

University of Montana

ScholarWorks at University of Montana

Graduate Student Theses, Dissertations, &
Professional Papers

Graduate School

2014

AN EMPRIRICAL TEST OF THE EFFECTIVENESS OF AN INDIRECT MANAGEMENT TOOL IN INCREASING OPTIONAL SHUTTLE USE AT GLACIER NATIONAL PARK

Alex Benjamin Weinberg
The University of Montana

Follow this and additional works at: <https://scholarworks.umt.edu/etd>

Let us know how access to this document benefits you.

Recommended Citation

Weinberg, Alex Benjamin, "AN EMPRIRICAL TEST OF THE EFFECTIVENESS OF AN INDIRECT
MANAGEMENT TOOL IN INCREASING OPTIONAL SHUTTLE USE AT GLACIER NATIONAL PARK" (2014).
Graduate Student Theses, Dissertations, & Professional Papers. 4227.
<https://scholarworks.umt.edu/etd/4227>

This Thesis is brought to you for free and open access by the Graduate School at ScholarWorks at University of Montana. It has been accepted for inclusion in Graduate Student Theses, Dissertations, & Professional Papers by an authorized administrator of ScholarWorks at University of Montana. For more information, please contact scholarworks@mso.umt.edu.

AN EMPIRICAL TEST OF THE EFFECTIVENESS OF AN INDIRECT MANAGEMENT TOOL IN
INCREASING OPTIONAL SHUTTLE USE AT GLACIER NATIONAL PARK

By

Alex Benjamin Weinberg

B.A., Western Washington University, Bellingham, Washington, 2008

Thesis

presented in partial fulfillment of the requirements
for the degree of

Master of Science
in Major, Recreation Management

The University of Montana
Missoula, MT

May 2014

Approved by:

Sandy Ross, Dean of The Graduate School
Graduate School

Wayne Freimund, Chair
Society and Conservation

Libby Covelli Metcalf
Society and Conservation

Douglas Dalenberg
Economics

Dusten Hollist
Sociology

© COPYRIGHT

by

Alex Benjamin Weinberg

2014

All Rights Reserved

Abstract Title: An Empirical Test of the Effectiveness of an Indirect Management Tool in Increasing Optional Shuttle Use Among a Target Population at Glacier National Park

Chairperson: Wayne Freimund

Glacier National Park instituted an optional, free shuttle system on the Going-to-the-Sun Road in 2007. It was recently discovered that the shuttle system was having an adverse impact on parking congestion at the Logan Pass parking lot. This was occurring because visitors were able to park at Logan Pass all day while they performed a looped hike from the Highline trailhead to the Loop trailhead. Upon completion of their hike, visitors would take the shuttle back to their vehicles. A variety of data suggests that the shuttle system may be inadvertently adding 40-60 day-long passenger vehicles to the Logan Pass parking area as a result of this phenomenon.

In order to alleviate management issues in protected areas, managers typically employ two types of management techniques: indirect or direct management. Direct management typically calls for placing direct constraints on visitor behavior while indirect management employs a more subtle approach which typically consists of persuasive messaging. Visitors typically prefer indirect management because it preserves a sense of freedom.

This study tested the effectiveness of indirect management in increasing optional shuttle use among St. Mary Campground and Rising Sun Campground occupants. It was surmised that if the technique was shown to be effective at increasing shuttle use among a target population it could be useful at alleviating the problem described above. The present study constructed a persuasive message that was guided by the theory of planned behavior, elaboration likelihood model of persuasion, research pertaining to alternative transportation in National Parks, and research pertaining to the effectiveness of indirect management in recreation settings.

Results suggested that the brochure was ineffective at increasing shuttle use and the researcher concludes by recommending that the park use a direct form of management to alleviate the problem described in this paper. Furthermore, contrary to suggestions provided in prior research, this study suggests that providing messages to increase shuttle use will not be effective at increasing optional shuttle ridership. The researcher suggests that if managers want to increase use on park shuttles they should first examine constraints, incentives and disincentives pertaining to shuttle use in order to understand the barriers concerning shuttle ridership.

Acknowledgements

I would like to take this opportunity to thank the many people who provided their support, guidance and encouragement during my two-year journey through graduate school.

First and foremost I would like to thank Dr. Wayne Freimund. I feel I am truly in his debt for having been given the opportunity to work with him as a research assistant in Glacier. This experience has been invaluable to me and more than I could have hoped for as a graduate student. Furthermore, his easy-going demeanor often helped to ease my nerves during the most stressful portions of my time at the University of Montana. His guidance and encouragement were vital to my success and I can't imagine having another mentor during my time as a graduate student.

Secondly, I would like to thank Douglas Dalenberg for his guidance through this process. His patience, understanding and availability were particularly appreciated. I also enjoyed partnering with him on various aspects of my research assistantship at Glacier and I would be excited to work with him again in the future if the opportunity presented itself.

I would also like to thank my remaining committee members, Libby Covelli Metcalf and Dusten Hollist. You each have challenged me in your own way; from understanding how to analyze, interpret and write about my data, to strengthening my understanding of the human dimensions of conservation. Your efforts in and outside of the classroom have directly contributed to improving the quality of my thesis and have helped me improve upon my critical thinking skills.

I would also like to thank my fellow classmates who I was able to share this journey with; particularly Sarah Markegard and Christina Mills. When things got rough, it was nice to take solace in the fact that I was in great company.

Finally, I would like to thank my parents Christine and Daniel Weinberg. I could not have done this without your incredible support since the beginning of the application process.

Contents

List of Figures	vii
List of Tables	viii
CHAPTER 1: INTRODUCTION	1
Problem Statement.....	3
Research Questions	10
CHAPTER 2: HISTORICAL NARRATIVE OF TRANSPORTATION AND DEVELOPMENT IN GLACIER NATIONAL PARK.....	11
Alternative Transportation in National Parks	14
Transportation in National Parks Summary.....	17
CHAPTER 3: LITERATURE REVIEW	18
Introduction	18
Management Techniques	19
Theoretical Models for Behavior Change & Persuasion	22
The Theory of Reasoned Action/Planned Behavior	22
The Elaboration Likelihood Model of Persuasion	35
Encouraging Alternative Transportation Ridership: Moral vs. Self-Interest Motivations	41
Intervention Medium and Dissemination Methods	47
Message Construction: What Makes a Good Brochure?	54
Literature Review Summary.....	56
CHAPTER 4: METHODOLOGY	59
Hypotheses	59
Variables: Conceptualization, Operationalization, and Data Collection Instruments	60
Independent Variable	60
Study Site	76
Experimental design.....	77
Dissemination Procedure and Personal Contact Script	78
Brochure Manufacturing.....	81
Methodology Limitations.....	81
CHAPTER 5: DESCRIBING THE DATA.....	82
Describing the Sample: Message Recipient Characteristics	83
Group State of Origin	83

Group Type.....	85
Group Size	85
Number of Children in Groups	86
Summary of Group Characteristics	87
Describing the Sample: Brochure Dissemination.....	87
Reason for not taking the brochure.....	87
Brochure Dissemination Statistics	88
How Many Brochures Were Returned to Shuttle Drivers/Campground Attendant?	92
CHAPTER 6: DATA ANALYSIS	94
Logic of Analysis	94
Determining Treatment Effects Among Experimental Groups.....	95
Variable Descriptions	96
Assumptions.....	97
ANOVA Results.....	99
Regression Analysis: Controlling for Natural Variation in Shuttle Use	103
Dependent and Independent Variables.....	104
Control Variables.....	105
Assumptions.....	107
Controlling for External Variation in an Attempt to ‘Tease out’ Treatment Effects	112
Regression Results for the St. Mary Visitor Center Shuttle Stop	113
Regression Results for the Rising Sun Motor Inn Shuttle Stop	119
Results Summary.....	125
CHAPTER 6: CONCLUSION AND DISCUSSION.....	127
Limitations	128
Discussion of Results.....	131
Implications.....	136
Future Studies	140
Literature Cited	143
Appendix	157
Study Schedule.....	157
Brochure (outside)	159
Brochure (inside for St. Mary).....	160

List of Figures

Figure 1: GNP Shuttle Route Map	3
Figure 2: Logan Pass Entrance & Exit average hourly use data, summer 2012 (Aug. 7th-25th)	7
Figure 3: Highline Trail & Loop Trail average hourly use data, summer 2012.....	8
Figure 4: Theory of Planned Behavior Conceptual Model	26
Figure 5: Primary appeals (inside).....	65
Figure 6: Primary appeal (outside).....	66
Figure 7: Moral/Environmental appeal (inside).....	67
Figure 8: Moral/Environmental appeal (outside)	67
Figure 9: Avoid traffic stress appeal (inside).....	68
Figure 10: Avoid traffic stress appeal (outside)	69
Figure 11: Safety appeal (inside).....	70
Figure 12: Control appeal (inside, St. Mary brochure)	71
Figure 13: Control appeal (inside, Rising Sun brochure).....	72
Figure 14: Control appeal (outside)	72
Figure 15: Message contacts' state of origin	84
Figure 16: Number in party.....	86
Figure 17: Message dissemination statistics at the Rising Sun Campground (those who received the brochure)	89
Figure 18: Message dissemination statistics at the Rising Sun Campground (those who did not receive the brochure)	90
Figure 19: Message dissemination statistics at the St. Mary Campground (those who received the brochure)	91
Figure 20: Message dissemination statistics at the St. Mary Campground (those who did not receive the brochure)	91
Figure 21: Brochure return days	94
Figure 22: St. Mary shuttle stop average ridership per experimental group	100
Figure 23: Rising Sun Motor Inn shuttle stop average ridership per experimental group	101
Figure 24: St. Mary daily shuttle ridership/messages disseminated	102
Figure 25: Rising Sun Motor Inn daily shuttle ridership/messages disseminated	103
Figure 26: St. Mary shuttle stop ridership scenarios line graph	118
Figure 27: Comparing St. Mary Shuttle stop experimental groups with and without holding control variables constant	118
Figure 28: Rising Sun Motor Inn shuttle stop line graph of scenario models	124
Figure 29: Comparing Rising Sun Motor Inn stop experimental groups with and without holding control variables constant	125

List of Tables

Table 1: Shuttle ridership attitude composite scores (from Baker, 2008)	62
Table 2: Shuttle ridership perceived behavior control scores (from Baker, 2008).....	62
Table 3: Message contacts' group type	85
Table 4: Reason for not taking the brochure	88
Table 5: Brochure dissemination statistics	92
Table 6: Levenes Test of Equality of Error Variances	98
Table 7: Cook's distance scores for St. Mary and Rising Sun	98
Table 8: Descriptive statistics.....	99
Table 9: ANOVA test for the St. Mary shuttle stop	101
Table 10: ANOVA test for the Rising Sun Motor Inn shuttle stop.....	101
Table 11: Independent variable/dependent variable correlation matrix (St. Mary shuttle stop analysis)	108
Table 12: Independent variable/dependent variable correlation matrix (Rising Sun Motor Inn shuttle stop analysis).....	109
Table 13: Control variable descriptive statistics	111
Table 14: Regression results for the St. Mary shuttle stop.....	113
Table 15: St. Mary shuttle stop ridership model scenarios	117
Table 16: Regression results for the Rising Sun Motor Inn shuttle stop.....	120
Table 17: Rising Sun Motor Inn shuttle stop scenario models	124

CHAPTER 1: INTRODUCTION

Glacier National Park (GNP) was established in 1910 and is situated within the crown of the continent ecosystem. This ecosystem is a portion of the Rocky Mountains that extends from just east of Missoula, Montana to into Canada; running along the border of British Columbia and Alberta. GNP borders Canada to the north, where it meets Waterton Lakes National Park to form the world's first International Peace Park (Tanner et al., 2007). The east-side of the park is bordered by the Blackfeet Indian reservation and the west and south sides are bordered by the Flathead National Forest.

The area is known for its outstanding natural beauty and many accounts from the first white visitors to the area praise the area's scenic beauty. For instance, upon visiting Glacier for the first time, John Muir famously referred to the area as possessing "the best care-killing scenery on the continent" (Sheire, 1987, p. 145). During the infancy of the National Park Service (NPS), many naturalist writers contrasted the American west with the "long-tamed nature" of Europe (Wellman, 1987, p.44). Comparisons of American landscapes to Europe reflect a young nation attempting to distinguish itself from its big brother. This desire is reflected in the Swiss style architecture of every hotel and chalet in Glacier, as many early visitors referred to Glacier as the 'American Alps'.

Park tourism currently contributes prominently to the local economy. According to a spending and economic impact analysis of National Park visitors on local economies conducted in 2010, Glacier receives roughly two million visitors annually who contribute over 100 million dollars to the local economy and create 1,632 jobs, primarily in the Flathead Valley (Stynes, 2011). Approximately three-fourths of Glacier's visitors travel the Going-to-the-Sun Road (GTTSR).

The GTTSR meanders through the Park's high country and crosses the continental divide at Logan Pass. The 52-mile road runs from West Glacier to the town of St. Mary and was officially opened in June of 1933 (Robinson, 1960). An average of about 11,000 visitors travel the GTTSR each day from

July through Labor Day weekend, with Logan Pass being the most frequented destination (Weinberg et al., 2013a; Weinberg et al., 2013b; Dilsaver & Wyckoff, 1999).

The GTTSR is currently undergoing a complete rehabilitation project. Glacier National Park instituted an optional, free shuttle system in 2007 in an attempt to alleviate traffic congestion which was anticipated to occur as a result of the GTTSR reconstruction project. The GTTSR reconstruction project is scheduled to complete in 2014. The shuttle system is split into two services which converge at the Continental Divide at the Logan Pass parking area. One service operates out of the Apgar Transit Center and provides service to Logan Pass with a frequent layover at Avalanche Creek. The second service operates out of the St. Mary Visitor Center and travels to Logan Pass. The service that begins at the Apgar Transit Center is commonly referred to as the 'west-side route' and the service that begins at the St. Mary Visitor Center is commonly referred to as the 'east-side route'. Visitors are able to transfer to either service from the Logan Pass parking area. A map of the shuttle service is provided below (Figure 1). Since the GTTSR was constructed, Logan Pass has been a management challenge due to the high number of visitors who are attracted to the area's accessible beauty. In the summer of 1977, it was reported that 6,000 people visited Logan Pass a day (Dilsaver and Wyckoff, 1999). That number remains similar today although it may be slightly higher as a result of a new shuttle system that is adding use to a system that what was once constrained by parking availability (Weinberg et al., 2013a).

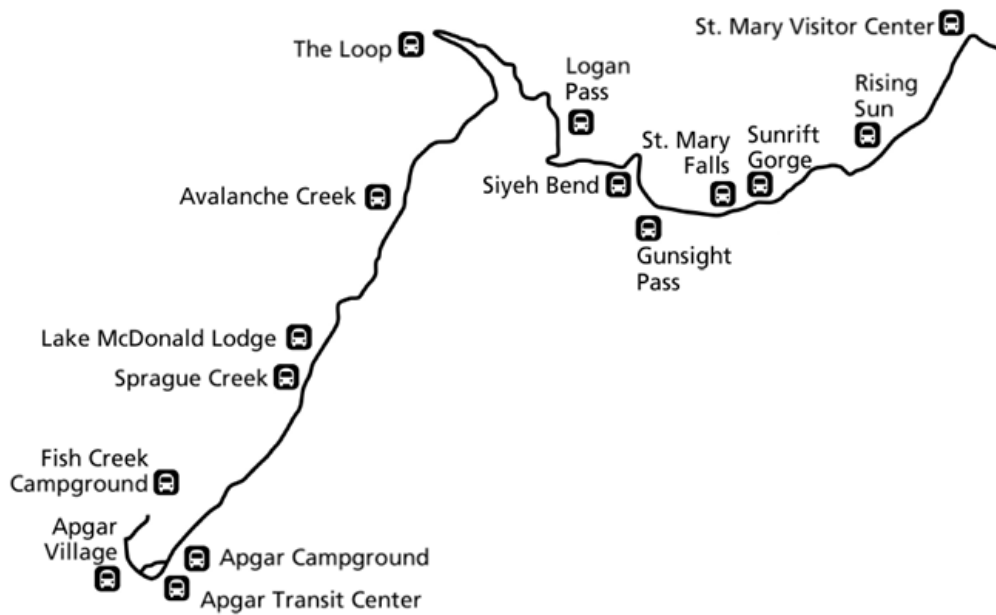


Figure 1: GNP Shuttle Route Map

The shuttle system posed many questions as to the effects it would have on visitor use dynamics within the GTTSR corridor. For instance, it is still unknown how many vehicles are taken off the road due to the availability of the shuttle, although it was reported that car queuing at construction zones was generally lower during periods of shuttle operation (Baker & Freimund, 2007). Also important to understand is how the shuttle system affects and influences trail use, parking area congestion, and crowding. These are important questions because road reconstruction will be completed in 2014 whereupon managers will decide upon the future of the shuttle system.

Problem Statement

Researchers from the University of Montana have been performing extensive visitor use research on the GTTSR corridor since 2005 in order to understand system dynamics associated with the inception of the shuttle system as well as general visitor use dynamics along the corridor. Topics of past

research include: investigation of visitor characteristics, vehicle parking behavior, hike planning behavior, shuttle versus non-shuttle rider characteristics, visitor coping behavior, shuttle information sources, use of roadside pullouts along the GTTSR, and visitors' motivations for riding the shuttle (Freimund et al., 2006a; Baker & Freimund, 2007; Dimond & Freimund, 2009; Bedoya & Freimund, 2012).

Of particular interest and research focus has been how the shuttle has impacted the use of trails where a looped hike is possible due to the fact the shuttle can increase the ability to perform a looped hike. Prior research focused on alternative transportation in National Parks has noted that the addition of an optional shuttle system can affect system trails and parking areas by artificially increasing supply, thus causing unanticipated impacts such as crowding and higher use levels (Pettebone, et al., 2011).

The Highline/Loop trail system was of research interest for the present study. The Highline/Loop trail system begins at Logan Pass and ends 11-miles later at The Loop trailhead. Most visitors begin the hike at Logan Pass and end at The Loop trailhead because it is an easier and primarily downhill trek. The Highline trail typically opens near late July due to snow hazards, so completing the trail system at The Loop trailhead is only possible for a limited portion of the summer. The system garnered research focus in previous studies because it is arguably the most popular day-hike in the park where a loop is possible and because the shuttle stops at the beginning and end of the hike. In order to understand hiker/shuttle use dynamics, a 2012 visitor survey asked Loop hikers if they used the shuttle to facilitate their hike. Of The Loop hikers who responded, 59.2% of them reported having used the shuttle to facilitate their hike (Bedoya & Freimund, 2012). Additionally, 76% of hikers completing their hike at the Loop trail indicated that their decision to perform a hike was based on the availability of the shuttle, further indicating that hikers on The Loop trail rely on the shuttle to facilitate their hike in some fashion (Bedoya & Freimund, 2012).

The 2012 survey also asked visitors leaving The Loop trail where they had left their personal vehicle. Data indicated that 58% of Loop hikers parked their car at Logan Pass (Bedoya & Freimund, 2012). The second most reported location to leave a car was the Loop (18%), followed by the Apgar transit center (12%). This data corresponds closely with the proportion of Loop hikers who used the shuttle to facilitate a point-to-point hike (59.2%). The data also appears to suggest that approximately 58% of visitors finishing their hike at the Loop trailhead used the shuttle to return to their vehicle at Logan Pass.

Parking and shuttle use behaviors associated with The Loop/Highline trail system poses significant implications for parking issues at Logan Pass because mean travel time on the Loop/Highline trail was 316 minutes in 2012 (Bedoya & Freimund, 2012). This data suggests that the presence of the shuttle system is adding parking pressure to the Logan Pass parking area, as approximately 58%-60% of The Loop hikers tend to park for long periods of time at this location as indicated by mean travel time (316 minutes). The data also suggests that the presence of the shuttle is allowing visitors to facilitate a point to point hike for the Highline/Loop trail system where it was once only possible by using two vehicles or hitchhiking.

As the shuttle adds parking pressure to the Logan Pass parking area, it exacerbates an already typically congested parking area. During the summers of 2012 and 2013 researchers noted that managers closed the parking area frequently during times of particularly bad congestion. Logan Pass parking area data that was collected in 2012 revealed that approximately 6,000 people visit Logan Pass a day (Weinberg et al., 2013b). Parking lot monitoring data indicates the parking area fills all 230 parking spaces by about 10 AM and remains full until about 4:30 PM during the months of July and August (Weinberg et al., 2013b). Average wait time to park at Logan Pass typically reached its peak between 12pm and 1pm, with an average wait of 5 minutes (Mills, et al., 2014a). Average time vehicles circled the

parking area and left without finding a parking spot occurred during the same time frame as well; with an average of 7.3 minutes (Mills, et al., 2014a).

The ability to quantify the amount of vehicles added to the Logan Pass parking area by visitors who use the shuttle to facilitate transportation associated with hiking the Loop/Highline trail has been made possible through the most recent research focused on quantifying visitor use on the GTTSR corridor (Bedoya & Freimund, 2012; Weinberg et al., 2013a; Weinberg et al., 2013b, Weinberg et al., 2014). Trail counts were achieved by installing TRAFx infrared trail counter along Glacier National Park trails located within the GTTSR corridor. The trail counters are designed to count warm moving objects that come into the device's field of vision. A trail counter was installed on the Loop trail in 2011, 2012 and 2013 approximately a 30-45 minute hike from the trailhead. The Loop trail averaged 297 hikers during the summers (July-September 4th) of 2011, 2012 and 2013. According to surveys conducted in 2012, 58% of visitors parked their car at Logan Pass, meaning about 174 Loop/Highline hikers used the shuttle to return to their vehicles upon completion of their hike. At 2.5 persons per car, this creates 70 private automobiles parked at Logan Pass all day; at 3 persons per vehicle it would account for 58 vehicles. These group size estimates are consistent with data from previous surveys performed within the GTTSR corridor (Freimund et al., 2006a; Baker & Freimund, 2007; Dimond & Freimund, 2009; Bedoya & Freimund, 2012). A trail counter was installed approximately an hour's walk down the Highline trail during 2011-2013 as well. Trail counts from the Highline trail typically peak at 10 AM, meaning hikers typically begin at 9 AM because the counter was located about an hour down the trail (Figure 3). Therefore, this data suggests that the presence of the shuttle system has unintentionally lowered parking capacity at Logan Pass by about 50-70 vehicles, beginning as early as 9 AM while lasting over 5 hours.

Additionally, an analysis of average hourly vehicle counts entering and exiting Logan Pass from 2012 provides further evidence of this phenomenon. Analysis of graphs generated in TRAFx.net from

August 7th to August 25th reveals a rise in vehicle use at the Logan Pass exit which is not accompanied by a corresponding rise in use at the entrance during the hours of 4 pm and 5 pm (Figure 2). This bump in use corresponds with a peak in trail use at the Loop trail-counter (located about 30 minutes from the Loop trailhead) during roughly the same time frame (Figure 3). This data suggests that shuttle riders are using the shuttle to pick up their vehicles from the parking lot after completing their hike.

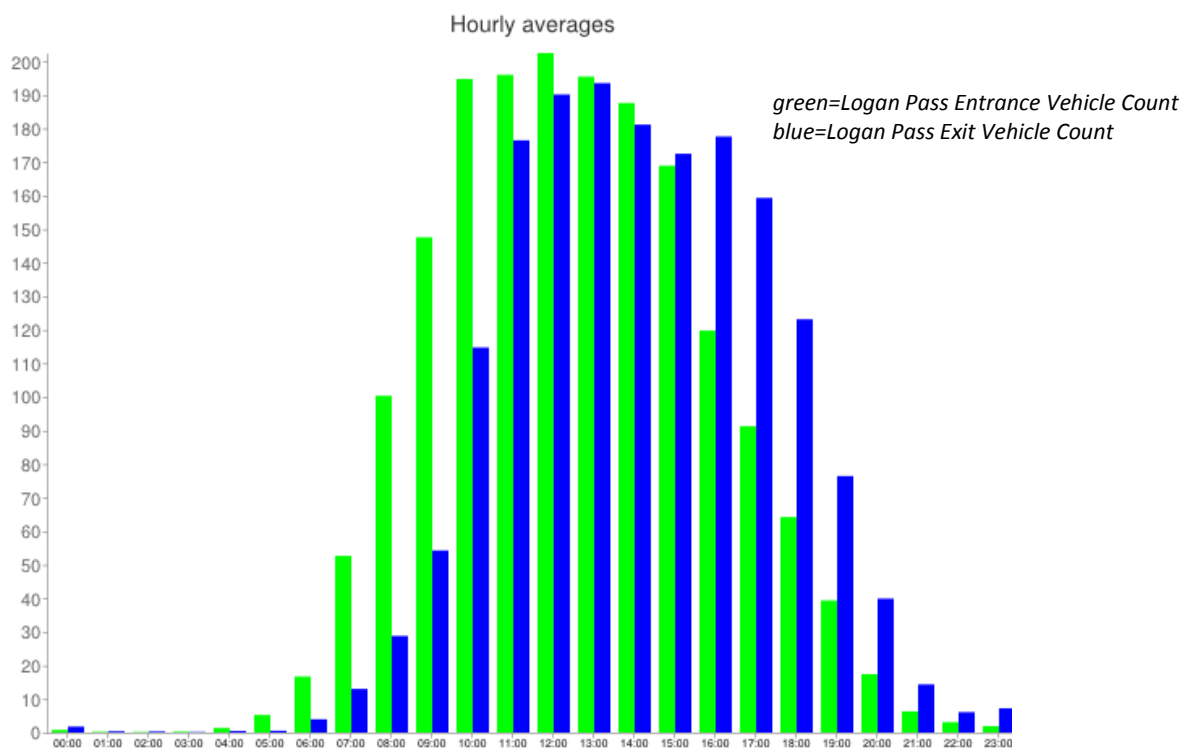


Figure 2: Logan Pass Entrance & Exit average hourly use data, summer 2012 (Aug. 7th-25th)

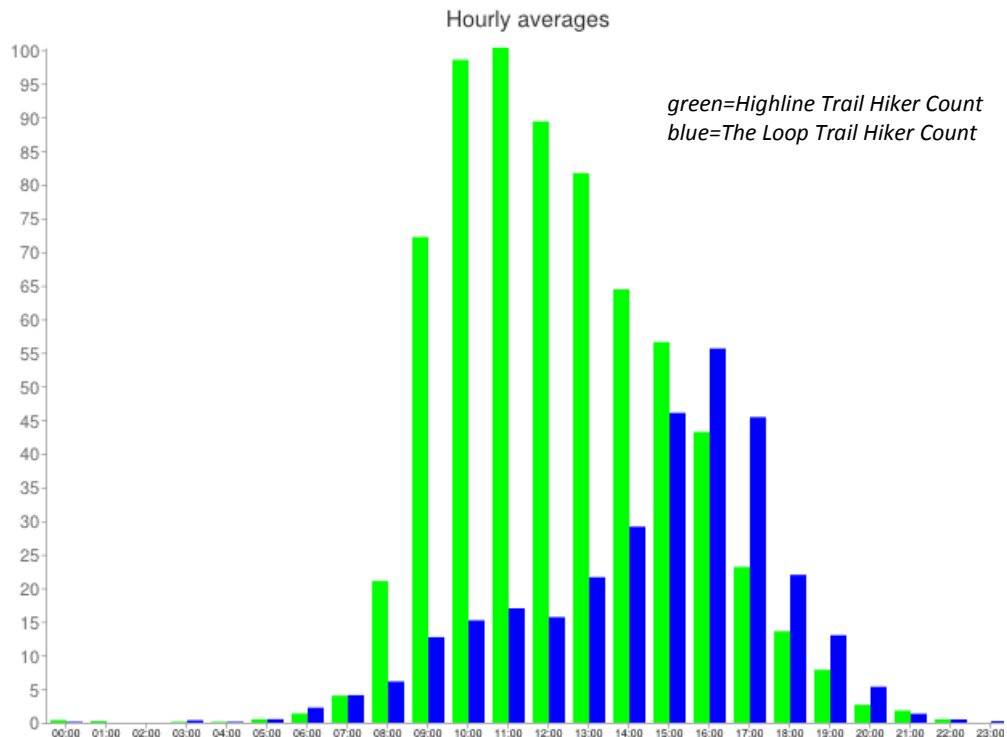


Figure 3: Highline Trail & Loop Trail average hourly use data, summer 2012

Well designed shuttle systems should mitigate effects of increased capacity and it appears that the GNP shuttle service has fallen short in this endeavor. In order to address this issue, managers can utilize two types of management techniques: direct measures or indirect measures. Direct management techniques can be instituted and enforced such as requiring Loop/Highline hikers to ride the shuttle service, or by putting a 3 hour time limit on parking at Logan Pass. Managers can also utilize indirect management techniques and attempt to persuade Loop/Highline hikers to use the shuttle to facilitate all transportation associated with their hike. Past studies have found that visitors typically prefer indirect management over direct management (Krumpe & Brown, 1982; Manning, 2009; Manning, 2011; Needham & Szuster, 2011). Additionally, managers typically favor indirect management because it allows them to serve as guides rather than enforcers as well as allowing their management practices to preserve the critical aspect of freedom within the visitor experience. Therefore, it appeared important to understand whether or not an indirect management technique could be utilized to remedy the

problem presented in this chapter. If it was found effective managers could replicate the technique to decrease instances of visitors using the shuttle to return to their vehicle at Logan Pass at the end of the day. If it was found ineffective, this study would provide managers with evidence that they could present to the public to justify any direct management techniques they found necessary.

The present study attempted to design an indirect management tool that was designed to influence St. Mary Campground occupants and Rising Sun occupants to board the east-side shuttle from the St. Mary Visitor Center and the Rising Sun Campground. The researcher originally desired to influence Highline/Loop trail hikers to use the shuttle to facilitate all transportation associated with their hike. However, various constraints associated with performing such an experiment were uncovered, rendering this study inappropriate for experimental design. One major constraint was that it was going to be costly and difficult to control the ability to target those specific users from the visitor centers, entrance stations and the park service website. Additionally, it was discovered that west-side shuttle demand often exceeded capacity which would make it difficult to detect a difference in ridership as well as potentially cause visitor conflicts.

An analysis of 2012 shuttle use data revealed that east-side shuttles were underutilized during morning operations; as an average of about 100 seats were available each morning during the first five shuttle departures (7:30 am, 8:30 am, 9:30 am, 10:30 am and 11:20 am). The St. Mary and Rising Sun campgrounds both contained sufficiently large populations to fill these seats as well as relatively isolated populations in which to conduct an experiment. They are also the first two locations to board the shuttle on the east-side shuttle route.

Construction of the tool was guided by relevant persuasion research, alternative transportation in National Parks research, indirect management research, and message formatting research. The two dominant theories that guided the creation of the brochure within this study were the Theory of Planning Behavior and the Elaboration Likelihood Model of Persuasion. These theories have been the

most widely used theories of persuasion in recreation management research. Additionally, a recent study has shown how these theories can be utilized in tandem to create an effective persuasive message in a National Park setting (Brown et al., 2010). The management tool was used in an empirical study to test the effectiveness of indirect management in influencing shuttle use behavior. The findings were deemed valuable in understanding whether or not this technique could be used to influence Loop/Highline hikers to use the shuttle system to facilitate all transportation associated with their hike. The findings would also be used to understanding if the mixed persuasion theory design used in the present study could be used to influence shuttle use in National Parks. Additionally, the findings were also deemed useful for future park shuttle researchers, as some have recommended or indicated such an approach could be used to increase optional shuttle use.

It has been noted that optional shuttle systems have the ability to influence visitor use dynamics depending on the manner in which they are utilized. Therefore, the researcher in the present study had the ability to monitor trail, road and parking area dynamics on the GTTSR corridor and did so in order to understand how increased shuttle use (should this occur) impacted system dynamics. Research questions are listed below:

Research Questions

Q1: Can an indirect management tool influence a target population to ride the shuttle at Glacier National Park?

Q2: If the management tool is successful at increasing use, what impacts will increased ridership have on the Going-to-the-Sun Road system (i.e. trail use, parking availability, and vehicle traffic)?

CHAPTER 2: HISTORICAL NARRATIVE OF TRANSPORTATION AND DEVELOPMENT IN GLACIER NATIONAL PARK

For the purpose of the present research it is important to understand transportation in National Parks from a historical perspective prior to delving into literature pertaining to persuasion and indirect management in recreation settings. It is of particular importance to understand the manner in which park infrastructure development has led to a dependence and traditional mode of experience that largely relies on personal automobile use within America's National Parks. Thus, this perceived dependence on automobiles may render any attempt to influence transportation mode choice quite difficult. The following section will summarize early National Park Service management history and highlight how these policies affected Glacier and the Park Service as a whole. This historical narrative will end by discussing the Alternative Transportation Program in National Parks which the Department of Interior has established largely in part to mitigate effects of their past management focus on infrastructure development and access.

Early park management strategies focused on encouraging tourism and access. The failure to protect the Hetch Hetchy Valley in Yosemite from being dammed led many conservationists to realize that in order to protect such areas there must be an economically justifiable and humanly satisfying form of land-use that overrides arguments for resource development (Louter, 2006). Thus, access and infrastructure became a major focus of the conservationist movement as well as early Park Service management (Dilsaver & Wyckoff, 1999). In addition to increasing access, early treatment of nature suggested the park was attempting to make Park landscapes as appealing as possible. These were vital goals for the young agency because the U.S. Forest Service began to launch its own recreation program

in an effort that some conservationists viewed as an attempt to make the NPS appear to be a redundant agency (Sellars, 1997).

Fueled by the goal of protecting the areas it was established to preserve, the NPS's primary goal as an agency in its infancy was to get as many visitors to come to the parks as possible. However, the NPS had minimal funds to accommodate visitors once they could reach these areas. Many park units had to rely on private funding. For example, Glacier National Park officials supported private investment towards park accommodation; most notably from the Great Northern Railroad. The Great Northern aggressively developed transportation and tourist facilities within GNP. Every chalet constructed on the east-side of the park was constructed by the Great Northern, including: East Glacier Lodge, St. Mary Lodge, Many Glacier Lodge, and the two existing backcountry chalets known as the Sperry and Granite Park Chalets (Dilsaver & Wyckoff, 1999). All of the hotels were constructed using Swiss architecture in order to create a European-style vacation atmosphere.

During the NPS's early years, park managers sought to manipulate the environments in various ways in order to create a setting which was appealing to visitors. For instance, the Park Service as a whole implemented a predator control policy in the early 1920's. As a Park unit, GNP would be managed to maximize popular ungulates, as well as bears because visitors were attracted to these animals. Stephen Mather, the original Park Service director, connected the reduction of predators to visitor enjoyment by classifying ungulates as "animals that add so much to the pleasure of park visitors" (Sellars, 1997, p.72). This management strategy led to the extirpation of wolves, and the near extirpation of coyotes and mountain lions.

Another environmental modification, which is readily viewable in the present day, includes that of fish stocking. Park managers wanted to make the area popular among fishermen, introducing many non-native fish species which currently threaten many native species in Glacier's lakes (Keller & Turek, 1998).

Park managers and hotel operators also sought to present members of the Blackfeet Nation to the public as the "noble savage", in order to enhance visitor experience and create an authentic atmosphere (Keller & Turek, 1998). During the early years of hotel operation, Great Northern hotels would employ many Blackfeet Indians and promote them as romantic savages living within a pristine wilderness, which was ironic considering the creation of GNP outlawed almost all traditional uses of the area by the Blackfeet Nation (Ashby, 1985; Keller & Turek, 1998; Craig, et al., 2012).

The aforementioned early management practices which took place in GNP fostered the creation of a tourist product. The next logical step in the management process was to provide unlimited access to the product. With the automobile boom, NPS director Stephen Mather and his assistant Horace Albright aggressively encouraged the development of automobile infrastructure within National Parks (Forestra, 1984). Stephen Mather vocally supported this development stating, "automobiles belong in parks" (Dilsaver & Wyckoff, 1999, p. 78). This declaration was reflected in the subsequent rapid development of some of the most iconic roads built in the National Parks system during the 1920's and 1930's including: Trail Ridge Road in Rocky Mountain National Park, the Zion-Mount Carmel Highway in Zion National Park, Crater Rim Drive in Crater Lake National Park, and arguably the most iconic National Park Service road; the GTTSR in Glacier National Park. The GTTSR opened in 1933 and Logan Pass became the main attraction; with demand becoming so high the park would eventually construct a parking area and visitor center.

The most enduring and visible legacy left behind by early management practices within the National Parks system has been infrastructure oriented towards the personal automobile. It is clear that the automobile has influenced the design of park facilities and infrastructure (i.e. viewpoints, rest stops, parking lots, etc), thus playing a central role in driving the idea that automobiles belong in parks. Such transportation systems have largely defined the manner in which millions of NPS visitors experience parks. For instance, *driving for pleasure* has become a recreational activity in and of itself (Louter, 2006;

Manning, 2011) and a study conducted in 2007 revealed that 79% of GTTSR visitors participated in auto-touring as an activity (Baker, 2008). Traveling the GTTSR in the summer is arguably the most well-known examples of driving for pleasure in the National Parks system. During the summer of 2014, an average of 2,162 vehicles entered the GTTSR from the west side of the park and an average of 1,687 vehicles entered the road from the east side of the park (Weinberg et al., 2014). This is an alarmingly high amount of vehicle traffic for a 52-mile stretch of road that travels through sensitive alpine areas and past lookouts where receding glaciers can be viewed from the comfort of one's automobile. A significant irony exists that the NPS, an agency whose purpose it is to protect such natural settings for the enjoyment of future generations, has developed infrastructure that encourages a mode of experience which directly leads to its degradation.

Alternative Transportation in National Parks

The management of park resources during early NPS history set many managerial precedents whose goals aligned closely with one half of the agency's dual mandate: "provide for the enjoyment" (16 U.S.C. § 1). Eventually the forces of preservation would tug back during the era of Mission 66 and the enactment of the Wilderness Act, as many preservationists had become unhappy with park managers spending of park funds on development rather than resource protection and preservation (Miles, 2009). Currently the NPS takes a more balanced managerial approach by spending more agency funds in research that helps managers protect and understand park resources while attempting to maximize visitor experience (Sellars, 1997). Aggressive infrastructure addition is much less common within Park units. However, the legacy of road building and management oriented towards access remains.

It can be argued that the early NPS goal of getting visitors to the parks has succeeded to such an extent that it is now undermining the ability of many park units to preserve their resources. One of the

most commonly cited managerial issues in protected areas management literature is that of high levels of visitor use which often renders existing infrastructure over capacity (Dilsaver & Wyckoff, 1999; Manning, 2011). Due to the automobile-oriented design of many popular National Parks, high visitor use often manifests itself in the form of social and resource issues related automobile use. These issues include crowding on trails, roads and parking areas, wildlife collisions, undesignated parking issues; as well as air quality and noise pollution concerns.

In response to these issues, a series of top-down legislative actions initiated a push for the incorporation of alternative transportation planning in National Parks. The Department of Interior issued a Memorandum of Understanding between the Secretary of Interior and the Secretary of Transportation in 1997 that called for the improvement and establishment of transportation planning in the National Park Service. Findings presented in the memorandum suggested that many National Park units were experiencing high visitation levels which were causing traffic congestion and high demands for parking which detracts from visitor experience (DOT, 1997). The report also suggested that parking areas in National Parks commonly experience much more demand than can be supplied and some units go as far as closing their gates during particularly high periods of visitation because existing transportation systems are well beyond capacity. Findings from this report closely echo existing conditions at Logan Pass.

Additional top-down legislative pressure arrived in 1998 from the Transportation Equity Act for the twenty-first century (TEA-21). Part of the Act required the secretary of transportation, in coordination with the secretary of the interior to begin an extensive study of alternative transportation needs in National Parks and other federal recreation lands. The goal of the study was to understand transportation needs of every park unit and various BLM and USFWS sites in order to define opportunities in which alternative transportation could relieve some of the impacts associated with excessive automobile use. The study identified that 118 of 169 NPS sites were in need of alternative

transportation services (Cambridge Systematics, Inc & BRW Group, Inc., 2001). This study catalyzed the establishment of the Alternative Transportation Program (ATP) in the NPS which works in conjunction with the Federal Lands Transportation Program. In one of the first ATP reports published by the NPS, former Park Service director Fran Mainella was quoted as saying:

"my goal is to maintain our existing infrastructure and reduce our backlog of road and bridge needs in an environmentally sensitive manner. We must also develop, when appropriate, sustainable alternative transportation systems as a means of reducing congestion in our park units." (NPS, 2003)

This quote provides contrast to earlier discussed management goals of development and access. Where early park management focused on building infrastructure, it is clear that permanent infrastructure is no longer acceptable and the ATP is an attempt at transforming the manner in which visitors travel through and experience National Parks. Objectives of the ATP in National Parks include: improving visitor experience by reducing congestion on roads and parking areas, protecting natural and cultural resources, promotion of economic development, creation of partnerships, enhancement of visitor safety and security and enabling new services (NPS, 2013b). Types of alternative transportation include bicycles, carriages, ferries, trams, boats, and shuttle busses. The Park Service currently has 110 alternative transportation systems in 81 parks; 42 of the systems are bus systems (NPS, 2013a). For the purposes of the present study, this paper will primarily discuss shuttle busses.

There are two common types of shuttle services in National Parks: mandatory services, and optional services. Notable mandatory systems include Zion National Park and Denali National Park. Both of these systems require visitors to ride a bus in order to enter specific areas of the park. Denali National Park requires visitors to pay a fee to ride mandatory alternative transportation after the initial first 12

miles of Park Road (Miller & Wright, 1999). Zion National Park requires all summer season visitors to ride the free park shuttle system if they plan to travel into Zion Canyon (NPS, 2013b).

Other Parks have established optional and free transportation systems such as Acadia National Park and Yosemite National Park. The success of such systems depends on visitors voluntarily leaving their vehicles behind in favor of public transportation. The historical narrative on transportation in National Parks presented in the previous section revealed that ATS may require National Park visitors to alter the way National Parks are typically experienced. Thus, if a system is optional, visitors may be more hesitant to voluntarily adopt a change in transportation mode choice. However, it has been found that acceptance of a mandatory shuttle in Zion National Park has increased over time (Mace, et al., 2013). Additionally, studies in Sequoia Kings National Park and Golden Gate National Monument suggest that prior experience with park shuttles increases the likelihood of ridership during future visits (Dilworth & Shafer, 2004). A qualitative study performed in Yosemite that focused on uncovering transportation experiences revealed that visitors with greater experience in National Parks with ATS were more likely to utilize alternative transportation in Yosemite (Youngs, et al., 2008). These studies provide evidence that ATS can become an acceptable form of transportation in some Park units as such systems become the norm.

Transportation in National Parks Summary

The historical narrative presented in this section reveals that alternative transportation in National Parks is a response to automobile related problems that have become prevalent as a result of past National Park management and development. While the inclusion of ATS is not a traditional form of park development, it is indeed a new form of transportation infrastructure; and when executed incorrectly has been found to exacerbate the problems such systems are intended to resolve. For instance, optional shuttles have been found to increase capacity to access areas where parking lot size

once constrained access (Mills, et al., 2014a). However, it has been revealed that many benefits can be derived by shifting visitors from personal vehicles to a shuttle service which include: the lowering of CO₂ emissions, decreased road and parking congestion, protecting wildlife, enhancing the economy of gateway communities, and reducing noise pollution (Lawson, et al., 2011; Turnbull, 2003). Thus, careful planning and monitoring before and after the implementation of an ATS is important in order to understand the effects such systems may create.

In summary, one can frame ATS in National Parks as yet another infrastructure enhancement enacted by an agency long known for similar forms of development. Conversely, one can frame it as a way for the agency to separate itself from the 'windshield wilderness' experience long associated with the agency, as well as a method used to mitigate or eliminate automobile related resource and visitor experience impacts (Louter, 2006). However, no matter how one frames ATS in National Parks, success of such systems ultimately depends on informed and proactive management. For the purpose of the present study, it appears pertinent that managers attempt to remedy parking issues that are occurring at Logan Pass as a result of the optional shuttle service. As the following literature review will display, management of this issue will preferably be implemented in a manner that imposes minimal impact on the visitor experience, while still functioning to protect the resource.

CHAPTER 3: LITERATURE REVIEW

Introduction

The nature of presenting persuasive information to a large and diverse audience is inherently complex. What is the best medium to present information? What types of messages are most effective? How much impact can be abated by simply providing information? This paper will focus on reviewing the

effectiveness of various types of indirect management practices related to information dissemination as well as the theory behind the approaches. The review will begin with an introduction to indirect management techniques, and will then shift to an overview of the two main theoretical models utilized in recreation management research in influencing visitor behavior: the elaboration likelihood model of persuasion, and the theory of planned behavior. The theory section will be followed by a review of literature pertaining to studies that are designed to influence or understand behavior related to encouraging environmentally responsible behaviors with a primary focus on transportation mode choice. That section will be followed by literature pertaining to effective medium and dissemination techniques for influencing behavior in a National park setting. The final section of the literature review will explore formatting and design concepts for creating an effective brochure.

Management Techniques

Management techniques are employed in a National Park setting in order to meet the National Park Service's mission stated in the agency's Organic Act "to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such a manner and by such means as will leave them unimpaired for the enjoyment of future generations" (National Park Service Act, 1916). Different management practices vary in effectiveness and acceptability based on their context and are commonly grouped into two broad categories: direct and indirect management (Manning, 2009). Direct management practices involve, as the name implies, directly enforcing and regulating visitor behavior (Krumpe & Brown, 1982; Manning, 2003; Manning, 2009; Needham & Szuster, 2011). Direct management strategies directly act on user behavior by placing constraints on freedom of choice. In contrast, indirect practices are more subtle and aim at persuading visitors to alter their behavior or intentions in favor of a more sustainable action (Krumpe & Brown, 1982; Manning, 2009; Manning, 2011; Needham & Szuster, 2011).

In general, indirect management is preferred by visitors because it preserves a sense of freedom and spontaneity for users (Krumpe & Brown, 1982). For instance, visitors surveyed at Sequoia Kings National Park and Golden Gate National Monument indicated 73% of respondents supported an optional park shuttle while only 37% of visitors supported a mandatory park shuttle. Additionally, perceived freedom has been cited as an important experiential indicator for a successful transportation system within National Parks (Mace, et al., 2013; Taff et al., 2013). Additionally, Lucas (1983) examined the role of regulation in a recreation setting and determined that managers should regulate in the least intrusive means required to solve a problem. However, recent studies have revealed that users are willing to make tradeoffs for direct management actions if certain situational factors are present. For instance, a study performed by Needham and Szuster (2011) found that visitors at various beaches in Oahu were more likely to support direct management for issues of crowding or reef damage than other management issues. However, indirect management techniques were more acceptable for all situational factors.

A study conducted at Acadia National Park further explored visitor acceptability of various management options between two distinct sites (Cahill, et al., 2008). One recreation site was a heavily used site with high levels of human impact while another was a low use site with low levels of human impact. The study found that visitors at the less used site were more acceptable of management which restricted use in order to protect the resource from human impact. In contrast, visitors to the heavily used area were less likely to support regulations that restricted use and were more supportive of hardening the resource. However, when asked outright, visitors to both sites preferred little or no restrictions on public access (Cahill, et al., 2008). This study displays that acceptance of direct management depends on various factors such as characteristics of the site or preferences of visitors.

A study which was conducted in the Northern Forest in Vermont, Maine, and New York on three mountain peaks explored tradeoffs between management actions based on indicators and standards of

quality (Riper, et al., 2011). Results suggested that visitors preferred low resource impact, low levels of visitor use and low management presence. However, when visitors were presented with tradeoffs they were more likely to accept more intense management to protect natural resources.

In summary it appears that visitors prefer indirect management. However various situational factors can influence acceptability of direct management. Situational factors such as level of use, character of site, and resource damage have been shown to influence visitor acceptability of direct management (Cahill et al., 2008; Riper, et al., 2011; Needham & Szuster, 2011). However, it remains clear visitors will support the use of indirect management over that of direct management if the indirect technique has the ability to remedy the issue in a satisfactory way.

Information dissemination is a commonly utilized indirect management technique (Schomaker, 1975; Lime & Lucas, 1977; Lucas, 1981; Roggenbuck & Berrier, 1982; Brown et al, 1992). The approach consists of providing an information source, which acts as a management tool with the aim of persuading visitors to alter their behavior. It appeals to visitors as well as managers because the information approach enables the manager to act as a guide or educator, rather than a law enforcement officer (Lucas, 1981). The approach has been used with mixed success and that is partly because certain behaviors are difficult to influence. For instance transportation mode choice has proven to be a difficult behavior to influence in an urban setting (Corbett, 2005; Bamberg et al., 2003). However, Daigle and Zimmerman (2004) displayed that providing information regarding parking lot saturation and road congestion can influence visitors to ride an optional shuttle at Acadia National Park.

The information dissemination approach also fails often because the message does not possess adequate persuasive power. The present study incorporated the best theory and prior research into the development of a persuasive brochure in order to yield a management tool thought to possess a high level of persuasive power. The next two sections of this literature review will review the Theory of Planning Behavior and the Elaboration Likelihood Model of Persuasion in order to reveal how these

models of human behavior guided the construction of the persuasive argument presented to the sample within the present study.

Theoretical Models for Behavior Change & Persuasion

Before exploring the effectiveness of information in influencing visitor behavior, it is important to understand the theories past studies have used to guide their research in such endeavors. The two theories presented in this section are not the only theories used, but they are the most prominent within recreation and leisure research. The following sections on the theory of planned behavior and the elaboration likelihood model of persuasion will review studies related to the respective cognitive models which guide in general understanding of the theories, as well as how both models informed the creation of the intervention within the present study. The review will begin with the theory of planned behavior/theory of reasoned action.

The Theory of Reasoned Action/Planned Behavior

The theory of reasoned action (TRA) is a conceptual model which was commonly used to predict and explain why humans participate in social behaviors (Ajzen & Fishbein, 1980; Bamberg et al., 2003; Heath & Gifford, 2002). The theory posits that human behavior is guided by relationships between beliefs, attitudes, and intentions to perform a behavior (Ajzen & Fishbein, 1980). The TRA was expanded upon to include perceived behavioral control within the behavior decision process and was renamed the theory of planned behavior. The present literature review will briefly describe the TRA model before reviewing literature pertaining to the expanded model.

The TRA theorizes that beliefs regarding a specific behavior foster the formation of attitudes and subjective norms regarding the behavior; which in turn lead to behavioral intent. The TRA contains two

specific types of beliefs. The first belief concerns an individual's belief as to the likely outcome or evaluation in regards to performing a specific behavior (Ajzen & Fishbein, 1980). For instance, an individual may be weighing whether or not to travel a designated pathway of a popular trail. The subject may believe that leaving the trail may allow the individual to achieve better views, or get closer to wildlife which would make the subject inclined to leave the trail.

The second belief pertains to how a subject believes other individuals would perceive the individual if they performed a specific behavior. This belief is referred to as the subject's normative beliefs (Ajzen & Fishbein, 1980, Ajzen, 1991). This belief typically is associated with individuals whose opinions matter to the subject. For instance, the subject who wishes to step off the established path may perceive social pressure from the rest of the subject's party to stay on the trail rather than trampling vegetation. Factoring this normative belief into the behavior formation process may render the subject less likely to leave the trail due to social pressures. In this case, negative beliefs concerning what others would think of the individual would play a dominant role in affecting attitudes towards the behavior.

The TRA theorizes that beliefs are typically formed based on past experience in performing the same or similar types of behavior (Ajzen & Fishbein, 1980, Ajzen, 1991). For instance, an individual may believe that riding alternative transportation in National Parks will be inefficient and confusing based on past experience with riding public transit systems in a city. Therefore, the subject would likely possess negative beliefs concerning public transportation use in National Parks.

The TRA posits that once beliefs are established, positive or negative attitudes are formed pertaining to the behavior of interest (Ajzen & Fishbein, 1980, Ajzen, 1991). In other words, the more a subject believes performing a target behavior will lead to positive consequences, the more favorable an attitude will become. Beliefs and attitudes are distinguished in that beliefs describe the object, whereas an attitude describes a person's evaluation of the object (i.e. positive or negative). The term 'attitude' is

defined in many ways within the field of social psychology. Vaske and Donnelly (1999, p. 527) define an attitude as: "representing an individual's consistent tendency to respond favorably or unfavorably toward the object in question". Lutz (1990, p. 318) defines an attitude as "a predisposition to respond overtly and that this predisposition leads to actual overt behavior". Fishbein and Manfredo (1992, p. 34) define an attitude as an "individual's positive or negative feelings about performing the behavior in question". Despite varying definitions within literature, there is a general consensus that an attitude possesses three common components: a subject-object relationship where the subject is evaluating the object, the evaluations are often based on experience, and attitudes can also be applied to situations or behaviors that were not necessarily present during the original attitude formation (such as applying attitudes a subject holds towards public transportation in cities to using alternative transportation in National Parks)(Vaske & Donnelly, 1999; Eagley & Chaiken, 1993; Sherif & Cantril, 1945). These commonly cited attitudinal components reflect well the definition used in the TRA and TPB models of behavior formulation.

Similar to behavioral beliefs leading to positive or negative attitudes towards a behavior, normative beliefs lead to positive or negative subjective norms associated with a target behavior (Ajzen & Fishbein, 1980, Ajzen, 1991). For example, if National Park visitors believe that park managers want them to take the park shuttle; they may establish positive subjective norms towards the behavior which may influence them to ride the shuttle. The TRA posits that knowledge of a subject's subjective norms and attitudes associated with a particular behavior will increase the ability to predict behavior intentions.

The TRA supports the idea that if an individual has a positive attitude toward a behavior and their personal acquaintances support them in performing the behavior, they are likely to perform the behavior. However, one of the assumptions for this model was that a subject has complete volitional control to perform the behavior (Ajzen, 1991). This ended up being a major criticism of the theory and

an expanded model known as the theory of planned behavior (TPB) was developed (Ajzen, 1991). Thus, control beliefs and perceived behavioral control were added to the conceptual model in order to account for situations where the subject does not possess volitional control to perform the activity in question.

Perceived behavioral control refers to an individual's perceived ability to perform a behavior. This construct is formed from past experiences and expected outcomes (Fishbein & Ajzen, 2010; Ajzen, 1991). This construct is often thought to largely mediate actual behavior. For instance, a subject may have favorable attitudes and subjective norm beliefs regarding a behavior, but if the ability to perform the behavior is not within perceived control the individual will more than likely not perform the behavior. For example, a study undertaken by Vining and Ebreo (1990) explored why people chose to recycle or not recycle. The researchers discovered that most people did not differ in their attitudes and motives related to recycling; indeed most individuals had positive attitudes towards recycling (Vining & Ebreo 1990). However, the main element in subjects' cognition that distinguished recyclers from non-recyclers was perception of their ability to perform the activity. Non-recyclers perceived recycling as inconvenient and costly and thus chose not to participate in the behavior (Vining & Ebreo 1990). Therefore, perceived control plays a key role in whether or not an individual participates in a behavior related to conservation even when they view the action favorable. Figure 4 displays the complete model below:

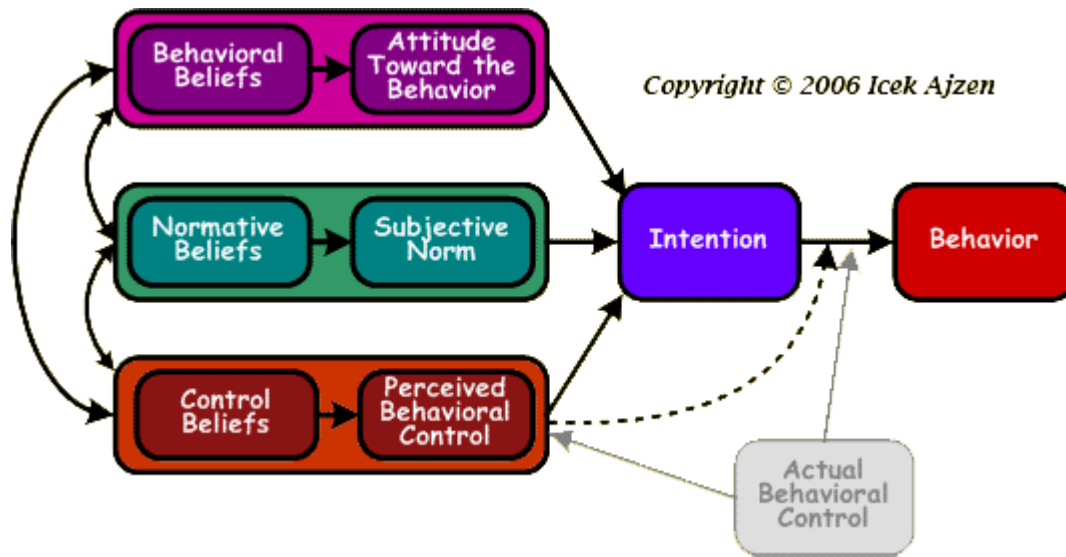


Figure 4: Theory of Planned Behavior Conceptual Model

The TPB posits that knowledge of the most common attitudinal, normative and control beliefs regarding a specific behavior within a given population can help researchers account for a significant amount of variation within behavior intention (Ajzen, 1991). In turn, behavioral intention has been found to be a reliable predictor of actual behavior (Ajzen & Fishbein, 1980; Ajzen and Driver, 1991; Fishbein & Manfredo, 1992, Ajzen, 1991, Baker, 2008). The model has been used within a variety of natural resource and leisure related studies to help researchers understand behavior. For instance, the constructs of the TPB were tested in predicting leisure behavior in college students (Ajzen and Driver, 1991). Results from the study revealed that attitudes, subjective norms and perceived behavioral control cognitions predicted intentions as well as behavior.

Another study used the TPB to test whether behavior intentions with regard to imposed restrictions were being followed by visitors at a Nature Reserve in Switzerland (Seeland et al., 2002). A survey designed to measure strength of attitudes, norms, control, and intentions to adhere to management restrictions was conducted at the study site. Results indicated that the TPB model accounted for 88% of variance within behavior intention prediction.

Expanding the TPB Model

Many studies have also sought to predict intentions to perform a behavior by expanding the TPB to include additional constructs which researchers have hypothesized add predictive value to the model (Shrestha et al., 2012; Baker, 2008; Heath & Gifford, 2002; Hrubes, et al., 2001; Vaske & Donnelly, 1999). These studies have generally encountered mixed results. It is important to note that the TPB has largely withstood past criticisms and despite these studies, no additional constructs have been added to the model. However, the primary takeaway from these studies is that human behavior is complex and obviously incorporates more cognitions than the three components of the TPB. Behavior decisions are also highly dependent on context as these next studies will display.

A study performed in the state of Vermont surveyed recreationists and hunters in order to predict and explain hunting behavior (Hrubes, et al., 2001). The standard TPB constructs were surveyed in order to elicit behavioral beliefs, attitudes, norms, perceived behavior control beliefs related to hunting. In addition to the aforementioned constructs, the study also included value orientations in an attempt to add predictive ability to the model and to understand how wildlife values affect decisions to hunt. The authors defined value orientations as being "composed of patterns of beliefs relative to a particular topic" (Hrubes et al., 2001, p. 166). The authors hypothesized that values act as background factors that influence behavior by guiding beliefs and attitudes with respect to a given behavior. Findings from the study revealed that value orientations only added 2% of unique variation accounted for in the model. In contrast, components of the TPB provided stronger predictive value within the model and accounted for 93% of variation in hunting behaviors (Hrubes, et al., 2001). This study was significant because it displayed the strength of the components of the TPB in predicting hunting behavior. The study also provided some evidence in support of a value-attitude-behavior hierarchy of cognition.

Another study displayed the predictive strength of the TPB when exploring the effects of value and value orientations on voting behavior intentions in the context of wildland preservation (Vaske & Donnelly, 1999). The study defined values as, "an enduring belief that a specific mode of conduct is personally or socially preferable to an opposite or converse mode of conduct or end state of existence" (Vaske & Donnelly, 1999, p. 524). Values were posited to be few in number and difficult to change. Results from the study suggested that the path between value orientation and attitude was significant and the path between attitude and behavior intention also significant. It was also found that attitudes fully mediated the effect of values (Vaske & Donnelly, 1999). Therefore the results also supported the notion that the TPB does not require values in order to accurately predict intentions and behavior; however incorporating values into the model were deemed important in understanding why people hold specific attitudes.

A study explored the role of constraints on intentions within the TPB model on hunting behavior in Oregon (Shrestha et al., 2012). Constraints were defined as, "the factors that are assumed by researchers and perceived by individuals to inhibit or prohibit participation and enjoyment in leisure" (Jackson, 2000, p. 62 in Shrestha et al., 2012). Constraints were surmised to include both physical and social constraints. The study explored the mediating role that the TPB possessed on four constraints which were: site management, health and partner, confidence and skill, and time, distance and money. Findings from the study revealed that perceived behavioral control fully accounted for two of the constraints, and partially accounted for the other two constraints. This study revealed new dimensions within the hierarchy of the control component of the TPB (at least in the context of hunting behavior) and further displayed that the behavior formation process is complex and difficult to fully account for within any single model (Shrestha et al., 2012). However, it is noted that the TPB did explain 78% of variance within the model, displaying once again that the model possesses high predictive ability.

Another study surveyed hospital workers in order to assess the predictive ability of the TPB as well as examine the distinction between self-efficacy and perceived behavioral control (Armitage & Conner, 1999). This was done in an attempt to further clarify and possibly expand on the TPB model. Self-efficacy was defined as one's ability and confidence in performing the behavior (Armitage & Conner, 1999). Results suggested that the TPB was reliable predictor of food choice; accounting for 46% and 48% of variation during two trials (Armitage & Conner, 1999). However, the study did find that self-efficacy was a better predictor of food choice than control. This study displayed that within the context of food choice, perceived behavioral control should be expanded to include self-efficacy in order to provide increased predictive power. The study also explored causal links between the constructs of the TPB but limited evidence was uncovered for this link.

The TPB model of human behavior describes a rational decision making process which does not involve emotions, morals or values, and this is a common criticism of the model due to the fact that humans are emotional beings. Various studies have explored the manner in which emotions impact behavioral decision making using an expanded TPB framework. For instance, Wang (2011) explored the role that anticipated negative emotions play in the formation of physical activity intentions and behaviors. Anticipated emotions were distinguished from attitudes because anticipated emotions focus on feelings about the consequences about the behavior while attitudes focus on what respondents think about the behavior (Wang, 2011). It was also surmised that because physical activity is emotionally charged type of behavior because it is directly tied to physical well-being. Results revealed that anticipated negative emotions added significant predictive capability beyond the components of the TPB.

Mohiyeddini et al. (2009) discovered similar results; as their study revealed that emotional appraisal concerning sports participation accounted for an additional 17% of variance beyond the TPB in regards to behavior prediction. Carrus and others (2008) also discovered that anticipated emotions

played a role in developing pro-environmental behavior intentions such as public transportation use and recycling. These results are significant when discussing TPB in the context of a recreation setting. The recreation experience has long been theorized to be a highly emotional experience--specifically in the case of place attachment. Place attachment concerns the emotional bond between recreationists and the places they visit (Manning, 2011; McCool & Martin, 1994; Kyle, et al. 2004). The behavioral approach to recreation states that visitors, "engage in a preferred activity such as hiking; in a preferred setting, such as a remote area; to realize desired experiences" (Driver et al., 1987, p. 203). In this context it would appear that the TPB may be improved by incorporating emotions into the model when predicting recreation behavior.

Previously discussed studies within this section reveal that the TPB typically possesses high predictive ability when exploring behavior and behavior intentions. Research has shown that the model can account for a large amount of variation in a variety of behavior intentions (Armitage & Conner, 1999; Shrestha et al., 2012; Hrubes, et al., 2001; Seeland et al., 2002). It also displays that the utility of the TPB changes based on setting and behavior of interest. For instance, values have been found to aid in explaining decisions to hunt and food choice can be better predicted when incorporating self-efficacy into the model (Armitage & Conner, 1999; Vaske & Donnelly, 1999; Hrubes, et al., 2001). Furthermore, incorporating emotions into the model has been found to increase variation explained in physical activity participation and conservation behaviors such as recycling and public transportation use (Wang, 2011; Mohiyeddini, 2009; Carrus, et al., 2008).

A review of prior research has revealed that the TPB is far from a perfect model, and new constructs can always be added to increase predictive capability. Despite its shortcomings in fully accounting for behavior decision making, it remains a highly reliable behavior predictive tool and is the most commonly used model in predicting social behavior.

Predicting Transportation Mode Choice Using the TPB

The present literature review has thus far reviewed TPB studies that predict behaviors such as: adherence to recreation regulations, natural resource-related voting intentions, leisure choice, hunting, physical activity, food choice, and conservation behaviors. The aim of the present study was to influence transportation mode choice in Glacier National Park; however, limited studies have used the TPB to predict transportation mode choice. However, there are a few examples from both urban and recreation settings that informed the creation of the intervention in the present study which will be reviewed next.

Heath and Gifford (2002) performed a study at the University of Victoria in British Columbia which was designed to predict and explain transportation mode choice using the TPB. The researchers hypothesized that the TPB would significantly explain respondents' public transportation use. In addition to the standard TPB components, researchers also sought to understand how *morals, values, and awareness and responsibility for the problems caused by car use* account for behavior. The researchers also predicted that the introduction of a transportation-pass program for university students would alter beliefs after implementation. The study employed a longitudinal approach in order to uncover beliefs associated with public transportation before and after the introduction of the intervention. Results suggested that the TPB possessed high predictive validity in explaining transportation mode choice among university students; accounting for 70% in phase one (pre-intervention), and 53.5% in phase two (post-intervention). Additionally, the intervention was found to lower positive beliefs related to car use and increase positive beliefs about bus use. Results from this study suggest that attempts to alter behavior should incorporate ways to remove perceived barriers to participation in a behavior (i.e. positively altering beliefs, attitudes, and norms related to performing a specific behavior) (Heath & Gifford, 2002). Results also provided evidence that suggest that neither environmental values nor perceived responsibility for the problems related to car use added predictive value to intention to take the bus. Thus, it can be surmised that transportation mode choice was guided mostly by egoistic motives

rather than altruistic ones. For the present study this is significant because an intervention designed to encourage shuttle use would likely be more effective when targeting beliefs that directly impact the message recipient.

Bamberg et al. (2003) studied the effects of a pre-paid bus ticket intervention on bus ridership among college students at the University of Giessen in Germany. Results revealed that the intervention increased bus ridership at the University by more than doubling the proportion of students who rode the bus. Researchers also found that the TPB helped to accurately predict intentions and behavior before and after the intervention; however, pre-intervention beliefs were not reliable indicators of post-intervention behavior. This indicated that the intervention altered respondents' attitudes, subjective norms, and control beliefs associated with riding the shuttle (Bamberg, et al 2003). Thus, it can be surmised that an intervention that targets and successfully alters one or more of these components can successfully alter a target behavior. The study, as well as the previously reviewed study, also display that the TPB is a reliable model when predicting transportation mode choice.

Baker (2008) conducted research in Glacier National Park that explored the ability of the TPB in predicting shuttle use while also attempting to expand the model to include visitor recreation experience preferences. Visitor preferences were conceptualized as goals established by a visitor to achieve a desired recreation experience (Baker, 2008). A survey was administered to understand: beliefs about the outcome of riding the shuttle, normative beliefs, control beliefs, attitudes, subjective norms, and perceived behavioral control; as well as desired experiences and activities. Visitors were also mailed a follow-up survey to assess if they rode the shuttle in order to quantify shuttle riding behavior for the model. Results from the study indicated that the constructs of the TPB were significant predictors of intentions and intentions were significant in prediction of shuttle ridership behavior. Also of significance was that shuttle riders and non-shuttle riders differed significantly in regards to their attitudes, subjective norms and perceived behavioral control beliefs regarding shuttle use. Results also revealed an

experience preference for solitude added predictive capability to the TPB model. In other words, visitors who preferred solitude were more likely to ride the shuttle than those who did not prefer a recreational experience that included solitude.

TPB, Salient Beliefs, and Implications for Present Study

Of great significance for the present study was that Baker (2008) was able to reveal salient attitudes, subjective norms, and control beliefs held by visitors regarding shuttle use at GNP. The TPB has been used to construct messages designed to influence visitor behavior in leisure settings by appealing to salient (most common) beliefs in an attempt to alter underlying beliefs and influence behavior (Lackey & Ham, 2003; Brown et al., 2010, Manning, 2011). It has been noted in prior research that knowledge of beliefs in which to target within a persuasive message is one of the most important aspects of persuasive communication (Ham, 2007; Brown et al., 2010). In terms of the present study, it is vital to understand shuttle related beliefs which differ between shuttle riders and non-shuttle riders. In order to do this, Fishbein and Manfredo (1992) proposed conducting an elicitation survey to determine the most salient beliefs and attitudes within a target population for a specific behavior. Upon uncovering the most salient beliefs, one must then decide which belief(s) to target within an intervention. Fishbein and Manfredo (1992) state that the target belief must be targeted to the correct audience (i.e. those who do or do not intend to perform the behavior), and this depends on the type of behavior and population. For instance, if non-shuttle riders dominantly believe that the shuttle will not stop at their desired location, then an effective intervention would target this belief in a way that alters it to reflect otherwise.

A study conducted in Yosemite National Park utilized the TPB to understand how the park could effectively communicate with park visitors about black bear safety (Lackey & Ham, 2003). Part of the study aimed to determine salient beliefs concerning proper food storage behavior at Yosemite. The TPB

suggests that messages that target salient beliefs within a target population will be more effective in causing behavior change than manager guesswork (Ajzen, 1991; Fishbein & Manfredo, 1992). To elicit salient beliefs, researchers designed a survey consistent with methodology produced by Fishbein and Manfredo (1992) where questions were designed to elicit belief strength for the components of the TPB (i.e. beliefs, attitudes, control, norms and intentions). The questions were formatted as a seven point scale to assess belief strength along a continuum. Results suggested that various salient negative behavioral outcomes and normative control belief messages were not currently in park messaging. This information was utilized to help managers design effective persuasive messaging.

Brown et al. (2010) successfully crafted information signage designed to reduce litter using salient TPB beliefs associated with litter pick-up (Brown, et al., 2010). The researchers carried out a survey to determine the most salient beliefs involved with picking up litter left behind by other users in Mt. Field National Park, Tasmania. The researchers left a piece of garbage on the trail and surveyed both visitors who picked up the garbage and those who did not. Survey results led researchers to determine that "because it sets a good example for others" was the most salient belief associated with picking up litter for those who picked up litter, but ranked relatively low for those who did not (Brown, et al., 2010). This belief was incorporated into park signage in hopes of influencing litter pick-up behavior. Results showed that litter pick up increased up to 19% with the sign treatment (Brown, et al., 2010). This approach was informative as to the ability to successfully incorporate persuasive communication theory into message construction within a recreation area.

TPB Summary

In summary, the TPB has been utilized to accurately predict intentions and behaviors in a variety of settings. The present literature review has displayed that various constructs can be added to the model to increase variation accounted for by the model and expand understanding of various types of

social behavior from food decisions to transportation mode choice (Armitage & Conner, 1999; Vaske & Donnelly, 1999; Hrubes, et al., 2001; Heath & Gifford, 2002; Wang, 2011; Baker, 2008; Carrus, et al., 2008; Mohiyeddini, 2009). Of particular interest within the present study was the ability to utilize TPB constructs (when they are known) to craft a persuasive message designed to influence GNP visitors to ride the Park's free, optional shuttle service. Previous research has shown that changing beliefs, attitudes, subjective norms and perceived behavioral control can result in a change in transportation mode choice (Heath & Gifford, 2002; Bamberg, et al., 2003). Furthermore, this technique has been utilized with success in the field of recreation management (Brown et al., 2010; Lackey & Ham, 2003). Fortunately, for the present study, research performed by Baker (2008) uncovered salient beliefs regarding shuttle use for both shuttle riders and non-shuttle riders. This information was used in the present study to craft a persuasive message and will be discussed further within the methodology section.

The Elaboration Likelihood Model of Persuasion

Another often-utilized theory in influencing human behavior using information dissemination in recreation areas is the elaboration likelihood model of persuasion (ELM). The ELM framework asserts two avenues of persuasion: the central route to persuasion and the peripheral route to persuasion (Petty & Cacioppo, 1984; Roggenbuck, 1992; Manning, 2011). The peripheral route to persuasion typically involves a low level of cognition and results in a potential short-term change in behavior. It occurs when an individual's motivation or ability to process information is low (Petty & Cacioppo 1984). The peripheral route to persuasion can be useful in areas with lots of distractions such as high use areas or sites near a road because ability to process information may be lower due to a distracting environment (Roggenbuck, 1992). In order to alter behavior, the message must appear professional as well as easy to summarize (Roggenbuck, 1992). In other words, if a message recipient lacks the ability to

thoughtfully process information, a recipient must decide what ideas to accept based on their perception of the source, number of arguments or other peripheral cues not directly related to the message. For instance, it has been found that mere exposure to an attitude object can increase favorable attitudes towards the object (Petty, et al., 1997). An example of this would be a visitor noticing many shuttle busses on the GTTSR which may act as a subliminal cue that causes a favorable attitude to form in regards to the shuttle.

Another example of a peripheral cue are images or illustrations within a message. Decorative images function to draw attention and interest towards a message (David, 1998). In contrast, functional pictures serve to strengthen the message or provide visual evidence of the argument in question. Functional and decorative images have been found to increase message cognition and recall abilities (David, 1998). Therefore, it would appear that adding images which support an argument (especially an argument designed to change a behavior that has been found to be difficult to alter) is an important component to a persuasive message. For instance, a message which states that the GTTSR is often congested may not convince a visitor if they have never visited the road. However, a written message along with visual images that provides proof that the road is congested will likely strengthen the persuasive power of the message. In other words, images that aid in visualizing a scenario will likely add elaboration potential and increase the likelihood that the message recipient will believe the scenario will occur.

It has also been shown that increasing the number of arguments can lead to a positive impact in persuasion when motivation to process is low. In this case a message recipient who does not have motivation to put forth an effortful thought process may judge a message's merits by the number of arguments. However, strength of arguments are more important when motivation is high (Petty & Cacioppo, 1984). This study displays how arguments can play multiple roles in a persuasive message. For instance, a message that will be presented in a setting where motivation to process is low will likely be

augmented by presenting multiple short arguments rather than one long and detailed one. Likewise, if a message is designed to foster central processing, it would likely benefit from one or two detailed arguments.

Source heuristics have also been shown to act as the prime determinant of persuasion when subjects were not motivated to systematically process information (Chaiken & Maheswaran, 1994, Rucker & Petty, 2006). Furthermore, source heuristics were found to bias attitudes regarding a message based on heuristic strength (Chaiken & Maheswaran, 1994). For example, if source credibility was high subjects were inclined to view the message more favorably and vice versa. A favorable perception will increase the likelihood of changing behavior, but as stated earlier, this change in behavior is typically short term if the attitudes about the behavior are not incorporated into an individual's personal beliefs pertaining to a behavior (Petty & Cacioppo 1984; Roggenbuck, 1992). Thus, it can be surmised that while peripheral cues such as source credibility do not possess high persuasive effect, they are in fact a vital component to any persuasive message. Therefore, for the purpose of the present research, a message that is crafted using National Park Service official formatting techniques will likely be more effective than one using the University of Montana as a source.

The central route to persuasion is the second route of persuasion according to the ELM. The central route involves a process in which the recipient of the persuasive message determines if they are motivated to process the information by assessing personal relevance or interest. For example, personal relevance is typically elevated when a message is related to personal safety because humans are typically concerned when they perceive their safety is in jeopardy. Hockett and Hall (2007) found that a message designed to reduce wildlife feeding which was crafted using a fear appeal elicited personal relevance and had great persuasive potential. The study also found that a moral appeal had no effect on elaboration. This study revealed that egoistic cognitions can be more effective than altruistic ones when attempting to alter certain behavior.

The next step in the ELM process involves whether or not the recipient is able to process the information. This could be influenced by external sources such as a distracting environment. The message could also be too long or too complicated, which might reduce the ability to process the message (McCool & Cole, 2000).

If a recipient is motivated and has the ability to process information, then the subject will establish feelings or thoughts associated with the message that can be categorized as favorable, unfavorable or neutral (Roggenbuck, 1992). These feelings and thoughts are dependent upon the perceived strength and quality of the argument. For instance, a message may be designed to create personal relevancy using a 'fear message' that states that if you do not take the shuttle you are directly contributing to the extinction of GNP's glaciers. The message may be effective in initially establishing personal relevancy and the subject may begin to meaningfully process the message; however such a message may be regarded as weak due to a perceived minimal impact one's personal vehicle has in the grand scheme of climate change; thus rendering the message ineffective. In this case, a neutral or unfavorable attitude may be formed regarding the message. If a neutral attitude is formed it will usually foster an ineffective impact on a recipient's overarching belief. Favorable or unfavorable thoughts have the potential to utilize the message received and turn it into an attitude change by incorporating the new idea into a previously existing belief schema (Petty & Cacioppo 1984). For example, eliciting unfavorable thoughts concerning driving a personal automobile on the Going-to-the-Sun Road may influence users to ride the shuttle. An effective message will encourage subjects to create their own arguments that support the argument within the message. This high level of cognitive elaboration will in turn lead to strong and enduring beliefs. In summary, the more a message influences humans to think, the more likely the message is to provoke the formation of understanding, meaning, and behavior change.

A message recipient's perceived personal relevance to the message plays a key role within the ELM framework. Personal relevancy can be increased by creating a message that elicits a sense of being needed (Vining & Saunders, 2004). A well-known example of this is the Smokey the bear campaign, *Remember, only you can prevent forest fires* is a statement that appears to elicit direct relevancy (Scott, 2008). Summarizing major arguments as questions has proven to increase personal relevancy, as well as changing pronouns from 'one', 'he' or 'she' to 'you' in order to enhance personal involvement (Petty, et al. 1992). Additionally, arguments that match an existing attitude that closely parallel the desired behavior are more easily assimilated into an existing attitude structure (Roggenbuck, 1992; Petty, et al. 1992). For example, a visitor who has a pro-environmental attitude may be easily persuaded to ride the shuttle if a message focuses on the positive environmental impacts that may occur by riding the shuttle. However, strong attitudes are difficult to influence if the new behavior does not match an existing cognitive structure (Petty & Cacioppo 1984; Roggenbuck, 1992; Petty, et al. 1992).

Brown et al. (2010) provide an example of how to use the ELM in a persuasive message within a recreation area. Brown et al. (2010) crafted a multiphasic approach to construct a message designed to reduce litter in Mt. Field National Park in Australia that was based on the TPB and ELM frameworks (Brown, et al., 2010). As discussed earlier, the researchers carried out a survey to determine the most salient beliefs involved with picking up litter left behind by other users in Mt. Field National Park, Tasmania. The researchers then chose the most appropriate target belief for a persuasive message. The sign was also designed to provoke central route processing by establishing personal relevance. This was accomplished by speaking directly to visitors in the title. "If not you who?", and "what will you do when you see it?" were two title treatments (Brown et al., 2010). The messages also contained park logos designed to elicit peripheral cues. The researchers predicted that users would read the sign due to perceived personal relevance elicited from the title created by using the pronoun 'you' and that the park logo would increase the likelihood of attending to the message by increasing source credibility. Results

suggested that litter pick-up increased up to 19% with the sign treatment (Brown, et al., 2010). This approach was informative as to the ability to successfully incorporate persuasive communication theory into message construction.

Before concluding this section, a brief overview for why messages designed using the ELM framework fail will be provided. Rucker and Petty (2006) discuss four common reasons why some persuasive messages designed using the ELM framework are ineffective. One reason is that an argument may not be strong enough to alter the target behavior. In this case, the target behavior may be an especially difficult one to alter. A second reason these types of interventions may fail is that subjects lack motivation to put effortful thought into the message and peripheral cues are weak (Rucker & Petty, 2006). This will typically occur if the environment in which the message takes place is too distracting for the recipient to actively elaborate on the message. A third cited reason such messages fail is that the subject may be biased and decide to counter-argue the message or scrutinize the argument for faults. For example, a message which is seen to affect a subject's personal freedom may become biased against the argument and the argument may backfire. The fourth reason cited by Rucker and Petty (2006) for why a persuasive message may fail is that a subject may actually perceive a bias and attempt to correct for the bias by overcompensating in the opposite direction. For instance, if a message utilizes a subject's favorite sports star to advertise a product, a message recipient may pick up on this and become negatively biased towards the message. This could occur because the recipient may feel that the marketers are attempting to use their favorite sports star to sell their product.

As can be surmised, a persuasive message will most likely falter in a number of circumstances due to any of the reasons cited above. This is due to the highly dynamic setting in which real-life persuasion takes place. Add that to the fact that the recreation experience is often explained as a highly dynamic and emotional experience and a researcher may have a difficult time producing the perfect persuasive tool (Manning, 2011). However, indirect management does not depend upon 100%

persuasive success, but rather a smaller percentage. Therefore, if 20-30% of message recipients are persuaded to perform a target behavior it can likely be regarded as a success. Components of the ELM were utilized in the construction of the intervention for the present study in order to elicit personal relevancy and enhance message elaboration through various peripheral cues.

Encouraging Alternative Transportation Ridership: Moral vs. Self-Interest Motivations

Baker's (2008) research revealed that GNP shuttle riders and non-shuttle riders differed significantly on virtually every attitudinal, subjective norm, and perceived behavioral control measure provided in the survey. According to past studies, targeting salient beliefs which differ between those who perform the target behavior and those who do not within a persuasive message can increase persuasive power (Brown et al., 2010; Lackey & Ham, 2003). However, Baker (2008) analyzed 26 of these beliefs, all of which differed significantly. Prior research indicates that targeting beliefs that are strongest for those who perform the behavior while also being quite weak for subjects who do not perform the behavior are the best components to target (Ajzen, 1991; Fishbein & Manfredo, 1992). For this reason it appeared pertinent to understand how past research on alternative transportation could help inform the present study as to the most relevant components for a persuasive tool that would influence visitors to ride the shuttle at Glacier National Park. This section will review research pertaining to alternative transportation use in National Parks as well as urban settings in order to understand key cognitive factors pertaining to shuttle riding behavior.

Reducing personal automobile use has often been cited as one of the most difficult behaviors to encourage (Corbett, 2005; Bamberg et al., 2003). The act of voluntarily abandoning the ease, freedom and efficiency of the personal automobile in favor of an alternative must be sufficiently appealing for this behavior change to occur. Using alternative transportation may be viewed as an environmentally responsible behavior due to the common idea that widespread personal automobile use is detrimental

to the environment. Perhaps nowhere is this more evident than Glacier National Park; where it is widely accepted that all glaciers will become extinct within 20 years due to human-caused climate changes. Environmentally responsible behavior in this context implies a degree of sacrifice associated with personal freedom, which is likely guided by a moral obligation toward the betterment of a particular community. This sacrifice could be argued to be even larger within National Parks due to the tradition and orientation towards freedom and access (Turnbull, 2003).

One way environmentally responsible behaviors have been understood is through a relatively new model of human behavior known as the reasonable person model (RPM) (Kaplan, 2000). This model is used to predict and explain environmentally responsible behavior through four components: altruism, self-interest, personal control and desirable choices. Kaplan (2000) posited that, in the context of environmentally responsible behavior, altruism and self-interest interact in a manner that is contrary to how many researchers dichotomize the concepts. For instance, many environmentalists love nature and place high value in the benefits they receive from it. Thus, Kaplan (2000) argues, environmentalists are often not altruists, but acting on both self-interest and moral grounds. Kaplan (2000) states that a purely altruistic approach causes a sense of helplessness, calling for a degree of sacrifice that inherently degrades the quality of life of the individual who performs the 'sacrifice'. The model proposes that people prefer to perform environmentally responsible behaviors when they are not seriously disadvantaged by doing so. According to this model, an environmentally responsible behavior that directly benefits an individual and benefits a wider community will likely be performed over one that mainly benefits the community. In the context of the present study, the sacrifice would involve giving up personal freedom associated with a personal vehicle to ride the shuttle in Glacier. According to this model, a message that appeals to self-interest motives (avoid traffic stress) as well as moral motives (reduce CO₂ emissions) would be more effective than one which appeals to morals alone.

Corbett (2005) tested the components of the RPM in order to understand if it could predict the choice of whether to walk or drive. The researcher collected data from a questionnaire designed to determine beliefs related to the four components of the RPM: altruism, self-interest, personal control and desirable choices. The model failed to derive significant results from the personal control component, but altruism, self-interest, and desirable choices were significant predictors of walking or driving (Corbett, 2005). Thus, it was shown that the model possesses merits when predicting environmentally responsible behaviors and further supports the idea that both moral and self-interest beliefs should be targeted within a persuasive message aimed at increasing shuttle use.

Another study that was conducted in Sweden displays the role environmental morals play within alternative transportation. The study was designed to assess beliefs and evaluations of various travel demand measures such as prohibiting traffic in certain areas and road pricing. Results from the survey suggested that environmental concern played a large role in understanding the travel demand measures (Loukopoulos et al., 2005). Those with high environmental concern were more likely to claim general support for the measures and were also more likely to support a cost measure if it would lead to increased environmental quality (Loukopoulos et al., 2005). This study reveals that people with a moral concern for the environment may likely be supportive of restrictive transportation measures, thus illustrating the point that environmental morals play a factor within assessment of alternative transportation measures.

Additionally, a study on travel mode choices among university employees found that employees who had recently moved to an area and were environmentally concerned used their car less frequently than those who had not recently moved to the area and were not environmentally concerned (Verplanken et al., 2008). Thus it can be surmised that environmental values or morals may be a factor when deciding whether or not to use public transportation. This is significant because GNP visitors may possess higher levels of environmental concern than the average citizen due to the fact they are visiting

an area to primarily enjoy its natural scenery. Therefore, it may be effective to appeal to visitors' morals to some extent when encouraging shuttle use at GNP.

While it has been noted that altruistic (or moral) motives as well as self-interest play a role in environmentally responsible behavior, most recent studies within National Parks indicate that self-interest is the main determining factor when visitors decide whether or not to ride a park shuttle. Mace and others (2013) recently completed a longitudinal study that assessed visitor satisfaction with the Zion National Park shuttle system over time. It was found that personal freedom was the most important visitor experience factor when the shuttle was first implemented. Efficiency, accessibility and comfort were also noted as important factors in shuttle satisfaction. These results appear to indicate that shuttle satisfaction was dominantly determined based on self-interest motives at Zion National Park. However, the author did note that park information should also highlight environmental benefits associated with the shuttle to increase shuttle popularity (Mace, et al., 2013). It is important to note however that this shuttle system differs from the one in GNP because it is mandatory while Glacier's is optional. However, it appears that results are still valuable in understanding visitor motivations for shuttle use.

Results from the previous study appear consistent with a qualitative study performed at Acadia National Park which sought to understand incentives and disincentives for using the Park's optional and free shuttle service (Holly, 2009). This study found that shuttle frequency and length of wait for the bus were the most important factors in deciding whether or not to ride the shuttle service. Visitors suggested that the service should run every 15-25 minutes. It was also noted that respondents often expressed importance of protecting Acadia's environment by riding the busses, but data suggested this was not a primary incentive for riding the shuttle. Interviews also showed that many visitors perceived the shuttle as limiting freedom to visit areas of interest; echoing the results from Mace and others' (2013) study which indicates that perceived freedom is an important factors for visitors deciding whether or not to ride a park shuttle. This study suggests visitors value a shuttle that runs frequently

which is detrimental to this study because Glacier's east-side shuttle runs every 45 minutes to 1 hour. Therefore, it was noted that this may be a difficult hurdle to overcome when attempting to influence behavior.

Taff et al. (2013) explored factors that influenced visitors at Yosemite National Park and Rocky Mountain National Park to ride each park's respective optional free shuttle service. Results from the study revealed three salient factors typically influenced decisions on whether or not to ride the shuttle service at both parks. The factors were: ease, freedom and stress. Ease was related to safety and the ability to find one's way around the park. Freedom was categorized as the ability to access desired locations throughout the park; and stress was related to traffic and parking congestion worries as well as conflict caused by various types of transportation. Taff and others (2013) indicated that these factors should be focused on by managers when creating messages designed to influence visitors to use optional shuttles. Specific appeals such as "avoid traffic stress - park here and let our free buses take you to the scenic overlooks" and "let our buses safely guide you around the park" were cited as examples of messages tailored to appeal to these factors (Taff, et al., 2013, p 43). This study reveals that self-interest largely guides transportation mode choice for optional free shuttles at Yosemite and Rocky Mountain National Park.

White (2007) explored visitors' perspectives towards transportation at Yosemite National Park. Findings revealed that personal vehicles provided convenience and personal freedom to dictate their travel schedule. Downsides to personal vehicle use were cited as: being stuck in traffic, parking shortages, and route-finding. When asked about the shuttle service, respondents also listed the shuttle as convenient. Convenience in this context meant avoiding traffic congestion, parking shortages and route-finding. Visitors also noted that the park shuttle promoted their environmental beliefs, although it is noted that personal convenience played a larger role (White, 2007). Researchers concluded that perceived freedom and convenience were salient beliefs that managers could target to increase optional

shuttle ridership. This study illustrated the role which self-interest plays within transportation mode choice in national parks due to the fact that freedom and convenience were the biggest in dictating shuttle use among respondents. Therefore, appeals that contain messages such as "avoid parking problems and traffic stress", or "The shuttle stops at all popular locations at regular intervals" should heighten persuasive potential.

A study conducted on the Bear Lake Road at Rocky Mountain National Park explored the tradeoffs visitors were willing to make in order to ride the park shuttle (Pettebone, et al., 2011). Results suggested that visitors were more inclined to ride the shuttle if it would enhance their potential to experience solitude. The study also indicated that visitors were willing to make tradeoffs to avoid traffic congestions as well. Pettebone et al. (2011) recommended information be provided about parking and traffic congestion in order to increase shuttle use because, for instance, if visitors realize they cannot park at a desired location they would be more willing to make a tradeoff to ride the shuttle. Findings from this research provides further evidence that self-interest beliefs pertaining to the ability to perform a desired activity as well as avoid poor driving conditions may guide shuttle riding behavior.

Daigle and Zimmerman (2004) explored the effects intelligent transportation systems had on optional shuttle ridership in Acadia National Park. An aspect of the information system that visitors found particularly useful in achieving management's ridership goals was information that relayed real-time parking updates to visitors. Based on survey responses, 44% of visitors indicated that the information helped them decide to take the shuttle, 43% of visitors indicated the information influenced when they would visit a location and 38% indicated the information influenced where they visited (Daigle & Zimmerman, 2004). The findings from this study display that it is possible to increase shuttle ridership using information, particularly information pertaining to visitors' ability to visit a desired destination. This finding is significant for the present study because low parking availability at popular destinations has been found to be a major issue on the GTTSR. Areas such as Avalanche Creek, the St.

Mary Falls trailhead, and especially Logan Pass are generally at capacity throughout the day during peak season (Mills et al., 2014a; Mills et al. 2014b; Mills et al., 2014c; Weinberg, et al., 2013a).

While past studies on environmentally responsible behaviors have revealed that morals play a role in performing a target behavior (Kaplan, 2000; Corbett, 2005; Loukopoulos et al., 2005; Verplanken, 2008), recent literature pertaining to alternative transportation in national parks have revealed that mostly self-interest motives guide shuttle riding behavior (Daigle & Zimmerman, 2004; Pettebone, et al., 2011; White, 2007; Taff et al., 2013; Holly, 2009; Mace, et al., 2013). The present literature review has revealed various themes that are important factors within visitors' transportation mode choice. These themes include: ease, freedom, stress, shuttle frequency, length of wait, efficiency, accessibility, comfort, traffic congestion and parking availability (Daigle & Zimmerman, 2004; Pettebone, et al., 2011; White, 2007; Taff et al., 2013; Holly, 2009; Mace, et al., 2013). Various studies have indicated that future research or management actions should explore the effectiveness of national park communications on shuttle use (White, 2007; Baker, 2008; Youngs et al., 2008; Taff et al., 2013). For the purposes of the present study, the intervention will primarily appeal to visitors' self-interest, while making a secondary appeal to moral obligations towards Glacier's environment. Therefore, visitors may be persuaded to ride the optional free shuttle if they believe the shuttle: allows them to park at their desired location, helps them avoid driving stress, does not impede on personal freedom, is comfortable, is convenient, and beneficial to the environment. These types of concerns are also represented in Baker's (2008) tables of attitudes, perceived behavioral control and subjective norms pertaining to GNP visitors' shuttle beliefs. Components of the intervention will be discussed further in the methodology section.

Intervention Medium and Dissemination Methods

A persuasive brochure has been the most commonly utilized medium when influencing visitors within recreation settings (Schomaker, 1975; Lucas, 1981; Roggenbuck & Berrier, 1982; Lime & Lucas,

1977; Krumpe & Brown, 1982; Huffman & Williams, 1987; Hendricks et al., 2001; Oliver et al., 1985; Doucette & Cole, 1993). There are currently no studies which assess the effectiveness of a persuasive brochure in influencing optional free shuttle usage in National Parks. However, a review of relevant literature will reveal that brochure dissemination can be effective in influencing visitor behavior within a recreation setting. This section will review successful and unsuccessful instances in which brochure dissemination was used in order to understand how this technique can be used effectively. That will be followed by a review on dissemination techniques and will conclude with general guidelines for formatting an effective brochure and message.

One type of behavior modification that has been targeted using brochures in a recreation setting is that of altering visitor destination intentions. This is an indirect method that allows people to perceive a sense of freedom and spontaneity even though managers are subtly attempting to persuade or urge visitors to visit a specific area. This method has been used with varying success and has been found to alter use by up to 33% (Lucas, 1981; Lime & Lucas, 1977).

A few early attempts at influencing visitor use through information failed due to short-comings in design. A study by Schomaker disseminated a map at trailheads in the Rawah Wilderness in Colorado with the purpose of dispersing backcountry campers to less used areas. The map highlighted areas with high use and crowding issues. The map was found to have no impact on visitors' route decisions; however, visitors did find the information useful (Schomaker, 1975). The researcher noted that handing out the map at the trailhead was likely ineffective because visitors had already established route decisions. The researcher also suggested that a more detailed and relevant message may have increased wilderness site dispersal; citing that perhaps site attributes of alternate sites may have been more appealing than information which strictly pertained to crowding.

Another study conducted by Lucas (1981) attempted to shift use in the Selway Bitterroot Wilderness in Montana through a similar technique. A brochure was developed that provided

information regarding relative use levels on trails within the wilderness and it was disseminated at trailheads, ranger stations, and mailed to visitors who inquired about information relating to the wilderness (Lucas, 1981). After a summer of research, findings suggested that the brochure was not effective in influencing use patterns. Despite attempts to disseminate the information prior to arrival at a given trailhead, only 40% of visitors had the information before they reached the trailhead (Lucas, 1981). Researchers surmised that this study failed to achieve its desired objectives for three reasons: because information was not distributed in a timely manner, it relied on information pertaining to crowding to influence visitors, and visitors indicated they lacked confidence in the information provided. Therefore, perceived validity, relevant information, and timing of message were inferred to be important factors when influencing visitor behavior via indirect management.

A study in the Pemigewasset wilderness in New Hampshire used a face-to-face approach to disseminate information as a management tool to influence campsite decision making (Brown et al., 1992). In this study wilderness rangers were dispersed in the backcountry to give information lessons on low-impact camping techniques as well as information regarding less used campsites in nearby areas. Findings from the study concluded that the program did not influence backcountry campsite selection. It was noted that contacting visitors who are already in the backcountry is ineffective because it is likely too late in the decision making process.

The previous three studies failed to perform desired outcomes primarily because the information was not available to users early enough in the decision making phase in order to change behavior (Schomaker, 1975; Lucas, 1981; Brown et al., 1992). Drawing ideas from the TPB, it is unrealistic to suppose that visitors will alter their behavior when they arrive at a desired location because intentions to perform a behavior are likely established. Therefore, timing of information dissemination plays a role within the effectiveness of a persuasive message. Previous research has also shown that relevant content and perceived message validity plays a large role as well (Lucas, 1981). It

was also surmised that information provided in previously discussed studies was not sufficiently relevant or detailed enough to foster behavior change. The next studies reviewed will pertain to studies that succeeded in influencing visitor behavior.

A study performed in the Boundary Waters Canoe area in Minnesota was designed to redistribute use through information dissemination (Lime & Lucas, 1977). Similar to the previous study examples, a brochure was developed that was designed to encourage visitors to visit less used destinations and entry points. The brochure was mailed to 5,000 trip leaders from a list of visitors from the previous year. The information was mailed in early spring of 1975 in order to allow visitors time to incorporate this decision aid early into their activity intention development process (Lime & Lucas, 1977). The contents of the brochure included information on general use patterns, noting heavily used areas and times of heavy use. This message was designed to help visitors understand the least crowded times to visit an area. A questionnaire was mailed out following the summer after the brochure was handed out. One third of visitors who responded indicated that they used the brochure to select a new entry point into a lightly used area. Users who were most influenced by the information provided in the brochure had typically low experience in the area. Visitors who had more experience and tended to concentrate their use in a few localized areas were least influenced by the information (Lime & Lucas, 1977). This study revealed that visitor experience within an area plays a role in how easily they are persuaded. This study also highlighted the importance of timely dissemination as well as adequate information. Mailing out the information well in advance of a user's intended visit allowed them to incorporate the decision aid into a decision making process before intentions were established.

Another study performed by Krumpe and Brown (1982) in Yellowstone National Park used a decision aid brochure to influence use with a similar degree of success. The study was premised on the idea that visitors choose recreation destinations based on settings in order to realize desired experiences (Krumpe & Brown, 1982). The researchers designed the brochure to mimic the human

decision making process in regards to selecting a recreation destination; creating a decision tree. The decision tree encouraged users to select a trail by following a line of decision making based on desired settings. Results suggested that less experienced users were more likely to be influenced by the information. Furthermore, the message treatment contributed to the distribution of 23% of visitors to lesser used areas in comparison with a control group (Krumpe & Brown, 1982). It is noted that this percentage may seem low. However, over-distributing users to the extent that previously low-used areas are socially or environmentally degraded is undesirable. Therefore, this level of distribution may be quite desirable. Indeed, it was noted that some managers had issues with the backcountry trail selector and its potential to harm unused trails and ruin wilderness experience for those who found an area by oneself (Krumpe & Brown, 1982). In a managerial context, the amount of distribution is dependent on where a manager desires to distribute use, if the area is capable of supporting more use, and how much use managers wish to redistribute. In the case of the optional shuttle at Glacier National Park, redistributing users from their personal automobiles to the shuttle should be executed and monitored carefully. For instance, it would be undesirable if the intervention increased shuttle use to levels that supply could not support. Visitors would likely complain that they were fooled by managers into using a shuttle system that was unable to transport them efficiently.

Huffman and Williams designed a study in Rocky Mountain National Park that tested the effectiveness of influencing backcountry visitors to consider less used sites (Huffman & Williams, 1987). The study included a brochure as well as a computer program which were both designed to influence visitor use using a decision tree. The design of the brochure was similar to that of Krumpe and Brown's backcountry trail selector. Based on survey results, 58.8% of visitors in the computer treatment, 37.7% in the brochure treatment, and 18.9% in the control treatment selected less used sites (Huffman & Williams, 1987). It was noted that the novelty of a computer within a visitor center may have enhanced its effectiveness (Huffman & Williams, 1987). It may not be realistic to assume a computer decision aid

will be as effective today considering people are accustomed to computers being part of their everyday life, thus novelty would be significantly reduced. Visitors who were less experienced found the brochure and computer most useful. Additionally, visitors who had no firm destination intentions indicated the treatments influenced their decision (Huffman & Williams, 1987). Conversely, visitors who had planned well in advance to their trip did not find the information as useful.

A study conducted by Roggenbuck and Berrier in the Shining Rock Wilderness in North Carolina attempted to distribute overnight backcountry users away from a heavily used camping area (Roggenbuck & Berrier, 1982). The researchers designed a brochure that was disseminated at the trailhead that contained information about alternative campsites. The brochure contained information on low-used sites, including trail difficulty, proximity to water sources, and views. This brochure was one treatment and another treatment was a personal contact by a Forest Service official along with the brochure at the trailhead. The official was instructed to briefly summarize the points made in the brochure. Overall the two treatments were effective in distributing use; reducing use by 29% in the brochure alone treatment and 42% in the brochure plus contact treatment (Roggenbuck & Berrier, 1982). It is interesting that this study succeeded in distributing use because the information was handed out relatively late in the decision making process which indicates that the persuasive nature of the brochure was high. Additionally, it was found that a personal contact plus brochure dissemination was significantly more effective than a brochure alone.

Another study in Tamalpais, California disseminated information to mountain bikers regarding minimum impact behaviors. The information was presented using a moral appeal or a fear appeal and was disseminated in three treatments: presented by a volunteer hiker, a volunteer biker, or a uniformed hiker. The study indicated that both a moral and a fear message were nearly equally effective (Hendricks et al., 2001). Results from the study suggested that minimum impact recommendations were observed in 59.2% of mountain bikers in one treatment as compared to 16.7% of bikers under a control.

Additionally, the least effective dissemination treatment was a uniformed volunteer, while the most effective was a volunteer on a bicycle. This data appears to suggest that visitors may be more receptive to park representatives who appear to be volunteers rather than official employees.

Another study that was conducted at a developed campground utilized three treatments in attempting to lower vandalism and littering. The treatments included a brochure, a brochure plus agency contact, and both of those treatments plus a verbal request for assistance by the agency contact to report depreciative behaviors (Oliver et al., 1985). The data suggested that the most effective treatment was the brochure plus agency contact as it lowered depreciative behaviors described in the brochure more so than the other treatments.

The previously discussed studies in this section reveal various patterns that have informed the present study as to the factors that influence persuasion potential within a recreation setting. Previous studies have revealed that message recipients who possessed lower levels of experience within a recreation site were easier to persuade than users who possessed high levels of experience (Lime & Lucas, 1977; Krumpe & Brown, 1982; Huffman & Williams, 1987). It was surmised that users with higher levels of experience may plan their trip farther in advance and have a well-planned itinerary prior to visiting a site. Thus, attempting to influence behavior on-site or in close temporal proximity to planned behavior will likely be ineffective. However, Roggenbuck and Berrier (1982) displayed that it is possible to influence behavior late in the intention formulation stage if the persuasive power is great enough. Additionally, as discussed earlier, Daigle and Zimmerman (2004) found that real-time parking availability information influenced users to ride the optional free shuttle at Acadia National park, indicating that transportation mode choice can be influenced on-site. This type of information appears important to visitors when making transportation mode choice decisions within a National Park setting. Various studies have also shown that messages must include relevant content that is detailed enough for a visitor to make an informed decision (Schomaker, 1975; Lucas, 1981; Brown et al., 1992). It appears that

parking congestion information; which indicates whether or not a particular destination is available is quite relevant and persuasive. Furthermore, it appears persuasive power increased when a brochure was disseminated with a personal contact (Oliver et al., 1985; Hendricks et al., 2001; Roggenbuck & Berrier, 1982).

In summary, information gathered from this section indicates that a brochure designed to influence visitor information within a recreation setting should possess various qualities. These qualities are as follows: the brochure should be disseminated within a timely manner, it should possess high persuasive quality, the message should be perceived as valid, it should contain relevant and useful information, and it should be disseminated in conjunction with a personal contact.

Message Construction: What Makes a Good Brochure?

At first glance, constructing an effective brochure may seem trivial. However, crafting an effective persuasive tool must take design as well as content into account. The elaboration likelihood model of persuasion states that perceived professionalism of source can act as a peripheral cue to persuasion and will increase the likelihood of central route processing as well (Petty & Cacioppo 1984; Roggenbuck, 1992). The following section will describe various layout and design components that facilitate the creation of an effective brochure.

A general consensus among researchers is that an overly complex or long message may require too much processing and reduce its overall effectiveness (Petty et al., 1992). In other words, an effective brochure message should be concise and understandable to the intended audience no matter the subject. Big blocks of text can intimidate message recipients. Typically it is accepted that less is better. Cole et al. (1993) found that visitors can experience information overload when attending to messages designed to provide information on low-impact behavior. Visitors in this study were less likely to retain information when more than 2 messages were present (Cole, et al., 1997). However, message simplicity

should not be taken to an extreme and it is still important to relay the intended message in an adequate manner so that it can be sufficiently processed by the message recipient. To go along with this component, it is important to include open space. Open space is known to increase attractiveness and readability (Doucet & Cole, 1993). The balance between getting the point across with as little text as possible can be difficult and it is noted that a message should be edited carefully by multiple people to ensure it meets this requirement.

Attractiveness and perceived expertness play a role when formatting a brochure. It has been shown that using professional, readable, and consistent fonts (size and type) is important when formatting a brochure (Winter, 2007; Doucet & Cole, 1993). In regards to the present study, it would be practical to use official NPS fonts and media formatting techniques to enhance attractiveness and perceived expertness. Type of paper also affects perceived attractiveness and expertness. Paper quality can enhance visual appeal as well as source validity (Doucet & Cole, 1993). For instance, newspaper type material will probably be less appealing than a more durable material that doesn't wrinkle as easily.

Another important component of a brochure is the use of effective imagery. Images are especially effective when they support arguments within the text (David, 1998; Doucet & Cole, 1993). For instance, a message designed to increase shuttle use which states "avoid dealing with traffic, ride the shuttle", may benefit from an image that displays poor traffic conditions. This image could add validity to the message by providing some evidence that poor traffic conditions exist. High quality images can also enhance visual appeal which can increase source validity.

In summary, an effective brochure should keep the message succinct but effective, include whitespace for readability, use professional and consistent fonts, should be printed on attractive and professional paper, and should possess attractive imagery that enhances the message. These types of formatting components may appear trivial, or even obvious; but they serve the purpose of visually guiding the message recipient through the intended argument in an effective and efficient manner. For

instance, too many words may cause the recipient to lose interest, an inconsistent font scheme may confuse the audience, or the lack of imagery may bore the reader. There is no exact formula for incorporating these components successfully, but these components should be kept in mind and used according to the type of message and type of audience.

Literature Review Summary

Indirect management techniques have been shown to be preferred by visitors over direct methods because of the technique's low impact on visitor experience (Lucas, 1983; Krumpal & Brown, 1982). It is important to note that various studies display that visitors are willing to accept direct methods when various situational factors are present (Cahill, et al., 2008; Riper, et al., 2011; Needham & Szuster, 2011). However, when all things are equal, visitors generally support indirect methods over direct methods. Therefore, it appears pertinent for managers to understand whether or not indirect management could be utilized to resolve a particular management issue. Information dissemination is one of the most commonly used forms of indirect management within a recreation setting (Schomaker, 1975; Lime & Lucas, 1977; Lucas, 1981; Roggenbuck & Berrier, 1982; Brown et al., 1992). The approach has been used with mixed success and that is partly because certain behaviors are difficult to influence. For instance transportation mode choice has been shown to be a difficult behavior to influence in an urban setting (Corbett, 2005; Bamberg et al., 2003). However, Daigle and Zimmerman (2004) displayed that providing information regarding parking lot saturation and road congestion can influence visitors to ride an option shuttle at Acadia National Park. The present study seeks to understand whether or not an indirect method which utilizes the best theory and prior research can influence visitors to ride the optional free shuttle at GNP.

The theory of planned behavior has been utilized to accurately predict intentions and behaviors in a variety of settings and a large amount of research has displayed that various constructs can be added

to the model to increase variation accounted for by the model (Armitage & Conner, 1999; Vaske & Donnelly, 1999; Hrubes, et al., 2001; Heath & Gifford, 2002; Wang, 2011; Baker, 2008; Carrus, et al., 2008; Mohiyeddini, 2009). Of particular interest for the present study was the ability to utilize TPB constructs (when they are known) to craft a persuasive message designed to influence GNP visitors to ride the Park's free, optional shuttle service. Previous research has shown that altering beliefs, attitudes, subjective norms and perceived behavioral control cognitions can result in a change in transportation mode choice (Heath & Gifford, 2002; Bamberg, et al., 2003). Furthermore, this technique has been utilized with success in the field of recreation management to alter depreciative behavior (Brown et al., 2010; Lackey & Ham, 2003). Fortunately for the present study, a research performed by Baker (2008) uncovered salient beliefs regarding shuttle use at GNP for both shuttle riders and non-shuttle riders. Due to the high amount of salient beliefs uncovered in Baker's (2008) research, prior research on shuttle riding behavior in National Parks has guided in the selection of target beliefs found in Baker's study. These studies suggest that self-interest motives such as the ability to find parking, avoid traffic congestion and maintaining personal freedom are major factors for visitors when contemplating transportation mode choice (Daigle & Zimmerman, 2004; Pettebone, et al., 2011; White, 2007; Taff, et al., 2013; Holly, 2009; Mace, et al., 2013). Additionally, it has been found that, in the context of environmentally responsible behaviors, self-interest appeals are enhanced when combined with a moral appeal (Kaplan, 2000; Corbett, 2005; Loukopoulos et al., 2005; Verplanken, 2008). This information was used in the present study to craft a persuasive message designed to increase shuttle ridership at Glacier National Park.

The ELM is another human behavior model that has been often utilized in recreation management research to influence behavior. Peripheral cues such as source validity and effective imagery have been utilized to foster message processing (Chaiken & Maheswaran, 1994, Rucker & Petty, 2006; David, 1998). The central route to persuasion, which is thought to foster enduring and meaningful

behavior change, is thought to depend on the establishment of personal relevancy between the message recipient and the message (Brown et al., 2010; Hockett & Hall, 2007; Petty & Cacioppo 1984; Roggenbuck, 1992; Petty, et al. 1992). This can be done by creating a message that appears to directly affect visitor experience (such the ability to park at a desired location) as well as speaking directly to the visitor. These techniques were incorporated into the intervention used within the present study.

Using the TPB and the ELM within a mixed model in the current research has a couple implications. The first major implication is that it has the potential to increase understanding concerning how these two models can work together to enhance persuasion. Additionally, utilizing the framework used by Brown et al. (2010) will help provide understanding as to the utility of their persuasive messaging framework in increasing optional shuttle use. Furthermore, mixing the ELM and TPB models has the potential to expand our knowledge of human behavior and cognitive thought processes as well as provide evidence for a possible expanded model for human persuasion.

Many studies have utilized brochure dissemination as an indirect management technique aimed at influencing visitor behavior (Schomaker, 1975; Lucas, 1981; Roggenbuck & Berrier, 1982; Lime & Lucas, 1977; Krumpe & Brown, 1982; Huffman & Williams, 1987; Hendricks et al., 2001; Oliver et al., 1985; Doucette & Cole, 1993). These studies have revealed that persuasion potential is increased if: the intended audience is of low experience, the message is delivered before behavior intentions are established, the message contains information important to the user, the source is perceived as valid, and the information is accompanied by a personal contact (Oliver et al., 1985; Hendricks et al., 2001; Roggenbuck & Berrier, 1982; Schomaker, 1975; Lucas, 1981; Brown et al., 1992). However, it has been shown that transportation mode choice can be altered relatively late in the recreation experience by relaying information pertaining to parking availability and road congestion to users (Daigle and Zimmerman, 2004). It appears that parking congestion information, which indicates whether or not a

particular destination is available, is quite relevant and persuasive which is also supported in other shuttle related research in National Parks (Taff, et al., 2013; White, 2007; Pettebone, et al., 2011).

Finally, interpretive research has guided the design of the brochure for the present study. These techniques lend to the source credibility, readability, and overall attractiveness components of the brochure. Specifically, prior research has revealed that the brochure should include white space, use attractive images, maintain consistent and professional font styles, avoid large blocks of text, and be printed on a professional medium (David, 1998; Doucet & Cole, 1993; Winter, 2007; Cole, et al., 1997). Most importantly, the brochure should be proofread by various experts to ensure these qualities are adhered to.

CHAPTER 4: METHODOLOGY

This section will provide an overview of the methodology that was employed in support of this research project. Details included in this section are as follows: hypotheses being tested, conceptualization/operationalization of variables, experimental design, measurement instruments, expected number of observations, and threats to internal and external validity.

Hypotheses

The purpose of the present experiment was to empirically test the ability of an indirect management technique (persuasive pamphlet plus verbal contact), which was grounded in theory and prior research, in increasing shuttle ridership among Rising Sun and St. Mary campground occupants. Various visitor use dynamics would be monitored in order to understand the treatment's impact if researchers were able to detect an increase in shuttle ridership as a result of the treatment.

Hypotheses tested in this study were as follows:

1) The introduction of a persuasive message treatment designed to increase shuttle ridership among Rising Sun and St. Mary Campground occupants will increase the number of visitors boarding the shuttle at the St. Mary visitor center and Rising sun Campground between 7:30 am and 11:20 am.

If H1 is successful:

- 2) The introduction of a persuasive message treatment will increase the number of visitors arriving via east-side shuttles at Logan Pass, St. Mary Falls, and Siyeh Bend between 8am and noon.
- 3) The introduction of a persuasive message treatment will be associated with a later (temporal) observed moment of parking saturation at Logan Pass.
- 4) The introduction of a persuasive message treatment will increase the number of hikers on the St. Mary Falls trail, Hidden lake trail and Highline trail before noon.

Variables: Conceptualization, Operationalization, and Data Collection Instruments

Independent Variable

The introduction of a persuasive message acted as the independent variable in each of the hypotheses. For the purpose of this study, *persuasive message* will be conceptualized as: a message designed in a manner so as to elicit a specific desired behavioral response among its recipients.

The independent variable was operationalized as a pamphlet which was disseminated, along with a personal contact who briefly summarized the main points of the brochure, at the Rising Sun and

St. Mary Campgrounds. Brochures were chosen as the medium for practical purposes as well as because they are a commonly utilized medium for persuasive communication in recreation research (Schomaker, 1975; Lucas, 1981; Roggenbuck & Berrier, 1982; Lime & Lucas, 1977; Krumpke & Brown, 1982; Huffman & Williams, 1987; Hendricks et al., 2001; Oliver et al., 1985; Doucette & Cole, 1993). The pamphlet was 8.5"x10.5" and folded in thirds.

The content of the persuasive message was constructed by utilizing components of the ELM and the TPB; as well as previous research on alternative transportation in National Parks. Prior research has shown that targeting salient attitudes, subjective norms and perceived behavioral control cognitions pertaining to a particular behavior can alter recipient beliefs and change behavior (Brown et al., 2010; Lackey & Ham, 2003; Fishbein & Manfredo, 1992). Baker's research presented GNP visitors' salient beliefs pertaining to shuttle ridership within the park for shuttle and non-shuttle riders. Responses for both groups differed significantly between all categories; therefore it was pertinent to understand which components would produce the highest level of persuasive power.

Prior research pertaining to environmentally responsible behavior and shuttle ridership in National Parks enabled the researcher in the present study to select five salient beliefs from Baker's (2008) study. These components were incorporated into the persuasive message contained in the brochure. Components included four salient attitudes and one salient control belief. Subjective norms were not included because it appeared impractical to influence beliefs pertaining to the manner in which family members and friends of message recipients felt about the shuttle. The five salient beliefs chosen from Baker's (2008) study have been highlighted below (Tables 1 & 2). The mean rating score is a composite score of a respondent's belief about the likelihood of the outcome and their evaluation of that outcome. A mean above four indicates a positive attitude and a mean below four indicates a negative attitude. Likewise, a mean close to four indicates a neutral attitude. Justification for the inclusion of each attitude and control belief is also included following the tables below.

Table 1: Shuttle ridership attitude composite scores (from Baker, 2008)

Attitude Composite	Shuttle Riders		Non-Riders	
	N	Mean	N	Mean
Benefit the environment at GNP	166	7.40	144	5.31*
Relieve me of the responsibility of driving	169	6.81	146	3.82*
Alleviate parking issues	168	6.80	139	4.51*
Safely travel the GTTSR	168	6.77	134	4.00*
Shorten traffic delays	168	6.30	145	2.81*
Allow me to see the sights at GNP	164	6.11	138	3.25*
Be a comfortable way to travel the GTTSR	166	5.81	147	2.64*
Prevent undesirable traffic conditions	169	5.80	143	2.82*
Reduce stress while visiting GNP	168	5.71	144	1.84*
Allow me to go the areas I want in GNP	166	5.05	143	2.46*
Allow me to engage in my chosen activity	169	5.04	142	2.24*
Allow me to have the type of experience I desire at GNP	168	4.36	148	2.23*
Help me decide where to stop along the GTTSR	168	3.95	141	2.15*
Allow me more time to interact in my family	163	3.95	140	1.75*
Cause me to be with new and different people	172	3.34	149	2.76*
Make me more aware of time while visiting GNP	169	2.84	145	1.46*
Require me to plan my day	165	2.19	144	1.22*
* denotes differences between shuttle riders and non-shuttle riders is statistically significant beyond the .05 alpha level				

Table 2: Shuttle ridership perceived behavior control scores (from Baker, 2008)

Attitude Composite	Shuttle Riders		Non-Riders	
	N	Mean	N	Mean
Understanding how to use the shuttle at GNP	164	5.50	153	2.37*
Having Ample time to do the things I want to do at GNP during this visit	170	5.07	158	2.00*
The shuttle will stop at the locations I want	168	4.41	155	2.33*
Being able to get on the bus I want	168	3.63	157	2.01*
Carrying a lot of gear	167	1.87	154	0.52*
* denotes differences between shuttle riders and non-shuttle riders is statistically significant beyond the .05 alpha level				

Salient Belief Constructs Utilized in the Persuasive Brochure (Independent Variable)

The Primary appeal utilized in the present study was *allow me to engage in my chosen activity in GNP*. Baker's (2008) study revealed that non-shuttle riders possessed a negative view toward this attitude while shuttle riders typically held a positive attitude. This discrepancy between groups rendered this attitude an excellent choice for a persuasive message. It has been found that targeting and altering

salient beliefs which differ between those who perform a behavior and those who do not can lead to behavior change (Fishbein & Manfredo, 1992). Therefore, it was predicted that if visitors could be influenced to possess a positive attitude toward this belief, they be more likely to ride the shuttle. This attitude was incorporated into the message by providing information that presented evidence that riding the shuttle would help users reach their desired destination by avoiding parking constraints. It was found that the inability to park at a desired destination influenced visitors at Acadia National Park to ride the optional shuttle (Daigle & Zimmerman, 2004). It was surmised that this occurred because visitors believed that a threat existed as to their ability to visit their desired destination. Researchers who performed a study exploring visitor tradeoffs for riding the park shuttle at Rocky Mountain National Park also suggested that information that provides parking and traffic congestion information can increase optional shuttle use (Pettebone, et al., 2011). Furthermore, various park shuttle studies have revealed that freedom to access areas of interest and avoid traffic and parking problems were major factors in transportation mode choice decisions in National Parks (White, 2007; Holly, 2009; Mace, et al., 2013). The studies indicated that visitors may be more likely to ride an optional shuttle if they perceived that their freedom to visit areas of interest would be unimpeded. The appeal in this message attempted to influence visitors to ride the park shuttle by indicating that their freedom to access areas of interest would actually be enhanced by using the shuttle.

Previous studies have shown that visitors are less likely to be persuaded by information if they already have existing plans to perform a specific behavior (Schomaker, 1975; Lucas, 1981; Brown et al., 1992). However, other research pertaining to behavior change in National Parks has indicated that a message that contains high persuasive power can influence visitor behavior relatively late in the behavior formulation process (Roggenbuck & Berrier, 1982; Daigle & Zimmerman, 2004). The researcher in the present study believed that a threat to the message recipient's ability to visit a desired location would have enough persuasive power to influence transportation mode choice even if the persuasive

message was introduced late in their decision making phase (while occupying a campsite within the park). Logan Pass, St. Mary Falls and Avalanche Creek were targeted in this message as areas that would be difficult to visit due to high parking demand. It is important to note that this message was not misleading, as trail use data from 2012 and 2013 suggest that these areas receive extremely high demand during the summer season (Weinberg et al., 2013b, Weinberg et al., 2014).

Another reason this belief was chosen was because it had high potential to establish personal relevancy for the message recipient. Establishing personal relevancy among the message recipient is one technique that has been used by researchers to facilitate central route processing (Hocket & Hall, 2007; Brown et al., 2010; Petty & Cacioppo, 1984). Parking areas that typically have the biggest issues with overuse include Logan Pass, Avalanche Creek, and the St. Mary Falls parking area. These locations are among the most popular destinations on the GTTSR corridor and it was surmised that the threat of being unable to visit these locations could influence users to ride the shuttle.

The attitude, *allow me to engage in my chosen activity in GNP*, was paired with another salient attitude from Baker's (2008) study: *alleviate parking issues within the park*. Significant differences in mean attitude ratings were found between shuttle and non-shuttle riders for this cognition (Baker, 2008). These messages pair well together because they alert users to a possible threat to their experience as well as a way to avoid this threat; while also mentioning how avoiding the threat will help the park. It was predicted this pairing would be effective in influencing behavior based on previous research that indicates messages designed to influence environmentally responsible behaviors are most effective when paired with moral appeals (Verplanken et al., 2008; Loukopoulos et al., 2005; Corbett, 2005; Kaplan, 2000). Various photographs were included because they have the ability to increase the power of the argument and create a more attractive presentation (Doucet & Cole, 1993; David, 1998; Rucker & Petty, 2006). Two images (one in the inside panel and one on the outside) display the Logan Pass parking area as completely full. Another image displays a content hiker enjoying a view with a

message implying the hiker was able to do this because they took the shuttle to reach their destination.

The messages were included within the brochure and are highlighted in red below (Figures 5 & 6).

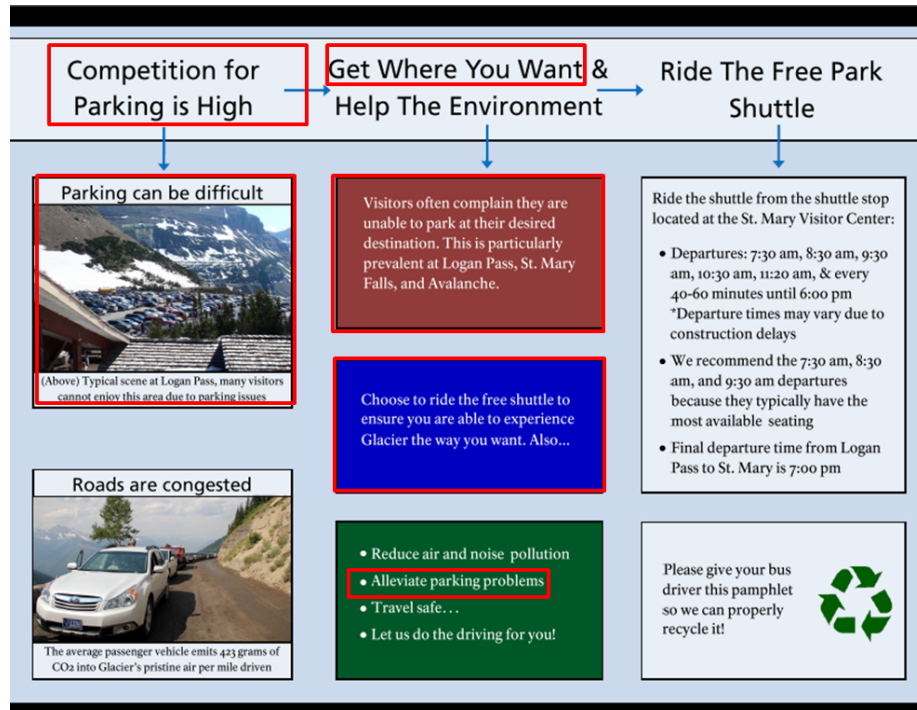


Figure 5: Primary appeals (inside)

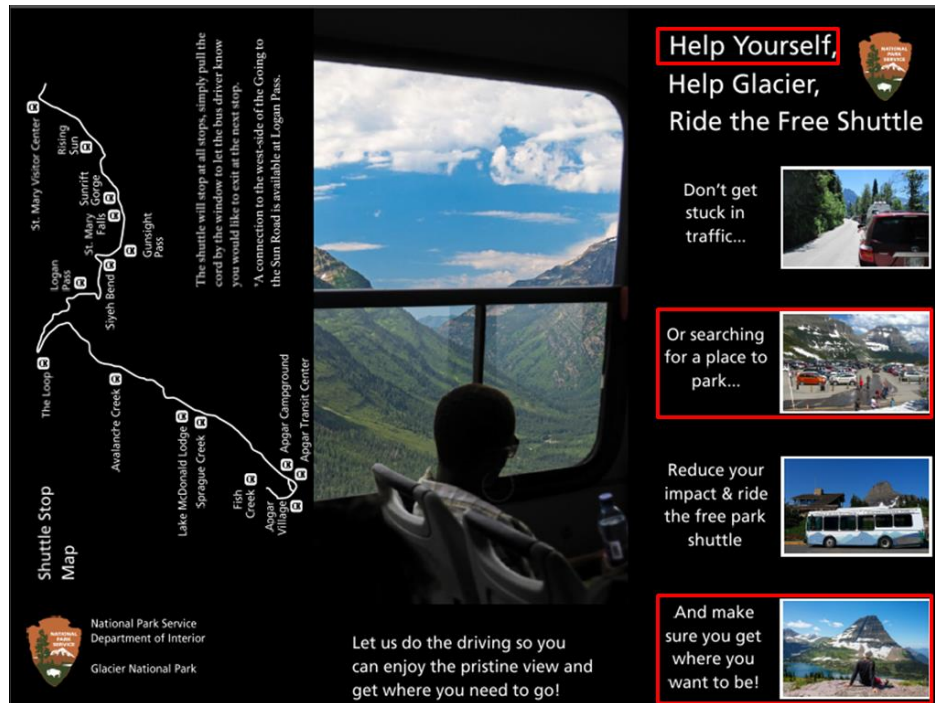


Figure 6: Primary appeal (outside)

Benefit the environment at GNP was another attitudinal belief incorporated into the persuasive message. This was the most widely held attitudinal belief for both shuttle riders and non-shuttle riders. Despite a generally positive attitude held by non-shuttle-riders, they still held a less positive attitude towards this belief than shuttle riders. This difference was shown to be statistically significant. Therefore, there was potential to improve this attitude and increase positive attitudes towards shuttle ridership among visitors. Furthermore, prior research suggested that moral obligations towards the environment have been shown to increase the likelihood of performing such behavior, especially when paired with self-interest concerns (Verplanken et al., 2008; Loukopoulos et al., 2005; Corbett, 2005; Kaplan, 2000). An image of the shuttle was included with this brochure on the front panel in order to make message recipients aware of what the shuttle looks like. This belief was incorporated into the brochure and is highlighted in red below (Figures 7 & 8).

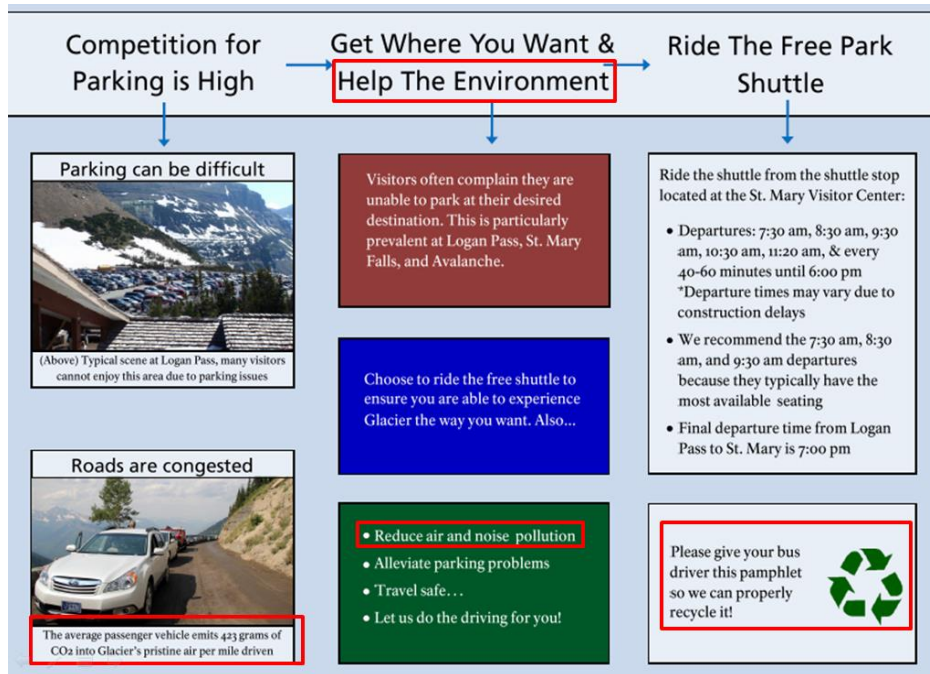


Figure 7: Moral/Environmental appeal (inside)

Shuttle Stop Map



National Park Service
Department of Interior
Glacier National Park

**Help Yourself,
Help Glacier,
Ride the Free Shuttle**



Don't get stuck in traffic...



Or searching for a place to park...



Reduce your impact & ride the free park shuttle



And make sure you get where you want to be!



Let us do the driving so you can enjoy the pristine view and get where you need to go!

Figure 8: Moral/Environmental appeal (outside)

Relieve me of the responsibility of driving was another component used in the present study which was derived from Baker's (2008) list of salient beliefs pertaining to shuttle ridership in GNP. The

researcher in the present study noted that non-shuttle riders possessed significantly less positive attitudes towards this belief than shuttle-riders, thus making it an excellent cognition to include within a persuasive message (Fishbein & Manfredo, 1992). Additionally, Taff et al. (2013) found that shuttle ridership was influenced by stress, which was associated with traffic and congestion worries as well as conflict caused by such worries. The researchers provided specific appeals they felt would increase persuasion potential which included: "avoid traffic stress - park here and let our free buses take you to the scenic overlooks" (Taff, et al., 2013, p 43). The present study utilized similar appeals and included illustrations which revealed undesirable traffic conditions on the GTTSR as well as a comfortable rider enjoying a view from the shuttle. These images were meant to increase the validity of the argument by providing visual examples of the argument (David, 1998; Rucker & Petty, 2006). This belief was incorporated into the brochure and is highlighted in red below (Figures 9 & 10).

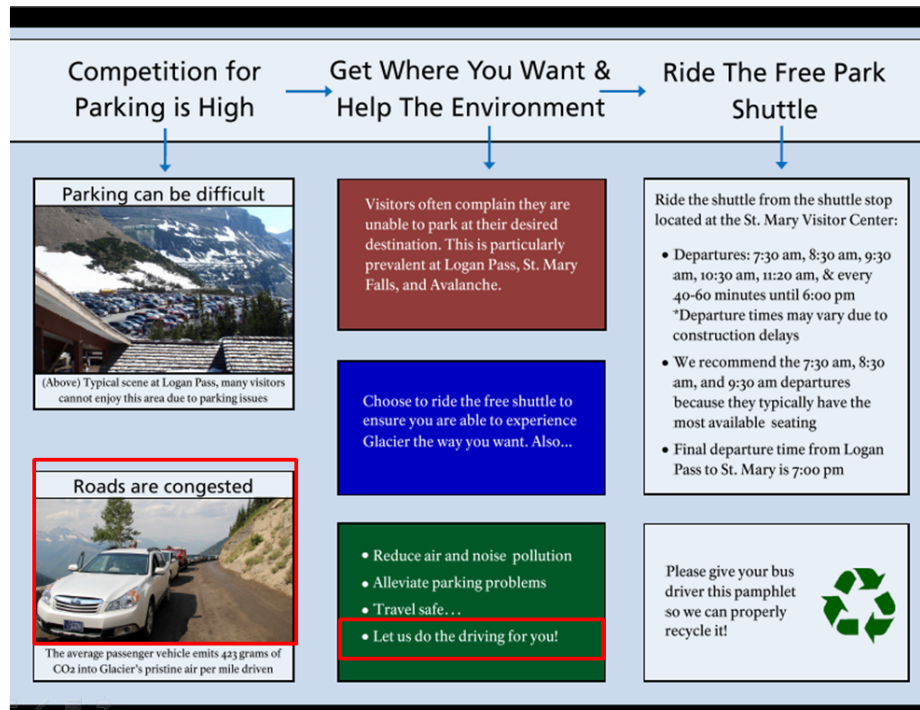


Figure 9: Avoid traffic stress appeal (inside)



Figure 10: Avoid traffic stress appeal (outside)

Safely travel the GTTSR was another salient attitude found in Baker's (2008) study that was incorporated into the persuasive brochure for the present study. Baker (2008) found that the differences between shuttle riders and non-shuttle riders' attitudes towards this cognition were statistically significant; with non-shuttle riders holding less positive attitude towards this belief than shuttle-riders. Thus, it was surmised that if visitors believed that the shuttle system would allow them to safely travel the GTTSR they would be more likely to ride the shuttle. Additionally, Taff et al. (2013) found that the safety provided by shuttle transportation in Yosemite and Rocky Mountain National Parks influenced many users to ride the shuttles. They also provided an example of an appeal they thought would influence visitors to ride an optional shuttle: "let our buses safely guide you around the park" (Taff et al., 2013, p 43). It is also significant to mention that University of Montana researchers received information from Glacier employees which indicated that many visitors fear driving the GTTSR due to

the steep cliffs and narrow traffic lanes. Therefore, it appeared pertinent to appeal to this belief. This appeal was incorporated into the brochure and is highlighted in red below (Figure 11).



Figure 11: Safety appeal (inside)

Finally, *understand how to use the shuttle at GNP* was incorporated into the message as a perceived behavioral control component. Baker's (2008) study revealed that non-shuttle riders were unsure of their ability to understand how to use the shuttle compared to shuttle riders. Therefore, information which helps the user understand how to use the shuttle was incorporated into the brochure. Various studies pertaining to the effectiveness of information dissemination in altering human behavior have found that providing adequate and relevant information is vital to their success (Lime & Lucas, 1977; Schomaker, 1975; Lucas, 1981). Due to practical as well as theoretical reasons, a schedule and shuttle use map were included within the brochure. The St. Mary Campground and Rising Sun Campground brochures differed only in the schedule listed on the right panel of the inside portion. The message contained in the brochure recommended visitors board the first three shuttle departures in

order to avoid crowding. This appeal was included because those three departures were typically the least utilized departure times in 2012. The study would attempt to detect a difference in ridership during morning hours between treatment and non-treatment days. This appeal was incorporated into the brochure and is highlighted below in red (Figures 12, 13 & 14).

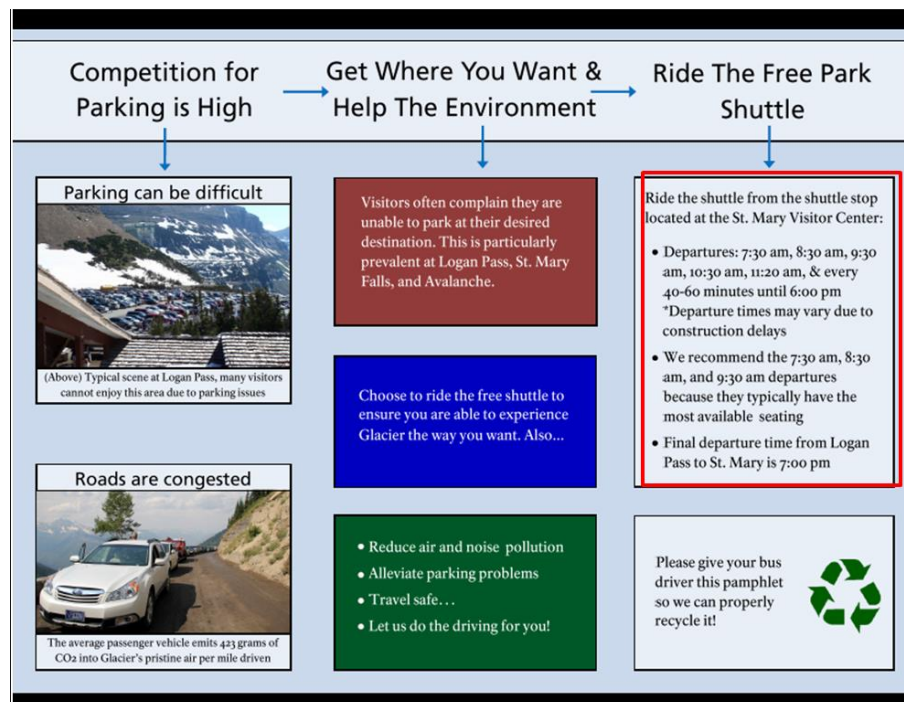


Figure 12: Control appeal (inside, St. Mary brochure)

Design and ELM Components (Independent Variable)

The design and layout of the brochure adhered to guidelines that dictate NPS media in order to elicit peripheral cues as per the ELM which states that perceived professionalism or expertness of a source can influence a visitor to process information (Petty & Cacioppo 1984; Chaiken & Maheswaran, 1994; Rucker & Petty, 2006). Standard NPS graphics were incorporated into the brochure including official typefaces, the black bar, and the agency logo. The ELM also states that eliciting personal relevancy is one of the first steps in attaining thoughtful processing (central route) of a persuasive message (Petty & Cacioppo 1984). The message in this study used a large, bold faced title which speaks to the message recipient: "Help Yourself, Help the Park". Speaking directly to the message recipient within a message by using the word 'you' has been found to be an effective way to establish personal relevancy (Brown et al., 2010).

The message was constructed so as to include minimal blocks of text, as well as various visual components to enhance attractiveness such as: white space, images, and consistent font size. The brochure was inspected by committee members and park personnel to insure the message was accurate and designed appropriately to produce intended results.

Dependent Variables

The dependent variables will be introduced by presenting the hypothesis that the variable pertains to in order to provide context. The section will then discuss how the researcher conceptualized and operationalized the dependent variables for the present study.

H1: Introduction of a persuasive message treatment designed to increase shuttle ridership among Rising Sun and St. Mary Campground occupants will increase the number of visitors boarding the shuttle at the St. Mary visitor center and Rising sun Campground between 7:30 am and 11:20 am.

Dependent variable for H1: The variable was conceptualized as the number of visitors who board the shuttle at the St. Mary Visitor Center and Rising Sun Campground on the 7:30am, 8:30am, 9:30am, 10:30am, and 11:20am runs.

The dependent variable for hypothesis one was operationalized by obtaining detailed on/off shuttle ridership counts from Glacier National Park officials. The ridership counts were listed by shuttle number, location, amount of visitors boarding, and the amount of visitors unloading at a destination. All values were assigned a time vector.

It was noted that if the brochure was overly successful in increasing shuttle usage it may have created conflict with users if demand was too high. If this issue occurred the research agreed to design options in altering the study with park staff to mitigate these effects.

Hypotheses two through four were to be evaluated only if it was found that the persuasive brochure increased shuttle use. Conceptual and operational definitions for hypotheses two through four are offered below.

H2: Introduction of a persuasive message treatment will increase the number of visitors arriving via east-side shuttles at Logan Pass, St. Mary Falls, and Siyeh Bend between 8am and noon.

Dependent variable for H2: The variable was conceptualized as the amount of visitors arriving via east-side shuttle at Logan Pass, St. Mary Falls, and Siyeh Bend between 8am and noon.

The dependent variable for hypothesis two was operationalized by obtaining detailed on/off shuttle ridership counts from Glacier National Park officials. The ridership counts were listed by shuttle number, location, amount of visitors boarding, amount of visitors unloading, and time.

H3: Introduction of a persuasive message treatment will be associated with a later (temporal) observed moment of parking saturation at Logan Pass.

Dependent variable for H3: The variable is conceptualized as the time in which the Logan Pass parking lot is full. The variable was operationalized by observing the parking area to determine the approximate time when parking demand was higher than supply. The time of saturation was recorded by a researcher. A time was recorded when the parking area became unsaturated to compare average saturation lengths.

Additionally, average vehicle counts at the Logan Pass entrance and exit (provided by TRAFx vehicle counters) will be analyzed to contribute further information as to the amount of vehicles entering and exiting the Logan Pass parking area during the time before and after saturation.

H4: Introduction of a persuasive message treatment will increase the number of hikers on the St. Mary Falls trail, Hidden lake trail and Highline trail before noon.

Dependent variable for H4: The dependent variable used in hypothesis four was hikers on the Highline, St. Mary Falls and Hidden lake trails. It was conceptualized as the number of hikers traveling on the Highline, St. Mary Falls, and Hidden Lake trails. These trails were chosen because their access is restricted by parking lot supply, but is increased by the presence of the shuttle.

The dependent variable for hypothesis four was operationalized through the installation of TRAFx trail counters on the Highline, St. Mary Falls and Hidden Lake trails. The trail counters were installed at locations on Hidden Lake and Highline trails which allow the researcher to obtain a reliable count of hikers for both trails. Field calibrations were run as part of a larger visitor use study in order to determine average hiking direction and to obtain the degree of error associated with the device.

Study Site

The experiment was conducted within Glacier National Park in Montana. The brochure was disseminated at two campgrounds within the park: St. Mary Campground and Rising Sun Campground. St. Mary Campground was located approximately a half mile west on the GTTSR from the town of St. Mary. This campground had 143 sites which were available to reserve on the internet. This campground was fully occupied from July through August. The campground was located about a quarter mile from the shuttle stop which the brochure instructed users to visit. A trail was available at the St. Mary Campground which took 5-10 minutes to reach the St. Mary Transit Center. The transit center is the location where the east-side shuttle route begins and ends.

The Rising Sun Campground is located 6.3 miles west on the GTTSR from the town of St. Mary. The campground has 84 sites. The closest shuttle stop is less than a quarter mile from the campground in front of the Rising Sun Motor Inn. This is where Rising Sun occupants were instructed to board the shuttle. This is the second stop on the east-side shuttle route when traveling towards Logan Pass. This campground was fully occupied throughout the study period until August 5th. Beginning August 5th and lasting until August 9th, the campground was closed due to bear activity. When it reopened, it was only open to hard sites, meaning only campers and RVs (no tents). This resulted in a much lower occupancy than before the closure.

Experimental design

The experiment was conducted as a blocked quasi-experimental design. Due to constraints in the duration of the study and the nature of the variables being measured, true random assignment was not possible. The treatment (independent variable) was assigned to an entire day, thus the overall unit of analysis was measured by day.

The experimental design adhered to a design consistent with an interrupted time-series design where multiple observations are made before and during the introduction of the treatment. This type of design is preferred by researchers using a time series design because it helps the researcher distinguish treatment effects from overall trends by comparing the overall pattern with any change that occurred during the introduction of the intervention (Singleton & Straits, 2010). This design was used because it was thought that it could account for daily fluctuations in visitor use on the GTTSR. It was surmised that the experimental design would also remove variation caused by day of the week trends (i.e. Saturday use vs. Tuesday use) because the treatments were scheduled on different days every week. Therefore, the effects of natural and weekly variation were thought to be controlled by the design. The researcher also used vehicle use data in order to control for daily fluctuations in visitor use to further account for daily fluctuations in shuttle use. This will be discussed in the *analysis* section.

Experimental blocking occurred in 4-day blocks. Two days of control condition observations were conducted first. The brochure was disseminated the evening of the second control day (after the shuttle stopped operating). The following day was monitored as a 'main effect' treatment day. The day following main treatment was referred to as a 'partial treatment'. This day was referred to as a 'partial treatment' because it was predicted that the day after the treatment was disseminated would have the strongest effect, while the second day would have a partial effect. It was predicted that following the

partial treatment were two days with little to no effect. This prediction was made because data from visitor studies conducted at Glacier National Park from 2005 to 2007 indicated that average visitor length of stay was two nights (Freimund et al., 2006a; Baker & Freimund, 2007). The overall purpose of partial treatment period was to study the lag effect that may occur as a result of the treatment, as well as to give the treatment a temporal buffer in order for the effects to wear off before control days can be observed again.

Overall, the block consisted of 4 days: 2 control days, 1 treatment day and 1 partial treatment day; occurring in sequential order. The experiment began the first of July and the final control day was monitored on August 27th. This would allow the researcher to gather data for 30 control days, 14 treatment days and 14 partial treatment days. The study schedule is depicted in the appendix.

Dissemination Procedure and Personal Contact Script

The brochure was handed out by a researcher dressed as a park volunteer at both the St. Mary and Rising Sun campgrounds during the evening of the second control day. Dissemination periods occurred at the same time for both campgrounds so two researchers were required for this process. During days in which the brochure was disseminated, the researcher present would accompany a park interpretation employee while the employee informed visitors of their evening program. After the employee completed their contact they would inform the group that a volunteer would give them information about the park shuttle. This was done so that park visitors would be less burdened by the researcher's presence due to the fact that an employee was already contacting them. The dissemination procedure was also designed in this manner because park employees could easily replicate this

technique if it was found effective at changing behavior due to the fact they already patrol the campgrounds every evening.

The researcher was instructed to first gain an understanding as to whether or not the contacted party was planning to use the GTTSR while they were staying at the campground. If the party had already visited the road, taken the shuttle, or was leaving the following day they would not be given a brochure and the researcher would move on to the next occupied site. The researcher was instructed to ask a 'filter' question which varied between contacts but approximately resembled the following question:

"Good evening, are you planning to visit the Going to the Sun Road during your stay?"

The 'filter' question was asked in order to avoid wasting time and brochures attempting to persuade users who could not ride the shuttle or who had already taken the shuttle. If it was found the information was not suitable for the campsite occupants the researcher would dismiss the party as tactfully as possible and move on to the next occupied campsite. If the researcher found that the users did meet the necessary requirements to receive the brochure they would then summarize the information presented in the brochure. The researcher disseminating the information was asked to summarize the information using the following script.

"The park would like to recommend you use the free shuttle. Parking and traffic can be congested and it is often very difficult to park at many locations on the Going-to-the-Sun Road including Logan Pass, St. Mary Falls, and Avalanche Creek. Riding the shuttle will make sure you don't have issues parking at your desired destination. You can also help the park reduce air and noise pollution by leaving your car behind and riding the shuttle. We recommend the 7:30, 8:30

and 9:30 shuttles departures to beat the crowds, but all shuttles typically have available space. Here is a pamphlet with more details. Please give it to your bus driver if you decide to use it so we can recycle it. Have a good night!"

Visitors were urged to ride the earlier shuttles because they were typically the least utilized shuttles based on ridership data from 2012. It must be noted that this script was not followed word by word as some variation occurred during each contact. This was simply the nature of conducting an experiment in a real-world setting. The researchers did make concerted efforts to hit the key points with every contact.

The researcher who disseminated the information was also asked to explain the shuttle map, schedule and frequency of departure to the message recipients. The message recipients were asked to return the brochure to their bus driver if they used the shuttle in an attempt to quantify the approximate amount of visitors who utilized the information. The date the drivers received the brochures was recorded in order to understand when the visitors used the information. This was important because it would enable the research to validate the study design.

The researcher who disseminated each brochure also collected data pertaining to visitor characteristics which included: number in party, number of children, group type, and license plate origin. This data was collected by observation alone. This information was gathered in order to understand the amount of campers who received the information as well to gather general group characteristics.

Beginning July 27th, the dissemination procedure was slightly altered to include dissemination at the St. Mary Campground entrance gate as well as the procedure listed above. This was done in order to increase the amount of brochures disseminated as it was found that many visitors were not available at their campsites during the interpretive rangers' evening patrols. This alteration consisted of handing

out brochures at the entrance as visitors checked into the campground. Only visitors who were checking into a campsite were contacted. The script was also changed slightly to include a statement which let the message recipient know that if they did not use the information they could return it to the campground attendant when they check out. This was done in order to gauge how many visitors did not use the information. Other than the aforementioned changes, the researcher followed the same protocol when handing out the brochure at the entrance station and would still patrol the campground with the interpretive ranger the same day. No alterations were made the dissemination protocol at Rising Sun.

Brochure Manufacturing

Brochures were printed at a local printing company in full color on 24 lb. smooth text paper. Due to the large number of campsites at both campgrounds 500 brochures were printed for each campground.

Methodology Limitations

A limitation of the methods used in this study was that there would be a relatively low number of potential observations which could have made it difficult to derive statistical significance if an effect was detected. Additionally, the nature of performing an experiment within a National Park setting presents obvious issues in controlling for extraneous forces. The dependent variables measured in this study were associated with various aspects of visitor use in Glacier National Park which render their values vulnerable to the influence of natural fluctuation. Conditions in this experiment were not randomly assigned which made it difficult to rule out effects associated with extraneous variables--specifically the effects of natural, day to day variation in visitor use levels. However, the researcher felt

the experimental design would partly control for this natural variation. This design increased the likelihood that effects of natural variation were evenly spread out as the block design was repeated throughout the summer.

Other factors that were difficult to control were the nature of the conversations with visitors who often wanted to extend conversations and ask questions about the park. The researchers themselves may have also influenced the persuasiveness of the brochure just by the way they appeared or interacted with visitors. Another reason this study may be difficult to generalize is the fact that road construction took place on the east side of the GTTSR; specifically between Rising Sun and the Sunrift Gorge parking area. The presence of road construction caused traffic delays that commonly reached ten minutes and may have influenced travel patterns on the road corridor. Therefore, the data for the present study should be interpreted with this information in mind when making generalizations concerning the results.

CHAPTER 5: DESCRIBING THE DATA

The purpose of this chapter is to describe the data analysis conducted which was designed to test the hypotheses for the research presented in this paper. The chapter will begin by describing the visitors contacted during brochure dissemination. This will be followed by a descriptive analysis of the amount of brochures disseminated and when visitors returned brochures to shuttle drivers and campground attendants. Chapter six will then describe the variables, assumptions and detail the steps for an ANOVA analysis to determine if significant differences existed between experimental groups. This was followed by a regression analysis that was designed to control for various extraneous variables. A summary is presented at the end.

Describing the Sample: Message Recipient Characteristics

The purpose of this section is to describe the message recipients who were targeted in the present experiment. Researchers made various demographic observations while disseminating the message at the Rising Sun and St. Mary Campgrounds. Basic information was recorded including: state of origin (based on license plate information), group type, group size, and number of children. This information was gathered in order to compare the present sample population with previous sample populations performed in GNP in order to understand if St. Mary and Rising Sun campground occupants are consistent with the general GTTSR population. This was important because the present study aims to generalize its findings to the GTTSR corridor.

It is important to note that this data was not reported by the message recipients, but rather by the researcher. Therefore the data presented likely possesses some inaccuracies. For instance, measurement of group size was limited to whoever was present at the campsite, some vehicles may have been rental cars thus rendering license plate origin an invalid measurement, and assessment of group type was purely subjective. Despite these limitations, the researcher in the present study feels that this data possessed some utility in describing the sample population for the present study.

It must also be noted that researchers did not collect any demographic information on the first day the brochure was handed out (July 7th). Therefore, the demographic data pertains to thirteen days of brochure dissemination at the St. Mary Campground and twelve days at the Rising Sun Campground.

Group State of Origin

Figure 15 displays the top ten most frequently observed license plates during brochure dissemination periods. A total of 953 vehicle license plates were observed. Montana was the most often observed license plate origin with 145 observed vehicles which accounted for 15.2% of observed

vehicles. Washington and Colorado were the next most frequently observed license plates; accounting for 6.3% and 5.8% of observed vehicles respectively. Rounding out the top five most frequently observed license plates were Minnesota and California.

These results appear roughly consistent with results from past studies. For instance, Montana ranked the highest in frequency from studies conducted in past studies. However, results from this study garnered the lowest population percentage of Montana residents than three previous studies which were conducted in 2006, 2007 and 2012. These studies gathered percentages of 26%, 16.8%, and 18.6% respectively (Baker et al., 2006; Baker, 2008; Bedoya & Freimund, 2012). These differences can likely be explained by natural variation as well as differing methods. For instance, the study that observed 26% of Montana residents collected data by observing license plates at popular viewpoints. This slight inconsistency could also have occurred due simply because the state of origin differs for visitors at east-side campgrounds in contrast to visitors on the GTTSR in general. However, it can be surmised that place of residence is roughly consistent with previous studies that were performed on varying sample populations within the GTTSR.

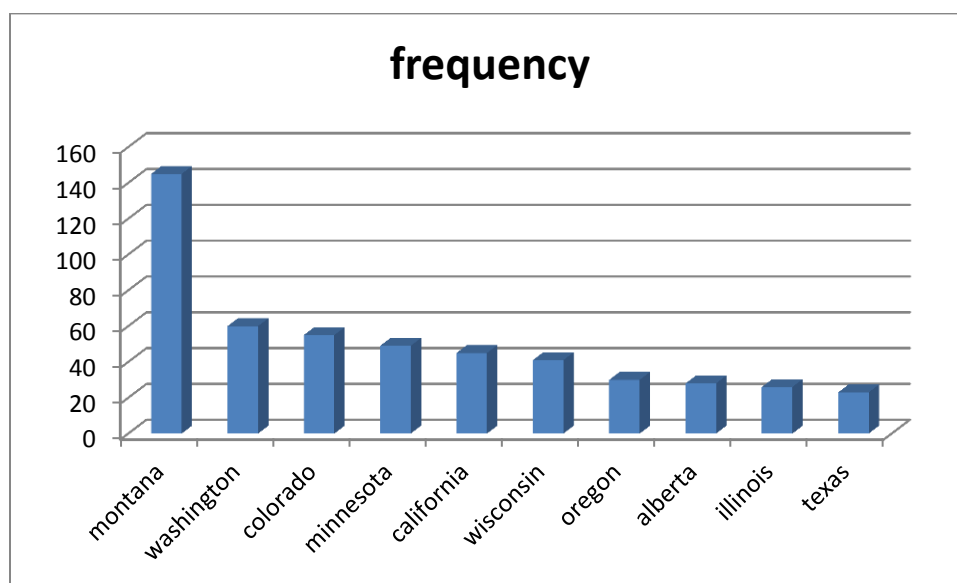


Figure 15: Message contacts' state of origin

Group Type

Table 3 displays observed group types during dissemination periods. A total of 953 groups were observed. Family was the most frequently observed group type; accounting for 60.7% of groups. This is consistent with previous studies where it was found that families accounted for 60-70% of group types on the GTTSR corridor (Freimund et al., 2006a; Baker, 2008; Bedoya & Freimund, 2012). Friends accounted for the second highest observed group type (24%). This number is consistently about 10% higher than previous studies, which indicates that campgrounds may have more groups of friends, or that observers misinterpreted group types. Groups consisting of friends and family made up 5.4% of contacted groups which is slightly lower than observed frequencies in previous studies which indicates that observers may have had a difficult time determining group type for this category. Conversely, the data could indicate that groups of friends and family frequent campgrounds less often. The remaining group types observed in the present study (alone, organized group, work group) are consistent with percentages found in past studies (Freimund et al., 2006a; Baker, 2008; Bedoya & Freimund., 2012).

Table 3: Message contacts' group type

Group Type	N	Percent
Family	578	60.7
Friends	229	24
Alone	71	7.5
Friends/Family	51	5.4
Organized Group	5	0.5
Work Group	1	0.1

Group Size

A frequency table below displays frequency of various group sizes observed in the present study (Figure 16). A total of 953 groups were observed. Mean group size was 2.82 with a median of 2. This average group size is slightly lower than previous studies (Baker, 2008; Bedoya & Freimund, 2012). It is not surprising the mean is slightly lower because group sizes were limited to what the researcher could

observe which didn't count those in the group who weren't present. Maximum observed group size was 20 which was observed twice. Group sizes of two were the most frequently observed; accounting for 49.3% of groups. Group sizes of three and four were the next most frequently observed, accounting for 15.7% and 14.3% respectively. Group sizes of one were observed 8% of the time. Overall, it appears that group sizes in the present study are approximately consistent with group sizes found within previous studies conducted on the GTTSR corridor (Baker, 2008; Bedoya & Freimund, 2012).

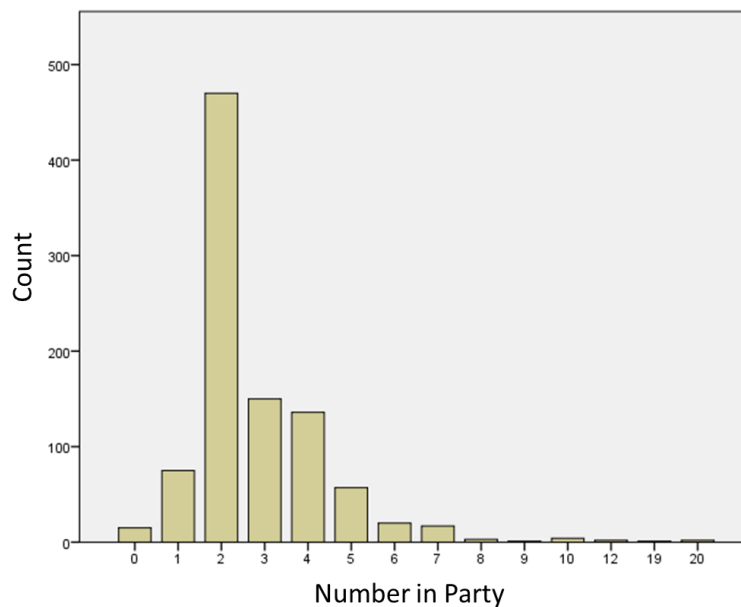


Figure 16: Number in party

Number of Children in Groups

For the purposes of this study, children were defined as group members who appeared to be under the age of 18. Of 953 groups observed, 252 of them had children. Groups with children accounted for 26.4% of groups observed. Groups with 1 child and 2 children accounted for 10% and 10.8% of groups respectively. These findings are roughly consistent with past studies conducted on the GTTSR corridor (Baker, 2008; Bedoya & Freimund, 2012).

Summary of Group Characteristics

Despite the limitations concerning the manner in which group characteristics data was collected, the visitors sampled in the present study appear consistent with previous studies conducted on the GTTSR in terms of state of origin, group type, number in party, and number of children in party. Therefore, the author argues that findings from the present study can be generalized to the entire GTTSR corridor.

Describing the Sample: Brochure Dissemination

In addition to collecting data pertaining to group type, researchers also collected data pertaining to brochure dissemination. The types of data included: the reason visitors gave for not taking the brochure (of those who were not given the message), various measures as to how many messages were disseminated, and when visitors returned the message to a shuttle driver or campground attendant. This type of information was gathered in order provide general descriptive data and to understand how widely the message was disseminated. Information pertaining to when visitors returned the message also gave insight as to the validity of the study design.

Reason for not taking the brochure

Researchers collected data pertaining to why groups were not given a brochure during dissemination periods. This data was deemed helpful in understanding why the brochure was not useful to those who did not fit the requirements to receive the message or for those who did fit the requirements but refused the message.

A variety of reasons were given by message recipients for not accepting the brochure and the top seven responses are listed below (Table 4). Of 953 groups who were contacted, 394 respondents

were not given a brochure. The two most commonly cited reasons for not accepting a brochure were that the groups were leaving the park the following day (34%) and that they had already taken the shuttle and thus did not require persuasion (32%). Other fairly common reasons included: that the group was already familiar with the shuttle (5.3%), the group was headed to Many Glacier (5%), the group did not want the information (4%), the group wanted to drive the road (3.3%) and some groups indicated they were simply not interested in receiving the information (3%).

Table 4: Reason for not taking the brochure

Reason cited	N	Percent of sample	Percent of those who did not accept
Leaving tomorrow	135	14.2	34
Already rode the shuttle	126	13.2	32
Familiar with the shuttle	21	2.2	5.3
Going to Many Glacier	20	2.1	5
Didn't want information	16	1.7	4
Want to drive	13	1.4	3.3
Not interested	12	1.3	3

Brochure Dissemination Statistics

Figures 17 and 18 display brochure dissemination statistics for the Rising Sun Campground. A total of 176 brochures were disseminated to campers on 13 treatment days. The total number of visitors in groups who received a brochure was 421. Therefore, the brochure had the potential to influence 421 visitors to board the shuttle from the Rising Sun Motor Inn shuttle stop. An average of 35 total visitors received the brochure on treatment days. It must be noted that this number is the minimum amount of visitors that potentially could be persuaded. This is due to the fact that researchers only counted visitors who were present at the campsite, which did not take into account the amount of visitors who were part of the group but were not present. The same reasoning applies to data from the St. Mary Campground.

It is significant to note that the campground was closed for one treatment day on August 7th. This was caused by bear activity in the area. The campground was reopened on August 10th, but only to

hard sites. As can be viewed, significantly fewer visitors were contacted after this point. It was noted that most visitors could not be contacted after this point because visitors were often inside their campers and the dissemination protocol did not allow for this type of contact. Despite this interruption to the study, it is surmised that amount of message recipients in the first nine treatments could have created a detectable change in shuttle ridership if the treatment was effective.

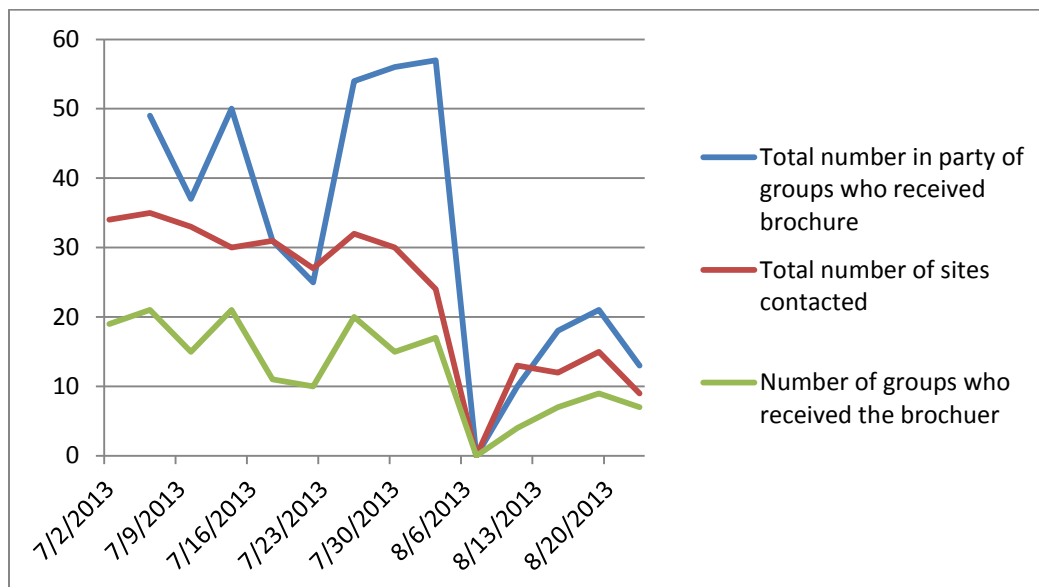


Figure 17: Message dissemination statistics at the Rising Sun Campground (those who received the brochure)

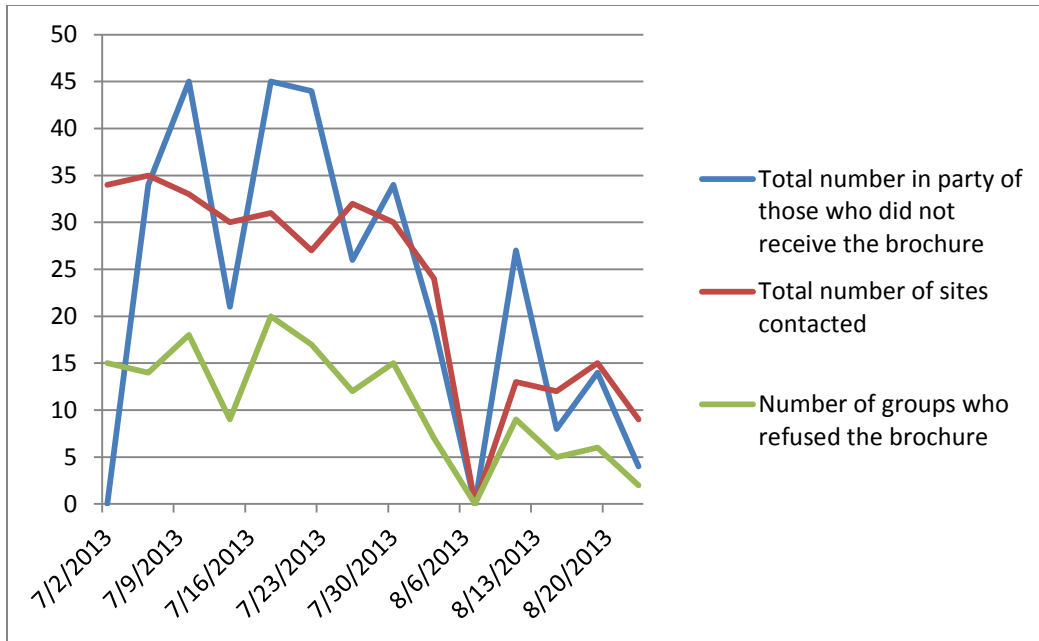


Figure 18: Message dissemination statistics at the Rising Sun Campground (those who did not receive the brochure)

Figures 19 and 20 display brochure dissemination statistics for the St. Mary Campground. This data includes brochures handed out at the St. Mary Campground entrance station. A total of 398 brochures were disseminated to campers on 14 treatment days. The total number of visitors in groups who received a brochure was 1,129. Therefore, the brochure had the potential to influence 1,129 visitors to board the shuttle at the St. Mary Transit Center. An average of 87 total visitors received the brochure on treatment days. These statistics indicate there were likely enough visitors contacted in order to create a detectable change in shuttle ridership if the brochure was sufficiently persuasive.

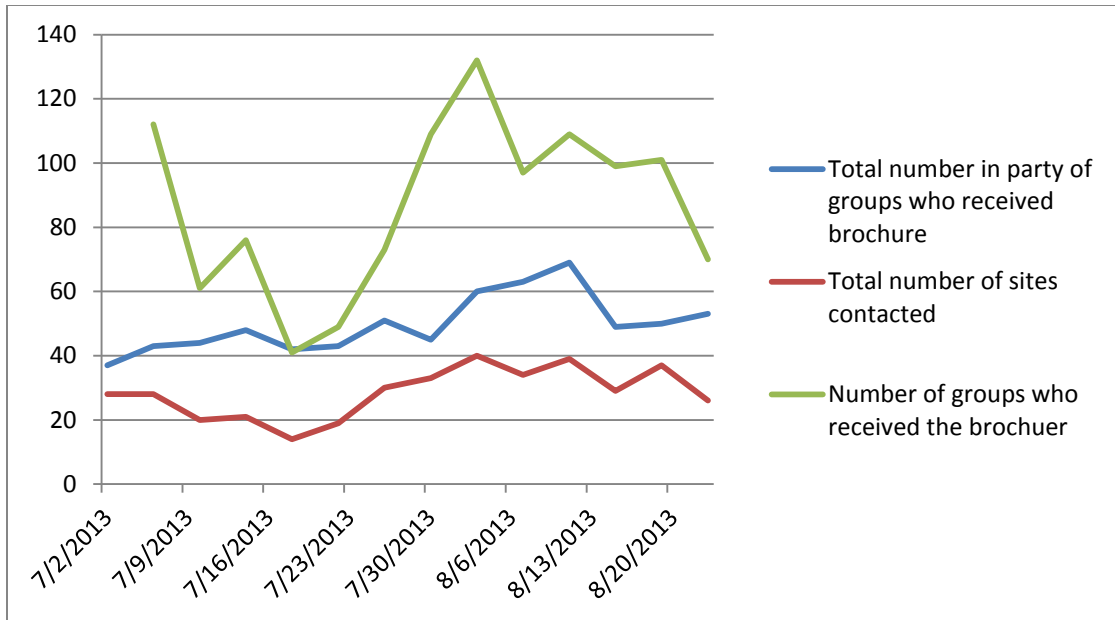


Figure 19: Message dissemination statistics at the St. Mary Campground (those who received the brochure)

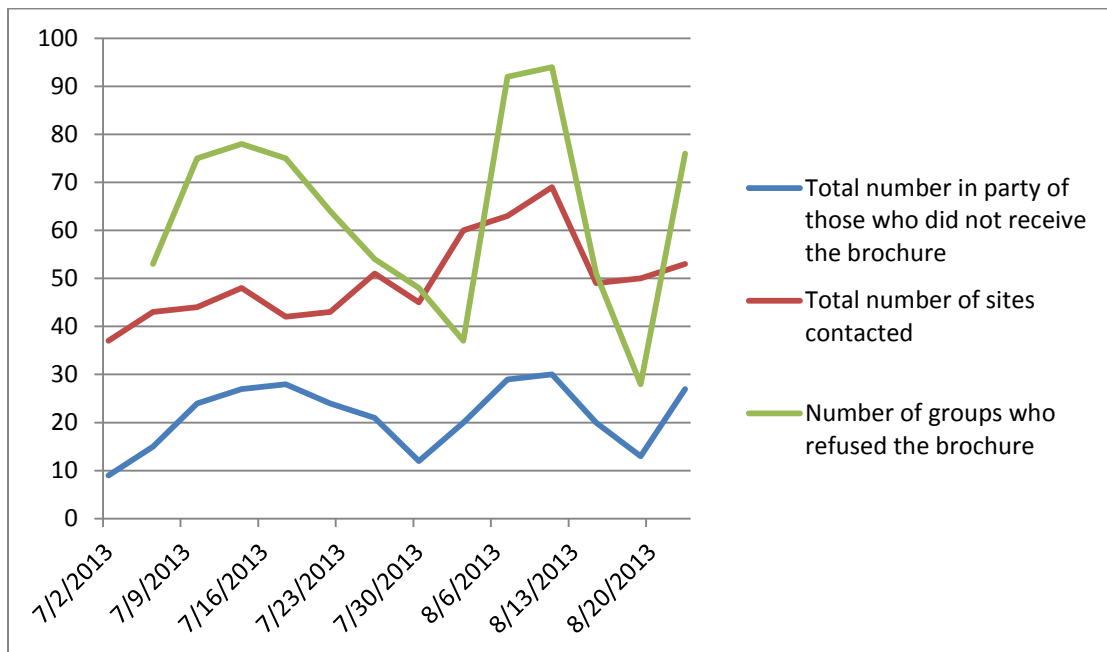


Figure 20: Message dissemination statistics at the St. Mary Campground (those who did not receive the brochure)

Table 5 displays combined dissemination statistics totals from the Rising Sun and St. Mary campgrounds. A total of 1,022 sites were contacted over 14 treatment days (13 at Rising Sun) with a total of 574 brochures disseminated. A total of 1,540 visitors were part of groups who received the

brochure. The large number of total visitors who were in groups that received the brochure indicates there was a sufficient number of message recipients to create a detectable change in shuttle ridership if the brochure was effective.

Table 5: Brochure dissemination statistics

Location	Number of Sites Contacted	Number of Brochures Disseminated	Total Group Size Disseminated	Number Groups Refused	Total Group Size Refused
St. Mary Campground	550	277	781	273	774
St. Mary CG Entrance Station	147	121	338	26	51
Rising Sun Campground	325	176	421	149	321
Total	1022	574	1,540	448	1,146

How Many Brochures Were Returned to Shuttle Drivers/Campground Attendant?

Message recipients were asked to return their brochure to a shuttle driver if they rode the shuttle so that the Park could recycle the brochure. Additionally, message recipients at the St. Mary Campground were asked to return the brochure to the campground attendant when they checked out if they did not ride the shuttle so that the Park could recycle the brochure. Visitors were asked to do this so the researcher could understand when message recipients used the brochure in order to validate the study design. For instance, if most visitors returned the brochure to their shuttle driver on ‘main effect’ treatment days, then it would display that the experimental design was valid. However, if most brochures were returned on the second control day it would indicate that the brochure was not being used as close to the dissemination date as possible and it would be difficult to detect a difference between treatment and control days.

Another reason visitors were asked to return their brochures was to roughly quantify how many visitors were persuaded or not persuaded by the information.

Results suggest that the study design was valid; however, the researcher was surprised how few brochures were returned. Of 574 brochures disseminated, only 12 were returned to a shuttle driver

(.3%). Of the 268 groups who received a brochure at the St. Mary Campground who were given the additional request of returning the brochure to the campground attendant when they checked out if they did not ride the shuttle, 15 were returned to the attendant (5.6%). Of the 15 returned to the campground attendant, researchers were unable to identify four of the brochures were returned.

Figure 21 displays the amount of brochures that were returned on the four experimental group days. As can be viewed, the majority of returned brochures were returned on 'main effect' days or 'partial effect' days. A total of 16 brochures were returned on main effect days (70%), 5 brochures were returned on partial effect days (22%), and 2 brochures were returned on control days (8%).

The limited number of data pertaining to returned brochures appears to support the experimental design of the present study. It also suggests that the attempt to get visitors to recycle the brochure was wildly unsuccessful. It appears that visitors did not desire to recycle the brochure whether they rode the shuttle or not. A number of reasons for not returning the brochure can be surmised: visitors forgot about the brochure, visitors wanted to keep the brochure, or visitors discarded the brochure in their campground fire. The limited amount of brochures returned to shuttle drivers may also be interpreted as the brochure not being persuasive in encouraging shuttle use. The other utility this information provided to the present study was the ability to understand when visitors used the information. This information was helpful in validating the experimental design.

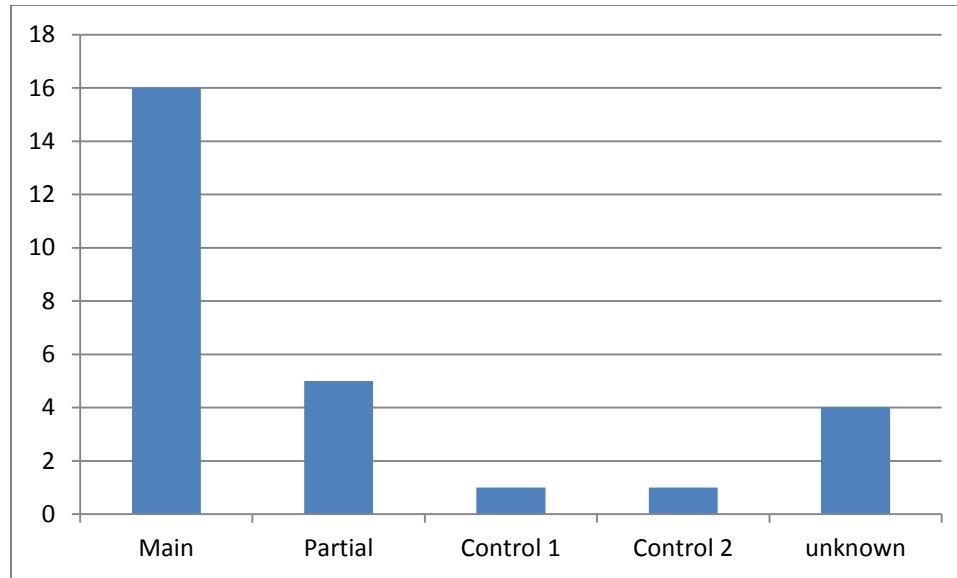


Figure 21: Brochure return days

CHAPTER 6: DATA ANALYSIS

The primary purpose of this chapter is to perform the necessary analyses in order to assess the hypotheses presented in this paper. The chapter will begin with an ANOVA analysis which determined whether or not the anticipated treatment effect occurred among the experimental groups. This analysis will be followed by a regression analysis which was designed to control for variation which may have impacted shuttle use external to the brochure treatment.

Logic of Analysis

The present study used a one-way ANOVA followed by an ordinary least squares regression model as the means to test the first hypothesis presented in this paper. The first step was to determine whether or not there were any anticipated differences among experimental groups. A one-way ANOVA fit well with this type of analysis. It was also deemed important to understand how controlling for daily fluctuation in shuttle use could impact the results of the ANOVA. An ordinary least squares regression analysis was surmised to be appropriate because it allows the researcher to observe changes in the

independent variables (the experimental groups) while holding the effects of various control variables constant. Due to the highly dynamic nature of visitor use on the GTTSR, it was thought that controlling for these forces would enhance the ability of the researcher to 'tease out' any treatment effects if they indeed existed.

Determining Treatment Effects Among Experimental Groups

The present study was concerned with whether or not an indirect management technique (persuasive brochure dissemination) could be successful in increasing optional shuttle ridership in GNP. The hypothesis is listed below:

H1: Introduction of a persuasive message treatment designed to increase shuttle ridership among Rising Sun and St. Mary Campground occupants will increase the number of visitors boarding the shuttle at the St. Mary visitor center and Rising sun Campground between 7:30 am and 11:20 am.

The experiment was designed to increase the amount of visitors boarding the shuttle in the morning (7:30am-11:20 am) at the Rising Sun Motor Inn and St. Mary Visitor Center shuttle stops. The researcher predicted a sizeable increase in shuttle ridership every day after the brochure was disseminated. This was referred to as the main effect treatment. Two days after was referred to as the partial effect treatment; where it was predicted shuttle use would increase, but by a lesser amount. The third and fourth days were control days. It was predicted the effect of the persuasive brochure would be minimal during control days because data from previous studies suggest that GTTSR visitors typically spend an average of 2 nights in the park (1.5 nights, 2.5 nights, 2.4 nights) (Freimund et al., 2006a; Freimund, et al., 2006b, Baker & Freimund, 2007). The design of the experiment was partially validated

based on dates in which brochures were returned by message recipients. Therefore, the treatment was predicted to create a detectable increase in shuttle ridership every four days. This 'blip' in shuttle ridership was predicted to level off by the first control day and be undetectable by the second control day.

A one way analysis of variance was used to determine if significant differences existed between the means of various experimental groups with respect to the dependent variables. This type of analysis was deemed appropriate because it would provide a statistical test of whether or not the means of the experimental groups were equal. Separate analyses were run for each shuttle stop. This was done because the Rising Sun shuttle stop was missing values due to a five day closure. The experiment was halted at the Rising Sun Campground when the campground was closed. In contrast, the St. Mary shuttle stop experiment was conducted without incident. The null hypothesis for both shuttle stops is listed below:

$$H_0: \mu_1 = \mu_2 = \mu_3 = \mu_4$$
$$H_1: H_0 \text{ False}$$

Variable Descriptions

Four experimental groups were present in the current analysis for both campgrounds and they act as the independent/factor variable. The experimental groups were: main effect day, partial effect day, first control day, and second control day. This variable was recorded as a categorical variable. The unit of analysis was day, which is the same for all variables within the present analysis.

Two dependent variables were measured. One variable represented the total number of visitors boarding the shuttle at the St. Mary Visitor Center during the first five shuttle stops of the day (7:30 am, 8:30 am, 9:30 am, 10:30 am, and 11:20 am). The other dependent variable was the total number of visitors boarding the shuttle at the Rising Sun Motor Inn during the first five shuttle stops of the day

(7:42 am, 8:42 am, 9:42 am, 10:42 am and 11:32 am). The dependent variables are measured using ratio measurement. The unit of analysis was day for both dependent variables.

Assumptions

The assumptions that must be met before conducting the present analysis are as follows: the data was collected using random sampling, the scores are normally distributed within the population, population variances are equal, and the variables are measured using interval/ratio measurement.

The present study used a method of data collection that wasn't true random sampling. However, through a quasi-experimental design the study was designed to mitigate effects of seasonal and weekly variation in visitor use, and was established in a manner as random as possible within the parameters of the study. Therefore, it can be assumed that this assumption is met.

The experimental group variable is a categorical variable and thus it does not meet the assumption of being interval/ration. However, one can argue that the differences between experimental groups are meaningful because the difference is essentially measuring the amount of days since the brochure treatment was disseminated. For the purposes of the present study, the analysis will continue with caution.

A Levene's test was run in order to test the assumption of equal population variance. The Levene's test assessed the null hypothesis of equal population variance for both analyses. The test results revealed that the null claim could not be rejected for either analysis (Table 6). Therefore, the assumption can be made that there are no differences among population variances within both samples.

Table 6: Levenes Test of Equality of Error Variances

Dependent Variable: St. Mary On

F	df1	df2	Sig.
.084	3	54	.969

Dependent Variable: Rising Sun On

F	df1	df2	Sig.
.311	3	49	.818

A Cook's Distance analysis was conducted in order to determine if influential cases would potentially bias the results of the analysis. Cook's Distance maximum values for both dependent variables were well below zero which indicated there were no influential cases (Table 7). The analysis will continue by reviewing descriptive statistics.

Table 7: Cook's distance scores for St. Mary and Rising Sun

	N	Minimum	Maximum
Cook's Distance for St. Mary On	58	.00	0.11
Cook's Distance for Rising Sun On	53	.00	0.10

Descriptive statistics were run to determine if the assumption of normality was valid and to assess whether or not there were missing values. Results from the descriptive statistics table suggested there were no missing values for the St. Mary and Rising Sun campgrounds analyses (Table 8). The differences in n values observed between the Rising Sun experiment and the St. Mary experiment can be

accounted for by the campground closure which halted the experiment at Rising Sun, while the experiment at St. Mary continued.

Table 8 reveals that the mean and median scores for the amount of visitors boarding the shuttle at the St. Mary Visitor Center and the Rising Sun Motor Inn shuttle stops were nearly equal, indicating the variables were approximately normally distributed. The skewness values for the dependent variables were also near zero which also indicated there was little skew. However, the kurtosis values were not close to three. This indicated that the 'peakedness' of the distribution was not consistent with a normal curve. However, due to the relatively small sample size and because the distributions appeared approximately normally distributed, the analysis proceeded with the normality assumption in mind. Normality was not of concern for the independent variables because they were categorical.

Table 8: Descriptive statistics

	N	Missing	Mean	Median	Std. Dev.	Skew	Std. Error Skew	Kurt.	Std. Error Kurt	Min.	Max.
St. Mary On	58	0	103.74	103.50	31.88	.314	.314	-.139	.618	37	185
Rising Sun On	53	5	20.55	21	7.96	.015	.327	-.602	.644	6	40
St. Mary Experimental Groups	58	0	2.53	3	1.127	-.051	.314	-1.370	.618	1	4
Rising Sun Experimental groups	53	5	2.55	3	1.136	-.080	.327	-1.387	.644	1	4

ANOVA Results

A brief analysis of the means between groups in both analyses revealed that there was very little anticipated effect (Figures 22 & 23). For instance, the difference between the lowest and highest experimental groups means was less than four rider at the Rising Sun shuttle stop. The St. Mary shuttle stop possessed some of the anticipated treatment effects except for the fact that the second control day possessed the highest mean.

Results from the comparison of means table were supported after conducting two separate one-way ANOVA's for both shuttle stops (Tables 9 & 10). In both cases the differences between experimental group means were found to be non-significant. Thus, the analysis revealed that the null claim of no differences between groups could not be rejected for the St. Mary or Rising Sun shuttle stops. Furthermore, the prediction that shuttle use would be highest on main treatment days and gradually decrease each day thereafter was found to to be unsupported by the results of the ANOVA.

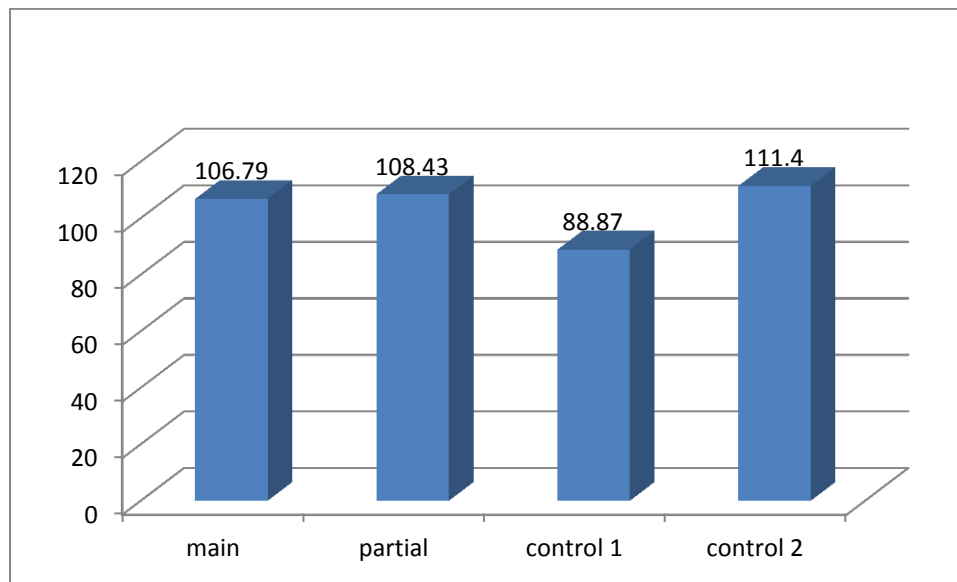


Figure 22: St. Mary shuttle stop average ridership per experimental group

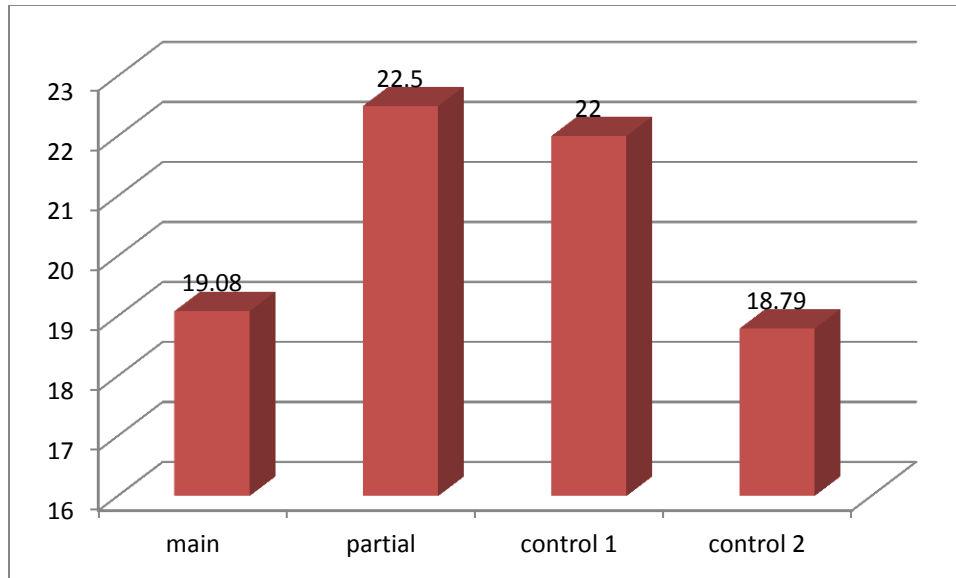


Figure 23: Rising Sun Motor Inn shuttle stop average ridership per experimental group

Table 9: ANOVA test for the St. Mary shuttle stop

Dependent Variable: St. Mary On

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4636.002 ^a	3	1545.334	1.566	.208
Intercept	625019.458	1	625019.458	633.452	.000
Exp. Groups	4636.002	3	1545.334	1.566	.208
Error	53281.119	54	986.687		
Total	682129.000	58			
Corrected Total	57917.121	57			

a. R Squared = .080 (Adjusted R Squared = .029)

Table 10: ANOVA test for the Rising Sun Motor Inn shuttle stop

Dependent Variable: Rising Sun On

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	146.852 ^a	3	48.951	.762	.521
Intercept	22379.745	1	22379.745	348.541	.000
Exp. Groups	146.852	3	48.951	.762	.521
Error	3146.280	49	64.210		
Total	25669.000	53			
Corrected Total	3293.132	52			

a. R Squared = .045 (Adjusted R Squared = -.014)

Two line graphs are displayed below in order to further illustrate the effect the treatment had on shuttle ridership (Figures 11 & 12). The red lines display an amount of visitors who received the brochure every four days. The anticipated effect was that shuttle use at the two locations would spike along with the dissemination of the brochure and gradually decline as the message effect wore off. However, as can be viewed in the line graphs, this effect was largely absent. There may have been a couple instances where use peaked along with brochure dissemination, but this occurred about as much as use peaked under control groups.

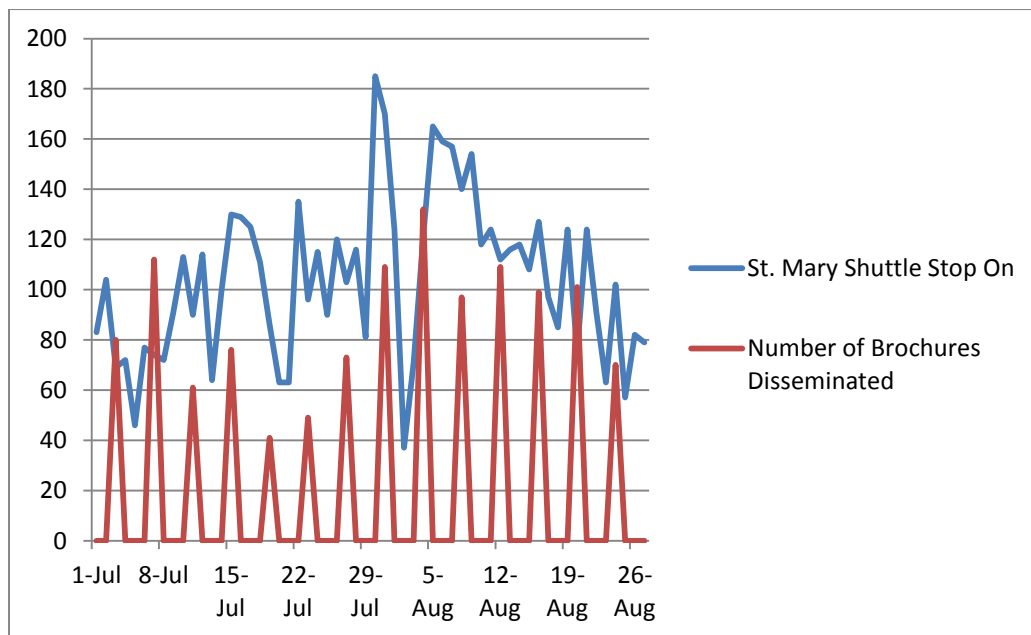


Figure 24: St. Mary daily shuttle ridership/messages disseminated

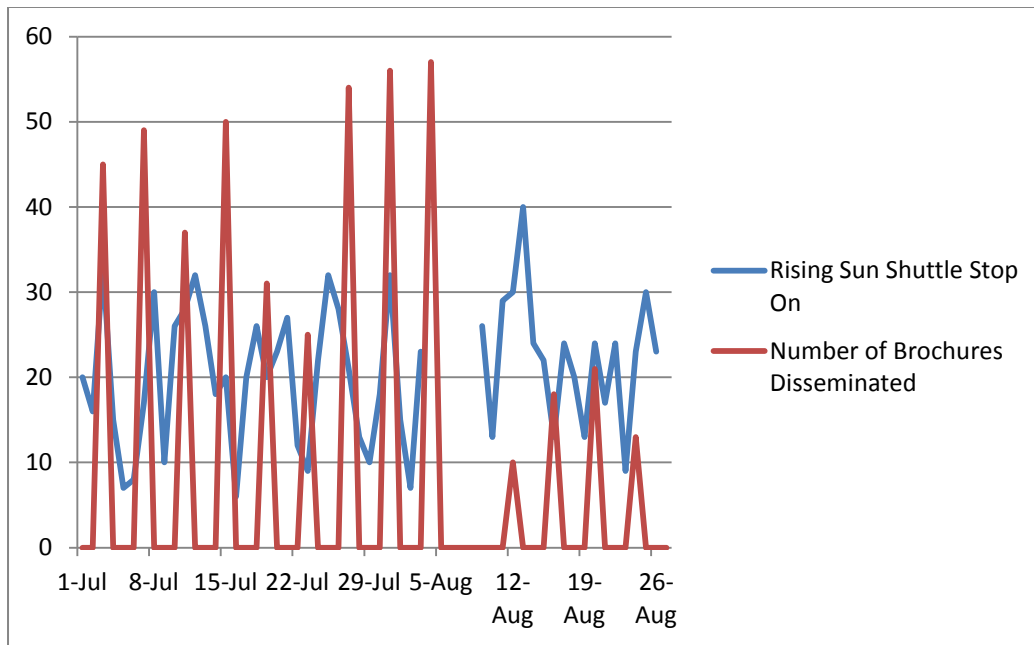


Figure 25: Rising Sun Motor Inn daily shuttle ridership/messages disseminated

Regression Analysis: Controlling for Natural Variation in Shuttle Use

The next step in the analysis will attempt to identify relevant variables which aid in controlling for shuttle use within the park in order to control for natural variation in shuttle use that was not accounted for within the study design.

The experiment in the present study was performed within a highly dynamic setting which made it difficult to control for external forces. The experimental design was established in order to minimize seasonal and weekly variation in visitor use by repeating every four days. This enabled seasonal variation and 'days of week' to be evenly distributed between groups. Despite this strength, it was deemed valuable to explore how controlling for various external forces could affect the ability to 'tease' out any treatment effects if they indeed existed. Therefore, it was deemed important to identify, measure, and control for various extraneous variables which may have influenced the dependent variables. Variables of interest included those that accounted for visitor use on the GTTSR (such as vehicles entering the GTTSR from St. Mary) as well as variables that may have influenced the

effectiveness of the message (such as using different researchers to disseminate the information). It was thought that controlling for visitor use on the GTTSR as well as various extraneous variables related to the methodology could account for natural variation in shuttle use and thus, isolate the effects of the treatment.

The next step in the analysis was to perform various ordinary least squares regression analyses in order to analyze how accounting for various control variables affects the ability of the independent variable to account for shuttle use. This type of analysis is appropriate because it allows the researcher to observe changes in the independent variable while holding the effects of various control variables constant. It was hoped that after controlling for extraneous forces, the beta coefficient value would be highest for the main effect day, second highest for the partial effect day, third highest for the first control day, and fourth highest for the second control day. Before this test could occur however, the results of the regression analysis must first have revealed that the differences in beta coefficients between experimental groups were not equal to zero. The null and alternative hypotheses are stated below:

$$H_0: \beta_1 = \beta_2 = \beta_3 = 0$$

$$H_1: H_0 \text{ false}$$

Dependent and Independent Variables

The dependent variables are once again total shuttle rider counts at the St. Mary Visitor Center shuttle stop and the Rising Sun Motor Inn shuttle stop during the first five boarding times per day. The variable is measured as a ratio variable. The unit of analysis is day.

The independent variable represents the four experimental groups: main effect, partial effect, first control day, second control day. For the purpose of the regression analysis, this variable was transformed into three variables with binary values. The variables represent main effect days, partial

effect days, and first control days. The second control day group was used as the base case in which all experimental groups were compared to. The variables are measured as dichotomous categorical variables and the unit of measurement is day.

Control Variables

Vehicle and trail use was monitored on the GTTSR corridor during the summer of 2013. The present study used this data to control for visitor use on the GTTSR. It has been noted in previous visitor use-related studies on the GTTSR corridor that daily fluctuations in visitor use occur regularly throughout the summer season and appear unrelated to seasonal trends (Weinberg et al., 2013a; Weinberg et al., 2012; Bedoya & Friemund, 2012). The researcher made the assumption that the amount of people who visit the GTTSR corridor accounts for some variation in shuttle use. Visitor use typically affects all aspects of a system from road and parking area congestion, to use on trails. This affects shuttle use as well. For instance, the shuttle system would most likely experience higher use on days where 1,000 vehicles entered the GTTSR than on days where 500 visitors entered the road.

The present study used data from three vehicle traffic counters on the GTTSR corridor. The three locations were designed to measure traffic entering the GTTSR from St. Mary, entering the Logan Pass parking area and vehicles entering the GTTSR from West Glacier. These are high use locations and are assumed to represent overall visitor use on the GTTSR corridor rather well. The vehicle counter devices were TRAFx vehicle counters. Manual calibrations were conducted in order to ensure accurate data collection. These variables were measured as ratio variables. The data was recorded as the total amount of vehicles traveling past these locations before 12 noon. The unit of analysis was day.

The present study also used hiker counts from four trails on the GTTSR to further account for visitor use. These trails were the Avalanche, St. Mary Falls, Siyeh Bend, and Hidden Lake trails. Data was recorded using TRAFx infrared trail counters. Manual calibrations were conducted in order to ensure

accurate data collection. These trails were selected because they are typically in high demand and fluctuate with general use on the GTTSR. One of the trails is a popular attraction on the west side of the park (Avalanche) and the other is a popular hiking destination on the east side of the park (St. Mary Falls). These variables were measured as ratio variables and the data was recorded as the total amount of hikers traveling on these trails before 12 noon. The unit of analysis was day.

Weather data from St. Mary was also used to account for variation in visitor use. It is generally acknowledged that weather affects use in National Parks, especially in parks such as Glacier that possess many high country attractions. Therefore, low temperatures and amount of precipitation were variables which were included in the present analysis in order to control for visitor use. This data was retrieved from NOAA's website. Precipitation (mm) was measured as a ratio variable and low temperature (Celsius x10) was measured as an interval variable. The unit of measurement for both variables was day.

The amount of total visitors occupying the Rising Sun campground was used to control for use within the park. The variable measured the total amount of visitors occupying each campsite per day. The variable was measured as a ratio variable. A variable representing the total number of visitors occupying the St. Mary Campground was not used in the model because it was found that occupancy at this campsite possessed very little day-to-day variation.

The analysis for the Rising Sun Campground also included a variable to control for *who* disseminated the brochure. The researcher who disseminated the brochure at Rising Sun varied frequently between two researchers. A dichotomous, categorical variable was included to account for who disseminated the brochure. A '0' or '1' was applied to each four day study period which corresponded to which researcher disseminated the information. The unit of measurement was day.

Assumptions

This section will discuss the assumptions related to performing an OLS regression analysis. One of the assumptions is that the dependent variables are measured using interval/ratio measurement. All variables in the present analysis meet this assumption except for two. The variable which accounts for which researcher handed out the brochure at the Rising Sun Campground was a categorical variable. This was noted and this variable was used with caution.

Another assumption is that the independent variables possess a linear relationship with the dependent variable. This assumption was tested using a correlations matrix. The results are displayed below (Tables 11 & 12). Predictably, the independent and dependent variables possessed weak relationships. The purpose of the present analysis was to control for extraneous variables in order to assess whether the predictive strength of the independent variables increase. In addition, the research was interested in whether or not the independent variables' beta coefficients change to reflect the hypothesized effects. In other words, it was hoped that the observed experimental group effects would more closely align with the hypothesized effects after controlling for external forces. Therefore, even though this assumption is not met, it should not negatively affect the analysis.

Table 11: Independent variable/dependent variable correlation matrix (St. Mary shuttle stop analysis)

Variables		St. Mary On	Main Effect	Partial Effect	Control 1	Control 2
St. Mary On	Pearson Correlation	1	.054	.084	-.278 [*]	.143
	Sig. (2-tailed)		.685	.532	.035	.284
	N	58	58	58	58	58
Main Effect	Pearson Correlation	.054	1	-.318 [*]	-.333 [*]	-.333 [*]
	Sig. (2-tailed)	.685		.015	.011	.011
	N	58	58	58	58	58
Partial Effect	Pearson Correlation	.084	-.318 [*]	1	-.333 [*]	-.333 [*]
	Sig. (2-tailed)	.532	.015		.011	.011
	N	58	58	58	58	58
Control 1	Pearson Correlation	-.278 [*]	-.333 [*]	-.333 [*]	1	-.349 ^{**}
	Sig. (2-tailed)	.035	.011	.011		.007
	N	58	58	58	58	58
Control 2	Pearson Correlation	.143	-.333 [*]	-.333 [*]	-.349 ^{**}	1
	Sig. (2-tailed)	.284	.011	.011	.007	
	N	58	58	58	58	58
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

Table 12: Independent variable/dependent variable correlation matrix (Rising Sun Motor Inn shuttle stop analysis)

Variables		Rising Sun On	Main Effect	Partial Effect	Control 1	Control 2
Rising Sun On	Pearson Correlation	1	-.106	.134	.110	-.134
	Sig. (2-tailed)		.449	.339	.431	.339
	N	53	53	53	53	53
Main Effect	Pearson Correlation	-.106	1	-.308 [*]	-.342 [*]	-.342 [*]
	Sig. (2-tailed)	.449		.025	.012	.012
	N	53	53	53	53	53
Partial Effect	Pearson Correlation	.134	-.308 [*]	1	-.324 [*]	-.324 [*]
	Sig. (2-tailed)	.339	.025		.018	.018
	N	53	53	53	53	53
Control 1	Pearson Correlation	.110	-.342 [*]	-.324 [*]	1	-.359 ^{**}
	Sig. (2-tailed)	.431	.012	.018		.008
	N	53	53	53	53	53
Control 2	Pearson Correlation	-.134	-.342 [*]	-.324 [*]	-.359 ^{**}	1
	Sig. (2-tailed)	.339	.012	.018	.008	
	N	53	53	53	53	53
*. Correlation is significant at the 0.05 level (2-tailed).						
**. Correlation is significant at the 0.01 level (2-tailed).						

Random sampling is another assumption for performing an OLS analysis. The previous analysis already determined the independent variables and dependent variables were collected using a rough random sampling method. Every control variable added to the present analysis was collected using a census method; therefore the data can be assumed to be representative of the population.

Another assumption is that the errors associated with the models are normally distributed. Analyses of skewness, and kurtosis scores of residuals from the various models displayed below indicate that the residuals were not normally distributed. However, an analysis of histograms indicate that the residuals are approximately normal. Therefore, it is likely the case that the sample size is relatively small and true normality of residuals is impractical. It was decided to continue with the analysis without performing any operations to remedy this issue. It was noted that this issue had the potential to bias confidence intervals and possibly lead to significance when none exists. Additionally, the standard errors

may become lower than they actually are in the population and thus lead the researcher to become more confident in the results than they should be. The researcher therefore interpreted the results with this in mind.

An analysis of descriptive statistics is presented below in order to understand if there were missing values or any potential outliers (Tables 13 & 14). The dependent and independent variables were not included because they were analyzed in the previous section.

The first round of descriptive statistics tables revealed that some variables possessed missing values including: the amount of vehicles entering the park before noon on the west side of the park, the amount of vehicles entering the Logan Pass parking area before noon, hiker counts at Siyeh Bend, St. Mary Campground occupancy, the amount of visitors who received the message at St. Mary and Rising Sun, and the variable which accounts for which researcher disseminated the message at rising sun. These values were extrapolated for the purpose of performing a regression analysis.

Missing values for both vehicle counters could be accounted for by device malfunctions. Missing values were interpolated from a regression model consisting of vehicle and trail use variables that predicted vehicle use at the Logan Pass and West Glacier entrance locations.

Missing values for the Siyeh Bend variable could be accounted for by the absence of data for the first nine days of July. The trail counter was installed the afternoon of July 9th. The missing data was extrapolated from a regression model that used trail use and weather variables to predict use on the Siyeh Bend trail.

Missing data for the variable which measured which researcher disseminated the brochure at the Rising Sun Campground could be accounted for by the campground closure which limited the amount of times this variable could be collected. Missing data for this variable should not be an issue for the Rising Sun Campground analysis because this variable actually has more values (54) than experimental groups (53).

An analysis of descriptive statistics also revealed that all values fell into their expected ranges.

Descriptive statistics tables displayed below account for the values which were added through interpolation and reflects the data used in the present analysis (Table 13).

Table 13: Control variable descriptive statistics

	N	Missing	Mean	Median	Skew.	Std. Error Skew.	Kurt.	Std. Error Kurt.	Min.	Max.
Precip. (mm)	58	0	14.74	.00	5.30	.314	30.85	.62	0.00	353.00
Minimum Temp. (x10)	58	0	84.24	78.00	.70	.314	1.36	.62	25.00	185.00
East Entrance Vehicles	58	0	752.17	739.50	.52	.314	.32	.62	627.00	942.00
St. Mary Falls Trail	58	0	199.00	200.00	.03	.314	.88	.62	85.00	307.00
Logan Pass Vehicles	58	0	931.099	934.00	-1.01	.314	3.49	.62	545.00	1,133.00
Avalanche Trail	58	0	328.07	325.00	-.09	.314	.95	.62	131.00	475.00
West Entrance Vehicles	58	0	1,356.11	1383.00	-.55	.314	-.27	.62	841.00	1,854.00
Hidden Lake Trail	58	0	358.84	360.00	-.49	.31	.242	.62	21	606.00
Siyeh Bend Trail	58	0	58.09	56.00	1.20	.31	4.49	.62	.00	166.00
Rising Sun Disseminator	58	4	.78	1.00	-1.36	.33	-.12	.64	.00	1.00
Rising Sun Occupancy	58	0	172.36	212.00	-1.34	.31	.92	.62	250.00	418.00

Prior to conducting the regression analysis, the researcher assessed issues of collinearity between the independent variables and the control variables. This was done in order to determine if the effects of

the treatment variable would be apparent within a larger model and thus, easier to explain. A correlation table was used to perform this section of the analysis. The correlation table revealed that all control variables possessed a non-existent to weak relationship with the independent variables .

Controlling for External Variation in an Attempt to ‘Tease out’ Treatment Effects

The present analysis provides two tables which display the manner in which the control variables impacted the effects that the experimental groups possessed on the dependent variable. Tables 14 and 16 display unstandardized beta coefficient values and standard error values (in parenthesis) for each variable in the St. Mary Shuttle stop and Rising Sun shuttle stop models. The analysis will begin by interpreting the regression analysis run for the St. Mary shuttle stop (Table 14).

The goal of the present analysis was to control for various extraneous values that account for visitor use on the GTTSR in order to determine if the brochure increased ridership in the manner hypothesized. An outcome that would lead the researcher to reject the null hypothesis of no difference between groups would result in the beta values for the three experimental groups in the present analysis to become statistically significant beyond the .05 alpha level. If this occurred, two more analyses would be run to determine if the beta coefficient for the main effect day was higher than the partial effect day (H_2), and whether or not the partial effect group's beta coefficient was higher than the first control group's beta coefficient (H_3) and greater than 0. It was hoped that controlling for levels of use within the park would account for enough variability in shuttle use to allow the treatment effect to become apparent. The various hypotheses are displayed below.

$$H_0: \beta_1 = \beta_2 = \beta_3 = 0$$

$$H_1: H_0 \text{ false}$$

Regression Results for the St. Mary Visitor Center Shuttle Stop

As stated earlier, the experimental group variable has been separated into three variables: main effect, partial effect, and first control day (control 1). The second control day was excluded from the model in order to serve as the base case for the experimental group variables. The table of regression models for the St. Mary shuttle stop is displayed below:

Table 14: Regression results for the St. Mary shuttle stop

Dependent variable: Total daily St. Mary shuttle stop ridership from 7:30 am to 11:20am n=58			
Model	(1)	(2)	(3)
(Constant)	111.400** (8.110)	-94.577 (60.939)	-91.694 (59.8690)
Main	-4.614 (11.673)	-11.020 (9.606)	-11.432 (9.451)
Partial	-2.971 (11.673)	-9.960 (9.504)	-9.480 (9.326)
Control 1	-22.533 (11.470)	-24.637* (9.804)	-24.006* (9.564)
Control Variables			
East entrance vehicles		.037 (.065)	.049 (.057)
West entrance vehicles		.058** (.016)	.060** (.016)
Logan pass vehicles		.018 (.050)	
St. Mary Falls hikers		-.050 (.097)	-.045 (.095)
Avalanche hikers		.147* (.071)	.150* (.070)
Hidden Lake hikers		.106** (.036)	.110** (.0350)
Siyeh Bend hikers		.137 (.167)	.145 (.164)
Precipitation (mm)		.185* (.085)	.180* (.083)
Minimum temp. (Celsius*10)		-.019 (.118)	-.019 (.117)
R²	.080	.527	.525
F	1.566	4.171**	4.624*
Sig.	.208	.000	.000

The first model provided in the table above accounted for only 8% of variation in shuttle use during the first five daily departures at the St. Mary Visitor Center. This model was not statistically significant. When examining the first model which contains only the three experimental group variables, it is important to note that every beta coefficient is negative. This reflects the results of the ANOVA analysis because the second control day for the St. Mary experiment possessed the highest mean value. Therefore, the rest of the experimental groups should possess a negative relationship with the amount of shuttle riders at the St. Mary shuttle stop when compared to the case of the second control group. For instance, the base case represents the constant value of 111.4 shuttle riders. The model suggests that when it is a main effect treatment day, the amount of riders will reduce by 4.6 riders from the base case value of 111.4. Likewise, the model suggests that partial effect days were typically accompanied by a decrease of about 3 riders. The effect was largest for the first control day, where the model suggested that ridership declines by 22.5 riders compared to the second control day.

The second model incorporated all control variables discussed earlier. This model increased the variation accounted for to 54.7% and was statistically significant beyond the .01 alpha level. The control variables appeared to alter the beta of the main effect group drastically. However, this also increased the standard error score for this variable. Therefore, it was surmised that one of the control variables produced a confounding effect. It was surmised that the variable that accounted for the amount of visitors who received the brochure likely produced the confounding effect due to the various red flags that were uncovered concerning the way the variable was collected and concerns with collinearity. The second model also revealed that the difference between the first control variable and the second control variable became statistically significant beyond the .05 alpha level. The amount of vehicles entering the park from the west entrance before noon and the amount of hikers on the Hidden Lake trail before noon were statistically significant beyond the .01 alpha level.

The second model incorporated all control variables discussed earlier. The model accounted for 52.7% of variation in shuttle use and was statistically significant beyond the .01 alpha level. The main effect group's beta lowered to -11.02 compared to its beta when no control variables were held constant of -4.61. This appears to suggest that controlling for visitor use and weather variables further increased the positive effect that the second control group possessed on shuttle ridership. The first control group became statistically significant beyond the .05 alpha level. The amount of vehicles entering the GTTSR on the west side of the park before noon and the amount of hikers on the Hidden Lake trail before noon became statistically significant beyond the .01 alpha level. Daily precipitation and the amount of hikers on the Avalanche trail also became statistically significant beyond the .05 alpha level.

It was decided to remove the variable which accounts for the amount of vehicles entering the Logan Pass parking area before noon for the third model. This was decided because the variable quantifies mostly the same type of use as the Hidden Lake trail due to the fact that visitor use in these locations are highly correlated. Therefore, it was decided that this variable be removed due to its redundancy within the model. The results of the amount of variation accounted for within the model suggest that this was the correct decision, variation only reduced by .2% to 52.5%. The model remained statistically significant beyond the .01 alpha level and all variables in the model which were statistically significant in the previous model remained statistically significant in model three. Furthermore, the beta weights for all variables remained largely the same while the standard errors lowered slightly for most variables within the model.

After controlling for variables that account for shuttle use within the park, the results remained largely the same, if not more inflated. According to the third model, the second control group remained the group with the highest ridership, with the main and partial effect days receiving 11 and 9 less riders than the second control day. Even after accounting for visitor use on the GTTSR, the model suggested

that the first control group received 24 less riders than the second control variable when all other variables were held constant. That was about 2 less riders before adding the control variables.

Three simulations will now be run using the fourth model to predict St. Mary shuttle stop use under three conditions in order to illustrate the experimental group effects observed in the present study while controlling for extraneous variables. Scenario one will include vehicle data, trail data and minimum temperature at their observed maximum values; while precipitation is zero. Scenario two will include all variables at their mean values. Scenario three includes vehicle data, trail data, and minimum temperature at their observed minimum values; the value used for precipitation will be its observed maximum value. A table and a graph summarize the results below (Table 15 & Figure 26).

Scenario 1:

Number of vehicles entering the GTTSR from the east entrance before noon: 942

Number of vehicles entering the GTTSR from the west entrance before noon: 1,854

Number of St. Mary hikers before noon: 307

Number of hikers on the Avalanche trail before noon: 475

Number of hikers on the Hidden Lake trail before noon: 606

Number of Siyeh Bend trail hikers before noon: 166

Total daily precipitation: 0

Minimum temperature (x10): 185

Scenario 2:

Number of vehicles entering the GTTSR from the east entrance before noon: 752

Number of vehicles entering the GTTSR from the west entrance before noon: 1,356

Number of St. Mary hikers before noon: 199

Number of hikers on the Avalanche trail before noon: 328

Number of hikers on the Hidden Lake trail before noon: 358

Number of Siyeh Bend trail hikers before noon: 58

Total daily precipitation: 14.74

Minimum temperature (x10): 84

Scenario 3:

Number of vehicles entering the GTTSR from the east entrance before noon: 627

Number of vehicles entering the GTTSR from the west entrance before noon: 841

Number of St. Mary hikers before noon: 85

Number of hikers on the Avalanche trail before noon: 131

Number of hikers on the Hidden Lake trail before noon: 21

Number of Siyeh Bend trail hikers before noon: 0

Total daily precipitation: 353

Minimum temperature (x10): 25

Table 15: St. Mary shuttle stop ridership model scenarios

Experimental Group	Scenario 1	Scenario 2	Scenario 3
Main effect	199	104	60
Partial effect	201	106	61
Control 1	186	92	47
Control 2	210	116	70

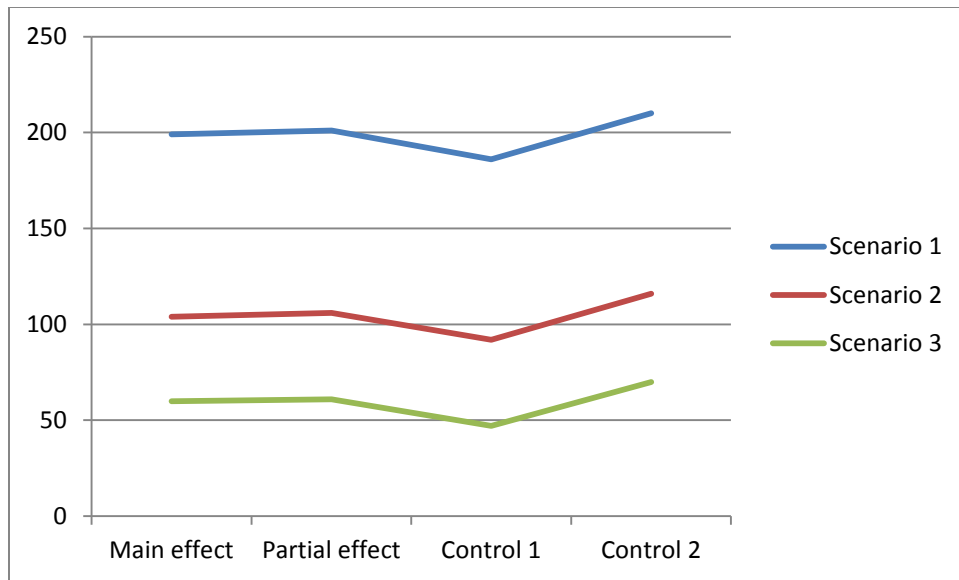


Figure 26: St. Mary shuttle stop ridership scenarios line graph

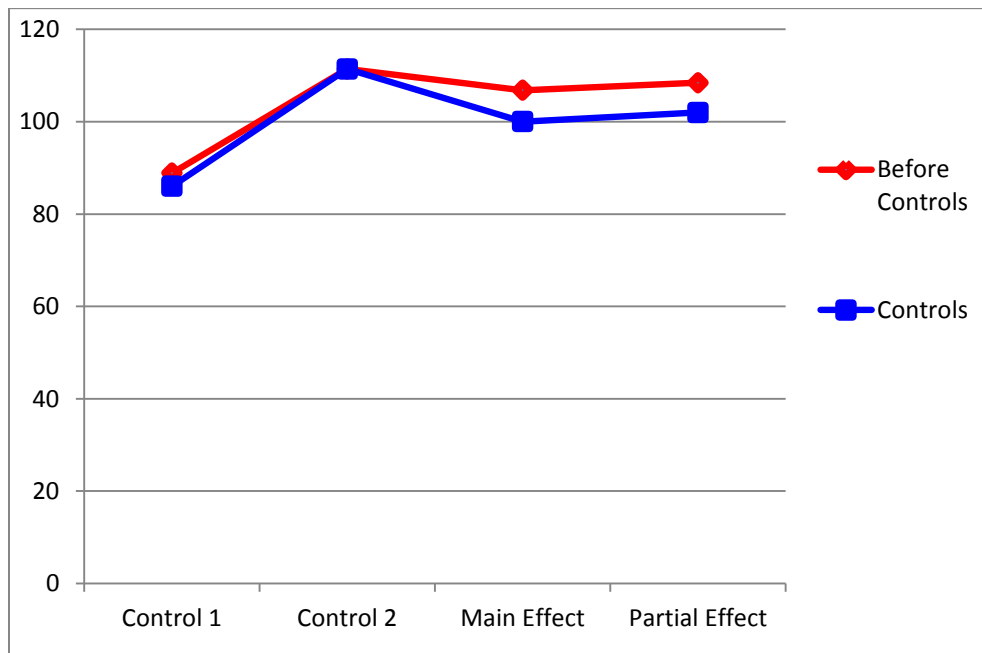


Figure 27: Comparing St. Mary Shuttle stop experimental groups with and without holding control variables constant

As can be viewed in figure 27, adding control variables to account for natural variation in shuttle use did little to impact the results presented in the comparisons of means and ANOVA analyses. Instead of following the hypothesized trend of shuttle use peaking on main effect days and gradually decreasing

until reaching its minimum level on control two days; the observed trend was that the main and partial effect days received similar use, with control day one typically receiving the least use, while shuttle use peaked on control day two.

Furthermore, while the first control group was statistically significant within the model, the other two experimental groups were not, therefore the present analysis fails to reject the null hypothesis of no difference between experimental group effects. Furthermore, all beta coefficients remained negative, indicating that the predicted outcome of an influx of shuttle ridership on main effect days, followed by a gradual decline over the next three days was not observed; even after accounting for various extraneous variables.

Regression Results for the Rising Sun Motor Inn Shuttle Stop

The results section will now discuss the results of the regression analysis conducted for the Rising Sun shuttle stop. Table 16 displays unstandardized beta coefficient values and standard error values (in parenthesis) for each variable included within the Rising Sun shuttle stop models. The table is presented below:

Table 16: Regression results for the Rising Sun Motor Inn shuttle stop

Dependent variable: Total daily Rising Sun Motor Inn shuttle stop ridership from 7:42 am to 11:32am n=53			
Model	(1)	(3)	(4)
(Constant)	18.786** (2.142)	54.323* (21.077)	56.857** (19.764)
Main	.291 (3.086)	-3.240 (3.067)	-2.095 (2.985)
Partial	3.714 (3.152)	1.370 (3.074)	2.488 (2.946)
Control 1	3.214 (3.029)	2.786 (3.079)	3.502 (2.936)
Control Variables			
East entrance vehicles		-.048* (.021)	-.038* (.020)
West entrance vehicles		-.007 (.006)	-.008 (.005)
Logan pass vehicles			
St. Mary Falls hikers		-.054 (.031)	-.066* (.030)
Avalanche hikers		.004 (.028)	.008 (.026)
Hidden Lake hikers		-.003 (.011)	-.001 (.011)
Siyeh Bend hikers		.224** (.059)	.207** (.056)
Precipitation (mm)		-.030 (.026)	-.024 (.026)
Minimum temp. (Celcius *10)		.052 (.039)	.035 (.036)
Rising Sun CG occupancy		.013 (.033)	-.005 (.030)
Brochure disseminator		3.937 (2.920)	
R²	.045	.422	.382
F	.762	2.081*	2.063*
Sig.	.521	.041	.043

The first model provided in the table above accounted for just 4.5% of variation in shuttle use during the first five daily departures at the Rising Sun Motor Inn shuttle stop. This model was not statistically significant. The beta coefficients for the experimental groups appear consistent with the

results found in the comparisons of means and ANOVA analyses conducted earlier. All experimental groups possessed positive effects on shuttle ridership when compared to the second control group. The first model indicated that the partial and first control groups typically experienced 3-4 additional riders compared to the second control group, while the main effect group typically experienced about the same level of ridership as the second control group.

The goal of the present analysis was the same as the regression analysis conducted for the St. Mary shuttle stop: to control for various extraneous values that account for shuttle use on the GTTSR in order to determine if the brochure increased ridership in the manner hypothesized. The hypotheses are displayed below.

$$H_0: \beta_1 = \beta_2 = \beta_3 = 0$$
$$H_1: H_0 \text{ false}$$

The second model incorporated all of the previously discussed control variables. This model was statistically significant beyond the .05 alpha level and accounted for 42.2% of variation in shuttle use at the Rising Sun Motor Inn shuttle stop. The amount of vehicles entering the GTTSR from the east entrance was statistically significant beyond the .05 alpha level and the amount of hikers on the Siyeh Bend trail before noon was statistically significant beyond the .01 alpha level. The beta coefficient value of the main effect variable lowered to -3.240. The partial effect group's beta lowered by about 2.5 riders and the first control group changed minimally. It should also be noted that the variable which accounts for Rising Sun Campground occupancy was included in this model (unlike St. Mary) because use was not constant during the summer due to its closure in early August and the fact it was only open to hard sites after the closure.

The third and final model removed the variable which accounted for which researcher disseminated the brochure. It was thought that this variable produced a somewhat confounding effect.

The limited sample size of the two disseminators rendered this variable a poor predictor; there were only three experimental periods in which researcher '0' handed out the brochures in contrast to 10 instances where researcher '1' handed out the brochures. Therefore, this variable was deemed inappropriate within the model. The third model accounted for 38.2% of variation and was statistically significant beyond the .05 alpha level. The amount of visitors entering the park from the east side of the park before noon and the amount of hikers on the St. Mary Falls trail before noon were statistically significant beyond the .05 alpha level and the amount of hikers on the Siyeh Bend trail before noon was statistically significant beyond the .01 alpha level.

It appears that the addition of control variables rendered the treatment groups to possess similar effects on the dependent variable. The most notable effect that controlling for extraneous variables possessed on the independent variables was that the beta coefficient for the main effect day became negative. This is the opposite effect that was originally predicted. Partial and first control groups' effects were positive, but relatively minimal and none of the groups were statistically significant within the model.

Similar to the previous regression analysis, three simulations were run using the final model to predict Rising Sun Motor Inn shuttle stop use under three conditions in order to illustrate the experimental group effects observed in the present study while controlling for extraneous variables. Scenario one will include vehicle variables, trail variables, daily minimum temperature, and Rising Sun Campground occupancy at their observed maximum values, while precipitation is zero. Scenario two will include vehicle data, trail data, daily low temperature, Rising Sun Campground occupancy and precipitation at their observed seasonal averages. Scenario three includes vehicle data, trail data, daily low temperature and Rising Sun occupancy variables at their observed minimum values; the value used for precipitation will be its observed maximum value. A table and graph that summarize the results are displayed below (Table 17, Figure 28).

Scenario 1:

Number of vehicles entering the GTTSR from the east entrance before noon: 942

Number of vehicles entering the GTTSR from the west entrance before noon: 1,854

Number of hikers on the St. Mary Falls trail before noon: 307

Number of hikers on the Avalanche trail before noon: 475

Number of hikers on the Hidden Lake trail before noon: 606

Number of hikers on the Siyeh Bend trail before noon: 166

Daily low temperature: 185

Total daily precipitation: 0

Rising Sun occupancy: 229

Scenario 2:

Number of vehicles entering the GTTSR from the east entrance before noon: 752

Number of vehicles entering the GTTSR from the west entrance before noon: 1,356

Number of hikers on the St. Mary Falls trail before noon: 199

Number of hikers on the Avalanche trail before noon: 328

Number of hikers on the Hidden Lake trail before noon: 358

Number of hikers on the Siyeh Bend trail before noon: 58

Daily low temperature: 84

Total daily precipitation: 14.74

Rising Sun occupancy: 172

Scenario 3:

Number of vehicles entering the GTTSR from the east entrance before noon: 627

Number of vehicles entering the GTTSR from the west entrance before noon: 841

Number of hikers on the St. Mary Falls trail before noon: 85

Number of hikers on the Avalanche trail before noon: 131

Number of hikers on the Hidden Lake trail before noon: 12

Number of hikers on the Siyeh Bend trail before noon: 0

Daily low temperature: 25

Total daily precipitation: 353

Rising Sun occupancy: 0

Table 17: Rising Sun Motor Inn shuttle stop scenario models

Experimental Group	Scenario 1	Scenario 2	Scenario 3
Main effect	27	17	12
Partial effect	31	21	17
Control 1	32	22	18
Control 2	29	19	14

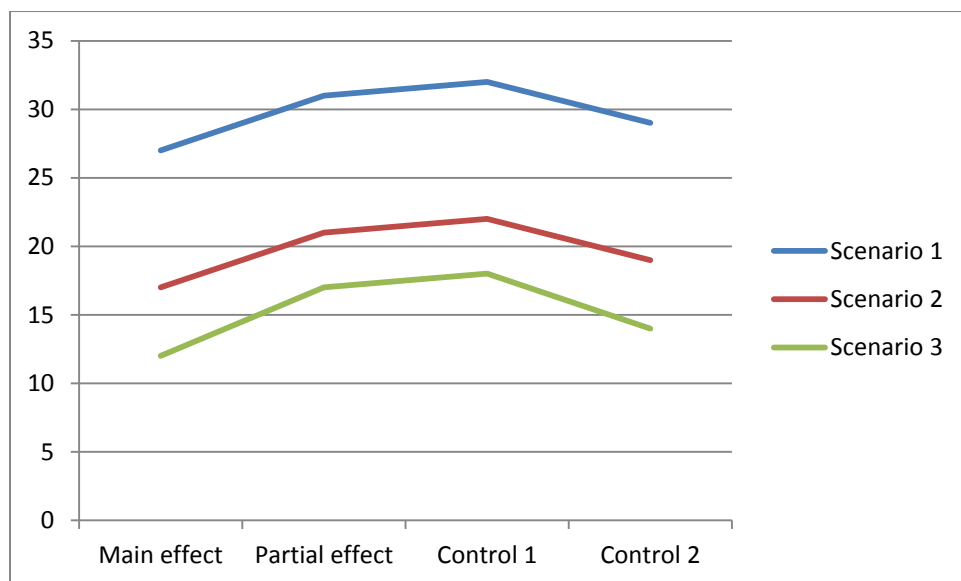


Figure 28: Rising Sun Motor Inn shuttle stop line graph of scenario models

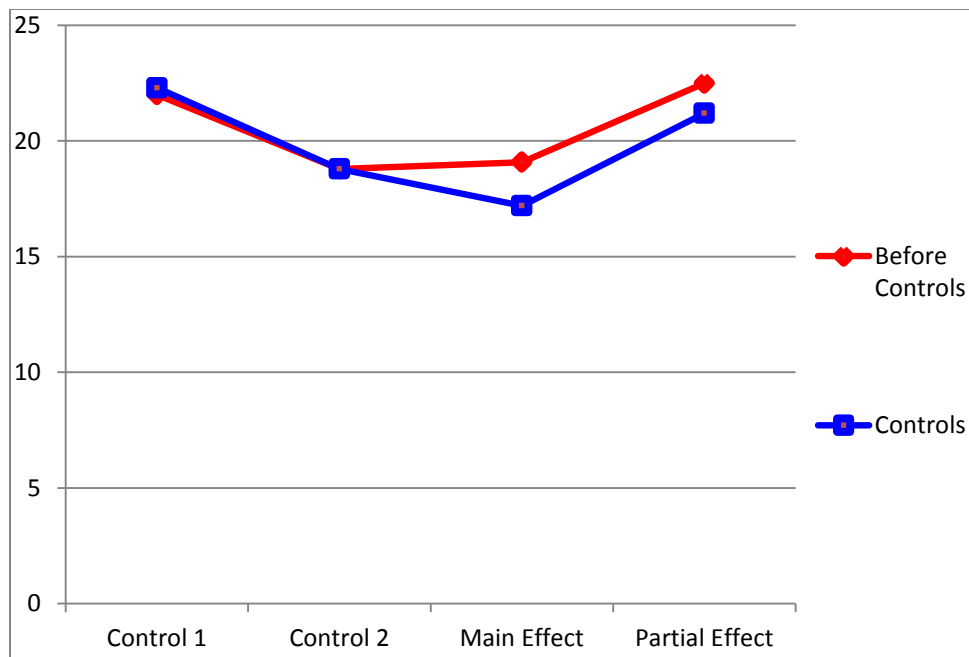


Figure 29: Comparing Rising Sun Motor Inn stop experimental groups with and without holding control variables constant

Similar to the regression analysis for St. Mary, adding control variables to account for natural variation in shuttle use at Rising Sun did little to impact the results presented earlier within the comparisons of means and ANOVA analyses (figure 29). Instead of following the hypothesized trend of shuttle use peaking on main effect days and gradually decreasing until reaching its minimum level on control two days; the observed trend was fairly equal between groups. Therefore the researcher in the present study fails to reject the null hypothesis of beta coefficients equal to zero.

Results Summary

The results from the present analysis indicate that the first hypothesis for the present research is not supported by the evidence. The results from the ANOVA and regression analyses led the researcher to fail to reject the null hypothesis in both cases. Therefore, the results suggested that the introduction of the persuasive message treatment did not appear to have the effect of increasing shuttle

ridership at the intended locations. The differences between experimental groups were found to be non-statistically significant. The results remained roughly the same after controlling for extraneous variables that account for up to 52.5% of variation in shuttle use at the St. Mary shuttle stop and 38.2% of variation in the Rising Sun shuttle stop. Therefore, the researcher determined there was no discernible impact on shuttle ridership as a result of the introduction of a persuasive brochure.

Due to the fact that hypothesis one was not supported by the evidence, there was no need to test hypotheses two through four as they were dependent on the success of hypothesis one. The hypotheses are listed below. The present researcher paper will discuss these findings in the next section.

H1: Introduction of a persuasive message treatment designed to increase shuttle ridership among Rising Sun and St. Mary Campground occupants will increase the number of visitors boarding the shuttle at the St. Mary visitor center and Rising sun Campground between 7:30 am and 11:20 am.

If H1 is successful:

H2: Introduction of a persuasive message treatment will increase the number of visitors arriving via east-side shuttles at Logan Pass, St. Mary Falls, and Siyeh Bend between 8am and noon.

H3: Introduction of a persuasive message treatment will be associated with a later (temporal) observed moment of parking saturation at Logan Pass.

H4: Introduction of a persuasive message treatment will increase the amount of hikers on the St. Mary Falls trail, Hidden lake trail and Highline trail before noon.

CHAPTER 6: CONCLUSION AND DISCUSSION

The major purpose of this study was to determine if an indirect management tool could influence a target population to ride the shuttle at Glacier National Park. This research need was uncovered after it was found that the shuttle was being used to facilitate a point to point hike on the Loop/Highline trail system, which had the effect of exaggerating adverse parking lot conditions at Logan Pass by allowing visitors to park at Logan Pass all day and return to their vehicle at the end of the day by using the shuttle. The construction of the indirect management tool was informed by relevant protected area management research, persuasion research, and research pertaining to alternative transportation in National Parks. The tool used the medium of a brochure plus a personal contact. It was disseminated at the St. Mary Campground and Rising Sun Campground throughout the summer. It was predicted that the dissemination of the brochure would increase shuttle use during the first two days after the brochure was disseminated. It was surmised that the effect of the persuasive brochure would be minimal three and four days after the brochure was handed out based on past research that indicated that GTTSR visitors spend an average of two nights in the park.

Study findings suggest that the brochure produced little anticipated effect. An analysis conducted for the St. Mary Visitor Center shuttle stop revealed that the second control day group produced the highest shuttle ridership mean. The Rising Sun shuttle stop analysis revealed very little difference between means. In all cases, experimental groups were not statistically significant except for the difference between the first control group and second control group of the St. Mary shuttle stop study. Therefore, results suggested that the persuasive brochure had little effect on shuttle ridership at the St. Mary Visitor Center shuttle stop and the Rising Sun Motor Inn shuttle stop.

Limitations

Methodological limitations of the study must first be discussed in order to understand the implications the research presented in this paper possess within the field of protected area management. One of the most important assumptions the researcher made was that the persuasive brochure would have the largest effect the day after it was handed out, followed by a steady decrease thereafter. The effect was hypothesized to be essentially undetectable after the fourth day. This was based on prior data collected in the park which indicated that visitors on the GTTSR spent an average of about two nights in the park. The study design was somewhat validated when analyzing dates in which visitors returned brochures. Most brochures were returned the day after they were disseminated (70%), the second most were returned on partial effect days (22%) and the remaining eight percent was spread between the two control days. The limitation with this finding was that only 23 brochures were returned with identifiable dates. This was out of a total of 574 brochures which were disseminated throughout the summer. Therefore, it is difficult to completely validate the manner in which the experiment was carried out. This could be improved in future studies by mailing follow-up surveys which ask message recipients if the message influenced them to ride the shuttle. Additionally, knowing that visitor use on trails and roads accounts for much variation in shuttle use, a study design which disseminates brochures every day for 5-10 days, followed by a halt in dissemination for a similar period may allow more messages to be handed out to visitors and thus increase the amount of users influenced to ride the shuttle. The researcher could then control for natural variation in shuttle use with the control variables used in the present study--which was a concern when constructing the original study design. However, the fact that very few message recipients returned the brochures appears to support the results of the experiment which found that the introduction of the persuasive brochure produced no effect on shuttle ridership.

Furthermore, a promising statistic that helps validate the length of experiments (4 days) carried out for the study was that only six groups out of 953 were contacted more than once. This indicates that most visitors that were contacted over the summer did not stay more than four days at the Rising Sun or St. Mary campgrounds, and thus had little potential to utilize the persuasive information in a manner that was inconsistent with the design.

Taken as a whole, limited data concerning when visitors used the information presented in the brochure indicates that visitors likely used the brochure in the manner anticipated by the researcher. Therefore, it can be argued that the experimental design allowed the researcher to adequately assess the impact the treatment had on shuttle ridership.

Another limitation concerning the study design was that the researcher was unable to gather information pertaining to the manner in which the brochure was perceived by visitors. For instance, it would have been helpful to understand what components of the message were or were not perceived as useful or persuasive; or the reason why visitors chose to use or not to use the information presented in the brochure. This type of data could have informed future studies as to what type of appeals work best in influencing alternative transportation in National Parks. It could have also informed the present study as to the strengths and weaknesses of the brochure. However, the researcher understood this would not be possible before the brochure was designed due to the fact it would take longer than the study could afford to attain OMB approval for any type of survey. Therefore, the present study took the approach of using the most relevant research from various fields in order to construct the brochure. This 'blanket approach' was deemed the most appropriate approach for this particular problem. It was surmised that a message which contained the strongest persuasive potential from a theoretical standpoint would have the highest potential to influence shuttle use. Therefore, whether or not this approach succeeded or failed would be informative in and of itself for this particular problem.

Another limitation which has already been discussed was the fact that the experiment was conducted in a highly dynamic setting. An ideal experiment controls for all external variables so that accurate measurements of the dependent and independent variables can be executed and measured. This was far from the case for the present study. For instance, few interactions between message recipients were the same as the one which took place before it. This was because the visitors perceived the researcher as a park employee and thus often asked many questions about the park or even wanted to perform small talk. Researchers were instructed to try to disengage the message recipients as quickly as possible after the message was delivered but this was often easier said than done. The researchers were instructed to not make visitors aware that the brochure they were receiving was part of an experiment. This was done because it would have confounded the results and yielded the message as ineffective if visitors understood the brochure was part of a University of Montana study rather than a park effort to spread awareness of the shuttle system. Therefore, it was difficult to relay a consistent message from group to group. Despite this limitation, it was also seen as a strength due to the practical nature of the study design. For instance, if the study revealed significant results, it would have been easy for park managers to replicate it for their own purposes. It was generally recognized among the three researchers who performed the dissemination protocol that the central message concerning the brochure was dominantly consistent between message recipients.

The biggest limiting factor in terms of assessing change in the dependent variables was that of natural variation in shuttle use. It was observed in 2012 that shuttle use varied daily. The study was designed in a manner so as to equally distribute the effects of natural variation among treatment groups; however this was not deemed sufficient. The researcher went further and incorporated various control variables into the analysis that helped account for variation in shuttle use. These models accounts for 50% and 39% of variation. It would have been ideal to account for more variation, especially in the case of Rising Sun Campground. However, it appeared that the study results were not

highly affected by holding control variables constant and the researcher doubts that adding variation accounted for within the models would have significantly affected the results.

Discussion of Results

The analysis section revealed that the sample population appeared to be consistent with past sample populations from studies conducted on the GTTSR corridor. Therefore, the author argues that findings from this study can be generalized to the entire GTTSR corridor. Additionally, it was determined that a sufficient amount of brochures were disseminated in order to cause a detectable change in shuttle ridership if the indirect method was found to be effective. Researchers also asked message recipients to return the brochure to their shuttle driver after they finished using it so that it could be properly recycled. Only eleven brochures were returned to the bus driver of 574 that were disseminated. This data appeared to indicate that very few people actually used the brochure. A comparison of means test and an ANOVA analysis revealed that no significant difference existed between experimental groups. The analysis also attempted to control for extraneous variables which account for daily variation in shuttle ridership in order to try to 'tease out' effects of the brochure. Results from this analysis yielded similar results as the ANOVA analysis. Therefore, the data suggested that the persuasive brochure designed for the present study was not effective in increasing optional shuttle ridership in Glacier National Park.

The limitations discussed in the previous section present problems in confirming the results of the study. For instance, it may be difficult to understand whether or not the persuasive brochure produced no increase in shuttle use, or if these results were derived via a fault in the methodology. This concern was partly assuaged based on the amount of brochures visitors returned and when brochures were returned. Additionally, less than 1% of message recipients were contacted more than once,

indicating that the experimental block length was valid. Therefore, this data suggests that the study design was valid and the results accurately reflect the effect the brochure had on shuttle use.

The bigger question pertains to *why* the indirect method did not work. It is difficult to make any conclusions pertaining to why the brochure failed to persuade shuttle ridership due to the fact that message recipients were not surveyed. This could have helped the researcher gain an understanding of visitors' perceptions of the brochure or dissemination method. Therefore, it can only be speculated as to why the brochure failed. A few reasons for why the brochure failed will be discussed next.

The present study mirrored the mixed model approach (TPB and ELM) that Brown et al. (2010) used when attempting to increase litter pick-up in a National Park setting. This was done by targeting salient beliefs underlying the target behavior within a persuasive message and presenting the message in a manner so as to elicit personal relevance as per the ELM. Brown et al. (2010) was able to detect a change in attitudes among the sample frame as well as an increased participation in the target behavior. Therefore, it was concluded that the researchers had successfully targeted and altered attitudes pertaining to litter pick-up which results in an increase of the target behavior. The present study did not measure message recipient attitudes, but it did monitor whether or not instances of participating in the target behavior altered as a result of the treatment (which it did not). A question arises as to why the mixed model approach used in the present study was effective for litter pick-up but not transportation mode choice? One reason is that litter pick-up requires a much lower degree of personal sacrifice and thus may be easier to influence. Previous studies have indicated that transportation mode choice is a difficult type of behavior to influence (Corbett, 2005; Bamberg et al., 2003). The historical narrative on transportation in National Parks presented earlier in this paper also displays that personal automobile has been entrenched as the dominant form of transportation in National Parks as a result of aggressive road infrastructure development and the promotion of access. Thus, attempting to alter attitudes and beliefs in order to change behavior through messaging may be largely ineffective in influencing this type

of behavior. Bamberg et al. (2003) found that a type of intervention which lowers perceived barriers to riding alternative transportation could be an effective way to change behavior and subsequently alter attitudes and beliefs pertaining to that behavior. That particular study used a pre-paid bus ticket for university students. It was found that attitudes and beliefs pertaining to riding a bus to school became more positive after the introduction of the pre-paid bus ticket (Bamberg et al., 2003). White (2007) noted that automobile visitors often have a "go where you want when you want" (p. 60) attitude when it comes to personal automobile use in National Parks and that accommodating such users with a more flexible shuttle routes may increase ridership. In the context of the present study, perhaps a ticket which allows visitors who possess the ticket to receive priority boarding may have been a more effective intervention because it could ensure visitors would be able to board the shuttle when they wanted. In turn, this type of intervention could have improved visitors attitudes and beliefs pertaining to shuttle use. Another reason this mixed model approach may have failed was that it targeted the wrong beliefs. Baker's (2008) survey was conducted when the shuttle was relatively new. The present study may have benefited from an updated survey which might have revealed new or more relevant salient beliefs.

Despite the speculation provided in this section, the fact remains that the message provided in this study, which was constructed using prior research and literature, was ineffective in altering shuttle use among message recipients.

Another reason this persuasive message may have failed was due to limitations of the shuttle system. A study performed at Acadia National Park found that a major disincentive to riding the shuttle service was the amount of time visitors had to wait to board the shuttle (Holly, 2009). The researcher found that visitors suggested that the service should run every 15-25 minutes. Mace et al. (2013) also found that frequency of shuttle busses directly affected visitor satisfaction with the Zion National Park mandatory shuttle. Both of these studies indicated that short wait times were associated with increased

freedom and convenience. These findings are important because the Glacier National Park east-side shuttle runs at a frequency of every 45 to 60 minutes. Therefore, this long wait time may have been viewed as a large disincentive for visitors who may have been planning to drive their personal vehicles. It must be noted that visitors who received the message often expressed concerns regarding the long time between departures. Therefore, it is noted that the long wait time between shuttle busses on the east side may have acted as a large disincentive which overrode the messages contained in the brochure.

Previous research which pertains to influencing visitor use in recreation settings has suggested that visitors who have previous experience in a recreation area or those visitors who already have firm plans are difficult to influence (Lime & Lucas, 1977; Krumpal & Brown, 1982; Huffman & Williams, 1987). The fact that the information was disseminated after visitors had already arrived at the park may have rendered the information less useful than if it had been handed out while visitors were planning their trip. It should be noted that the researcher evaluated whether or not a message should have been provided on the internet so that visitors who were using the NPS website to plan their trip could have access to the information before they had firm plans. However, it was determined that supplying information on the internet would make it difficult to understand when and if visitors used this information to ride the shuttle. Therefore, while it would have been preferable to supply visitors with the message prior to planning their trip, it was determined that doing this would not have been practical from an experimental standpoint. Unfortunately, this could have been a reason why the study failed to derive its expected results. It must be noted that the type of information provided in the brochure (information about parking shortages) has been used to influence visitors to ride the optional free shuttle service at Acadia National Park after they had already arrived in the park (Daigle & Zimmerman, 2004). However, the information medium was a real time-display of parking lot saturation throughout

the park. This type of information presentation may be more effective than a brochure due to the fact that the information provided is up to date and novel.

Finally, to build off of the previous paragraph, it must be discussed as to whether or not a brochure was the most appropriate choice of medium. A brochure was chosen along with an employee contact because prior research had shown that method to have success in influencing human behavior and because brochure dissemination appeared highly practical. Brochures are also convenient for the user because they are able to keep the information handy and refer to it at their leisure. However, protected area managers have a variety of communication mediums available to them including: interpretive talks, communication campaigns (i.e. *Smokey the Bear*), and internet resources. It has been shown that a novel communication medium can be more effective than a brochure in influencing human behavior within a protected area (Huffman & Williams, 1987). Additionally, brochures appear to be the most commonly used information dissemination technique within Glacier National Park. The ELM posits that information sources that appear too familiar may be discarded by the message recipient due to a message recipient's lack of personal relevancy with the message (Petty & Cacioppo 1984). Therefore, it would be interesting to experiment with different types of mediums that National Park visitors are less familiar with. For instance, the information presented in the brochure could have been presented using a tablet where videos of traffic and parking congestion were played for visitors. This presentation technique would have been relatively novel and it may have made the threat of not being able to find parking more legitimate. As discussed earlier, a message presented on the internet could have also augmented the persuasive potential because it would have given message recipients an opportunity to view the information before they arrived at the park.

While the topic of climate change is out of the scope of the present research paper, the author feels a brief discussion is warranted within the context of alternative transportation in National Parks. The National Park Service has thus far struggled to deal with how to approach the topic of climate

change. Perhaps a communication campaign, conducted at a similar scope as the *Smokey the Bear campaign*, aimed at encouraging and promoting alternative transportation use in National Parks would be a positive first step. Such a campaign could establish the agency's public stance on the topic as well as celebrate the agency's Alternative Transportation Program. A widespread campaign would also have the potential to change the longstanding personal automobile mode of experience norm that prevails within the agency as a result of early park management that aggressively encouraged such an experience. Obviously, the decision to invest in such a campaign hinges on the agency's commitment to their Alternative Transportation Program as well as their comfort level with taking a public stance on a politically charged issue. This line of inquiry also begs the question as to how the NPS's recent investment in alternative transportation fits into the agency's legacy of aggressive infrastructure development presented earlier in this paper. Could this effort be just another addition to the list of infrastructure enhancements that are a response to overuse and high demand? Or will this be a purposeful and concerted effort to adjust the traditional and likely unsustainable manner in which the majority of visitors currently experience parks in the United States?

Implications

The goal of the present study was to influence visitors to ride the shuttle who were not already planning to do so. The study failed to influence shuttle ridership among Rising Sun and St. Mary Campground visitors. This finding has implications for the field of protected area management as well as management implications at Glacier National Park.

Recent studies concerning alternative transportation in National Parks suggest that visitors favor shuttle systems that: are perceived to allow visitors to avoid parking and traffic congestion issues, allow visitors a sense of freedom, are easy to use, comfortable and help the environment (Daigle & Zimmerman, 2004; Pettebone, et al., 2011; White, 2007; Taff et al., 2013; Holly, 2009; Mace, et al.,

2013). Some studies have even recommended various message appeals that researchers have surmised could increase the use of optional free shuttle service. Specific appeals such as "avoid traffic stress - park here and let our free buses take you to the scenic overlooks" and "let our buses safely guide you around the park" were cited as examples of messages tailored to appeal to these factors (Taff et al., 2013, p 43). White (2007) recommends that communication designed to influence visitors to ride optional shuttles in National Parks should promote convenience, flexibility, and accessibility of the shuttle. White also cited that park information could highlight social and environmental benefits of alternative transportation in National Parks (White, 2007). The present study appealed to many of these concerns using similar messages and found them highly ineffective. This finding is significant and echoes the finding in the Bamberg et al. (2003) study which indicated that reducing perceived barriers to alternative transportation use may be a better catalyst for increasing shuttle use, which can then lead to more positive attitudes towards the behavior. Examples of barriers to shuttle ridership in Glacier National Park could include: frequency of shuttles, the amount of destinations served by the shuttle service and perceived crowding on shuttles.

The present study utilized a mixed model approach to design a persuasive message. The TPB and ELM have been used successfully to construct a persuasive message in a previous study (Brown et al. 2010). The present study displayed no evidence of this approach being effective in influencing visitors to ride an optional and free shuttle. However, it is noted that perhaps the belief elicitation process should have been carried out in closer temporal proximity to the present study because beliefs from Baker's (2008) study may not have reflected as well the current shuttle-related beliefs pertaining to shuttle use at GNP. Therefore, while previous research has found that constructing a persuasive message using the TPB and ELM can be effective in influencing visitor behavior, it was not found effective in this study. Perhaps the TPB and ELM may not be effective at influencing this type of behavior and another type of model might be more suitable (such as one that incorporates emotions). Emotions

have been shown to account for significant variation in activities that involve physical activity (Wang, 2011; Mohiyeddini et al. 2009, Carrus et al. 2008). Furthermore, the recreation experience is often described as one that is dynamic and highly emotional. Thus it is possible the present study did not utilize the most appropriate model or cognitive constructs. However, there are no widely accepted behavioral models that incorporate emotions so they were not included in the brochure because the study desired to use the most widely accepted persuasive practices as dictated by prior research and literature.

One thing that has been made clear through this study is that it may be difficult to influence visitors to ride an optional shuttle by simply telling them that the shuttle is convenient and increases freedom to visit areas of interest; they need to also *know* this to be true. This can likely be accomplished by a well-designed shuttle system that incentivizes use through a system which fosters convenience, ease and freedom. For instance, Acadia National Park's intelligent transportation systems (ITS) incorporated various functions into the system which were designed to decrease psychological stress and increase efficiency associated with public transit. The ITS provided visitors with real time parking lot updates at two popular parking areas, provided signs which relayed real-time departures times at bus stops and also transmitted an audio message regarding the next shuttle stop while riding the busses. It was found that visitors commonly reported that the information provided by the ITS helped to relieve stress or uncertainty of travel (Daigle & Zimmerman, 2004). Additionally, visitors indicated that parking information succeeded in changing when visitors traveled to specific attractions in up to 43% of visitors and influenced 44% of riders to ride the shuttle (Daigle & Zimmerman, 2004). This system appeared to work well at Acadia National Park by increasing optional shuttle use while also maintaining a sense of freedom for visitors because they were able to make informed transportation decisions. It is also important to note that the shuttle ran frequently; every 15-20 minutes. Intelligent transportation

systems appear to be a good indirect method for increasing optional shuttle use within a National Park setting in a manner that also augments system efficiency.

Of additional utility was the finding that knowledge of vehicle use, trail use and weather variables can add significant predictive ability to shuttle use and were found to account for 40 to 50 percent of variation in shuttle ridership. This finding displayed that overall use levels on the GTTSR are closely related to shuttle ridership within the park. This information could be useful for researchers who seek to understand shuttle use levels in other National Park settings. Additionally, this information could be used by managers to provide a more efficient shuttle service. For instance, past use trends from various predictor variables could be utilized to predict periods of the summer when the shuttle service could be expanded in order to meet demand and provide a satisfactory experience. This could be helpful when deciding how to meet ridership demand under budgetary constraints.

While increasing general shuttle use can be a dominant goal of an alternative transportation system in National Parks, the overarching goal of the present study was to understand if managers could target a specific population within the park and persuade them to ride the shuttle. Specifically, the problem which was discovered was that Highline/Loop hikers were exasperating parking congestion at Logan Pass by parking at Logan Pass and hiking the Highline trail to the Loop trailhead. The visitors would then take the shuttle back to their vehicles at the end of their hike which resulted in a large number of vehicles parked at Logan Pass for about five hours, during the busiest time of the day. The goal of this research project was to understand if it would be possible to influence Loop/Highline hikers to use the shuttle to facilitate all transportation associated with their hike using an indirect management technique. When examining the role of regulation in a recreation setting, Lucas (1983) determined that managers should regulate in the least intrusive means required to solve a problem. The research presented in this study by a University of Montana student in partnership with the National Park Service displays a transparent attempt at understanding whether or not the unintended consequences of the

shuttle system can be alleviated through indirect management. The results of the study indicate that influencing enough Highline/Loop hikers to ride the shuttle in order to reduce parking issues at Logan Pass is largely unrealistic and that direct measures will be necessary. A likely option for reducing parking congestion at Logan Pass includes placing a three hour parking time limit at the parking area. This would effectively force Loop/Highline hikers to use the shuttle to facilitate all transportation associated with their hike because this trail system takes an average of over 5 hours to complete.

In summary, prior alternative transportation studies in National Parks have indicated that various appeals to convenience, freedom, stress and safety could be effective ways to increase optional shuttle use. Previous research also indicated that appealing to salient beliefs pertaining to shuttle use could also increase shuttle ridership. This study revealed that these appeals were not effective in this case. The author suggests that augmenting a shuttle system with intelligent transportation systems or in another manner that reduces perceived barriers to alternative transportation use in National Parks will likely be more effective than simply telling visitors the shuttle system meets their needs or serves their best interest. Furthermore, the study revealed that using this indirect management technique was completely ineffective at increasing optional shuttle use among a target population in Glacier National Park. This appears to indicate it will not be feasible to target Loop/Highline hikers in an attempt to persuade them to use the shuttle to facilitate all transportation associated with their hike. Therefore the study concludes that direct measures are necessary in order to alleviate the unintended parking pressure which the shuttle has added to the Logan Pass parking area.

Future Studies

Results from this study suggest various additional paths of research relating to alternative transportation at GNP and other National Parks. One suggestion consists of the continued monitoring of

shuttle use operations in GNP. Monitoring vehicle use, trail use and shuttle use dynamics on the GTTSR have provided valuable insight as to the manner in which these components of the system influence and are affected by each other. Of specific interest has been how the shuttle system has affected visitor use on the GTTSR. Continued efforts should be maintained to monitor human use on the GTTSR, especially after the new GTTSR visitor use management plan has been implemented. Understanding effects of instituted management practices (i.e. placing a three hour time limit for parking at Logan Pass, increasing shuttle departure frequency) can give insight to GNP management as well as general NPS visitor use management as to the efficacy and impacts of such practices.

Further research could also focus on understanding the role emotions play in transportation mode choice in National Parks. This type of research would help further clarify the various cognitions that influence shuttle use within National Parks as well as reveal another emotional facet to the recreation experience. This type of research would also allow researchers and managers to understand how alternative transportation in National Parks impacts visitors' emotional experience.

More research efforts could also attempt to understand the effectiveness of various information mediums in National Parks. This type of research could examine various behaviors under various mediums. This would lend understanding to the role information mediums play in influencing behavior under a variety of behaviors.

It would also be helpful to understand how shuttle use satisfaction and attitudes have changed over time at GNP. For instance, an updated study similar to the one Baker (2008) performed would be informative as to how acceptance and attitudes of the shuttle service have changed over time. An updated study would also aid in understanding of whether or not the present study utilized the most relevant salient beliefs. This could also inform managers as to possible changes that could be implemented to the shuttle system in order to increase visitor satisfaction. Ideally, this would best be carried out before the new visitor use management plan, then at some point after the implementation

of the management plan. This would provide the best insight as to how management actions have impacted visitor experience and attitudes towards the shuttle.

Although inconclusive, results from the study also hinted that the message disseminator may influence the effectiveness of a message. Future research may explore how different types of interaction influence message effectiveness. For instance, sociable interactions could be tested against terse interactions. Research could also explore how physical characteristics of a message disseminator affect message effectiveness. This type of research could clarify the role a message disseminator plays in message effectiveness as well as reveal the most effective way to deliver a persuasive message, and whether or not disseminator characteristics make a difference at all.

Future research could also be directed to understand incentives and disincentives for shuttle ridership at GNP. This study would be helpful in order to understand what exactly drives or hinders visitors from choosing to ride the optional shuttle at GNP. Findings from this study could inform management as to the manner in which the system could be improved to provide more incentives to ride the shuttle at GNP.

Literature Cited

Ajzen, I. (1991). The Theory of Planned Behavior. *Organizational Behavior and Human Decision Processes*, 50, 179–211

Ajzen, I., & Driver, B. L. (1991). Prediction of leisure participation from behavioral, normative and control beliefs: An application of theory of planned behavior. *Leisure Sciences*, 13, 185–204.

Ajzen, I., Fishbein, M. (1980). Understanding attitudes and predicting social behavior. Englewood Cliffs, NJ: Prentice-Hall.

Armitage, C., Conner, M. (1999). The theory of planned behavior: assessment of predictive validity and 'perceived control'. *British Journal of Social Psychology*. 38, 35-54

Ashby, C. (1985). The Blackfeet Agreement of 1895 and Glacier National Park: a case history. Dissertation. University of Montana, Missoula, MT

Baker, M. (2008). *An evaluation of visitor decisions regarding alternative transportation in Glacier National Park*. Dissertation. Missoula, MT: University of Montana Department of Society and Conservation.

Baker, M., Freimund, W. (2007). *Initial Season of the Going-to-the-Sun Road Shuttle System at Glacier National Park: Visitor Use Study*. Missoula, MT: University of Montana Department of Society and Conservation.

Bamberg, S., Ajzen, I., Schmidt, P. (2003). Choice of Travel Mode in Theory of Planned Behavior: The Roles of Past Behavior, Habit, and Reasoned Action. *Basic and Applied Social Psychology*, 25(3), 175-187

Bedoya, D. & Freimund, W. (2012). *2011 Use of Selected Trails and Parking Areas on the Going-to-the-Sun Road: Interim Report*. Missoula, MT: University of Montana Department of Society and Conservation.

Brown, T. J.; Ham, S. H.; Hughs, M. (2010). Picking up Litter: An Application of Theory-based Communication to Influence Tourist Behavior in Protected Areas. *Journal of Sustainable Tourism*, 18(7) 879-900

Brown, C., Halstead, J., Luloff, A. (1992) Information as a management tool: An evaluation of the Pemigewasset Wilderness management plan. *Environmental Management*. 16(2) 143-148

Cahill, K., Marion, J., Lawson, S. (2008). Exploring Visitor Acceptability for Hardening Trails to Sustain Visitation and Minimise Impacts. *Journal of Sustainable Tourism*. 16(2) 232-245

Cambridge Systematics, Inc, BRW Group, Inc. (2001). *Federal Lands Alternative Transportation Systems Study: Summary of National ATS Needs*. Retrieved March 3, 2014, from http://www.fta.dot.gov/documents/3039_study.pdf.

Carrus, G., Passafaro, P., Bonnes, M. (2008). Emotions, habits and rational choices in ecological behaviors: The case of recycling and use of public transportation. *Journal of Environmental Psychology*. 28 51-621

Chaiken, S., Maheswaran, D. (1994). Heuristic Processing Can Bias Systematic Processing: Effects of Source Credibility, Argument Ambiguity, and Task Importance on Attitude Judgment. *Journal of Personality and Social Psychology*. 66(3) 460-473

Craig, D., Yung, L., Borrie, W. (2012). "Blackfeet Belong to the Mountains": Hope, Loss, and Blackfeet Claims to Glacier National Park, Montana. *Conservation and Society*. 10(3) 232-242

Cole, D., Hammond, T., McCool, S. (1997). Information Quantity and Communication Effectiveness: Low-Impact messages on Wilderness Trailside Bulletin Boards. *Leisure Sciences*. 19, 59-72

Corbett, J. (2005). Altruism, Self-Interest, and the Reasonable Person Model of Environmentally Responsible Behavior. *Science Communication*. 26, 368-389

Daigle, J. J.; Zimmerman, C. A. (2004). The Convergence of Transportation, Information Technology, and Visitor Experience at Acadia National Park. *Journal of Travel Research*, 43, 151-160

David, P. (1998). News Concreteness and Visual-Verbal Association. *Human Communication Research*, 25(2) 180-201

Dilsaver, L. & Wyckoff, W. (1999). Agency culture, cumulative causation and development in Glacier National Park, Montana, *Journal of Historical Geography*. 25, 75-92

Dilworth, G., Shafer, S. (2004). Visitor Perceptions of Intelligent Transportation Systems in a National Park. *Proceedings of the 2004 Northeastern Recreation Research Symposium*. USDA Forest Service Northeastern Research Station, Newtown Square, PA, 158–163

Dimond, A. & Freimund, W. (2009). *Recreational Use of Selected Viewpoints on the Going-to-the-Sun-Road, 2009*. Missoula, MT: University of Montana Department of Society and Conservation.

Doucette, J., Cole, D. (1993). Wilderness visitor education: information about alternative techniques. Gen. Tech. Rep. INT-295. Ogden, UT: USDA For. Serv., Intermountain Research Station.

DOT. (1997). Memorandum of Understanding Between Secretary of Transportation and Secretary of the Interior, Retrieved June 3, 2013, from <http://www.fhwa.dot.gov/agreements/headquarters/hfla3agr.htm>.

Driver, B., Brown, P., Stankey, G., and Gregoire, T. (1987). The ROS planning system: evolution, basic concepts, and research needed. *Leisure Sciences*. 9, 201-212.

Eagley, A. H., & S. Chaiken. (1993). *The psychology of attitudes*. New York : Harcourt Brace Jovanovich, Inc.

Forestra, R. (1984). *America's National Parks and Their Keepers*. Washington, D.C.: Resources for the Future, Inc.

Fishbein, M., Ajzen, I. (2010). *Predicting and Changing Behavior*. New York, New York: Psychology Press.

Fishbein, M., Manfredo, M. (1992). A Theory of Behavior Change. In, M.J. Manfredo, ed. *Influencing Human Behavior: Theory and Applications in Recreation Tourism, and Natural Resources*. Champaign, Illinois: Sagamore Publishing, 29-50

Freimund, W., McCool, S., Adams, J. (2006a). Recreational Use of Selected Viewpoints on the Going-to-the-Sun Road, 2005. Missoula, MT: University of Montana Department of Society and Conservation

Freimund, W., Baker, M., McCool, S. (2006b). Recreational Use of Selected Viewpoints on the Going-to-the-Sun Road, 2006. Missoula, MT: University of Montana Department of Society and Conservation

Ham, S. (2007). Can interpretation really make a difference? Answers to four questions from cognitive and behavioral psychology. *Proceedings, Interpreting World Heritage Conference*, March 25-29, Vancouver, Canada. 42-52. Fort Collins, CO: National Association for Interpretation.

Heath, Y., Gifford, R. (2002). Extending the Theory of Planned Behavior: Predicting the Use of Public Transportation. *Journal of Applied Social Psychology*. 32(10) 2154-2189

Hendricks, W., Ramthus, R., and Chavez, D. (2001). The effects of persuasive message source and content on mountain bicyclists' adherence to trail etiquette guidelines. *Journal of Park and Recreation Administration*, 19(3), 38-61

Hockett, K. S. & Hall, T. E. (2007). The Effect of Moral and Fear Appeals on Park Visitors' Beliefs About Feeding Wildlife. *Journal of Interpretation Research*, 12(1): 5-27

Holly, F. M. (2009). Incentives and disincentives for day visitors to park and ride public transportation at acadia national park.(Order No. 1465645, Clemson University). *ProQuest Dissertations and Theses*, 85. Retrieved January 18, 2014, from <http://search.proquest.com/docview/304866044?accountid=14593>.

Hrubes, D., Ajzen, I., Daigle, J. (2001). Predicting Hunting Intentions and Behavior: An Application of the Theory of Planned Behavior. *Leisure Sciences* (23) 165-178

Huffman, M.G. & Williams, D. R. (1987). The Use of Microcomputers for Park Trail Information Dissemination. *Journal of Park and Recreation Administration*. 5, 34-46

Jackson, E. L. (2000). Will research on leisure constraints still be relevant in the twenty-first century? *Journal of Leisure Research*, 32(1), 62–68.

Kaplan, S. (2000). Human Nature and Environmentally Responsible Behavior. *Journal of Social Issues*. 56(3) 491-508

Keller, R., Turek, M. 1998. *American Indians & National Parks*. The University of Arizona Press, Tucson. 319pp.

Krumpe, E.; Brown, P. (1982). Redistributing Backcountry Use Through Information Related to Recreation Experiences. *Journal of Forestry*, 80, 360-364.

Kyle, G., Graefe, A., Manning, R., and Bacon, J. (2004). Effect of activity involvement and place attachment on recreationists' perceptions of setting density. *Journal of Leisure Research*, 26(2), 209-31.

Lackey, B. & Ham, S. (2003). Contextual Analysis of Interpretation Focused on Human-Black Bear Conflicts in Yosemite National Park. *Applied Environmental Education and Communication*. 2, 11-21

Lawson, S., Chamberlin, R., Choi, J., Swanson, B., Kiser, B., Newman, P., Monz, C., Pettebone, D., Gamble, L. (2011). Modeling the Effects of Shuttle Service on Transportation System Performance and Quality of Visitor Experience in Rocky Mountain National Park. *Journal of the Transportation Research Board* No 2244, 97-106

Lime, D. W. & Lucas R. C. (1977). Good Information Improves the Wilderness Experience. *Naturalist* 28(4), 18-21

Loukopoulos, P., Jakobsson, C., Garling, T., Schneider, C., Fujii, S., (2005). Public attitudes towards policy measures for reducing private car use: Evidence from a study in Sweden. *Environmental Science & Policy*. 8(1) 56-66

Louter, D. (2006). *Windshield wilderness: cars, roads, and nature in Washington's national parks*. Seattle, Washington: University of Washington Press.

Lucas, R. C. (1983). The Role of Regulations in Recreation Management. *Western Wildlands*, 9(2), 6-10

Lucas, R. C. (1981). *Redistributing Wilderness Use Through Information Supplied to Visitors*. U.S. Dept. of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station, Ogden

Lutz, R. (1990). The Role of Attitude Theory in Marketing. In Kassirjian H., Robertson, T. (eds) *Perspectives in Consumer Behavior*, 4th ed. New Jersey: Prentice Hall

Mace, B., Marquit & J., Bates, S. (2013). Visitor Assessment of Mandatory Alternative Transportation System at Zion National Park. *Environmental Management*. 52, 1271-1285

Manning, R.E. (2011). *Studies in Outdoor Recreation: Search and Research for Satisfaction*. Corvallis, Oregon: Oregon State University Press

Manning, R. E. (2009). *Parks and People: Managing Outdoor Recreation at Acadia National Park*. Burlington, Vermont: University of Vermont Press

Manning, R. E. (2003). Emerging Principles for Using Information/Education in Wilderness Management. *International Journal of Wilderness*, 9(1) 20-27

McCool, S. F. & Cole, D. N. (2000). *Communicating Minimum Impact Behavior with Trailside Bulletin Boards: Visitor Characteristics Associated with Effectiveness*. USDA Forest Service Proceedings, 15(4) 208-216

McCool, S. F. and Martin, S. R. (1994) Community Attachment and Attitudes Toward Tourism Development. *Journal of Travel Research*, 32(3) 29-34.

Miles, J. C. (2009). *Wilderness in National Parks*. Seattle, Washington: University of Washington Press

Mills, C., Freimund, W., Weinberg, A., Dalenberg, D., Bedoya, D. (2014a). *Glacier National Park Research Site History: Logan Pass*. Missoula, MT: University of Montana Department of Society and Conservation.

Mills, C., Freimund, W., Weinberg, A., Dalenberg, D., Bedoya, D. (2014b). *Glacier National Park Research Site History: Sunrift & St. Mary Falls*. Missoula, MT: University of Montana Department of Society and Conservation.

Mills, C., Freimund, W., Weinberg, A., Dalenberg, D., Bedoya, D. (2014c). *Glacier National Park Research Site History: Avalanche Creek*. Missoula, MT: University of Montana Department of Society and Conservation.

Mohiyeddini, C., Pauli, R., Bauer, S. (2009). The role of emotion in bridging the intention-behavior gap: The case of sports participation. *Psychology of Sports and Exercise*. 10, 226-234

National Park Service Act. (1916). Retrieved January 27, 2013, from <http://www.nps.gov/legacy/organic-act.htm>.

Needham, M. & Szuster, B. (2011). Situational influences on normative evaluations of coastal tourism and recreation management strategies in Hawai'i. *Tourism Management*. 32 732-740.

NPS. (2013a). *Alternative Transportation in The Parks*. Retrieved February 3, 2014, from http://www.nps.gov/transportation/alternative_transportation.html.

NPS. (2013b). *Shuttle System*. Retrieved May 3, 2013, from <http://www.nps.gov/zion/planyourvisit/shuttle-system.htm>.

NPS. (2003). National Park Service Accomplishments in Alternative Transportation. Retrieved March 1, 2014, from http://www.fta.dot.gov/documents/Natl_Park_Svc_Trans_Report.pdf.

Oliver, S., Roggenbuck, J., Watson, A. (1985). Education to reduce impacts in forest campgrounds. *Journal of Forestry*. 83, 234-236

Pettebone, D., Newman, P., Lawson, S., Hunt, L., Monz, C., Zwiefka, J. (2011). Estimating visitors' travel mode choices along the Bear Lake Road in Rocky Mountain National Park. *Journal of Transport Geography*. 19, 1210-1221

Petty, R. & Cacioppo, J. (1984). The effects of involvement on responses to argument quantity and quality: central and peripheral routes to persuasion. *Journal of Personality and Social Psychology*. 46(1) 69-81

Petty, R. E., McMichael, S., Brannon, L. (1992). The Elaboration Likelihood Model of Persuasion: Applications in Recreation and Tourism. Pages 77-102. In: *Influencing Human Behavior* (M. Manfredo, editor), Champaign, Illinois, Sagamore Publishing

Petty, R., Wegener, D., Fabrigar, L. (1997). Attitudes and attitude change. *Annual Review Psychology*. 48, 609-647

Riper, C., Manning, R., Monz, C., Goonan, K. (2011). Tradeoffs Among Resource, Social, and Managerial Conditions on Mountain Summits of the Northern Forest. *Leisure Sciences*. 33, 228-249

Robinson, D. H. (1960). *Through the Years in Glacier National Park*. Kalispell : Glacier Natural History Association, Inc.

Roggenbuck,, J. W. (1992). Use of Persuasion to Reduce Resource Impacts and Visitor Conflicts. Pages 149-208. In: *Influencing Human Behavior* (M. Manfredo, editor), Champaign, Sagamore

Roggenbuck, J. W.; Berrier, B. L. (1982). A Comparison of the Effectiveness of Two Communication Strategies in Dispersing Wilderness Campers. *Journal of Leisure Research*, 14(1) 77-89

Rucker, D., Petty., R. (2006). Increasing the effectiveness of communications to consumers: recommendations based on elaboration likelihood and attitude certainty perspectives. *American Marketing Association*, 25(1) 39-52

Schomaker, J. H. (1975). *Effect of Selected Information on Dispersal of Wilderness Recreationists*. Ph.D. diss. Colorado State Univ. Univ. Microfilms. Ann Arbor. Mich.

Scott, M. C. (2008). Smokey Bear: American Icon. *Documents to the People* 36(1): 47-51

Sellars, R. (1997). *Preserving Nature in National Parks*. New Haven & London. Yale University Press

Seeland, K., Moser, K., Scheuthle, H., Kaiser, F. (2002). Public acceptance of restrictions imposed on recreational activities in the peri-urban Nature Reserve Sihlwald Switzerland. *Urban Forestry & Urban Greening*. ,1 49-57

Sheire, J. (1970). *Glacier National Park Historic Resource Study*. Office of History and Historic Architecture, Eastern Service Center

Sherif, M. & Cantril, H. (1945). The Psychology of 'Attitudes' Part I. The *Psychological Review*. 52(6) 295-319

Shrestha, S., Burns, R., Deng, J., Confer, J., Graefe, A., Covelli, E. (2012). The role of elements of theory of planned behavior in mediating the effects of constraints on intentions: a study of Oregon big game hunters. *Journal of Park and Recreation Administration*. 30(2) 51-62

Singleton, R. & Straits, B. (2009). *Approaches to Social Research*. Oxford, UK: Oxford University Press

Stynes, D. (2011). *Economic Benefits to Local Communities from National Park Visitation and Payroll, 2010*. U.S. Department of the Interior. Retrieved April 20, 2014, from <http://www.nature.nps.gov/socialscience/docs/npssystemestimates2010.pdf>

Tanner, R., Freimund, W., Hayden, B., Dolan, B. (2007). The Waterton--Glacier International Peace Park: Conservation amid Border Security. Pages 183-203. In: Saleem, A. *Peace Parks*. Massachusetts, MIT Press

Taff, D., Newman, P., Pettebone, D., White, D., Lawson, S., Monz, C., Vagias, W. (2013). Dimensions of alternative transportation experience in Yosemite and Rocky Mountain National Parks. *Journal of Transport Geography*. 30, 37-46

Turnbull, K. (2003). Transports to Nature: Transportation Strategies Enhancing Visitor Experience of National Parks. *TR News*. 224, 15-21

Vaske, J. & Donnelly, M. (1999). A Value-Attitude-Behavior Model Predicting Wildland Preservation Voting Intentions. *Society & Natural Resources: An International Journal*. 12(6) 523-537

Verplanken, B., Walker, I., Davis, A., Jurasek, M. (2008). Context change and travel mode choice: Combining the habit discontinuity and self-activation hypotheses. *Journal of Psychology*. 28, 121-127

Vining, J.; Ebreo, A. (1990). What Makes a recycler? A Comparison of Recyclers and Non-Recyclers. *Environment & Behavior*, 22, 55-73.

Vining, J.; Saunders C. (2004). Conservation Psychology. Pages 47-57. In: *Society and Natural Resources: A Summary of Knowledge Prepared for the 10th International Symposium on Society and Natural Resources* (M. Manfredo, editor), Modern Litho, Jefferson City, 361pp.

Wang, X. (2011). The role of anticipated negative emotions and past behavior in individuals' physical activity intentions and behaviors. *Psychology of Sports and Exercise*. 12, 300-305

Wellman, J., (1987). *Wildland Recreation Policy*. New York, New York: John Wiley & Sons

Weinberg, A., Freimund, W., Dalenberg, D. (2013a). *2012 Going to the Sun Road Corridor Vehicle Use Report*. Missoula, MT: University of Montana Department of Society and Conservation.

Weinberg, A., Freimund, W., Dalenberg, D. (2013b). *2012 Going to the Sun Road Corridor Trail Use Report*. Missoula, MT: University of Montana Department of Society and Conservation.

Weinberg, A., Freimund, W., Dalenberg, D. (2014). *2013 Going to the Sun Road Corridor Vehicle and Trail Use Report*. Missoula, MT: University of Montana Department of Society and Conservation.

White, D. (2007). An Interpretive Study of Yosemite National Park Visitors' Perspectives Toward Alternative Transportation In Yosemite Valley. *Environmental Management*. 39, 50-62

Winter, L. (2007). Communicating with Recreation Visitors: A Brief Synthesis of Findings. *General Technical Report – Pacific Northwest Research Station, USDA Forest Service*. Pnw-gtr-698, 149-156

Youngs, L, White D, Wodrich, J. (2008). Transportation systems as cultural landscapes in national parks: the case of Yosemite. *Society and Natural Resources*. 21,797–811

Appendix

Study Schedule

July 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	1 control	2 control	3 main	4 partial	5 control	6 control
7 main	8 partial	9 control	10 control	11 main	12 partial	13 control
14 control	15 main	16 partial	17 control	18 control	19 main	20 partial
21 control	22 control	23 main	24 partial	25 control	26 control	27 main
28 partial	29 control	30 control	31 main			

August 2013

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1 partial	2 control	3 control
4 main	5 partial	6 control	7 control	8 main	9 partial	10 control
11 control	12 main	13 partial	14 control	15 control	16 main	17 partial
18 control	19 control	20 main	21 partial	22 control	23 control	24 main
25 partial	26 control	27 control	28	29	30	31

Brochure (outside)

Shuttle Stop Map

St. Mary Visitor Center
Rising Sun
St. Mary Sunrift Gorge Falls
Gunsight Pass
Logan Pass
Siyeh Bend
The Loop
Avalanche Creek
Lake McDonald Lodge
Sprague Creek
Fish Creek
Apgar Village
Apgar Campground
Apgar Transit Center

The shuttle will stop at all stops, simply pull the cord by the window to let the bus driver know you would like to exit at the next stop.
*A connection to the west-side of the Going to the Sun Road is available at Logan Pass.

Help Yourself, Help Glacier, Ride the Free Shuttle

Don't get stuck in traffic...

Or searching for a place to park...

Reduce your impact & ride the free park shuttle

And make sure you get where you want to be!

National Park Service
Department of Interior
Glacier National Park

Let us do the driving so you can enjoy the pristine view and get where you need to go!

Brochure (inside for St. Mary)



Brochure (inside for Rising Sun)

