,874** (0.17%)	18,025 (0.17%)	00:01:08	6,369 (0.13%)	45.24%	21.45%	$0.00 (0.00%)
64.	nps.gov/glac/planyourvisit/winter.htm	**21,997** (0.16%)	18,173 (0.17%)	00:02:48	11,035 (0.22%)	51.27%	48.41%	$0.00 (0.00%)
65.	nps.gov/glac/contacts.htm	**21,693** (0.15%)	17,940 (0.17%)	00:01:38	6,221 (0.12%)	46.95%	31.84%	$0.00 (0.00%)
66.	nps.gov/glac/planyourvisit/boating.htm	**21,242** (0.15%)	19,270 (0.18%)	00:02:11	4,044 (0.08%)	67.35%	32.15%	$0.00 (0.00%)
67.	nps.gov/glac/learn/historyculture/index.htm	**20,907** (0.15%)	14,962 (0.14%)	00:02:01	5,613 (0.11%)	39.98%	24.83%	$0.00 (0.00%)
68.	nps.gov/glac/planyourvisit/gtsrproject.htm	**20,560** (0.15%)	18,641 (0.17%)	00:01:39	1,426 (0.03%)	54.82%	24.79%	$0.00 (0.00%)
69.	nps.gov/glac/planyourvisit/safety.htm	**19,997** (0.14%)	13,153 (0.12%)	00:00:38	3,239 (0.06%)	44.18%	14.65%	$0.00 (0.00%)
70.	nps.gov/glac/planyourvisit/rafttours.htm	**19,076** (0.13%)	14,028 (0.13%)	00:03:24	4,527 (0.09%)	32.63%	35.37%	$0.00 (0.00%)
71.	nps.gov/glac/planyourvisit/northfork.htm	**18,197** (0.13%)	14,633 (0.14%)	00:01:33	3,481 (0.07%)	54.17%	21.41%	$0.00 (0.00%)
72.	nps.gov/glac/planyourvisit/horseback-rides.htm	**17,913** (0.13%)	14,955 (0.14%)	00:02:59	4,259 (0.08%)	34.26%	38.58%	$0.00 (0.00%)
73.	nps.gov/glac/learn/nature/glaciers.htm	**17,402** (0.12%)	14,899 (0.14%)	00:04:33	9,822 (0.19%)	70.75%	58.42%	$0.00 (0.00%)
74.	nps.gov/glac/getinvolved/workwithus.htm	**16,963** (0.12%)	13,960 (0.13%)	00:02:48	10,277 (0.20%)	42.60%	53.16%	$0.00 (0.00%)
75.	nps.gov/glac/learn/news/fact-sheet.htm	**15,427** (0.11%)	13,808 (0.13%)	00:04:13	7,739 (0.15%)	69.96%	57.70%	$0.00 (0.00%)
76.	nps.gov/glac/learn/nature/plants.htm	**14,907** (0.11%)	8,781 (0.08%)	00:01:53	3,865 (0.08%)	38.33%	20.99%	$0.00 (0.00%)
77.	nps.gov/glac/planyourvisit/crosscountryskiing.htm	**14,439** (0.10%)	10,751 (0.10%)	00:02:41	3,664 (0.07%)	26.05%	42.13%	$0.00 (0.00%)
78.	nps.gov/glac/learn/nature/lakesandponds.htm	**13,394** (0.09%)	12,324 (0.11%)	00:02:45	10,513 (0.21%)	82.08%	73.90%	$0.00 (0.00%)
79.	nps.gov/glac/planyourvisit/goodsandservices.htm	**13,226** (0.09%)	10,435 (0.10%)	00:02:03	1,915 (0.04%)	55.41%	26.74%	$0.00 (0.00%)
80.	nps.gov/glac/learn/bookstore.htm	**13,020** (0.09%)	11,470 (0.11%)	00:03:51	5,686 (0.11%)	28.01%	65.13%	$0.00 (0.00%)
81.	nps.gov/glac/getinvolved/partners.htm	**12,717** (0.09%)	11,464 (0.11%)	00:00:39	420 (0.01%)	80.45%	20.82%	$0.00 (0.00%)
82.	nps.gov/glac/learn/nature/bears.htm	**12,310** (0.09%)	11,001 (0.10%)	00:02:51	5,952 (0.12%)	61.78%	48.88%	$0.00 (0.00%)
83.	nps.gov/glac/learn/news/18-40.htm	**12,301** (0.09%)	11,560 (0.11%)	00:02:43	7,443 (0.15%)	87.02%	72.24%	$0.00 (0.00%)
84.	nps.gov/glac/learn/news/index.htm	**11,646** (0.08%)	9,775 (0.09%)	00:00:36	969 (0.02%)	28.17%	12.27%	$0.00 (0.00%)
85.	nps.gov/glac/learn/nature/index.htm	**10,664** (0.08%)	7,397 (0.07%)	00:00:47	738 (0.01%)	46.26%	10.49%	$0.00 (0.00%)
86.	nps.gov/glac/learn/photosmultimedia/going-to-the-sun-road-audio-tour.htm	**10,662** (0.08%)	8,754 (0.08%)	00:03:04	2,183 (0.04%)	59.04%	36.55%	$0.00 (0.00%)
87.	nps.gov/glac/planyourvisit/connectivity.htm	**10,394** (0.07%)	9,524 (0.09%)	00:02:00	4,384 (0.09%)	72.72%	43.50%	$0.00 (0.00%)
88.	nps.gov/glac/getinvolved/air.htm	**10,222** (0.07%)	8,398 (0.08%)	00:02:12	3,219 (0.06%)	53.81%	34.46%	$0.00 (0.00%)

89.	nps.gov/glac/learn/nature/night-sky.htm	**9,778** (0.07%)	7,531 (0.07%)	00:02:38	3,579 (0.07%)	50.96%	38.65%	$0.00 (0.00%)
90.	nps.gov/glac/planyourvisit/nas.htm	**9,672** (0.07%)	8,167 (0.08%)	00:01:56	1,568 (0.03%)	61.70%	27.43%	$0.00 (0.00%)
91.	nps.gov/glac/learn/news/fire-18-01.htm	**9,326** (0.07%)	8,353 (0.08%)	00:02:26	1,280 (0.03%)	57.99%	47.59%	$0.00 (0.00%)
92.	nps.gov/glac/learn/education/geology.htm	**9,274** (0.07%)	7,768 (0.07%)	00:05:10	5,214 (0.10%)	64.96%	55.53%	$0.00 (0.00%)
93.	nps.gov/glac/learn/nature/climate-change.htm	**9,239** (0.07%)	7,895 (0.07%)	00:04:33	4,880 (0.10%)	75.82%	60.37%	$0.00 (0.00%)
94.	nps.gov/glac/planyourvisit/mgh-rehab.htm	**9,151** (0.06%)	8,496 (0.08%)	00:01:54	627 (0.01%)	77.01%	24.70%	$0.00 (0.00%)
95.	nps.gov/glac/learn/management/lawsandpolicies.htm	**9,137** (0.06%)	7,066 (0.07%)	00:03:38	4,882 (0.10%)	52.04%	57.20%	$0.00 (0.00%)
96.	nps.gov/glac/learn/news/socialmedia.htm	**9,115** (0.06%)	7,789 (0.07%)	00:01:37	423 (0.01%)	66.50%	36.17%	$0.00 (0.00%)
97.	nps.gov/glac/planyourvisit/river-camping.htm	**8,892** (0.06%)	7,716 (0.07%)	00:02:02	1,046 (0.02%)	53.86%	25.52%	$0.00 (0.00%)
98.	nps.gov/glac/learn/news/changes-to-glacier-national-park-fees.htm	**8,876** (0.06%)	8,199 (0.08%)	00:02:35	5,956 (0.12%)	54.07%	50.60%	$0.00 (0.00%)
99.	nps.gov/glac/learn/nature/birds.htm	**8,854** (0.06%)	7,241 (0.07%)	00:02:49	2,859 (0.06%)	61.65%	39.53%	$0.00 (0.00%)
100.	nps.gov/glac/getinvolved/internships.htm	**8,624** (0.06%)	6,960 (0.06%)	00:01:31	2,166 (0.04%)	30.04%	24.26%	$0.00 (0.00%)
101.	nps.gov/glac/learn/news/media18-02.htm	**8,299** (0.06%)	7,488 (0.07%)	00:02:34	4,921 (0.10%)	48.48%	45.69%	$0.00 (0.00%)
102.	nps.gov/glac/learn/nature/naturalfeaturesandecosystems.htm	**8,174** (0.06%)	4,891 (0.05%)	00:01:47	1,764 (0.03%)	33.69%	17.43%	$0.00 (0.00%)
103.	nps.gov/glac/learn/photosmultimedia/webcams.htm?version=meter+at+null&module=meter-links&pgtype=article&contentid=&mediaid=&referrer=&priority=true&action=click&contentcollection=meter-links-click	**8,151** (0.06%)	6,571 (0.06%)	00:00:46	4,936 (0.10%)	20.40%	21.32%	$0.00 (0.00%)
104.	nps.gov/glac/planyourvisit/mtnlionsafety.htm	**7,895** (0.06%)	7,335 (0.07%)	00:01:22	819 (0.02%)	64.20%	17.85%	$0.00 (0.00%)
105.	nps.gov/glac/learn/management/statistics.htm	**7,833** (0.06%)	6,823 (0.06%)	00:01:37	3,334 (0.07%)	23.18%	50.53%	$0.00 (0.00%)
106.	nps.gov/glac/blogs/bcblog.htm	**7,768** (0.05%)	5,240 (0.05%)	00:01:00	494 (0.01%)	30.62%	11.70%	$0.00 (0.00%)
107.	nps.gov/common/utilities/sendmail/sendemail.cfm?o=4c89dab8a2c2bab987af1aa0f7048ba3568e088853a0&r=/glac/contacts.htm	**7,479** (0.05%)	3,806 (0.04%)	00:03:09	88 (0.00%)	26.14%	29.82%	$0.00 (0.00%)
108.	nps.gov/glac/learn/news/fire-18-05.htm	**7,329** (0.05%)	6,470 (0.06%)	00:02:45	2,370 (0.05%)	71.39%	54.89%	$0.00 (0.00%)
109.	nps.gov/glac/learn/historyculture/people.htm	**7,300** (0.05%)	4,956 (0.05%)	00:01:59	631 (0.01%)	53.53%	17.36%	$0.00 (0.00%)
110.	nps.gov/glac/getinvolved/vip-campground.htm	**7,276** (0.05%)	5,659 (0.05%)	00:03:20	3,927 (0.08%)	49.02%	49.46%	$0.00 (0.00%)
111.	nps.gov/glac/planyourvisit/accessibility.htm	**6,959** (0.05%)	5,717 (0.05%)	00:01:18	1,275 (0.03%)	31.73%	20.38%	$0.00 (0.00%)
112.	nps.gov/glac/learn/nature/wildflowers.htm	**6,882** (0.05%)	5,707 (0.05%)	00:03:20	2,400 (0.05%)	55.60%	45.00%	$0.00 (0.00%)
113.	nps.gov/glac/learn/nature/environmentalfactors.htm	**6,605** (0.05%)	4,370 (0.04%)	00:02:19	1,780 (0.04%)	40.28%	24.03%	$0.00 (0.00%)
114.	nps.gov/glac/blogs/what-to-bring-what-to-leave-behind.htm	**6,491** (0.05%)	6,134 (0.06%)	00:05:28	4,919 (0.10%)	81.92%	73.24%	$0.00 (0.00%)
115.	nps.gov/glac/learn/photosmultimedia/park-videos.htm	**6,367** (0.05%)	4,524 (0.04%)	00:00:30	384 (0.01%)	39.47%	9.00%	$0.00 (0.00%)
116.	nps.gov/glac/learn/news/18-42.htm	**6,349** (0.04%)	5,468 (0.05%)	00:03:41	890 (0.02%)	51.82%	55.63%	$0.00 (0.00%)
117.	nps.gov/glac/learn/historyculture/lodges-and-chalets.htm	**6,306** (0.04%)	5,598 (0.05%)	00:03:04	2,847 (0.06%)	70.18%	47.54%	$0.00 (0.00%)
118.	nps.gov/glac/learn/nature/treesandshrubs.htm	**5,986** (0.04%)	5,064 (0.05%)	00:03:37	2,343 (0.05%)	72.03%	46.29%	$0.00 (0.00%)
119.	nps.gov/glac/learn/kidsyouth/parkfun.htm	**5,843** (0.04%)	3,611 (0.03%)	00:02:00	838 (0.02%)	30.77%	23.64%	$0.00 (0.00%)
120.	nps.gov/glac/planyourvisit/ranger-led-activities-july-2018.htm	**5,788** (0.04%)	5,100 (0.05%)	00:04:58	1,461 (0.03%)	70.46%	52.11%	$0.00 (0.00%)
121.	nps.gov/glac/learn/news/fire-18-14.htm	**5,741** (0.04%)	5,013 (0.05%)	00:02:46	406 (0.01%)	65.53%	45.67%	$0.00 (0.00%)
122.	nps.gov/glac/learn/news/18-43.htm	**5,690**	4,951	00:03:44	842	53.50%	55.17%	$0.00

123.	nps.gov/glac/blogs/exploring-waterton-glacier-international-peace-park.htm	**5,576** (0.04%)	4,758 (0.04%)	00:02:50	3,700 (0.07%)	56.10%	53.46%	$0.00 (0.00%)
124.	nps.gov/glac/learn/kidsyouth/beajuniorranger.htm	**5,473** (0.04%)	3,337 (0.03%)	00:01:46	951 (0.02%)	42.57%	22.99%	$0.00 (0.00%)
125.	nps.gov/glac/learn/historyculture/tribes.htm	**5,439** (0.04%)	4,496 (0.04%)	00:03:15	1,212 (0.02%)	64.33%	33.43%	$0.00 (0.00%)
126.	nps.gov/glac/planyourvisit/ranger-led-activities-august-2018.htm	**5,308** (0.04%)	4,766 (0.04%)	00:04:55	1,034 (0.02%)	73.11%	51.94%	$0.00 (0.00%)
127.	nps.gov/glac/learn/management/international-designations.htm	**5,273** (0.04%)	4,779 (0.04%)	00:02:06	519 (0.01%)	67.48%	30.48%	$0.00 (0.00%)
128.	nps.gov/glac/learn/nature/geologicformations.htm	**5,255** (0.04%)	4,379 (0.04%)	00:03:55	2,044 (0.04%)	63.17%	44.15%	$0.00 (0.00%)
129.	nps.gov/glac/learn/nature/reptiles.htm	**5,168** (0.04%)	4,594 (0.04%)	00:01:50	1,302 (0.03%)	71.78%	30.13%	$0.00 (0.00%)
130.	nps.gov/glac/planyourvisit/privatestockuse.htm	**5,090** (0.04%)	4,748 (0.04%)	00:01:56	758 (0.01%)	70.00%	27.84%	$0.00 (0.00%)
131.	nps.gov/glac/getinvolved/pathways.htm	**5,086** (0.04%)	4,089 (0.04%)	00:01:38	470 (0.01%)	43.91%	26.17%	$0.00 (0.00%)
132.	nps.gov/glac/learn/historyculture/places.htm	**5,015** (0.04%)	3,757 (0.03%)	00:02:14	545 (0.01%)	52.25%	22.79%	$0.00 (0.00%)
133.	nps.gov/glac/learn/news/18-47.htm	**4,999** (0.04%)	4,719 (0.04%)	00:02:26	3,725 (0.07%)	85.91%	73.45%	$0.00 (0.00%)
134.	nps.gov/glac/planyourvisit/watersafety.htm	**4,668** (0.03%)	4,413 (0.04%)	00:02:02	1,029 (0.02%)	73.11%	35.73%	$0.00 (0.00%)
135.	nps.gov/glac/learn/nature/fire-history.htm	**4,618** (0.03%)	3,437 (0.03%)	00:03:54	2,566 (0.05%)	42.04%	52.75%	$0.00 (0.00%)
136.	nps.gov/glac/planyourvisit/ranger-led-activities-listing-2018.htm	**4,608** (0.03%)	3,990 (0.04%)	00:04:18	864 (0.02%)	68.87%	47.16%	$0.00 (0.00%)
137.	nps.gov/glac/siteindex.htm	**4,518** (0.03%)	3,201 (0.03%)	00:00:38	188 (0.00%)	34.22%	8.01%	$0.00 (0.00%)
138.	nps.gov/glac/learn/news/fire-18-08.htm	**4,477** (0.03%)	3,770 (0.03%)	00:03:02	368 (0.01%)	53.49%	44.65%	$0.00 (0.00%)
139.	nps.gov/glac/planyourvisit/wildlifesafety.htm	**4,428** (0.03%)	4,099 (0.04%)	00:02:03	720 (0.01%)	69.31%	27.73%	$0.00 (0.00%)
140.	nps.gov/glac/learn/news/18-11.htm	**4,422** (0.03%)	4,057 (0.04%)	00:02:38	2,507 (0.05%)	56.23%	50.88%	$0.00 (0.00%)
141.	nps.gov/glac/learn/education/continental_divide.htm	**4,408** (0.03%)	4,001 (0.04%)	00:04:07	3,305 (0.07%)	76.26%	71.37%	$0.00 (0.00%)
142.	nps.gov/glac/learn/nature/fish.htm	**4,397** (0.03%)	3,806 (0.04%)	00:02:01	517 (0.01%)	63.74%	21.58%	$0.00 (0.00%)
143.	nps.gov/glac/learn/news/history-of-the-nps-arrowhead.htm	**4,366** (0.03%)	3,888 (0.04%)	00:03:56	2,866 (0.06%)	69.18%	62.96%	$0.00 (0.00%)
144.	nps.gov/glac/learn/news/18-16.htm	**4,339** (0.03%)	3,794 (0.04%)	00:02:37	2,358 (0.05%)	77.47%	57.27%	$0.00 (0.00%)
145.	nps.gov/glac/learn/news/fire-18-22.htm	**4,242** (0.03%)	3,593 (0.03%)	00:02:50	409 (0.01%)	63.29%	44.01%	$0.00 (0.00%)
146.	nps.gov/glac/learn/news/18-48.htm	**4,204** (0.03%)	3,648 (0.03%)	00:03:53	1,827 (0.04%)	72.32%	60.70%	$0.00 (0.00%)
147.	nps.gov/glac/planyourvisit/instameet.htm	**4,156** (0.03%)	3,842 (0.04%)	00:01:00	660 (0.01%)	69.17%	19.61%	$0.00 (0.00%)
148.	nps.gov/glac/learn/education/native-american-plant-use.htm	**4,081** (0.03%)	3,744 (0.03%)	00:05:00	3,317 (0.07%)	88.45%	82.36%	$0.00 (0.00%)
149.	nps.gov/glac/blogs/greetings-from-glacier.htm	**3,805** (0.03%)	3,119 (0.03%)	00:00:53	184 (0.00%)	39.89%	12.25%	$0.00 (0.00%)
150.	nps.gov/glac/learn/nature/amphibians.htm	**3,750** (0.03%)	3,233 (0.03%)	00:01:53	320 (0.01%)	71.02%	15.68%	$0.00 (0.00%)
151.	nps.gov/glac/learn/news/media13-41.htm	**3,731** (0.03%)	3,485 (0.03%)	00:05:12	3,237 (0.06%)	89.22%	86.12%	$0.00 (0.00%)
152.	nps.gov/glac/blogs/of-wolves-and-wilderness.htm	**3,602** (0.03%)	3,360 (0.03%)	00:03:49	2,894 (0.06%)	85.73%	77.87%	$0.00 (0.00%)
153.	nps.gov/glac/getinvolved/index.htm	**3,496** (0.02%)	2,872 (0.03%)	00:00:34	128 (0.00%)	32.31%	10.61%	$0.00 (0.00%)
154.	nps.gov/glac/getinvolved/volunteer.htm	**3,495** (0.02%)	2,690 (0.02%)	00:01:46	968 (0.02%)	35.15%	27.93%	$0.00 (0.00%)
155.	nps.gov/glac/planyourvisit/physical-mobility.htm	**3,428** (0.02%)	3,026 (0.03%)	00:02:54	459 (0.01%)	71.71%	35.21%	$0.00 (0.00%)
156.	nps.gov/glac/learn/news/18-38pm.htm	**3,408** (0.02%)	3,067 (0.03%)	00:02:45	472 (0.01%)	58.26%	45.13%	$0.00 (0.00%)

Government-Wide Account
NPS Agency Profile (Pi... 360

GO TO REPORT

Top Events

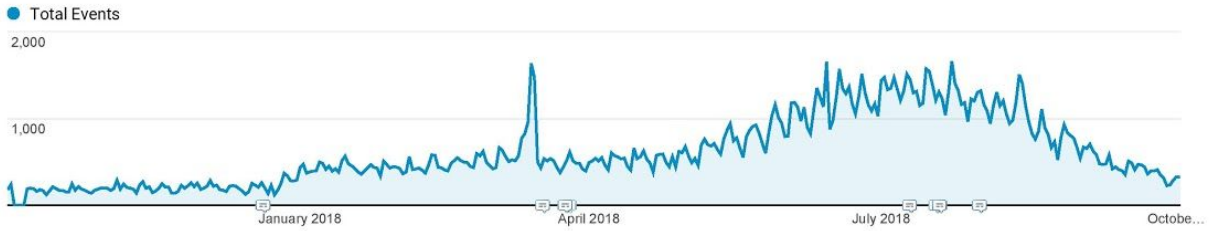
ALL » EVENT ACTION: pdf » EVENT CATEGORY: Download

Oct 2, 2017 - Oct 2, 2018

All Users
11.77% Unique Events

Explorer

Event



This data was filtered with the following filter expression: **/glac/**

Event Label	Total Events	Unique Events	Event Value	Avg. Value
	222,000 % of Total: 0.20% (112,772,184)	**180,867** % of Total: 0.19% (93,167,134)	**0** % of Total: 0.00% (1,851,084,009,731)	**0.00** Avg for View: 16,414.37 (-100.00%)
1. https://www.nps.gov/glac/learn/news/upload/Logan-Pass-Open-Close-Dates_Press-Kit-6-26-2017.pdf	**30,466** (13.72%)	28,977 (16.02%)	0 (0.00%)	0.00
2. https://www.nps.gov/glac/planyourvisit/upload/Many-Glacier.pdf	**30,008** (13.52%)	20,382 (11.27%)	0 (0.00%)	0.00
3. https://www.nps.gov/glac/planyourvisit/upload/McDonald-Valley.pdf	**27,088** (12.20%)	18,435 (10.19%)	0 (0.00%)	0.00
4. https://www.nps.gov/glac/planyourvisit/upload/Backcountry-Map-Web-2018.pdf	**26,914** (12.12%)	22,852 (12.63%)	0 (0.00%)	0.00
5. https://www.nps.gov/glac/planyourvisit/upload/St-Mary-Valley.pdf	**21,250** (9.57%)	15,327 (8.47%)	0 (0.00%)	0.00
6. https://www.nps.gov/glac/planyourvisit/upload/Two-Medicine.pdf	**13,329** (6.00%)	10,194 (5.64%)	0 (0.00%)	0.00
7. https://www.nps.gov/glac/planyourvisit/upload/Goat-Haunt-and-North-Fork.pdf	**9,522** (4.29%)	7,084 (3.92%)	0 (0.00%)	0.00
8. https://www.nps.gov/glac/planyourvisit/upload/Backcountry-Map-Web.pdf	**6,524** (2.94%)	5,650 (3.12%)	0 (0.00%)	0.00
9. https://www.nps.gov/glac/planyourvisit/upload/Advance-Reservations-STEP-by-STEP-Tutorial-2016.pdf	**4,680** (2.11%)	3,982 (2.20%)	0 (0.00%)	0.00
10. https://www.nps.gov/glac/planyourvisit/upload/Day-Trip-Plan.pdf	**3,945** (1.78%)	3,786 (2.09%)	0 (0.00%)	0.00
11. https://www.nps.gov/glac/planyourvisit/upload/2018-July-Final-Edits-web.pdf	**3,742** (1.69%)	3,423 (1.89%)	0 (0.00%)	0.00
12. https://www.nps.gov/glac/upload/WGG-Web-2017.pdf	**3,469** (1.56%)	3,173 (1.75%)	0 (0.00%)	0.00
13. https://www.nps.gov/glac/planyourvisit/upload/August-Final-revised.pdf	**2,614** (1.18%)	2,365 (1.31%)	0 (0.00%)	0.00
14. https://www.nps.gov/glac/planyourvisit/upload/xc-ski-2016.pdf	**2,417** (1.09%)	2,274 (1.26%)	0 (0.00%)	0.00
15. https://www.nps.gov/glac/learn/nature/upload/Mammal-Checklist-2016-web.pdf	**2,234** (1.01%)	2,081 (1.15%)	0 (0.00%)	0.00
16. https://www.nps.gov/glac/upload/Fall-Winter-SpringVG-web.pdf	**2,172** (0.98%)	1,971 (1.09%)	0 (0.00%)	0.00
17. https://www.nps.gov/glac/planyourvisit/upload/Pay-gov-Account-Set-Up-Tutorial-2017.pdf	**1,888** (0.85%)	1,641 (0.91%)	0 (0.00%)	0.00
18. https://www.nps.gov/glac/planyourvisit/upload/September-Final-Web.pdf	**1,819**	1,690	0	0.00

		(0.82%)	(0.93%)	(0.00%)	
19.	https://www.nps.gov/glac/learn/kidsyouth/upload/Things%20to%20do%20in%20Glacier%20with%20kids%20for%20web.pdf	**1,618** (0.73%)	1,520 (0.84%)	0 (0.00%)	0.00
20.	https://www.nps.gov/glac/getinvolved/upload/vip-camphostinfo.pdf	**1,491** (0.67%)	1,328 (0.73%)	0 (0.00%)	0.00
21.	https://www.nps.gov/glac/planyourvisit/upload/Fishing-2017-Web.pdf	**1,449** (0.65%)	1,355 (0.75%)	0 (0.00%)	0.00
22.	https://www.nps.gov/glac/planyourvisit/upload/NASTable2017.pdf	**1,402** (0.63%)	1,281 (0.71%)	0 (0.00%)	0.00
23.	https://www.nps.gov/glac/planyourvisit/upload/backcountrycampgroundsGPS.pdf	**1,184** (0.53%)	1,118 (0.62%)	0 (0.00%)	0.00
24.	https://www.nps.gov/glac/learn/management/upload/Fact%20Sheet%20Firearms%20in%20National%20Parks%202-17-10_FINAL[1].pdf	**1,177** (0.53%)	1,130 (0.62%)	0 (0.00%)	0.00
25.	https://www.nps.gov/glac/learn/nature/upload/Bird-Checklist-2016-web.pdf	**1,150** (0.52%)	1,066 (0.59%)	0 (0.00%)	0.00
26.	https://www.nps.gov/glac/getinvolved/upload/Volunteer-Application-2-15-2011.pdf	**1,145** (0.52%)	1,009 (0.56%)	0 (0.00%)	0.00
27.	https://www.nps.gov/glac/planyourvisit/upload/NF-Flathead-Undesignated-River-Camping-Float-Map.pdf	**1,096** (0.49%)	1,004 (0.56%)	0 (0.00%)	0.00
28.	https://www.nps.gov/glac/learn/management/upload/Frequently%20Asked%20Questions%20Public%202-18-10_FINAL[1].pdf	**968** (0.44%)	921 (0.51%)	0 (0.00%)	0.00
29.	https://www.nps.gov/glac/planyourvisit/upload/Contaminants-in-Fish-web.pdf	**964** (0.43%)	908 (0.50%)	0 (0.00%)	0.00
30.	https://www.nps.gov/glac/learn/kidsyouth/upload/Family%20Pack%20Handout-2.pdf	**845** (0.38%)	814 (0.45%)	0 (0.00%)	0.00
31.	https://www.nps.gov/glac/planyourvisit/upload/SUMMER-2018-WGG-NEWSPAPER-ACCESSIBLE.pdf	**794** (0.36%)	711 (0.39%)	0 (0.00%)	0.00
32.	https://www.nps.gov/glac/getinvolved/upload/Internship_Interpretation_GlacierNP18.pdf	**646** (0.29%)	607 (0.34%)	0 (0.00%)	0.00
33.	https://www.nps.gov/glac/getinvolved/upload/Internship_Interpretation_GlacierNP17.pdf	**624** (0.28%)	553 (0.31%)	0 (0.00%)	0.00
34.	https://www.nps.gov/glac/learn/kidsyouth/upload/Full-book-single-pages-including-cover.pdf	**624** (0.28%)	533 (0.29%)	0 (0.00%)	0.00
35.	https://www.nps.gov/glac/planyourvisit/upload/Academic-Fee-Waiver-Guidelines-and-Application-8-7-16.pdf	**512** (0.23%)	480 (0.27%)	0 (0.00%)	0.00
36.	https://www.nps.gov/glac/planyourvisit/upload/10-930s-Application-for-SUP-Short-Form-NEW.pdf	**375** (0.17%)	348 (0.19%)	0 (0.00%)	0.00
37.	https://www.nps.gov/glac/planyourvisit/upload/August-Web.pdf	**365** (0.16%)	343 (0.19%)	0 (0.00%)	0.00
38.	https://www.nps.gov/glac/planyourvisit/upload/Commercial-Filming-and-Photography-Permit-Information-082012.pdf	**358** (0.16%)	335 (0.19%)	0 (0.00%)	0.00
39.	https://www.nps.gov/glac/learn/kidsyouth/upload/Tree_Key_parkwide-1.pdf	**357** (0.16%)	329 (0.18%)	0 (0.00%)	0.00
40.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Disappearing-Glaciers.pdf	**338** (0.15%)	309 (0.17%)	0 (0.00%)	0.00
41.	https://www.nps.gov/glac/planyourvisit/upload/service-animal.pdf	**329** (0.15%)	308 (0.17%)	0 (0.00%)	0.00
42.	https://www.nps.gov/glac/learn/management/upload/2017-Compendium-Web.pdf	**224** (0.10%)	202 (0.11%)	0 (0.00%)	0.00
43.	https://www.nps.gov/features/glac/pdf/gmpfinal.pdf	**223** (0.10%)	156 (0.09%)	0 (0.00%)	0.00
44.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Habitats-are-Homes.pdf	**200** (0.09%)	181 (0.10%)	0 (0.00%)	0.00
45.	https://www.nps.gov/glac/learn/education/upload/Glacier-Wildlife-Coloring-Book.pdf	**191** (0.09%)	174 (0.10%)	0 (0.00%)	0.00
46.	https://www.nps.gov/glac/planyourvisit/upload/10-930s-Application-for-SUP-Ash-Spreading-NEW.pdf	**190** (0.09%)	162 (0.09%)	0 (0.00%)	0.00
47.	https://www.nps.gov/glac/learn/kidsyouth/upload/Answer-Key.pdf	**179** (0.08%)	157 (0.09%)	0 (0.00%)	0.00
48.	https://www.nps.gov/glac/planyourvisit/upload/10-930-Application-for-SUP-Long-Form-NEW.pdf	**174** (0.08%)	154 (0.09%)	0 (0.00%)	0.00
49.	https://www.nps.gov/glac/learn/news/upload/SpragueFactsheet-09282017.pdf	**170** (0.08%)	166 (0.09%)	0 (0.00%)	0.00
50.	https://www.nps.gov/glac/learn/management/upload/GLAC_FD_SP.pdf	**164** (0.07%)	139 (0.08%)	0 (0.00%)	0.00
51.	https://www.nps.gov/glac/planyourvisit/upload/2018-wgg-web-version-2.pdf	**156** (0.07%)	138 (0.08%)	0 (0.00%)	0.00
52.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Leave-No-Trace.pdf	**153**	141	0	0.00

		(0.07%)	(0.08%)	(0.00%)	
53.	https://www.nps.gov/glac/learn/news/upload/Going-to-the-Sun-Road-An-Engineering-Feat.pdf	**151** (0.07%)	134 (0.07%)	0 (0.00%)	0.00
54.	https://www.nps.gov/glac/planyourvisit/upload/10-932-Commercial-Filming-Still-Photography-NEW.pdf	**143** (0.06%)	133 (0.07%)	0 (0.00%)	0.00
55.	https://www.nps.gov/glac/learn/education/upload/Who%20eats%20who%20chart.pdf	**140** (0.06%)	111 (0.06%)	0 (0.00%)	0.00
56.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_See-America-First.pdf	**128** (0.06%)	121 (0.07%)	0 (0.00%)	0.00
57.	https://www.nps.gov/glac/planyourvisit/upload/GLACmap1.pdf	**128** (0.06%)	119 (0.07%)	0 (0.00%)	0.00
58.	https://www.nps.gov/glac/planyourvisit/upload/AIS-permit-2016.pdf	**126** (0.06%)	119 (0.07%)	0 (0.00%)	0.00
59.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Moving.pdf	**125** (0.06%)	117 (0.06%)	0 (0.00%)	0.00
60.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Wise-about-Wildlife.pdf	**122** (0.05%)	115 (0.06%)	0 (0.00%)	0.00
61.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Four-Nations.pdf	**120** (0.05%)	108 (0.06%)	0 (0.00%)	0.00
62.	https://www.nps.gov/glac/learn/education/upload/Vocabulary.pdf	**113** (0.05%)	105 (0.06%)	0 (0.00%)	0.00
63.	https://www.nps.gov/glac/learn/education/upload/ForbsandShrubsColoringBook2008.pdf	**110** (0.05%)	87 (0.05%)	0 (0.00%)	0.00
64.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Living-Lightly.pdf	**110** (0.05%)	103 (0.06%)	0 (0.00%)	0.00
65.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Native-Names.pdf	**105** (0.05%)	99 (0.05%)	0 (0.00%)	0.00
66.	https://www.nps.gov/glac/learn/upload/Day-Hike-Guide-2016.pdf	**104** (0.05%)	91 (0.05%)	0 (0.00%)	0.00
67.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Native-Names-wordsearch.pdf	**98** (0.04%)	93 (0.05%)	0 (0.00%)	0.00
68.	https://www.nps.gov/glac/learn/education/upload/Work-House-Unit-1-People-and-Glacier-2.pdf	**97** (0.04%)	91 (0.05%)	0 (0.00%)	0.00
69.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Up-Up-and-Away.pdf	**97** (0.04%)	92 (0.05%)	0 (0.00%)	0.00
70.	https://www.nps.gov/glac/learn/kidsyouth/upload/Jr-Ranger-Activity_Making-Peace.pdf	**95** (0.04%)	89 (0.05%)	0 (0.00%)	0.00
71.	https://www.nps.gov/glac/learn/management/upload/GLAC_OV_SP.pdf	**92** (0.04%)	82 (0.05%)	0 (0.00%)	0.00
72.	https://www.nps.gov/glac/planyourvisit/upload/Private-Stock-Use-2016.pdf	**92** (0.04%)	90 (0.05%)	0 (0.00%)	0.00
73.	https://www.nps.gov/glac/learn/education/upload/alphabet.pdf	**90** (0.04%)	79 (0.04%)	0 (0.00%)	0.00
74.	https://www.nps.gov/parkhistory/online_books/glac/contribution_history.pdf	**90** (0.04%)	73 (0.04%)	0 (0.00%)	0.00
75.	https://www.nps.gov/glac/getinvolved/upload/Commercial-Use-Authorization-2018-Bicycle-Tours-No-Tables.pdf	**88** (0.04%)	78 (0.04%)	0 (0.00%)	0.00
76.	https://www.nps.gov/glac/learn/education/upload/Work-House-Unit-3-Climate-Changes-Glaciers-and-Glaciation-2.pdf	**87** (0.04%)	82 (0.05%)	0 (0.00%)	0.00
77.	https://www.nps.gov/glac/learn/education/upload/Work-House-Student-Readings-2.pdf	**84** (0.04%)	70 (0.04%)	0 (0.00%)	0.00
78.	https://www.nps.gov/glac/planyourvisit/upload/Camping-Regulations-2017-web.pdf	**83** (0.04%)	75 (0.04%)	0 (0.00%)	0.00
79.	https://www.nps.gov/glac/learn/nature/upload/grizzly-brochure-aug-3.pdf	**78** (0.04%)	68 (0.04%)	0 (0.00%)	0.00
80.	https://www.nps.gov/glac/learn/kidsyouth/upload/parkranger.pdf	**72** (0.03%)	62 (0.03%)	0 (0.00%)	0.00
81.	https://www.nps.gov/glac/learn/management/upload/Frequently%20Asked%20Questions%20Public%202-18-10_FINAL%5b1%5d.pdf	**69** (0.03%)	67 (0.04%)	0 (0.00%)	0.00
82.	https://www.nps.gov/glac/learn/education/upload/alphabet-to-color-small.pdf	**66** (0.03%)	61 (0.03%)	0 (0.00%)	0.00
83.	https://www.nps.gov/glac/learn/upload/ONeal_announcement_17.pdf	**66** (0.03%)	65 (0.04%)	0 (0.00%)	0.00
84.	https://www.nps.gov/glac/planyourvisit/upload/Access-web.pdf	**66** (0.03%)	63 (0.03%)	0 (0.00%)	0.00
85.	https://www.nps.gov/glac/planyourvisit/upload/July-RLA-2017-web.pdf	**64** (0.03%)	60 (0.03%)	0 (0.00%)	0.00
86.	https://www.nps.gov/glac/learn/education/upload/Work-House-Unit-4-Native-Plants-FIxed.pdf	**63** (0.03%)	47 (0.03%)	0 (0.00%)	0.00

87.	https://www.nps.gov/glac/planyourvisit/upload/Backcountry-Planner-2015-Web.pdf	**61** (0.03%)	52 (0.03%)	0 (0.00%)	0.00
88.	https://www.nps.gov/glac/getinvolved/upload/recruitment-flyer-2017.pdf	**59** (0.03%)	57 (0.03%)	0 (0.00%)	0.00
89.	https://www.nps.gov/glac/learn/education/upload/Work-House-Unit-2-Mountains-and-Mountain-Building-2.pdf	**57** (0.03%)	54 (0.03%)	0 (0.00%)	0.00
90.	https://www.nps.gov/glac/getinvolved/upload/Commercial-Use-Authorization-2018-Photography-Workshops-No-Tables.pdf	**56** (0.03%)	52 (0.03%)	0 (0.00%)	0.00
91.	https://www.nps.gov/glac/learn/historyculture/upload/GLAC_HQ_CLR_Final.pdf	**55** (0.02%)	47 (0.03%)	0 (0.00%)	0.00
92.	https://www.nps.gov/glac/learn/management/upload/EMS-Glacier-NP-5-06.pdf	**51** (0.02%)	43 (0.02%)	0 (0.00%)	0.00
93.	https://www.nps.gov/glac/learn/education/upload/Work-House-Unit-5-Animas-and-Habitat-2.pdf	**50** (0.02%)	45 (0.02%)	0 (0.00%)	0.00
94.	https://www.nps.gov/glac/learn/management/upload/Fact%20Sheet%20Firearms%20in%20National%20Parks%202-17-10_FINAL%5b1%5d.pdf	**49** (0.02%)	48 (0.03%)	0 (0.00%)	0.00
95.	https://www.nps.gov/glac/planyourvisit/upload/Boating-2017-web.pdf	**49** (0.02%)	45 (0.02%)	0 (0.00%)	0.00
96.	https://www.nps.gov/glac/learn/education/classrooms/upload/Track-Makers.pdf	**46** (0.02%)	25 (0.01%)	0 (0.00%)	0.00
97.	https://www.nps.gov/glac/getinvolved/upload/Cover-Letter-2018-Photography-Workshops.pdf	**45** (0.02%)	42 (0.02%)	0 (0.00%)	0.00
98.	https://www.nps.gov/glac/learn/nature/upload/Jerry-O-Neal-brochure-web.pdf	**44** (0.02%)	43 (0.02%)	0 (0.00%)	0.00
99.	https://www.nps.gov/glac/parknews/upload/Going-to-the-Sun-Road-An-Engineering-Feat.pdf	**44** (0.02%)	43 (0.02%)	0 (0.00%)	0.00
100.	https://www.nps.gov/glac/getinvolved/upload/Cover-Letter-2018-Bicycle-Tours.pdf	**43** (0.02%)	41 (0.02%)	0 (0.00%)	0.00
101.	https://www.nps.gov/glac/learn/education/upload/1718-Ed-Opps-Tabloid-interactive.pdf	**41** (0.02%)	39 (0.02%)	0 (0.00%)	0.00
102.	https://www.nps.gov/glac/learn/education/upload/Wild_Animals_Wild_-Places.pdf	**38** (0.02%)	32 (0.02%)	0 (0.00%)	0.00
103.	https://www.nps.gov/glac/learn/education/upload/Work-House-Introduction-2.pdf	**38** (0.02%)	36 (0.02%)	0 (0.00%)	0.00
104.	https://www.nps.gov/glac/learn/nature/upload/climate%20change%20and%20glaciers.pdf	**38** (0.02%)	28 (0.02%)	0 (0.00%)	0.00
105.	https://www.nps.gov/glac/planyourvisit/upload/Mountain-Climb-Logan-Pass-2016.pdf	**37** (0.02%)	35 (0.02%)	0 (0.00%)	0.00
106.	https://www.nps.gov/glac/planyourvisit/upload/RLA-Web-Sept-2017.pdf	**37** (0.02%)	32 (0.02%)	0 (0.00%)	0.00
107.	https://www.nps.gov/glac/parknews/upload/Bear-Deaths.pdf	**36** (0.02%)	35 (0.02%)	0 (0.00%)	0.00
108.	https://www.nps.gov/glac/learn/education/upload/Final-Work-House-and-At-Home-in-this-Place-2016.pdf	**34** (0.02%)	32 (0.02%)	0 (0.00%)	0.00
109.	https://www.nps.gov/glac/learn/historyculture/upload/Final-History-Tour-Script-5_6_2011.pdf	**32** (0.01%)	32 (0.02%)	0 (0.00%)	0.00
110.	https://www.nps.gov/glac/learn/education/classrooms/upload/updated-Final-Repeat-Photo-Trunk-Small-for-Web.pdf	**31** (0.01%)	30 (0.02%)	0 (0.00%)	0.00
111.	https://www.nps.gov/glac/learn/historyculture/upload/HQ_map.pdf	**31** (0.01%)	26 (0.01%)	0 (0.00%)	0.00
112.	https://www.nps.gov/glac/parknews/upload/press_Glacier-significance.pdf	**29** (0.01%)	28 (0.02%)	0 (0.00%)	0.00
113.	https://www.nps.gov/glac/planyourvisit/upload/GNP-Non-profit-status-verification-form-12210.pdf	**28** (0.01%)	26 (0.01%)	0 (0.00%)	0.00
114.	https://www.nps.gov/glac/learn/education/upload/Climate_change_MS-Unit_Final.pdf	**27** (0.01%)	21 (0.01%)	0 (0.00%)	0.00
115.	https://www.nps.gov/glac/learn/education/upload/glacier%20food%20chain.pdf	**27** (0.01%)	22 (0.01%)	0 (0.00%)	0.00
116.	https://home.nps.gov/glac/planyourvisit/upload/St-Mary-Valley.pdf	**25** (0.01%)	13 (0.01%)	0 (0.00%)	0.00
117.	https://www.nps.gov/glac/planyourvisit/upload/August-RLA-2017-web.pdf	**23** (0.01%)	22 (0.01%)	0 (0.00%)	0.00
118.	https://www.nps.gov/glac/upload/June-2017-Web-Final.pdf	**22** (0.01%)	17 (0.01%)	0 (0.00%)	0.00
119.	https://www.nps.gov/glac/learn/nature/upload/Fall_Winter-2015_web.pdf	**21** (0.01%)	20 (0.01%)	0 (0.00%)	0.00
120.	https://www.nps.gov/glac/planyourvisit/upload/summer-paper-2016-web.pdf	**21** (0.01%)	19 (0.01%)	0 (0.00%)	0.00

121.	https://www.nps.gov/glac/learn/education/learning/upload/ConnectionGuide.pdf	**20** (0.01%)	18 (0.01%)	0 (0.00%)	0.00
122.	https://www.nps.gov/glac/learn/education/upload/1st-2nd-winter-field-trip_GNP.pdf	**20** (0.01%)	14 (0.01%)	0 (0.00%)	0.00
123.	https://www.nps.gov/glac/planyourvisit/upload/Mountain-Climbing-2016.pdf	**20** (0.01%)	19 (0.01%)	0 (0.00%)	0.00
124.	https://www.nps.gov/glac/getinvolved/upload/CUA-Annual-Report-BikeTours-Form-10-660.pdf	**19** (0.01%)	17 (0.01%)	0 (0.00%)	0.00
125.	https://www.nps.gov/glac/getinvolved/upload/Form-10-660-CUA-Annual-Report-Photo.pdf	**19** (0.01%)	17 (0.01%)	0 (0.00%)	0.00
126.	https://www.nps.gov/glac/upload/Sprague-rev2015.pdf	**19** (0.01%)	19 (0.01%)	0 (0.00%)	0.00
127.	https://www.nps.gov/glac/planyourvisit/upload/10-930-Weddings-final-8-31-2013-1.pdf	**18** (0.01%)	16 (0.01%)	0 (0.00%)	0.00
128.	https://www.nps.gov/glac/getinvolved/upload/CUA-Application-2018-Bicycle-Tours.pdf	**17** (0.01%)	13 (0.01%)	0 (0.00%)	0.00
129.	https://www.nps.gov/glac/learn/education/upload/Work-House-Vocabulary_Resources_Standards-2-2.pdf	**17** (0.01%)	17 (0.01%)	0 (0.00%)	0.00
130.	https://www.nps.gov/glac/upload/8-29-15-closures.pdf	**17** (0.01%)	15 (0.01%)	0 (0.00%)	0.00
131.	https://home.nps.gov/glac/planyourvisit/upload/Many-Glacier.pdf	**16** (0.01%)	10 (0.01%)	0 (0.00%)	0.00
132.	https://www.nps.gov/glac/learn/education/upload/18-19-Education-Opportunities-accessible-2.pdf	**15** (0.01%)	14 (0.01%)	0 (0.00%)	0.00
133.	https://www.nps.gov/glac/learn/education/upload/3rd-5th-winter-field-trip_GNP.pdf	**15** (0.01%)	14 (0.01%)	0 (0.00%)	0.00
134.	https://www.nps.gov/glac/learn/education/upload/Winter%20Ecology%20Teacher%20Guide%202010.pdf	**15** (0.01%)	13 (0.01%)	0 (0.00%)	0.00
135.	https://www.nps.gov/glac/learn/news/upload/August-17-Interagency-Fire-Information-Fact-Sheet-2.pdf	**15** (0.01%)	12 (0.01%)	0 (0.00%)	0.00
136.	https://www.nps.gov/glac/learn/education/upload/Fire_Ecology.pdf	**14** (0.01%)	12 (0.01%)	0 (0.00%)	0.00
137.	https://www.nps.gov/glac/learn/education/upload/land-of-many-stories-trunk.pdf	**14** (0.01%)	13 (0.01%)	0 (0.00%)	0.00
138.	https://www.nps.gov/glac/learn/kidsyouth/upload/2016-GLAC-Annual-Pass-Contest.pdf	**14** (0.01%)	12 (0.01%)	0 (0.00%)	0.00
139.	https://www.nps.gov/glac/learn/nature/upload/climate%20change%20and%20biotic%20patterns.pdf	**14** (0.01%)	14 (0.01%)	0 (0.00%)	0.00
140.	https://www.nps.gov/glac/learn/news/upload/august-15-interagency-fire-information-fact-sheet-1.pdf	**14** (0.01%)	13 (0.01%)	0 (0.00%)	0.00
141.	https://home.nps.gov/glac/planyourvisit/upload/McDonald-Valley.pdf	**13** (0.01%)	10 (0.01%)	0 (0.00%)	0.00
142.	https://www.nps.gov/glac/planyourvisit/upload/GLAC-Swimmer-s-Itch-Advisory-V1-1.pdf	**13** (0.01%)	10 (0.01%)	0 (0.00%)	0.00
143.	https://www.nps.gov/glac/getinvolved/upload/CUA-Application-2018-Photography-Workshops.pdf	**12** (0.01%)	12 (0.01%)	0 (0.00%)	0.00
144.	https://www.nps.gov/glac/learn/education/upload/Successful%20fieldtrip2006.pdf	**12** (0.01%)	10 (0.01%)	0 (0.00%)	0.00
145.	https://www.nps.gov/archive/glac/pdf/2003fireea.pdf	**11** (0.00%)	8 (0.00%)	0 (0.00%)	0.00
146.	https://www.nps.gov/glac/getinvolved/upload/Commercial-Use-Authorization-2018-Photography-Workshops.pdf	**11** (0.00%)	11 (0.01%)	0 (0.00%)	0.00
147.	https://www.nps.gov/glac/learn/education/classrooms/upload/Teacher-Guide-Repeat-Photo-Education-Trunk.pdf	**11** (0.00%)	10 (0.01%)	0 (0.00%)	0.00
148.	https://www.nps.gov/glac/learn/education/upload/Forest_Processes.pdf	**11** (0.00%)	11 (0.01%)	0 (0.00%)	0.00
149.	https://www.nps.gov/glac/learn/education/upload/Glacier-NP-Chaperone-Guidelines.pdf	**11** (0.00%)	10 (0.01%)	0 (0.00%)	0.00
150.	https://www.nps.gov/glac/learn/nature/upload/climate%20change%20and%20the%20water%20cycle.pdf	**11** (0.00%)	11 (0.01%)	0 (0.00%)	0.00
151.	https://www.nps.gov/glac/learn/nature/upload/Reprint-Weed-field-guide_web.pdf	**11** (0.00%)	10 (0.01%)	0 (0.00%)	0.00
152.	https://www.nps.gov/glac/learn/nature/upload/Rocky-Point-Brochure-web.pdf	**11** (0.00%)	10 (0.01%)	0 (0.00%)	0.00
153.	https://www.nps.gov/glac/learn/news/upload/August-22-Interagency-Fire-Information-Fact-Sheet.pdf	**11** (0.00%)	9 (0.00%)	0 (0.00%)	0.00
154.	https://www.nps.gov/glac/learn/news/upload/August-28-Interagency-Fire-Information-Fact-Sheet.pdf	**11** (0.00%)	11 (0.01%)	0 (0.00%)	0.00

Appendix D: GNP Traffic & Travel Tips Mock Up

NPS.gov / Park Home / Plan Your Visit / Directions & Transportation / Traffic Tips

Traffic & Travel Tips

Overcrowding in Glacier

Like other national parks, Glacier has seen a dramatic increase in visitation over the last few years. Glacier experiences extreme crowding during busy periods throughout the year, including **spring break, summer, and holiday times during fall and winter.** You can expect:

- Limited parking near visitor centers
- Large crowds at popular viewpoints
- Long lines at entrance gates
- Long waits for shuttle bus seats
- Park Closures

However, there are ways to navigate and avoid some of this congestion to make the most of your time in Glacier. **Here are some tips:**

Quick Stats

3,305,512
visitors in 2017

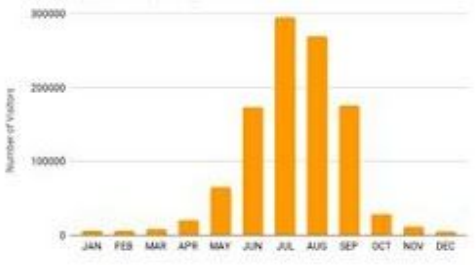
1,063,298
cars in 2017

1
major road

Avoiding Crowds

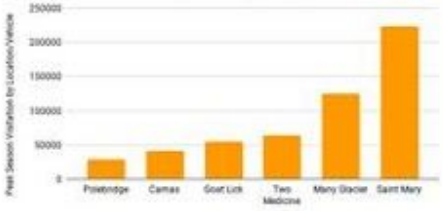
Busy Times of Year:
July is the busiest month with almost 1 million visitors a day. August, June, and early September, while less busy, still experience overcrowding issues.

Visitation by Month (2017)



Busy Locations:
Saint Mary and Many Glacier are very popular sites during the peak season. These areas get crowded quickly and turnover for parking spaces can be low since these locations are popular for long hikes.

Peak Season Visitation by Location (2017)



Travel Tips & Alternatives

Timing Your Trip:

1. **Consider the shoulder seasons:** April, May, September, early October offer amazing views and hikes without the hassle of crowded parking lots and trails. Look here for things to do in shoulder season
2. **Come on weekdays:** weekends are consistently busier than weekdays
3. **Avoid holidays:** visitation spikes on holidays, especially long weekends. This includes Memorial Day, Labor Day, and Indepence Day.
4. **Arrive Early:** Parking lots frequently fill up before 9am and work on a first-come-first-serve basis. For best chances as getting a parking spot, arrive before 8am. Check here for the most accurate information about busy times in Glacier's parking lots.

Alternative Destinations:

1. **Destinations outside Glacier:** Consider visiting nearby attractions like Flathead National Forest, Blackfoot Indian Reservation, Whitefish, and Kalispell.
2. **Less Popular in park cites:** Check out hikes around Chief Mountain, Porcupine Ridge, and Kintla Peak.
3. **Make your visit international:** Look into visiting the Glacier's Canadian counterpart, Waterton National Park

Alternate Transportation

Free Glacier Shuttles

A free hop on, hop off shuttle system provides **two-way service along Going-to-the-Sun Road** between Apgar Visitor Center and St. Mary Visitor Center. The system helps reduce traffic congestion through voluntary bus ridership. The shuttles are air-conditioned and have large windows for sightseeing. More info...

Hiker's Shuttle

A seasonal hiker's shuttle is offered by Glacier National Park Lodges for a fee. It connects West Glacier, Apgar, Lake McDonald Lodge, St. Mary, and Many Glacier. Reservations required. More info...

The Blackfeet Perspective

Learn about the Blackfeet Indian culture while traveling in comfortable 25-seat passenger buses equipped with large windows and air conditioning, also accessible with ramps and lock downs. For information and reservations, please visit Sun Tours.

Take a Ride on the Red Bus

Glacier National Park Lodges (Xanterra) offers tours throughout the park. Sit back and enjoy the park's spectacular scenery in a historic Red Bus. On clear days, the canvas roofs are rolled back and transformed into convertible buses.

CURRENT CONDITIONS

Check webcams on the park's entrance road.

Check when parking lots are busiest.

Appendix E: Raspberry Pi Webcam BOM

Raspberry Pi Webcam BOM

Main Components:

Item	Cost
Raspberry Pi 3 Model B	$37.30
Raspberry Pi Camera	$25.00
16GB microSD Card	$7.79
Pelican 1060 Micro Case (Clear)	$22.19

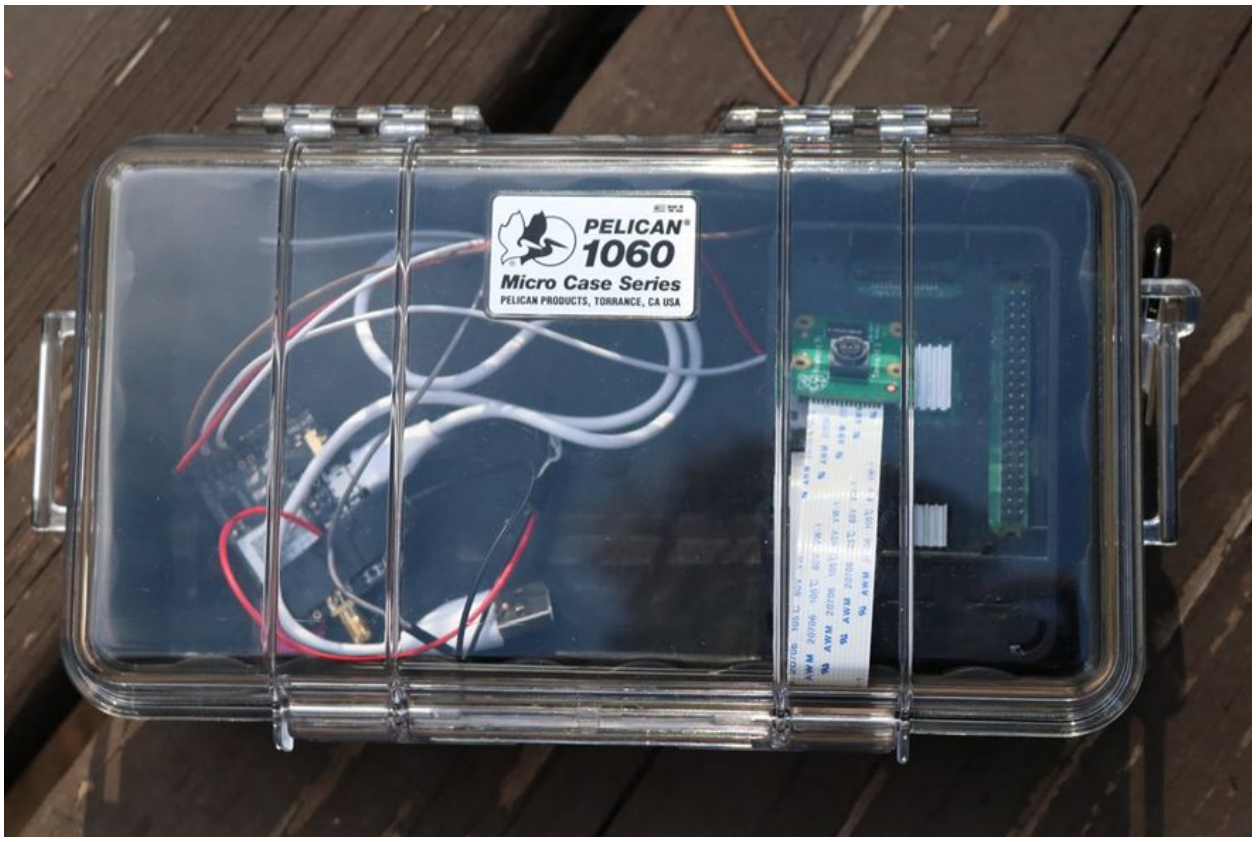
Power Components:

Item	Cost
MicroUSB Power Supply	$9.99
OR	
Solar Charger Kit	$148.00
MicroUSB Cable (As short as possible to avoid voltage drop)	~$7.50

Cellular Components (Work in Progress):

Item	Cost
Adafruit FONA 3G Cellular Board	$79.95
Lithium Ion Polymer Battery	$9.95
1ft MicroUSB Cable(4)	$9.99
Prototyping Wires	$11.99
AT&T SIM Card	
Cellular Antenna:	
Slim Sticker-type GSM Antenna	$2.95
OR	
SMA to uFL Adapter Cable	$3.95
GSM 3G 4G LTE Antenna or similar	$9.79

Raspberry Pi Webcam Implementation Guide



Written by: Trevor Rizzo

For the use of the United States National Park Service

Materials Needed:

All parts required for making a webcam unit are listed in the BOM.
Internet Connection is required during set up and while running the webcams.
The following materials are required for setup only:

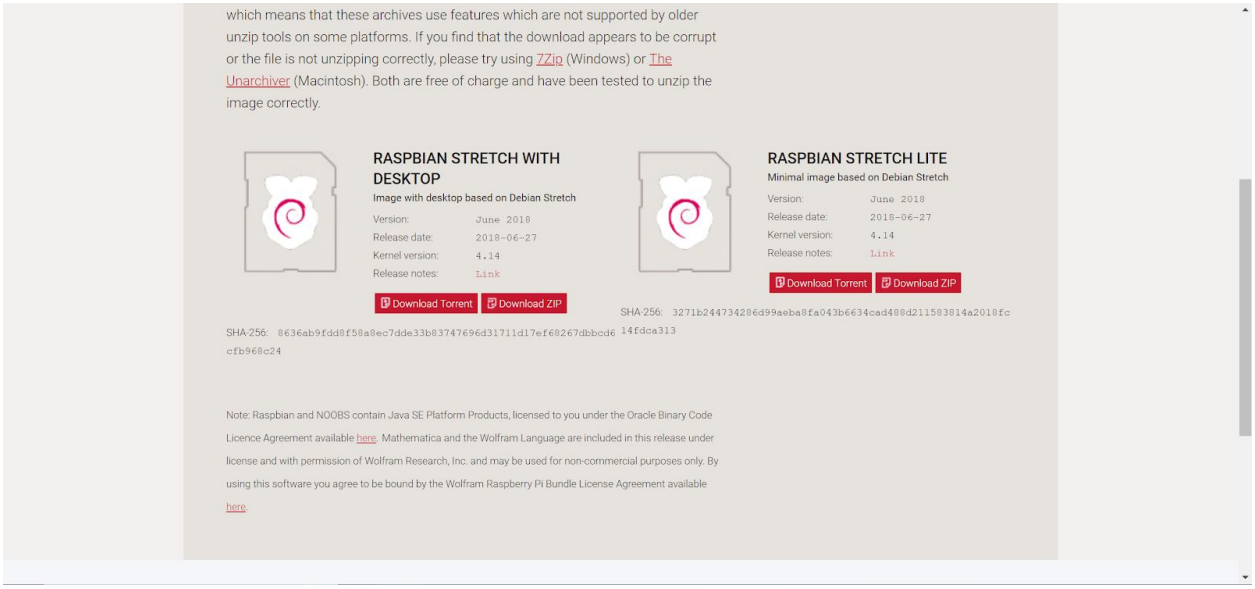
- microSD Card Reader
- USB Flash Drive
- USB Keyboard
- USB Mouse
- HDMI Cable
- TV/Monitor with HDMI Input
- A computer (any OS can work)

Formatting the SD Card:

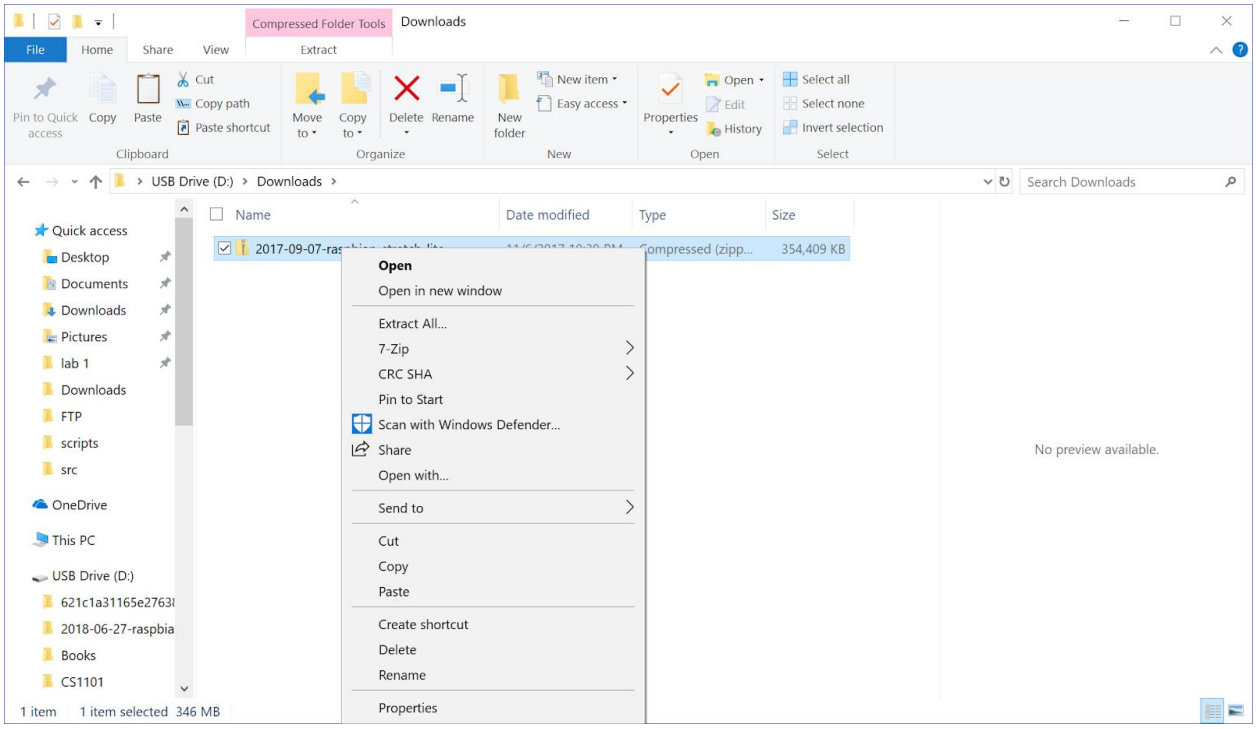
Download Operating System:

The first step in setting up a Raspberry Pi webcam is to format it microSD card. The microSD card is the Raspberry Pi's main data drive and holds the Raspberry Pi's operating system.

The most common operating system used for Raspberry Pis and the one we will use for the webcam is Raspbian. Raspbian is a a custom adaptation of the Linux distribution Debian made specifically for the Raspberry Pi. To format the microSD card with Raspbian you must first download Raspbian from the downloads page on the raspberrypi.org website (here). We will be using the version of Raspbian with a desktop environment to make setting up the Raspberry Pi easier. On the downloads page (shown below) click the link to download "Raspbian Stretch With Desktop". Make sure to choose "Download ZIP" and not "Download Torrent".

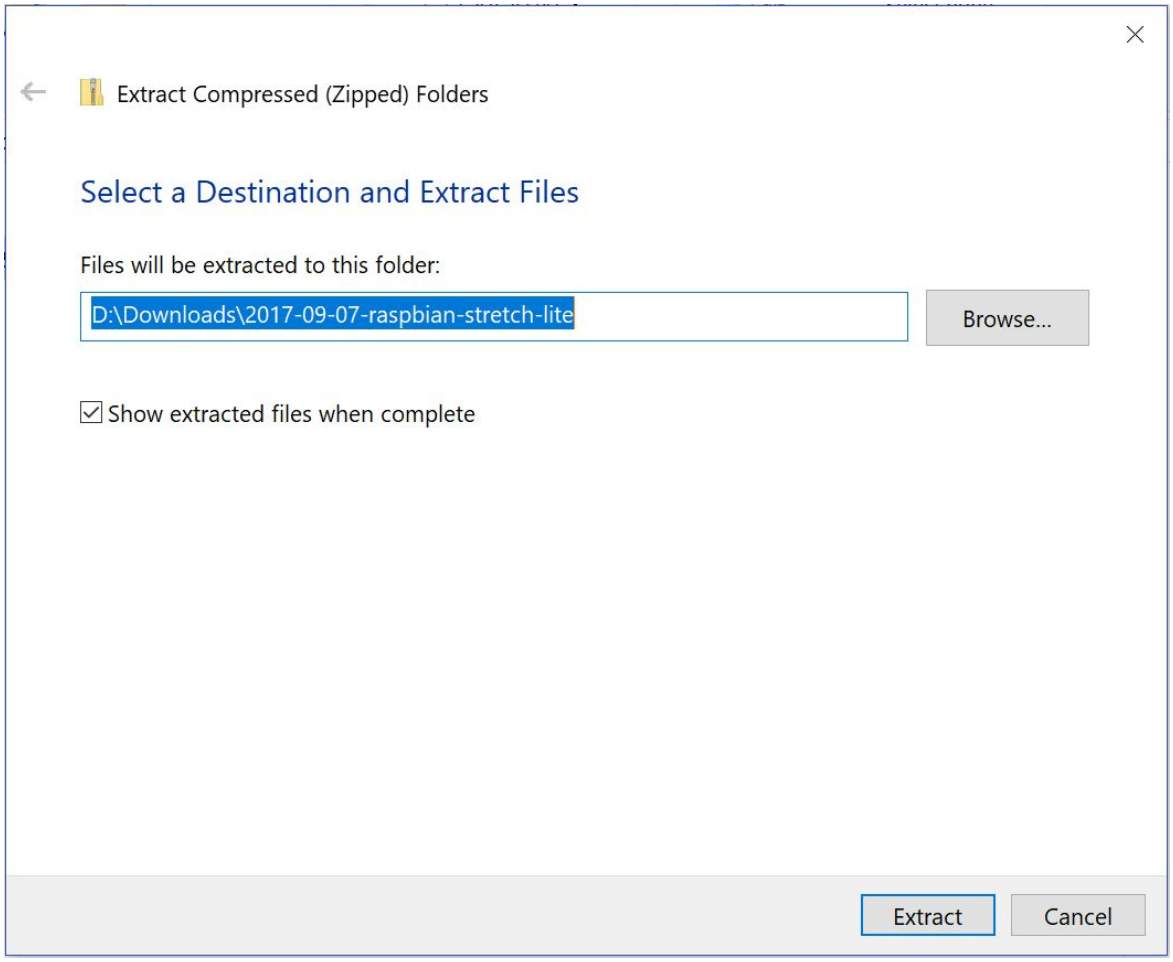


Once the file has finished downloading, locate the file in your downloads folder.



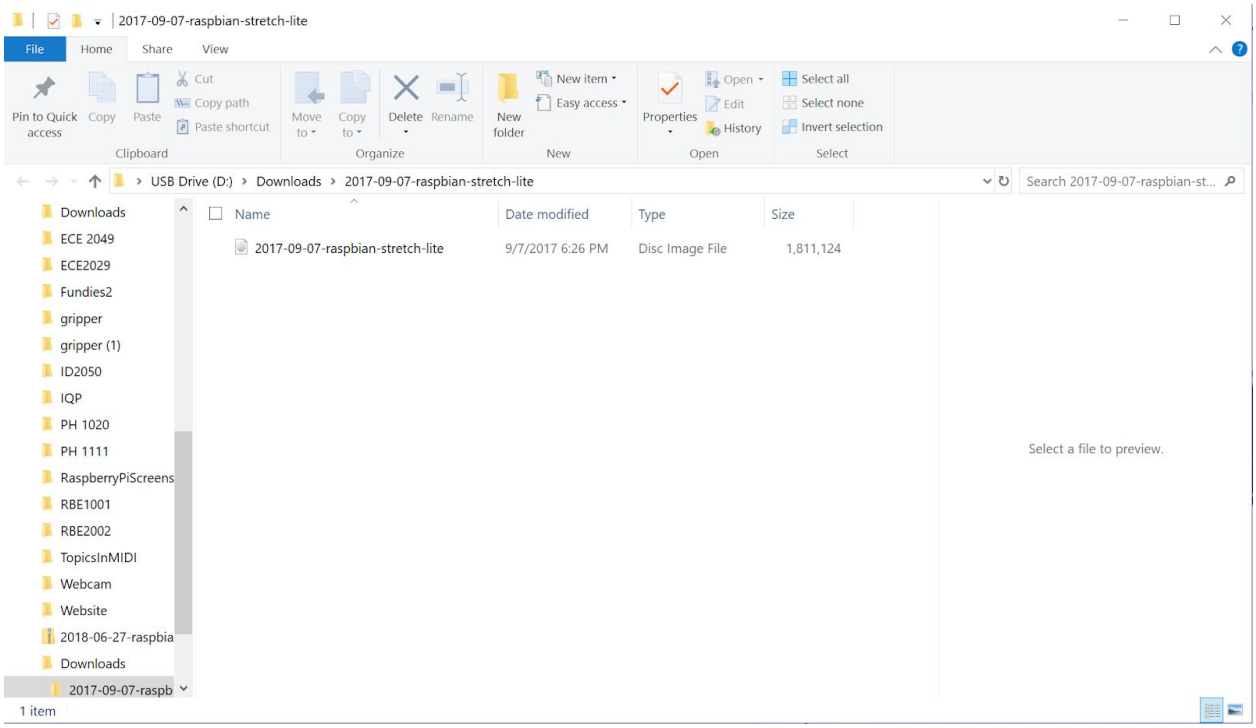
Right-click on the downloaded zip folder and choose “Extract All…”

The following window will then appear.



Choose “Show extracted files when complete” and then click the “Extract” button.

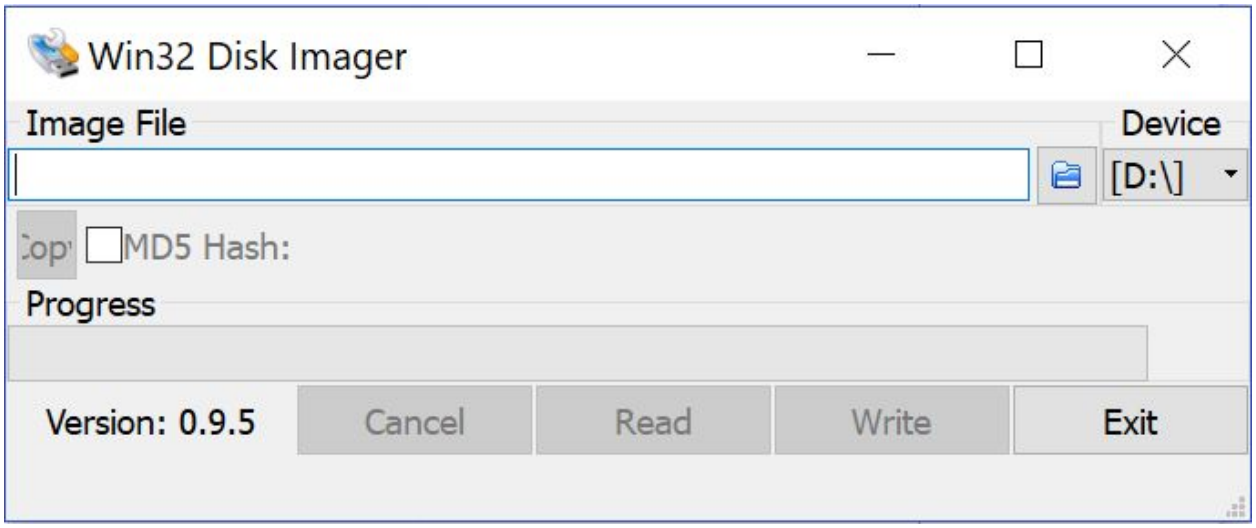
Once the zip file is done being extracted, a window with a new folder will appear. Inside the folder will be a disk image file. This will be the disk image that we image the microSD card with. Imaging a microSD card can be described as copying the content of another data drive (the disk image) to the microSD card



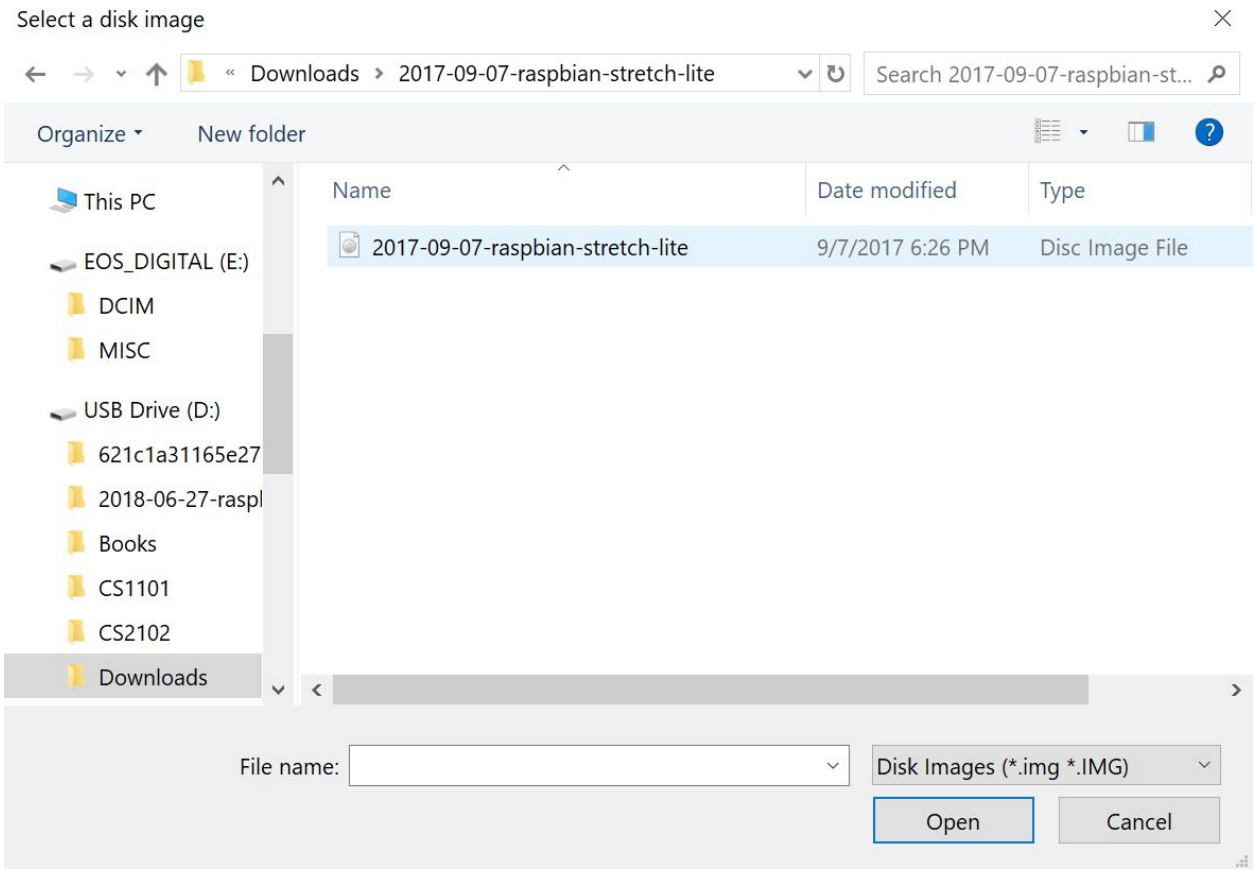
Imaging SD Card:

Now that the disk image with the Raspbian operating system has been downloaded and extracted, it is ready to be imaged onto the microSD. This can be done on any computer with any disk imaging software. For this tutorial I will be using win32DiskImager on a Windows 10 computer, another common software to images disks is Etcher. If you do not have a disk imaging software, download one now.

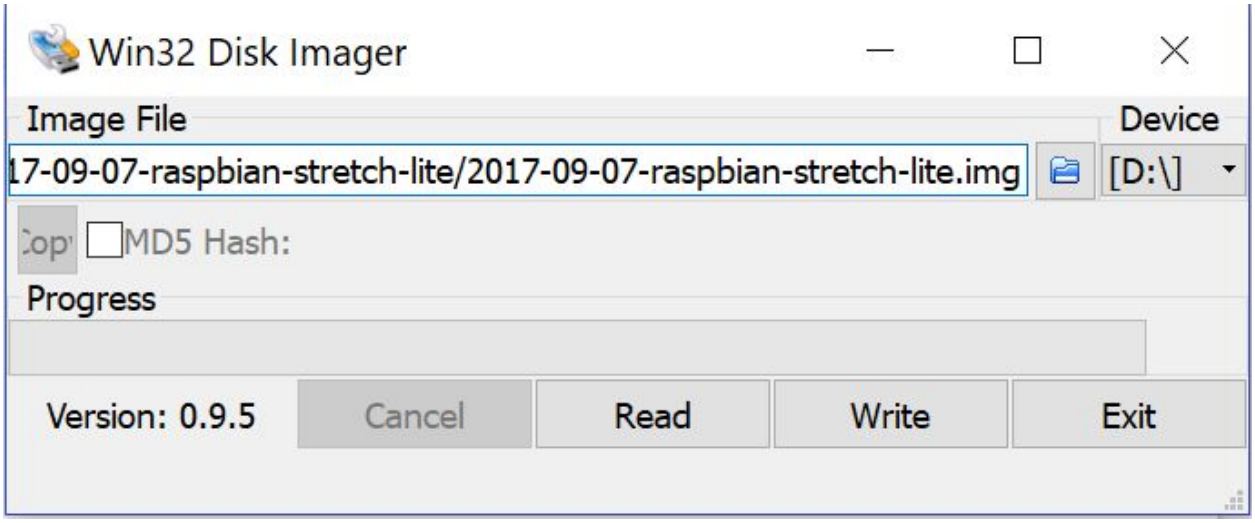
First, open win32DiskImager



Next, click the blue file icon in the upper right corner of the page to select an image file.

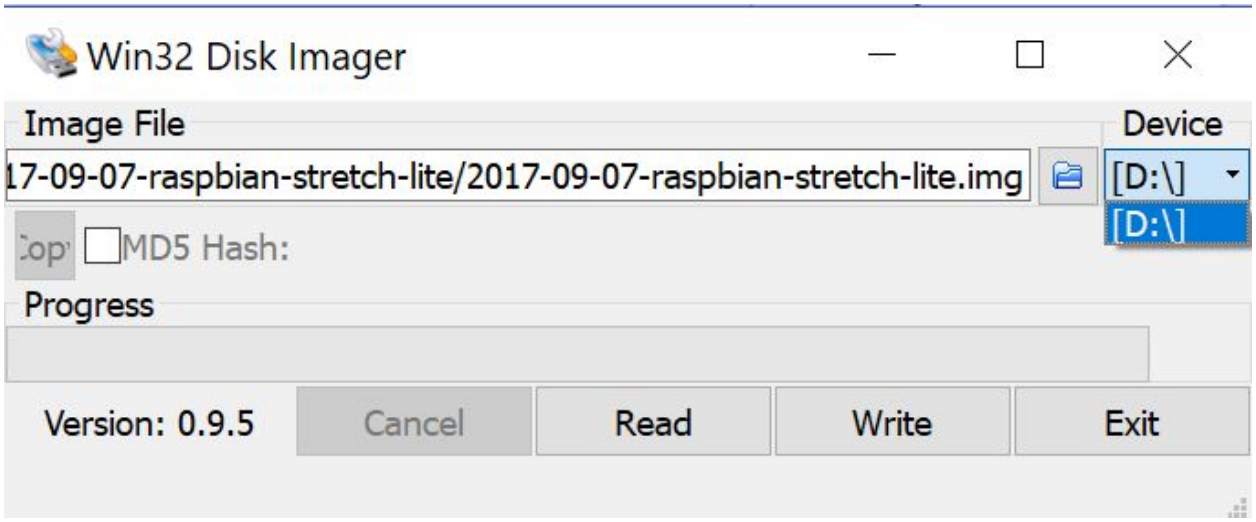


Navigate to the disk image that was extracted in the last section. Select the image and press “Open”.



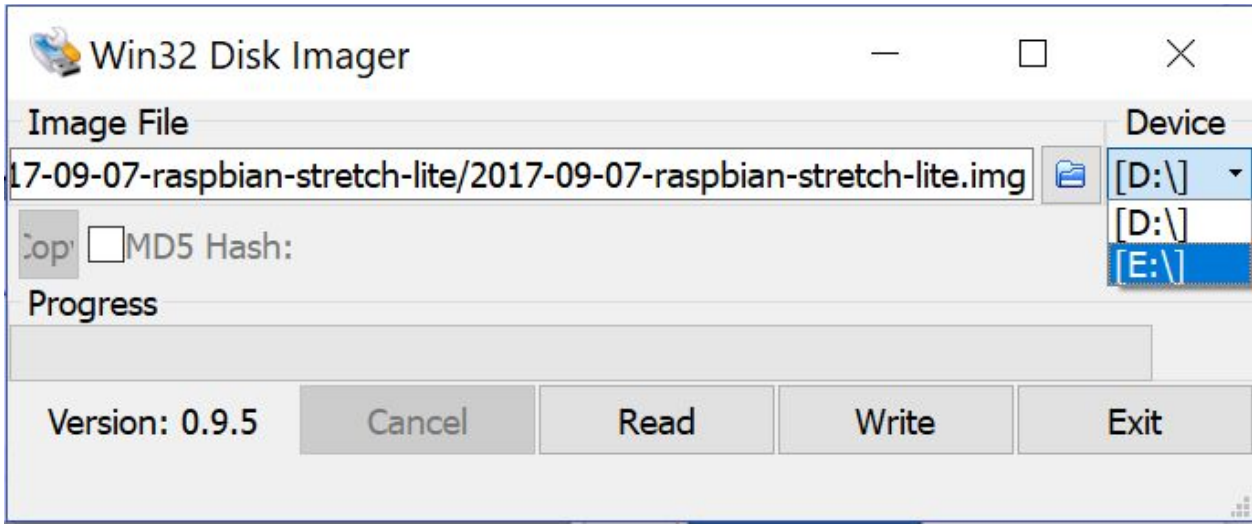
Now that the disk image has been selected, it is time to choose a drive to image. Choose a drive to image by selecting a drive from the drop down menu under the word “Device” in the upper right corner of the window. The drive letter you want to choose is the drive letter of the microSD card.

The drive letter of the microSD card can be determined by viewing the drop down menu without the microSD card inserting into your computer.



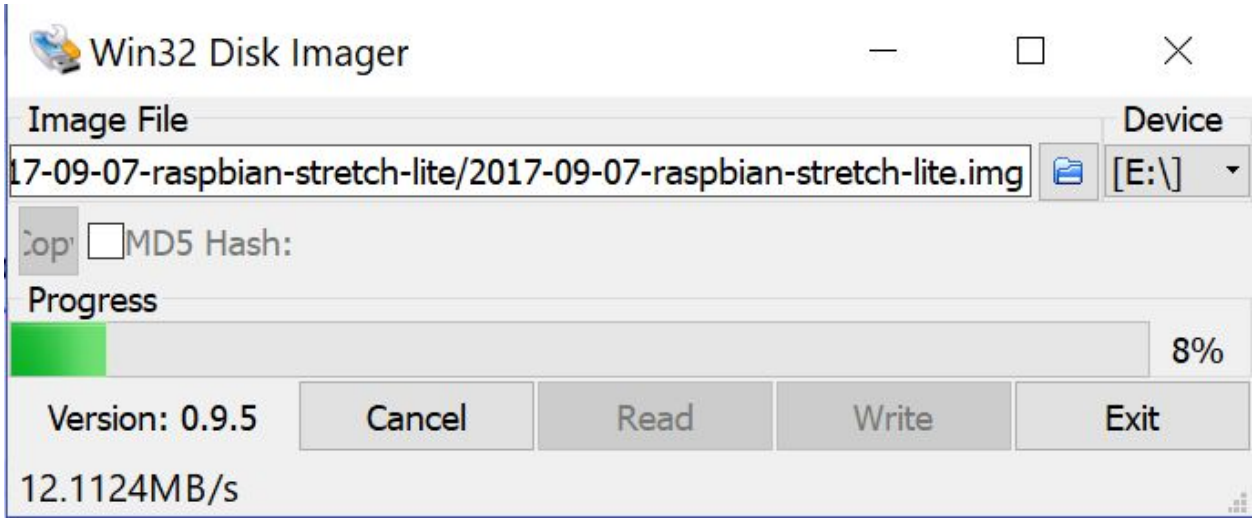
Make note of which drive letters are in the drop down menu

Then insert the microSD card into your computer and reselect the drop down menu.



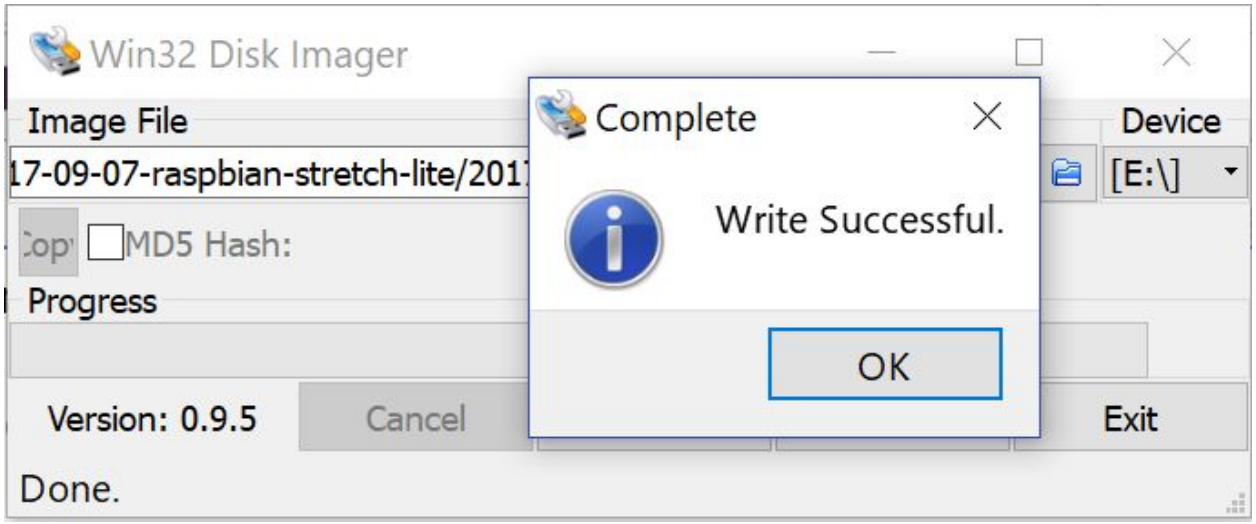
The drive letter that did not appear previously is the drive letter of the microSD card.

Select the drive letter of the microSD card and press the “Write” button to begin imaging the microSD card.



The status bar above should appear while the microSD card is being imaged.

The software will notify you when the microSD card imaging has been completed.



The microSD card is now imaged and can ejected and removed from the computer.

Before Power Up:

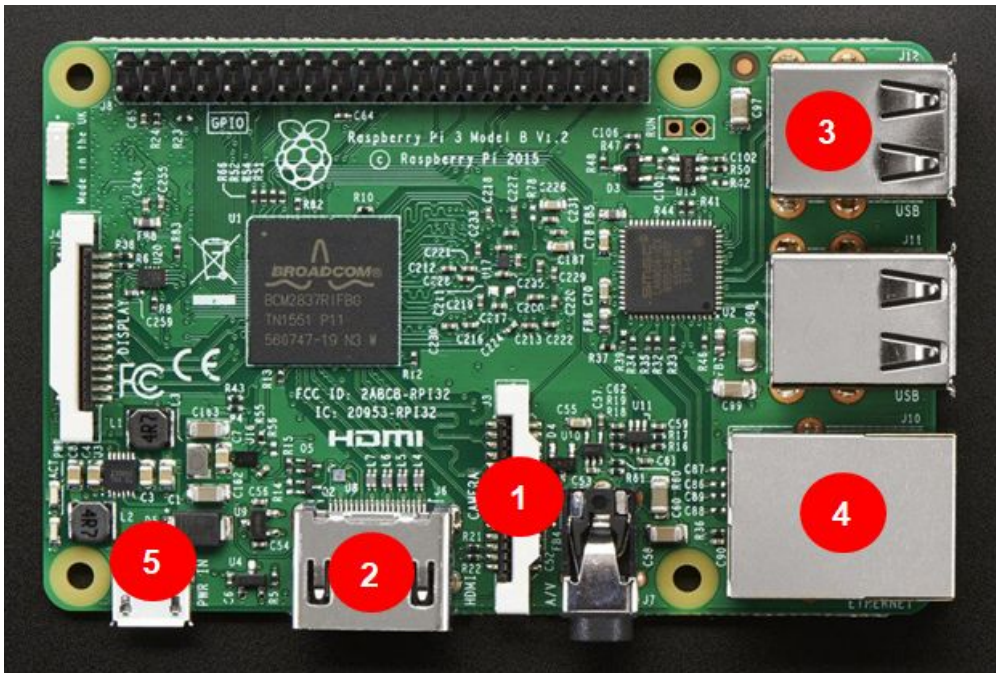


Figure XX. Top Side of Raspberry Side

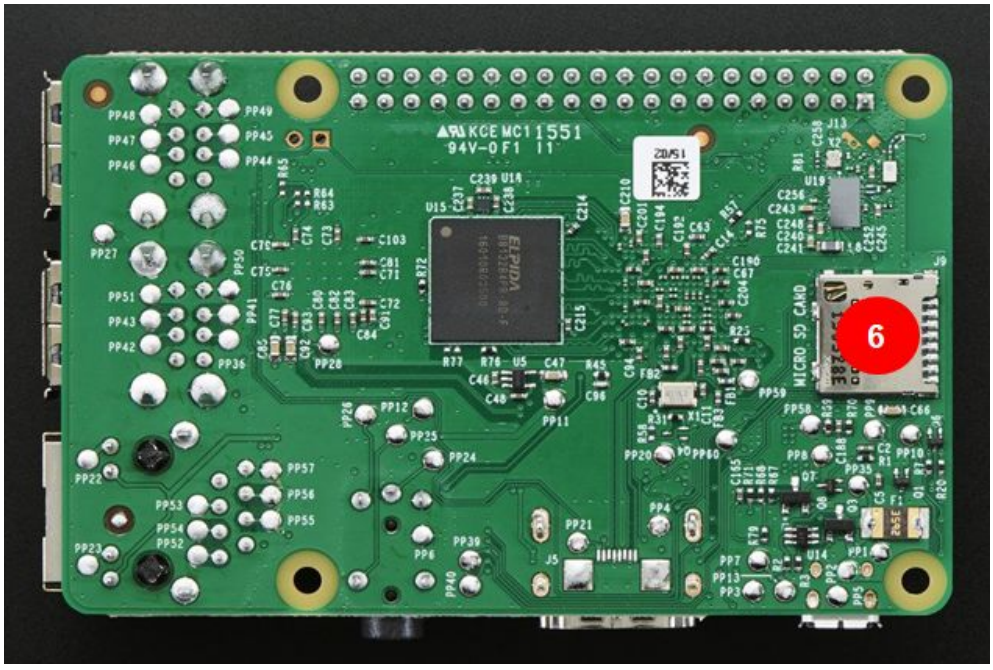


Figure XX. Bottom Side of Raspberry Side

https://www.adafruit.com/product/3055 (image source)

Before powering on the Raspberry Pi, you must first connect all the necessary peripherals. The camera module is the most difficult and sensitive connection to make so it should be made first.

The Raspberry Pi Camera connects to the Raspberry Pi with a ribbon cable. One end of the ribbon cable should come attached to camera module. The other end of the ribbon cable attaches to the top side of Raspberry Pi with the ribbon cable labeled “CAMERA” (Port 1 in the image above). To connect the ribbon cable to the Raspberry Pi lift up slightly on the top of the connector and insert the ribbon cable with the exposed contacts (silver colored metal) facing the HDMI connector (Port 2), then gently push the top of the connector back into place.

After connecting the camera, be sure to remove the protective sticker from the lense.

Next connect the following peripherals into their respective ports; connect the HDMI cable to the HDMI port (Port 2), connect the keyboard and mouse to the USB ports (Port 3), and insert the microSD card into the microSD slot located on the bottom side of the Raspberry Pi (Port 6).

After these connections have been made the raspberry Pi is ready to be powered on. The Raspberry Pi does not have any power buttons so it will boot as soon as the power cable is plug into Port 5.

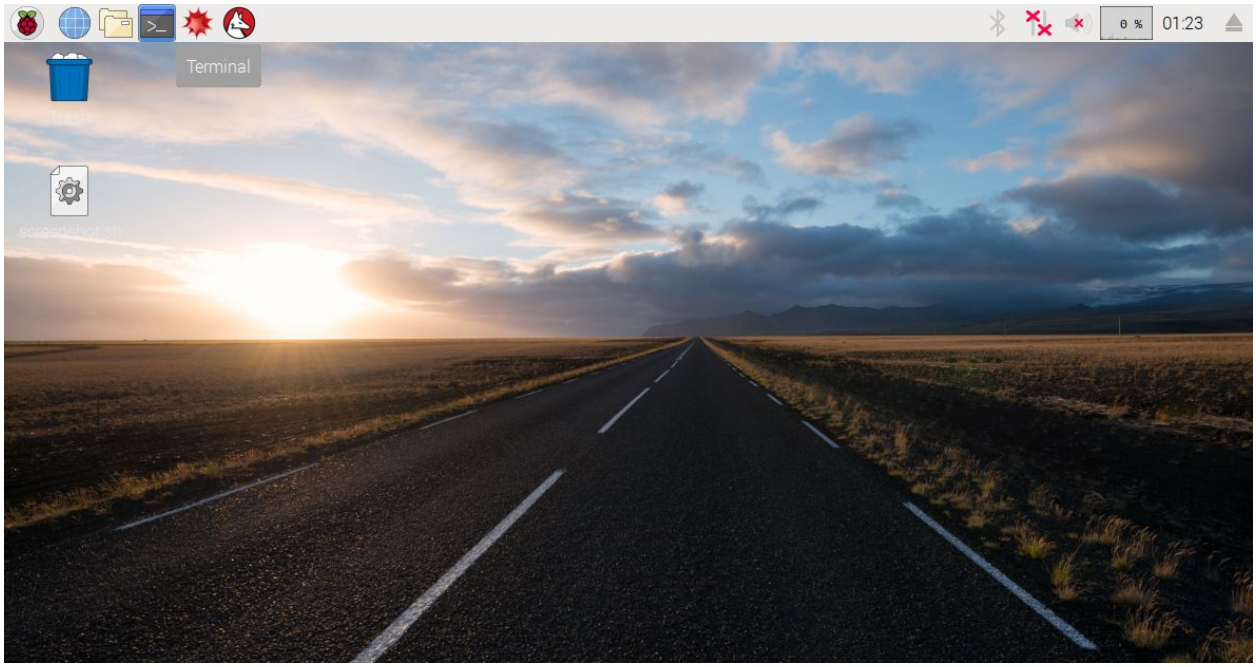
Configuring the Raspberry Pi:

Now that the the Raspberry Pi has been physically configured and has it's microSD card formatted, it is time to configure the Raspberry Pi's software.

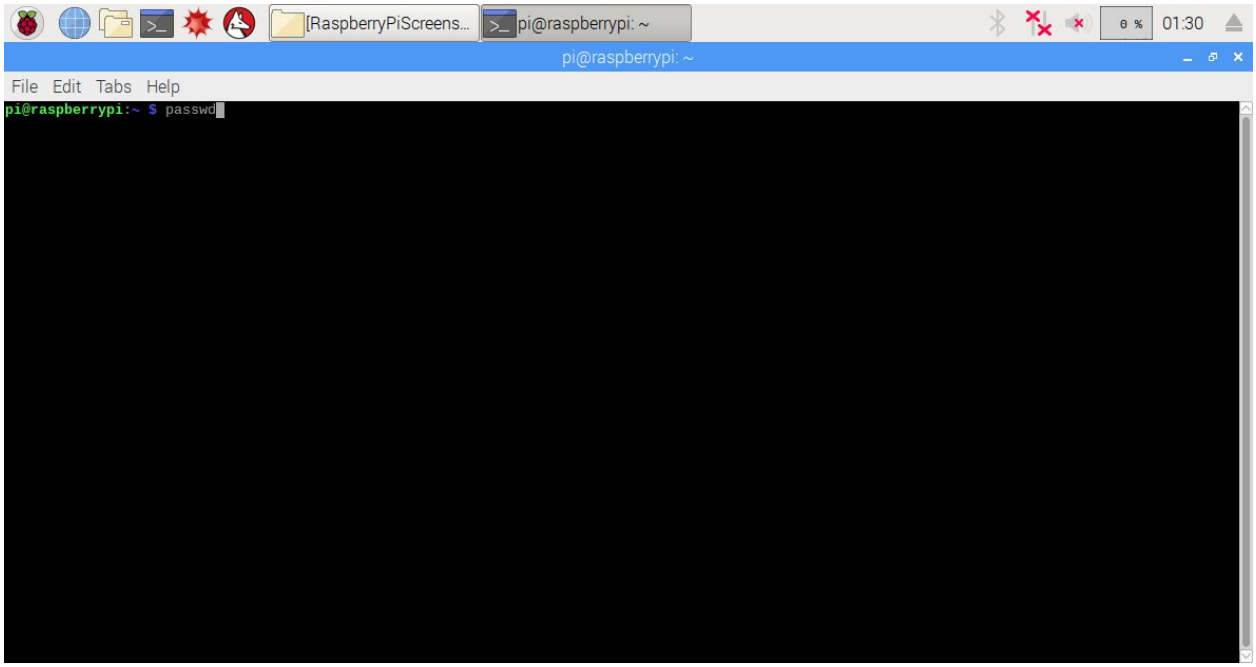
Changing the Password:

All Raspberry Pi's with Raspbian installed with them start off with the same default username and password (username: pi, password: raspberry). To avoid any potential security breaches from this, the first thing we will do after booting up the Raspberry Pi for the first time is change the default password.

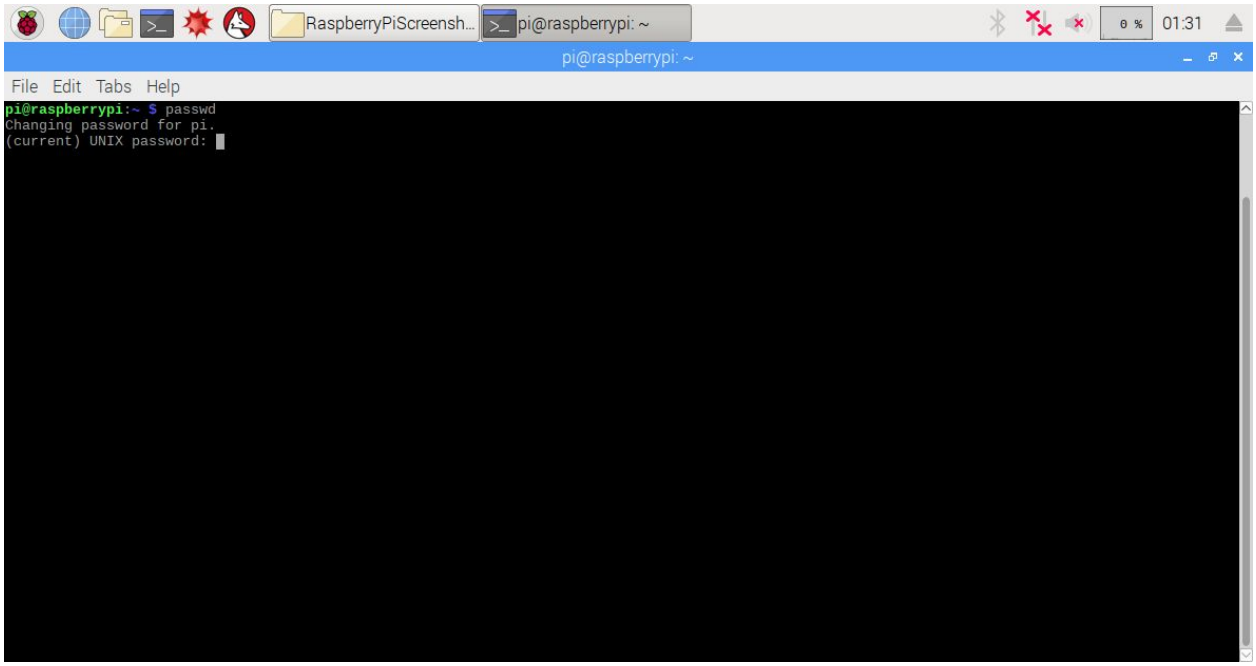
After the Raspberry Pi has finished booting you will be greeted with the desktop environment.



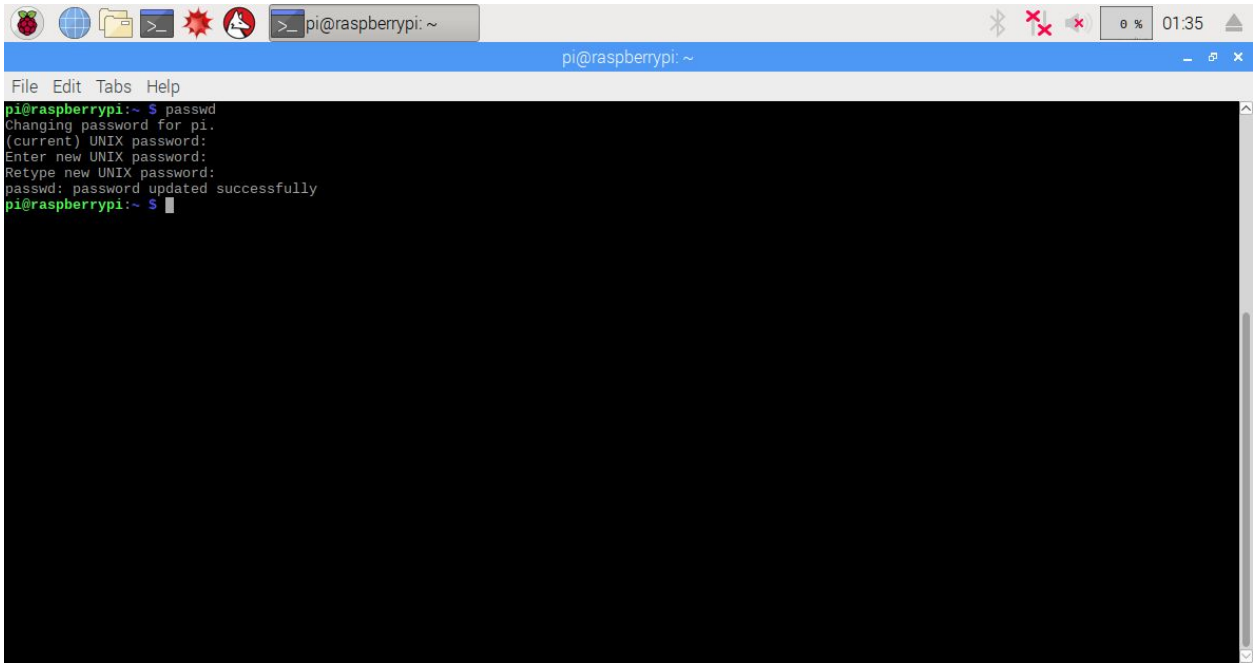
The first step in changing the default password is opening a "Terminal" window. This can be achieved by clicking the taskbar icon highlighted in blue in the image above.



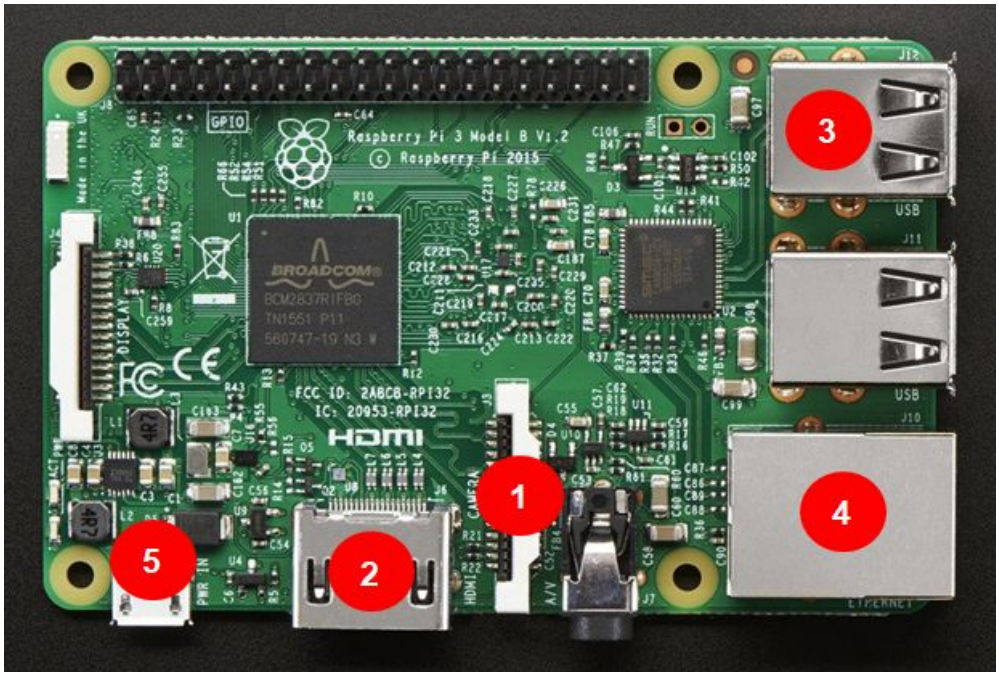
You will then be greeted by the window above. Using the terminal is as simple as typing in a command and pressing enter. To change the password enter the command “passwd”.



You will then be prompted to enter the current password, which as previously stated, is “raspberry”. After successfully entering the current, password you will be prompted to enter a new password of your choosing and then to verify the new password. If you are successful in changing the password, you will receive the message shown in the image bellow.

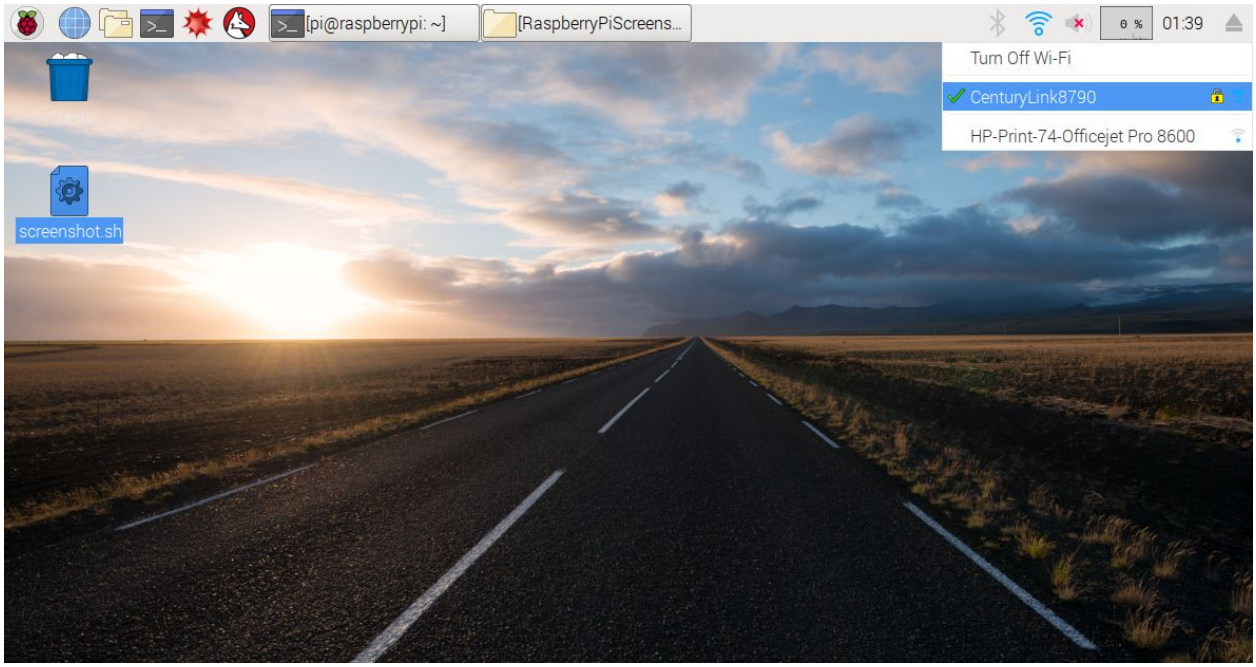


TIP: You can type the command “clear” at anytime to clear the terminal and be left with a window to when you opened terminal.



The next step in setting up the Raspberry Pi is connecting it to the internet. If you are using a wired internet connection, connect the CAT5/6 cable to the CAT5/6 port (Port 4 in the image above).

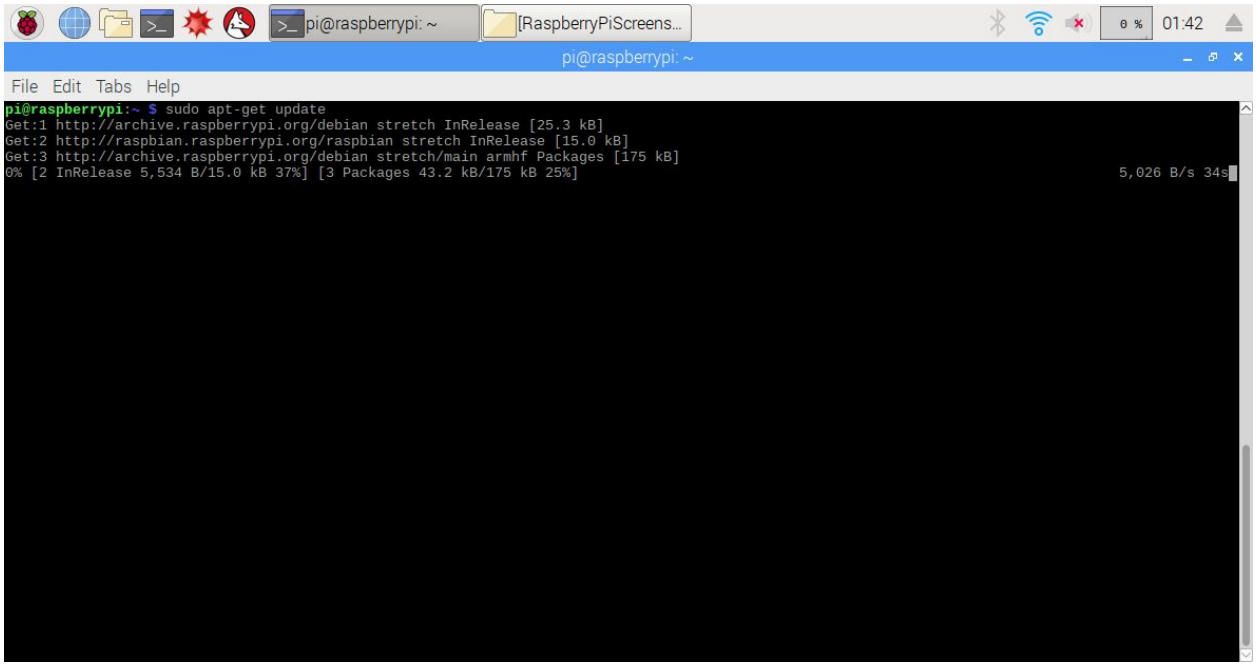
If you are trying to connect the the Raspberry Pi to Wifi, the process is almost as easy.



To connect to a wireless network, click the Wifi icon in the right side of the taskbar. Then choose your desired network from the dropdown menu, and enter the network's password if necessary.

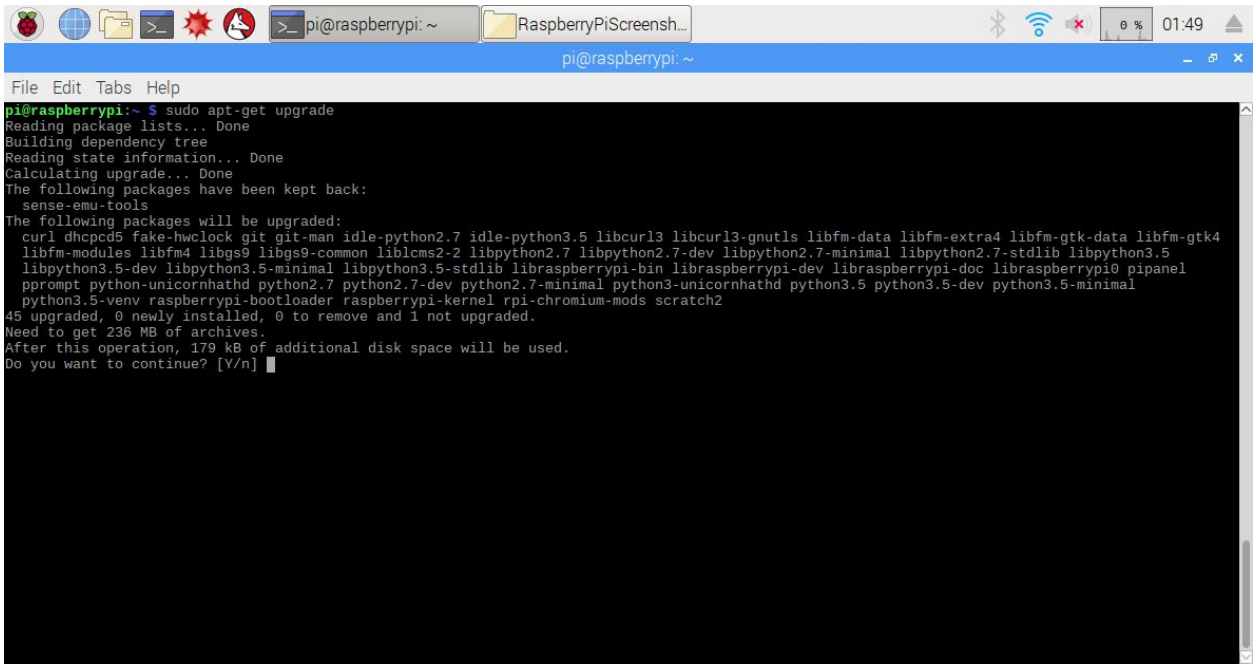
Updating the Raspberry Pi:

Now that the Raspberry Pi is connected to the internet, the operating system and the installed software can be updated.



Go back to the terminal window (or open a new window) and enter the command “sudo apt-get update”. Now wait for the update to complete. The update is completed when “pi@raspberrypi:~ $” is shown.

When the update is complete enter the command “sudo apt-get update”. This will begin the next step of the updating process.

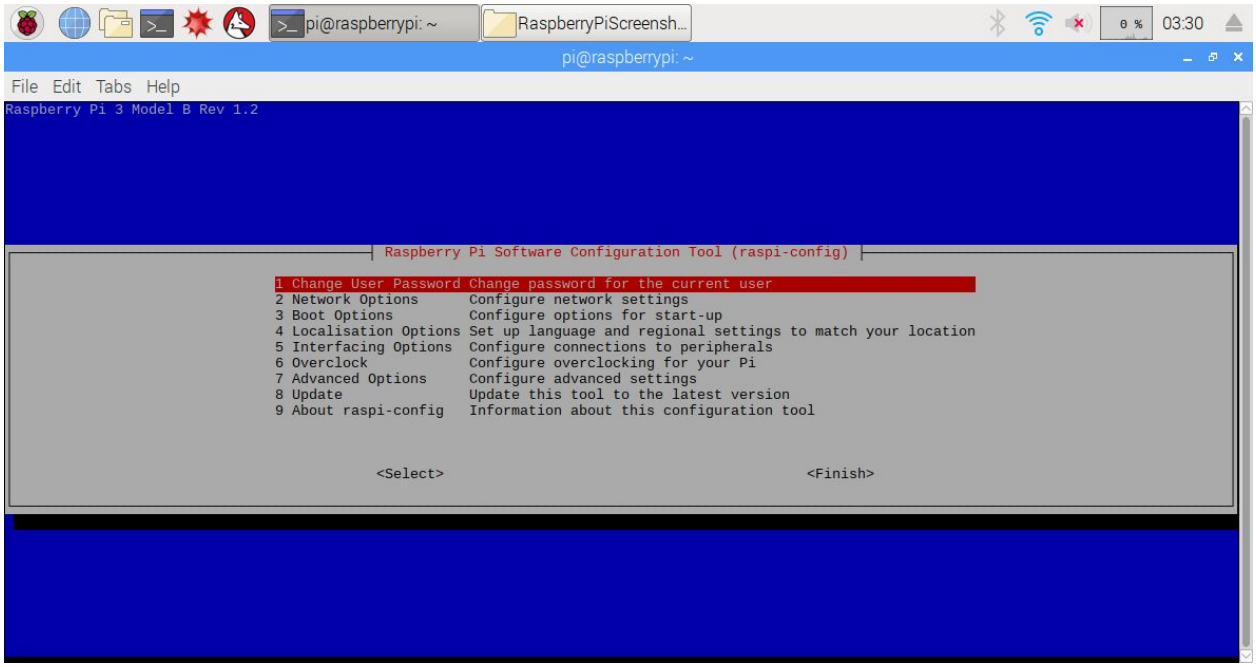


Once prompted with where you want to continue type “y” and press enter. The Raspberry Pi will then continue to update. This process may take some time; the update is completed when “pi@raspberrypi:~ $” is shown.

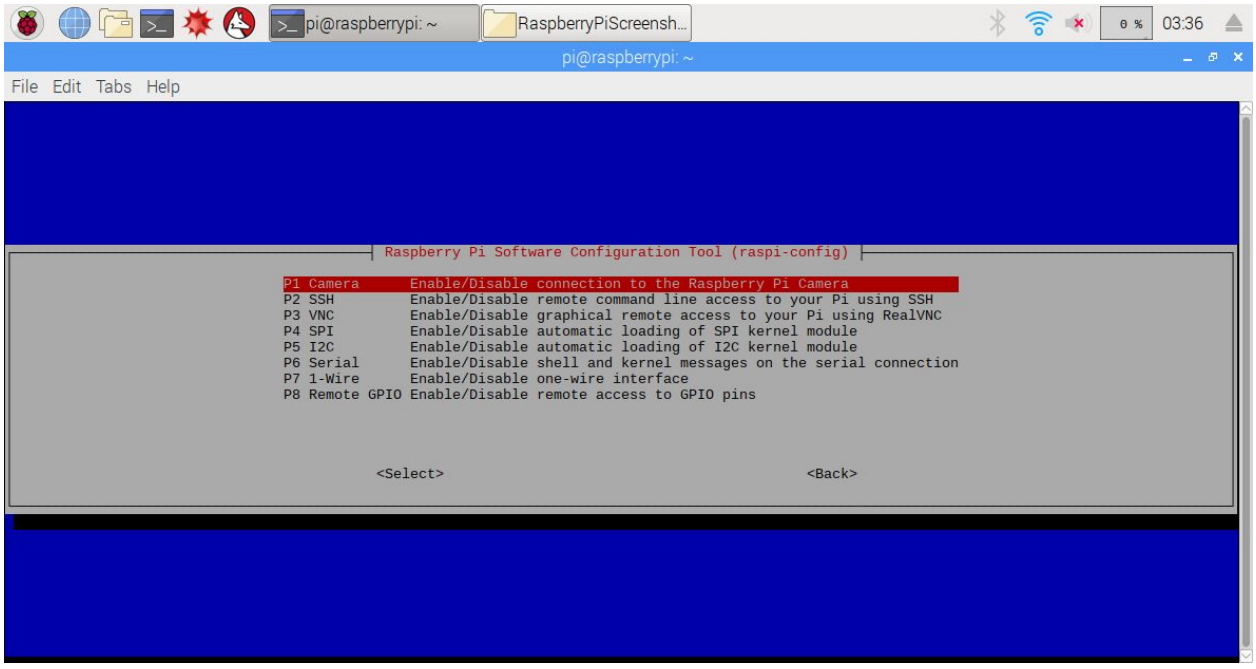
<u>Enabling the Raspberry Pi Camera:</u>

Even though the Raspberry Pi Camera is physically connected to the Raspberry Pi, we must enable the electrical interface via software in order to use it.

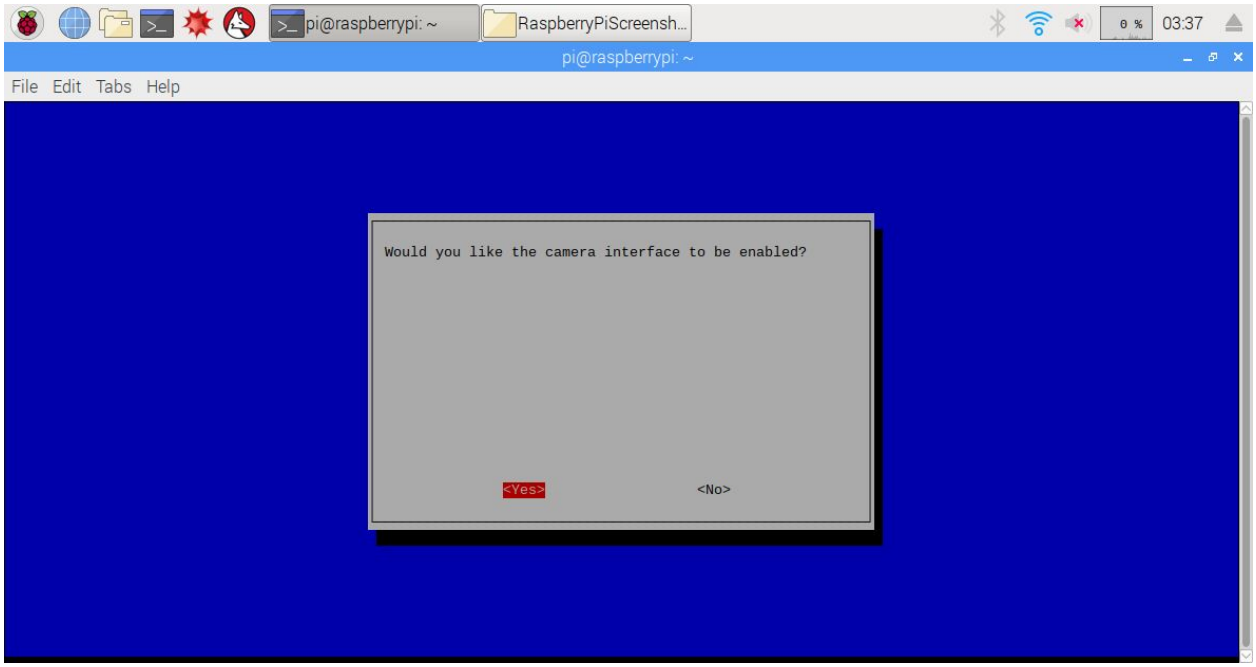
To enable the Raspberry Pi Camera interface, we will again use the terminal. First, enter the command “sudo raspi-config”, this will open a graphical menu. To navigate the menu use the arrow keys on your keyboard and the enter key to select the highlight option.



Once in the raspi-config menu, move to and select “5. Interfacing Options”.

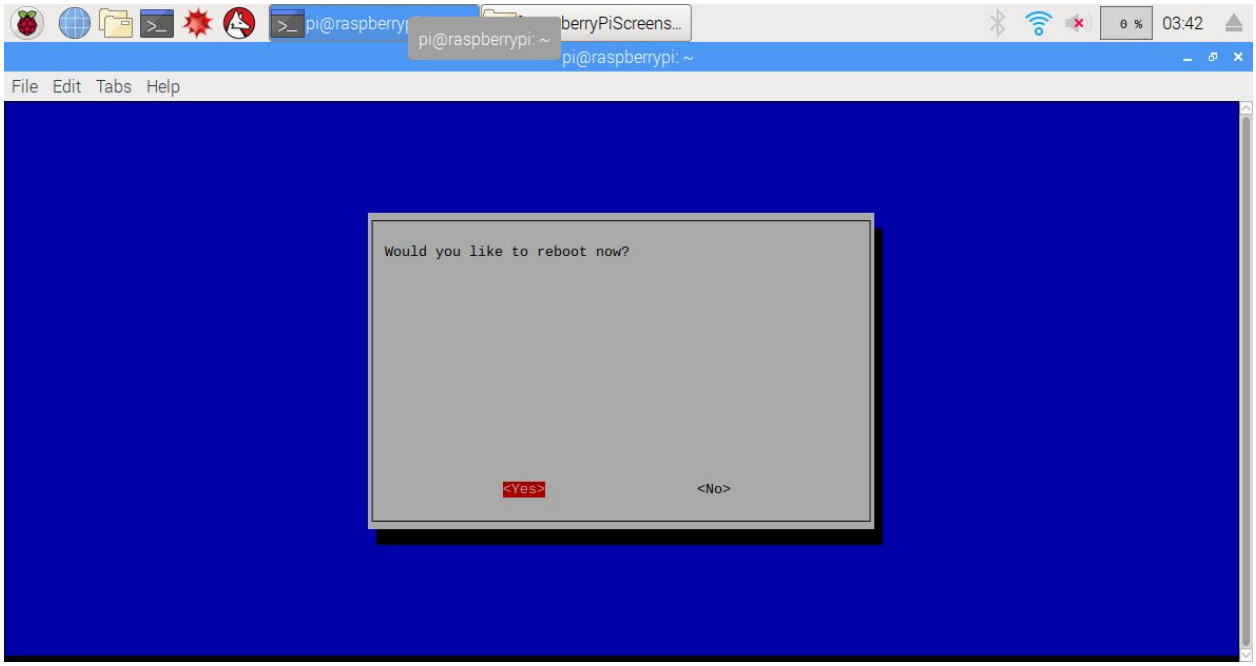


Within the Interfacing Options menu, choose the first menu item “P1 Camera”.



You will then be prompted to choose if you want the camera interface enabled. Choose “<Yes>” to enable the camera interface.

You will then be brought back to the original menu., where you should move to and select “<Finish>”.



When prompted if you would like to reboot choose “<Yes>”.

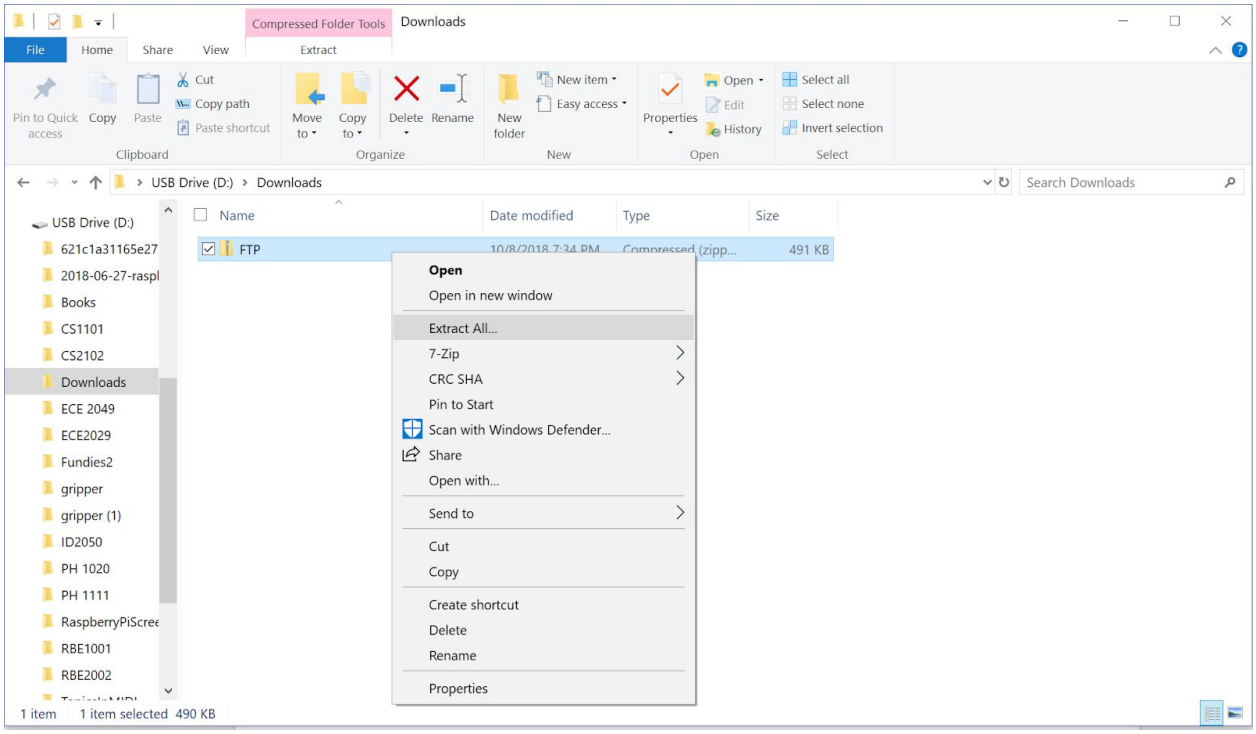
The Raspberry Pi will then reboot and the camera interface will be enabled.

Configure Camera Code:

Configure FTP Parameters:

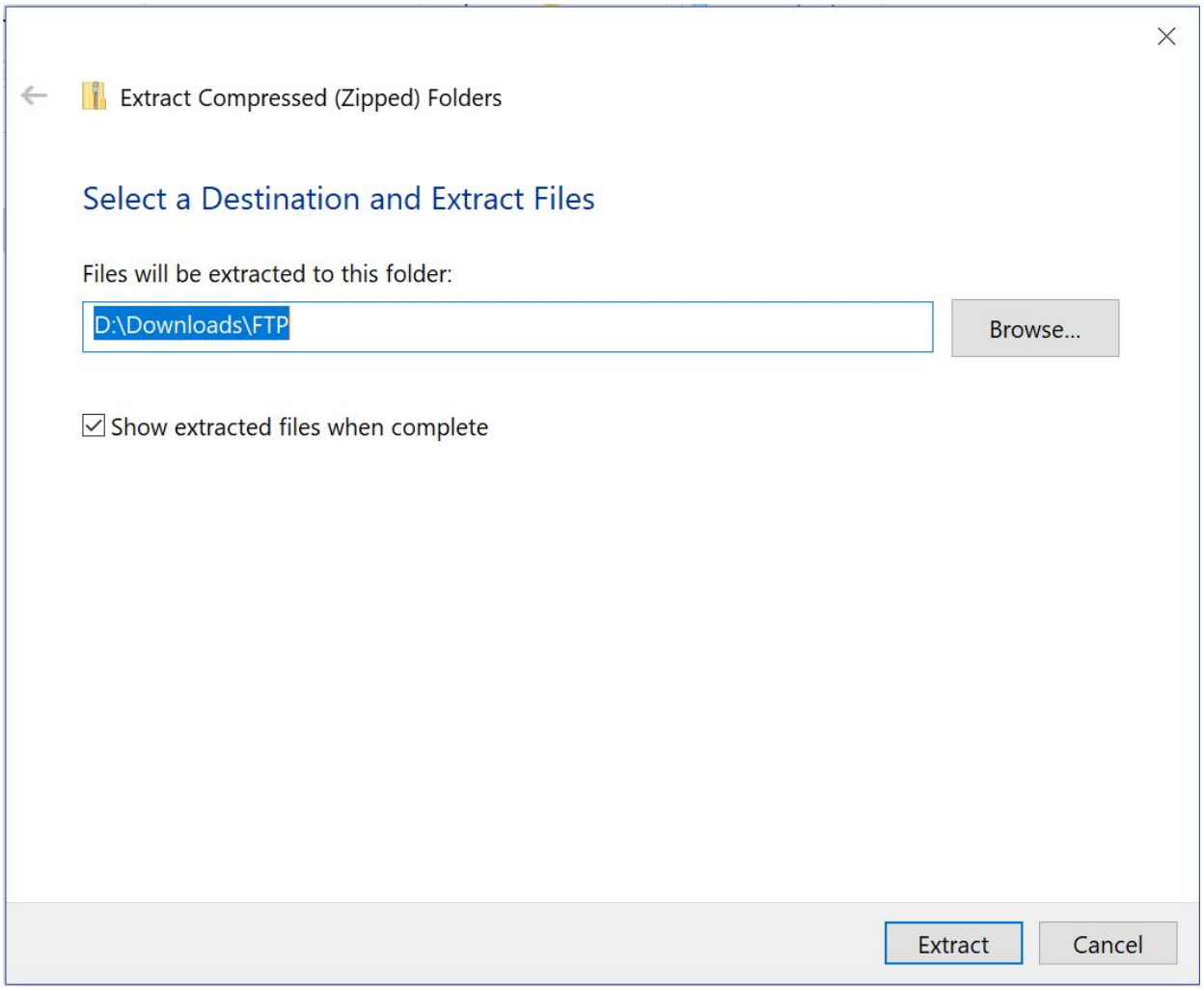
Now that the Raspberry Pi has been setup and updated, the final step in the configuration process is to add the code that captures images and uploads them via FTP.

The first thing to do is to download the FTP zip folder from here.
Once the file has finished downloading locate it in your downloads folder.

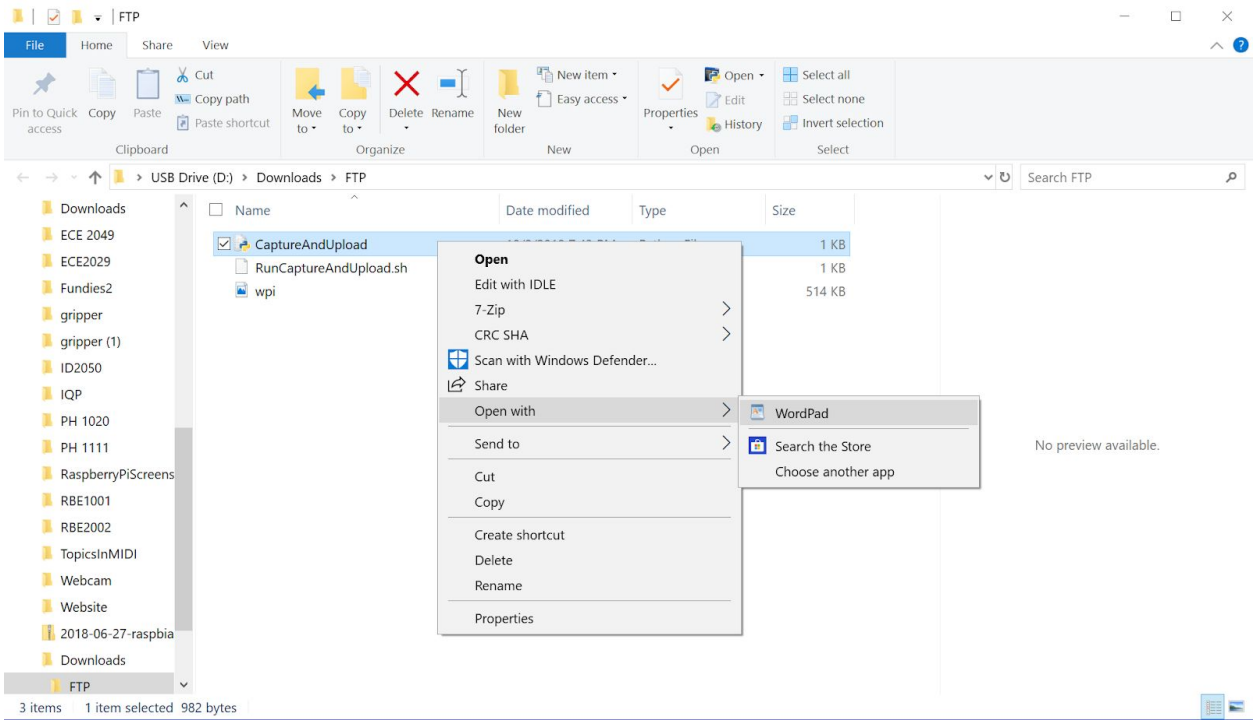


Then, right-click on the zipped “FTP” file and select “Extract All…”

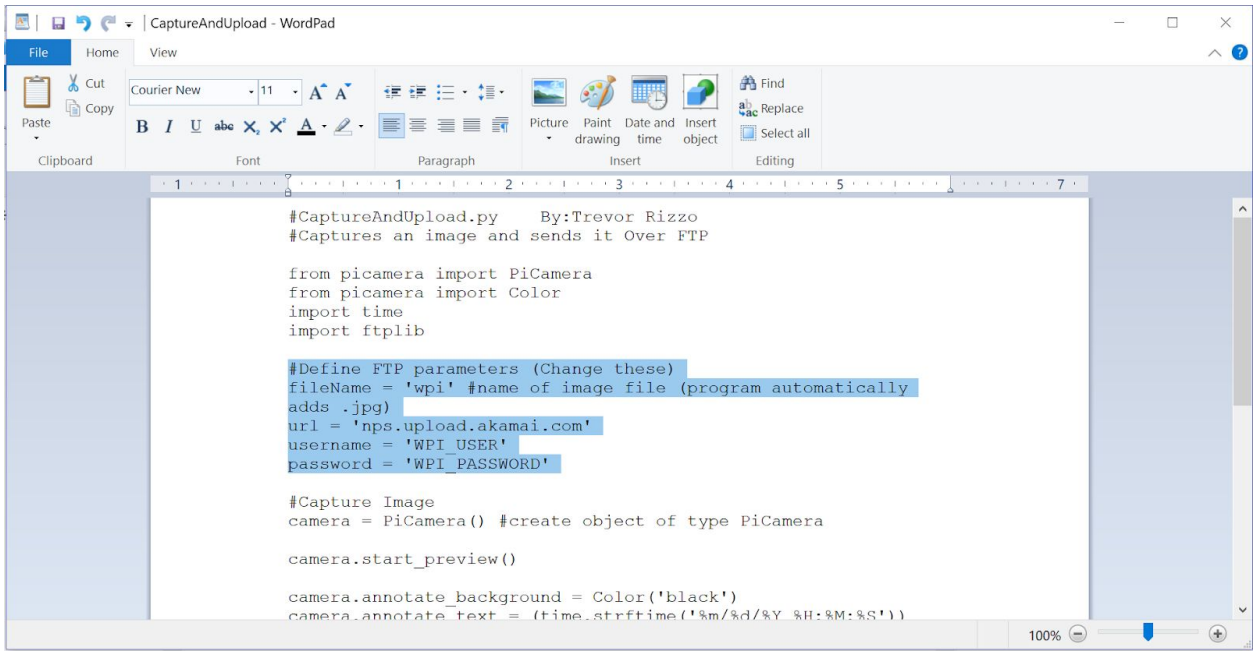
The following window will then appear.



Choose “Show extracted files when complete” and then click the “Extract” button.



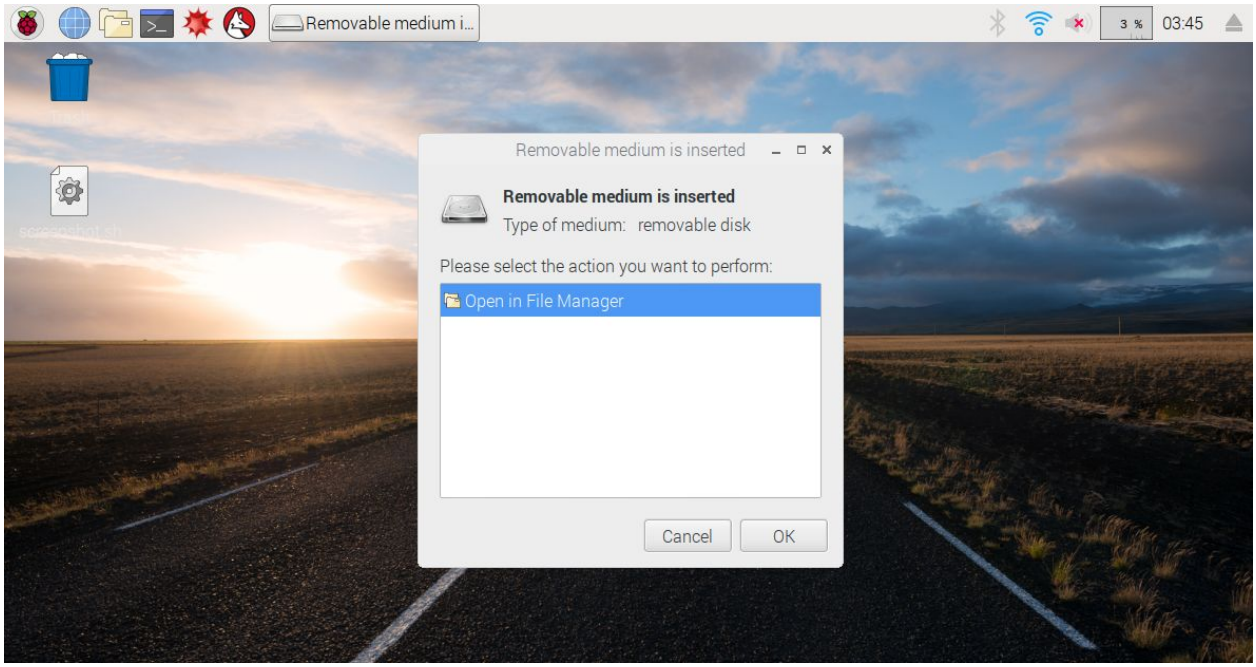
In the newly opened file explorer window, right-click CaptureAndUpload.py and choose open with WordPad.



Find the section highlighted above at the top of the opened document. Change each term within quotation marks to match the file name, url, username, and password of the desired FTP connection. Make sure to leave the quotation marks around each term.

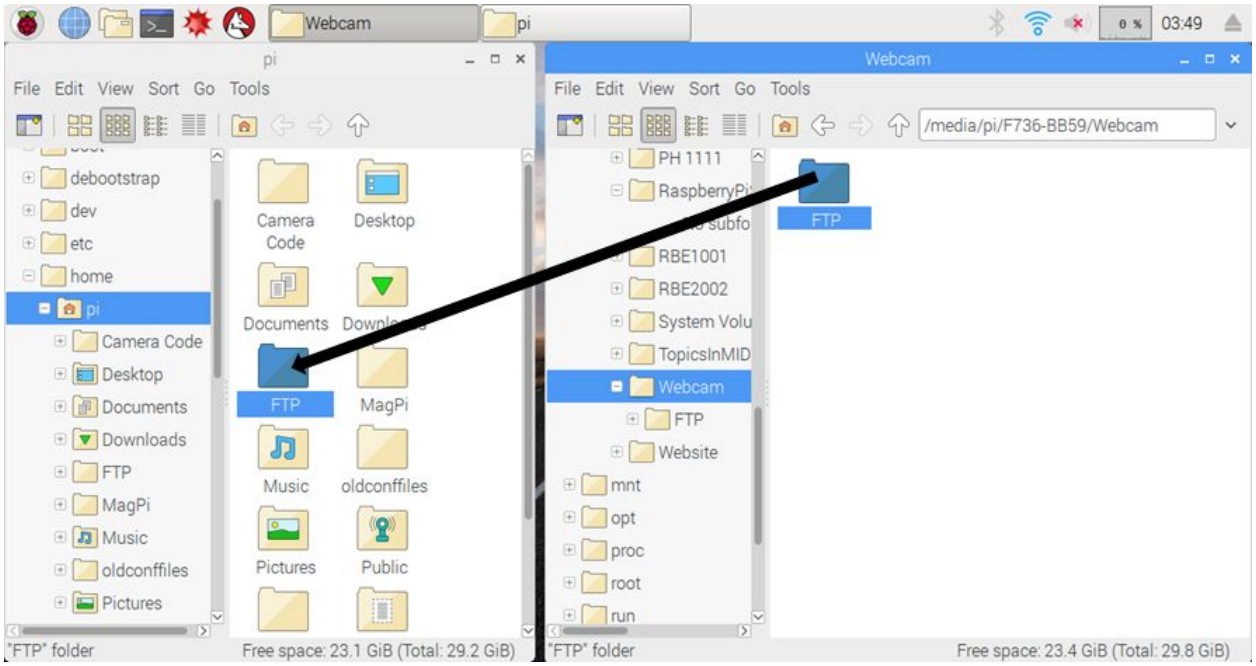
After entering all the parameters for the FTP connection, save and then close the file.

Next, copy the entire extracted “FTP” folder to a flash drive and insert the flash drive into the Raspberry Pi. When the flash drive is inserted into the Raspberry Pi the following window will appear.



Choose “Open in File Manager” and select “OK”. A File Manager window will be open showing the files on the flash drive.

Next, open another File Manager window using the file icon in the left side of the task bar.



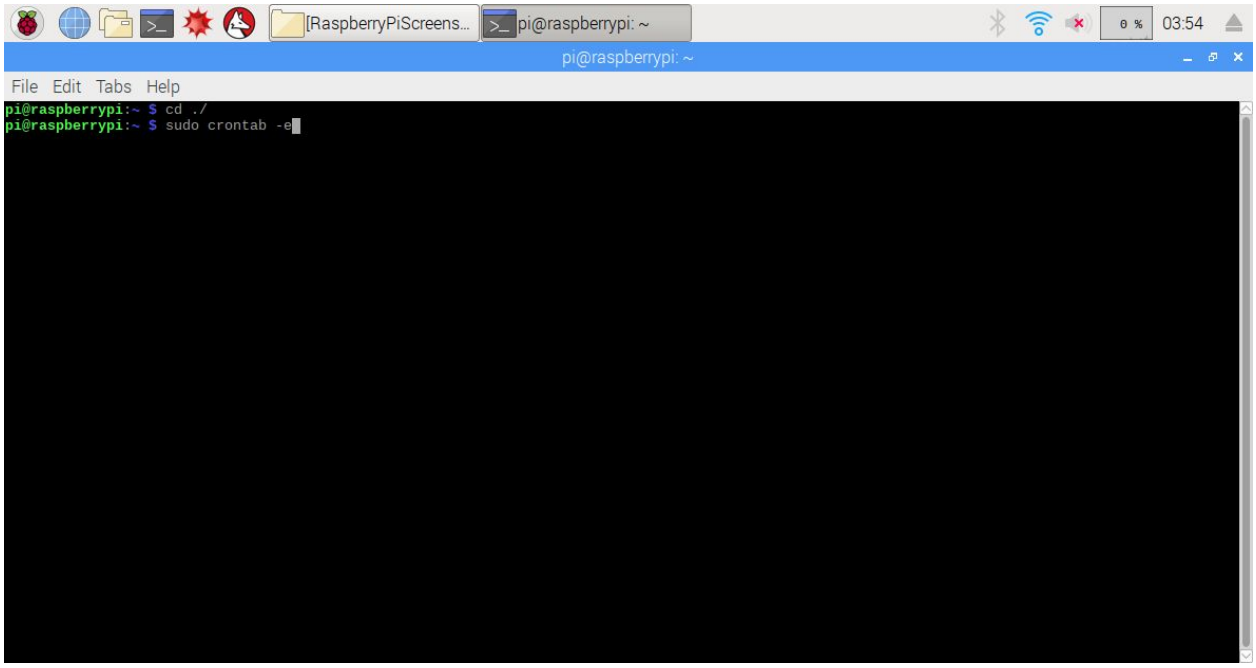
With the two windows side by side, drag the “FTP” folder from the flashdrive to the”pi” folder on the Raspberry Pi. This will copy the file and its contents to the Raspberry Pi.

The flash drive can then be ejected by selecting the eject icon on the right side of the taskbar, and then select to eject the flash drive. Once ejected, the flash drive can be removed from the Raspberry Pi.

Setting Frequency of Image Capturing:

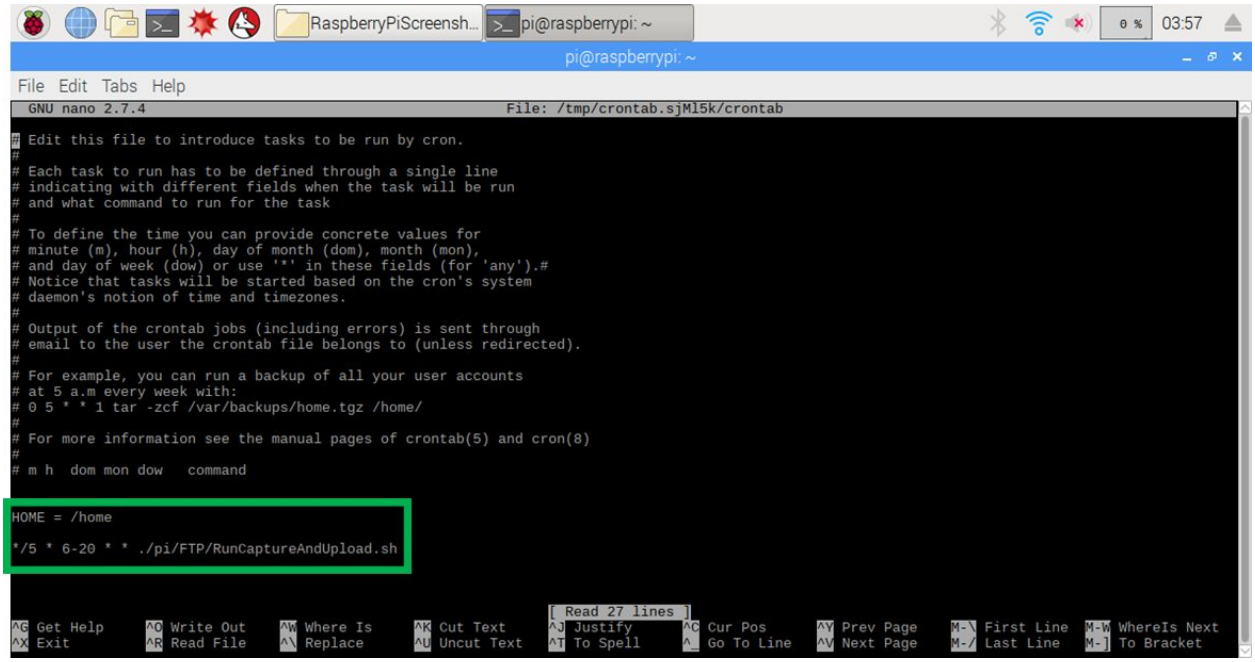
The final step in configuring the FTP connection is setting how often the Raspberry Pi should capture and upload and images. This will be performed using crontab which is used to execute scheduled programs in linux based systems.

To begin this process we will, again, open a terminal window.



In the terminal window, type the command “cd ./” to move to the root directory. Next, enter the command “sudo crontab -e”.

When prompted to choose an editor, press enter to choose “node”. Node is a text editor that runs inside of terminal. To use node, use the arrow keys to move to cursor and type with the keyboard as usual.

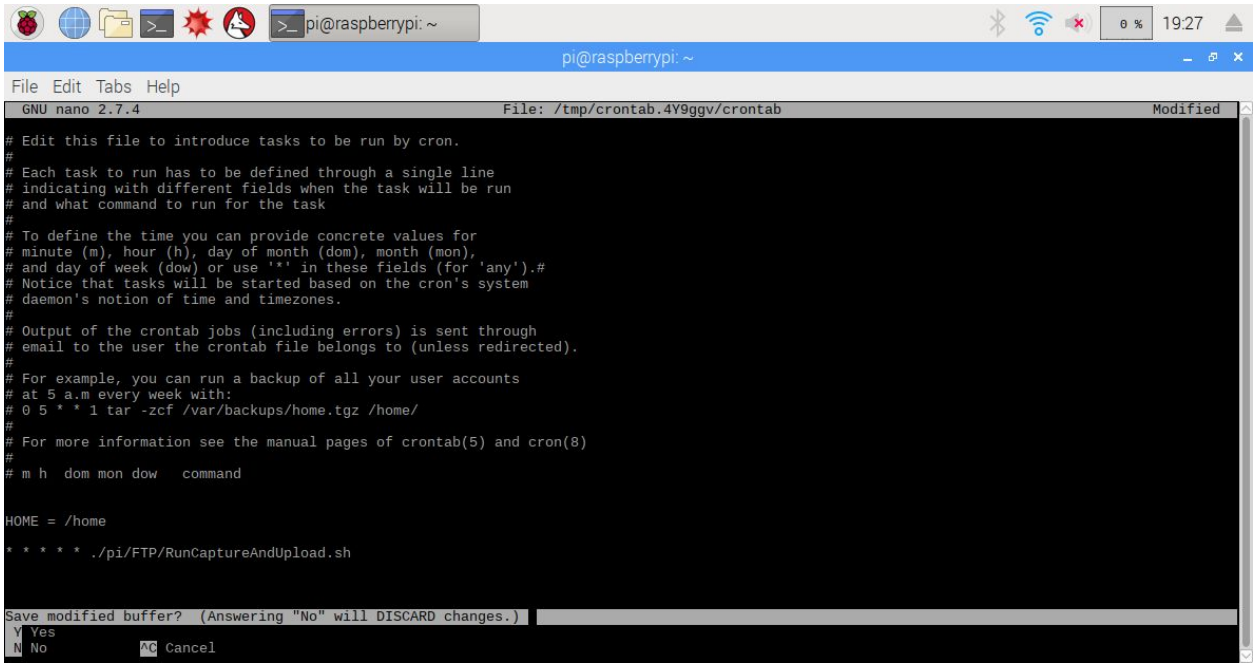


Under the existing text in the document, add the first of two lines boxed in green shown above:

"HOME = /home"

The next line sets the frequency at which the Raspberry Pi captures and uploads images over FTP. The second of the green boxed lines ("*/5 * 6-20 * * ./pi/FTP/RunCaptureAndUpload.sh") captures and uploads an image every 5 minutes from 6am (06:00 hours) to 8pm (20:00 hours) everyday. We can adjust time between photos and the daily timeframe for taking photos. A general format for doing this is inputting */A * B-C * *, where A is the time between photos in minutes, B is the start time, and C is the end time, in military time.
"*/5 * 6-20 * *" to "* * * * *" to capture and upload an image every minute of everyday. For more frequency options visit crontab.guru and https://crontab.guru/examples.html.

Once a frequency has been chosen, add the second line with the modified frequency.



Next, press Ctrl+X to exit node. When prompted to save press “y” and then enter.

The FTP setup is now completed and the terminal window can be closed. Now, anytime the Raspberry Pi is powered on and connected to the internet it will capture and upload images via FTP and the set frequency.

Before powering down the Raspberry Pi, ensure that the FTP connection is functioning. If the connection is verified, the Raspberry Pi can be powered down and placed in its new location.

Setting Up Cellular Network Connection:

This feature of the Webcam was not fully implemented during the project term for more information on implementing this connect with the Adafruit FONA Board visit:

- https://www.adafruit.com/product/3147 **(note required materials)**
- https://learn.adafruit.com/fona-tethering-to-raspberry-pi-or-beaglebone-black/overview
- https://www.digikey.com/en/product-highlight/i/initial-state/pi-3-fona-tutorial

Appendix G: Raspberry Pi Webcam Code

```
#CaptureAndUpload.py    By:Trevor Rizzo
#Captures an image and sends it Over FTP

from picamera import PiCamera
from picamera import Color
import time
import ftplib

#Define FTP parameters (Change these)
fileName = 'wpi' #name of image file (program automatically adds .jpg)
url = 'nps.upload.akamai.com'
username = 'WPI_USER'
password = 'WPI_PASSWORD'

#Capture Image
camera = PiCamera() #create object of type PiCamera

camera.start_preview()

camera.annotate_background = Color('black')
camera.annotate_text = (time.strftime('%m/%d/%Y %H:%M:%S')) #add timestamp
to image

time.sleep(5)

camera.capture('/home/pi/FTP/%s.jpg' % fileName) #capture image and save
to FTP folder

camera.stop_preview()
camera.close()


#Upload Image with FTP

#Starts FTP session with FTP url, username, and password
session = ftplib.FTP(url, username, password)

image = open('/home/pi/FTP/%s.jpg' % fileName, 'rb')
session.storbinary('STOR %s.jpg' %fileName, image)

image.close()
session.quit()
```