Strategies for Saving: Identifying Strategies for the Future of the National Parks

by

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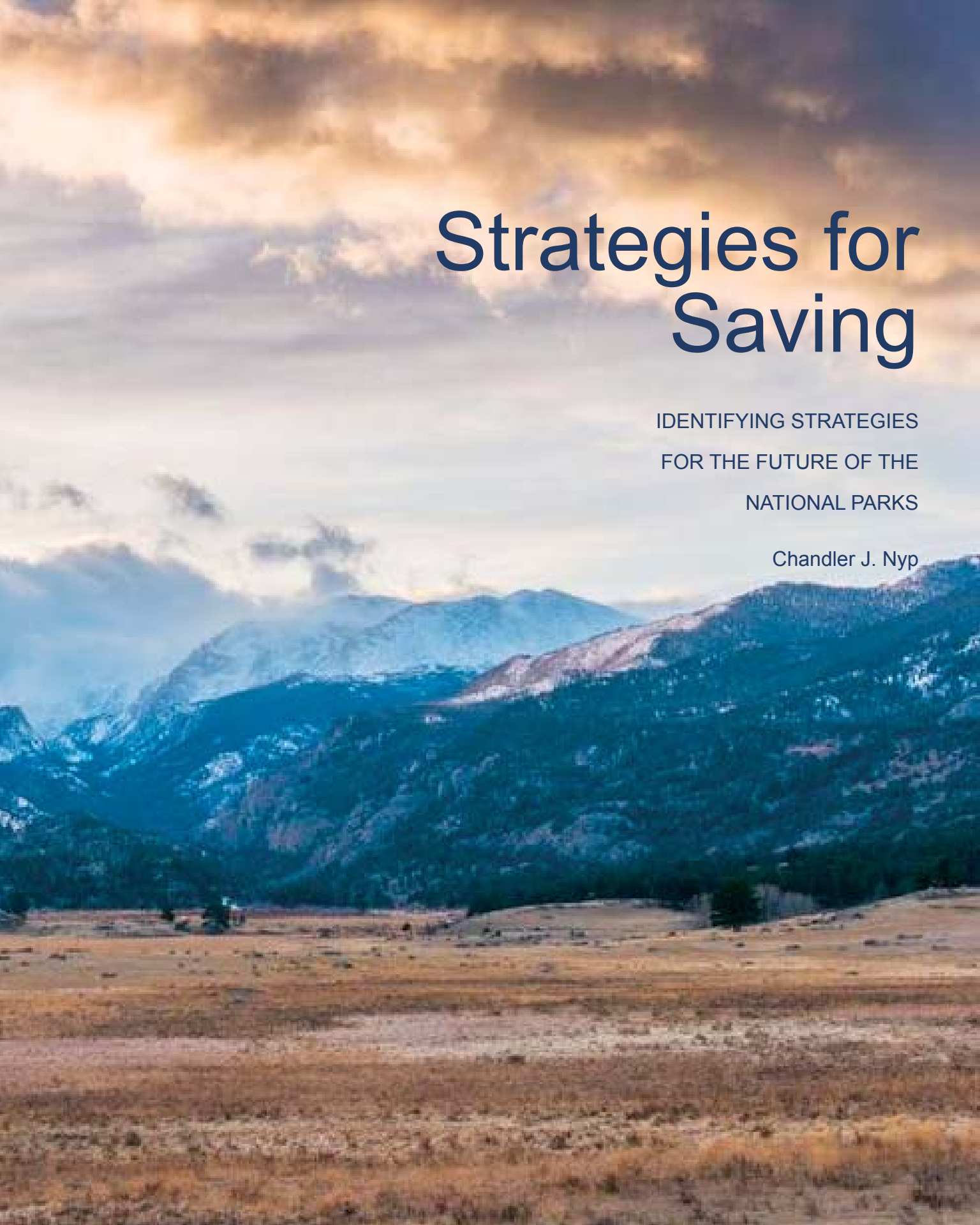
Abstract

When visiting a national park, what do you expect to see? Beautiful views of scenery, or long lines for crowded overlooks and massive parking lots overflowing with people? With the current state of most national parks, you will most likely be in for all three. Within the last hundred years the national parks have offered visitors a chance to escape the hustle and bustle of life by offering a place outside of crowded cities and sprawling suburbs. But the increasing popularity of the National Parks comes with a cost: a decline in the nature experience as parks become more crowded and parking lots become more sprawling. What are the impacts of visitors on the national parks, and how can the NPS reduce these impacts?

This report begins with background research to determine what impacts visitors have on the National Parks, as well as the strategies and practices park management uses to help combat the negative impacts of visitors. Next, park profiles of 8 of the top visited parks in the nation were developed to understand more about the history of each park, and what impact mitigation practices they have used in the past. Using Manning and Anderson's matrix for identifying and organizing information about the issues in the national parks and the management strategies and solutions an online survey and a phone interview were developed to gather information on current conditions in the most visited parks (Manning and Anderson 2012).

With the information gathered from the interviews, surveys, and park profiles, a set of recommendations for the future of the national parks was identified. The objective of this research was to determine what options are available for national parks to preserve these relaxing vacation destinations for future generations.



Strategies for Saving

IDENTIFYING STRATEGIES FOR THE FUTURE OF THE NATIONAL PARKS

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Acknowledgments

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Chapter One:

Introduction

Background

With 2016 marking the Centennial of the National Park Service (NPS), the number of annual visitors to the parks has skyrocketed. Although increasing popularity among these national treasures may seem beneficial, there are certain problems that arise alongside this success. An increase in population and the number of visitors to national parks can have a severe and detrimental effect on a park's infrastructure and ecology. In addition to the straight forward effects caused by having more visitors, such as an increased need for staff and more infrastructure to accommodate these numbers, it also creates an ethical dilemma pertaining to the balance between the visitors' wants and needs, and the NPS' primary purpose of preserving and protecting the parks from harm.

In the Organic Act of 1916 President Woodrow Wilson simultaneously created the National Park Service and commissioned them to the following:

> *"the service thus established shall promote and regulate the use of Federal areas, known as national parks, monuments and reservations…by such means and measures as conform to the fundamental purpose of the said parks, monuments and reservations, which purpose is to conserve the scenery and the natural and historic objects and the wild life therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations (National Park Service 2016)."*

This research begins with the history of the NPS and the negative impact outdoor recreation has on the natural systems of the parks. The focus of the study was on the top 10 most visited

parks in the NPS. The rationale behind this focus is that the most-visited parks in the NPS would have the most damage caused by outdoor recreation. Following selection of the parks to be used in this study, the next step was to create overviews of information on these individual parks, coined “park profiles.” With the research and park profiles in mind, a standardized interview was created; it was reviewed and approved by Kansas State University’s Internal Review Board. Park Superintendents (or their representatives) at the top National Parks were invited to be interviewed, with eight parks agreeing to participate. In addition to the interview, the Park Superintendents were asked to supply a list of five Key Park Personnel who would take an online Qualtrics Survey that also went through the IRB approval process. With the transcripts from the interviews and the results from the Qualtrics surveys, a thematic exploration was conducted to evaluate the participants’ comments on the issues plaguing the national parks and the management practices and strategies being implemented to remedy them. From the analysis of themes, a series of recommendations were made to improve the issues identified in the thematic exploration.

Research Questions

What can the National Park Service do to manage the annual rise in park attendance, in a way that respects both the visitors’ needs and the National Park Service’s mission to preserve the ecology and scenic beauty of our parks?

Supporting Questions Include:

1. What strategies have been proposed and attempted in the past, to combat the National Park Service’s visitor dilemma?
2. What strategies are currently being used, and why were they selected over other options?

Overview of Project

This study aims to develop recommendations for the future development of the National Parks from Thematic Exploration of information gathered from a series of Park Profiles, Semi-Structured Interviews with Park Superintendents and Qualtrics Surveys with key park personnel.

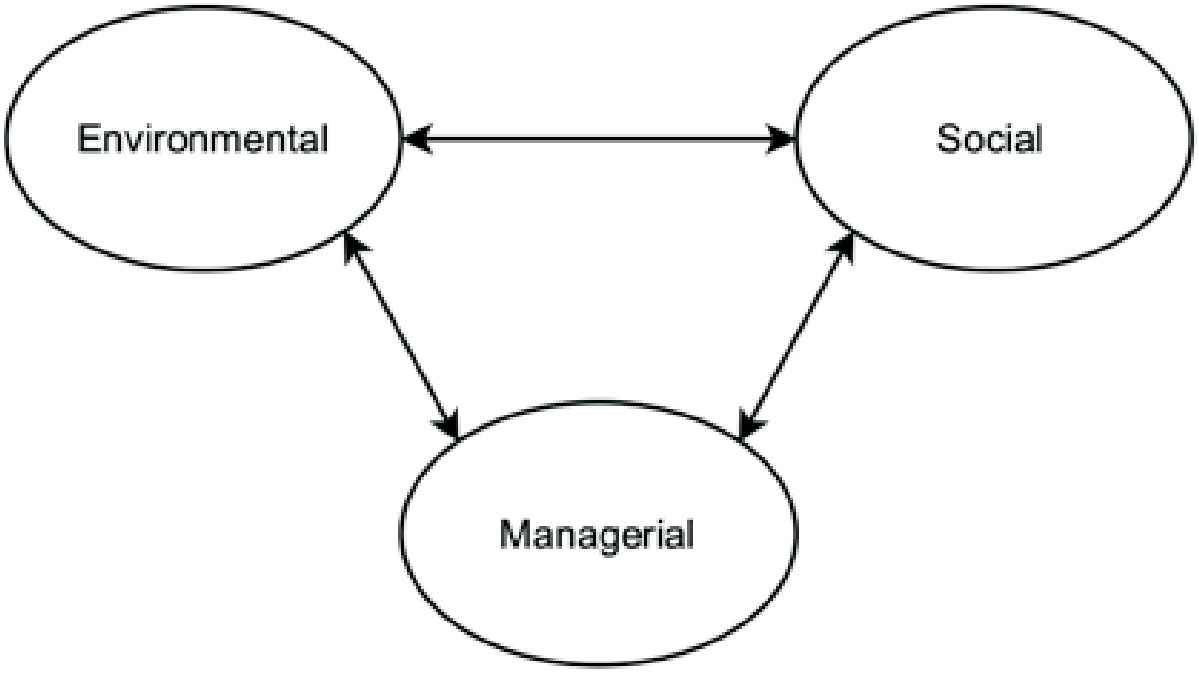

Figure 2.1- The threefold framework of outdoor recreation (Manning and Anderson 2012)

Chapter Two:

Background

In Manning and Anderson's 2012 book *Managing Outdoor Recreation*, the authors thoroughly explain the attendance trends and issues presented in national parks all over the nation. Manning and Anderson separate the issues the national parks are facing into three categories: Environmental Issues, Social Issues, and Managerial Issues, as found in Manning and Anderson 2012. Figure 2.1 shows Manning and Anderson's threefold framework of outdoor recreation impacts. In *Managing Outdoor Recreation*, Manning and Anderson guided this research on the topic of outdoor recreation.

Visitor Impacts

Impacts to Resources

The first category of impacts outlined by Manning and Anderson (Manning and Anderson 2012) are those visitors have on resources, namely impacts on soil, vegetation, water, wildlife, air, soundscape, night sky, and historical/ cultural resources.

Soil

Visitors impact the soil predominately through soil compaction, both directly and indirectly. Visitors directly increase compaction through hiking, use of pack animals, and vehicles (such as ATVs, golf carts, and mountain bikes) (Manning and Anderson 2012; Hammitt and Cole 1998). Visitors indirectly effect the soil through damages caused by fires, erosion of topsoil that in turn changes what microorganisms are found in the soil, and the loss of important parts of the ecosystem like rotting logs that aid in fungi growth (Manning and Anderson 2012; Hammitt and Cole 1998). These impacts to the soil are interconnected with other resources, especially impacts on vegetation (both suffer from trampling when visitors leave the path) and impacts on water (the relationship between compaction and changes to erosion).

Vegetation

Outdoor recreation affects vegetation in much the same way it affects soil. When visitors leave the defined paths, they tend to step on plants, unaware that they are potentially damaging delicate ecosystems in ways that can have long lasting effects (Manning and Anderson 2012; Hammitt and Cole 1998).

Water

Outdoor recreation's main impacts on water are through changes to the ecosystem, pollution, and littering. Changes to an ecosystem can appear as introduction of outside species of plants and animals or nonnative/ invasive species (Leung and Marion 2000) or as human impacts on an ecosystem such as over-fishing (Manning and Anderson 2012; Leung and Marion 2000; Hammitt and Cole 1998). Pollution can occur through the accidental or intentional release of chemicals or toxins into a waterway, including pollution from boats and vehicle runoff, and from human waste and products (soaps and chemicals), (Manning and Anderson 2012; Hammitt and Cole 1998).

Wildlife

Visitors' impacts on wildlife can be very visible, such as when a visitor interacts with the wildlife directly by feeding it or trying to pet it, but it can also be subtler such as when visitors make lots of noise and startle wildlife causing them to move from their customary habitats or by preventing them from having access to a water or food source (Manning and Anderson 2012; Hammitt and Cole 1998).

Air

Outdoor recreation can cause various types of air pollution which affect and magnify the impacts of pollution in other factors. Air pollution from vehicles and campfires can be harmful to vegetation, water, and wildlife. User experiences also suffer when air pollution is present, causing trouble for visitor with breathing problems like asthma and it can even damage views by lowering visibility (Manning and Anderson 2012).

Soundscape

The impacts of outdoor recreation on a park's soundscape can affect visitors' experiences as well as wildlife. One of the draws of coming to a national park is that the visitor gets a break from the loud and busy cities and towns, and when parks are filled with noisy vehicles, noisy people, and noise devices like phones and music players, visitors' experiences can be severely degraded. Wildlife also require more natural soundscapes to ensure that they are not disturbed or impaired in the way they communicate, hunt, or protect themselves (Manning and Anderson 2012).

Night sky

The impacts of light pollution effect nocturnal wildlife and visitors alike. Nocturnal wildlife requires dark environments to hunt for prey and hide from predators, and therefore light pollution creates a difficult situation for them. Some visitors come to the national parks to escape from the city and for some that means enjoying the untainted darkness of the night sky, therefore the lights of cities or development decrease the experience (Manning and Anderson 2012).

Historical/ Cultural Resources

In areas where there are historically or culturally important objects or sites, visitors can have negative impacts by improper handling of the objects, removal of objects as souvenirs, or not showing proper reverence and respect. Things like camping, campfires, and cooking near these resources can likewise damage the objects or sites (Manning and Anderson 2012).

Impacts to Experience

The second series of impacts caused by outdoor recreation revolve around the experience of the user. These impacts deal mainly with things that visitors do that impact other visitors, namely crowding, conflict between visitors or groups, and depreciative behavior.

Crowding

Crowding can significantly impact how visitors feel about the national parks and is one of the most-discussed issues within the NPS. Visitors come to the national parks to escape the city and enjoy the scenic beauty of the wild, but too many people can cause the experience to become

tainted. Areas where visitors would typically like to stop and relax and reflect become spots to pass through or take only a brief break in (Manning and Anderson 2012; Manning 1999).

Conflict

Conflict between groups of park users can significantly impact how visitors experience the parks. The conflict is usually based on groups of people disagreeing over the purpose and function of the national park. This disagreement launches the debate about what the NPS was founded for, which is an issue that has been debated for most of the NPS's history (Manning and Anderson 2012; Jacob and Schreyer 1980).

Depreciative Behavior

Depreciative behavior impacts visitors because the national park has been damaged by vandalism, littering, or any behavior that damages the future experience of the future visitor. Depreciative behavior can take many forms such as carving in trees, constructing cairns, or being boisterous and disturbing animals and other visitors. Such behavior can have an impact on other visitors' experience in the parks (Manning and Anderson 2012; Hammitt and Cole 1998).

Impact to Facilities/ Services

The third type of impacts caused by outdoor recreation are impacts to the park facilities and services. These impacts deal mainly with the way visitors interact with different areas of the park. The previous two sections list the impacts visitors have on both the ecology of the park and on their fellow visitors, but in this third section the impacts deal with areas that see a large amount of park visitors and therefore are at a high risk of being damaged by the ecological and social issues described in the previous sections. These areas of the park that receive large amounts of visitors are special attraction sites, the trail systems, the campgrounds and campsites, the roadways and parking areas, and the interpretive facilities and programs that occur within the park.

Attraction Sites

The first area of the parks that experiences heavy impacts from outdoor recreation are the special attraction sites. These special attraction sites are unique to each park and often are the "must see" attractions for visitors to the parks. These areas are designed for large numbers of

visitors and generally include amenities for the comfort of visitors, as well as for the protection of the feature of display. Due to the level of popularity common with attractions sites, they are susceptible to crowding, conflict among visitors, and depreciative behavior like littering (Manning and Anderson 2012).

Trails

The next area of the parks that experiences heavy impacts from outdoor recreation are the trail systems that lace through the parks. NPS trails are generally used by hikers/ backpackers, mountain bikers, ATV users, and horseback riders and, depending on use and funding, can be anywhere on the spectrum between highly developed concrete trails and more natural dirt paths. Trails are susceptible to damages caused by visitors from trampling, including “erosion, muddiness, trail widening and vegetation loss, soil compaction, loss of habitat for burrowing animals, trail deepening, formation of ruts and grooves, and creation of unofficial social paths (Manning and Anderson 2012; Leung and Marion 2000). With the increase in visitors, these resource factors are also increased and social factors such as crowding and conflicts between users are introduced (Manning and Anderson 2012).

Campgrounds/Campsites

Campgrounds and campsites are often used as interchangeable terms for the general population, but in truth a campsite is used by a single group of campers while a campground is a cluster of campsites. The ecological effects of visitors on campgrounds are much the same as the ecological effects on trails, with trampling being the cause of soil compaction, erosion, loss of vegetation, fire damage, wood depletion for campfires, and damage to trees (Manning and Anderson 2012). Wildlife can also be scared away from vital habitats, or conversely visitors’ food can attract animals and cause them to become accustomed to coming to the visitors for food, which can result in visitors and wildlife being injured. Visitors also harm the environment by littering and by leaving behind waste that can damage the water supply (Manning and Anderson 2012).

Roads/Parking Areas

Roads and parking lots receive some of the heaviest impacts from visitors, due to most visitors' vehicular dependency. During the busiest times of year parks can experience huge numbers of vehicles vying for parking spaces and access to scenic views from the road, which can cause congestion on the roads. This congestion in turn leads to air pollution and conflicts between visitors, and in areas with insufficient parking, people often park on the side of the road, causing soil compaction and damage to vegetation (Manning and Anderson 2012).

Interpretive Facilities/Programs

Interpretive facilities are the buildings with the purpose of aiding visitors and adding to their experience, and interpretive programs are programs that help inform and educate visitors to the park. As examples of interpretive signs Manning and Anderson give visitor centers and interpretive signs, and as examples of interpretive programs they cite ranger-led hikes and school programs. Impacts visitors have on these interpretive facilities include crowding during busy season and depreciative behavior like graffiti and littering. Noisy and disruptive visitors can have a negative effect on the interpretive programs (Manning and Anderson 2012).

Management Strategies and Practices

Management Strategies

After defining the impacts of outdoor recreation on a park's ecology, experience, facilities, and services, Manning and Anderson (2012) go on to outline the management strategies that are commonly used to limit the impacts of visitors. Manning (1979) defines management strategies in an earlier work as "the basic conceptual approaches that relate to the achievement of desirable objectives" (Manning and Anderson 2012; Manning 1979). Manning and Anderson list four strategies for addressing the impacts of visitors on parks: increase supply, reduce the impacts of use, increase the durability of resource or experience, and limit use (Manning 1979).

Increase Supply

The first management strategy denoted by Manning (1979) is to increase the supply, which in this case means increasing the visitor's access to the park. This can be accomplished by

increasing the amount of time that visitors have access to the park, or by expanding the area in which the visitors can explore the park. When increasing the amount of time that visitors can visit the park, it is important to examine when the parks are the most crowded and when people could be encouraged to visit to alleviate the burden of the busiest days. Some ways to entice people to visit in non-peak times, is to lower entry fees at lower use times (and higher entry fees at higher use times), create new programs, and changing when seasonal activities begin and end.

When expanding the area that visitors have access to, it is important to examine how much space is currently being used within a park, as well as what the current uses of those areas are. Another important question to ask is, what will the effects be on the areas of expansion? Manning and Anderson offer two strategies for expansion, real area expansion and effective area expansion, with expansion of the real area being “the acquisition of additional acres of parkland for recreation” and effective area being “managing existing units more intensively to provide additional opportunities for recreation” (Manning and Anderson 2012). Expanding the real area available for recreation can mean growing the size of a park unit, while expanding the effective area can mean increasing the visitors’ ability to access the current recreation areas by bettering facilities, such as roads, trails, and campsites (Manning and Anderson 2012).

Reduce Impacts of Use

The second management strategy is to reduce the impacts of visitor use on the park, which can mean modifying the use, dispersing the use, or concentrating the use to one area of the park. When modifying the use of recreational areas, it is important to examine what visitor activities are most harmful to the park’s ecology, because if they cannot be modified to reduce their impacts, they may need to be moved to a new location or even eliminated. When trying to establish if an activity can be modified, the key factors that can most often be modified are the activity’s timing, location, and practices. Manning and Anderson (2012) recommend limiting activities to the dry season (timing), below the tree line (location), and regulating campfires (practices) to limit effects on the park’s ecology (Manning and Anderson 2012).

However, the principle behind dispersing use is that by spreading out the visitors throughout the entire site, there will be less concentration of impacts within a smaller area. The two ways this

can be done is by distributing the visitor's activities or by separating conflicting uses. Incompatible uses can be separated uses by the times at which they are used and by the area in which they are used (Manning and Anderson 2012).

In direct opposition to the previous point of dispersing use, Manning and Anderson propose another way to reduce the actual use is to concentrate visitor use to one area of the park, effectively leaving the rest of the park unimpacted. The key to making a concentrated visitor area work is to use an area that will be resilient and can stand up to the number of visitors that will be utilizing the area. It is also important in a concentrated visitor area to group like activities (Manning and Anderson 2012).

Increase Durability Resource/ Experience

The third management strategy is to increase the durability of the resource. Manning (1979) believes a site can increase its durability by developing facilities that are solely for activities that have big impacts on the site, hardening the site either naturally or artificially, or by hardening the experience. Developing facilities that will attract large amounts of visitors to be concentrated into fewer spaces, which allows for natural and artificial hardening of these areas to preserve the other areas of the park. The experience itself can be made more resilient by attempting to reduce conflicts among visitors and by educating visitors on what the conditions in the park are and what the causes for those conditions are (Manning and Anderson 2012).

Limit Use

The final management strategy defined by Manning is to limit the impacts of visitor use on the park, which can mean limiting the amount of use the park receives or limiting the types of recreation allowed in the park. When limiting the amount of use the park receives, it is important to examine which types of visitor activities have the greatest impacts on the ecology of a site and limiting or eliminating these activities completely. Another way of to reduce the impacts of use is to regulate the amount of time visitors can spend in the park. This type of policy would be fair and would continue to allow people to see the park, but it would help regulate the amount of people and could help people discover other parks in the area (Manning and Anderson 2012).

Management Practices

Management practices differ from management strategies in that the management strategies in the previous section are policy-based approaches and the management practices listed in the following section are the tools used by park managers to carry out the management strategies (Manning and Anderson 2012). The categories of management practices are information and education, use rationing and allocation, rules and regulations, law enforcement, and zoning, as well as facility development, site design, and maintenance.

Information and Education

Although information and education is the most studied management practice, Manning and Anderson state “it is generally viewed as an indirect, soft, and light-handed approach” (Manning and Anderson 2012). The practice’s weakness doesn’t appear to lessen its popularity, however. The practice of informing and educating visitors to the effects their actions have on parks, both ecologically and experientially, shows promise in programs like Leave No Trace (2009). Manning and Anderson created a table (adapted from Vander Stoep and Roggenbuck 1996; Roggenbuck 1992; Hendee et al. 1990) to explain the potential effectiveness of information and education in response to park management problems, which can be seen in Table 2.2.

Type of Problem	Example	Potential effectiveness of information and education
Illegal	Theft of cultural artifacts; Invasion of wilderness by motorized off-road vehicles	Low
Careless Actions	Littering; Nuisance activity (e.g. shouting)	Moderate
Unskilled Actions	Selecting inapproproate camping site; Building improper campfire	High
Uninformed Actions	Selecting a lightly used campsite in the wilderness; Using dead snags as firewood; Camping in sight or sound of another party	Very High
Unavoidable Actions	Disposal of human body waste; Loss of groundcover vegetation in the campsite	Low

Table 2.2- Application of information and education to recreation management problems. (Manning and Anderson 2012)

The table suggests that the areas information and education may be most beneficial are in response to careless actions, unskilled actions, and uninformed actions. Although the illegal and unavoidable actions are believed to be unaffected by information and education, they could be addressed through another management practice if management practices were combined (Manning and Anderson 2012).

Rationing/ Allocation

The second category of management practice – rationing and allocation of the resource – has been extensively researched and written about. There are five methods that fall within the rationing and allocation management practice. They are reservation systems, lotteries, queuing, pricing, and merit system. The reservation system essentially requires that visitors must reserve space at a park ahead of time. The lottery system is based on a visitor putting their name in to visit on a given day, then a random chance drawing to determine who can come to the park. The first come, first served system is based on visitors waiting in line for a limited number of permits or tickets. A pricing system filters some visitors out based on those unwilling (or unable) to pay an entrance or permit fee. The merit system is based on the visitors earning the right to visit the park. These strategies have pros and cons, which can be seen in Table 2.3 on the following pages (Stankey and Baden 1977).

In response to the five methods of rationing and allocation, Manning and Anderson identified five issues to be aware of when selecting a rationing and allocation strategy; they are fairness, effectiveness, pricing, acceptability, and discrimination. Because National Parks are a public resource, it is important to be fair when determining what the rationing and allocation technique is. The research, done by Shelby et al. 1989, on distributive justice identifies four key dimensions of fairness: equality, equity, need, and efficiency. Equality is deemed important because all have the right to experience the beauty of the National Parks. Equity is deemed important because those who have invested time, money, or some type of effort into a park should have the right to benefit from their contribution. Need is deemed important to allow people who don't have ready access to nature the opportunity to experience it. Efficiency is deemed important based on the

idea that the people who place the highest value on it should have the most access (Shelby et al. 1989).

One concern when considering rationing and allocation is pricing discrimination, which can be present when an increase in fees would prevent lower income visitors from being able to see parks that are held in public trust. Research about pricing discrimination in rationing and allocation presents somewhat mixed results about whether it is currently a problem in the parks (Manning and Anderson 2012). Another concern is the differential pricing as a rationing and allocation method. Differential pricing is the process of changing pricing based on specific times and areas (Manning and Anderson 2012). Differential pricing is important to the NPS because the parks experience a high percentage of their annual number of visitors in only a couple of months. Therefore, by using differential pricing to lower entry fees during less popular times of year, visitors may become less densely concentrated in one part of the year (Manning and Anderson 2012).

	Reservation	Lottery	First Come, First Serve	Pricing	Merit
Clientele group benefitted by system	Those able and/or willing to plan ahead; i.e. persons with structured life styles	No one identifiable group benefitted. Those who examine probabilities of success at different areas have better chance	Those low opprotunity cost for their time (e.g. unemployed). Also favors users who live nearby	Those able or willing to pay entry costs	Those able or willing to invest time and effort to meet requirements
Clientele group adversely affected by system	Those unable or unwilling to plan ahead; e.g. persons with occupations that do not permit long-range planning, such as many professionals	No one identifiable group discriminated against. Can discriminate against the unsuccessful applicant to whom the area is very important	Those persons with high opprotunity cost of time. Also those persons who live some distance from areas. The cost of timeis recovered by anyone	Those unwilling or unable to pay entry costs	Those unable or unwilling to invest time and effort to meet requirement
Experience to date with use of system	Main type of rationing system used in both national forests and national parks	None. However, is a common method for allocating big-game hunting permits	Used in conjunction with reservation system in San Jacinto Wilderness. Also used in some National Park Wildernesses	None	None. Merit is used to allocate use for some related activities such as river running
Acceptability of system to users	Generally high. Good acceptance in areas where used. Seen as best way to ration by users in areas not currently rationed.	low	low to moderate	Low to moderate.	Not clearly known. Could vary considerably depending on level of training required to attain necessary proficiency and knowledge level
Difficulty for administrators	Moderately difficult. Requires extra staffing, expanded hours. Record keeping cn be substantial	Difficult to moderately difficult. Allocating permits over an entire use season could be very cumbersome	Low difficulty to moderate	Moderate difficulty. Possibly some legal questions about imposing a fee for wilderness entry	Difficult to moderately difficult. Initial investments to establish licensing program could be substantial

Table 2.3a- Evaluation of the five recreational use rationing practices (Stankey and Baden 1977)

	Reservation	Lottery	First Come, First Serve	Pricing	Merit
Efficiency extent to which system can minimize problems of suboptimization	Low to moderate. Under-utilization can occur because of "no shows", thus denying entry to others. Allocation of permits to applicants has little relationship to value of the experience as judged by the applicant	Low. Because permits are assigned randomly, persons who place little value on an opprotunity stand equal chance of gaining entry to those who place high value on an opportunity	Moderate. Because system rations primarily through a cost of time, it requires come measure of worth by participants	Moderate to high. Imposing a fee requires user to judge worth of experience against costs. Uncertain as to how well use could be "fine-tuned" with price	Moderate to high. Requires user to make expenditures of time and effort (and maybe dollars) to gain entry
Principal way in which used	Reducing visitor numbers. Controlling distribution of use in space and time by varying number of permits available at different trailheadsor at different times	Reducing visitor numbers. Controlling distribution of the use in space and time by number of permits available at different places or times, thus varying probability of success	Reducing visitor numbers. Controlling distribution of use in space and time by number of persons permitted to enter at different places or times	Reducing visitor numbers. Controlling distribution of use in space and time by using differential prices	Some reduction in numbers
How system affects user behavior	Affects both spatial and temporal behavior	Affects both spatial and temporal behavior	Affects both spatial and temporal behavior. User must consider cost of time of waiting in line	Affects both spatial and temporal behavior. User must consider cost in dollars.	Affects style of user's behavior

Table 2.3b- Evaluation of the five recreational use rationing practices (Stankey and Baden 1977)

Rules and Regulations

The third category of management practice, rules and regulations, is common in parks but has experienced a spectrum of effectiveness, in part due to the visitors not understanding what the rules are (Ross and Moeller 1974). This leads to the conclusion that having educational programs that not only list the rules, but also address the reasons behind the creation of the rules, would lead to less rule breaking. There are many different issues that require rules and regulations but a few of the most important and most often regulated topics deal with the number of people within a party, the limitations on campfires, and the regulation of camping areas and itineraries.

The first topic deals with the size of groups going on hiking trips, and it can deal with making sure groups are not too large or in some cases not too small. Groups that are too large can have detrimental effects on sites by creating an instant crowding situation at overlooks, but problems arise when deciding how large is too large due to differing sizes of families and social groups. It can also be an issue to travel in too small of a group, especially in areas where predatory wildlife is common. This “safety in numbers” mentality is substantiated by a paper that claims groups of six are less likely to experience trouble from predators like bears (Tucker 2001).

The second topic deals with where campfires are allowed within parks. Due to concerns about wildfires, most parks have areas or times of year in which campfires are not allowed depending on when and where the greatest threats would be. Rules about possessing and using axes and saws are also common, and they help to reduce the number of trees that are damaged for the sake of firewood (Manning and Anderson 2012).

The third topic deals with the rules and regulations that govern backcountry campsites and camping itineraries. Issues stem from people camping outside of designated areas and people finishing multiday hikes in shorter or longer than average times. Camping in non-designated areas creates problems by damaging areas outside of the approved campsites, while people spending too long or too short of times on the trails can create problems when it comes to the safety of visitors (Manning and Anderson 2012).

Law Enforcement

The fourth category of management strategy is law enforcement, which can be a hotly-debated topic. Some people feel that law enforcement inside of parks should mirror the "hard" style of enforcing laws in the urban and suburban law enforcement agencies, but others feel a "soft" style is more appropriate. The difference between the hard and soft styles is that the hard style is often more rigid and harmful to a visitor's experience, whereas the soft style is more based upon the idea of keeping visitors safe, informing the visitors of the rules and regulations, and the consequences of disobeying the rules. The law enforcement in a park can drastically alter a visitor's perception of the park, and therefore is important to how the parks are seen by the general population (Manning and Anderson 2012).

Zoning

The fifth category of management practice is site zoning, which is especially important for assigning uses to different spaces. When creating zones for a site, there are several different systems for organizing zones including ecological stability, recreational uses, and accessibility to the zones from roadways and trails. These different zones can allow for like uses to be consolidated in areas where activities are compatible (Manning and Anderson 2012).

Facility Development/ Site Design/ Maintenance

The sixth and final category of management practice is facility development, site design, and management, and the strategies within this category focus on how best to protect the park or feature from the impacts of visitors. The primary issue being addressed by these strategies is should visitors be spread out through the site to allow for less concentrated impacts, or should visitors be concentrated to a smaller area of the park to limit the effects they have on the resource (Manning and Anderson 2012).

Regarding the idea of dispersing the visitors through the site, the major argument for the implementation of the dispersal method is that the impacts are spread over a larger area and are therefore less concentrated. This practice would therefore alleviate the strain on the resource. However, some studies show that even with application of this dispersal method, even low levels of use cause low levels of impact such as trampling, soil compaction, and other visitor impacts

(Hammitt and Cole 1998). The arguments against the dispersal method include that the already-small numbers of park rangers will have much larger areas to patrol and this can lead to visitors disobeying rules more and park rangers becoming overworked (Manning and Anderson 2012). The key to utilizing this method would be to determine how much use is too much in different parts of the site, and then limiting visitation to those areas accordingly.

The major argument for the implementation of the concentration method is that, with all the visitors staying in a smaller area of the site, the area where visitors are not allowed is kept from the impacts of visitors. In contrast the arguments against this method are that the area used by visitors will be very heavily impacted and that the likelihood of visitor conflicts and crowding will increase as well. The rebuttal to this argument is that if the visitors are concentrated in a more resilient area of the site, and if the park staff maintain it then the site would be able to handle the visitors' impacts (Manning and Anderson 2012). As opposed to the dispersal method, there are several studies that point toward the success of the concentration method (Cole et al. 2008; Reid and Marion 2004; Marion and Farrell 2002; Spildie et al. 2000).

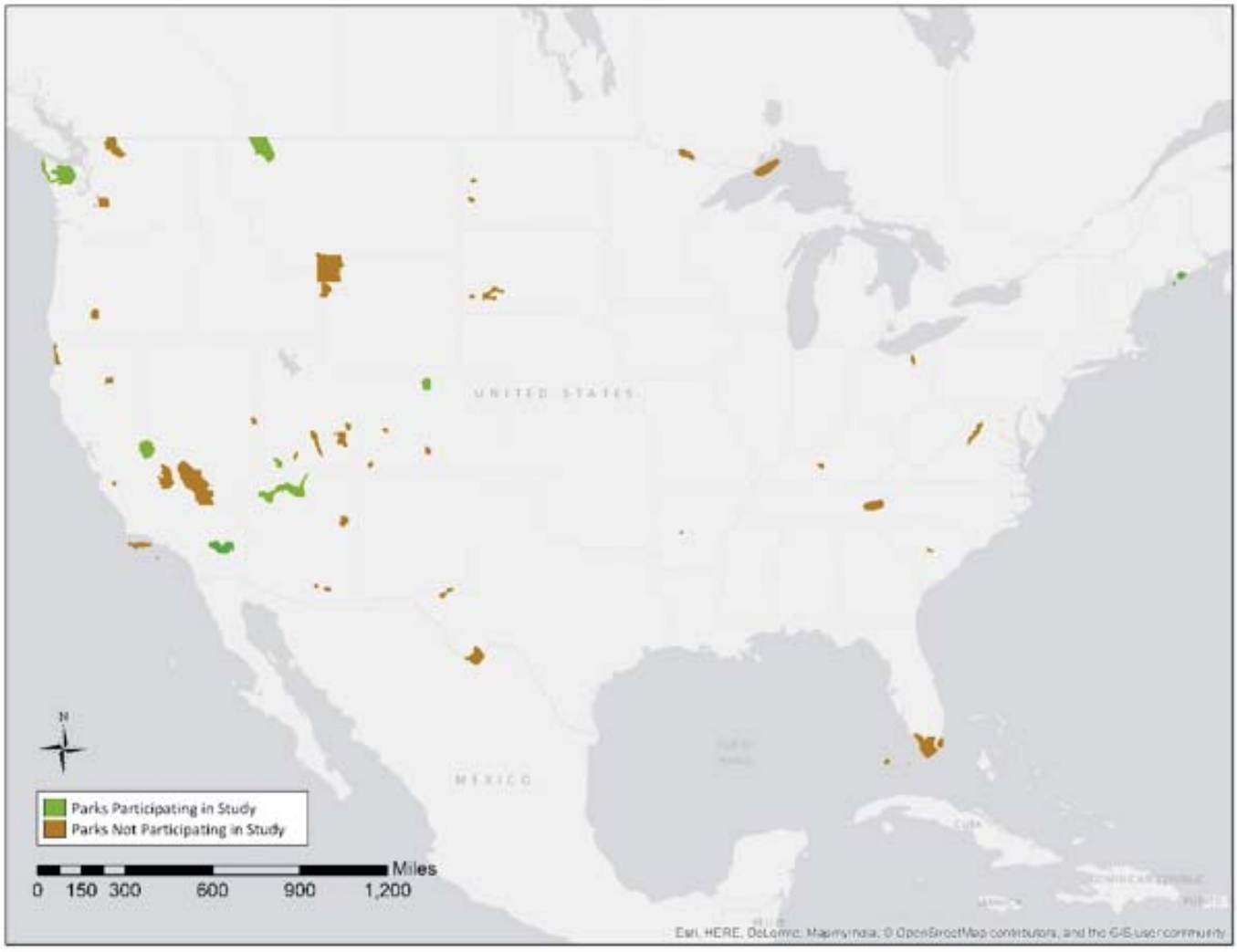

Figure 3.1- Map of national parks to be studied (by author).

Chapter Three:

Methodology

Study Area

The criteria used to select the national parks for study was the annual number of visitors at each park. Using the NPS's Integrated Resource Management Applications (IRMA) website, the top 10 most-visited national parks and their superintendents were then invited to participate in this research; when seven chose to participate the pool was expanded to include Joshua Tree National Park, the 11th most-visited, in an effort to include at least eight parks. To verify that a variety of ecosystems would be represented, a map of their locations was created and can be seen in Figure 3.1. This map also helps show the distribution of the parks across the nation and how the study compares to all the NPS national parks.

The parks examined, the Park Representatives interviewed, and the annual visitation over the past 25 years can be found in the Table 3.1. More information on each of the national parks included in the study can be found in Chapter 4: Park Profiles. These park profiles include information on the history and context of each park, each park's scenic and ecological qualities, site circulation, and visitor trends.

Park Ranking	Park Name	Park Representative	Position in Park	Visitation in 1992	Visitation in 2017	Percentage Increase
2	Grand Canyon NP	Kirby Shedlowski	Public Affairs Officer	4,203,545	6,254,238	48.8%
3	Zion NP	Jim Butterfus	Landscape Architect/ Project Manager	2,390,626	4,504,812	88.4%
4	Rocky Mountain NP	Lochen Wood	Outdoor Rec Planner	2,788,868	4,437,215	59.1%
5	Yosemite NP	Kathleen Morse	Chief of Strategic Plan.	3,819,518	4,336,890	13.5%
7	Acadia NP	John Kelly	Management Assistant	2,382,113	3,509,271	47.3%
8	Olympic NP	Sarah Creachbaum	Park Superintendent	3,030,195	3,401,996	12.3%
10	Glacier NP	Jeff Mow	Park Superintendent	2,199,767	3,305,512	50.3%
11	Joshua Tree NP	David Smith	Park Superintendent	1,220,539	2,853,619	133.8%
Total Attendance from All 58 National Parks				63,940,501	84,053,610	31.5%

Table 3.1- National parks included within the study (by author).

Research Questions

The research questions addressed here are built upon the NPS's dual mandate to balance the ecological and scenic preservation of these national treasures, while allowing visitors to enjoy and experience the parks. This dual mandate, as it has come to be known, has been the stumbling block of many park officials, as they aim to balance visitor comfort and environmental protection. The main research question follows:

1. What can the National Park Service do to manage the annual rise in attendance, in a way that respects both the visitors' needs and the National Park Service's mission to preserve the ecological integrity and scenic beauty of our parks?

This initial question is the basis of this project, and it spurred the research into the NPS and the individual issues each park faces. Through this research, a pattern of increasing visitation emerged. To help understand this issue and to ensure that this project looked at crucial issues affecting the national parks currently, two supporting research questions were developed:

2. What strategies have been proposed and attempted in the past, to combat the National Park Service's visitor dilemma?

3. What strategies are currently being used, and why were they selected over other options?

These secondary questions served to guide further research into the field of Parks and Wildlife Management. Research questions directed the data collection and data analysis phases, which are described in the following sections. Analysis generated possible resolutions to the issues parks are currently facing due to the rapid increases in park visitation. The following sections detail the process used to gather and analyze data and to create the recommended strategies.

Data Collection

Two data collection techniques were used in this study. The first was a semi-structured interview with Park Administrators, used to identify broad themes, while the second was a

Qualtrics online survey taken by key park personnel, which served to establish more detail of the themes identified in the interviews.

Semi Structured Interviews

Telephone interviews were conducted with Park Superintendents from the national parks identified in the Study Area section. In the parks where the Park Superintendent was unable or unwilling to participate directly, they were asked if they would feel comfortable delegating the interview to a knowledgeable representative. Some Park Superintendents didn't feel comfortable delegating and didn't have time to be interviewed and were subsequently removed from the study.

The interview consisted of five questions and took about 30 minutes to complete. I felt that this was a long enough conversation to get the information I was looking for, but not so long that it was an inconvenience for the interviewee. Interview questions were delivered to Park Administrators ahead of time, so they could formulate their answers and ask any questions ahead of the interview, making efficient use of interview time.

The interview questions aimed to discover the major impacts visitors have on the parks, current management strategies, and specific practices that are being used to mitigate visitor impacts. A copy of the questions asked of the Park Administrators can be found in Appendix A on page 156.

For ease of interview and to keep the interview flowing like a conversation, interviews were recorded and typed by a transcriptionist after the interview was completed. The interview transcripts were vital for the Thematic Exploration, which is discussed in the Data Analysis section.

Qualtrics Survey

The second data collection method used was an online Qualtrics Survey taken by park staff members identified by park administrators. Qualtrics is a survey software that is used in many universities for data collection. The objective of the survey was to gain more detailed information on the impacts observed by park staff along with their responses to these impacts in the form of management strategies and categories.

The Park Superintendents from the semi-structured interviews were asked to provide five Key

Park Personnel to participate in the survey. These Key Park Personnel were to include the Chief of Resources, Chief of Interpretation, and Head Law Enforcement Ranger, in addition to the two park officials who were chosen at the Park Superintendent's discretion based on consideration of who would best be able to speak about visitor impacts and management strategies. Those Park Superintendents who felt they had more than five Key Park Personnel were encouraged to submit as many Key Personnel as they wanted.

The online survey utilized the categories of visitor impacts, management strategies, and management practices from Manning and Anderson (2012), which are explained in Chapter 2. The survey was made up of five short answer questions and 11 matrix table questions and was designed to take about 15 to 20 minutes to complete. A copy of the Qualtrics Survey can be found in Appendix B on page 157.

The survey began with a question asking what park they work for, to allow comparison of responses from park to park. To mitigate possible risk to interviewees, I removed other information that could reveal who answered each question, allowing the participant to speak freely without fearing repercussions. Questions were grouped into three categories: visitor impact questions, management practice questions, and management strategy questions.

Data Analysis

Transcription

The process of analyzing the data collected from the semi-structured interviews began with transcribing the recordings of the eight interviews conducted via telephone in February and March 2018. To insure the accuracy of the transcripts, I read them while listening to the recordings. The purpose of this was to find any inconsistencies between the recordings and the transcripts.

Thematic Exploration

The transcripts were separated by park and then subdivided by question, then each question was assessed to create a short, succinct response. These responses were then used to create a series of summary tables. Next, within each section, basic responses were sorted into the categories of visitor impacts, management strategies, and management practices as listed in

What visitor impacts do you deal with most often, and what are your strategies to deal with them?																															
			Visitor Impacts																		Management Strategies				Management Practices						
			Impacts on Resources								Impacts on Experience			Impacts on Facility/ Service																	
			Soil	Vegetation	Water	Wildlife	Air	Soundscapes	Night sky	Historical/ Cultural	Crowding	Conflict	Depreciative Behavior	Attraction Sites	Trails	Campgrounds/ Campsites	Roads/ Parking	Interpretive Facilities/ Programs			Limit Use	Increase Supply	Reduce Impact of Use	Harden Resource/ Experience	Information/ Education	Rationing/ Allocation	Rules/ Regulations	Law Enforcement	Zoning	Facility Development/ Site Design/ Maintenance	
2	Grand Canyon	Wildlife Encounters				X							X												X						
		Littering			X	X							X																	X	
3	Zion	Crowding									X																				
4	Rocky Mountain	Crowding									X														X		X				
5	Yosemite	Crowding									X																				
7	Acadia	Crowding									X														X		X	X			
8	Olympic	Crowding	X	X							X					X															
		Waste Management			X								X														X			X	
10	Glacier	Crowding									X														X	X					
11	Joshua Tree	Crowding	X	X							X		X														X				

Table 3.2- Table showing the results of the Park Superintendent Interview (by author).

Manning and Anderson (2012), and responses were placed into Manning and Anderson's pre-determined categories. Details about the impact, practice, or strategy were also gathered, and all information collected was put into Excel spreadsheets by question and by park, an example of which can be seen in Table 3.2. A complete collection of the spreadsheets by question and by park can be found in Appendix C on page 168. From the spreadsheets, a set of themes were identified to later be compared with the results of the surveys of key park personnel.

After Key Park Personnel had turned in their Qualtrics Surveys (22 out of 40 responded, 55%) results were organized into spreadsheets for each individual question. An example of one of these question spreadsheets can be seen in Table 3.3, and all the survey results spreadsheets can be seen in Appendix D on page 175. These spreadsheets were designed to fall into Manning and Anderson's framework, for an easy comparison with the interview responses.

Following the creation of the survey spreadsheets, the themes from the interviews were compared to the survey results. The analysis is done by comparing responses to the survey and interview responses of Manning and Anderson's framework. From the comparison a set of key themes that summarize all the gathered data were identified.

From the key set of themes, a series of recommendations were proposed that cater to the issues that were brought up in the survey and interview results. These recommendations are the final result of my research. Following the creation and explanation of my recommendations, I discussed the results of my research, and the potential impacts of my research.

	How would you rate the following:		
	Crowding in the Park	Conflict Between Visitors	Depreciative Behavior
Grand Canyon National Park	Extremely High Impact	Extremely High Impact	Extremely High Impact
	Moderate Impact	Moderate Impact	Moderate Impact
	Moderate Impact	Moderate Impact	Low Impact
Zion National Park	Extremely High Impact	Low Impact	Moderate Impact
Yosemite National Park	Extremely High Impact	Moderate Impact	Low Impact
	Extremely High Impact	Extremely High Impact	Moderate Impact
	Extremely High Impact	Moderate Impact	Low Impact
Acadia National Park	Extremely High Impact	High Impact	Moderate Impact
	Extremely High Impact	High Impact	High Impact
	Extremely High Impact	Extremely High Impact	Low Impact
Olympic National Park	Extremely High Impact	Moderate Impact	Extremely High Impact
	Extremely High Impact	High Impact	Moderate Impact
	High Impact	Low Impact	Low Impact
	Moderate Impact	No Impact	Moderate Impact
Glacier National Park	Extremely High Impact	High Impact	Low Impact
	Extremely High Impact	Extremely High Impact	Moderate Impact
	High Impact	Low Impact	Low Impact
	High Impact	Moderate Impact	I'm not responsible
Joshua Tree National Park	Extremely High Impact	High Impact	High Impact
	Extremely High Impact	High Impact	Extremely High Impact
	Extremely High Impact	High Impact	High Impact
	High Impact	High Impact	High Impact

No impact	0%	4%	0%
Low impact	0%	14%	32%
Moderate impact	14%	28%	32%
High impact	18%	36%	18%
Ex. High impac	68%	18%	14%
Not responsible	0%	0%	4%

Table 3.3- Table showing the results of the Key Park Personnel Survey (by author).

2017 Rank	National Park	Visitors				
		2017	2016	2015	2014	2013
1	Great Smoky Mountains NP	11,338,893	11,312,786	10,712,674	10,099,276	9,354,695
2	Grand Canyon NP	6,254,238	5,969,811	5,520,736	4,756,771	4,564,840
3	Zion NP	4,504,812	4,295,127	3,648,846	3,189,696	2,807,387
4	Rocky Mountain NP	4,437,215	4,517,585	4,155,916	3,434,751	2,991,141
5	Yosemite NP	4,336,890	5,028,868	4,150,217	3,882,642	3,691,191
6	Yellowstone NP	4,116,524	4,257,177	4,097,710	3,513,484	3,188,030
7	Acadia NP	3,509,271	3,303,393	2,811,184	2,563,129	2,254,922
8	Olympic NP	3,401,996	3,390,221	3,263,761	3,243,872	3,085,340
9	Grand Teton NP	3,317,000	3,270,076	3,149,921	2,791,392	2,688,794
10	Glacier NP	3,305,512	2,946,681	2,366,056	2,338,528	2,190,374
11	Joshua Tree NP	2,853,619	2,505,286	2,025,756	1,589,904	1,383,340
12	Bryce Canyon NP	2,571,684	2,365,110	1,745,804	1,435,741	1,311,875
13	Cuyahoga Valley NP	2,226,879	2,423,390	2,284,612	2,189,849	2,103,010
14	Hawaii Volcanoes NP	2,016,702	1,887,580	1,832,660	1,693,005	1,583,209
15	Hot Springs NP	1,561,616	1,544,300	1,418,162	1,424,484	1,325,719

Table 4.1- 15 Most Visited National Parks Based on 2017 Statistics (by author).

Chapter Four:

Park Profiles

Introduction

This chapter is dedicated to the development of Park Profiles for the parks included within the study. These Park Profiles are important in that they provide background and context to the information gathered in the interviews and surveys. Each Park Profile includes a brief overview of the park's history and context, an exploration of the scenic and ecological qualities of the site, a look at the park's circulation and major attractions, and an examination of visitor trends in the park. The park profiles are organized based on the 2017 visitor rankings, which can be seen in Table 4.1.

Grand Canyon National Park

Introduction

Grand Canyon National Park is the logical place to begin the Park Profile portion of the research, since it is the most visited park included within the study. It is also appropriate for it to appear first due to its iconic status among the national parks.

Park History

Long before Grand Canyon was a national park, it was an important place to various tribes of Native Americans (including the Hopi, Zuni, Paiutes, and Havasupai) due to its connections to their creation stories. The Native Americans had been living in and around the Grand Canyon for thousands of years when trappers came through the area in the 1830s. It wasn't until 1869, when Major J. W. Powell published a description of the river and canyon he saw as he explored the Colorado River, that the Grand Canyon area began to capture America's interest. Over the following 39 years, many attempts were made to both preserve and exploit the area. It wasn't

until President Theodore Roosevelt finally created the Grand Canyon National Monument in 1908, that Grand Canyon began to make real progress towards preservation (Ise 1961).

One individual who stands out in the Grand Canyon's history is Ralph Cameron. Cameron staked several claims throughout the Grand Canyon area and even went so far as to become an Arizona Senator in an attempt to manipulate and gain control of the Grand Canyon. His claims were just a few of the many that sought to control the canyon's rim and make massive profits from those who hoped to use the Bright Angel Trail to reach the bottom of the canyon. However, on February 26, 1919, Grand Canyon National Park (GCNP) became the 14th national park added to the NPS when President Woodrow Wilson signed the bill to make it a park (Ise 1961). At that point, Cameron was sued by the government in a case that went all the way to the Supreme Court in his attempt to overturn his loss of claims within the Grand Canyon. By the early 1930s Cameron was pushed out of the park completely (Ise 1961).

The 1920s were a time of building and improving for GCNP. Starting in 1920, with the building of a wooden suspension bridge, the park began improving the way people could explore the park. Then, in 1922, Phantom Ranch was completed at the base of the canyon. In the years after the national park was formed, visitors used a ferry to cross the river, but in 1928, due to how dangerous the ferry was, the Kaibab Suspension Bridge across the canyon was built and the ferry was abandoned. With the building of the Kaibab Suspension Bridge, it was also determined that the North Rim of the park should be opened to visitors (Anderson 2000).

During the 1930s and '40s, GCNP continued to advance and build projects envisioned by earlier park officials by using the Civilian Conservation Corps which resulted from the economic woes of the Great Depression and World War II. Grand Canyon Park Superintendents saw many projects completed that may never have been built had the economy been better. During these times, Park Superintendents mainly pushed for projects that made the park seem more like a resort than a modern national park (Anderson 2000).

In 1956, the NPS launched its Mission 66 program that sought to bring an end to visitors' complaints about the parks and help the parks to meet the growing demands from visitors. This was a time when Park Superintendents created wish lists of projects they wanted to complete

and staff they needed to do so. The drawback of this rapid growth was that operating budgets increased drastically. In GCNP, the annual operating budget went from $9.1 million in 1956 to astounding $21.6 million in 1964, which is an increase of $12.5 million a year, or an over 137% increase in operating budget. This also led to an increase in GCNP's focus on visitors' demands and a decrease in focus on the ecological and aesthetic side of the park. Mission 66 lasted into the NPS's 50th anniversary in 1966, hence the name Mission 66 (Anderson 2000).

Though Mission 66 sought to enhance visitors' comfort and happiness, it did nothing to preserve the Grand Canyon's scenic beauty and in many cases these changes in the quantity and kind of visitors led to degrading or damaging preservation. In 1975, Grand Canyon National Park grew to its current size through the Grand Canyon National Park Enlargement Act. However, during this time, nature and humans seemed at odds. Modern buildings that were built no longer reflected the rustic style typically found in the national parks, and park superintendents sacrificed the park's ecology to make way for more and more visitors (Anderson 2000).

This division in how to manage the park began to grow. As people flocked to the park, both rims of the canyon suffered from congestion, but still visitation rose. During this time however, dissent began to rise, and visitors and environmentalists began to lobby Congress and the courts to save the parks, especially Grand Canyon. Environmental groups spoke out about dam projects in the Colorado River basin, which led to arguments about the purpose of the national parks and whether they should be able to stand in the way of people around the park's rights (Anderson 2000).

The issues that began in the wake of Mission 66 still plague the park to this day in the form of uncontrolled park visitation, dam projects upstream on the Colorado river, and pollution due to industry and visitors. The economic benefit national parks have on the businesses surrounding them creates a big problem, as nearby communities have grown and flourished in an era of unchecked visitation and are therefore resistant to limiting the number of visitors coming to the parks, even when it is for the preservation of the park that is responsible for the regions tourism (Anderson 2000).

Site Circulation

Grand Canyon National Park is set around the Colorado River Canyon in the northwestern corner of Arizona. The park spans both sides of the canyon, and there are visitor centers on both the north and south rims. Because the canyon is so wide, there is some difficulty getting from the south rim to the north rim (and vice versa) by vehicle. The drive is 200 miles from Grand Canyon Village to the North Rim Visitor Center and takes as little as three hours if there is little traffic, but during busy times of year can take up to five hours. Figure 4.1.1 shows a map of Grand Canyon.

Grand Canyon National Park offers excellent opportunities for hikers to explore the park on iconic day hikes, as well as overnight hikes. Some of the most popular day hikes are the Bright Angel Trail and the Grandview Trail on the South Rim, and the North Kaibab Trail and the Arizona Trail on the North Rim. Some more determined hikers choose to do a rim-to-rim hike, which involves going from one rim to the other. Runners are also allowed in the inner canyon to go on organized team runs, but they are required to obtain a special permit that regulates how many runners can be in the canyon at a time and on any given day (NPS GRCA 2018c).

Grand Canyon also offers shuttle services on the south rim, with four different lines running from March until the Tusayan Route closes in September and the Hermit Road Route closes in November. The park's shuttle service has been in operation for over 40 years and now runs on natural gas, which is more environmentally conscious. Figure 4.1.2 shows the South Rim shuttle routes and stops (NPS GRCA 2018b).

Figure 4.1.1- Grand Canyon National Park map (NPS 2018).

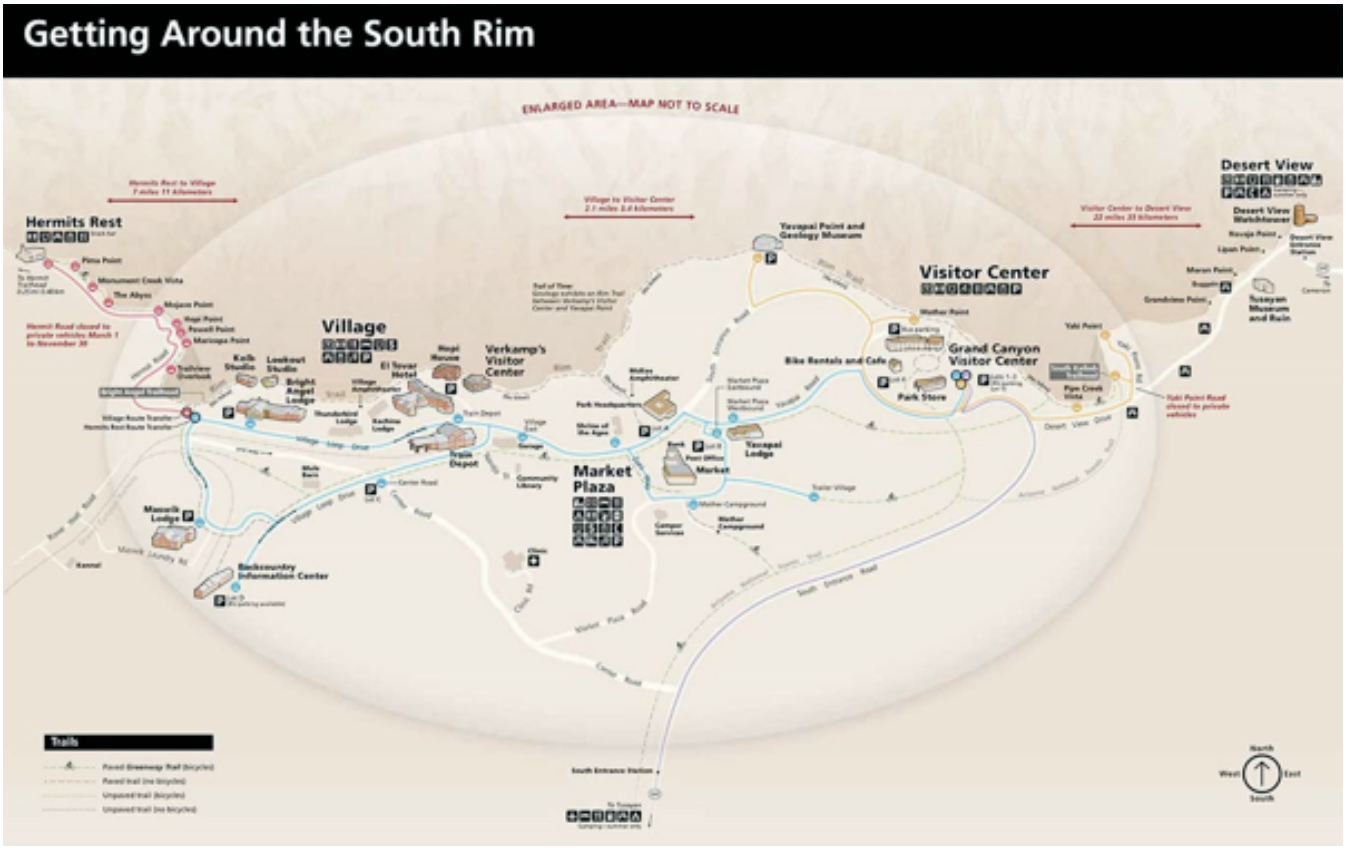

Figure 4.1.2- Grand Canyon National Park shuttle map (NPS 2016).

Bicycles are allowed at Grand Canyon National Park at the South Rim, but they are strictly prohibited below the rim. They also are required to stick to paved surfaces or roads, and according to Arizona law must follow the same rules as vehicles. Cyclist are planned for in the park's shuttle service, with the implementation of bike racks on all shuttles (NPS GRCA 2017).

Scenic and Ecological Qualities

The Grand Canyon is known for its stunning views across like those of Figure 4.1.3; in fact it is hard to find someone who hasn't seen photos of the iconic canyon. Some photos paint the Grand Canyon as strictly an arid, sun-baked canyon with little vegetation, but that isn't strictly true. The Grand Canyon also has alpine environments where meadows and forests of aspen and fir trees cover the north rim, and areas on the south rim have stands of ponderosa pines. The areas in between the rims have various micro climates based on sun aspect, proximity to water, and other factors that create a range of habitats including the dessert like canyon floor complete with cacti (NPS GRCA 2015).

Figure 4.1.3- Grand Canyon National Park: Desert View Watchtower (Quinn 2008).

Grand Canyon National Park itself focuses on a section of the Colorado River that has carved canyons and plateaus from the red brown rock. It is a haven for wildlife species like the endangered California Condors and mountain lions, as well as javelinas, elk, bison, and black bears (NPS GRCA 2018a). Grand Canyon is home to more than 1,500 plant species, 355 bird species, 89 mammal species, 47 reptile species, 9 amphibian species, and 17 fish species (NPS GRCA 2018a).

All these animals are living in the park, as more than 6 million visitors come to the park on a yearly basis. This makes human/wildlife interactions more likely, which can lead to changes to animal behavior (loud noises, human wildlife conflict, depending on humans for food) and negative effects on their environment (vegetation trampling, water pollution, littering). The more visitors know about what they may encounter in the park, how they should behave in the park, and what the reasons are for park etiquette rules, the more likely they are to respect both the flora and the fauna (NPS GRCA 2018a).

Visitor Trends

Grand Canyon National Park has long captured the American People's imagination. This popularity is easy to see when looking at the annual visitation rankings published by the NPS, which ranks Grand Canyon as the second most visited national park behind Great Smoky Mountains National Park. With annual visitation breaking 6 million visitors for the first time in 2017, it is a must see for every national park lover. Figure 4.1.4 below tracks the annual number of visitors coming to the Grand Canyon since its official opening as a NPS site in 1919.

Grand Canyon National Park has come a long way from the 37,745 visitors it saw in its first year in the NPS. As mentioned above 2017 was noteworthy for Grand Canyon because it broke the 6 million visitors mark. The graph below in Figure 4.1.5 shows the distribution of visitors throughout 2017. May, June, July, and August are the peak months for Grand Canyon, experiencing a total of 2.9 million visitors, or 46.6% of the park's annual visitors, in just four months. Grand Canyon's least visited months are January, February, November, and December, which combined only received a little over 1.1 million visitors, or 18.2% of the total yearly number of visitors.

Figure 4.1.4- Grand Canyon National Park visitation graph (by author).

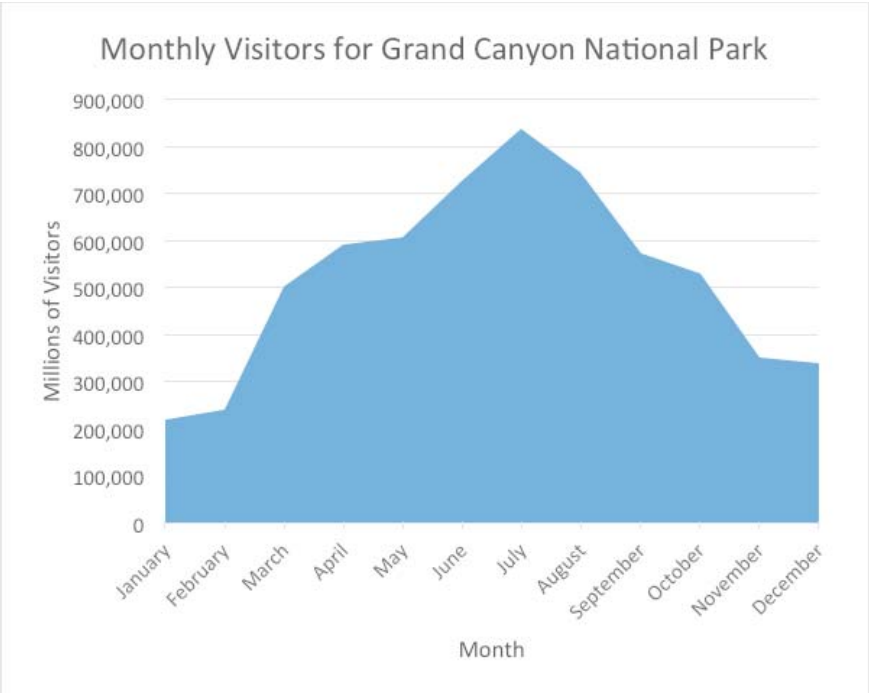

Figure 4.1.5- Grand Canyon National Park 2017 monthly visitor statistics (by author).

Zion National Park

Introduction

Zion National Park in southwestern Utah was formed in 1919 and was the 15th national park to form. It is currently rising through the ranks of national parks, and according to the 2017 visitor numbers, Zion surpassed Yosemite and Rocky Mountain and is now the third most visited park in the nation. It is easy to see why it is so popular; the beauty of Zion's wind carved canyon is second to none and its shuttle service was one of the leaders in changing the way visitors experience the park. Zion National Park is great example of how fast visitation can increase. The park's restrictions on driving through the park create a unique environment for the visitors to explore the park.

Park History

The history of Americans within Zion canyon begins in 1858, when Nephi Johnson first saw the canyon while scouting for Mormon settlers. Three years later, the revered Mormon leader Brigham Young visited the canyon with some settlers and bestowed the name Zion on the canyon. During this time the Mormons used Zion as a place of safety and retreat from the Native Americans in times of trouble. The name Zion was replaced by the name Mukuntuweap in 1872, when Major Powell, the distinguished explorer of the Grand Canyon, came to explore the park and bestowed the area with its new name (Ise 1961).

In 1909, 51 years after Johnson's discovery of the canyon, President William Howard Taft signed the legislation that made Mukuntuweap a national monument. Seven years later, Congress began shifting funds to Mukuntuweap National Monument, which allowed for initial projects to begin. Two years later, in 1918, President Woodrow Wilson more than tripled the size of the monument, going from just under 16,000 acres to 78,800 acres. In the same bill, President Wilson decided to also change the monument's name back to Zion, thereby briefly making the Zion National Monument. On the third attempt to pass legislation to create a Zion National Park, Congress approved the bill, although there were some concerns about create a new park so soon after World War I, but eventually those concerns were laid to rest. On November 19, 1919,

President Woodrow Wilson officially signed the park into existence (Ise 1961).

With this the “Yosemite of the Desert” began drawing people to see its magnificent scenery, and many significant changes came to the park. Only three years after the park was made official, a flood washed out several park bridges. Based on this, Congress encouraged the park to study the roads in the park and awarded the park a grant based on the information gathered. That same year, President Warren G. Harding came to the park, which helped to publicize the park and increased the number of visitors coming to the park. The Union Pacific Railroad saw an opportunity to capitalize on the growing popularity of the park, so in 1922 they build a line from Lund to Cedar City, which significantly increased the amount of tourism in the park. Following the road study, presidential visit, and rail line to the park, in 1925 the government awarded Zion National Park $1.5 million to improve the roads and trails within the park. The only complaint about the park was that it was too small of a park, so in 1930 after a careful study of the area surrounding the park, the government acquired additional land (Ise 1961).

Site Circulation

Zion National Park can be divided into two distinct areas, Zion Canyon and Kolob Canyon. These two distinct areas of Zion National Park have two visitor centers -- one at the Zion Canyon Entrance near the town of Springdale and one near the Kolob Canyon Entrance to the park. Zion Canyon is considered the main portion of the park because the town of Springdale sits right outside the entrance, and many of Zion’s campgrounds are located just inside the park as well. Zion Canyon is also home to the park’s history museum, theatre, shuttle system, and many of its most famous views. Driving is allowed in the park from the entrance to Canyon Junction, but then vehicles are diverted out of Zion Canyon and onto the Zion- Mount Carmel Highway. The map below in Figure 4.2.1 shows the layout of Zion National Park, as well as some of the important elements like the shuttle stop locations and visitor centers.

Zion National Park runs a shuttle service from the Zion Canyon Visitor Center at one end of the canyon to Temple of Sinawava at the other, and on the road beyond Canyon Junction only shuttle buses are allowed. The shuttle bus service at Zion was established in 2000 to address problems with parking and congestion on the roads due to increasing numbers of visitors. The

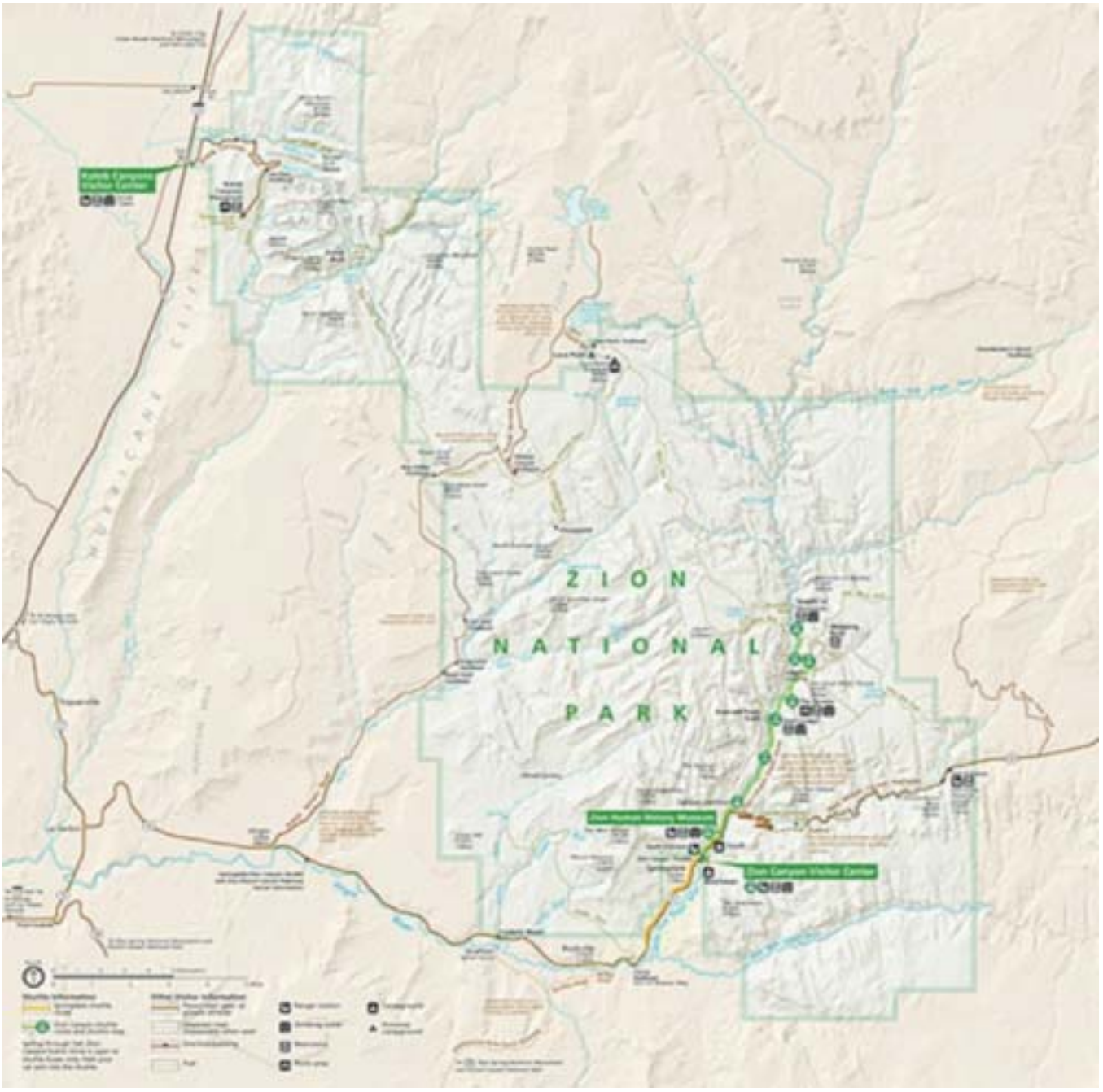

Figure 4.2.1- Zion National Park map (NPS 2018).

Figure 4.2.2- Zion National Park Shuttle Bus and Hiking Trail Map (NPS ZION 2018).

buses run one line all the way through the park and are free for all park visitors. Initially in the park there were concerns with how the public would react to the shuttle buses being the only way to get to some areas of the parks, but visitors have embraced the buses and it has become the new normal in Zion (Manning and Anderson 2012).

Zion National Park allows for cycling on all park roads and on the Pa'rus Trail, but all other areas are restricted for cyclists. Another area open to cyclists is the Zion-Mt. Carmel Highway, with the caveat that cyclists are not allowed to ride through the tunnels. This means that if a ride through the tunnels can be secured, cyclists are free to enjoy the ride. Also, all shuttle buses are equipped with a bike racks for the convenience of riders (NPS ZION 2018).

Zion National Park offers 18 different hikes and a total of almost 70 miles of trail in the park. Zion organizes their hikes based on their difficulty into easy, moderate, and strenuous categories. There are six easy hikes, seven moderate hikes, and five strenuous hikes. Figure 4.2.2 shows the shuttle route and hiking trails, to help orient the explanation of the shuttle bus service and the hiking trails (NPS ZION 2018).

The longest hike in the park is the 14-mile-long Kolob Arch hike via the La Verkin Creek Trail, and the shortest hike is the 0.4-mile-long Weeping Rock Trail. Some of the most famous hikes in Zion include the Angels Landing Trail, Observation Point Trail, and the Narrows Trail. Some of the more strenuous hikes also have quite a bit of elevation change; for example the Observation Point Trail experiences over 2,100 feet in elevation change (NPS ZION 2018).

Scenic and Ecological Qualities

Zion National Park is known for its stunning red rock canyons and tranquil Virgin River. The canyons themselves were made over the course of thousands of years of water carving the stone, and the process continues to this day. Because the area around Zion National Park is so dry, the Virgin River is a source of water that gives life to Zion Canyon, supporting the plant life and wildlife.

Zion is home to 78 species of mammals, 291 species of birds, 8 species of fish, and 37 species of reptiles and amphibians. All those species of animals are found in the five different plant communities of Zion National Park including Riparian and Aquatic, Arid Grasslands and

Figure 4.2.3- Angels Landing from the Deertrap Mountain Trail (Neidig 2008)

Desert Shrubs, Pinyon-Juniper Forests, Ponderosa Pine Forests, and Mixed Conifer-Aspen Forests. The Riparian and Aquatic plant communities are found mainly in the canyon floors and are easily distinguishable from the other plant communities because of the lushness of the vegetation and the presence of aquatic plants like cattails and rushes. The Arid Grassland and Desert Shrub plant communities are found in lower elevations and generally consist of drought tolerant grasses and cacti that can tolerate high temperatures. The Pinyon-Juniper Forests are found at higher elevations than the arid grassland and dessert shrub communities and are drought tolerant forests that support large amounts of the wildlife found in Zion. Each of these habitats include some of the over 1,000 plant species found in the park. Zion is an important site for the reintroduction of California Condors and Peregrine Falcons, in addition to a sanctuary for Bald Eagles and Mexican Spotted Owls (NPS ZION 2017).

Visitor Trends

In 2017, Zion National Park reached new levels of popularity, rising to claim the title of the third most popular national park behind Great Smoky Mountain and Grand Canyon National Parks. This was accomplished by receiving 4.5 million visitors last year, which is a new park record. Speaking of record breaking years, Zion has received record breaking visitation every year since 2014. In the past five years, Zion's visitation has increased by 1.5 million visitors, which is a 51.5% increase. Zion's rising in popularity from its first year in 1919 until 2017 can be seen in the park visitation graph below in Figure 4.2.4.

Zion National Park's 4.5 million visitors in 2017 were not spread evenly throughout the year, and Figure 4.2.5 below shows the distribution of visitors to Zion by individual months. As the graph below shows, Zion has six straight months from April through September when the park receives more than half a million visitors a month, with the peak month for visitors occurring in July when 576,000 visitors come to the park. These six months see almost 3.8 million visitors and account for over 70% of the total number of visitors in 2017. Such a long busy season can mean that seasonal help in the park is needed for more of the year, which can be more expensive than when park's busy seasons only last for a few months and therefore seasonal help only needs to last for a shorter time.

Figure 4.2.4- Zion National Park yearly visitation graph (by author).

Figure 4.2.5- Zion National Park 2017 monthly visitation statistics (by author).

Rocky Mountain National Park

Introduction

Rocky Mountain National Park was the ninth national park to be established, and according to 2017 visitation results it is the fourth most-visited national park with almost 4.5 million visitors. Nestled in the mountains 30 miles north of Denver, Rocky Mountain National Park became a park because of its accessibility to the nation, and since it was signed into existence in 1915, it has come to be close to many Americans' hearts.

Park History

Long before Rocky Mountain National Park, and even before the first European set foot on the continent, the people of the Ute, Shoshoni, and Comanche tribes wandered through much of Colorado and Utah (Buchholtz 1983). These Native American tribes were nomadic and would spend their summers in the area where Rocky Mountain National Park is now located. As settlers began to come to the mountain in the 1850s in search of gold or to stake their claims on land, the Native Americans experienced shifting and shrinking of their territory. This spurred anger and violence for a short time until the Native Americans were completely removed from the area. As westerners began to exploit the land and the city of Denver grew into an urban center for the mid-western part of the country, many people began to come to the area for its fresh air, and to get away from the hustle and bustle of the cities in the east. By the 1870s Denver became more accessible to the rest of the nation through the Denver Pacific Railway and the Kansas Pacific Railway. Although initially used for the movement of goods, these railways would become an important part of the formation of Rocky Mountain National Park (Frank 2013).

In 1884, a man affectionately known publicly as "the John Muir of the Rockies" came to the Colorado. Enos Mills came by way of rail when he was only 14 and quickly got work building cabins, later working as a miner in the Rockies. In 1889, when he was 19, Mills took a trip to California where he met the real John Muir. Based on Muir's advice, Mills went to school and then spent time traveling first the West and then Europe. During his time in Europe, Mills began to appreciate the value of tourism in natural environments. Upon his return to Colorado in the early

1900s he bought his uncle's inn, renaming it the Long's Peak Inn in 1902. Thanks to his business, Mills then proceeded to meet and befriend powerful members of the US Forest Service, who promptly offered him a job touring the nation and speaking to people about conservation. Mills accepted the offer and took this opportunity to spread the word about Colorado's scenic beauty and his establishment Long's Peak Inn as well. By 1909, when Mills and the Forest Service parted ways, the Estes Park Improvement Association began speaking to members of the US Forest Service about the establishment of an Estes National Park. The Estes National Park idea was not popular with everyone though, and in 1911 the miners, farmers, and concerned citizens of Estes banded together to form the Front Range Settlers' League (FRSL) to oppose the park. In direct contrast to the FRSL, the Colorado Mountain Club (CMC) was founded in 1912 to support the preservation of Mountains in Colorado, and with their support of the park plan a bill was drafted and submitted to Congress in 1913. Although the bill required some rewording and some changes, the bill passed in 1915 and President Woodrow Wilson officially finalized the decision by signing the bill on January 26, 1915 (Frank 2013).

One of the primary reasons that Rocky Mountain National Park was supported by so many was because of its accessibility. The park's accessibility stems from the shipping companies that sent goods on the railway through Denver. Reductions in mining in the 1890s led to economic hardships that forced railroads, which were shipping goods to miners through rail hubs in Denver, to find a way to supplement income. The railroad reduced the price of train tickets from the east coast to Denver, thereby giving easier access to the park. In the early 1900s as Ford Motor Company's assembly-line process began producing cheaper cars, middle class people were able to afford their own vehicles. Robert Marshall, a Chief Geographer from the Department of Interior, once said, "Estes Park can be reached from Chicago in about 30 hours and from Denver by automobile in about three hours (Frank 2013)." Rocky Mountain National Park is unique because unlike the other parks of the time, it never received a railroad terminus. People who arrived by rail to Denver would drive to the park. This reliance on driving to the park meant that roads were a very important and needed to be part of the experience, and this is still true today (Frank 2013).

The time between the end of World War I and the beginning of the Great Depression in

the 1930s was a golden time for Rocky Mountain National Park. With visitation increasing, the facilities became outdated and lackluster, so new, more comfortable amenities were built, including newer, better maintained trails and museums. When the Great Depression hit, visitation remained steady, but the nation struggled with unemployment. President Franklin Roosevelt's New Deal, which helped many Americans through the economic hardships of the Great Depression, greatly benefited Rocky Mountain National Park as well. Through the New Deal, members of the Civilian Conservation Corp worked in the park to make improvements and complete construction projects including the Trail Ridge Road. Trail Ridge Road was a vast improvement over the older, deteriorating Fall River Road, and it helped the driving through the park become a better experience for the visitor (NPS ROMO 2015a).

Although World War I had little negative impact on Rocky Mountain National Park's visitation, World War II had a serious effect. When the United States entered the war in 1941, visitation was at its highest point in history with almost 682,000 visitors, but during the war the park averaged only 268,000 visitors. When the war ended the park bounced back quickly, but the absence of visitors during the war had caused reduced revenue and lack of staff that resulted in deterioration of the park. In the 1950s the NPS came up with the idea of Mission 66 to revitalize the parks for the 50th anniversary of the NPS' founding. During all the improvements for Mission 66, Rocky Mountain National Park built its first visitor center, which was very popular with the visitors. During this time Rocky Mountain National Park also bought the old guest lodges and demolished them to make way for new campgrounds (NPS ROMO 2015a).

Following the extensive spending and construction of Mission 66, many visitors began to question how all the extensive building projects were affecting the land. As the environmental movement began and gathered support, park superintendents had to make difficult choices about where to allocate resources and how they manage their land (NPS ROMO 2015a). These competing ideas added strain to the park, but eventually environmental laws were passed, which helped by requiring certain actions be taken to preserve the ecology of the parks (Frank 2013).

In recent times, Rocky Mountain National Park is still subject to the same problem that began in the 1960s and '70s, which is how to balance the dual mandate of the NPS. However there

is a new twist, with the rapid increase in number of visitors coming to the park. In 2015, Rocky Mountain National Park entered an exclusive group of national parks that received over 4 million visitors in a single year, and then the following year, in 2016, the number of visitors rose to over 4.5 million visitors. This kind of massive growth is problematic especially for a park like Rocky Mountain because it is still very car-oriented. This means backed up traffic and high levels of emissions, which all take a toll on both the visitors' experience in the park and the health and wellbeing of the park's environment (Frank 2013).

Site Circulation

Rocky Mountain National Park is located north of Denver, near the city of Estes Park. Because Rocky Mountain embraced its place as an automobile centered park early on, roads have always been a priority in the park, and the drive to the park from Denver could almost be considered part of the circulation in the park. Figure 4.3.1 below shows a park map with roads, trails, and the visitor centers. The park can be entered from the west or the east, with the east entrance being closest to Estes Park. Vehicles travel through the park on Trail Ridge Road, with part of the Trail Ridge Road being closed in the winter due to snowfall.

Rocky Mountain has 355 miles of hiking trails, with varying elevation gains making some trails far more strenuous than others of equal distance. Trail surfaces vary but are predominately dirt trails or concrete trails. In 2013 a flood in the park caused damage to some of the trails (NPS ROMO 2015c). Rocky Mountain offers hikes many popular hikes for visitors of all ages and abilities, but safe hiking practices are encouraged for everyone in the park. Most of the more popular hikes to go on include well-known lakes, waterfalls, or summits, including the Bear Lake Hike, Ouzel Falls Hike, and Twin Sisters Peaks Hike (NPS ROMO 2017b).

Rocky Mountain's shuttle service has three routes including a Hiker Express Route for hikers looking to get into the park quickly. Once in the park the other routes shuttle people between trail heads and visitor centers. The shuttle service only runs from late May until mid-September for the Hiker Express Route; the Bear Lake and Moraine Park Routes however remain open until early October. These limits to shuttle service are due to hazardous road conditions that cause road closures in the winter months. Figure 4.3.2 shows a map of Rocky Mountain National Park's

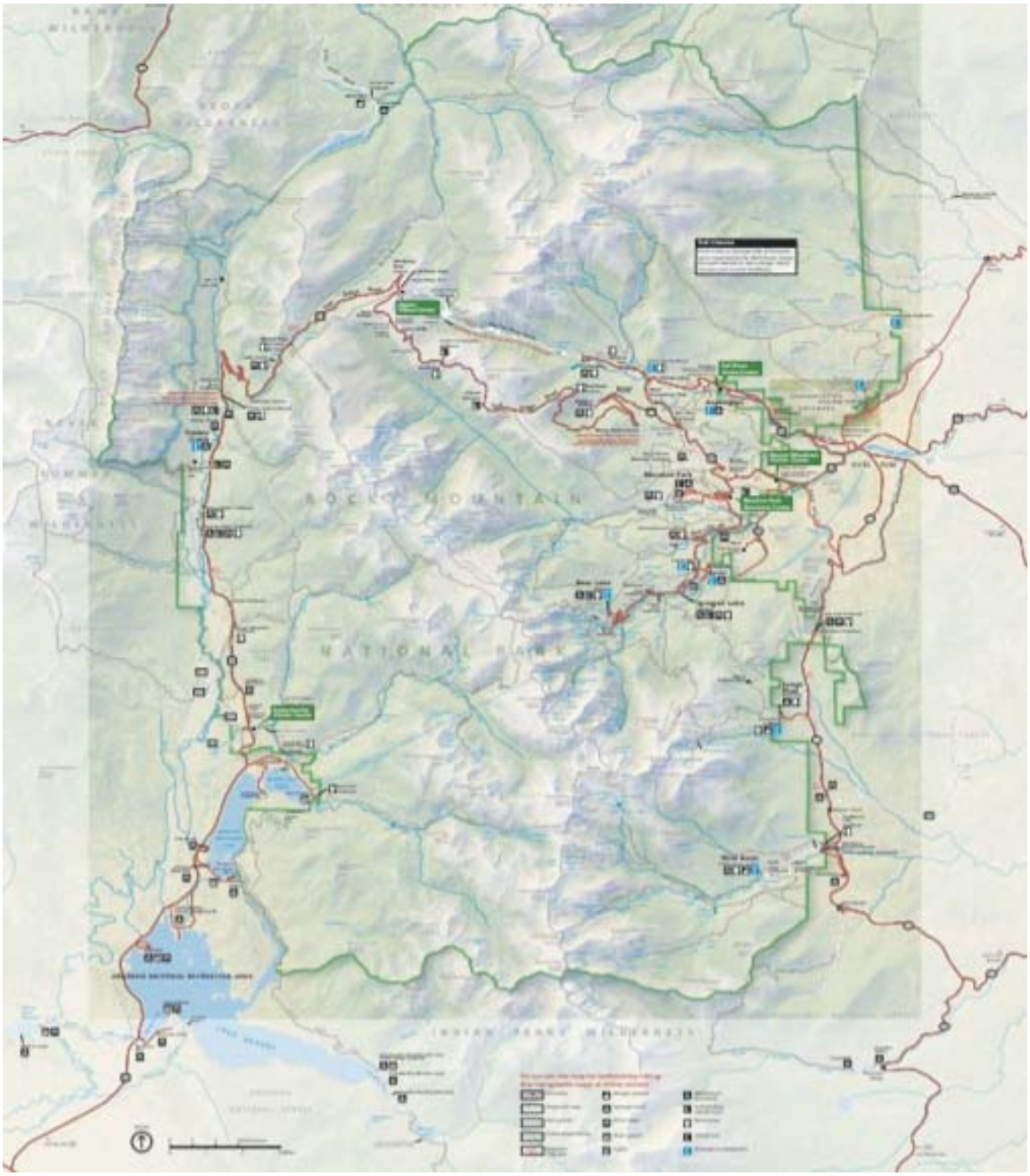

Figure 4.3.1- Rocky Mountain National Park map (NPS 2017).

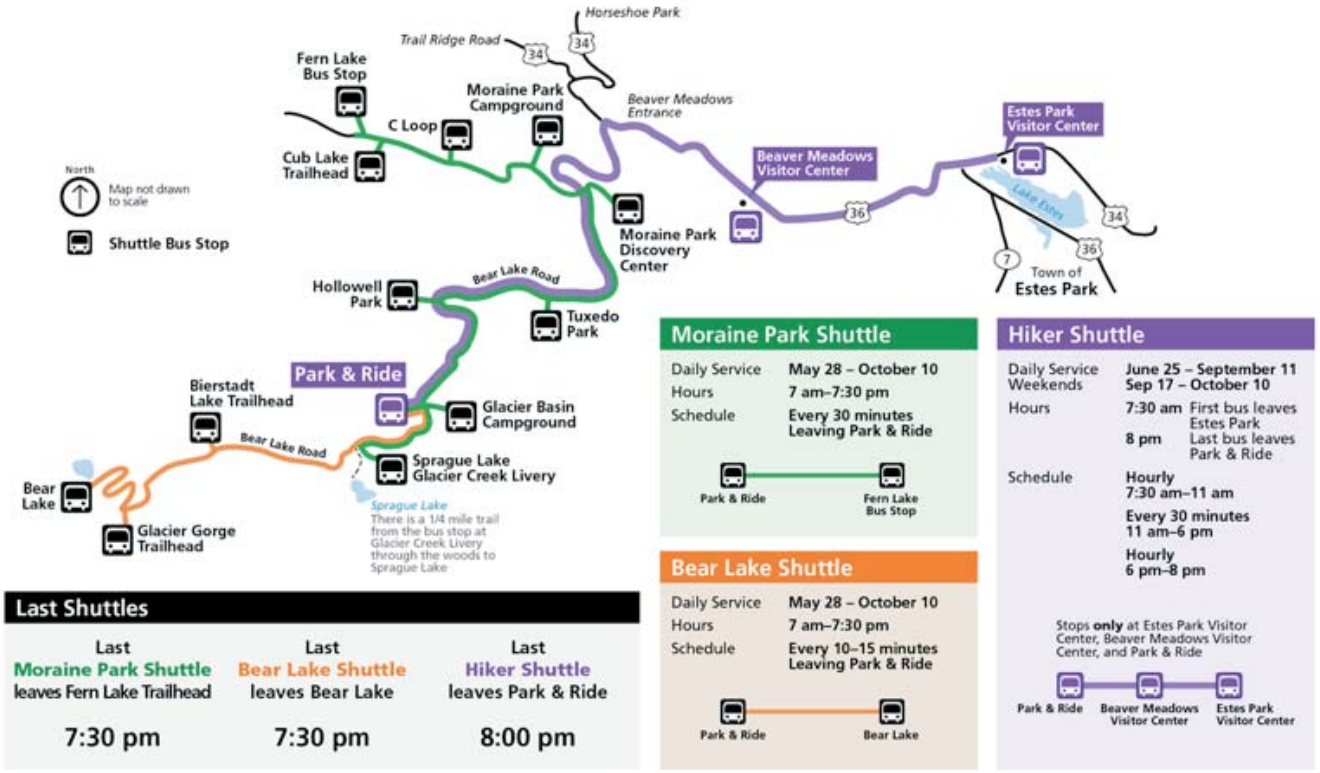

Figure 4.3.2-Rocky Mountain National Park shuttle map (NPS 2017).

shuttle system.

Like most other national parks, Rocky Mountain strictly prohibits bicycles on trails and Grand Ditch Road, but they are encouraged on Trail Ridge and Old Fall River Road. Rocky Mountain National Park recommends that cyclists take proper safety precautions, as well as follow the rules of the road just as a car would. Group bike rides of more than 25 people require a special permit to ride within the park (NPS ROMO 2017a).

Scenic and Ecological Qualities

Rocky Mountain National Park is most known for its elk and the scenery at Longs Peak and Bear Lake. The scenic beauty of the park from Trail Ridge Road is also a major attraction for the park, due to the gently curving road that winds along mountains, tundra, and forests. The Continental Divide is also a point of interest for many, and the Never Summer Range makes it especially attractive.

The 266,000 acres that make up Rocky Mountain National Park are home to many animal and plant species, including some threatened species like the Canadian Lynx and Greenback Cutthroat Trout. Some of the more commonly seen and encountered animals within the park are mule deer, elk, moose, mountain lion, and coyotes. The park's elk herd has between 600 and 800 members, and the park is also home to about 350 big horn sheep as well. The large number of big animals within the park can sometimes lead to visitor interaction with these animals, so Rangers encourage visitors to not approach wildlife and to remain a safe distance away (NPS ROMO 2017c).

Rocky Mountain National Parks is one of the highest elevated parks in the nation and contains more than 60 peaks above 12,000 feet. This impressive landscape is home to montane, subalpine, alpine tundra, and glacial ecosystems. Because of the fragile nature of these ecosystems, specifically the alpine tundra ecosystem, it is important to heed rangers' instructions, all park signage, and all rules available in park literature (NPS ROMO 2018). It is important to understand that Rocky Mountain National Park is susceptible to the effects of climate change, air pollution from vehicles, water pollution, environmental pests and diseases, invasive species, flooding, and damages caused by visitors. These factors must be planned and managed by the

Figure 4.3.3- Hallett Peak reflected in Dream Lake (NPS)

park, including the damages visitors have on the park when they don't follow rules or when the combined number of visitors increases a problem based purely on the sheer number of visitors.

The use of controlled forest fires to maintain plant and animal diversity ensures Rocky Mountain's ecological health. These controlled wildfires mimic the natural fires caused by lightning and by the burning done by some Native Americans in the past to ensure that buildup of flammable materials don't accumulate and cause a higher risk of uncontrolled burning in the future. Burning also purges the area of smaller trees, pine needle, pine cones, and invasive species, helping native species of plants return to areas and thus gives native animals the habitats they require (NPS ROMO 2015b).

Visitor Trends

Rocky Mountain has been a national park for over 100 years, and in that time, has seen many ups and downs in visitation. Rocky Mountain National Park has long been one of the NPS' most visited parks and in 2017 it was ranked the fourth most visited national park. Rocky Mountain accounted for 5.28% of the visitors of national parks in 2017. Figure 4.3.3 shows the yearly visitation to Rocky Mountain National Park, and this data shows how the visitation has risen and fallen since the park's founding in 1915.

In Rocky Mountain's first year as a national park it received 31,000 visitors, and the most visitors ever received in the park in a year was 4.4 million visitors in 2016. This is hardly a surprising year to receive peak visitation, since it was the centennial year of the NPS and there were major campaigns to entice visitors to come to the parks. Figure 4.3.4 shows the distribution of visitors throughout the year from 2017 and illustrates how the peak months are June, July, August, and September with over 3 million visitors accounting for 69.6% of yearly visitors attending in only four months. In contrast, January, February, November, and December received only 447,000 visitors combined, which is only 10% of the total yearly visitors. These statistics show that most visitation is concentrated in a small window of the year in the summer, due to inaccessibility to the entire site in the winter months. Having peak seasons like this can be harmful to visitor experience during the peak seasons, but tend to be more efficient for the hiring of seasonal help to cope with the demands of a peak season.

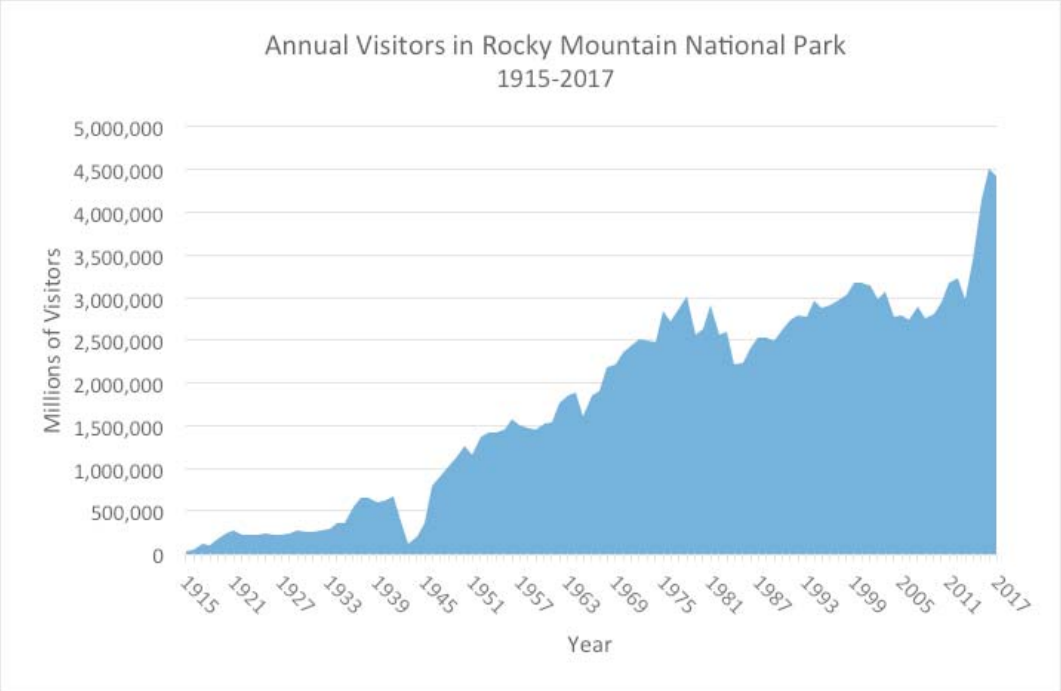

Figure 4.3.4- Rocky Mountain National Park yearly visitation graph (by author).

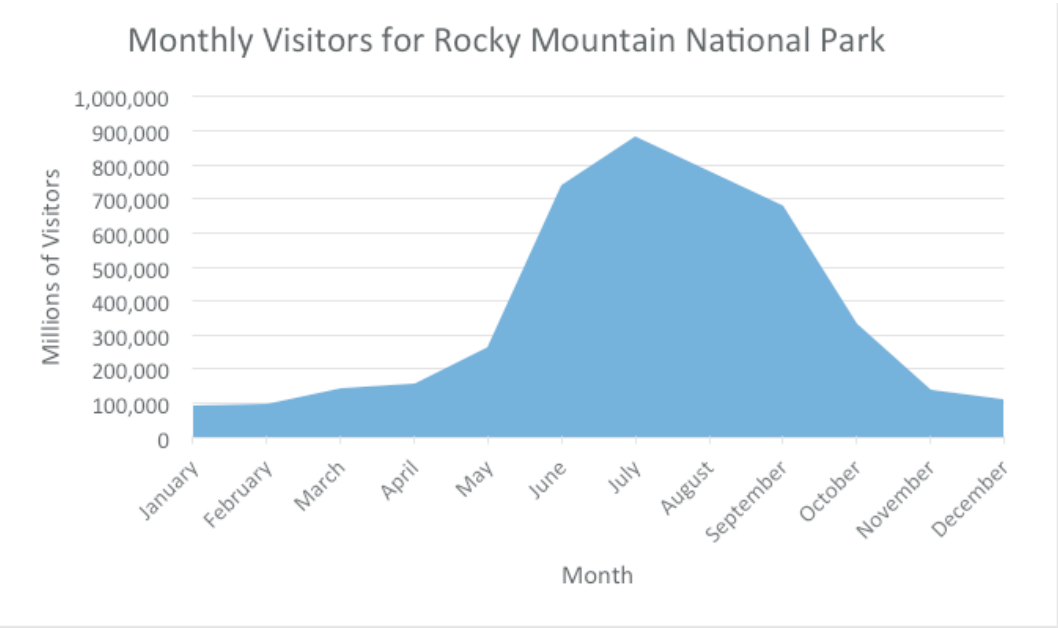

Figure 4.3.5- Rocky Mountain National Park 2017 visitation statistics (by author).

Yosemite National Park

Introduction

Yosemite National Park is both one of the oldest and one of the most fought for national parks in all the NPS. It has captivated famous environmental enthusiasts like John Muir and Frederick Law Olmsted, and great artists like Ansel Adams and Albert Bierstadt (Runte 2010). Yosemite has been part of our nation for over a hundred and fifty years, and during that time it has inspired us and called us back to nature. As John Muir famously said of it,

"Everybody needs beauty…places to play in and pray in where nature may heal and cheer and give strength to the body and soul alike (NPS GOGA 2016)."

Park History

The history of Yosemite and westerners began in 1851, when a group of miners and soldiers came across the Yosemite Valley while searching for the valley's Ahwahnee inhabitants (Runte 2010). These first "visitors" came back to the east with stories of a beautiful valley and astounding waterfalls, and soon many writers and painters made the journey to see such wonders. In the following years as easterners began to see the beautiful paintings made by the visiting artists and read about the splendors of the Yosemite Valley, some began making trips to see the valley. There were others who saw the splendors of Yosemite Valley as a money-making opportunity akin to Niagara Falls. These opportunistic settlers argued with the government that they should be allowed to settle in the Yosemite Valley, though it had yet to be surveyed, which according to law meant that it was not yet available for settling. Two of the most notable proponents of settling were James C. Lamon and James Mason Hutchings, both of whom were made famous for their claims to the Yosemite Valley. Lamon and Hutchings unknowingly spurred the legislation that would enable President Abraham Lincoln to sign the Yosemite Park Act in 1864 and officially create a park in the Yosemite Valley. Through this bill, the boundary was defined as the mountain peaks surrounding the Yosemite Valley, and in addition to the valley a small portion of the Mariposa Grove would be part of the park to preserve some of the giant sequoias (Runte 2010).

After the Yosemite Park Act was passed, Congress made the decision to grant the State of

California the honor of managing Yosemite, and along with this responsibility California inherited the problems of Yosemite, namely the land claims of Lamon and Hutchings that had yet to be resolved. Immediately after California accepted control of the park in 1866, Lamon and Hutchings asked for a ruling on their claims to the Yosemite Valley. Instead of granting Lamon and Hutchings ownership of the land, the State of California offered them a 10-year lease. Unhappy with this, Lamon and Hutchings took the matter to the California State legislature and then to the Congress. Congress' final decision was that Lamon and Hutchings may stay on the land but made no promises that they would retain the land once it was surveyed, due to the area's popularity and park status. This was the first step toward the creation of a national park, because, "Although California had been given the honor of managing Yosemite, the American people remained its owners (Runte 2010)."

Following this legal struggle, one of the most iconic figures in Yosemite's history arrived to the park in 1868. This man forever shaped the way America looked at the park, and even today he inspires environmentalists and park enthusiasts everywhere. His name was John Muir, and although he was only 28 at the time he would have a huge impact on the park from the start. Over the course of his time in Yosemite he explored much of the Sierra Nevada Mountain range and became a little bit of a legend for those who came to visit. Like the Lorax in Dr. Seuss's book of the same name who "spoke for the trees," Muir spoke out for the environment and challenged the groups both political and private that sought to exploit the park he loved. Muir also championed the causes of many other parks like Grand Canyon National Park and Olympic National Park (Runte 2010).

One of the most iconic struggles in the park's history for both Yosemite National Park and John Muir was the battle over Hetch Hetchy. The story of the struggle begins in the early 1880s, with the City of San Francisco searching for a source of fresh water in the nearby Sierra Mountains. During the searching the City determined that an area known as the Hetch Hetchy Valley would serve as the ideal location for a dam. Conflict arose in 1890 when Yosemite National Park grew to encompass the Hetch Hetchy Valley due to its similarity to Yosemite and its grand, unspoiled scenic qualities. Eleven years after Hetch Hetchy joined Yosemite National Park,

the City of San Francisco completed its plans for a dam at Hetch Hetchy and applied for the land. The first two applications for the land were unsuccessful due to sympathetic leadership in the Department of Interiors, but after the great earthquake of 1906 hit San Francisco and fires destroyed much of the city, the government was more sympathetic to their plight. In 1908, San Francisco had permission to build their dam in Hetch Hetchy, which would flood the valley. Although there were many arguments, the City of San Francisco remained victorious and on December 19, 1913, President Woodrow Wilson signed the bill granting the City of San Francisco the rights to the valley. Though this was a tragic loss to the park, Hetch Hetchy was the motivation for many environmental activists and is still today fueling people's drive to protect the parks from exploitation (Runte 2010).

On August 25, 1916, President Wilson signed the NPS into existence, which transferred Yosemite from the Department of the Interiors to the newly minted NPS. After the blow struck at Hetch Hetchy, the founding of an overseeing governmental agency that is tasked with the preservation of the parks seemed like a definite step in the right direction. However, problems in the park continued after the founding, including the decline of rail in favor of the more economical and convenient automobile. This switch from rail to road required some adjustments like building more roads, filling stations, and parking lots, all of which were significant expenditures of both money and energy. Battles raged over whether cars should even be allowed into the park, as well as what role tourists should play in the parks. Eventually it was decided that tourism would have precedence over environmental preservation, and Yosemite moved toward becoming a "tourist trap" in the same fashion as Niagara Falls. Albert Atwood, a reporter for the Saturday Evening Post, condemned the way that Yosemite had been "straightened up". He also noted with disgust, "its dance halls, movies, bear pit shows, studios, baseball, golf, swimming pools, wienie roasts, marshmallow roasts, and barbecues -- all well-advertised in bulletins and printed guides." In response to criticisms like this one the head of the NPS, Arno Cammerer said, "Our National Parks are wilderness preserves where true natural conditions are found. When Americans, in years to come, wish to seek out extensive forests, mountain solitudes, deep canyons, or sparsely vegetated deserts, they will be able to find them in the National Parks." This, however, did little to

remedy the problem of a visitor-centered park, where any money-making endeavor that could be used to squeeze money out of visitors was welcome. The visitors themselves were turning into a problem as the number of visitors a year skyrocketed; even events like the Great Depression and World War II didn't significantly damage the NPS's total numbers (Runte 2010).

When the Great Depression began in 1929, no one could have predicted that it would be a time of prosperity for the parks, but when the New Deal was introduced by President Franklin Roosevelt in 1933 the NPS saw an opportunity. That same year the Civilian Conservation Corps began and started bringing young men to work in many national parks, including Yosemite. Young men from all different walks of life were being brought into the most splendid areas of nature in the United States and were working to help the parks in some way or another. Whether it was planting trees, removing invasive plants, or working on construction projects like building roads and cabins, the CCC members gained an education in their national parks. After the CCC was disbanded in 1942, those who had worked in Yosemite went back to their families with a better understanding of the parks and with an appreciation for the national parks (Runte 2010).

At roughly the same time the CCC was disbanding, the United States entered World War II. During the war, the number of staff within the park declined since most young men were going to fight in the war, which led to the decline in some of the facilities within the parks. After World War II ended in 1945, there was a surge in visitor numbers as men came back from war and wanted to be reminded of all the beauty the national parks had to offer. In the last year of the war (1945) only about 290,000 visitors came to Yosemite, but the very next year (1946) visitation soared to 640,000 visitors in a single year (US Department of Interior 1904-2017). This demonstrates how eager people were to see the parks they remembered from before the war. As they ventured to the parks, though, many visitors found that the parks had not kept up maintenance during the war and that some park facilities needed to be updated to keep up with the number of visitors coming to the park. As complaints began piling up, in the 1950s the NPS had the idea to create a plan to accomplish many of the projects that national parks direly needed, in time for the 50th anniversary of the NPS, which was set to occur in 1966. Mission 66 began in 1956 and aimed to be finished in time for the NPS' centennial celebration in 1966. This project would serve to

distribute huge amounts of funding to update the facilities of the national parks and help reduce the visitor complaints about the park (Green 1987).

Mission 66 was initially considered successful because it revived development within the park, but some felt that Mission 66 focused to heavily on building and repairing roads and trails and building new concession facilities, when it could be used for resource protection. As the 1960s wore on into the 1970s, the environmentalism movement began to spread and gain new members. A faction of park visitors and supporters began to complain that perhaps there were too many people in the parks and that the parks should be preserving the nature of the parks. Some visitors began looking for “wilderness experiences” where they could hike and backpack through the parks away from modern conveniences. The Wilderness Act of 1984 helped Yosemite’s wilderness gain more protection and move toward a more equal balance between visitor wants and needs and the protection of wilderness areas (Green 1987).

As Yosemite National Park moved closer to the 100th anniversary of the NPS, visitation continued to soar, as can be read about in the Visitor Trends section. The continual increase of visitation is the same problem that was predicted early in Yosemite’s history, which is how many people are too many and what will be done when there are too many people? The history of Yosemite has been full of heartbreaks like Hetch Hetchy and triumphs like the gradual increase in environmental protections. But as Yosemite moves toward the future, it is important to reflect on what has happened in the past, so that similar mistakes are not made in the future.

Site Circulation

Yosemite National Park is nestled in the Sierra Nevada Mountains of California. The main public and historic buildings are in Yosemite Valley, but Visitor Centers are also located in the Tuolumne Meadows and Wawona (near the Mariposa Grove). The main road for entering the park from the west is the El Portal Road, which leads directly into Yosemite Valley but doesn’t run all the way through the park. Tioga Road runs through the entire park, connecting Big Oak Flat Road with the Tuolumne Meadow area of the park. Big Oak Flat Road serves the purpose of connecting the Yosemite Valley with the Hetch Hetchy Road further north.

Yosemite National Park has six different shuttles within the park and three different Yosemite

Figure 4.4.1- Yosemite National Park map (NPS 2017).

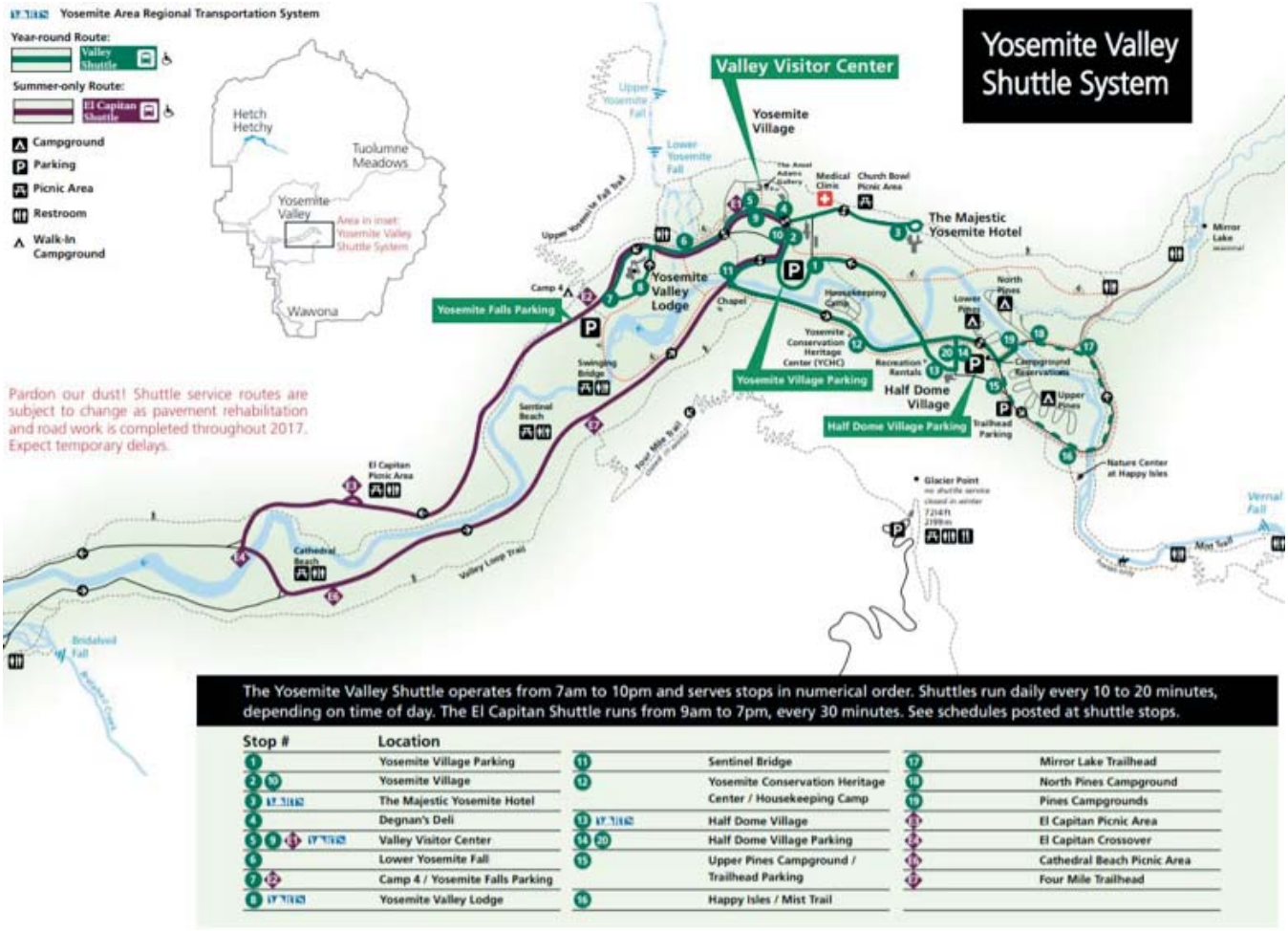

Figure 4.4.2- Yosemite National Park shuttle map (NPS YOSE 2018).

Area Rapid Transit Systems (abbreviated as YARTS) from different nearby cities. The shuttles in the park include the Yosemite Valley Shuttle, the Badger Pass-Glacier Point Shuttle, the Tuolumne Meadows Shuttle, The Yosemite Valley-Tuolumne Meadows Hiker Bus, the Yosemite Ski and Snowboard Shuttle, and the now inactive Wawona-Mariposa Grove Shuttle. These shuttles allow for easy travel between the major areas of the park. YARTS is an outside service that provides access to the park for a fee. The YART locations are Fresno, Sonora, and Mammoth Lakes with various stops once at the park. These public transportation options allow for visitors to get to and travel around the park with relative ease (NPS YOSE 2018).

As one of the oldest parks in the nation, Yosemite also has an extensive trail network that includes more than 50 different hikes, and 750 miles of trails (NPS YOSE 2014). Yosemite National Park's hiking locations are divided into six different regions of the park, the Yosemite Valley, Glacier Point Road, Wawona and Mariposa Grove, Hetch Hetchy, White Wolf and Tuolumne Meadows. Within each of these regions there are many different trails to hike, and due to the wide range of visitors coming to the park the trails cater to varying levels of skill. Many factors can make trails more difficult including trail distance, trail type, and elevation changes, and the trails at Yosemite are all different. When hiking in Yosemite, visitors' expectations should also take into consideration that some trails will be busier than others based on especially popular scenery or easier hiking. Some of the more popular hikes in Yosemite include Half Dome Trail (which requires a special permit), Glacier Point Trail, and the Lower Mariposa Grove Trail. Overnight backpacking trips are allowed in Yosemite but require a wilderness permit (NPS YOSE 2016a).

Cycling is popular in Yosemite, and the park has over 12 miles of designated bike paths in the Yosemite Valley. In addition to these designated trails, cyclists can use any paved road but must follow the traffic rules just like any other vehicle. Bicycles are not allowed on any trails not designated as bike trails. Some of the rental agencies in Yosemite Valley do rent bicycles for a fee (NPS YOSE 2016b).

Scenic and Ecological Qualities

As the first park of its type, Yosemite has long been the measuring stick other parks used

Figure 4.4.3- Ackerson Meadow in Yosemite National Park (Hirsch 2016).

to measure against. A prime example of this is the way that other parks like Zion National Park have been called things like “the Yosemite of the Desert,” demonstrating that Yosemite really is one of the most iconic national parks. Yosemite National Park has been known for views of densely forested valleys surrounded by immense vertical stone cliffs, breathtaking waterfalls, and snowcapped mountain peaks. Figure 4.4.3 is an example of the scenery in the Yosemite Valley that has been inspiring people around the world.

Scenery like the groves of Giant Sequoias found in the Mariposa Grove and the view of Half Dome from Tunnel View. These areas that have been a muse to painters like Albert Beirstadt and to thinkers like John Muir, and those artists in turn made great creative works that are still enjoyed by people hundreds of years after they were written and painted. The park itself appears to be a giant work of art that changes and adapts and pulls us to it.

Yosemite Valley was carved from the granite by glaciers, which created the wall like cliffs that make Yosemite’s mountain landscape so striking. The glacial melt feeds the streams that can be found in the Yosemite Valley, as well as the Hetch Hetchy Reservoir, and is very important for the plant and animal species that live in the park. There are five major vegetation zones in Yosemite including the Foothill-Woodland Zone, Lower Montane Forest, Upper Montane Forest, Sub Alpine Forest, and the Alpine Zone. The conditions within each of these vegetation zones are based on climate, topography, moisture, and the soil type and quality (NPS YOSE 2015).

The Foothill-Woodland Zone can be found in the lowest elevations of the park (about 2,000 feet above sea level) and the climate is hot and dry during the summer and rarely gets snow in the winter. Lower Montane Forests is the zone found above the Foothill-Woodland Zone and it begins at 3,000 feet above sea level. It can be identified by its hot, dry summers and cool, moist winters, and it receives snow in the winter. Lower Montane Forests, as the name suggests, are home to many tree species and includes Yosemite National Park’s giant sequoia groves, as well as the Yosemite Valley and parts of Hetch Hetchy. Upper Montane Forests can be found above Lower Montane Forests, beginning at 6,000 feet above sea level. In Upper Montane Forests summers tend to be short and cool, while winters tend to be cold and wet, with large amounts of snow. Pines and Firs are more common in the Upper Montane Forests, which can be seen along

the Glacier Point Road. Subalpine Forests are found starting at 8,000 feet above sea level, and are characterized by their short cool summers, and long, cold winters that receive large amounts of snow. The Alpine Zone begins at 9,500 feet above sea level and is easily distinguishable from the previous zones because it is present above the treeline, which means there is limited vegetation in this zone. The terrain tends to be rocky, and the plants that do live there take full advantage of the extremely short summers to flower and seed. These five bioclimatic zones make up the varied mountain slopes of the park and are home to Yosemite's varied flora and fauna (NPS YOSE 2015).

These bioclimatic zones contain varied vegetation that is adapted to the conditions present, and the vegetation in turn provides for the wildlife that is found in the park. Over 400 species of animals can be found within Yosemite, including 90 species of mammal, 12 species of amphibians, 262 species or birds, 22 species of reptiles, and many species of fish and insects. Yosemite is home to 17 mammals whose declining numbers have given them a declining species status, as well as being home to many large carnivore species such as brown bears and mountain lions. In 1986, Sierra Nevada bighorn sheep were reintroduced to the park after a 100-year absence from the park, and their numbers have steadily been growing since then. One issue being seen among the park's wildlife is the presence of nonnative species that are wreaking havoc on ecosystems within the park and damaging the native species. A prime example of this is the presence of nonnative trout species that are preying on the Sierra Nevada yellow-legged frog tadpoles and then compete with the adult frogs for food. This competition threatens the frog's ability to reproduce, which threatens the species ability to survive (NPS YOSE 2017).

Visitor Trends

Yosemite National Park is one of the oldest parks in the nation, and over that long history the park has welcomed too many visitors to count. Since the NPS records began in 1906, almost 195 million visitors have come to the park. This number seems astronomical knowing that only 5,400 visitors came to the park in 1906, but visitation quickly took off as the park broke a million visitors in a single year in 1954. In 2016, Yosemite's visitation record was shattered when over 5 million visitors came to the park to celebrate the NPS's centennial. It is no wonder that Yosemite

Figure 4.4.4- Yosemite National Park yearly visitation graph (by author).

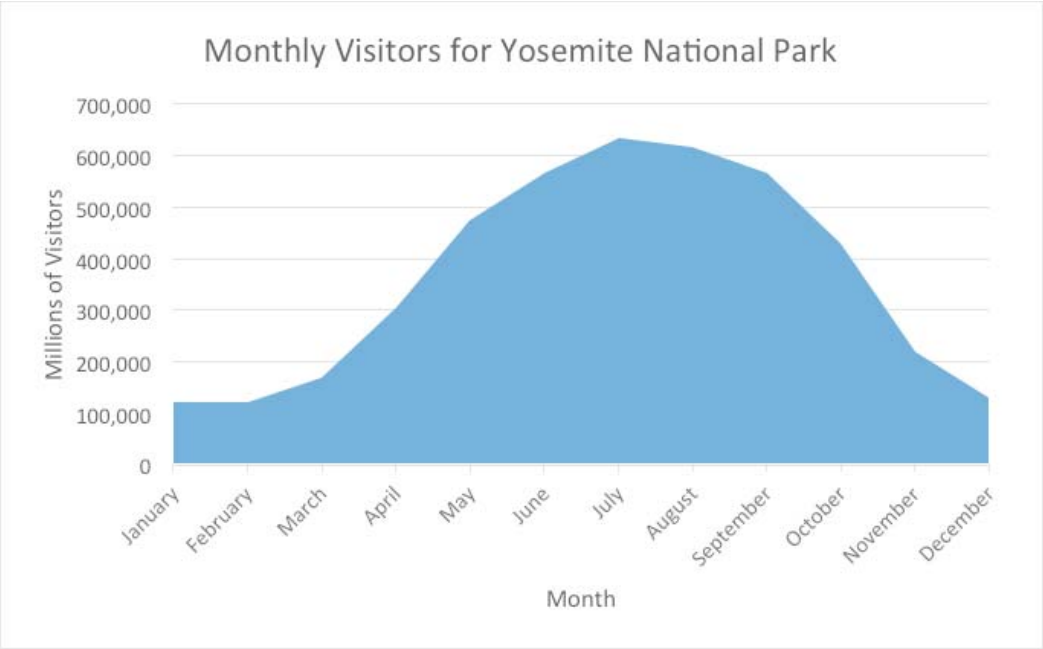

Figure 4.4.5- Yosemite National Park 2017 monthly visitation statistics (by author).

is the fifth most popular national park in the NPS. Figure 4.4.4 below shows the number of visitors coming to the park since visitation began being tracked in 1906.

Figure 4.4.5 shows the distribution of visitors throughout 2017. This is important to note because there are peak months like July when 14.5% of the annual number of visitors come, and then there are months like February when only 2.7% of the annual visitors come to the park. One of the NPS's long time strategies is trying to shift visitation into the less busy seasons, so that the park isn't extremely packed for a small portion of the year. This creates some difficulties, because as the number of visitors coming in the off seasons continues to increase, more staff are needed year-round.

Acadia National Park

Introduction

In 1919, Acadia National Park was the 16th national park to be added to the NPS, and as the first park in the eastern United States, Acadia National Park plays a crucial part in the history of the NPS. Due to a dedicated group of landowners that sought to preserve the natural beauty of the island, Acadia National Park has been saved for future generations.

History and Context

The history of Acadia National Park begins with the island's first inhabitants, the Wabanaki tribes of Native Americans. The Wabanaki tribes were predominately hunters, fishers, and gatherers that occupied Mt. Desert Island for an estimated 5000 years before the tribes first recorded meeting with Europeans in 1604 (NPS ACAD 2017). This first meeting occurred with a French expedition headed by Samuel Champlain, which resulted in the area initially being claimed for France. During the time that the area was under French rule, the French established a Jesuit mission on Mt. Desert Island in 1613, which attempted to convert the Wabanaki people. The mission was short lived due to an attack by the British destroyed the mission, causing Mt. Desert Island to become disputed territory until 1759 when the British defeated the French in Quebec. The next year a British Governor claimed the island and attempted to help settle the island, but the Revolutionary war broke out in 1775 and due to the United States' victory in 1783 the land became available for settlement once again (NPS ACAD 2017).

In the years following the Revolutionary War, Mt. Desert Island became a popular spot for settlers interested in farming, lumber production, fishing, and ship building. By the mid-1800s the island began to grow in popularity as a destination for respite from the growing cities in the northern United States. This was especially true for artists and journalists, who through their paintings and writings led to an increase in popularity among visitors who wished to experience the rustic life of those on the island. This increase in tourism led to an increase in the demand for accommodations, which led to the building of hotels and other amenities coming to the area. Due to the rise of wealthy families and the growth of Mt. Desert Island's popularity, many of these

affluent families began to build large estates that acted as luxury retreats from the hustle and bustle of the growing cities of the east coast (NPS ACAD 2017).

As the 1800s came to an end and development on Mt. Desert Island continued, a man named George Dorr began to take notice of effects that were occurring on the island. Dorr came from one of the wealthy families that owned a large estate on the island and seeing the need for conservation on the island decided to act. In 1901, Dorr and some of the like-minded island elites established the Hancock County Trustees of Public Reservations or HCTPR to preserve the scenic beauty of the island and the wildlife that was disappearing from the island. The HCTPR sought to achieve their goal of preservation by buying up land so that it would be protected from development. In 1913, Dorr and the HCTPR offered the 6,000 acres of land they had accumulated to the government for the creation of a national preserve, and so three years later President Woodrow Wilson signed the bill creating Sieur de Monts National Monument. Three years later in 1919, President Wilson signed the bill that upgraded Sieur de Monts National Monument to Lafayette National Park. With this elevation to national park status the park needed a Park Superintendent, which was the perfect job for Dorr. Ten years after the bill creating Lafayette National Park was signed, the name of the park was changed to Acadia National Park (Ise 1961).

After Acadia National Park was renamed in 1929, the country fell on hard times with the Great Depression beginning in 1929 and lasting into the mid-1930s. As with many of the other national parks the Great Depression had a major impact on Acadia National Park through President Franklin Roosevelt's Civilian Conservation Corps (CCC) which was started in 1933. In the years before the CCC came to Acadia the park wasn't being used to its full potential. When the CCC came to the park in 1933 they found Dorr, who was still the Park Superintendent, eagerly awaiting them with many ideas for how the CCC would help Acadia become more developed. For nine years the CCC worked tirelessly in Acadia on forestry projects that include fire suppression and clearing debris, as well as trail and campsite construction. When the CCC program ended in 1942, Acadia National Park looked vastly improved and many young men came away from the program with a new-found appreciation and love for the National Parks (NPS ACAD 2016a). As

Figure 4.5.1- Rocky Ocean Drive Coast of Acadia National Park (Rugg)

the CCC was concluding the United States became involved in World War II, and from the early 1940s until the mid-1940s attendance at Acadia suffered. In 1941, over 400,000 visitors came to Acadia which was a record year for the park but during the war park attendance plummeted to only 8,000 visitors in 1943 (Ise 1961).

As the World War II ended visitors began pouring into Acadia and attendance rose even higher than before the war, but as in many national parks at this time the visitors found that the park had fallen on maintenance. For Acadia, this lack of maintenance had extreme effects in 1947 as Maine had one of the hottest and driest years in memory. On October 17, 1947 a fire started on Mt. Desert Island that was not fully extinguished until November 14. The fire left over 17,000 acres burned on the island, 10,000 of which were part of Acadia National Park. Few people lost their lives in the fire, but the damage was extensive, but the fire also had a lasting effect on the park and the island. The fire changed the forests on the island significantly by changing the species that made up the fire; old growth fir and spruce trees were replaced by sun loving birch and aspen. Potentially a larger impact on the island though was that the fire burned many homes, including the estates that were owned by the wealthy families that used the area as a vacation spot. Due to hard times in the Depression and World War II, most of the wealthy families chose not to rebuild, which left a large amount of land on the island for the large hotels that were required to accommodate the ever-increasing number of visitors (NPS ACAD 2015).

In the years that followed Acadia continued to rise in popularity due to the expansion of the national highway system which occurred in the 1950s and 1960s. Another factor that plays into the rise in visitors during the mid-1900s was the NPS' bicentennial celebration in 1966, which drew many people to the parks with the famous Mission 66 program that improved many national parks. In 1989 visitation peaked, with 5.4 million people that were counted as visiting the park, but the next year Acadia changed the way it collects its annual number of visitors which dropped the number of annual visitors to 2.3 million in 1990. Since that time the number of visitors has remained stably above 2 million but never breaking 3 million, until the NPS celebrated its 100th anniversary of its founding in 2016 when the park surpassed 3 million visitors for the first time since 1989 (IRMA). In 2002 the Navy donated a facility on the Schoodic Peninsula and in 2015 an

additional 1,400 acres were given to the park by a donor, which brought the park's size to more than 47,000 acres (Trotter 2016). The park is now working to develop new transportation plans and systems, to manage the number of visitors coming to the park and in order to help alleviate the crowding that occurs in popular areas on peak days of the season.

Site Circulation

Acadia National Park is located off the coast of Maine on Mt. Desert Island, which limits how visitors can get to the site. The only way to drive to Acadia from the mainland is to take the Bar Harbor Road from Trenton, but visitors can also get to the island by boat and cruise ship at Bar Harbor. The town of Trenton also has an airport, which adds to the accessibility of the park. Acadia has six different visitor facilities including a visitor center, a historical museum, a welcome center, a nature center, and two information centers. These different facilities help the park to function and allow visitors to easily find the information they are looking for. One point of interest is that part of Acadia National Park is not found on Mt. Desert Island (where the majority of the park is), specifically the section of the park on the Schoodic Peninsula, the museum on Islesford, Isla au Haut, and some smaller islands off the coast of Mt. Desert Island. The portion of Acadia that is on the Schoodic Peninsula can be driven to on the mainland, but the islands that are included in the park require a boat. Figure 4.5.1 shows a map of Mt. Desert Island, which shows the main area of the park.

In 1993, the first shuttle service came to Acadia as a response to the growing concerns about air pollution, but it wasn't until 1997 that a partnership solidified with the Downeast Transportation Inc., the Maine Department of Transportation, and the Friends of Acadia, which led to the creation of the Island Explorer Shuttle System with an extended route. Since then the Island Explorer Shuttle System has expanded to 10 different routes, including a route from the airport in Trenton to Bar Harbor which is the hub for many of the routes. Figure 4.5.2 shows the Island Explorer Shuttle System except for the shuttle route on the Schoodic Peninsula (NPS ACAD).

Acadia National Park doesn't have any trails dedicated to cyclists, but there is an extensive network of carriage trails throughout the portion of Acadia that is on Mt. Desert Island. These carriage roads are also used by hikers and horse back riders, but any type of motor vehicle is

Figure 4.5.2- Acadia National Park map (NPS 2018)

Figure 4.5.3- Acadia National Park shuttle map (Island Explorer 2017)

strictly prohibited, and cyclists are expected to yield to all other users (NPS ACAD 2018a). In addition to the extensive system of carriage roads (over 45 miles of road), Acadia National Park is home to over 120 miles of designated hiking trails (NPS ACAD 2018b). These dedicated hiking trails help the hiking enthusiasts explore the park without competing with horses and bikers for space, and with the range in difficulty of the hikes there is something for every level of skill. All these transportation systems overlap and create a variety of visitor experiences.

Scenic and Ecological Qualities

Acadia National Park was the first coastal national park, and therefore when visitors think of Acadia they often imagine rocky coastlines such as the one shown in Figure 4.5.3. Acadia is much more than coasts and beaches though, the park also is home to forests, lakes, swamps, and mountains. The park is home to many animal and plant species that make up these diverse ecosystems, and their preservation was the goal of those dedicated people who began buying the land for the park over 100 years ago.

The coasts and beaches of Acadia are where the ocean meets the land, and these areas are rich in wildlife including marine invertebrates and shore birds. Further inland there are the wetlands, marshes, swamps, lakes, and pond which contain the 28 fish species still surviving in the area, as well as various small mammal species, reptile species, and bird species. One way in which Acadia differs from some of the larger parks is that it lacks large animal species, due mainly to the fact that large animals need more space than is available on the island (NPS ACAD 2016b).

Acadia is also home to many native plant species that due to human interference are being threatened by nonnative plants, in fact a quarter of the plants in the park are nonnative. Acadia is also home to almost 25 plant species that are listed as rare plants in Maine. The plant communities that occur within the park vary based on their location and their access to sunlight and rain. For example, Acadia has plant communities that thrive in the freshwater ponds and lakes, but it is also home to marine plants that can be found washed up on the park's beaches. The wooded areas of the park are home to wild flowers, ferns, mosses, and liverworts that thrive in the shade provided by Acadia's trees. The diversity of plants that live in the island's ecosystems

are part of why Dorr and the other members of HCTPR tried so hard to save the island they cared (NPS ACAD 2016c).

Visitor Trends

When Acadia National Park was created in 1919, it was the 16th national park in the NPS. In 2017, it was the seventh most-visited national park in the NPS, with 3.5 million visitors. Acadia experienced its highest number of visitors in 1989, when 5.4 million visitors came to the park. This spike in visitors only lasted from 1981 when the number of visitors reached almost 3 million visitors and continued climbing until the number of visitors spiked in 1989. The following year, Acadia only saw 2.3 million visitors which is less than half the number of visitors it saw the year before. The visitor trend since Acadia was formed can be observed in Figure 4.5.4 and shows that the current rise in visitor numbers began in 2013 and has continued until 2017.

Figure 4.5.5 shows a breakdown of visitor numbers in 2017, which supplements the data shown in Figure 4.5.4 by showing what times of year are the most and least busy. This is important because the number of visitors that come to the park in a month directly effects the amount of seasonal staff that are needed to help handle the visitors. This means in months like July, August, September, and October when most visitors come to the park, the need for staff is much greater than months like January, February, March, and December when very few visitors come to the park. In 2017, July, August, September, and October received 2.6 million visitors which is 74.3% of the annual visitors to Acadia. In contrast, January, February, March, and December only account for less than 63,000 visitors which is 1.8% of the total annual visitors. This means that in the busy season from July through October most visitors come to the park, while the rest of the year sees a relatively small number of visitors in comparison.

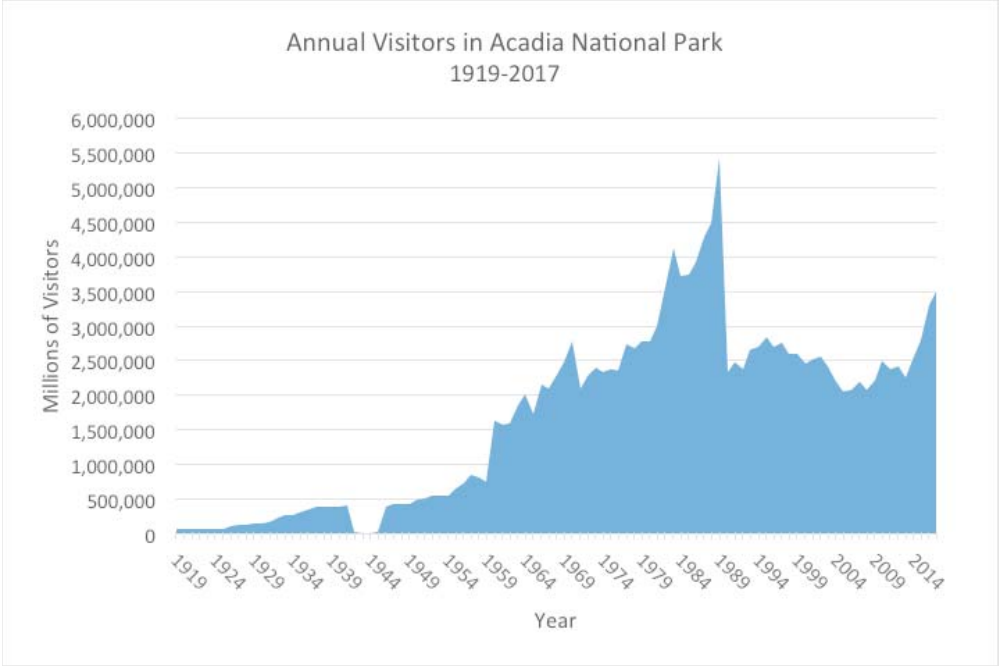

Figure 4.5.4- Acadia National Park yearly visitation statistics (by author).

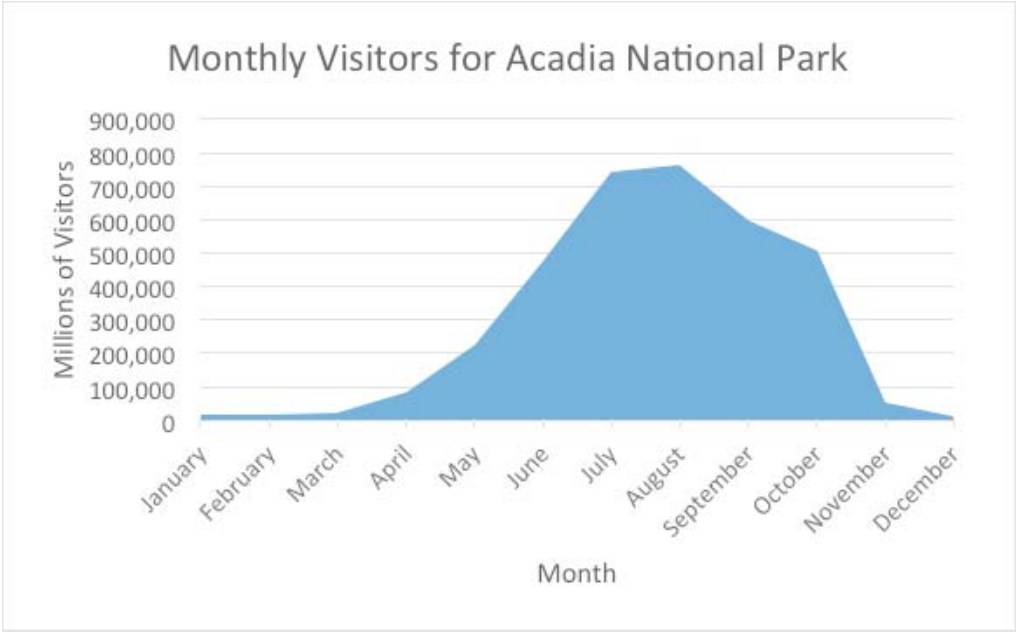

Figure 4.5.4- Acadia National Park 2017 monthly visitation statistics (by author).

Olympic National Park

Introduction

Olympic National Park is located on the Olympic Peninsula in Washington and joined the NPS as the 24th National Park in 1938. The area is known for its old growth forests and the impressive Olympic Mountains that give the park and the area its name, as well as for the wildlife in the area, such as the Olympic elk. Olympic National Park has many ecosystems that it protects, like the temperate rainforests that receive almost 160 inches of rain a year, all of which make the park a unique and important part of the NPS (Ise 1961).

History and Context

The story of the Olympic Peninsula begins with the Native Americans who lived in the area prior to the arrival of Europeans or Americans. There are eight tribes that can still be found in the Olympic National Park area including the Hoh, Ovette, Makah, Quinault, Quileute, Queets, Lower Elwha Klallam, and Jamestown Klallam. These tribes lived in relative peace with one another, trading, hunting, fishing, and living off the land when the first Europeans arrived at the peninsula in 1592. That was the year Juan de Fuca allegedly discovered the straight that on the north side of the Olympic Peninsula, but it wasn't until the late 1700s that the waters surrounding the peninsula were explored more thoroughly (NPS OLYM 2015a).

Though the waters were explored in the 1780s and 1790s, the land was not explored thoroughly until the 1880s and 1890s. It was around this time that the land near the coast began to be settled, and though settling was hard work the land had abundant resources (NPS OLYM 2015b). It was in 1897 that a large section of the Olympic Peninsula was set aside as the Olympic Forest Reserve. Over the next 41 years the area shifted from agency to agency and from title to title, until the site finally became Olympic National Park in 1938. During the time leading up to the creation of the park, there was much debate about whether mining, hunting, and logging would be allowed, with strong opinions on both sides of the issue. The debate over whether Olympic National Park should include the heavily forested valleys would be added to the park or whether they would be opened to logging was decided in 1940, with President Franklin D. Roosevelt

giving the additional 187,000 acres of forest to Olympic National Park. Even after this victory for the NPS, President Roosevelt further expanded the park to preserve and protect as much of the area as possible (Ise 1961).

As the United States entered World War II in 1941, the park came under fire once again, this time from those who believed the mountains within the park held valuable mineral resources, but it once again failed to effect Olympic National Park. After the war ended, foresters began to clamber for a reduction to the size of the park in order to increase the amount of wood to be used for houses for soldiers returning home from war. In response to political pressure and fearing the worst, Olympic National Park released 56,000 acres of the forest to be logged by the timber industry. This effort to appease them failed and the lumbermen demanded still more of the park be opened for logging, but nothing came of it. In 1953, President Truman added almost 48,000 acres of land to Olympic National Park, which almost brought the size of the park back up to where it was before it released the 56,000 acres to the lumbermen. This brought about much criticism because many thought the park should be reducing in size not expanding, but ultimately the park didn't shrink in size (Ise 1961).

As Olympic National Park pushed on into the late 1900s, the support for wilderness areas began to increase. This was helped by the Wilderness Act of 1964 and the designation of the park as an International Biosphere Reserve by the United Nations Educational, Scientific, and Cultural Organization in 1976. In 1982, Olympic National Park became a UNESCO World Heritage site that set it aside as an "irreplaceable treasure of outstanding value (NPS OLYM 2016a)." All these impressive acts of preservation helped to solidify the idea that preserving the wildlife and wilderness of the Olympic Peninsula is worth the investment.

In 1992 the Elwha River Ecosystem and Fisheries Restoration Act was signed into effect which planned for the removal of the Elwha River Dam that was constructed in 1910. The dam was constructed to help the lumbermen, but it had the unfortunate side effect of not allowing the salmon that used the area upstream as a spawning ground. Another side effect was that the typical sediments and debris that are carried by the river had nowhere to go, which resulted in flooding around the river. With the Elwha Restoration Act, Olympic National Park was able

to create a plan to remove both the Elwha Dam and the Glines Dam in an effort to restore the ecosystem to what it was before humans intervened. In 2012, the Elwha Dam Removal was complete and two years later the Glines Canyon Dam Removal was completed. This ecosystem project is a great example of how Olympic National Park is making great strides to repair and advance the ecological health within their park (NPS OLYM 2018a).

Site Circulation

Olympic National Park is located on the Olympic Peninsula, which is in the northwestern part of Washington. The park is a little over two hours north west of Seattle and an hour north of Olympia, which makes the park appealing to people visiting Washington. The most important highway that allows visitors to get around the park and the Olympic Peninsula is Highway 101, which can be seen in Figure 4.6.1 and can be seen wrapping around the peninsula. The closest airport that makes the area available to travelers is in Seattle, and there is a ferry that connects British Columbia to the city of Port Angeles (15 minutes from the park) as well (NPS OLYM 2018b).

Olympic National Park has three Visitor Centers, the Olympic National Park Visitor Center, the Hurricane Ridge Visitor Center, and the Hoh Rain Forest Visitor Center, as well as the Wilderness Information Center and a Ranger Station, all of which can be seen in the park map in Figure 4.6.2.

Although there are two shuttle bus systems on the Olympic Peninsula that operate between the towns surrounding the park there is no direct transportation from surrounding communities into the park or around the park. This means that hikers and backpackers are forced to hitchhike from towns near the park into the park unless they can drive (NPS OLYM 2016b).

Olympic is home to over 64 trailheads and over 600 miles of trails that allow visitors the chance to see the 922,651 acres of park (NPS OLYM 2015c). Many visitors to the park wish to go into the Olympic National Park backcountry, which is the area of the park that is designated wilderness that requires the visitor to follow guideline for how to minimize their impacts on the park. These backcountry campers are also required to get a pass to stay overnight in the backcountry. Off trail hiking is allowed in the backcountry, so it is important for backcountry

Figure 4.6.1- Olympic Peninsula Transportation map (OLYM Roads 2018).

Figure 4.6.2- Olympic National Park map (NPS 2018)

campers to know how to read a map and plan for emergencies they may have. Backcountry camping is often thought of as a responsible way to experience the park in a way that limits the visitor's impact on the park (NPS OLYM 2017).

Scenic and Ecological Qualities

Olympic National Park is a massive park that showcases the mountains, rivers, forests, and coastlines that the Pacific Northwest is known for. Figure 4.6.3 is one such picture that shows the intense beauty of the region, but there is a wide variety in the scenery of Olympic National Park; from the snowcapped peaks of the Olympic Mountains to the lush, verdant Temperate Rainforest Olympic has many different ecosystems that support many plant and animal species.

There are four major ecosystem types that are found in Olympic which are mountains, rivers and lakes, forests, and coasts. The Olympic Mountains are home to a spectrum of ecosystems from the summits that lie hidden beneath glaciers, to the alpine zone that contains little vegetation, to the subalpine grasslands that eventually give way to the montane forests, these ecosystems harbor a diverse assortment of plants and animals that survive only in their niche mountain ecosystem.

The rivers and lakes of Olympic National Park are very important because they give life to the wildlife of the park by providing them with drinking water and by containing fish, which are a food supply for humans and animals alike. In the past ten years, Olympic National Park has been working tirelessly to remove dams like the Elwha Dam and the Glines Canyon Dam, which were destroying the ecosystems of the surrounding valley, and then to repair and rehabilitate the ecosystems to a healthier state. The demolition of the dams and restoration of the rivers were crucial to the repairing of the area's ecosystem, and by allowing fish like salmon to run further up the river, the areas around the rivers have begun to heal and the fish are able to reproduce more effectively (NPS OLYM 2018a).

The forests of Olympic National Park are some of the most pristine old growth forest in the contiguous United States. The forests ecosystems are broken down into five different types of forest including the coastal forests, temperate rainforests, lowland forests, montane forests, and subalpine forests, which all differ in tree species, rain received, soil depth, elevation, and nutrients

Figure 4.6.3- Krause Bottom in the Elwha River in Olympic National Park (NPS)

received. These forests help to support the region's unique wildlife like the Olympic Elk, which are also referred to as Roosevelt Elk (NPS OLYM 2015d).

The coastal areas of Olympic National Park are teeming with life, from water birds and fish to marine mammals and the invertebrates. The 73 miles of coasts included in the park are home to a unique hotspot ecosystem in the tidepools that are packed with life like sea urchins and sea cucumber. The rocky coast is the perfect place for seals and sea lions to congregate and sun themselves, as well as the nesting areas for sea birds. The coastal ecosystems are the overlap between the sea and the land and are home to the species that overlap both as well (NPS OLYM 2015e).

Olympic National Park is home to many species of animals including 20 species of reptiles and amphibians, 37 species of fish, 300 species of birds, and 56 mammal species. Of these 413 species of animal that can be found in the park, 16 are endemic species, 22 are listed as either threatened or endangered species. In addition to the park's wildlife it is also home to 1,200 different species of plant, eight of which are endemic species in the park, which means they only occur in the park. All of these species of plants and animals make for a park that is bustling with biodiversity in many different ecosystems (NPS OLYM 2015c).

Visitor Trends

Only 75,000 visitors came to Olympic National Park in 1938, when President Franklin Roosevelt established the park. Since then, visitation has increased greatly, reaching over 3.8 million visitors in 1997, when visitor numbers peaked. This is a different trend than most of the national parks looked at in these park profiles; most of the other parks show a fairly constant rise culminating in a new record for visitation around the NPS' centennial celebration in 2016. Following Olympic's 1997 peak, visitor numbers fell below 3 million from 2006 until 2007, plateaued, and declined again 2010 through 2012. In 2013 the number rose above 3 million visitors again and continued to rise until the number of visitors reached 3.4 million visitors in 2017. Though Olympic didn't set any new park records for visitation in 2017, they did manage to secure the eighth most-visited national park spot. Figure 4.6.4 shows the visitor trends from 1935 to present, which shows the rise in visitor numbers until the peak in 1997 and the subsequent

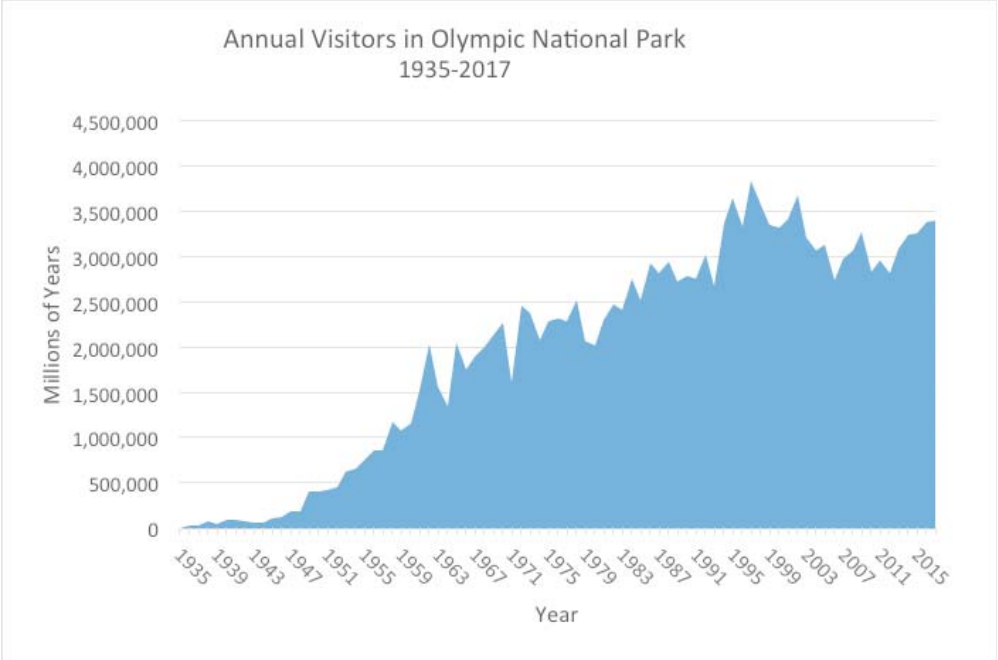

Figure 4.6.4- Olympic National Park yearly visitation stats (data from NPS, figure by author).

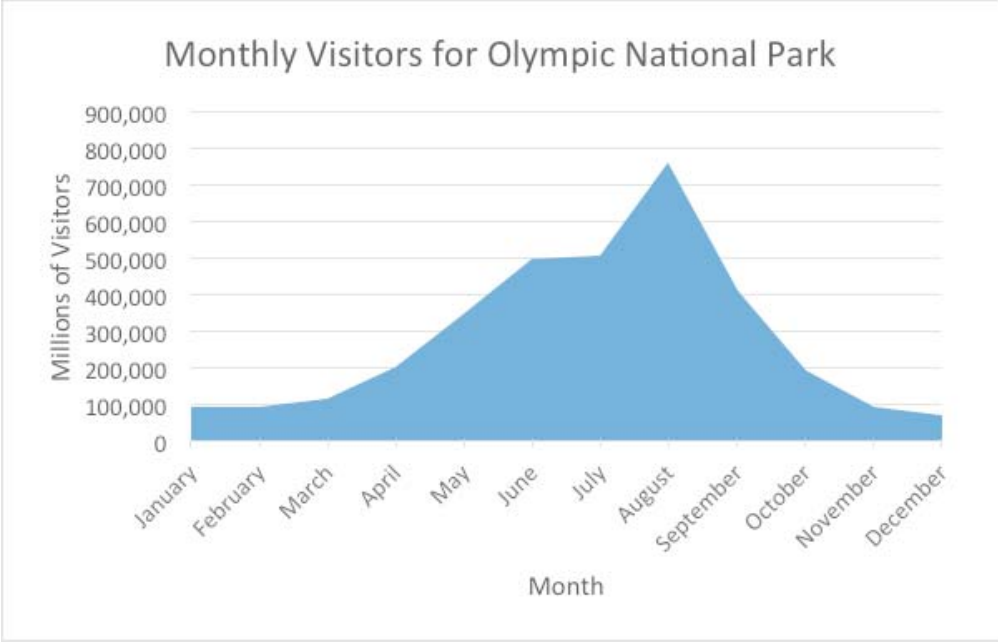

Figure 4.6.5- Olympic National Park 2017 monthly visitation stats (data from NPS, figure by author).

drop in numbers and following rise.

Another important aspect of visitor trends in Olympic National Park is the number of visitors in individual months, which explains which months need seasonal help with visitors and which receive few visitors. Figure 4.6.5 shows the visitor trends during 2017 based on monthly attendance to Olympic. The busiest month for Olympic is August, when the park receives 764,000 visitors, which accounts for 22.4% of 2017's total number of visitors. The busy season extends from June until September, which sees a total of almost 2.2 million visitors, accounts for 64.2% of the park's yearly number of visitors in just four months. In contrast the least visited month for Olympic is December, when around 71,000 visitors come to the park which is equal to 2% of the park's yearly number of visitors.

Glacier National Park

Introduction

Glacier National Park joined the NPS in 1910, and since then it has inspired people around the world with its beautiful mountain landscapes and crystal-clear lakes. Since this time the park has become a must see for back country campers and all who love the outdoors. Though the park is in a remote area in Montana, the park has recently received a surge in visitors surrounding the NPS's centennial celebration.

History and Context

The history of the area that would later become known as Glacier National Park begins with the Native American tribes living in the area, the Blackfeet, the Kootenai, and the Salish. In the prairies on the east side of what is now Glacier, the Blackfeet tribe was dominant. However, the forested area on the western side of the park was occupied by the Kootenai and Salish tribes. In the 1700s trappers began coming to the area in search of beaver and other valuable furs and began to trade with the tribes that lived in and around Glacier. As more traders and settlers came to the area and resource use increased, the Native Americans in the area signed treaties that shrink their lands and eventually led to the Blackfeet reservation that still exists to this day east of Glacier National Park (NPS GLAC 2016a).

In 1885, George Grinnell came to the park and was enticed by the area's beauty. The Great Northern Railroad (GNR) saw an opportunity to create a line through the Marias Pass, which was completed in 1891. A year later, opportunistic businessmen built cabins and began housing visitors, offering meals, and giving tours both on horseback and hiking, which led to the increase in visitors wanting to come to the park. After Grinnell's exploration in the Glacier area, he began pushing for a national preserve in the area, which was realized in 1900 when the area became a Forest Preserve. Still not satisfied, Grinnell teamed up the GNR to lobby the government to upgrade Glacier to a National Park. Ten years after Glacier became a Forest Preserve, President William Howard Taft signed the bill that made Glacier National Park the 10th national park in the United States (NPS GLAC 2015a).

The legislation that created Glacier National Park had some very unusual sections for a national park foundation, such as allowances for railroads, the use of streams for power and irrigations, and the ability for the park to sell dead or downed timber. These allowances made the idea of preservation difficult, but there were many more pressing issues that needed to be solved, like how would visitors get around the park, where would they stay, and how would rules be enforced in the park? The question of how visitors would get around the park was answered in 1921, when construction began on the Going to the Sun Road. Before the Going to the Sun Road was completed, vehicles were loaded on trains to be transported to the opposite side of the park. When the road was completed 11 years later, it immediately was hailed as one of the most scenic highways in the nation. In 1932, the same year the road was completed, Congress made Glacier National Park part of the Waterton-Glacier International Peace Park therefore linking it to the Waterton Park across the border into Canada (NPS GLAC 2015a).

In the 1930s as the Going to the Sun Road was built and the Waterton-Glacier International Peace Park was established, the US experienced an economic downturn which resulted in the creation of the Civilian Conservation Corps (CCC) in 1933. Later in that same year, the CCC arrived in Glacier National Park and established their first eight camps. In the early months of the program, the CCC focused on building camps for their own use then moved on to cleanup projects from the fires of 1929, and later the fire of 1936. CCC crews also prepared campsites and cleaned up roads, as well as built buildings, trails, roads, telephone lines, sewer, and water systems. In addition to these tasks, the CCC was also vital in fire suppression in the years they occupied the park up through 1942 when the CCC was disbanded. The reason for this disband was the start of the US's involvement in World War II in 1942 (NPS GLAC 2016b).

During World War II visitation in Glacier National Park dropped, but as in many other national parks at this time, when the war ended people came flooding back to the parks in even larger numbers than before the war. In 1941, Glacier National Park saw 178,000 visitors, then from 1942 to 1945 Glacier had a total of 189,000 visitors, which is an average of 47,000 visitors a year. Following the war, in 1946 the park saw over 200,000 visitors, the highest attendance on record at Glacier. During the war some changes had come to the park, and due to a lack of upkeep

and few visitors the park had begun to fall into disrepair. The hotels and chalets that had housed visitors before the war had been closed for three years of the war and during that time became uninhabitable. After the war, only two chalets remained, and they became expensive to keep up. This, combined with buses and automobiles having better access to the park, meant that railroads could no longer afford to rebuild the hotels they previously had managed (NPS GLAC 2015b). Due to the rise in the number of visitors to parks and the general need for improvements and renovations, the NPS decided to launch a program called Mission 66 to clean up the parks and fix the issues visitors were having. Mission 66 began in the 1950s and was meant to wrap up in time for the NPS's centennial celebration in 1966, hence the name Mission 66. In Glacier National Park Mission 66 included increasing the site's staff and preparing accommodations for more park visitors, as well as the construction of two visitor centers that are a tell-tale example of the Mission 66 program. With the building of the St. Mary and Logan Pass Visitor Centers, visitors were able to have a much better experience (Wagner 2017).

After Mission 66 was completed, the program cam under fire for having only improved the parks through the construction of more buildings. People were beginning to care about the health of the park's ecology, as well as the scenic beauty. As legislation, such as the Wilderness Act of 1964, came into effect the NPS adjusted the way that the national parks managed their parks. As areas within the national parks became designated as wilderness, parks had regulations on what could happen within these wilderness areas for the protection of the park's ecology. As the environmental movement continued, society became more worried about the effect humans were having on nature. In the 1990s, as climate change began to be realized and discussed, Glacier became a prime area for study of the effects humans are having on climate because the park is home to many glaciers. As global warming became a concern first for scientists and then for all of society, one area where it can be easily observed is in the loss of glaciers, and Glacier National Park was a prime place to view this. In 2007 USA Today reported, "The last official count -- in 1998 -- pegged the number of glaciers here at 27, down from 150 a century ago…Grinnell Glacier has lost 14 acres -- 9% of its total coverage -- just in the past 24 years (Rossman 2007; Runte 2010)." As this glacial retreat continues, many people are working on the issue of how to limit

climate change, as well as how to fix some of the effects climate change is having on ecosystems around the globe. In addition to glacial melting, Glacier National Park also has experienced issues based on the rapid jump in visitors which creates is raising questions about how to manage more visitors in a way that will preserve the park for generations to come (Runte 2010).

Site Circulation

Glacier National Park is in northwest Montana and spills over the Canadian border into Waterton Park. The park is accessible by plane at the Glacier Park International Park, and by the Empire Builder train on the same route that passengers would have taken on the Great Northern Railroad. Most national parks removed their rail lines when automobiles became popular making the historic train trip to Glacier National Park a unique experience. Traveling from the east side of the park to the west side can be managed by driving on the famous Going to the Sun Road, which was finished constructing in 1932. Many of Glacier National Park's trailheads are located along the scenic Going to the Sun Road, as well as the park's three visitor centers and many of the park's built structures. Figure 4.7.1 shows the Glacier National Park with roads and trails.

Glacier National Park is home to a shuttle service that operates along the Going to the Sun Road. The shuttle service operates from early July to early September, which are three of the four busiest months in the parks. The shuttle service itself includes 15 stops between Apgar Village at the western entrance to the park to the St. Mary Visitor Center at the eastern entrance to the park. These shuttle stops relate to entrances to attractions such as the Rising Sun Boat Dock Shuttle Stop and the Jackson Glacier Overlook Shuttle Stop. The map in Figure 4.7.2 shows the shuttle line and stops for the Glacier National Park ().

Cycling in Glacier National Park is allowed on all paved roads but not on trails, except for the trail from Apgar Village to the Park Headquarters, Apgar Village to Fish Creek Campground, and the Flathead Ranger Station Trail where bikes are allowed. During the summer there are restrictions on roads that can be biked, for the benefit of the drivers during the busiest time of year for the park, specifically from the Apgar Village to Sprague Creek and Logan Creek to Logan Pass. Also, the shuttle buses have bike racks so that bikers can utilize the shuttle service as well (NPS GLAC 2018a).

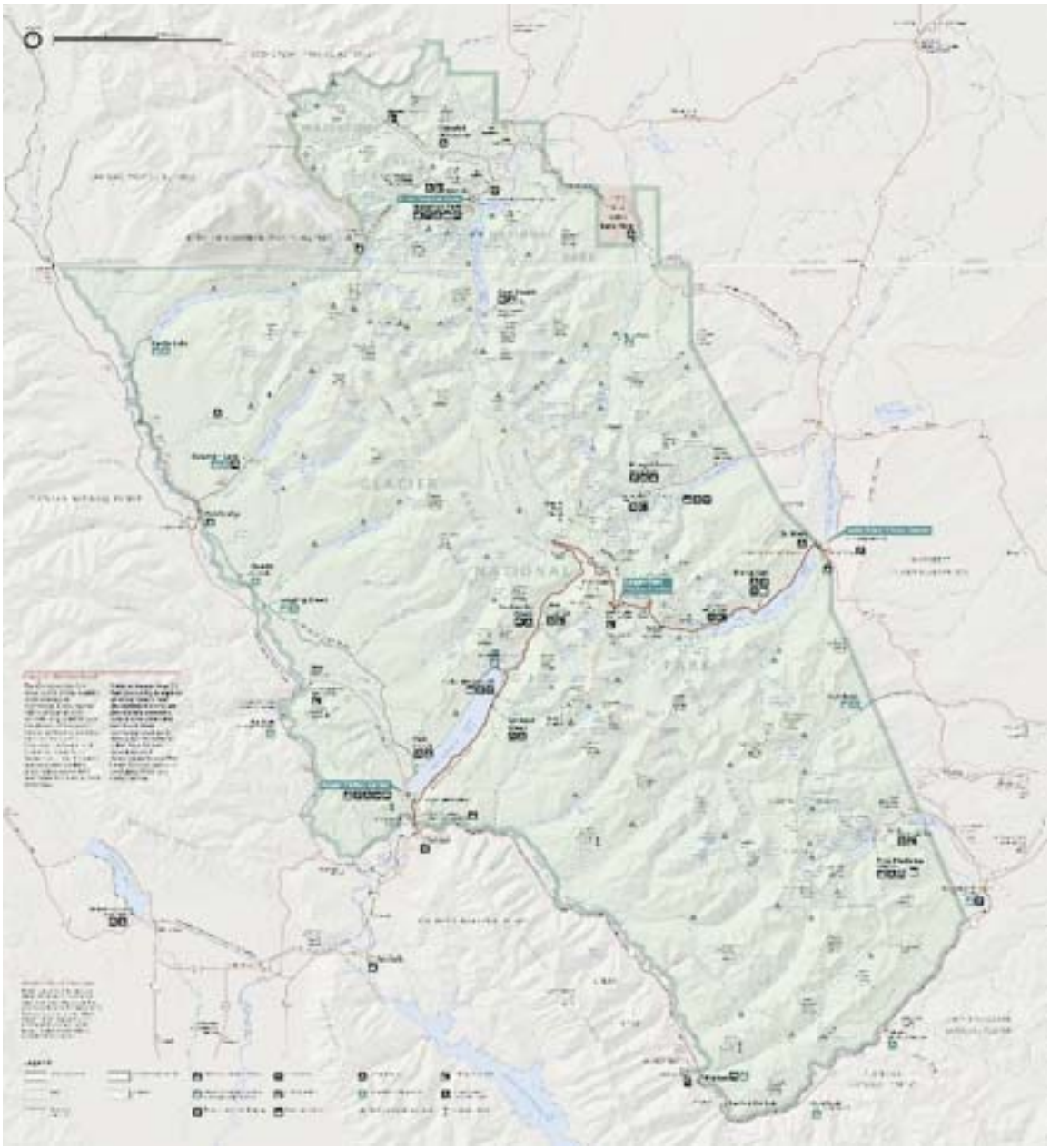

Figure 4.7.1- Glacier National Park Map (NPS 2016).

Figure 4.7.2- Glacier National Park Shuttle Map (NPS 2016).

Glacier National Park is known to many backpackers and hikers as a paradise, with its 734 miles of trail through scenic Rocky Mountain wilderness. The hiking trails exist in five separate districts of the park including the Lake MacDonald, Many Glacier, North Fork & Goat Haunt, St. Mary, and Two Medicine districts (NPS GLAC 2017a). Visitors to Glacier engage in two different hiking experiences, day hikes and overnight backcountry hikes. The difference is that day hikers tend to go on shorter trails and do not camp in the park, while backcountry hikers go on longer hikes and spend the night in the park. Backcountry hikers are required to apply for permits and follow specific rules while in the backcountry such as following the leave no trace rules that are designed to limit visitor impacts on wilderness zones (NPS GLAC 2018b).

Scenic and Ecological Qualities

Glacier National Park is home to over 963,000 acres of preserved wilderness, out of the national park's impressive 1 million acres. It is home to 175 mountains, 26 glaciers, and 762 lakes (131 of which are named). Glacier is part of the Rocky Mountains in the state of Montana and is home to some of the least disturbed parts of the Rocky Mountains. Glacier was named such because of the glaciers that are found within the park. These glaciers are responsible for the carving of Glacier National Park's landscape of mountains and valleys (NPS GLAC 2017b). Glacier National Park's highest peak is Mt. Cleveland, which stands at over 10,000 feet above sea level (NPS GLAC 2017b).

Glacier National Park is home to many ecosystems, including forests, wetlands, marshes, and swamps. Glacier National Park is 55% covered in forests, which can be broken down into the subtypes of forest. These subtypes that are found within Glacier are moist coniferous forest, dry coniferous forest, and deciduous forest. Each forest type supports different species of plants based on differences in climate, elevation, moisture, burning, wind, and avalanches. Wetlands, marshes, and swamps are only found in a small portion of Glacier, but many species depend on these areas for food and water. Like forests, these wetland ecosystems are home to unique species of plants and animal, including 43 rare species of plants, the rare bog lemming, and all the park's amphibian species (NPS GLAC 2016c).

Glacier National Park is home to more than 1,100 species of plants, and of those species 109

Figure 4.7.3- Grinnell Glacier Basin in Glacier National Park (Rains)

are listed as sensitive by the State of Montana. The plant cover in the park consists of 33% moist coniferous forest,16% dry coniferous forest, 8% dry meadow and prairie, 6% deciduous forest, 5% wetland or fen, 3% lakes, and 29% barren. The plant communities are different based on which side of the continental divide you are on. The west side of the divide is predominately moist and temperate because of the moisture coming in from the Pacific Ocean. The east side of the divide is dryer than the west side, and the forests and grasslands are more open than the west side (GLAC 2016d).

Glacier National Park is home to a variety of animal species including 71 mammal species, 276 bird species, 3 species of reptiles, 6 amphibian species, and a variety of native and nonnative fish species. Some of the mammal species that live in the park include elk, grizzly bears, beaver, bighorn sheep, mountain lions, and wolverines (NPS GLAC 2017c). The over 270 bird species found in Glacier National Park take advantage of the many habitats created by the continental divide and by the differing climates and plant communities (NPS GLAC 2017d). Only three reptile species are found within the park due to the severity of the winters (NPS GLAC 2017e). Glacier National Park's amphibian species are gaining habitat as glaciers in the park melt and wetland areas become more extensive (NPS GLAC 2017f). Most areas of the park is a relatively pristine example of Rocky Mountain wilderness, but due to fish migration habits, non-native species of fish are now being found in Glacier's streams and rivers (NPS GLAC 2017g). Glacier National Park is protecting all these wildlife species, as well as the habitats they live in so that part of the Rocky Mountains are preserved for future generations.

One part of Glacier's management of wilderness is the regulated burnings that occur for the benefit of the park's wildlife and forests. Fire acts as a way of clearing fallen trees and other plant material from the forest floor to allow new plants to grow. Some plants even require the heat of fires for their cones to open and release their seeds. However due to climate change, the fires within the park have become larger, more hazardous, and less controllable as well as longer lasting and occurring more frequently and over a greater time frame (NPS GLAC 2017h).

Visitor Trends

Glacier National Park achieved its national park status in 1910, but the first-year attendance

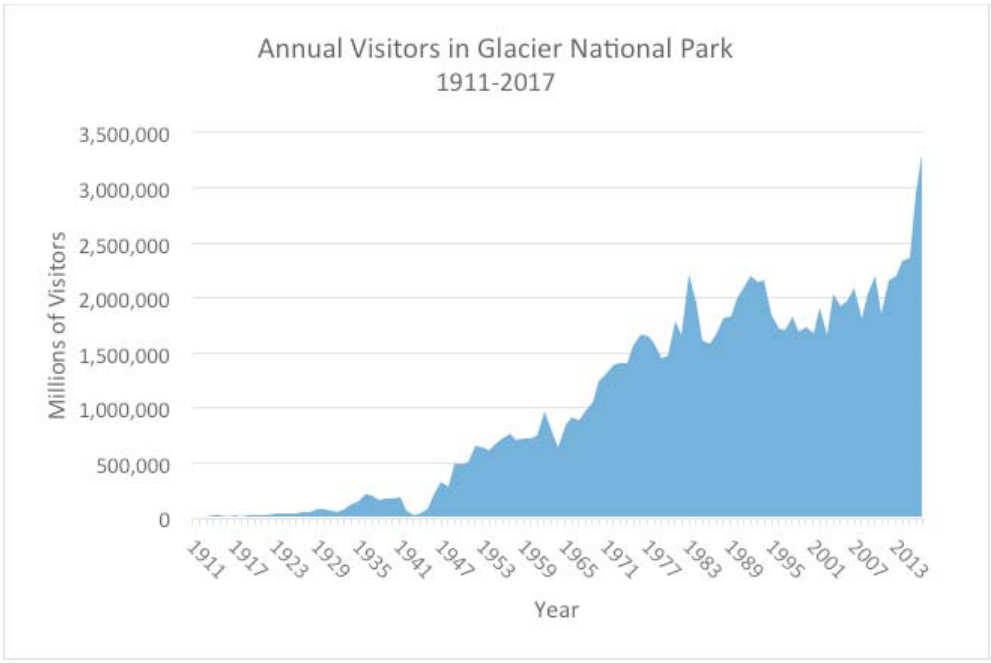

Figure 4.7.4- Glacier National Park yearly visitation stats (by author).

Figure 4.7.5- Glacier National Park 2017 monthly visitation statistics (by author).

was recorded was in 1911 when 4,000 visitors came to the park. Since that year Glacier's yearly visitor number has climbed with occasional spikes in visitor numbers, and a stretch during World War II when visitation sank dramatically. In the years leading up to the NPS's centennial celebration in 2016, Glacier National Park began to see large increases in attendance. For example, in 2012 the park received 2.2 million visitors but in 2016, the year of the NPS centennial, the park received 2.9 million visitors and broke the park record for the most visitors to Glacier in a year. This record was promptly broken last year in 2017, when the number of visitors jumped by over 350,000 visitors for a total of 3.3 million visitors. With its impressive 3.3 million visitors, Glacier National Park is currently the 10th most-visited national park in the NPS. Figure 4.7.4 shows the yearly visitation to Glacier and tracking the rise in annual visitor numbers over the last 107 years that Glacier has been a national park helps to validate the idea that the parks are experience rapid increases to visitor numbers.

Figure 4.7.5 shows the distribution of visitors to Glacier throughout 2017. This diagram illustrates that the peak month for visitors is July when 1.4 million visitors which is 30.5% of yearly visitors attending in a single month. If you look at the three busiest months of the year, June, July and August they combined account for 76.8% of the park's yearly visitors. In contrast, January, February, March, November, and December each receive less than 20,000 visitors each and combined only receive less than 77,000 visitors, which accounts for only 2.3% of the total yearly visitors. Peak visitor season occurs in the summer because it is the time of year when the park is most accessible to visitors, and the weather remains goof for most of the time. In contrast, winter comes with snowfall, poor road conditions, and restricted access to areas of the park, which is the reason so few visitors are willing to come to Glacier in these months.

Joshua Tree National Park

Introduction

Though Joshua Tree National Park only received its national park status in 1998, the area has quickly become one of the most popular parks in the NPS. Many visitors have enjoyed the park's stunning geologic features and the exotic flora, like the Joshua Tree that lends its name to the park. As visitation has jumped in the years surrounding the centennial of the NPS, it is important to examine the history of the park and the importance of the desert ecosystems in order to fully appreciate the wonders that Joshua Tree National Park protects and provides for.

History and Context

Before the white settlers came to what is now known as Joshua Tree National Park, the area was occupied by four Native American Tribes: the Cahuilla, Chemehuevi, Serrano, and Mojave tribes. The Cahuilla and Serrano tribes were hunter-gatherers who would move between elevations as the seasons changed. The Chemehuevi and Mojave lived peacefully along the Colorado River, until war caused the weaker Chemehuevi tribe to retreat from the river into the dessert. The Mojave tribe was the largest and most dominant tribe in the region, with their permanent settlements and agriculture separating them from the other three tribes that were partially nomadic and depended on hunting and gathering from the desert (Dilsaver 2016).

As Europeans came to the area starting with the Spanish in the late 1700s, and then subsequently the Mexicans and Americans, the Native American population shrank significantly, and those that remained were moved onto reservations in the 1870s by the United States Government. These three governments' interests in the area that is now Joshua Tree National Park revolved around two main industries: mining and ranching. Another draw to the area was the isolation and lack of law enforcement, which made the area ideal for horse thieves and cattle rustlers. Mining operations began in the desert in the 1860s with gold and silver mines, but there were also successful lead, zinc, and iron mines. Mining for gold and silver was popular in the area until World War I, but it experienced a resurgence later during desperate economic times in the 1930s. Due to the Homestead Act, more people came to the area and more law enforcement

along with them and so the outlaw activities common in earlier times disappeared, but new problems like an increased demand for water surfaced just as quickly as the old problems disappeared (Dilsaver 2016).

The United States Government encouraged people to move to the desert by enacting the Homestead Act, which sold land to settlers for a low price if they stayed on the land for five years, and the Pacific Railroad Act, which gave railroad companies land if they would build their railroad through the area. The Southern Pacific Railroad (SPR) decided in 1873 to begin building its transcontinental railroad through the Colorado Desert, which gave greater access to the desert and convinced the Government Land Office to survey the area and make it available for settling. As the mining, ranching, and transportation industries grew and towns began to spring up along rail lines, people flocked to the region in response to medical recommendations that dry desert air helps ease respiratory problems. This became especially important after the extensive use of mustard gas in World War I created many veterans who suffered from respiratory issues. As the desert became a popular place for people to settle, developers saw this as a chance to make their fortunes. Some of the land that people rushed to buy, later was determined to be unusable due to problems acquiring water which left the buyers with useless land in the middle of the desert. There were areas that became popular -- namely Los Angeles -- but water issues occurred there just as in more remote areas. To get the water needed to sustain a city with so much growth potential, the Metropolitan Water District of Southern California (or the MWDSC) created a plan to carry water through a canal from the Colorado River to the city. This immensely expensive project cost $220 million to supply the city with water and traveled through the area that would later become Joshua Tree National Park (Dilsaver 2016).

In the late 1890s, Minerva Hoyt, the wife of a wealthy surgeon, moved to Los Angeles, California. Over the years following her arrival, she would begin to appreciate the dessert environment around her new home. In 1930, Hoyt chose to act in response to the tragic loss of Joshua Trees that was occurring from the intentional vandalism by rowdy motorists, so she founded the International Desert Conservation League. The IDCL stood for the protection of California's deserts ecosystems, including Joshua trees, by creating a government preserve.

Through the encouragement of the IDCL, the NPS determined that it wanted to help protect key plant species not just in the Southwest, but across the nation. This led to the protection of four desert species including the Saguaro Cactus, the Organ Pipe Cactus, the California Fan Palm, and finally the Joshua Tree. In 1936, after numerous NPS inspections and much lobbying by Hoyt, President Franklin Roosevelt signed Joshua Tree National Monument into existence, which gave the NPS control of over 825,000 acres of desert (Dilsaver 2016).

During the years that followed the creation of Joshua Tree National Monument, the monument struggled to survive in the adversity of the real world. The main threats to the new park were the mining industry, land ownership issues, and the lack of funding. The mining industry was a threat to the new monument because the park was established in an area where mining companies had staked claims, began mining operations, and were planning future mining operations. This all led to mining operations questioning how the new monument status would affect their business. Land ownership effected the parks because a third of the monument was owned by groups other than the NPS, including private companies, individuals, and the State of California. The final issue of limited funds meant that the park was without adequate personnel and buildings, which didn't allow for all of the recreation and preservation activities the NPS was hoping for (Dilsaver 2016).

One of the biggest blows to Joshua Tree National Monument came in 1950. After nearly 13 years of debate, the House and Senate approved Public Law 81-837 removing 267,000 acres from Joshua Tree to ease tension between the NPS and area miners. The law allowed miners to continue unimpeded in the eastern portion of the monument, which was the part of the monument that was removed, but it restricted the creation of new mines in the area that remained. This was a compromise because the miners wanted unrestricted access to the whole area, and the NPS wanted to preserve the vegetation and ecology of the whole monument (Dilsaver 2016).

The question of how the NPS would acquire the lands in private ownership (the Southern Pacific Railroad, private land owners, and mine owners) or owned by the State of California was one that weighed on many officials' minds. The SPR owned the land within its 20-mile indemnity zone, but thanks to the Transportation Act of 1940 the SPR returned its unclaimed lands in

this strip, which totaled more than 105,000 acres. After the return of unclaimed lands, the SPR refused to trade land within the park for other public lands, which made things difficult because Congress didn't have the funds to buy the land. After years of failed bargains, the NPS developed a strategy of tripartite deals where in a buyer would buy the land and the NPS would then trade with the third party. This strategy was very successful and yielded an increased 100,000 acres between 1948 and 1956 when the SPR refused to be a part of anymore tripartite deals. The lands that were owned by individual land owners were no easier to acquire than the SPR land. This was mainly due to the tax deeded lands that came into county possession which caused a long and arduous series of negotiations which lasted from 1946 until 1955 when the Federal Government filed for condemnation of the land. In 1956, the NPS received the almost 11,000 acres of land, although some was required to be returned to previous owners within the next year. The mining companies that existed within the monument were investigated by the General Land Office (GLO) beginning in 1937 to determine what claims were valid and which were coming near an end. As the GLO began to examine claims, they began to realize many claims were invalid, but as the new boundary took effect in 1950 many of the unexamined claims were no longer with the park, which meant there were few mining claims left within the monument (Dilsaver 2016).

The final group that held land within the parks that the NPS wished to acquire was the State of California. The NPS attempted to gain the land in 1947 through a trade for the Camp Irwin land, but the land was made unavailable by the military. The NPS then tried to create a tripartite land trade in 1947 with a private land owner, the retired Colonel Robert Ellsworth and the California State Land Commission (CSLC) and the BLM. Negotiations stalled when no side was willing or able to meet the other side's demands. Finally, in 1951, after the BLM attempted to close the door on the matter Colonel Ellsworth met with NPS and BLM delegates and agreed to amend his offer, which yielded 5,500 acres for the NPS. This spurred the CSLC to directly trade lands with the NPS, which led to 25,500 more acres in the monument to come under NPS control. As the 1950s drew to an end the lands not owned by the NPS within the Joshua Tree National Monument began to dwindle, much to the satisfaction of the NPS (Dilsaver 2016).

The final issue of how to develop the monument for visitor use is important because as

the park began to quell the anger from the miners and acquire land to make a cohesive NPS unit, the monument needed to address how to go about becoming usable for visitors. This meant developing a plan for how the park would operate with limited water, limited funding, and little existing infrastructure. The NPS's idea of a national monument needed things like roads, larger staff, visitor facilities, and interpretation resources, which was a hefty order for the new monument. Over the 5 years between the founding of the Joshua Tree National Monument and 1941 which was the first full year that it was open to the public, the park had made little progress toward the building of infrastructure and other advances. Still in 1941, over 23,000 visitors came to the monument and by 1950 the number of visitors in a year had risen to over 93,000. This shed light on the issues the NPS was having in establishing features of a national monument that visitors were used to seeing. In 1954, Joshua Tree opened its official headquarters in the Oasis of Mara and began selling books and other resources for the monument. In addition to the headquarters, signage began to be erected and brochures began to be distributed to visitors. In 1956, a milestone was reached when a ranger offered the monument's first formal interpretation program on the monument's 20th anniversary. This was a momentous occasion because it marked Joshua Tree's ability to survive when faced with adversities and adapt to situations that arose (Dilsaver 2016).

Over the next 20 years (1956 until 1976), two major events occurred that would drastically affect Joshua Tree, the first was the NPS's Mission 66 program and the second was a series of new environmental laws including the Wilderness Act of 1964. Mission 66 was announced by the NPS in 1956 and sought to improve the park through the building of visitor amenities and projects that would improve the monument staff's ability to perform their duties. For Joshua Tree Mission 66 was an opportunity to get the projects done that they had been waiting for, such as the visitor center, ranger residences, new campgrounds, and ranger stations at the monument's entrances. In addition to the buildings, some land was also acquired by the park during this time, but it went more smoothly due to increased funds (Dilsaver 2016).

In the years immediately around the completion of Mission 66, four key pieces of legislation would change the NPS significantly. These four acts were the Clean Air Act of 1963, the

Wilderness Act in 1964, the National Environmental Policy Act in 1969, and the Endangered Species Act in 1973, and they did much to change the way the NPS would manage their holdings including Joshua Tree National Monument. The Clean Air Act was meant to improve the air quality within the US by classifying different areas by how clean their air should be. This affected Joshua Tree because it is downwind from Los Angeles, and therefore received high amounts of air pollution, though their classification showed that they should have little air pollution. The Wilderness Act allowed the government to designate federal lands as wilderness areas, which significantly reduces what can happen on that land. Some of the things not allowed on land that has a wilderness designation are no motorized vehicles, mechanical tools, construction of buildings or structures, or any large environmental alterations. The National Environmental Policy Act created the Environmental Protection Agency, or EPA, which was formed to helped limit impacts on the environment, encourage interdisciplinary collaboration and examine whether any action is truly necessary, and involve the public in all planning and impact analysis efforts. This changed how monuments and parks in the NPS, like Joshua Tree, would create and carry out their management plans. The final new law was the Endangered Species Act, which required all federal agencies to reduce their effects on threatened and endangered species. This affected Joshua Tree because it has several plants and animals on the Threatened and Endangered Species list. These four laws were spurred by a growing concern for the environment on the behalf of the American public. Mission 66 helped to drive this because as the NPS was spending so much of their funding on building infrastructure and visitor centers, people began to wonder if some of that money should be spent on taking care of the flora and fauna of the parks that had become so beloved by the public (Dilsaver 2016).

In 1975, the Western Regional Office of the NPS sent evaluators Joshua Tree to perform a management assessment of the monument. The report that was published on Joshua Tree was somewhat damming. The report expressed how the monument was being managed poorly, specifically surrounding a new management plan, a division whose sole purpose was resource management, road repairs, newer and better signage, more staff in the protection and interpretation department, and more visitor information at park entrances. In addition to these

issues there were also issues of increasing air pollution, potential development encroaching on the parks, and depreciative behavior from the Marines stationed nearby. Within a few years of the management assessment, Joshua Tree began carrying out plans to repair roads, addressing the management's comments on trails, and managing resources in a more specialized way with the help of the monument's ecologist, Bob Moon. With these and other changes, the monument began to see major improvements and when the monument released its general management plan, which proposed an expansion of the monuments size and changed the area's status to a national park. When the General Management Plan was approved and the California Desert Protection Act (CDPA) was passed in 1994, the deserts of Joshua Tree National Monument were upgraded to National Park status, thus realizing the dream Hoyt and so many others in Southern California had for the preservation of the Joshua Tree area (Dilsaver 2016).

With the passing of the CDPA, Joshua Tree National Park experienced huge growth, but also experienced continued troubles. As the Joshua Tree began to receive more funding from the NPS, it was also now responsible for a greater area. The increased funding also meant that the natural resource management division could finally make the advancements they had been discussing. Visitation continued to increase, and the way visitors behaved in the park changed as well, which required new management strategies for law enforcement and park planners. Over the years following Joshua Tree's elevation to national park status, problems continue to intensify namely regarding air pollution from nearby Los Angeles, climate change issues, and the rapid ramping up of visitors as the NPS neared its 100th anniversary. These issues are still affecting Joshua Tree and the rest of the NPS, and strategies for dealing with them are currently being proposed (Dilsaver 2016).

Site Circulation

Joshua Tree National Park is located east of Los Angeles, near Palm Springs on the west side of the park and Twentynine Palms on the north side of the park. Joshua Tree has three visitor centers, one on the south side that is known as the Cottonwood Visitor Center and two on the north side on in Joshua Tree known as the Joshua Tree Visitor Center and the other in Twentynine Palms is known as the Oasis Visitor Center. Most of the camp grounds, trails, and

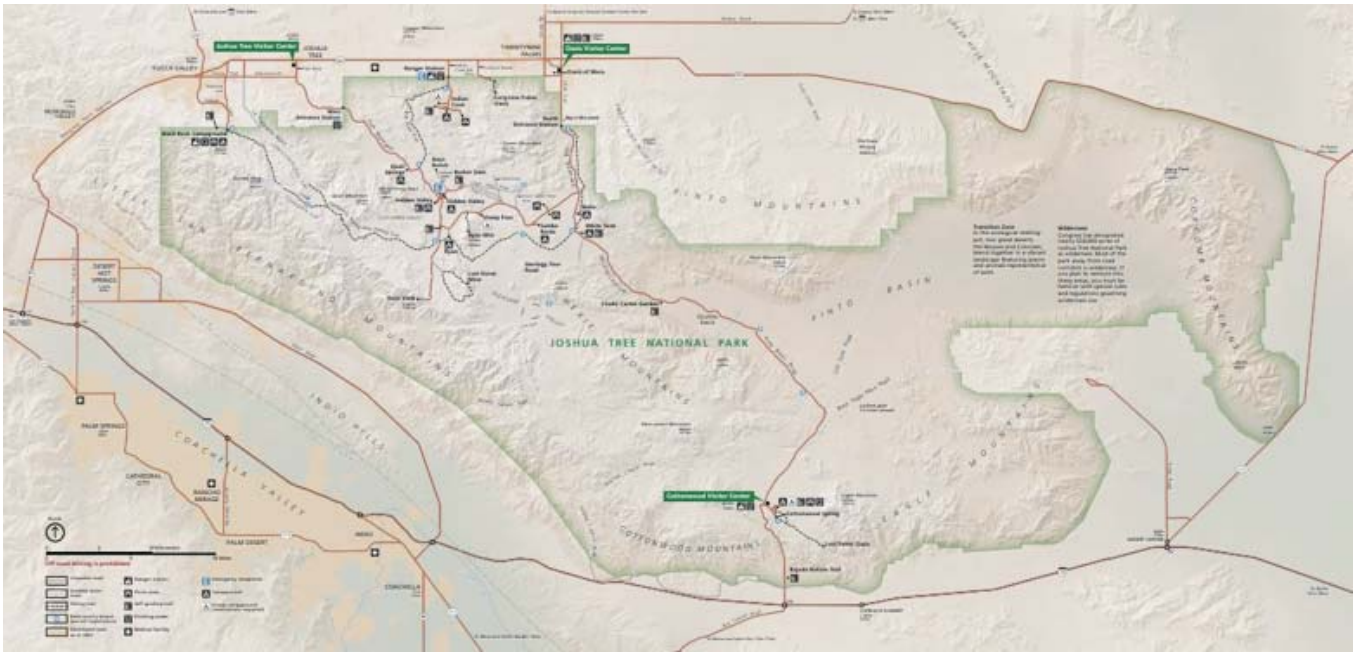

Figure 4.8.1- Joshua Tree National Park Map (NPS)

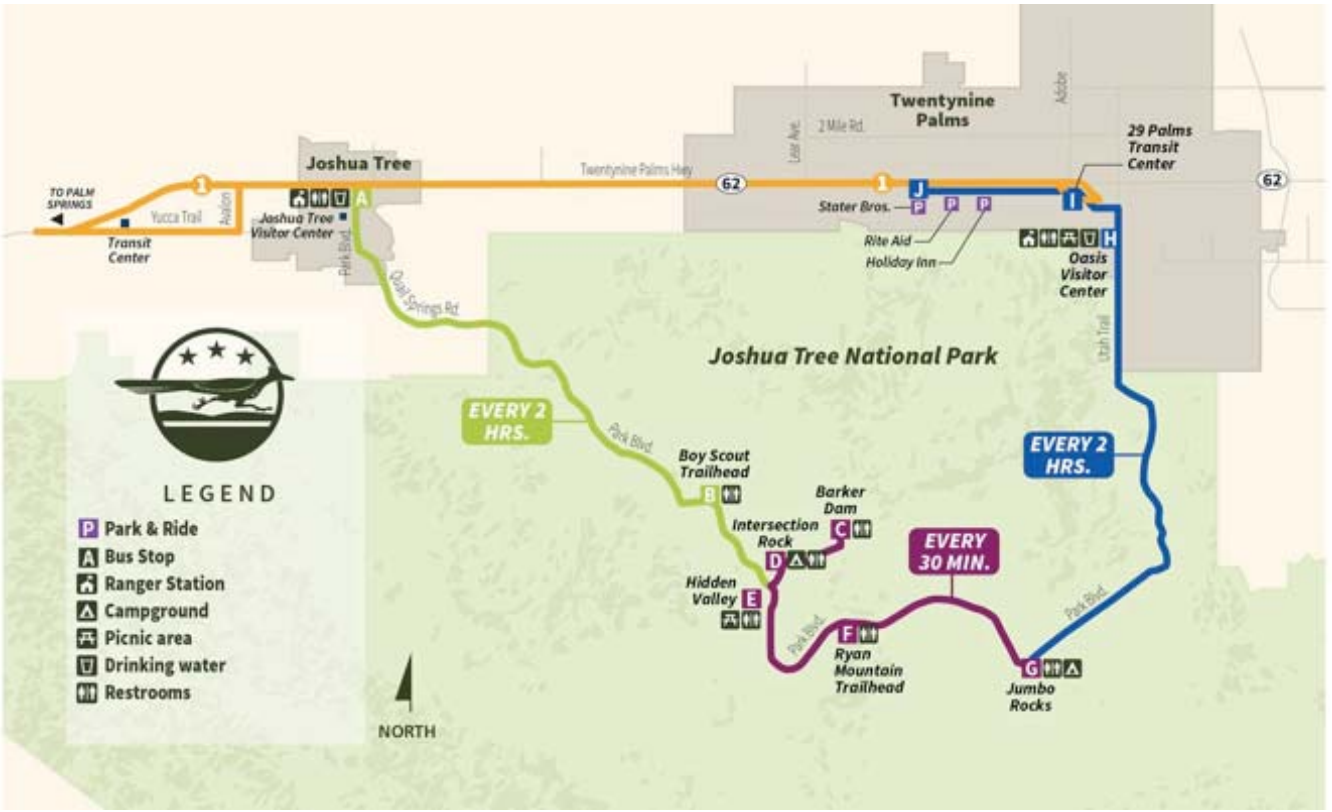

Figure 4.8.2- Joshua Tree National Park RoadRunner Shuttle Bus Map (NPS JTNP 2018a).

visitor amenities are concentrated in the northwestern portion of the park near the Joshua Tree and Twentynine Palm entrances, which is because the National Monument didn't exist in the western part of what is now the National Park. The main road from the Cottonwood Visitor Center to the main area of the park is the Pinto Basin Road, and it connects to Park Boulevard, which leads out of the park. The park map of Joushua tree in Figure 4.8.1 shows the features previously mentioned.

Earlier this year (2018) Joshua Tree National Park first began a shuttle pilot program in response to the ever-increasing number of yearly visitors. The two-year shuttle pilot is called the RoadRunner Shuttle and is still in the early stages of planning, so the shuttle service may make some adjustments over the coming years to perfect the fine details of the shuttle route and schedule. The map in Figure 4.8.2 shows the current shuttle's route and stops, as well as parking lot for the park and ride program. All shuttles are handicap accessible, pet friendly, and can carry bicycles (NPS JTNP 2018a).

Cycling in Joshua Tree National Park is limited to the paved roads, just like motorized vehicles, but all that will change if Congress approves the use of 29 miles of Backcountry trails for non-motorized bicycle use (NPS JTNP 2015). Joshua Tree offers 13 easy hiking trails, six moderate hiking trails, and eight challenging hiking trails. The main differences between these trail types is the distance of hikes, the elevation change of the trail, and the average hiker's ability to complete the hike in summer conditions. The easy trails can be managed in the summer, the moderate trails should be attempted based on the temperature, and challenging hikes should not be attempted during the summer months (NPS JTNP 2018b).

Scenic and Ecological Qualities

At first glance Joshua Tree National Park is a harsh desert that appears desolate, which is how the first settlers viewed it, but over time the idea of the desert being beautiful has begun to gain traction in our society. The vast, brilliant blue that seems endless balances the browns and tans of the mountains and rock formations. Strange plants dot the landscape, like the Cholla Cactus and Desert Fans and Joshua Trees, as can be seen in Figure 4.8.3. Joshua Tree really comes to life as the sun begins to set, with the rocks reflecting the pinks and oranges and golds

Figure 4.83- Lost Horse Valley in Joshua Tree National Park (Sutton)

of the sky. After the sun sets many animals come out of their caves and hiding places where they wait for the heat of the day to subside. Places like the Oasis of Mara and Cottonwood Spring exhibit the beauty of areas that receive enough moisture to support large palms, while places like the pinto basin exhibit the low, shrub filled landscape that are at the opposite end of the spectrum in the park (Dilsaver 2016).

Joshua Tree is known for being on the boundary between the Mojave and Colorado Deserts in Southern California, and the park also includes part of the Little San Bernardino Mountains. These three different ecoregions support a wide variety of otherworldly plants and odd little animals that have survived by their wits and their miraculous adaptations. The Mojave Desert stretches across the northern part of the park and is home to the Joshua Trees that give the park its name. The Colorado Desert ecosystem is part of the larger Sonoran Desert, and can be found in the southeastern portion of the park. The Colorado Desert has a different type group of plants from the Mojave Desert, including Octillo Plants and Cholla Cactus. The final ecosystem is the Little San Bernardino Mountains in the southwestern part of the park and is found in at higher elevations than the rest of the park. Because the Little San Bernardino Mountains begin at 4,000 feet above sea level, it is home to more trees than are common in the rest of the park including California Junipers and Pinyon Pines (NPS JTNP 2017a).

Joshua Tree is home to 52 mammal species, 44 reptile species, 250 species of birds, 2 species of amphibians, and over 75 species of insects and invertebrates. Of the total 423 species of animals only one species is threatened, the Mojave Desert Tortoise. Many of the animal species have adaptations that help them beat the extreme heat and lack of water, such as being nocturnal or being more efficient with water. Because of the scarcity of water in the park, desert wildlife species are extremely susceptible to damage if their sources of water (such as plants or natural springs) are polluted or removed, which makes the resource management side of Joshua Tree a very important part of the park (NPS JTNP 2017b).

Visitor Trends

Joshua Tree officially became a national park in 1994, but park attendance records extend back to 1941 which was 5 years after President Roosevelt signed the Joshua Tree National

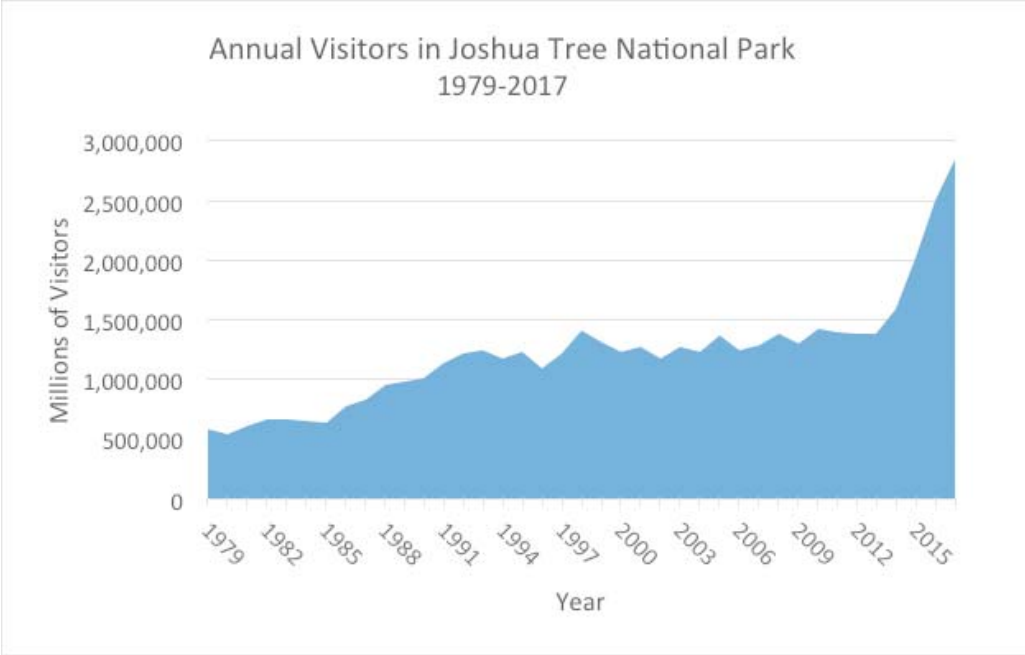

Figure 4.8.4- Joshua Tree National Park yearly visitation statistics (by author).

Figure 4.8.5- Joshua Tree National Park 2017 monthly visitation statistics (by author).

Monument. Joshua Tree National Park was the 11th most visited national park in the NPS in 2017 and received a record breaking 2.9 million visitors. Joshua Tree accounted for 3.39% of the visitors of national parks in 2017. Figure 4.8.4 below shows the yearly visitation to Joshua Tree National Park, and this data shows how the visitation has risen and fallen since Joshua Tree.

In Joshua Tree's first year as a national park it received just over 31,000 visitors and the most visitors ever received in the park in a year was 2.9 million visitors in 2017. This is hardly a surprising year to receive peak visitation since it was the year following the NPS's centennial celebration, and there were major campaigns to entice visitors to come to the parks. Figure 4.8.5 below shows the distribution of visitors throughout the year from 2017, which illustrates how the peak months are November, December, March, and April with 1.4 million visitors which is 47.6% of yearly visitors attending in only a quarter of the time. In contrast, June, July, August, and September received only 550,000 visitors combined which is only 19.3% of the total yearly visitors. These statistics show that visitation has long been on the rise and that peak visitation occurs mainly in two windows November-December and March-April, while the low time for the year occurs in the hottest months of the year. This reversal from the typical NPS busy season is due to the extreme heat in the summer months which limits what visitors can do within the park.

Park Profile Conclusion

The park profiles included in this chapter cover a broad range of ecosystems and locations around the nation, from the deserts of Joshua Tree to the temperate rainforests of Olympic and from the stunning mountains of Rocky Mountain to the beautiful coastlines of Acadia. The purpose of the park profiles is to explore what makes each park unique and what similar events or experiences the parks have.

The events that are common among the eight parks that were researched mainly revolve around events that affected the entire nation, like the economic depression in the 1930s and the growing awareness about ecology and the environmental movements in the 1960s and 1970s. Most parks (with the exception of Olympic National Park) had very beneficial dealings with the CCC directly before World War II, which advanced the health of the parks and enhanced the

visitors' experiences. This was mirrored in the late 1950s and early 1960s, as Mission 66 swept across the parks and allowed for a rapid increase in funding for building projects in the parks. However, these common experiences between the parks were not always good. Most of the parks received resistance at first to the park's founding or experienced reductions in boundaries due to economic pressures on the politicians of the day. These similar experiences show how politics and economic interests can change the parks, which is just as relevant in our time as it was in the first 100 years of the NPS.

The differences between the parks included in the park profiles are innumerable, but there are some trends in the differences that allow for a greater understanding of the parks. The first trend is that many of the parks that historically receive fewer visitors, such as Joshua Tree and Glacier, are now receiving huge increases to their number of annual visitors. This can be attributed to many factors, but the main factor is changing technology and the increased effect social media is having on both what parks visitors are going to and how visitors are spending their time in the parks. The second trend is that individual techniques are needed for each park and that there is no one-size-fits-all solution to the problems the parks are experiencing. There are many other differences like climate, rainfall, and vegetation, but it is important to note that though there are many differences, each park is working towards the preservation of the environment within their park. In the next chapter, the results of the surveys and interviews will be explained, bearing in mind the differences and similarities between the parks and how they may be informing and affecting the results.

Chapter Five:

Results of Thematic Exploration

Introduction

This chapter summarizes the responses gathered from the interviews with the eight park representatives and compares them with the responses gathered from the survey of 22 key park personnel. The purpose of comparing this information is to be able to create a series of key themes from the two sets of data. The first section of this chapter explains the key themes that were identified in the analysis of the transcripts from park superintendent interviews, which were typed by a transcriptionist from the recordings of the interviews. The second section of this chapter explores the responses the key park personnel gave to the survey in relation to the themes identified from the park representative interviews. The purpose of examining the results in this way was to facilitate the creation of one set of themes based on two groups of data (one from the survey results and one from the interview responses). The third section of this chapter lists and explains the key themes discerned from my research.

Themes for Interviews

Data analysis of the Park Representative Interviews began with recording the interviews and then employing a transcriptionist to write an interview transcript for each of the interviews. After the transcripts were written, they were checked a second time to ensure accuracy. From there the interviews were divided into sections based on the responses to the five interview questions and each interviewee's response was then simplified into a short answer that reflected the main themes that were touched on in each question's response. These simplifications can be found in a series of tables in Appendix C (on page 168). After the simplified responses were gathered, the responses were compared to Manning and Anderson's framework of impacts, management strategies, and management practices to identify how frequently ideas were talked about so that

patterns could be identified. From that comparison of Manning and Anderson's framework and the simplified results tables, two main themes were identified; the first is transportation and the second is communication and education. These simplified results tables can be found in Appendix C, pages 168 through 174.

Transportation

The first theme identified from the interviews is the state of the transportation systems in the most visited national parks, including how the parks are being overwhelmed by the number of vehicles on the roads in the parks.

The most commonly mentioned transportation issue is the need for a more extensive shuttle bus service, which was discussed in five out of the eight park representative interviews. A more extensive shuttle system would serve to reduce the number of personal vehicles on the road and to help visitors understand that this is a way to reduce pollution and congestion in the parks. An enhanced shuttle bus system could include both more shuttle buses and routes that increase the locations serviced, or express routes to popular destinations that would reduce the inconvenience of riding a shuttle for a longer time. However, a more extensive shuttle system would create some additional issues.

An issue that was mentioned both independently and in relation to expansions of the shuttle bus system is the need for more parking for park visitors. The park representatives who cited parking issues also explained their dilemma in that just building more parking lots creates additional problems by perpetuating the expansion of the built environment in the parks. They believed that more creative solutions are necessary beyond just building new parking lots, such as partnerships with local communities or even parking structures.

The final transportation issue mentioned is the need for a transportation hub that will help connect the gateway communities and the park and will help organize and orient the visitors within the park. Though only two out of the eight park representatives mentioned a transportation hub, it is still an aspect of the national parks' transportation network's future.

Communication and Education

The second theme I have identified from the interviews is the need for better communication

practices and more educational programs, which go hand in hand. These communication and education issues manifest in a variety of ways but those mentioned most frequently in the interviews include communication advancements, visitor management issues, the need for more education programs, law enforcement issues, and problematic wildlife interactions.

The issues with communication, visitor management, and education are all highly interconnected. The recent advancements in technology surrounding communication and greater dependence on smart phones have led to a new frontier in how parks interact with their visitors, which three of the eight parks discussed in their interviews. These changes in technology also open opportunities for education and information advancements, in the form of smart phone apps that can offer visitor downloadable content (i.e. maps, educational videos, and park rules) as well as minute-by-minute updates (i.e. weather updates, trail closures, and public service announcements). The potential seen in technological advances for information and education practices was addressed in two of the eight interviews. The need for better visitor management practices and visitor centers was addressed by three of the eight parks as well. Other areas that were brought up in the interviews that could be addressed through technological advancements to information and education programs are law enforcement issues (discussed by two of the eight park representatives) and wildlife issues (discussed by three of the eight park representatives).

The interviews yielded two themes: the transportation theme and the communication and education theme, which are caused by the increase in park visitors and the change in visitor expectations surrounding technology. As the results of the interviews and the online survey are compared for similarities and differences, it is important to note there is a difference in position that occurs between the park representatives in the interviews and the key personnel in the survey. Generally, the survey participants are more acquainted with specific departments in the parks, whereas the interviewees generally come from a more supervisory role and therefore should have a better idea of the big picture.

Comparing Survey and Interview Responses

This section explains the ways in which the responses given in the online survey with the key park personnel are alike and different from the interview responses with the park representatives.

As mentioned in the introduction to this chapter, it is important to analyze the two data sets this way so that a cohesive list of themes can be created that consider the responses from the survey, what was said in the interviews, and where there are overlaps in answers. The survey results are divided into four sections covering visitor impacts, management strategies, and management practices, as well as a section covering short response questions. These categories come directly from the survey, which was structured based on information gathered in the literature review. As with the interviews, a series of tables was created to better understand the survey results at a glance. These tables can be seen in Appendix D on page 175.

There are three things to note when looking at the survey results. The first is that Rocky Mountain National Park did not participate in the survey section of my research. The second noteworthy point is that only 22 key park personnel responded out of the 40 that were invited. And the third matter is that due to a typographical error in the survey in the Management Practices and Management Strategies sections, two categories of response were merged because they were both named “somewhat successful.” This last point is important to note because it essentially shifts the results from a 5-response system to a 4-response system.

Resource, Experience, and Facility Impacts

The first section on the survey dealt with the impacts that visitors have on the national parks, and the questions separated visitor impacts into the same three categories Manning and Anderson used (explained in Chapter 2): impacts in resources, impacts on experience, and impacts on facilities. The survey responses show that visitors generally have low to moderate impacts on park resources, with most impacts affecting soil, vegetation, and wildlife. The survey responses showed that visitor impacts on experience were very high, with 68% of respondents stating that crowding is an extremely high impact. 54% respondents stated that visitor’s experiences were either extremely highly impacted or highly impacted by conflict between visitors. When asked about the impacts visitors have on park facilities, 91% of respondents stated that attraction sites and roads/parking are highly impacted, while campgrounds and trails are moderately impacted. The survey responses to visitor impacts all match up with what was said in the interviews, especially the results on crowding.

Management Strategies

The second section of the survey asked questions pertaining to the four management strategies: limit use, increase access, reduce impacts of use, and harden the resource. The survey participants indicated that increasing access generally isn't being used at these seven participating parks. Limiting use and reducing impacts are the most used, with 36% of respondents stating that limiting use is very successful and 70% of respondents stating that reducing the impacts of use are somewhat, moderately, or very successful, with the highest percentage (45%) saying that reducing the impacts of use is somewhat successful. In the interviews, most of the park representatives talked about their strategies in terms of reducing the impacts of use, which is in line with the results of the survey. However, the surveys also mention limiting use as a popular and successful strategy, which did not seem to be a popular option according to the interviewees.

Management Practices

The third section of the survey revolved around the seven management practices: information and education, rationing and allocation, rules and regulations, law enforcement, zoning, facility development, and site design. The survey respondents stated information and education is the most important practice, followed by rationing and allocation with zoning and facility development ranking as the least important practices. In the same vein, 22% of survey respondents stated rationing and allocation is a very successful practice and 14% stated limiting use is a very successful practice. Survey respondents stated the other five management practices are all somewhat to moderately successful. Comparing these results to the interview results, the interviewees favored rules and regulations, as well as information and education as the most useful management practices. Both the survey respondents and interviewees agree that zoning is the least used.

Short Response

The fourth section of the survey allowed the respondents more freedom by allowing typed responses. These responses were varied in length and topic, but the most often noted points indicated the biggest issue in the parks is crowding, along with insufficient budgets and

insufficient staff to deal with the greater numbers of visitors. The solution mentioned most often was to limit the number of people coming into the park each day through reservation systems and lotteries systems, which is in contrast to what the interviewees stated. Responses in the short answer section of the survey were some of the most detailed and open information collected through this research, and I believe due to the anonymity of the key park personnel they were able to speak freely without fear of the consequences. They spoke mainly about how there are too few staff for the number of visitors and how many park workers feel overwhelmed by the numbers, and also about how there is a need to reduce the number of visitors coming to the park at a given time. One subject that was unexpected, but very interesting was one park respondent's comment on how current visitors show a complete lack of any sort of environmental ethic. This powerful comment points toward the need for an improved education to keep the parks from becoming unhealthy or damaged due to ignorance or indifference. In conclusion these short answer, less structured questions were a wealth of information on the conditions in the parks, and the responses were helpful in identifying the five key themes in the following section.

Five Key Themes

A comparison of the results of both the interviews and surveys together highlight five key themes, repeated in multiple interviews and within multiple survey responses, that I believe encompass the current issues being caused by increased visitor numbers and that will in the future be crucial to the planning for increasing numbers. These five themes are:

- Transportation,
- Staffing,
- Communication,
- Facilities/ Maintenance, and
- Educational/ Interpretive Programs.

I believe these themes shine a light on the current issues that are becoming more common in the parks, and also point to opportunities for long term planning efforts that will adapt to the growing number of visitors. In this section these five key themes are explained and elaborated on.

Transportation

The first theme is transportation, dealing with the way visitors get to the park, where they park, and how they get around the park. This is important in the current era because as more visitors come to the national parks, current infrastructure that was planned for less visitors becomes inadequate. As was noted in the interviews and surveys, as parking became scarce visitors began parking (and driving) anywhere they liked. One strategy that has been used in the past to manage the number of cars on the road is the implementation of a shuttle system (which was also mentioned extensively in the interview and survey section of the findings) but most parks' personnel surveyed or interviewed agreed that the shuttle services need to be refined, expanded, and made more inviting so that visitors view the shuttle buses as part of the NPS experience. Transportation planning in the future of the NPS will be crucial in being able to manage visitors and continue to offer a good visitor experience.

Staffing

The next theme identified through the interviews and survey responses is the need for additional staffing. As the number of visitors to parks continues grow, it is very important to take the NPS employees into account. As busy seasons extend and become more stressful due to the balance of the number of visitors per staff member, the importance of adequate staffing becomes critical. Due to the current NPS budget, hiring the necessary number of personnel may not be feasible, so using staff effectively becomes a very important issue. As was suggested in a few of the interviews, stationing rangers in parking lots to answer questions is a smart way to reduce the congestion in the Visitor Centers. Staffing is one of the issues that will need to be discussed in detail as planning for the future needs of each park, because without the staff that enforces laws, teaches educational programs, and helps give directions, the national parks would become less attractive places to visit.

Communication

Possibly the most crucial theme, communication is playing a bigger role in the parks with every passing year. As the NPS moves into the modern era, it needs to connect with visitors in ways that are easy to access, easy to understand, and easy to update, due to the rapid changes

that occur in the parks. Some solutions mentioned include park social media pages, apps that contain maps and other park data, and other services to keep visitors informed about what parts of the park are overcrowded and what alternatives are both in the park and in the area around the park. This type of communication is becoming expected by society because of the rapidly increasing accessibility of information on smartphones and wireless devices. Whether or not to embrace new technologies, especially in communication, is a hotly debated topic because the national parks have always been a place to get away from the overstimulation of modern life and revert to a simpler time. This argument will have long lasting effects because the planning that goes on now may take 10 or 15 years to implement due to funding or logistics, while not embracing technology could change the public's perception of an individual park and the NPS. As communication techniques continue to advance and as people come to expect information updates on a minute by minute basis, not adapting to changing technology can easily work against parks that are slow to adapt. For example if the main entrance to the park is closed due to maintenance and this is posted on a park's website, but visitors are used to finding information on twitter, they would miss the notice and be disappointed or angry when they are unable to reach the park. This is just one example of how as technology advances, and visitors' expectations change the park has the opportunity to reach potential visitors on multiple platforms, such as Twitter and Facebook.

Facilities/ Maintenance

The facilities and maintenance theme revolve around the built environment of the park (i.e. the Visitor Centers, restrooms, etc.) and the way the staff take care of these facilities (i.e. waste management). As the national parks' staffs plan, they will need to evaluate what facilities are crucial to the parks, what facilities have been over used and need major repairs, and what new facilities are needed. Another factor is the maintenance it takes to keep the park waste free and in working/ usable condition. These factors will be important to the future of the parks because the facilities and maintenance are some of the most noticeably aspects of the park to visitors. If the park looks like it is not being well taken care of, the park may see a decline in visitation.

Educational/ Interpretive Programs

The educational and interpretive programs theme is centered around helping the visitor become more aware of the park that they are visiting. This includes educating visitors in park history, park ecology, and safety practices, as well as explaining the reasons for specific rules and wayfinding. These programs are important because they give the visitors context for what they are seeing and nurture the curiosity some visitors may have about the park they are visiting. In the future educational and interpretive programs may change and adapt with technology much like the communication theme, educational talks and tours could be pre-recorded and played from an app allowing park staff to answer additional questions or work in other capacities in the park. These programs have the capability to reduce depreciative behaviors, both intentional and unintentional, as well as expand visitors' experiences within the park and help them plan a more meaningful and personalized trip to the park.

Summary of Themes

On the pages that follow, Tables 5.1 and 5.2 show summaries of which parks discussed the five key themes in the park representative interviews and key park personnel surveys respectively. The purpose of these diagrams is to illustrate the frequency with which themes where brought up and to check the results found in the survey and interview results section.

It is important to note that while I identified two main themes from the results of the interviews, Transportation and Communication and Education, Table 5.1 shows Transportation and Staffing as the most discussed themes, followed by Communication and Facilities/ Maintenance, with Educational/ Interpretive Programs in the least mentioned of the five themes. This is because in the interviews that mentioned Staffing, Communication, and Educational/ Interpretive Programs they often discussed their need for staff to increase communication and educational programs, which shows that the underlying issue for staffing is wanting to improve Communication and Educational/ Interpretive Programs.

In Table 5.2, Rocky Mountain National Park gave no responses to the survey and therefore I am unable to say with certainty whether they would have discussed the five themes. The remaining seven parks however gave feedback on all five themes. This was mainly possible

through the short answer responses and the multiple responses from each park. Because of the multiple responses each park discussed issues of transportation, staffing, communication, facilities/ maintenance, and educational/ interpretive programs.

For more information on interview and survey results, the summary diagrams for each interview and each survey question can be found in Appendix C on page 168 and Appendix D on page 175 respectively. The five key themes from this section have been taken from the Semi Structured Interview transcripts and the Online Qualtrics Survey results to spark ideas about how the national park service can begin to deal with the rise in visitation and the changing needs and wants of their visitors. In the following chapter a series of recommendations were made that aim to address the issues found in the survey and interview responses.

Parks That Discussed Key Themes In Interviews					
National Parks Included in the Interviews	5 Key Themes				
	Transportation	Staffing	Communication	Facilities and Maintenance	Educational and Interpretive Programs
Grand Canyon	X	X	X	X	X
Zion	X	X			
Rocky Mountain	X	X	X	X	X
Yosemite	X	X	X		
Acadia	X	X			X
Olympic	X		X	X	
Glacier		X	X	X	X
Joshua Tree	X	X		X	
Percentage of Parks That Discussed Key Themes	87.50%	87.50%	62.50%	62.50%	50%

Table 5.1- Table showing which parks discussed the five key themes in the interviews (by author).

Percentage of Park Respondents That Discussed Key Themes In Surveys					
National Parks Included in the Survey	5 Key Themes				
	Transportation	Staffing	Communication	Facilities and Maintenance	Educational and Interpretive Programs
Grand Canyon	66%	Staffing not directly discussed in survey but short answer responses support Staffing as a key theme	Communication not directly discussed in survey but short answer responses support Communication as a key theme	100%	66%
Zion	100%			100%	0%
Yosemite	100%			100%	66%
Acadia	100%			100%	100%
Olympic	75%			100%	66%
Glacier	100%			100%	33%
Joshua Tree	75%			100%	50%
Rocky Mountain	No responses to report				
Refrences in Appendix D (page 175-191)	Table D.7 (page 181)	Short Answer Summaries (page 190-191)	Short Answer Summaries (page 190-191)	Table D.7, D.8, and D.9 (page 181-183)	Table D.15 (page 189)

Table 5.2- Table showing the percentage of park respondents that discussed the five key themes in the survey (by author).

Relationship Between 5 Key Themes and the Three Recommendations for the Future of the Parks					
Three Recommendations for the Future of the Parks	5 Key Themes				
	Transportation	Staffing	Communication	Facilities and Maintenance	Educational and Interpretive Programs
Smart Phone Application	Would help visitors understand what to expect in the park; help visitors depend on bus system; help visitors find parking areas and transportation hub	Would help answer visitor questions, which reduces strain on staff; would allow staff to record content and therefore save time on repeating tours, education, and discussions	Would allow for easy parkwide announcements; would allow for greater ease of communication with visitors; helps reach the visitors in a way that is common	Would ease the strain of having all visitors coming to the visitor center thus illiminating some of the congestion	Would allow visitors to watch videos or listen to audio tours through their mobile devices which eases the demands on staff
Improved Transportation System	Would help visitors get around the park without the hassle of traffic jams and decentralized parking; allows for less pollution from individual vehicles through public transport utilizing alternative fuels	Would reduce the number of park rangers giving directions, by having a set series of public transit lines that are easy for visitors to understand	Would allow for announcements in shuttle busses	Would ease the strains on facilities and maintenance by having all visitors in one or two transportation hubs; also allows for less issues caused by visitors driving in the parks such as traffic accidents	Could allow for programs like audio or video tours and educational videos to play on tvs in the public transportation
Reduced Visitor to Staff Ratio	Would allow for more staff to facility a smooth visitor experience from parking lots to shuttle buses to campsites or destinations in the interior of the parks	Would allow staff to be able to meet visitor needs without becoming overwhelmed, which in turn would give the visitors a better experience	Would allow for staff to focus on increasing communication with visitors through a smart phone app or shuttle bus tv and audio systems	Would increase the amount of watchful staff, which would allow for more timely maintenance, such as trash collection, which makes the visitor's experience better	Would allow for varying levels of programs that may be unfeasable for parks currently due to staffing or budget constraints

Table 6.1- A summary of the three recomendations and how they relate to the five key themes proposed in Chapter 5 (by author).

Chapter Six:

Recommendations and Conclusions

Recommendations

The previous chapter identified five key themes from my research: Transportation, Staffing, Communication, Facilities/ Maintenance, and Educational/ Interpretive Programs. These themes encompass the issues that were most commonly discussed in the Park Representative Interviews and the Key Park Personnel Survey. This section makes three recommendations, based on these five themes and the comments made in the interviews and survey, which are:

- create a smart phone application,
- improve transportation system, and
- close the gap on visitor-to-staff ratios.

The connections between the five key themes and the three recommendations can be seen in Table 6.1.

Smart Phone Applications

The first recommendation is to embrace the powerful technology that is available to most people who visit the National Parks. This can be achieved by the creation of a smartphone application (app for short), which could have many benefits for a park. The first benefit of an app is that it acts as a virtual visitor center, which can lessen the amount of congestion at the real visitor centers. This is possible by having the same content available on the app that is available in the visitor center. This means that the app could have downloadable content like maps, educational videos, and guides to plant and animal species, in addition to streaming content that would offer the visitors up-to-the-minute details on weather, public service announcements, or areas of the park that have become crowded. This app could also pair with the park's shuttle systems to offer visitors a more convenient way of knowing when shuttles will arrive at trailheads. An app with

features like this would take considerable work but moving towards a more digital future could have real benefits in limiting congestion and helping visitors understand what the conditions are like in the park. While an immediate switch to an all-digital system wouldn't be necessary due to those visitors who prefer print materials, an app like this could help improve communications with visitors, manage visitor expectations, and help answer visitor questions without having to stand in line at the visitor center.

Improved Transportation System

The second recommendation is to improve the transportation system, in two ways: enhance existing shuttle bus systems and create a transportation hub. The first part of creating an improved transportation system is to improve the shuttle bus system so that visitors begin to view the shuttles as the most convenient way to get around the park and also as part of the park experience. These improvements can appear in expanding shuttle routes to reach more areas of the park, including express routes to popular locations, and improving the shuttle buses themselves. Improving the shuttles could include Wi-Fi access and other things that would make them more appealing to visitors.

The second part of creating an improved transportation system is creating a transportation hub for the park. This is an important idea because as visitors begin coming to the park and parking their vehicles, they need to be close to shuttle stops and they also need to have a place to park their vehicles. The issue of where people park is one that is addressed in many places throughout this research, but the summarization of the issue is that a centralized place to park that is close to the shuttle system and visitor center is crucial to people being willing to park and transition from personal transportation to public transportation. To solve these parking problems there are two solutions that I believe would have the desired effect without dramatically increasing the current amount of parking lots: partnerships with nearby communities and the building of parking structures. Partnering with nearby communities encourages visitors to shop and explore nearby communities while providing the visitor with a potentially inexpensive place to park. Parking structures are another good option because such a facility would centralize the parking and reduce the amount of land used for parking. Drawbacks to overcome with parking structures are

that they are expensive and can be eyesores. However, by creating a transportation hub with access to parking, close connections to visitor amenities and the shuttle system, visitors are more likely to accept changes to the way they travel in the parks.

Reducing the Staff-to-Visitor Ratios

The final recommendation is to reduce the staff-to-visitor ratio. Currently the number of staff compared to the number of visitors is overwhelming to the park staff. This is causing the staff to be overworked and stressed, which can in turn lead to poor visitor experiences when interacting with park staff. Therefore, to combat this, there need to be more park staff in the parks that are able to answer questions, educate visitors, and generally be available to help in whatever way they can. The issue with this recommendation, however, arises when considering the parks' budget, as both the interviewees and survey respondents were clear that there is no room in the budgets for hiring more personnel despite the general feeling that more personnel are needed throughout most parks. So how can the park staff increase, without increasing the budget? One answer is to encourage the people coming to the park to help preserve the parks by letting their political representatives know that the parks are important to them. This could be accomplished by sending letters or emails to state and federal government officials. After seeing how many visitors came to National Parks in 2016 for the NPS centennial, I believe that creating a more attractive volunteer program would help the park be able to handle the visitors. A volunteer program could help supplement the park rangers, with minimal compensation other than getting to be in the national parks.

Looking at the issue from another perspective, if the number of staff working at the park can't be increased, it may be time to look at imposing a cap on how many people are allowed in the park in a day. This could be accomplished through a reservation system or a lottery-based system. The reservation system would allow visitors to reserve their entry to the park at a specific time on a specific day, which would allow the park to know how many people were coming on a given day. It also would give the parks the opportunity to cap the number of visitors coming into the park. The lottery-based system would require everyone who hopes to come to the parks to apply, and then through a random drawing it would select a day for you to come to the park so that the parks would receive a standard number of visitors a day. This

would spread out the number of visitors throughout the entire year, rather than having most of the visitors come in a peak season.

A combination of increasing park staff and reducing the daily number of visitors is needed to help park staff not be overwhelmed by the growing numbers of visitors coming to the park every year.

Conclusion

In 1903, President Theodore Roosevelt visited a series of National Parks, and seeing their beauty said, “In your own interest and the interest of all the rest of the country keep this great wonder of nature as it now is. You cannot improve upon it. The ages have been at work on it, and man can only mar it. Keep it for your children and your children’s children and all who come after you as one of the great sights for Americans to see” (Runte 2010). This quote represents my motivation behind selecting this project and the main objective of my project.

This final chapter reiterates my study objectives and looks at my methods and research questions. It also includes a summary of my findings, the implications of my project on the field of landscape architecture and park management, and my own reflections on my project.

Study Objectives

The objectives of my study were two-fold. The first objective was to discover what impacts visitors are having on the most visited national parks in the NPS and how visitor impacts have increased due to the rise in attendance. The second objective was to discover how the most-visited parks are reacting to this rise in attendance by identifying the key management strategies and practices being used to mitigate the effects of the rise in number of visitors.

I believe the research done in this report and the data collected is a good first step in understanding the problems associated with an increase in the number of visitors to the national parks. Crowding, budgetary issues and the need for communication/education -- the themes that were identified in Chapter 5: “Results of Thematic Exploration” -- are what I anticipated finding when I began this project. This research, however, confirms my suspicion that shuttle services and road infrastructure are a huge part of the NPS’ future.

Other existing ideas about the NPS's future that could use further development include the possibility of autonomous shuttle bus services that include mobile Wi-Fi, tours and other amenities specific to the riders, as well as national park apps with downloadable content and up-to-the-minute updates on park conditions. These ideas are both aimed to keep the NPS up to date with the technology that is coming closer into reach and to help the parks meet the growing expectations of their visitors. Most of my recommendations in Chapter 6 are ambitious in the parks' current budget climate but laying the ground work for planning changes and helping NPS staff get on board with the rapidly changing world of technology can be time consuming and costly endeavors. Some strategies like the expansion of shuttle services would help get visitors used to the idea that one can park their car and ride in a shuttle when visiting a national park, which may help prove that public transportation in the parks is a worthwhile investment. Another example of recommendations for immediate use that will help the park in the long term is a park app that can help park staff communicate with visitors before they arrive in the park, thereby helping visitors understand what conditions in the park are going to be like and when the best time to come to the park is depending on the visitor's goals for their time in the park.

Research Questions & Methods

The research questions raised in the beginning of my report are somewhat flawed. Throughout my research and discussions with park staff, I think my questions were too broad and should have been narrowed down. Through initial readings I thought that park staff would be focusing more heavily on planning to reduce the impacts of visitors on park resources, but the main impacts that park staff discussed in the interviews revolved around impacts to visitor experience, namely crowding. It seems like everything discussed in the park comes back to the issue of crowding. This in my mind points to the how the idea behind my project was good instinctually, but it could have been carried out more pointedly had I focused more on research upfront.

Some of the new questions that emerged while doing the research that I was unable to address revolved around how communication with visitors before, during, and after their visit could drastically change their expectations for their trip and their experience in the park. One thing that was discussed quite a bit in the interviews was the issue of visitors' unreasonable expectations

for their trips causing people to have poor experiences, which can affect visitor's willingness to return to parks in the future, which may affect how important the American people and subsequently the American government put on the national parks.

The methods I utilized I believe were less successful than I had hoped. It is my opinion that the online survey took a lot of time to compose and carry out, and that it was difficult to find people who were willing and able to participate within the project's schedule. The interview method was more successful at generating meaningful information, but I feel that interviewing one person per park may not be enough to really paint a good picture. I believe that removing the survey portion of the study and replacing it with more interviews, perhaps conducted face to face, would create more opportunities for understanding the issues park personnel work to solve every day.

Implications for Practice

I believe that this project has improved landscape architecture because it opens the conversation about new technologies that can be adopted in the National Park Service, and the creation of these technologies will require landscape architects to help plan for how technology will interact with the physical environment of the parks. Many people believe that the national parks are a retreat from technology, as well as a place away from the hustle and bustle of mundane life, so as technology changes and grows more integrated in everything we do, it is also important to begin thinking about when technology becomes overwhelming and how we determine what technology is appropriate for what settings. It is our job as landscape architects to understand what visitors are looking for when they come to the parks and how these activities will affect the health of the parks. These complex social and environmental issues should stimulate conversation in the field of landscape architecture, and as technology changes, landscape architects must constantly be thinking about how new technology will affect the work we do with people and environments. The real benefit, I believe, to research and projects like mine is the stimulation of conversation and ideas that occurs in their wake, both positive and negative, that will spur more research and thought in the future. I believe it is the duty of Landscape Architects to think about the lasting affects of a project on an environment whether it is determining what solutions may be required to preserve a national park for future generations, or whether it is designing a small garden space.

Landscape Architects need to bring experts together and take into account the advice they give, and then make decisions that are mindful of the long term ramifications of a project and of society's actions in regards to nature.

Reflections on the Project

I remember going to my first national park when I was six or seven. My entire family, complete with my grandparents, aunts, uncles, cousins, parents, and siblings all in tow went to visit Rocky Mountain National Park. I remember seeing various wildlife like elk and porcupines, as well as all sorts of mountain scenery. This experience opened the door for me in the future to visit several more national parks all across the country. Before settling on a project focused on the national parks I mulled around other ideas, some related to zoos and prairie preservation, but with the National Park Service's centennial celebration just shortly before my choice, a project looking at the parks seemed appropriate. Though I fancied myself as someone who understood much of American history, as I delved into the history of the parks, I found that I had no idea about the effect historic events had in shaping the parks. As I continued to devour books on the parks, I began to gain more clarity on what shaped the parks. This clarity and understanding were multiplied many times over as I had conversations with park staff, and as I began to read through survey responses, I began to realize that the NPS is in trouble. Due to political changes the parks now find themselves underfunded and overworked, understaffed and overcrowded. These problems could spell major changes in which parks remain protected and what funding is available to them.

This project has been an eye-opening experience for me as a landscape architect and as someone who loves the national parks. Over my time on this project I have learned a lot about the time things take when working with agencies in other parts of the nation, as well as working with groups outside the protective bubble of the College of Architecture Planning and Design at Kansas State University. The rigor with which academic research is done still astounds me, and I remain convinced that academic research never really ends because topics are constantly evolving and changing, and there is seemingly never enough time to do all the things one can see within a project topic.

One of the most interesting parts of the project was experiencing the overlap between the

Park Management field and the Landscape Architecture field. There are many similarities between the disciplines, and I believe that they are both vital to the success of the national parks. One of the most interesting aspects about the overlap between Park Management and Landscape Architecture is that park management deals with the same issues as all landscape architects deal with, just within a specific environment.

If I were to share advice with future landscape architects looking to learn more about the NPS or outdoor recreation, I would first encourage them to talk to as many professionals in these fields as possible and to begin reading recent articles that focus on the issues surrounding their area of study. I would also advise them to begin with research and reading that allows them to clearly define what it is that they are looking for.

Although the intersection of landscape architecture with park management is not talked about as much as urban situations in landscape architecture, this project has been great in helping me realize the similarities between those two areas. Combining my personal interest in the National Park Service with my professional passion for landscape architecture, I have learned much about how people use the spaces we design, the considerations we make as designers, and how those decisions can have unexpected but lasting results in a project.

Resources

Buchholtz, C. W. 1983. Rocky Mountain National Park: A History. Boulder: Colorado Associated University Press.

Cole, David, Pam Foti, and Mathieu Brown. 2008. “Twenty Years of Change on Campsites in the Backcountry of Grand Canyon National Park.” Environmental Management 41,959-970.

Dilsaver, Lary M. 2016. Preserving the Desert: A History of Joshua Tree National Park. Staunton: George F. Thompson Publishing.

Frank, Jerry J. 2013. Making Rocky Mountain National Park: The Environmental History of An American Treasure. Lawrence: University Press of Kansas.

Green, Linda W. 1987. Yosemite: The Park and its Resources. Denver, CO: Government Printing Office. Accessed March 26, 2018. https://www.yosemite.ca.us/library/yosemite_resources/

Hammitt, William and David Cole. 1998. Wildland Recreation: Ecology and Management. 2nd ed. New York: John Wiley.

Harper, Andrew C. 2010. “Conceiving Nature: The Creation of Montana’s Glacier National Park.” Montana The Magazine of Western History 60, no. 2: 3-24, 91-94. Accessed March 27, 2018. http://www.jstor.org.er.lib.k-state.edu/stable/pdf/25701734.pdf?refreqid=excelsior:185267e0d32a975171d7ad2354cd2496.

Hendee, John, George Stankey, and Robert Lucas. 1990. Wilderness Management. Golden, CO: North American Press.

Huntley, Jen A. 2011. The Making of Yosemite: James Mason Hutchings and the Origin of America’s Most Popular National Park. Lawrence: University Press of Kansas.

Ise, John. 1961. Our National Park Policy: A Critical History. Baltimore & London: John Hopkins University Press.

Jacob, G and R Schreyer. 1980. “Conflict in outdoor recreation: A theoretical perspective.” Journal of Leisure Research. 12, 368-380.

Leave No Trace. 2009. “Leave No Trace Seven Principles.” Accessed November 15, 2017. https://lnt.org/learn/7-principles

Leung, Y and J Marion. 2000. “Recreation impacts and management in wilderness: A state-of-knowledge review.” USDA Forest Service Proceedings RMRS-P-15-Vol-5. Ogden, UT.

Manning, Robert E. and Laura E. Anderson. 2012. Managing Outdoor Recreation: Case Studies in the National Parks. Boston, MA: CAB International.

Manning, Robert. 1979. “Strategies for Managing the Recreational Use of National Parks. Parks 4, 13-15.

Manning, Robert. 1999. “Crowding and carrying capacity in outdoor recreation: From normative standards to standards of quality.” Leisure Studies: Prospects for the Twenty-First Century. Venture Press, State College, Pennsylvania, 323-334.

Marble, R.E. 2016. “American Indian Tribes”. National Park Service. Last modified June 18. Accessed March 27, 2018. https://www.nps.gov/glac/learn/historyculture/tribes.htm.

Marion, Jeffrey and Tracy Farrell. 2002. “Management Practices That Concentrate Visitor Activities: Camping Impact Management at Isle Royale National Park, USA.” Journal of Environmental Management 66, 201-212.

National Park Service. 2016. “John Muir”. Accessed March 27, 2018. https://www.nps.gov/goga/learn/historyculture/john-muir.htm.

National Park Service. 2016.“Lesson Plan: Dueling Mandates.” Accessed November 20, 2017. https://www.nps.gov/yell/learn/education/classrooms/duelingmandates.htm.

National Park Service. 2017a. “History & Culture - Pinnacles National Park (U.S. National Park Service).” Accessed September 24, 2017. https://www.nps.gov/pinn/learn/historyculture/index.htm.

National Park Service. 2017b. “About Us: Frequently Asked Questions” Accessed January 4, 2017. https://www.nps.gov/aboutus/faqs.htm

National Park Service: Acadia. “Acadia’s Island Explorer Shuttle”. Accessed June 2, 2018. https://www.nps.gov/articles/island-explorer-shuttle.htm

National Park Service: Acadia. 2015. “Fire of 1947”. Accessed June 2, 2018. https://www.nps.gov/acad/learn/historyculture/fireof1947.htm

National Park Service: Acadia. 2016a. “Civilian Conservation Corps”. Accessed June 2, 2018. https://www.nps.gov/acad/learn/historyculture/ccc.htm

National Park Service: Acadia. 2016b. “Animals”. Accessed June 2, 2018. https://www.nps.gov/acad/learn/nature/animals.htm

National Park Service: Acadia. 2016c. “Plants”. Accessed June 2, 2018. https://www.nps.gov/acad/learn/nature/plants.htm

National Park Service: Acadia. 2017. “History of Acadia”. Accessed June 2, 2018. https://www.nps.gov/acad/learn/historyculture/history-of-acadia.htm

National Park Service: Acadia. 2018a. “Bicycling”. Accessed May 27, 2018. https://www.nps.gov/acad/planyourvisit/bicycling.htm

National Park Service: Acadia. 2018ba. “Hiking”. Accessed May 27, 2018. https://www.nps.gov/acad/planyourvisit/hiking.htm

National Park Service: Glacier. 2015a. “The Development of Glacier National Park”. Accessed March 27, 2018. https://www.nps.gov/glac/learn/education/development.htm.

National Park Service: Glacier. 2015b. “The Great Northern Railway”. Accessed March 27, 2018. https://www.nps.gov/glac/learn/education/railway.htm.

National Park Service: Glacier. 2016a. “American Indian Tribes”. Accessed March 27, 2018. https://www.nps.gov/glac/learn/historyculture/tribes.htm.

National Park Service: Glacier. 2016b. “Civilian Conservation Corps (CCC)”. Accessed March 28, 2018. https://www.nps.gov/glac/learn/historyculture/ccc.htm.

National Park Service: Glacier. 2016c. “Wetlands, Marshes, and Swamps”. Accessed March 28, 2018. https://www.nps.gov/glac/learn/nature/wetlands.htm

National Park Service: Glacier. 2016d. “Plants”. Accessed March 28, 2018. https://www.nps.gov/glac/learn/nature/plants.htm

National Park Service: Glacier. 2016e. “Fire Ecology”. Accessed March 28, 2018. https://www.nps.gov/glac/learn/nature/fire-ecology.htm

National Park Service: Glacier. 2017a. “Hiking the Trails”. Accessed March 28, 2018. https://www.nps.gov/glac/planyourvisit/hikingthetrails.htm

National Park Service: Glacier. 2017b. “Mountains”. Accessed March 29, 2018. https://www.nps.gov/glac/learn/nature/mountains.htm

National Park Service: Glacier. 2017c. “Mammals”. Accessed March 29, 2018. https://www.nps.gov/glac/learn/nature/mammals.htm

National Park Service: Glacier. 2017d. “Birds”. Accessed March 29, 2018. https://www.nps.gov/glac/learn/nature/birds.htm

National Park Service: Glacier. 2017e. “Reptiles”. Accessed March 29, 2018. https://www.nps.gov/glac/learn/nature/reptiles.htm

National Park Service: Glacier. 2017f. “Amphibians”. Accessed March 29, 2018. https://www.nps.gov/glac/learn/nature/amphibians.htm

National Park Service: Glacier. 2017g. “Fish”. Accessed March 28, 2018. https://www.nps.gov/glac/learn/nature/fish.htm

National Park Service: Glacier. 2017g. “Wildland Fire”. Accessed March 28, 2018. https://www.nps.gov/glac/learn/nature/wildlandfire.htm

National Park Service: Glacier. 2018a. “Bicycling”. Accessed March 28, 2018. https://www.nps.gov/glac/planyourvisit/bicycling.htm

National Park Service: Glacier. 2018b. “Backcountry Camping”. Accessed March 28, 2018. https://www.nps.gov/glac/planyourvisit/backcountry.htm

National Park Service: Golden Gate. 2016. “John Muir”. Accessed April 16, 2018. https://www.nps.gov/goga/learn/historyculture/john-muir.htm

National Park Service: Grand Canyon. 2015. “Natural Features & Ecosystems”. Accessed March 27, 2018. https://www.nps.gov/grca/learn/nature/naturalfeaturesandecosystems.htm.

National Park Service: Grand Canyon. 2017. “Bicycling Information”. Accessed March 27, 2018. https://www.nps.gov/grca/planyourvisit/bicycling.htm.

National Park Service: Grand Canyon. 2018. “Day Hiking”. Accessed March 27, 2018. https://www.nps.gov/grca/planyourvisit/day-hiking.htm.

National Park Service: Grand Canyon. 2018. “Nature & Science”. Accessed March 27, 2018. https://www.nps.gov/grca/learn/nature/index.htm.

National Park Service: Grand Canyon. 2018. “South Rim Shuttle Bus Routes: Spring 2018”. Accessed March 27, 2018. https://www.nps.gov/grca/planyourvisit/shuttle-buses.htm.

National Park Service: Joshua Tree. 2015. “Mountain Biking”. Accessed March 20, 2018. https://www.nps.gov/jotr/planyourvisit/mountain-biking.htm

National Park Service: Joshua Tree. 2017a. “Plants”. Accessed March 20, 2018. https://www.nps.gov/jotr/learn/nature/plants.htm

National Park Service: Joshua Tree. 2017b. “Animals”. Accessed March 20, 2018. https://www.nps.gov/jotr/learn/nature/animals.htm

National Park Service: Joshua Tree. 2018a. “Shuttle Buses”. Accessed March 20, 2018. https://www.nps.gov/jotr/planyourvisit/shuttle-buses.htm

National Park Service: Joshua Tree. 2018b. “Hiking”. Accessed March 20, 2018. https://www.nps.gov/jotr/planyourvisit/hiking.htm

National Park Service: Olympic. 2015a. “Exploration of the Olympic Peninsula”. Accessed June 2, 2018. https://www.nps.gov/olym/learn/historyculture/exploration-of-the-olympic-peninsula.htm

National Park Service: Olympic. 2015b. “Euro-American Settlement of the Olympic Peninsula”. Accessed June 2, 2018. https://www.nps.gov/olym/learn/historyculture/euro-american-settlement-of-the-olympic-peninsula.htm

National Park Service: Olympic. 2015c. “Olympic Fun Facts”. Accessed June 2, 2018. https://www.nps.gov/olym/learn/management/olympic-fun-facts.htm

National Park Service: Olympic. 2015d. “Forests”. Accessed June 2, 2018. https://www.nps.gov/olym/learn/nature/forests.htm

National Park Service: Olympic. 2015e. “Coast”. Accessed June 2, 2018. https://www.nps.gov/olym/learn/nature/coast.htm

National Park Service: Olympic. 2016a. “History & Culture”. Accessed June 2, 2018. https://www.nps.gov/olym/learn/historyculture/index.htm

National Park Service: Olympic. 2016b. “Directions and Transportation”. Accessed June 2, 2018. https://www.nps.gov/olym/planyourvisit/directions.htm

National Park Service: Olympic. 2017. “Wilderness Travel Basics”. Accessed June 2, 2018. https://www.nps.gov/olym/planyourvisit/wilderness-travel-basics.htm

National Park Service: Olympic. 2018a. “Elwha River Restoration”. Accessed June 2, 2018. https://www.nps.gov/olym/learn/nature/elwha-ecosystem-restoration.htm

National Park Service: Olympic. 2018b. “Getting Around”. Accessed June 2, 2018. https://www.nps.gov/olym/planyourvisit/gettingaround.htm

National Park Service: Rocky Mountain. 2015. “Brief Park History”. Accessed March 27, 2018. https://www.nps.gov/romo/learn/historyculture/brief.htm.

National Park Service: Rocky Mountain. 2015. “Fire Ecology”. Accessed March 27, 2018. https://www.nps.gov/romo/learn/fire-ecology.htm.

National Park Service: Rocky Mountain. 2015. “Hiking”. Accessed March 27, 2018. https://www.nps.gov/romo/planyourvisit/hiking.htm.

National Park Service: Rocky Mountain. 2017. “Bicycling”. Accessed March 27, 2018. https://www.nps.gov/romo/planyourvisit/biking.htm.

National Park Service: Rocky Mountain. 2017. “Suggested Hikes”. Accessed March 27, 2018. https://www.nps.gov/romo/planyourvisit/hikes.htm.

National Park Service: Rocky Mountain. 2017. “Wildlife Viewing”. Accessed March 27, 2018. https://www.nps.gov/romo/planyourvisit/wildlife_view.htm.

National Park Service: Rocky Mountain. 2018. “Nature & Science”. Accessed March 27, 2018. https://www.nps.gov/romo/learn/nature/index.htm.

National Park Service: Yosemite. 2014. “Trail Descriptions”. Accessed April 16, 2018. https://www.nps.gov/yose/planyourvisit/trails.htm

National Park Service: Yosemite. 2015. “Plants”. Accessed April 16, 2018. https://www.nps.gov/yose/learn/nature/plants.htm

National Park Service: Yosemite. 2016a. “Hiking”. Accessed April 16, 2018. https://www.nps.gov/yose/planyourvisit/hiking.htm

National Park Service: Yosemite. 2016b. “Biking”. Accessed April 16, 2018. https://www.nps.gov/yose/planyourvisit/biking.htm

National Park Service: Yosemite. 2017. “Animals”. Accessed April 16, 2018. https://www.nps.gov/yose/learn/nature/animals.htm

National Park Service: Yosemite. 2018. “Public Transportation”. Accessed April 16, 2018. https://www.nps.gov/yose/planyourvisit/publictransportation.htm

National Park Service: Zion. 2017. “Nature & Science”. Accessed April 20, 2018. https://www.nps.gov/zion/learn/nature/index.htm

National Park Service: Zion. 2018. “Zion Summer Map and Guide”. Accessed June 13, 2018. https://www.nps.gov/zion/planyourvisit/upload/Zion-Summer-Map-and-Guide-2018-WEB.pdf

Reid, Scott and Jeffery Marion. 2004. “Effectiveness of a Confinement Strategy for Reducing Campsite Impacts in Shenandoah National Park.” Environmental Conservation 31, 274-282.

Roggenbuck, Joseph. 1992. “Use of Persuasion to Reduce Resource Impacts and Visitor Conflicts.” Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources. Champaign, IL: Sagamore Publishing.

Ross, Terrance and George Moeller. 1974. “Communicating Rules in Recreation Areas.” USDA Forest Service Research Paper NE-297.

Runte, Alfred. 2010. National Parks: The American Experience. Lanham, MD: Taylor Trade Publishing.

Shelby, Bo, Doug Whittaker, and Mark Danley. 1989. “Idealism Versus Pragmatism in User Evaluations of Allocation Systems. Leisure Sciences 11, 61-70.

Spildie, David, David Cole, and Sarah Walker. 2000. “Effectiveness of a Confinement Strategy in Reducing Pack Stock Impacts at Campsites in the Selway-Bitterroot Wilderness, Idaho.” Wilderness Science in a Time of Change Conference Volume 4: Wilderness Visitors, Experiences, and Visitor Management. USDA Forest Service Proceedings RMRS-15, 199-208.

Stankey, George and John Baden. 1977. “Rationing Wilderness Use: Methods, Problems, and Guidelines.” USDA Forest Service Research Paper INT-192.

Tucker, Wayne. 2001. “Minimum Group Sizes: Allowing Public Access and Increasing Safety.” Crossing Boundaries In Park Management: Proceedings of the11th Conference on Research and Resource Management in Parks and Public Lands 187-192.

Trotter, Bill. 2016. “How Sieur De Monts Became the Modern Acadia National Park: A Timeline.” Bangor Daily News: Maine Blogs. Accessed May 29, 2018. http://acadia100.bangordaily-news.com/2016/07/10/acadia-100/how-sieur-de-monts-became-the-modern-acadia-national-park-a-timeline/

US Department of the Interior. 1904-2017. National Park Service Visitor Use Statistics: Park Reports. Accessed March 27, 2018. https://irma.nps.gov/Stats/Reports/Park/

Vander Stoep, Gail and Joseph Roggenbuck.1996. “Is your Park Being ‘Loved to Death?’: Using Communication and Other Indirect Techniques to Battle the Park “Love Bug.” Crowding and Congestion in the National Park System: Guidelines for Research and Management.

Wagner, Mark. 2017. “Mission 66”. National Park Service. Last modified October 25. Accessed March 27, 2018. https://www.nps.gov/glac/learn/historyculture/mission-66.htm.

Image Citations

Tables

Table 2.2- Manning, Robert E. and Laura E. Anderson. 2012. Managing Outdoor Recreation: Case Studies in the National Parks. Boston, MA: CAB International.

Table 2.3- Stankey, George and John Baden. 1977. “Rationing Wilderness Use: Methods, Problems, and Guidelines.” USDA Forest Service Research Paper INT-192.

Table 3.1- Table by author.

Table 3.2- Table by author.

Table 3.3- Table by author.

Table 4.1- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Table C.1- Table by author.

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Figures

Figure 4.1.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.2.1- National Park Service. 2018. “Zion National Park Map”. Last modified April 9. Accessed March 27, 2018. https://www.nps.gov/zion/planyourvisit/maps.htm.

Figure 4.2.2- National Park Service. 2018. “Shuttle Bus Map”. Last modified April 9. Accessed March 27, 2018. https://www.nps.gov/zion/planyourvisit/maps.htm.

Figure 4.2.3- Neidig, Marc. 2008. “Angels Landing from the Deertrap Mountain Trail.” From National Park Service, https://www.nps.gov/media/photo/gallery.htm?id=98B2CD6B-155D-451F-67A73851F18C9948.

Figure 4.2.4- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.2.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.3.1- National Park Service. 2017. “Rocky Mountain National Park Map”. Last modified August 30. Accessed March 27, 2018. https://www.nps.gov/romo/planyourvisit/maps.htm.

Figure 4.3.2- National Park Service. 2017. “Shuttle Bus Routes”. Last modified August 30. Accessed March 27, 2018. https://www.nps.gov/romo/planyourvisit/maps.htm.

Figure 4.3.3- NPS Photo. N.d. “Hallett peak reflected in Dream Lake”. From National Park Service, https://www.nps.gov/media/photo/gallery.htm?id=016D0F70-1DD8-B71B-0BF43FF8619649E6.

Figure 4.3.4- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.3.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.4.1- National Park Service. 2017. “Yosemite National Park Map”. Last modified February 7. Accessed March 27, 2018. https://www.nps.gov/yose/planyourvisit/upload/valleyshuttle.pdf.

Figure 4.4.2- National Park Service. 2018. “Yosemite Valley Shuttle System”. Last modified April 1. Accessed March 27, 2018. https://www.nps.gov/yose/planyourvisit/publictransportation.htm.

Figure 4.4.3- Hirsch, Robb. 2016. “Ackerson Meadow in Yosemite National Park”. From Yosemite Conservancy, https://www.yosemiteconservancy.org/restoration-research-gallery.

Figure 4.4.4- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.4.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.5.1- National Park Service. 2018. “Acadia National Park”. Last modified March 2. Accessed March 27, 2018. https://www.nps.gov/acad/planyourvisit/maps.htm.

Figure 4.5.2- Island Explorer. 2017. “Bus Routes on Mount Desert Island. Accessed on March 27, 2018. http://www.exploreacadia.com/fullmap.htm.

Figure 4.5.3- Rugg, Kristi. N.d. “Rocky Ocean Drive Coast”. From National Park Service, https://www.nps.gov/media/photo/gallery.htm?id=59983CBC-1DD8-B71B-0B2806D453E64430.

Figure 4.5.4- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.5.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.6.1- Olympic Peninsula Transportation map (OLYM Roads 2018).

Figure 4.6.2- National Park Service. 2018. “Park Map”. Last modified March 21. Accessed March 27, 2018. https://www.nps.gov/olym/planyourvisit/maps.htm.

Figure 4.6.3- National Park Service. N.d. “Krause Bottom in the Elwha River”. From National Park Service, https://www.nps.gov/media/photo/gallery.htm?id=F23B92B0-155D-4519-3E8887C9EDC70F23.

Figure 4.6.4- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.6.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.7.1- National Park Service. 2016. “Glacier Park Map”. Last modified November 3. Accessed March 27, 2018. https://www.nps.gov/glac/planyourvisit/maps.htm.

Figure 4.7.2- National Park Service. 2016. “Shuttle Stop Map”. Last modified September 8. Accessed March 27, 2018. https://www.nps.gov/glac/planyourvisit/shuttlestops.htm.

Figure 4.7.3- Rains, Tim. N.d. “Grinnell Glacier Basin”. From National Park Service, https://www.nps.gov/media/photo/gallery.htm?id=349C0EDC-1DD8-B71B-0B7F5C7870E5BE6F.

Figure 4.7.4- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.7.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.8.1- National Park Service. N.d. “Map of Joshua Tree National Park”. Accessed March 27, 2018. https://www.nps.gov/hfc/carto/PDF/JOTRmap1.pdf.

Figure 4.8.2- National Park Service. 2018. “RoadRunner Shuttle Map”. Last modified April 11. Accessed March 27, 2018. https://www.nps.gov/jotr/planyourvisit/shuttle-buses.htm.

Figure 4.8.3- Sutton, Brad. N.d. “Lost Horse Valley”. From National Park Service, https://www.nps.gov/media/photo/gallery.htm?id=F5DD6FE7-1DD8-B71B-0B543C7B6B500E37.

Figure 4.8.4- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure 4.8.5- Graph by author. Data collected from https://irma.nps.gov/Stats/Reports/Park/.

Figure B.1- Figure from Qualtrics website, made by author.

Figure B.2- Figure from Qualtrics website, made by author.

Figure B.3- Figure from Qualtrics website, made by author.

Figure B.4- Figure from Qualtrics website, made by author.

Figure B.5- Figure from Qualtrics website, made by author.

Appendix A:

Interview Questions

The interview was conducted during a 30-minute phone call with park representatives from 8 out of the top 11 most visited national parks in the NPS. These national parks include: Grand Canyon National Park, Yosemite National Park, Rocky Mountain National Park, Zion National Park, Olympic National Park, Acadia National Park, Glacier National Park, and Joshua Tree National Park. I sent a copy of the interview questions to the park representatives ahead of time, along with a brief explanation of what the aim of my project is, so that their responses would be more helpful.

Interview Questions:

1. What visitor impacts do you deal with most often, and what are your strategies to deal with them?
2. What specific management practices do you use most often to deal with visitor impacts?
3. What are the biggest issues for your park, and how are they being planned for?
4. How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?
5. If budget wasn't an issue, what would you do to improve your park?

Appendix B:

Qualtrics Survey

Default Question Block

Informed Consent

Project Title: Strategies for Saving: Creating Strategies for the National Park Service's Future

Approval Date of Project: TBD

Expiration Date: 05/12/2018

Contact and Phone for Any Questions or Problems:

Chandler Nyp: cjnyp@ksu.edu

IRB Chair Contact and Phone Information: Rick Scheidt: +1 785 532-3224

Sponsor of Project: Private

Purpose of Research: The objective of this study is to propose a series of strategies for the reduction of visitor impacts on the 10 most visited national parks in the NPS. The result of this program will be a healthier and more protected park that can be enjoyed for generations, that respects the NPS' mandate and prepares for the future generations that will enjoy the parks.

Methods and Procedures to be used: Survey of key park personnel at the top 10 national parks in the NPS including questions about effects of visitors, management strategies, and management policies. The survey will be administered via Qualtrics online and will be anonymous. If the survey taker feels uncomfortable or does not want to answer a question, they do not have to and can end the survey for any reason at any time. The survey data will be processed by Qualtrics and inform the strategies I will create in response to the information gathered here. There will be no way to identify survey takers in the published product.

Length of Study: About 10 minutes.

Risks Anticipated: Inconvenience.

Benefits Anticipated: Answers will inform the creation of strategies to be described in my report. This report then can be used to inform future decisions by individual parks on how they can address the issues they are facing due to increased popularity.

The Extent of Confidentiality: Survey participants will remain anonymous, there will be no way to identify survey takers in the published work.

Terms of Participation: I understand this project is research and that my participation is completely voluntary. I also understand that if I decide to participate in this study, I may withdraw my consent at any time and stop participating at any time without explanation, penalty, or loss of benefits, or academic standing to which I may otherwise be entitled.

I verify that clicking consent box below that I have read and understood this consent form, and willingly agree to participate in this study under the terms described.

- ○ I consent.
- ○ I do not consent.

Block 7

What National Park do you work for?

- ○ Great Smoky Mountain National Park
- ○ Grand Canyon National Park
- ○ Yosemite National Park
- ○ Rocky Mountain National Park
- ○ Zion National Park
- ○ Yellowstone National Park
- ○ Olympic National Park
- ○ Acadia National Park
- ○ Grand Teton National Park
- ○ Glacier National Park
- ○ Joshua Tree National Park

Block 4

How would you rate the impact visitors have on the following park resources:

Figure B.1- Page one of the Qualtrics Survey that was administered to the Key Park Personnel (by author).

	No Impact	Low Impact	Moderate Impact	High Impact	Extremely High Impact	I'm not responsible for managing this
Soil Resources (ex. compaction)	○	○	○	○	○	○
Vegetation Resources (ex. trampling)	○	○	○	○	○	○
Water Resources (ex. pollution)	○	○	○	○	○	○
Wildlife Resources (ex. modification of behavior)	○	○	○	○	○	○
Air Resources (ex. pollution)	○	○	○	○	○	○
Soundscape Resources (ex. human noises)	○	○	○	○	○	○
Night Sky Resources (ex. artificial light)	○	○	○	○	○	○
Historical/ Cultural Resources (ex. disturbance)	○	○	○	○	○	○

How would you rate the increase of visitor impacts in the past 5 years, on the following park resources:

	No Increase	Small Increase	Moderate Increase	Large Increase	Very Large Increase	I'm not responsible for managing this
Soil Resources	○	○	○	○	○	○
Vegetation Resources	○	○	○	○	○	○
Water Resources	○	○	○	○	○	○
Wildlife Resources	○	○	○	○	○	○
Air Resources	○	○	○	○	○	○
Soundscape Resources	○	○	○	○	○	○
Night Sky Resources	○	○	○	○	○	○
Historical/ Cultural Resources	○	○	○	○	○	○

In what order would you place the following resources: (1 being the resource most impacted by visitors and 8 being the resource least impacted)

	1	2	3	4	5	6	7	8
Soil Resources	○	○	○	○	○	○	○	○
Vegetation Resources	○	○	○	○	○	○	○	○
Water Resources	○	○	○	○	○	○	○	○
Wildlife Resources	○	○	○	○	○	○	○	○
Air Resources	○	○	○	○	○	○	○	○
Soundscape Resources	○	○	○	○	○	○	○	○
Night Sky Resources	○	○	○	○	○	○	○	○
Historical/ Cultural Resources	○	○	○	○	○	○	○	○

Block 1

How would you rate the following:

	No Impact	Low Impact	Moderate Impact	High Impact	Extremely High Impact	I'm not responsible for managing this
Crowding in the Park	○	○	○	○	○	○
Conflict Between Visitors	○	○	○	○	○	○
Depreciative Behavior (ex.vandalism and graffiti)	○	○	○	○	○	○

What kind of increase have you seen in the past 5 years on the following:

Figure B.2- Page two of the Qualtrics Survey that was administered to the Key Park Personnel (by author).

	No Increase	Small Increase	Moderate Increase	Large Increase	Very Large Increase	I'm not responsible for managing this
Crowding in the Park	○	○	○	○	○	○
Conflict Between Visitors	○	○	○	○	○	○
Depreciative Behavior	○	○	○	○	○	○

In what order would you place the following: (1 being the most serious and 3 being the least serious)

	1	2	3
Crowding in the Park	○	○	○
Conflict Between Visitors	○	○	○
Depreciative Behavior	○	○	○

Block 5

How would you rate the impact visitors currently have on the following park facilities:

	No Impact	Low Impact	Moderate Impact	High Impact	No Basis for Judgment	I'm not responsible for managing this
Attraction Sites	○	○	○	○	○	○
Trails	○	○	○	○	○	○
Campgrounds	○	○	○	○	○	○
Roads and Parking	○	○	○	○	○	○
Interpretive Facilities and Programs	○	○	○	○	○	○

How would you rate the increase of visitor impacts in the past 5 years, on the following park facilities:

	No Increase	Small Increase	Moderate Increase	High Increase	No Basis for Judgment	I'm not responsible for managing this
Attraction Sites	○	○	○	○	○	○
Trails	○	○	○	○	○	○
Campgrounds	○	○	○	○	○	○
Roads and Parking	○	○	○	○	○	○
Interpretive Facilities and Programs	○	○	○	○	○	○

In what order would you place the following park facilities: (1 being the facility most impacted by visitors and 5 being the facility least impacted by visitor)

	1	2	3	4	5
Attraction Sites	○	○	○	○	○
Trails	○	○	○	○	○
Campgrounds	○	○	○	○	○
Roads and Parking	○	○	○	○	○
Interpretive Facilities and Programs	○	○	○	○	○

Block 2

What management strategies are currently being used to lessen the impact visitors have within your park? How successful are these strategies?

Are these management strategies being used?	How successful are these strategies?	What areas of the park are these strategies being used in?

Figure B.3- Page three of the Qualtrics Survey that was administered to the Key Park Personnel (by author).

	Are these management strategies being used?		How successful are these strategies?						What areas of the park are these strategies being used in?				
	Yes	No	Not Successful	Somewhat Succesful	Moderately Successful	Somewhat Successful	Very Successful	I'm not responsible for managing this	Attraction Sites	Traills	Campgrounds and Campsites	Roads and Parking	Interpretive Facilities
Limit Use	○	○	☐	☐	☐	☐	☐	☐	○	○	○	○	○
Increase Access	○	○	☐	☐	☐	☐	☐	☐	○	○	○	○	○
Reduce Impacts of Use	○	○	☐	☐	☐	☐	☐	☐	○	○	○	○	○
Harden the Resource or Experience	○	○	☐	☐	☐	☐	☐	☐	○	○	○	○	○

Block 3

What management practices are currently being used to lessen the impact visitors have within your park? How succesful are these practices?

	Are these management practices being used?		How successful are these practices?					
	Yes	No	Not Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	Very Successful	I'm not responsible for managing this
Information and Education	○	○	○	○	○	○	○	○
Rationing and Allocation	○	○	○	○	○	○	○	○
Rules and Regulations	○	○	○	○	○	○	○	○
Law Enforcement	○	○	○	○	○	○	○	○
Zoning	○	○	○	○	○	○	○	○
Facility Development	○	○	○	○	○	○	○	○
Site Design	○	○	○	○	○	○	○	○

Based on their importance to your park, rate the following management practices:

	1	2	3	4	5	6	7
Information and Education	○	○	○	○	○	○	○
Rationing and Allocation	○	○	○	○	○	○	○
Rules and Regulations	○	○	○	○	○	○	○
Law Enforcement	○	○	○	○	○	○	○
Zoning	○	○	○	○	○	○	○
Facility Development	○	○	○	○	○	○	○
Site Design	○	○	○	○	○	○	○

Block 6

What park issues related to park visitors would you consider a major concern in your park?

Figure B.4- Page four of the Qualtrics Survey that was administered to the Key Park Personnel (by author).

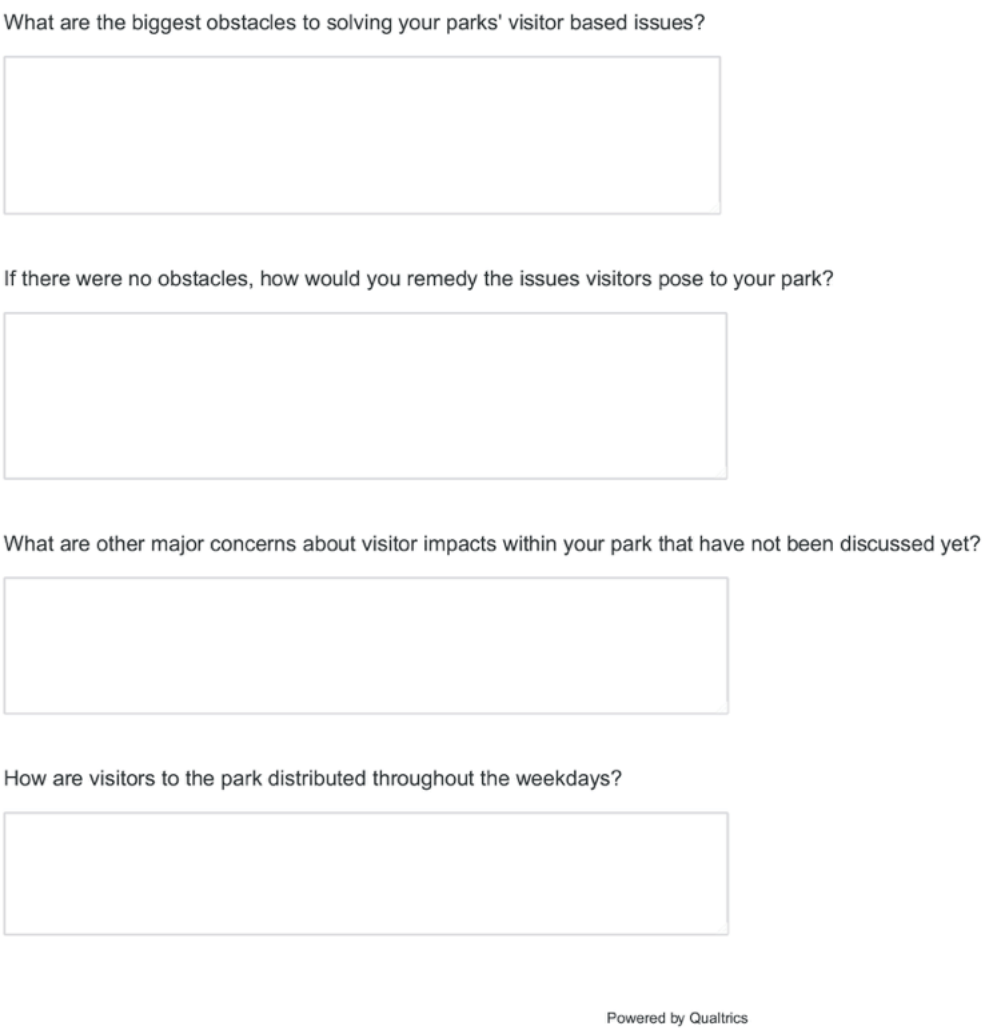

Figure B.5- Page five of the Qualtrics Survey that was administered to the Key Park Personnel (by author).

Appendix C:

Interview Results

The Interview results are separated into two different types of tables, the first is the Interviews Summaries by Park and the second is the Interview summaries by question. The purpose of this is to separate the information so that the park can be looked at as a whole, or so that all of the parks can be compared on a given question. There are eight Interview Summaries by Park tables (C.1 through C.8) and there are five Interview Summaries by Question tables (C.9 through C.13).

Interview Summaries by Park

Interview Questions	Responses from Grand Canyon's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Wildlife Encounters-** Impacts on Wildlife Resources, Impacts on Experience through Depreciative Behavior, Managed through Information and Education Practices
	Littering- Impacts on Water and Wildlife Resources, Impacts on Experience through Depreciative Behavior, Managed through Facility Development (moving trash cans to where they are needed)
What specific management practices do you use most often to deal with visitor impacts?	Utilize adaptive management strategy (constantly adjusting as new information comes to light) to address rapidly changing visitor uses; implement permit program for specialized uses like runners to manage the way visitors utilize park facilities such as trails and restrooms
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues**- Water source degradation (transcanyon waterline) **Solutions-** Plan and fundraise for waterline replacement
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**Short Term-** Extended shuttle bus service (with gateway town's assistance) and campaign encouraging visitors to use the service; use social media as a way to reach more visitors; have rangers set up in parks to help visitors find their way more efficiently
If budget wasn't an issue, what would you do to improve your park?	More Rangers in the Park, Communicate Alternative Activities in the Area, More Interpretive Programs, Better Cooperation with Tribal Neighbors

Table C.1- A Summary of the Park Representative from Grand Canyon's responses in the Semi Structured Interview (by author).

Interview Questions	Responses from Zion's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Crowding-** Impacts on Experience through Crowding
What specific management practices do you use most often to deal with visitor impacts?	New visitor management plan
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues-** Consistent/ declining budgets **Solutions-** Growing fees from increased number of visitors
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**Short Term-** Create the Visitor Management Plan (currently ongoing)
If budget wasn't an issue, what would you do to improve your park?	Revamp Parking, Expand Shuttle Service

Table C.2- A Summary of the Park Representative from Zion's responses in the Semi Structured Interview (by author).

Interview Questions	Responses from Rocky Mountain's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Crowding-** Impacts on Experience through Crowding, Managed through Information and Education, and Rules and Regulations
What specific management practices do you use most often to deal with visitor impacts?	Restrict visitor access to crowded areas to reduce illegal parking; Communication with visitors on areas that are busier helps to spread visitors throughout the park
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues-** Increased number of visitors in a concentrated time frame **Soultions-** Plan for visitor and staff safety, impacts on resources, operational changes, and the visitors experience
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**Short Term-** Better communication strategies; continue utilizing the barely closed restrictions; implement parking deterrents in dangerous stretches of road
If budget wasn't an issue, what would you do to improve your park?	Revamp Parking, Hire More Full Time Staff, Increase Funding for Maintenance, Revamp Trails (not increasing the foot print)

Table C.3- A Summary of the Park Representative from Rocky Mountain's responses in the Semi Structured Interview (by author).

Interview Questions	Responses from Yosemite's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Crowding-** Impacts on Experience through Crowding
What specific management practices do you use most often to deal with visitor impacts?	Utilizing resource management division for restoration projects; bear management program to reduce the likelihood of conflict between visitors and wildlife
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues-** Managing visitors and their experiences **Solutions-** Provide adequate transportation; increase solutions in areas of heavy use
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**Short Term-** Managing visitors and their experiences
If budget wasn't an issue, what would you do to improve your park?	Expand Shuttle Bus Network

Table C.4- A Summary of the Park Representative from Yosemite's responses in the Semi Structured Interview (by author).

Interview Questions	Responses from Acadia's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Crowding-** Impacts on Experience through Crowding, Managed through Information and Education, Rules and Regulations, and Law Enforcement
What specific management practices do you use most often to deal with visitor impacts?	Understand capacities on park facilities including restrooms and trails; expand shuttle service to address parking issues
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues-** Transportation network overload **Solutions-** Educate visitors; expand shuttle bus service; enforce parking and traffic rules; temporarily close attractions
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**No Response**
If budget wasn't an issue, what would you do to improve your park?	Construct a Transportation Hub, Revamp Parking, Expand Shuttle Bus Network, Hire More Law Enforcement and Full Time Staff, Increase Funding for Maintenance, Create Additional Education Programs

Table C.5- A Summary of the Park Representative from Acadia's responses in the Semi Structured Interview (by author).

Interview Questions	Responses from Olympic's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Crowding**- Impacts on Soil and Vegetation Resources, Impacts on Experience through Crowding, Impacts on Facilities at Campgrounds and Campsites
	Waste Management- Impacts on Water Resources, Impacts on Experience through Depreciative Behavior, Managed through Rules and Regulations, and Facility Development and Maintenance
What specific management practices do you use most often to deal with visitor impacts?	Implementation of permit systems to manage visitor use of wilderness/ backcountry parts of the park
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues-** Failing infrastructure
	Biggest Issues- Exotic goats within the park negatively impacting the ecosystem **Solutions-** Relocation to original ranges
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**Short Term-** Set capacity limits; explore ways to accommodate visitors in current parking boundaries; highlight areas of the park that are being underutilized; continue planning for shuttle bus system and the eventual construction of infrastructure
If budget wasn't an issue, what would you do to improve your park?	Do a Transportation Study, Expand the Shuttle Bus Network, More Project Managers, Create a Better Waste Management Plan

Table C.6- A Summary of the Park Representative from Olympic's responses in the Semi Structured Interview (by author).

Interview Questions	Responses from Glacier's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Crowding-** Impacts on Experience through Crowding, Managed through Information and Education, and Rationing and Allocation
What specific management practices do you use most often to deal with visitor impacts?	Limit visitor access by swinging the gates; Increase communication using technology like digital signage and social media to keep visitors informed; Connect with surrounding communities to help disperse visitors in the event of overwhelming numbers of visitors
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues-** Rapid changes to number of park visitors and park conditions **Solutions-** Specialized staff training to increase adaptability and flexibility to respond to rapid changes
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**Short Term-** Congestion Management Workshops; Continue to manage crowding by "swinging the gate" on areas
If budget wasn't an issue, what would you do to improve your park?	Better Social Media Presence, Manage Visitor Expectation, Communicate Alternative Activities in the Area (especially during times when the park is crowded), Add an Additional Visitor Center to the Park

Table C.7- A Summary of the Park Representative from Glacier's responses in the Semi Structured Interview (by author).

Interview Questions	Responses from Joshua Tree's Representative
What visitor impacts do you deal with most often, and what are your strategies to deal with them?	**Crowding-** Impacts on Soil and Vegetation Resources, Impacts on Experience through Crowding and Depreciative Behavior, Managed through Rules and Regulations
What specific management practices do you use most often to deal with visitor impacts?	Utilize expanded visitor centers and entrance stations to address congestion in people entering the park
What are the biggest issues for your park, and how are they being planned for?	**Biggest Issues-** Rapid rise in visitor numbers **Solutions-** Evaluate how visitor experience is changing
	Biggest Issues- Off road vehicle use **Solutions-** Fence areas where off roaders would enter the park
	Biggest Issues- Increased bolting in wilderness areas by climbers
How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?	**Short Term-** Continue working to maximize the new shuttle service; continue study to determine the park's capacity
If budget wasn't an issue, what would you do to improve your park?	Revamp Roads, Hire More Rangers (to be stationed in the park) and More Interpretive Staff, Expand Entrance Stations, Expand Campgrounds and Build New Campgrounds Outside the Park, Implement a Reservation System for the Park

Table C.8- A Summary of the Park Representative from Joshua Tree's responses in the Semi Structured Interview (by author).

Interview Summaries by Question

What visitor impacts do you deal with most often, and what are your strategies to deal with them?																												
			Visitor Impacts															Management Strategies				Management Practices						
			Impacts on Resources								Impacts on Experience			Impacts on Facility/ Service														
			Soil	Vegetation	Water	Wildlife	Air	Soundscapes	Night sky	Historical/ Cultural	Crowding	Conflict	Depreciative Behavior	Attraction Sites	Trails	Campgrounds/ Campsites	Roads/ Parking	Interpretive Facilities/ Programs	Limit Use	Increase Supply	Reduce Impact of Use	Harden Resource/ Experience	Information/ Education	Rationing/ Allocation	Rules/ Regulations	Law Enforcement	Zoning	Facility Development/ Site Design/ Maintenance
2	Grand Canyon	Wildlife Encounters				X							X										X					
		Littering			X	X							X															X
3	Zion	Crowding									X																	
4	Rocky Mountain	Crowding									X												X		X			
5	Yosemite	Crowding									X																	
7	Acadia	Crowding									X												X		X	X		
8	Olympic	Crowding	X	X							X					X												
		Waste Management			X								X												X			X
10	Glacier	Crowding									X												X	X				
11	Joshua Tree	Crowding	X	X									X												X			

Table C.9- A Summary of the Eight Park Representative's Responses to Question #1 of the Semi Structured Interviews (by author).

What specific management practices do you use most often to deal with visitor impacts?		
		Management Practices
2	Grand Canyon	Utilize adaptive management strategy (constantly adjusting as new information comes to light) to address rapidly changing visitor uses; implement permit program for specialized uses like runners to manage the way visitors utilize park facilities such as trails and restrooms
3	Zion	New visitor management plan
4	Rocky Mountain	Restrict visitor access to crowded areas to reduce illegal parking; Communication with visitors on areas that are busier helps to spread visitors throughout the park
5	Yosemite	Utilizing resource management division for restoration projects; bear management program to reduce the likelihood of conflict between visitors and wildlife
7	Acadia	Understand capacities on park facilities including restrooms and trails; expand shuttle service to address parking issues
8	Olympic	Implementation of permit systems to manage visitor use of wilderness/ backcountry parts of the park
10	Glacier	Limit visitor access by swinging the gates; Increase communication using technology like digital signage and social media to keep visitors informed; Connect with surrounding communities to help disperse visitors in the event of overwhelming numbers of visitors
11	Joshua Tree	Utilize expanded visitor centers and entrance stations to address congestion in people entering the park

Table C.10- A Summary of the Eight Park Representative's Responses to Question #2 of the Semi Structured Interviews (by author).

What are the biggest issues for your park, and how are they being planned for?			
		Biggest Issues	Solutions
2	Grand Canyon	Water source degradation (transcanyon waterline)	Plan and fundraise for waterline replacement
3	Zion	Consistent/ declining budgets	Growing fees from increased number of visitors
4	Rocky Mountain	Increased number of visitors in a concentrated time frame	Plan for visitor and staff safety, impacts on resources, operational changes, and the visitors experience
5	Yosemite	Managing visitors and their experiences	Provide adequate transportation; increase solutions in areas of heavy use
7	Acadia	Transportation network overload	Educate visitors; expand shuttle bus service; enforce parking and traffic rules; temporarily close attractions
8	Olympic	Failing infrastructure	-
		Exotic goats within the park	Relocation to original ranges
10	Glacier	Rapid changes to number of park visitors and park conditions	Specialized staff training to increase adaptability and flexibility to respond to rapid changes
11	Joshua Tree	Rapid rise in visitor numbers	Evaluate how visitor experience is changing
		Off road vehicle use	Fence areas where off roaders would enter the park
		Increased bolting in wilderness areas by climbers	-

Table C.11- A Summary of the Eight Park Representative's Responses to Question #3 of the Semi Structured Interviews (by author).

How are you planning for the short-term and long-term future of your park, considering the steadily climbing number of visitors?			
		Short Term Planning Solutions	Long Term Planning Solutions
2	Grand Canyon	Extended shuttle bus service (with gateway town's assistance) and campaign encouraging visitors to use the service; use social media as a way to reach more visitors; have rangers set up in parks to help visitors find their way more efficiently	All responses from the eight parks interviewed suggest a lack of long term planning due to the speed with which things are changing in response to the large number of visitors.
3	Zion	Create the Visitor Management Plan (currently ongoing)	
4	Rocky Mountain	Better communication strategies; continue utilizing the barely closed restrictions; implement parking deterrents in dangerous stretches of road	
5	Yosemite	Managing visitors and their experiences	
7	Acadia	-	
8	Olympic	Set capacity limits; explore ways to accommodate visitors in current parking boundaries; highlight areas of the park that are being underutilized; continue planning for shuttle bus system and the eventual construction of infrastructure	
10	Glacier	Congestion Management Workshops; Continue to manage crowding by "swinging the gate" on areas	
11	Joshua Tree	Continue working to maximize the new shuttle service; continue study to determine the park's capacity	

Table C.12- A Summary of the Eight Park Representative's Responses to Question #4 of the Semi Structured Interviews (by author).

If budget wasn't an issue, what would you do to improve your park?																						
		Better Transportation					More Staff					Better Communication				Improved Facilities and Maintenance						New Programs			
		Transportation Hub	Revamp Roads	Revamp Parking	Transportation Study	Expanded Shuttle Bus Network	More Rangers In the Park	More Project Managers	More Interpretive Staff	More Law Enforcement	More Full Time Staff	Better Social Media Presence	More Interpretive Programs	Manage Visitor Expectations	Communicate Alternative Activities	Better Maintenance (Trash)	Additional Visitor Center	Expanded Entrance Stations	More Campgrounds	Better Waste Management Plan	Revamp Trails	More Interpretive Programs	Better Cooperation with Tribal Neighbors	Implement Reservation System	Additional Educational Programs
2	Grand Canyon						X						X		X							X	X		
3	Zion			X		X																			
4	Rocky Mountain			X							X					X					X				
5	Yosemite					X																			
7	Acadia	X		X		X				X	X					X									X
8	Olympic				X	X		X												X					
10	Glacier											X		X			X								
11	Joshua Tree		X				X		X									X	X					X	

Table C.13- A Summary of the Eight Park Representative's Responses to Question #5 of the Semi Structured Interviews (by author).

Appendix D:

Survey Results Tables and Summaries

	How would you rate the impact visitors have on the following park resources:							
	Soil Resources	Vegetation Resources	Water Resources	Wildlife Resources	Air Resources	Soundscape Resources	Night Sky Resources	Historical/ Cultural Resources
Grand Canyon National Park	Extremely High Impact	Extremely High Impact	Extremely High Impact	Extremely High Impact	High Impact	Extremely High Impact	High Impact	High Impact
	Moderate Impact	Moderate Impact	Moderate Impact	Moderate Impact	Low Impact	Low Impact	Low Impact	Moderate Impact
	Low Impact	Low Impact	Low Impact	Low Impact	Moderate Impact	High Impact	Low Impact	Low Impact
Zion National Park	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible
Yosemite National Park	High Impact	High Impact	Low Impact	High Impact	High Impact	High Impact	Low Impact	Low Impact
	I'm not responsible	I'm not responsible	Low Impact	I'm not responsible	Low Impact	I'm not responsible	Moderate Impact	I'm not responsible
	Moderate Impact	High Impact	Low Impact	Moderate Impact	Low Impact	Moderate Impact	Low Impact	Low Impact
Acadia National Park	High Impact	High Impact	Low Impact	Moderate Impact	Moderate Impact	High Impact	Moderate Impact	Low Impact
	Moderate Impact	Moderate Impact	High Impact	Moderate Impact	Moderate Impact	High Impact	Moderate Impact	High Impact
	Moderate Impact	Moderate Impact	Low Impact	Low Impact	Low Impact	Extremely High Impact	High Impact	Moderate Impact
Olympic National Park	High Impact	Extremely High Impact	High Impact	Extremely High Impact	Low Impact	Extremely High Impact	No Impact	High Impact
	I'm not responsible	High Impact	High Impact	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible
	Low Impact	Moderate Impact	Low Impact	High Impact	Low Impact	Moderate Impact	Low Impact	Low Impact
	Moderate Impact	High Impact	Low Impact	High Impact	Moderate Impact	Moderate Impact	Low Impact	Low Impact
Glacier National Park	Moderate Impact	Moderate Impact	Low Impact	Moderate Impact	Low Impact	Low Impact	Low Impact	Low Impact
	High Impact	High Impact	Low Impact	Moderate Impact	Low Impact	Moderate Impact	Low Impact	Low Impact
	Moderate Impact	Moderate Impact	Low Impact	High Impact	Low Impact	Low Impact	Low Impact	Low Impact
	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible
Joshua Tree National Park	Moderate Impact	High Impact	No Impact	Moderate Impact	Low Impact	Low Impact	No Impact	Low Impact
	Extremely High Impact	Extremely High Impact	I'm not responsible	High Impact	High Impact	High Impact	High Impact	High Impact
	High Impact	High Impact	Low Impact	Moderate Impact	Low Impact	High Impact	Moderate Impact	High Impact
	Moderate Impact	High Impact	Low Impact	Moderate Impact	No Impact	Low Impact	Low Impact	Moderate Impact

No impact	0%	0%	4%	0%	4%	0%	9%	0%
Low impact	9%	4%	59%	9%	50%	23%	45%	45%
Moderate impact	41%	27%	4%	41%	18%	18%	18%	14%
High impact	23%	41%	14%	23%	14%	27%	14%	23%
Ex. High impac	9%	14%	4%	9%	0%	14%	0%	0%
Not responsible	18%	14%	14%	18%	14%	18%	14%	18%

Table D.1- Qualtrics Survey Question 1 Results

	How would you rate the increase of visitor impacts in the past 5 years, on the following park resources:							
	Soil Resources	Vegetation Resources	Water Resources	Wildlife Resources	Air Resources	Soundscape Resources	Night Sky Resources	Historical/ Cultural Resources
Grand Canyon National Park	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase
	Small Increase	Small Increase	Small Increase	Small Increase	Small Increase	Small Increase	No Increase	Small Increase
	Moderate Increase	Moderate Increase	Moderate Increase	Moderate Increase	Moderate Increase	Small Increase	Small Increase	Moderate Increase
Zion National Park	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible
Yosemite National Park	No Increase	No Increase	No Increase	No Increase	No Increase	Moderate Increase	No Increase	No Increase
	I'm not responsible	I'm not responsible	Small Increase	I'm not responsible	I'm not responsible	I'm not responsible	Small Increase	I'm not responsible
	Moderate Increase	Moderate Increase	Small Increase	Small Increase	Small Increase	Small Increase	Small Increase	Small Increase
Acadia National Park	Moderate Increase	Large Increase	Moderate Increase	Moderate Increase	Moderate Increase	Large Increase	Moderate Increase	Small Increase
	Large Increase	Large Increase	Large Increase	Large Increase	Moderate Increase	Large Increase	Moderate Increase	Large Increase
	Moderate Increase	Moderate Increase	Small Increase	No Increase	Small Increase	Moderate Increase	Moderate Increase	Small Increase
Olympic National Park	Very Large Increase	Very Large Increase	Moderate Increase	Very Large Increase	Small Increase	Very Large Increase	No Increase	Moderate Increase
	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible
	Small Increase	Moderate Increase	Small Increase	Moderate Increase	No Increase	Small Increase	Small Increase	Small Increase
	Small Increase	Small Increase	No Increase	Moderate Increase	Small Increase	No Increase		
Glacier National Park	Very Large Increase	Very Large Increase	Moderate Increase	Large Increase	Small Increase	Moderate Increase	No Increase	No Increase
	Large Increase	Large Increase	Small Increase	Small Increase	Small Increase	Small Increase	No Increase	Small Increase
	Moderate Increase	Moderate Increase	Small Increase	Moderate Increase	Small Increase	Small Increase	Small Increase	Small Increase
	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible
Joshua Tree National Park	Large Increase	Large Increase	No Increase	Moderate Increase	No Increase	Small Increase	Small Increase	Moderate Increase
	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase	Very Large Increase
	Very Large Increase	Very Large Increase	Small Increase	Moderate Increase	Small Increase	Small Increase	Small Increase	Large Increase
	Moderate Increase	Large Increase	Moderate Increase	Moderate Increase	No Increase	Small Increase	Small Increase	Very Large Increase

No Increase	4%	4%	14%	9%	18%	4%	24%	10%
Small Increase	14%	9%	36%	14%	41%	41%	38%	33%
Moderate Increase	27%	23%	18%	36%	14%	14%	14%	14%
Large Increase	14%	23%	4%	9%	0%	9%	0%	10%
Very Large Increase	23%	23%	14%	14%	9%	14%	10%	14%
Not responsible	18%	18%	14%	18%	18%	18%	14%	19%

Table D.2- Qualtrics Survey Question 2 Results

	In what order would you place the following resources: (1 being the resource most impacted by visitors and 8 being the resource least impacted)							
	Soil Resource	Vegetation Resources	Water Resource	Wildlife Resource	Air Resource	Soundscape Resources	Night Sky Resource	Historical/ Cultural
Grand Canyon National Park	6	5	4	3	1	2	7	8
	3	2	4	5	8	6	7	1
	7	6	5	2	4	1	8	3
Zion National Park	4	1	5	2	7	3	6	8
Yosemite National Park	5	1	6	2	3	4	8	7
	2	1	3	4	5	7	8	6
	3	2	4	1	5	6	7	8
Acadia National Park	2	1	7	5	6	3	4	8
	5	6	4	3	2	8	1	7
	2	1	7	8	6	3	4	5
Olympic National Park	2	1	6	3	7	4	8	5
	3	1	7	2	8	6	5	4
	3	2	6	1	7	5	8	4
Glacier National Park	7	8	4	6	2	5	1	3
	2	1	6	3	7	4	8	5
	3	2	6	1	8	4	7	5
Joshua Tree National Park	2	1	8	3	7	5	6	4
	1	2		3	6	5	4	7
	8	7	2	1	4	5	3	6
	3	2	4	5	8	6	7	1
Average	3.6	2.7	5.3	3.1	5.7	4.7	5.7	5.3
Average Rank	3	1	5	2	7	4	8	6

Table D.3- Qualtrics Survey Question 3 Results

	How would you rate the following:		
	Crowding in the Park	Conflict Between Visitors	Depreciative Behavior
Grand Canyon National Park	Extremely High Impact	Extremely High Impact	Extremely High Impact
	Moderate Impact	Moderate Impact	Moderate Impact
	Moderate Impact	Moderate Impact	Low Impact
Zion National Park	Extremely High Impact	Low Impact	Moderate Impact
Yosemite National Park	Extremely High Impact	Moderate Impact	Low Impact
	Extremely High Impact	Extremely High Impact	Moderate Impact
	Extremely High Impact	Moderate Impact	Low Impact
Acadia National Park	Extremely High Impact	High Impact	Moderate Impact
	Extremely High Impact	High Impact	High Impact
	Extremely High Impact	Extremely High Impact	Low Impact
Olympic National Park	Extremely High Impact	Moderate Impact	Extremely High Impact
	Extremely High Impact	High Impact	Moderate Impact
	High Impact	Low Impact	Low Impact
	Moderate Impact	No Impact	Moderate Impact
Glacier National Park	Extremely High Impact	High Impact	Low Impact
	Extremely High Impact	Extremely High Impact	Moderate Impact
	High Impact	Low Impact	Low Impact
	High Impact	Moderate Impact	I'm not responsible
Joshua Tree National Park	Extremely High Impact	High Impact	High Impact
	Extremely High Impact	High Impact	Extremely High Impact
	Extremely High Impact	High Impact	High Impact
	High Impact	High Impact	High Impact

No impact	0%	4%	0%
Low impact	0%	14%	32%
Moderate impact	14%	28%	32%
High impact	18%	36%	18%
Ex. High impac	68%	18%	14%
Not responsible	0%	0%	4%

Table D.4- Qualtrics Survey Question 4 Results

	What kind of increase have you seen in the past 5 years on the following:		
	Crowding in the Park	Conflict Between Visitors	Depreciative Behavior (ex.vandalism and graffiti)
Grand Canyon National Park	Very Large Increase	Very Large Increase	Very Large Increase
	Large Increase	Moderate Increase	Moderate Increase
	Large Increase	Moderate Increase	Small Increase
Zion National Park	Very Large Increase	Small Increase	Moderate Increase
Yosemite National Park	Very Large Increase	Moderate Increase	No Increase
	Large Increase	Very Large Increase	Moderate Increase
	Large Increase	Large Increase	Small Increase
Acadia National Park	Very Large Increase	Large Increase	Moderate Increase
	Very Large Increase	Large Increase	Large Increase
	Very Large Increase	Large Increase	Small Increase
Olympic National Park	Very Large Increase	Moderate Increase	Very Large Increase
	Very Large Increase	Moderate Increase	Moderate Increase
	Large Increase	No Increase	Not responsible
	Moderate Increase	No Increase	Not responsible
Glacier National Park	Very Large Increase	Very Large Increase	Small Increase
	Very Large Increase	Very Large Increase	Small Increase
	Very Large Increase	Small Increase	Small Increase
	Very Large Increase	Moderate Increase	Not responsible
Joshua Tree National Park	Very Large Increase	Very Large Increase	Very Large Increase
	Very Large Increase	Very Large Increase	Very Large Increase
	Very Large Increase	Very Large Increase	Very Large Increase
	Very Large Increase	Very Large Increase	Very Large Increase

No impact	0%	9%	4%
Low impact	0%	9%	28%
Moderate impact	4%	28%	23%
High impact	23%	18%	4%
Ex. High impac	73%	36%	27%
Not responsible	0%	0%	14%

Table D.5- Qualtrics Survey Question 5 Results

	In what order would you place the following: (1 being the most serious and 3 being the least)		
	Crowding in the Park	Conflict Between	Depreciative Behavior
Grand Canyon National Park	1	3	2
	1	3	2
	1	2	3
Zion National Park	1	2	3
Yosemite National Park	1	2	3
	1	2	3
	1	2	3
Acadia National Park	1	2	3
	3	1	2
	1	2	3
Olympic National Park	1	3	2
	1	3	2
	1	3	2
	1	3	2
Glacier National Park	1	2	3
	1	2	3
	1	3	2
	1	2	3
Joshua Tree National Park	1	3	2
	1	3	2
	2	1	3
	2	3	1
Average	1.2	2.3	2.5
Ranking based on average	1	2	3

Table D.6- Qualtrics Survey Question 6 Results

	How would you rate the impact visitors currently have on the following park facilities:				
	Attraction Sites	Trails	Campgrounds	Roads and Parking	Interpretive Facilities and Programs
Grand Canyon National Park	High Impact	High Impact	High Impact	High Impact	High Impact
	High Impact	High Impact	Moderate Impact	Moderate Impact	I'm not responsible
	Moderate Impact	Low Impact	Moderate Impact	High Impact	High Impact
Zion National Park	High Impact	High Impact	High Impact	High Impact	I'm not responsible
Yosemite National Park	High Impact	High Impact	High Impact	High Impact	Moderate Impact
	High Impact	High Impact	High Impact	High Impact	Moderate Impact
	High Impact	Moderate Impact	High Impact	High Impact	Moderate Impact
Acadia National Park	High Impact	High Impact	High Impact	High Impact	Low Impact
	High Impact	High Impact	High Impact	High Impact	High Impact
	High Impact	Moderate Impact	Moderate Impact	High Impact	Moderate Impact
Olympic National Park	High Impact	Moderate Impact	High Impact	High Impact	Low Impact
	High Impact	High Impact	Moderate Impact	High Impact	High Impact
	Moderate Impact	High Impact	Moderate Impact	High Impact	Moderate Impact
	High Impact	High Impact	Moderate Impact	High Impact	Low Impact
Glacier National Park	High Impact	High Impact	Moderate Impact	High Impact	Low Impact
	High Impact	High Impact	Moderate Impact	High Impact	High Impact
	High Impact	Moderate Impact	Moderate Impact	High Impact	Moderate Impact
	High Impact	Moderate Impact	Moderate Impact	High Impact	Moderate Impact
Joshua Tree National Park	High Impact	Moderate Impact	High Impact	High Impact	High Impact
	High Impact	High Impact	High Impact	High Impact	High Impact
	High Impact	High Impact	High Impact	Moderate Impact	Low Impact
	High Impact	Low Impact	Moderate Impact	High Impact	High Impact

No impact	0%	0%	0%	0%	0%
Low impact	0%	9%	0%	0%	23%
Moderate impact	9%	27%	50%	9%	32%
High impact	91%	64%	50%	91%	36%
Ex. High impac	0%	0%	0%	0%	0%
Not responsible	0%	0%	0%	0%	9%

Table D.7- Qualtrics Survey Question 7 Results

	How would you rate the increase of visitor impacts in the past 5 years, on the following park facilities:				
	Attraction Sites	Trails	Campgrounds	Roads and Parking	Interpretive Facilities and Programs
Grand Canyon National Park	High Increase	High Increase	High Increase	High Increase	High Increase
	Moderate Increase	Small Increase	Small Increase	Small Increase	I'm not responsible
	High Increase	Moderate Increase	Moderate Increase	High Increase	High Increase
Zion National Park	High Increase	High Increase	High Increase	High Increase	I'm not responsible
Yosemite National Park	Moderate Increase	Moderate Increase	Moderate Increase	High Increase	Small Increase
	High Increase	High Increase	High Increase	High Increase	Moderate Increase
	High Increase	Moderate Increase	Moderate Increase	High Increase	Moderate Increase
Acadia National Park	High Increase	High Increase	Moderate Increase	High Increase	Small Increase
	High Increase	High Increase	High Increase	High Increase	High Increase
	High Increase	Moderate Increase	Small Increase	High Increase	Moderate Increase
Olympic National Park	High Increase	Moderate Increase	High Increase	High Increase	Small Increase
	High Increase	High Increase	High Increase	High Increase	High Increase
	Moderate Increase	Small Increase	Moderate Increase	High Increase	Moderate Increase
	Moderate Increase	Moderate Increase	Moderate Increase	Moderate Increase	Moderate Increase
Glacier National Park	High Increase	High Increase	Moderate Increase	High Increase	Small Increase
	High Increase	High Increase	Moderate Increase	High Increase	High Increase
	High Increase	High Increase	Moderate Increase	High Increase	Moderate Increase
	High Increase	High Increase	Moderate Increase	High Increase	High Increase
Joshua Tree National Park	High Increase	Moderate Increase	High Increase	High Increase	High Increase
	High Increase	High Increase	High Increase	High Increase	High Increase
	High Increase	High Increase	High Increase	High Increase	Moderate Increase
	High Increase	Moderate Increase	High Increase	High Increase	High Increase

No impact	0%	0%	0%	0%	0%
Low impact	0%	9%	9%	4%	18%
Moderate impact	18%	36%	45%	4%	32%
High impact	82%	55%	45%	92%	41%
Ex. High impac	0%	0%	0%	0%	0%
Not responsible	0%	0%	0%	0%	9%

Table D.8- Qualtrics Survey Question 8 Results

	In what order would you place the following park facilities:				
	Attraction Sites	Trails	Campgrounds	Roads and Parking	Interpretive Facilities and Programs
Grand Canyon National Park	4	1	3	2	5
	1	2	3	4	5
	5	2	3	1	4
Zion National Park	1	3	4	2	5
Yosemite National Park	2	3	4	1	5
	4	2	3	1	5
	2	4	3	1	5
Acadia National Park	3	1	4	2	5
	1	3	5	4	2
	1	3	4	2	5
Olympic National Park	1	4	2	3	5
	2	5	4	1	3
	4	3	2	1	5
	3	4	2	1	5
Glacier National Park	5	4	2	3	1
	1	3	5	2	4
	2	3	5	1	4
	2	3	5	1	4
Joshua Tree National Park	3	4	2	1	5
	2	4	3	1	5
	5	4	3	2	1
	1	5	4	3	2
Average	2.5	3.4	3.5	1.7	4.0
Ranking based on average	2	3	4	1	5

Table D.9- Qualtrics Survey Question 9 Results

	Are these management practices being used?			
	Limit Use	Increase Access	Reduce Impacts of Use	Harden the Resource or Experience
Grand Canyon National Park	Yes	Yes	Yes	Yes
	Yes	No	Yes	Yes
	Yes	Yes	No	No
Zion National Park	No	No	No	No
Yosemite National Park	Yes	No	Yes	Yes
	Yes	No	Yes	No
	Yes	No	Yes	No
Acadia National Park	No	No	Yes	Yes
	No	No	Yes	Yes
Olympic National Park	Yes	No	Yes	Yes
	Yes			
	No	No	Yes	No
	Yes	No	Yes	Yes
Glacier National Park	Yes	No	Yes	Yes
	Yes	No	Yes	Yes
	Yes	Yes	Yes	Yes
	Yes	No	Yes	Yes
Joshua Tree National Park	Yes	Yes	Yes	Yes
	No	Yes	No	No
	No	No	No	No
	No	No	Yes	Yes
Yes	66%	25%	20%	35%
No	33%	75%	80%	65%

Table D.10- Qualtrics Survey Question 10A Results

	How successful are these practices?			
	Limit Use	Increase Access	Reduce Impacts of Use	Harden the Resource or Experience
Grand Canyon National Park	Moderately Successful	Moderately Successful	Not Successful	Moderately Successful
	Moderately Successful		Somewhat Succesful	Moderately Successful
	Somewhat Successful	Moderately Successful	I'm not responsible	I'm not responsible
Zion National Park	I'm not responsible	I'm not responsible	I'm not responsible	I'm not responsible
Yosemite National Park	Very Successful	Not Successful	Moderately Successful	Moderately Successful
	I'm not responsible	I'm not responsible	I'm not responsible	Somewhat Successful
	Moderately Successful,I'n	I'm not responsible	I'm not responsible	I'm not responsible
Acadia National Park	Not Successful	Not Successful	Somewhat Succesful	Somewhat Successful
	Somewhat Succesful	Moderately Successful	Somewhat Succesful	Somewhat Succesful
			Somewhat Succesful	Somewhat Successful
Olympic National Park	Somewhat Succesful	Very Successful	Somewhat Succesful	Somewhat Succesful
	I'm not responsible			
			Somewhat Succesful	
	Very Successful		Somewhat Successful	Somewhat Successful
Glacier National Park	Very Successful		Moderately Successful	Very Successful
	Moderately Successful		Somewhat Successful	Somewhat Successful
	Very Successful	Not Successful	Somewhat Succesful	Somewhat Succesful
	Very Successful	Not Successful	Not Successful	Somewhat Successful
Joshua Tree National Park	Somewhat Successful	Very Successful	Moderately Successful	Moderately Successful
	Not Successful	Not Successful	Not Successful	Not Successful
			Very Successful	

Not Successful	0%	38%	15%	6%
Somewhat Successful	21%	0%	45%	50%
Moderately Successful	29%	23%	15%	22%
Very Successful	36%	15%	5%	6%
Not responsible	14%	23%	20%	16%

Table D.11- Qualtrics Survey Question 10B Results

	What areas of the park are these strategies being used in?			
	Limit Use	Increase Access	Reduce Impacts of Use	Harden the Resource or Experience
Grand Canyon National Park	Roads and Parking	Roads and Parking	Roads and Parking	Roads and Parking
	Campgrounds and Campsites		Campgrounds and Campsites	Traills
	Campgrounds and Campsites	Roads and Parking		
Zion National Park				
Yosemite National Park	Attraction Sites		Roads and Parking	Roads and Parking
	Roads and Parking			
Acadia National Park	Roads and Parking		Traills	Traills
	Traills	Attraction Sites	Traills	Roads and Parking
			Attraction Sites	Attraction Sites
Olympic National Park	Roads and Parking			
	Roads and Parking			
			Attraction Sites	
	Campgrounds and Campsites		Traills	Roads and Parking
Glacier National Park	Attraction Sites		Attraction Sites	Traills
	Campgrounds and Campsites		Traills	Traills
	Roads and Parking	Roads and Parking	Roads and Parking	Traills
	Attraction Sites		Roads and Parking	Traills
Joshua Tree National Park	Attraction Sites	Campgrounds and Campsites	Roads and Parking	Traills
		Roads and Parking	Roads and Parking	
			Attraction Sites	Roads and Parking

Attraction Sites	27%	17%	27%	8%
Trails	6%	0%	27%	54%
Camp	27%	17%	6%	0%
Roads and Parking	40%	66%	40%	38%
Interpretive Facilities and Pro.	0%	0%	0%	0%

Table D.12- Qualtrics Survey Question 10C Results

	Are these management practices being used?						
	Information and	Rationing and	Rules and Regulations	Law Enforcement	Zoning	Facility Development	Site Design
Grand Canyon National Park	Yes	Yes	Yes	Yes	Yes	No	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Zion National Park	Yes	No	Yes	Yes	No	No	Yes
Yosemite National Park	Yes	Yes	Yes	Yes	No	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	No	Yes	Yes
Acadia National Park	Yes	No	Yes	Yes	Yes	Yes	Yes
	Yes	No	Yes	Yes	Yes	Yes	Yes
Olympic National Park	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	No	No	No
	Yes	Yes	Yes	Yes	No	No	No
	Yes	No	Yes	Yes		Yes	Yes
Glacier National Park	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Joshua Tree National Park	Yes	Yes	Yes	Yes	No	Yes	Yes
	Yes	Yes	Yes	Yes	No	No	No
	Yes	No	Yes	Yes	No	No	No
	Yes	Yes	Yes	Yes	No	No	No
Yes	100%	75%	100%	100%	53%	65%	75%
No	0%	25%	0%	0%	47%	35%	25%

Table D.13- Qualtrics Survey Question 11A Results

	What management practices are currently being used to lessen the impact visitors have within your... - How successful are these practices?						
	Information and Education	Rationing and Allocation	Rules and Regulations	Law Enforcement	Zoning	Facility Development	Site Design
Grand Canyon National Park	Very Successful	I'm not responsible	Somewhat Successful	I'm not responsible	Somewhat Successful		Very Successful
	Somewhat Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful	Moderately Successful	Moderately Successful	Somewhat Successful
	Somewhat Successful	Very Successful	Somewhat Successful	Somewhat Successful	Very Successful	Somewhat Successful	Somewhat Successful
Zion National Park	I'm not responsible	I'm not responsible	Somewhat Successful	Somewhat Successful	I'm not responsible	I'm not responsible	Moderately Successful
Yosemite National Park	Somewhat Successful	Very Successful	Somewhat Successful	Somewhat Successful		Somewhat Successful	Somewhat Successful
	I'm not responsible	Moderately Successful	Moderately Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	Somewhat Successful
	Somewhat Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful
Acadia National Park	Somewhat Successful		Somewhat Successful	Moderately Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful
	Somewhat Successful	Somewhat Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	Somewhat Successful	Moderately Successful
	Somewhat Successful		Moderately Successful	Moderately Successful	Moderately Successful	Moderately Successful	Moderately Successful
Olympic National Park	Somewhat Successful	Somewhat Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	Moderately Successful	Moderately Successful
	Somewhat Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful			
	Somewhat Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	I'm not responsible	I'm not responsible	I'm not responsible
	Very Successful		Very Successful	Somewhat Successful		Very Successful	Very Successful
Glacier National Park	Moderately Successful	Somewhat Successful	Moderately Successful	Moderately Successful	Somewhat Successful	Not Successful	Somewhat Successful
	Somewhat Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful	Somewhat Successful
	Moderately Successful	Very Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	Very Successful	Somewhat Successful
	Somewhat Successful	Moderately Successful	Somewhat Successful	Somewhat Successful	Moderately Successful	Somewhat Successful	Somewhat Successful
Joshua Tree National Park	Very Successful	Somewhat Successful	Moderately Successful	Moderately Successful		Moderately Successful	Somewhat Successful
	Somewhat Successful	Not Successful	Somewhat Successful	Somewhat Successful			
	Somewhat Successful		Not Successful	Not Successful			
	Somewhat Successful	Very Successful	Somewhat Successful	Somewhat Successful			

Not Successful	0%	6%	4%	4%	0%	6%	0%
Somewhat Successful	68%	50%	64%	59%	53%	47%	61%
Moderately Successful	9%	11%	27%	33%	27%	23%	22%
Very Successful	14%	22%	4%	0%	7%	12%	11%
Not responsible	9%	11%	0%	4%	13%	12%	6%

Table D.14- Qualtrics Survey Question 11B Results

	Based on their importance to your park, rate the following management practices:						
	Information and Education	Rationing and Allocation	Rules and Regulations	Law Enforcement	Zoning	Facility Development	Site Design
Grand Canyon National Park	1	5	2	4	3	7	6
	1	6	2	7	3	4	5
	3	1	2	4	5	7	6
Zion National Park	3	7	2	1	6	4	5
Yosemite National Park	4	1	5	6	7	3	2
	1	2	3	4	5	7	6
	2	3	5	4	7	6	1
Acadia National Park	1	6	3	2	7	5	4
	1	2	7	5	6	4	3
Olympic National Park	6	1	5	4	7	3	2
	1	3	2	4	7	5	6
	1	7	2	5	6	4	3
Glacier National Park	1	3	4	7	2	5	6
	3	1	4	5	7	2	6
	5	2	6	3	7	4	1
Joshua Tree National Park	1	6	3	4	7	2	5
	2	1	6	7	4	5	3
	7	2	6	5	1	4	3
	3	2	6	4	7	5	1
Average	2.65	2.94	4.18	4.35	5.76	4.41	3.71
Ranking based on average	1	2	4	5	7	6	3

Table D.15- Qualtrics Survey Question 12 Results

Questions 13 through 17 of the online Qualtrics Survey are the short answer portion of the survey, but due to the highly variable lengths of the responses (0 to 3500 words per each response) I have summarized the points made in the responses for each question.

Question 13

Question 13 begins the short answer section of the survey by asking, “What park issues related to park visitors would you consider a major concern in your park?” Due to the varied lengths of questions, I reviewed the responses and highlighted the issues. The issues listed by the survey participants include crowding, traffic congestion, limited parking, limited staffing, and visitor experience. The highest number of participants mentioned crowding and traffic congestion as the major issues for their parks, which in light of the comments made in the rest of the survey, appears to be valid. A few issues were mentioned that appear to be less pervasive and more focused within an individual park, including waste management and wildlife habituation.

Question 14

The fourteenth question asked of the survey participants was, “What are the biggest obstacles to solving your parks’ visitor based issues?” As with question thirteen, due to the extended responses to the question, I reviewed the responses and highlighted the obstacles listed. The primary obstacles listed by the survey participants are outside influences (business and political), insufficient budget, insufficient staffing, limited space in the park, insufficient infrastructure, and a lack of planning. These obstacles are all very important, but the most frequently mentioned obstacles were insufficient budgets and insufficient staffing. One additional set of responses that caught my attention were those that spoke about the resistance to a limited use model. This answer is not surprising in itself but the frequency that it appeared was surprising.

Question 15

The fifteenth question in the survey is another short answer question, “If there were no obstacles, how would you remedy the issues visitors pose to your park?” As with the previous short answer questions, I reviewed the responses and highlighted the suggested remedies listed. The responses to this question are less varied than most of the other questions. Most participants responded

that they would restrict access to their parks and create a reservation system, or they responded that they would install new infrastructure and hire new staff. One or the other (if not both) of these two responses are found in almost all of the participants responses, which was surprising to me.

Question 16

The sixteenth question asked of the survey participants was, “What are other major concerns about visitor impacts within your park that have not been discussed yet?” As with the previous short answer questions, I reviewed the responses and highlighted the concerns to be summarized here. The responses within this section were very different than those seen in the rest of the data, which I believe to be a good thing because it addresses more concerns that parks are having. Some of these concerns include pets being called service dogs to get them into the park, drone flying in the parks, wildlife habituation, costs of mitigation strategies, inappropriate behavior within the parks, and a general, total lack of an environmental ethic. Another big concern that has not been expressly mentioned yet is the way that visitor impacts on resources are not always addressed because of a lack of funding, which to me is a huge problem. Most of the concerns that survey participants mentioned were only mentioned a few times, so there is no way of knowing whether these issues are occurring in just one or two parks, or whether they are can be found in more of the parks and are a larger problem.

Question 17

The seventeenth question in the survey is another short answer question, “How are visitors to the park distributed throughout the weekdays?” As with the previous short answer questions, I reviewed the responses and highlighted the responses. Most responses stated that visitation varies greatly depending on weather, and that holidays and weekends are far busier than weekdays. Many parks made sure to point out that there are no slow seasons for them, while others state that during the summer the park is always full, but during the winter the only time they see visitors is on the weekend. These differing accounts point out the flaw in asking a question like this, because visitation at the park is highly individualized and therefore few parks would respond in the same way.