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Arapaho and Roosevelt National Forests Transportation Systems Alternatives Study

Final Report

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RSG

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Executive Summary

Introduction

This Executive Summary provides an overview of key findings from the Arapaho and Roosevelt National Forests Transportation (ARNF) System Alternatives Study. The ARNF Transportation System Alternatives Study was conducted under a Sarbanes Transit in Parks grant awarded to the ARNF in response to previous studies of growing unacceptable congestion and visitor use crowding at three recreation sites along Colorado's Front Range. The purpose of the work presented in this report is to provide United States Forest Service (USFS) with information that supports integrated transportation planning and visitor use management at Brainard Lake Recreation Area (BLRA), Guanella Pass (GP), and Mount Evans Recreation Area (MERA). The information presented represents the culmination of the work completed for the ARNF Transportation System Alternatives Study, designed and conducted during a 5-year period from 2011-2016.

The design of the ARNF Transportation System Alternatives Study is notably different from previous assessments of transportation planning needs at the three study sites. In this study, analysis of alternatives and recommendations for transportation improvements were developed according to the maximum levels of visitor use that can be accommodated at the sites without incurring unacceptable impacts to Forest resources, Wilderness values, and recreation experiences rather than in isolation from these relevant considerations. Moreover, Forest goals and objectives for resource condition played a central role in understanding appropriate visitor use capacities at each study site.

Project Overview

The ARNF Transportation System Alternatives Study started with baseline data collection to document existing transportation, visitor use, and resource conditions; a transportation and visitor use management needs assessment; and the development and analysis of alternatives to improve transportation, recreation, and resource management at each of the study sites.

The collection and evaluation of baseline transportation and visitor use data provided a foundation for defining transportation and visitor use management needs, opportunities, and management constraints. A variety of data types were collected from each study site to understand current conditions and desired future conditions. Data types collected include visitor surveys, global positioning system (GPS) tracks of hiking patterns, trail use counts, traffic counts, parking lot counts, and recreation-related resource impact assessments used to characterize transportation, recreation, and resource-related conditions at each site.

Results from the baseline data analysis were used to assess and identify specific transportation and visitor use management needs at each study site. The needs identified at each site were also validated through input from a public workshop, conversations with Forest management staff, and background information from previous studies and planning documents. While specific needs varied across sites, the following general transportation and visitor use management needs were common to all sites:

- Peak-period parking shortages
- Lack of advanced trip-planning and traveler information
- Traffic congestion at entrance stations and/or on roads during peak periods
- Intensive Wilderness use and crowding during peak times

Using the identified site-specific visitor use management and transportation needs as the basis, a range of potential solutions ("alternative components") were developed for consideration in addressing transportation, recreation, and resource management-related issues at the study sites.

Further in-depth analyses and modeling of baseline study data were conducted to evaluate potential outcomes of component implementation. User capacity analyses were conducted at each site to evaluate peak season use conditions in the context of site specific capacities that align with, and/or are derived from, USFS goals and objectives for management. User capacities were operationalized differently at each site, with capacity considerations and goals driven by site-specific factors including guidance from existing management plans, Wilderness designations, and findings from this study. Transit demand analyses were conducted to estimate the potential ridership demand for transit alternatives under consideration. Transit feasibility analyses were conducted for the proposed transit alternatives to provide cost and service information for implementation decision making. Finally, all components were evaluated using a systematic four-phase approach comparing all proposed solutions across the same evaluative scale.

Results of the user capacity, transit demand, transit feasibility, and alternative components analyses and input from meetings with the public and Forest managers were used to inform recommendations for addressing identified visitor use and transportation needs. Recommendations are made according to the needs identified at each site and the maximum levels of visitor use that can be accommodated at each study site without unacceptable impacts to Forest resources, Wilderness values, and recreation experiences identified through the user capacity analyses at each site. Management recommendations at each site are organized into phases, described below, according to implementation feasibility and anticipated financial constraints and/or needs. Strategies for adaptive management, or management strategies that can be employed to adapt to changes or shifts in visitor use at each site, are also discussed, as appropriate, for each study site after phased recommendations.

- Phase 1 recommendations are short-term management actions that generally address urgent needs, are less expensive to implement (than other proposed recommendations), and likely do not require National Environmental Policy Act (NEPA) compliance (and/or other time-intensive administrative processes) to be completed before implementation. Phase 1 recommendations also acknowledge current practices that are anticipated to continue to meet transportation and visitor use needs.

- Phase 2 recommendations are mid-term management actions that address identified needs that are important, but not as urgent as, those needs addressed in Phase 1. Phase 2 recommendations may require more planning and/or financial resources than those in Phase 1. Inclusion of a recommended action in Phase 2 provides additional time to realistically implement these components. These recommendations should be considered for implementation as soon as feasible, given budgetary and administrative constraints.
- Phase 3 recommendations are long-term solutions that require significant planning and financial support to fully implement. These recommendations address identified needs but likely cannot be implemented without the support of stakeholders. Implementation of these recommendations is just as important as the implementation of Phase 1 and 2 recommendations; however, this phasing acknowledges the efforts needed to implement solutions on this scale.

Brainard Lake Recreation Area

Integrated User Capacity Analysis and Results

In the 2005 BLRA Management Plan[1], the USFS established a theoretical user capacity for BLRA as the maximum number of visitors that can be accommodated, per day, without exceeding designated parking capacities at BLRA, including the Gateway Trailhead Parking Lot.

Results of the user capacity analysis suggest that visitor use does not exceed the designated parking capacity for BLRA on typically busy days during the winter or summer seasons. In other words, user capacity, as defined by the USFS in the BLRA Management Plan, is not exceeded on typically busy days during the winter or summer seasons.

Related, the vast majority of Indian Peaks Wilderness (IPW) visitors accessing the IPW via BLRA (85%) reported in the 2014 summer season visitor survey that they do not feel crowded during their hike. Ninety percent of IPW visitors reported that the presence of other people on the trail did not make them feel rushed and/or did not cause them to slow down at any point during their hike. These findings suggest that current visitor use levels, even on typically busy peak season days, do not cause unacceptable visitor crowding in the IPW.

However, BLRA still faces user capacity management challenges because *many visitors do not voluntarily park in the Gateway Trailhead Parking Lot as a means for accessing BLRA*. To make full use of the designated parking capacity at BLRA, and in particular the Gateway Trailhead Parking Lot, an onsite parking management team is necessary to continue enforcing designated parking requirements within BLRA and to direct all overflow parking to the Gateway Trailhead Parking Lot. An onsite parking management team has been functioning to eliminate unendorsed roadside

[1] USDA Forest Service Boulder Ranger District, Rocky Mountain Region, Roosevelt National Forest. (2005). Brainard Lake Recreation Area Management Plan. Available: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5228436.pdf

parking since 2015. A continued emphasis should be made to direct overflow traffic to the Gateway Trailhead Parking Lot.

In addition, visitors parking in the Gateway Trailhead Parking Lot with the intent of accessing BLRA and/or the IPW do not have a safe and convenient way to access their destinations “inside BLRA.” Visitors parking in the Gateway Trailhead Parking Lot must walk two or more miles in traffic on Brainard Lake Road and/or on what is currently a partially developed network of connector trails to access BLRA and IPW recreation sites. A circulator shuttle between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot would provide a safe and convenient way to help manage visitor use according to the USFS’s designated user capacity for BLRA. It is estimated there would be viable ridership demand for this service, approximately 195 daily riders.

Short-Term and Long-Term Recommendations

BLRA recommendations are organized into three implementation phases (Table 1). They provide short, mid, and long-term approaches for managing transportation and visitor use according to BLRA’s designated parking capacity and corresponding user capacity specified in the 2005 BLRA Management Plan.

- Phase 1 addresses the need to more effectively utilize the Gateway Trailhead Parking Lot to manage BLRA parking demand and user capacity; visitor use and user capacity monitoring is also recommended.
- Phase 2 focuses on providing a safe connection from the BLRA Day Use Lot to the IPW trailheads while also developing other trail-based recreation opportunities to help disperse use away from the IPW.
- Phase 3 provides a long-term solution for increasing the safety and convenience of access between the Gateway Trailhead Parking Lot and BLRA destinations through the provision of shuttle service from the Gateway Trailhead Parking Lot into BLRA.

An adaptive strategy for future visitor use management is also proposed for consideration. If substantial changes to visitor use of BLRA occur over the next five to ten years, particularly if Wilderness resource conditions in the IPW change due to increases in use, then a managed-use permit system and quota for day users of the IPW could be considered.

Table 1. BLRA Short-Term and Long-Term Recommendations

Recommended Alternatives by Implementation Phase		Rough Order of Magnitude (ROM) Costs**	
		Capital Costs	**Operations & Maintenance**
Phase 1			
1.	Implement visitor use monitoring for adaptive management*	$8,000	$20,000
	Automated Traffic Recorders	*($5,000)*	*($3,000)*
	Trail Counters	*($3,000)*	*($3,000)*
	Annual Interim Reports and Five-Year Evaluation for Trends	-	*($14,000)*
2.	Continue presence of onsite traffic and parking management team	-	$41,000
3.	Require mandatory queuing and/or parking at Gateway Trailhead Parking Lot when other lots are full and prohibit queuing at Courtesy Station	$1,000	*Included in 2*
4.	Install onsite signs and barriers to deter and prevent unendorsed roadside parking	$6,000	-
5.	Deploy variable message signs to communicate traffic and parking conditions	$120,000	$3,000
6.	Complete trail connection between the Gateway Trailhead Parking Lot and Brainard Lake via the Waldrop Trail	$221,000	-
7.	Install improved onsite wayfinding signage in parking areas	$3,000	-
8.	Provide pre-trip information through ARNF website, smartphone apps, and info centers*	$210,000	$54,000
	Update and Maintenance of ARNF Website	-	*($14,000)*
	Creation and Distribution of Information at Information Centers	*($10,000)*	-
	Development and Maintenance of Smartphone Application for ARNF	*($200,000)*	*($40,000)*
	Phase 1 ROM Cost**	**$569,000**	**$118,000**
Phase 2			
9.	Construct access trail to improve the flow of pedestrian traffic between parking areas	$206,000	-
10.	Construct recreation trails to increase visitor opportunities and enhance enjoyment	$300,000	-
	Phase 2 ROM Cost**	**$506,000**	**$0**
Phase 3			
11.	Operate a circulator shuttle from Gateway Trailhead Parking Lot to Day Use Lot	$70,000	$15,000
	Phase 3 ROM Cost**	**$70,000**	**$15,000**
Adaptive Management			
12.	Implement day use permit system and quota for Indian Peaks Wilderness	N/A	N/A

*Recommendations with multiple line items included in cost have been broken out for context. **ROM costs are adapted from Class C cost estimates for other similar projects and provide only a rough estimate of cost; detailed cost estimates should be prepared prior to implementation.

Guanella Pass

GP Integrated User Capacity Analysis and Results

Parking accumulation and turnover data collected during summer 2012 suggest that by early morning on typically busy peak season days at GP, the designated lots at GP are filled. Correspondingly, the number of cars parking in unendorsed spaces on the roadside at GP increases sharply through the morning hours. Parking accumulation at GP reaches its peak in the late morning, at which time there are nearly twice as many cars parked in unendorsed spaces on the roadside at GP than in the designated parking lots.

Results from the 2012 visitor use data collection and 2014 visitor survey indicate that Wilderness values are compromised in the Mount Evans Wilderness; specifically, on typically busy summer days:

- On a typically busy peak season day approximately 800 people per day hike the Mount Bierstadt Trail, which accounts for about 80% of all hiking use that occurs in the GP area.
- Peak visitor densities on the summit of Mount Bierstadt are equivalent to a moderate level of crowding for pedestrian facilities in an urban environment, such as a city sidewalk.
- The majority of weekend hikers (70%), and about one-third of weekday hikers (34%) on the Mount Bierstadt Trail feel crowded during their hike.

These findings suggest the physical (i.e., designated parking) and Wilderness resource capacities of the GP area are exceeded. Two approaches were taken to analyze and estimate the capacity at GP, including 1) a conventional approach based only on the designated parking capacity at GP and 2) a resource-based approach that integrates Wilderness resource and parking capacities together. The first approach, based on the physical capacity of designated parking lots is designed to accommodate visitor demand and correspondingly accommodates current levels of visitation that have been documented in this study to cause unacceptable levels of crowding and impact to Wilderness values on the Mount Bierstadt Trail and summit. The second approach establishes a Wilderness resource capacity, based on a threshold for the people-at-one-time (PAOT) on the summit of Mount Bierstadt, and optimizes parking and transit within the parameters of the Wilderness resource capacity. In this study, the term "Wilderness resource" is understood as a collective term for the intended resources and values that comprise Wilderness, and are derived from the Wilderness Act, including naturalness, opportunities for solitude, and wildness.[2] Both approaches were conducted as part of the integrated user capacity analysis, but only the Wilderness resource capacity-based approach provides a sustainable solution for managing transportation and visitor use at GP.

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[2] Dawson, C. P., & Hendee, J. C. (2014). *Wilderness management: Stewardship and protection of resources and values.* Fulcrum Publishing: Golden, CO.

The basis for the Wilderness capacity analysis is visitors' perceptions of and thresholds for crowding on the Mount Bierstadt summit. Crowding impacts are in direct conflict with Wilderness experience values outlined in the Wilderness Act of 1964. Furthermore, crowding avoidance behaviors cause resource damage (e.g., vegetation and soil trampling, social trailing, etc.) as people spread out over a landscape to get away from other visitors. Respondents to the 2014 survey of Mount Bierstadt Trail hikers were asked to indicate, for each of several simulated photos of varying numbers of people on the summit of Mount Bierstadt, if they would feel crowding being on the summit with that number of people. Survey results were used to identify an empirically-based crowding threshold that serves to balance the popularity and accessibility of the area with concerns for the quality of Wilderness resources. An overly restrictive threshold would not be pragmatic, given the popularity and accessibility of GP. Meanwhile, an overly relaxed threshold would be inconsistent with the Wilderness designation of the area and related USFS management goals. Based on these factors, the following visitor-based crowding threshold was adopted for the Wilderness capacity analysis:

Wilderness Threshold: No more than 15% of visitors who hike to the summit of Mount Bierstadt on a given day would see more than 22 people-at-one-time in their viewscape on the summit of Mount Bierstadt.

The Wilderness use and capacity model results suggest a Wilderness use permit system with a quota of no more than 400 hikers per day is required to manage use on the Mount Bierstadt Trail to reduce crowding conditions on the summit. This would reduce use on the Mount Bierstadt trail by approximately 50% on a typically busy peak season day.

Results from the physical capacity and wilderness capacity analyses support substantially different recommendations for transportation and visitor use management at GP, and corresponding outcomes related to Wilderness resource values and Forest Goals (Table 2). **Only the Wilderness resource capacity-based approach provides a sustainable solution for managing transportation and visitor use at GP.**

Table 2. Summary of Findings and Outcomes for Physical and Wilderness Capacity Analyses

	Physical Capacity Analysis	Wilderness Capacity Analysis
Mount Bierstadt Trail Peak Use	800+ people per day	400 people per day
Wilderness Resource Conditions	Approximately 60% of hikers encounter more than 22 people per view or more on the summit of Mount Bierstadt	No more than 15% of hikers encounter more than 22 people per view on the summit of Mount Bierstadt
Visitor Use Management	No systematic visitor use management	Wilderness use permit quota system
Transit Service Recommendations	Transit service; ridership demand of 400 to 700 people/day	Transit service; ridership demand of 100 people/day
Alignment with Forest Goals	Does not align with forest goals for resource protection and Wilderness values. May eliminate unendorsed roadside parking	Aligns with multiple goals (resource protection, Wilderness values, eliminating unendorsed roadside parking)

Short-Term and Long-Term Recommendations

GP recommendations are organized into three phases of implementation (Table 3). Together, they provide short, medium, and long-term approaches to managing transportation and visitor use according to the physical capacity of designated parking at GP and the Wilderness resource-based capacity of the Mt. Bierstadt Trail and summit.

- Phase 1 recommendations seek to reduce unendorsed roadside parking and set the stage for active parking management; visitor use and user capacity monitoring is also recommended.
- Phase 2 recommendations focus on implementing a Wilderness permit system and quota and deploying an onsite parking management and permit enforcement team.
- Phase 3 recommendations present three long-term management options for maximizing Mount Bierstadt Trail access under the managed-use permit system while balancing parking constraints and protecting resource and Wilderness values.

An adaptive strategy for future visitor use management is also proposed for consideration, should visitor use monitoring at GP indicate that use is changing. If visitor use of the Mount Bierstadt Trail shifts from weekends days to weekdays due to weekend permit requirements, managers should consider implementing a reduced number of weekday permits to preserve a different experience for weekday users. Managers may also consider increasing the provision of transit and/or parking at GP to accommodate visitor use if displacement of GP users that do not intend to hike the Mount Bierstadt Trail is excessive.

Table 3. GP Short-Term and Long-Term Recommendations

Recommended Alternatives by Implementation Phase		Rough Order of Magnitude (ROM) Costs**	
Phase 1		**Capital**	**Operating & Maintenance**
1.	Implement visitor use monitoring for adaptive management*	$8,000	$20,000
	Automated Traffic Recorders	*($5,000)*	*($3,000)*
	Trail Counters	*($3,000)*	*($3,000)*
	Annual Interim Reports and Five-Year Evaluation for Trends	-	*($14,000)*
2.	Coordinate parking enforcement with Clear Creek County through Memorandum of Understanding	-	Included in 1
3.	Deploy variables message signs to communicate traffic and parking conditions	$80,000	$2,000
4.	Provide pre-trip information through ARNF website and smartphone apps*	$200,000	$54,000
	Updating and Maintenance of ARNF Website	-	*($14,000)*
	Development and Maintenance of Smartphone Application for ARNF	*($200,000)*	*($40,000)*
	Phase 1 ROM Cost**	**$288,000**	**$76,000**
Phase 2			
5.	Implement a managed-use Wilderness day use permit system and quota for Mount Bierstadt Trail (300 permits per day)	-	$71,000
6.	Deploy onsite parking management and permit quota team	-	$60,000
7.	Install onsite signs and barriers to deter and prevent unendorsed roadside parking	$11,000	-
8.	Designate parking areas for Mount Bierstadt Trail users (91 spaces) and "other" GP users (15 spaces)	$6,000	-
	Phase 2 ROM Cost**	**$17,000**	**$131,000**
Phase 3			
9.	***Option 1:*** Retain managed-use permit system and quota at 300 permits per day without expanding onsite parking as a long-term solution	-	*Included in 5*
10.	***Option 2:*** Increase the managed-use permit system and quota to 400 permits per day and expand onsite parking at GP to accommodate all permit holders in designated parking spaces	$113,000	$88,000
11.	***Option 3:*** Increase the managed-use permit system and quota to 400 permits per day, with shuttle service from Georgetown for those permit holders that cannot park in a designated space at GP	$575,000	$159,000
	Phase 3 ROM Cost**	*Dependent on Option Selected*	
Adaptive Management			
13.	Reduce permit quota for weekday Mount Bierstadt Trail use if demand shifts to weekdays to preserve a different experience for weekday users	N/A	N/A
14.	Increase transit and/or parking at GP if displacement of other GP users is excessive	N/A	N/A

*Recommendations with multiple line items included in cost have been broken out for context. **ROM costs are adapted from Class C cost estimates for other similar projects and provide only a rough estimate of cost; detailed cost estimates should be prepared prior to implementation.

Mount Evans Recreation Area

Integrated User Capacity Analysis and Results

Parking accumulation and turnover data collected during the summer of 2012 suggest parking demand on typically busy peak season days in MERA is far above parking capacity from late morning through late afternoon/early evening. Between the hours of 12:00 PM and 4:00 PM on typically busy peak season days there is gridlock in parking lots and on the road itself as visitors wait for a place to park at Summit Lake and the Mount Evans summit. Traffic data collected during the 2012 season also indicate long lines of traffic form at the Welcome Station on typically busy summer days, and during particularly busy periods, traffic backs up onto Colorado Highway 103.

Parking and traffic conditions on typically busy summer days in MERA conflict with the paramount experience in MERA: scenic driving. Findings from the 2014 visitor survey in MERA indicate:

- The vast majority of visitor groups to Mount Evans (91%) engage in scenic driving and 61% of visitor groups report that scenic driving is their primary activity on their trip to MERA.
- The majority of weekend (93%) and weekday (70%) visitors reported that they experienced parking congestion during their visit to MERA.
- More than two-thirds (69%) of weekend visitor groups and about one-third (29%) of weekday visitor groups thought that parking congestion in MERA was moderate to extreme.
- Forty-percent of MERA visitors that parked at the summit of Mount Evans reported that they did not park in an actual parking space.

In contrast to the findings regarding scenic driving, survey results suggest crowding-related impacts to Wilderness values on the Mount Evans summit are less problematic:

- Very few visitors reported walking/taking a short hike (11%), day hiking (8%), or overnight backpacking (0%) as their primary activity during their visit to MERA.
- Less than half (46%) of MERA visitors hiked to the "true summit" of Mount Evans (and this is likely over-reported due to confusion among respondents about the difference between the Mount Evans parking lot and the "true summit").
- Regardless of the day of the week, a minority (17% on weekdays and 44% on weekend days) of those MERA visitors who hiked to the "true summit" felt crowded when they were there.

Based on the study findings, the user capacity analysis for MERA focuses on the physical capacity of designated parking areas in MERA to address the impacts of parking shortages and traffic congestion on scenic driving experiences and associated visitor safety.

Results of the user capacity analysis suggest that visitor use exceeds MERA's capacity, defined as available designated parking spaces, on typically busy peak season days. Options for addressing this include redirecting visitors to other recreation destinations in "real-time" using variable message signs and/or onsite staff, via a reservation/permit system with a daily quota, or directing visitors to an overflow parking lot with transit service to MERA. Transit demand analyses were conducted to estimate hourly ridership demand for two transit service options from overflow parking locations. Results from these analyses suggest that on typically busy peak season days, approximately 552 visitors who could not otherwise park in designated parking spaces at MERA would opt to use transit service from an overflow parking lot near the MERA Welcome Station. Alternatively, approximately only 211 visitors would do this if the overflow parking lot was in Idaho Springs.

Short-Term and Long-Term Recommendations

MERA recommendations are organized into two phases of implementation (Table 4). Together, they provide short-term and long-term approaches for managing transportation and visitor use according to the physical capacity of designated parking at MERA. The MERA recommendations reflect the paramount importance of scenic auto touring to visitors and the need to address congestion-related impacts to scenic driving experiences. The recommendations further reflect that Wilderness use at MERA is relatively low, and Wilderness use impacts are not pronounced.

- Phase 1 recommendations seek to reduce parking congestion and unendorsed roadside parking through active parking management; visitor use and user capacity monitoring is also recommended.
- Phase 2 provides three options for limiting vehicle access into MERA according to the physical capacity of designated parking spaces while maximizing overall visitor use via transit and/or a reservation system.

An adaptive strategy for future visitor use management is also proposed for consideration, should visitor use monitoring at MERA indicate that use is changing from baseline conditions. Phase 2 provides managers with two options for long-term visitor use management at MERA through limiting parking and providing transit to and/or in MERA, and one option for long-term visitor use management through implementation of a managed-use permit system and quota for entry to MERA. If managers find implementation of Options 1 or 2 to be ineffective for long-term management at MERA, a managed-use permit system and quota (Option 3) should be considered to actively manage the number of arriving visitors at MERA.

Table 4. MERA Short-Term and Long-Term Recommendations

Recommended Alternatives by Implementation Phase		Rough Order of Magnitude (ROM) Costs**	
Phase 1		**Capital**	**Operating & Maintenance**
1.	Deploy onsite traffic and parking management team	-	$41,000
2.	Coordinate parking and queuing management with CDOT through Memorandum of Understanding	-	$14,000
3.	Install onsite signs and barriers to deter and prevent unendorsed roadside parking	$11,000	-
4.	Deploy variable message signs to communicate traffic and parking conditions	$40,000	$1,000
5.	Provide pre-trip information through ARNF website, smartphone apps, and info centers*	$210,000	$54,000
	Update and Maintenance of ARNF Website	-	*($14,000)*
	Creation and Distribution of Information at Information Centers	*($10,000)*	-
	Development and Maintenance of Smartphone Application for ARNF	*($200,000)*	*($40,000)*
6.	Designate dates and/or times for bicycle access	-	*Included in 2*
7.	Implement visitor use monitoring for adaptive management*	$6,000	$20,000
	Automated Traffic Recorders	*($3,000)*	*($3,000)*
	Trail Counters	*($3,000)*	*($3,000)*
	Annual Interim Reports and Five-Year Evaluation for Trends	-	*($14,000)*
	Phase 1 ROM Cost**	**$267,000**	**$130,000**
Phase 2			
8.	***Option 1:*** Designate mandatory parking in new overflow parking lot near Welcome Station when lots are full, and operate van tour service of MERA	$1,721,000	$134,000
9.	***Option 2:*** Designate mandatory overflow parking in Idaho Springs, Colorado, and operate transit and van tours of MERA, when lots at MERA are full	$2,475,000	$270,000
10.	***Option 3:*** Implement a managed-use reservation system (in partnership with CDOT), with or without overflow parking and transit (dependent on number and type of reservations available)	-	$220,000
	Phase 2 ROM Cost**	*Dependent on Option Selected*	
Adaptive Management			
11.	If applicable and needed, move toward implementation of Option 3 (above)	N/A	N/A

*Recommendations with multiple line items included in cost have been broken out for context. **ROM costs are adapted from Class C cost estimates for other similar projects and provide only a rough estimate of cost; detailed cost estimates should be prepared prior to implementation.

Conclusion

Recommendations for each of the study sites are the result of rigorous, data-driven analyses designed to 1) incorporate Forest goals and objectives for transportation and recreation management, and 2) manage visitor use to the identified user capacity for each site without incurring unacceptable resource impacts. Visitor use capacity was operationalized differently at each study site incorporating site specific visitor use data and direction from relevant planning documents and legislation for each site. Ultimately, recommendations at BLRA and MERA seek to manage visitor use to the designated parking capacity of each site, while recommendations at GP seek to manage visitor use to the Wilderness resource capacity of the Mount Bierstadt Trail.

INTRODUCTION

The Arapaho and Roosevelt National Forest (ARNF) Transportation System Alternatives Study was designed and conducted during a 5-year period from 2011 through 2015. The primary purpose of the study was to support integrated transportation planning and visitor use management at three high-use recreation sites in Colorado managed by the US Forest Service (USFS): Brainard Lake Recreation Area, Mount Evans Recreation Area, and Guanella Pass (hereafter referred to as the study sites). The study included baseline data collection to document existing transportation, visitor use, and resource conditions; a transportation and visitor use management needs assessment; and development and analysis of alternatives to improve transportation, recreation, and resource management at each of the study sites. The study design is notably different from previous assessments of transportation planning needs at the study sites. Specifically, analysis of alternatives and recommendations for transportation improvements were developed in this study according to the maximum levels of visitor use that can be accommodated at the sites without unacceptable impacts to forest resources, Wilderness values, and recreation experiences.

The study was funded through a US Department of Transportation Federal Transit Administration Paul S. Sarbanes Transit in Parks Program grant, with additional support contributed by the Federal Highway Administration, Central Federal Lands Highway Division (FHWA CFLHD) and the USFS. Project partners include ARNF (funding recipient), project administration by FHWA CFLHD, and technical contributions by the U.S. Department of Transportation John A. Volpe National Transportation Systems Center and RSG Inc.

Project Background

The Front Range of Colorado contains a complex of federal land units and population centers, most notably, Denver. With its combination of major population centers and adjacent public lands, the area attracts over 23 million recreation visits annually[3]. Furthermore, it is one of the fastest growing regions in the United States, and is the fastest growing region in Colorado (Figure 0-1).

[3] Interagency Transportation Assistance Group (TAG), Alternative Transportation in Parks and Public Lands (ATPPL) Program. (2007). Transportation observations, considerations, and recommendations relative to the Colorado Front Range.

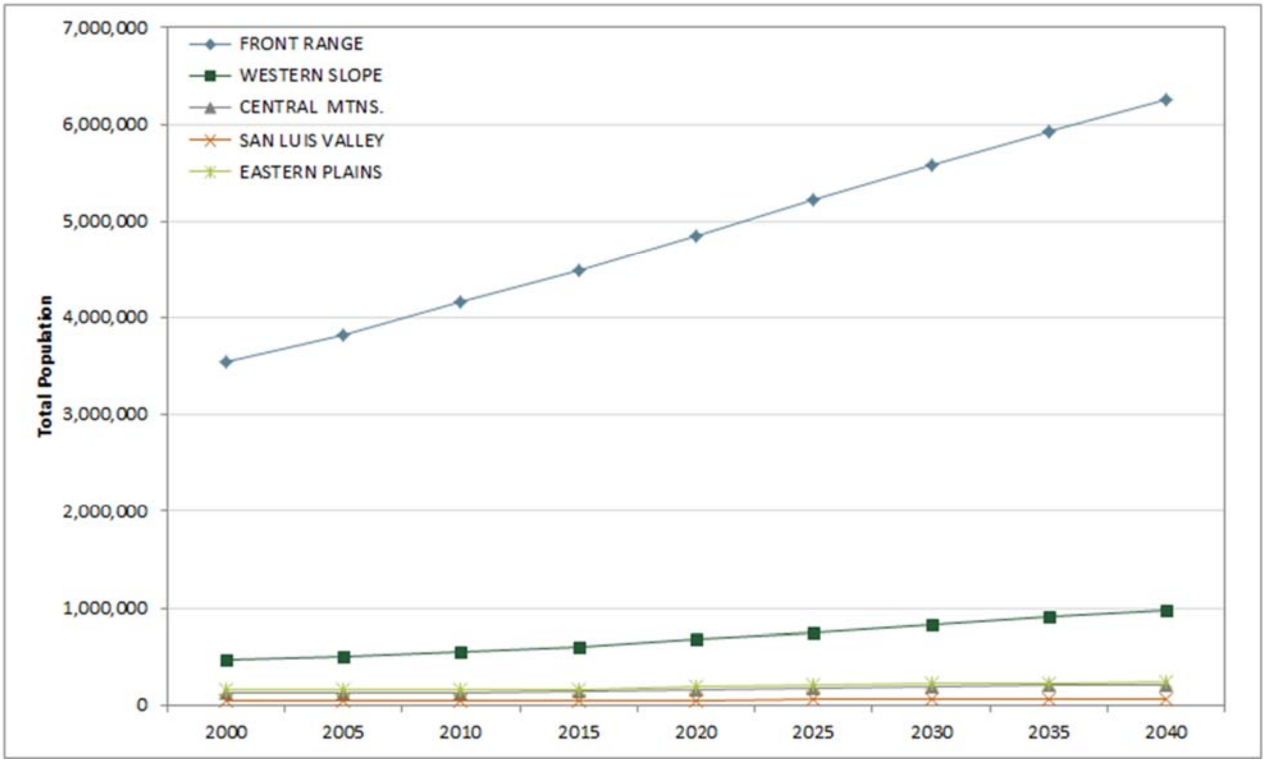


Figure 0-1. Estimated regional population growth in Colorado by 2040[4].

The ARNF is located within close proximity to the Colorado Front Range metro area population of nearly 3 million people (Figure 0-2). Due to its urban-proximity, and Colorado's longstanding popularity for nature-based tourism, the ARNF ranks among the most heavily visited national forests in the country. Previous studies within the ARNF identified three recreation sites facing the most immediate transportation and visitor use needs. These sites — the Brainard Lake Recreation Area (BLRA), Guanella Pass Scenic Byway (GP), and the Mount Evans Recreation Area (MERA) — are connected via major highways to several Front Range population centers. Consequently, these USFS recreation areas receive intensive levels of visitation, which have resulted in a number of transportation-related issues and associated impacts to natural resources and visitor experience quality. The scope and intensity of these impacts are expected to increase with projected regional population growth (Figure 0-1).

[4] "Population totals for Colorado and sub-state regions, 5 year increments, 2000 - 2050." (2015). Colorado State Demography Office. Available https://www.colorado.gov/pacific/dola/population-totals-colorado-and-sub-state-regions.

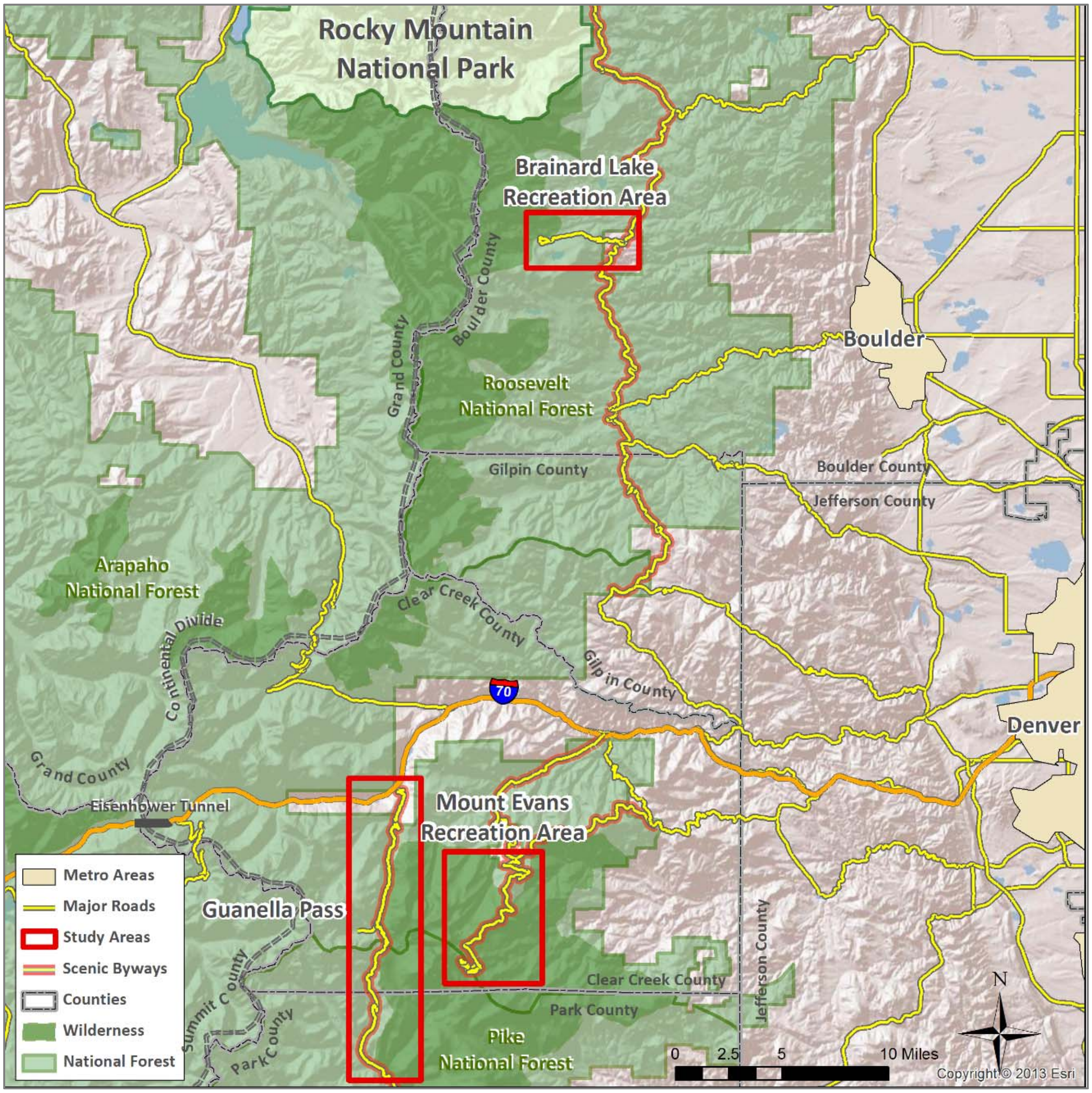


Figure 0-2. Regional map of study locations.

Previous Front Range interagency transportation and planning groups identified that primary transportation corridors, such as the I-70 corridor, are insufficient to accommodate current and increasing regional recreation-related traffic. Moreover, previous transportation and visitor use studies conducted specifically in the ARNF suggest there are near-term opportunities for alternative transportation solutions to the issues noted at BLRA, GP, and MERA[5]. For example, the FHWA evaluated the potential for shuttle service at BLRA, including a first phase with service limited to BLRA itself, and a second phase with connections from BLRA to Nederland, Colorado, via

[5] RSG, Inc. (2010). Transit in Parks Project Analysis: Data Assessment Report. Prepared for USDA US Forest Service Arapahoe and Roosevelt National Forests.

the Peak-to-Peak Highway, and from Nederland, Colorado, to Boulder, Colorado.[6] Similarly, a series of studies have been conducted at MERA to assess the feasibility of implementing a shuttle system on the Mount Evans Highway to reduce parking congestion and allow visitors to avoid the stress of driving in challenging road conditions presented by the Mount Evans Highway.[7] Planning studies at GP have also identified the potential benefits of shuttle service to manage transportation and visitor use conditions in the Byway corridor. [8]These previous studies document the need for consideration of alternative transportation solutions, in conjunction with visitor use management considerations, at each of these recreation sites.

While the problem of access to recreation sites is an important aspect of this project, an equally important component is the consideration of appropriate visitor use capacities for these recreation sites. Previous analyses of potential alternative transportation solutions for BLRA, GP, and MERA have lacked systematic evaluation of the limits of visitor use that can be accommodated without unacceptable impacts to visitor experience quality and natural resource conditions. Unacceptable impacts due to visitor use can be understood as changes in the provision of resources, whether they be to experiential or natural, due to the level of visitation experienced at a site that are found to be unacceptable given management objectives and/or visitor expectations for resource provision and stewardship. Yet, as the 1993 shuttle feasibility study at MERA suggests, the first consideration in designing a shuttle system (and/or other alternative transportation solutions) should be the recreation carrying capacity (i.e., user capacity) of the area[9]. To design a shuttle system for MERA (or any of the other study sites) that is in accord with sustainable levels of visitor use, the 1993 study notes, a user capacity model, coupled with visitor use data is essential. The same can be said for the design of other alternative transportation solutions for BLRA, GP, and MERA. This Transportation Systems Alternatives Study is unique in the region for taking an innovative approach to transportation planning that considers the demand for access in the context of appropriate ecological and social capacities and management objectives. At each of the three recreation sites evaluated in this study, the management objectives of USFS managers serve as the foundation of all recommendations. This approach deviates from the more traditional demand-driven approach to recreation transportation planning, in which excess demand at a recreation site drives site capacity planning and decision making.

Project Purpose

The purpose of the ARNF Transportation Systems Alternatives Study is to identify and evaluate the feasibility of potential alternative transportation solutions to improve recreation and resource

[6] Cambridge Systematics, Inc. (2004). Federal lands alternative transportation systems study: Summary of Forest Service ATS needs, FTA-TRI20-2004.1, FHWA-FLH-04-006. Prepared for Federal Highway Administration and Federal Transit Administration.

[7] Clear Creek County Tourism Board & Community Matters, Inc. (2000). Mount Evans Scenic and Historic Byway Corridor Management Plan. Available file:///Q:/Projects/_Federal/USFS/11210%20-%20ARNF/Background/Final%20Report%20Introduction%20Sources/MountEvansScenicBywayCMP.pdf

[8] Guanella Pass Road Technical Report: Year 2025 Traffic Projections. (2002). Prepared for Federal Highway Administration, Central Federal Lands Highway Division.

[9] Lewin, Brust, Gulas, Ohmart, & Velarde. (1993). Analysis of the Feasibility of the Shuttle System.

management at BLRA, GP, and MERA. In particular, the project was designed to identify, verify, and document transportation, visitor, and resource concerns; assess user capacity levels where appropriate; and identify feasible short-term and long-term alternative transportation and congestion management solutions for the three sites. Further, the project is intended to engage agency and public stakeholders in the development and analysis of alternatives, and create a framework for future collaboration on alternative transportation system solutions where and when appropriate. Thus, the alternative transportation solutions identified in this project provide the USFS with the tools needed to address transportation, recreation, and resource management-related needs at BLRA, GP, and MERA.

Following from the overall project purpose, the specific objectives, derived from Forest Goals and Objectives, of this project are to:

Protect Forest Resources

- Restore resource conditions in areas where vegetation and soils have been impacted by unendorsed roadside parking and recreational use in undesignated areas.
- Protect and enhance sensitive forest resources through implementation of improvements to transportation system facilities and services.
- Improve peak-period visitor use management to minimize recreation-related impacts to forest resources.

Improve the Safety, Efficiency, Convenience, and Sustainability of the Transportation System

- Reduce public safety risks due to conflicts among pedestrians, parked vehicles, and moving traffic.
- Reduce traffic congestion and parking shortages through effective use of alternative transportation systems and visitor use management.
- Provide a range of transportation mode choices that are financially feasible, convenient, and environmentally-friendly.
- Work with federal, state, regional, and local partners to promote coordinated and connected transportation systems and services.

Provide for Visitor Enjoyment of Forest Resources and Preserve the Quality of Visitors' Experiences

- Improve visitor information to help visitors make trip-planning decisions that enhance the quality of their experiences.
- Manage the type and amount of Wilderness use to ensure visitors have outstanding opportunities to experience Wilderness resource values.
- Promote visitor enjoyment of and learning about forest resources, without unacceptable levels of crowding or other impacts to the quality of visitors' experiences.

The USFS desires to improve recreation and resource management at the identified high-use recreation sites on the ARNF and the Pike NF (one of the study sites, Guanella Pass, is located in both the ARNF and the Pike NF). To that end, this project identified, verified, documented, evaluated, and analyzed transportation, visitor, and resource concerns; assessed visitor use and transportation capacity levels where appropriate; and identified feasible short-term and long-term alternative transportation and congestion management solutions for the three sites.

Project Scope and Report Structure

This document serves as the final report for the ARNF Transportation Systems Alternatives Study. The report is a compilation of the series of technical memorandums authored throughout the course of the project as individual project deliverables and additional new writing on capacity analyses and short and long-term recommendations. The content has been organized into chapters by topic and content, rather than according to the chronological and/or numerical order of the original technical memorandums. The outline below provides a summary of the final report organization.

Baseline Data Collection: Chapters 1-3

The collection and evaluation of baseline transportation and visitor use data at each of the three study sites provided a foundation for defining transportation and visitor use management problems, opportunities, and management constraints. A variety of data types were collected from each study site to understand current conditions and future desired conditions. Data types collected include visitor surveys, global positioning system (GPS) tracks of hiking patterns, trail use counts, traffic counts, parking lot counts, and recreation-related resource impact assessments used to characterize transportation, recreation, and resource-related conditions at each site. Chapters 1-3 report the data collection methods and data summaries for all transportation, visitor use, and site-specific data collected during the project, containing the following sections:

- Chapter 1: Brainard Lake Recreation Area Summary of Data Findings
  - Brainard Lake Recreation Area Transportation and Visitor Use, Winter 2011-2012
  - Brainard Lake Recreation Area Transportation and Visitor Use, Summer 2013
  - Brainard Lake Recreation Area Visitor Survey, Summer 2014
  - Brainard Lake Recreation Area Alternative Trail Alignment Analysis, Summer 2012
- Chapter 2: Guanella Pass Summary of Data Findings
  - Guanella Pass Transportation and Visitor Use, Summer 2012
  - Guanella Pass Visitor Survey, Summer 2014
- Chapter 3: Mount Evans Recreation Area Summary of Data Findings
  - Mount Evans Recreation Area Transportation and Visitor Use, Summer 2012
  - Mount Evans Recreation Area Visitor Survey, Summer 2014
  - Ecological Condition Assessment, Mount Evans Recreation Area and Guanella Pass, Summer 2012

Needs Assessment and Alternatives Development: Chapters 4-5

Results of baseline data analysis and modeling were used assess and identify specific transportation and visitor use management needs at each study site. The needs assessment also incorporated input from a public workshop and background information from previous studies and planning documents. Using the needs assessment as the basis, potential alternative transportation and visitor use management solutions ("alternative components") were developed to provide the

USFS with the tools needed to address transportation, recreation, and resource management-related issues at the study sites. Chapters 4 and 5 outline the needs identified for each site, and the resultant range of potential management solutions developed to address identified needs, and include:

- Chapter 4: Need Identification by Site
- Chapter 5: Alternative Components by Site

Analyses and Evaluation of Alternatives: Chapters 6-8

Analysis and modeling of study data were conducted to estimate user capacities for each of the study sites according to forest goals and objectives, and to estimate ridership demand for potential shuttle/transit scenarios at each study site. The ridership demand estimates were incorporated into site-specific transit feasibility analyses to provide a realistic picture of cost, ridership, and routes for potential transit solutions. The capacity, transit demand, and transit feasibility analyses provided context for the evaluation of proposed alternative components in the context of evaluation criteria and methodology consistent with management goals for the study sites. Chapters 6-8 provide methods and results of the user capacity, transit demand, transit feasibility, and alternative components analyses, and include:

- Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis, by Site
- Chapter 7: Transit Feasibility Analyses and Recommendations by Site
- Chapter 8: Alternative Components Analyses, Methodology and Results

Short-Term and Long-Term Recommendations: Chapter 9

Results of the capacity, transit demand, transit feasibility, and alternative components analyses and input from meeting with the public and forest managers were used to inform short-term and long-term recommendations for addressing identified visitor use and transportation needs. Recommendations are made according to the transportation and visitor use management needs, and maximum levels of visitor use that can be accommodated at the study sites without unacceptable impacts to forest resources, Wilderness values, and recreation experiences. Chapter 9 provides a tiered list of transportation and visitor use recommendations to USFS managers for addressing the recreation-related needs identified at each study site.

Recreation Site Descriptions

As discussed, the ARNF Transportation System Alternatives Study is focused on supporting integrated transportation planning and visitor use management at three high-use recreation sites in Colorado managed by the USFS: BRLA, GP, and MERA. Descriptions of each study site are included below, providing information on forest administration, existing infrastructure, parking infrastructure and capacity, and existing visitor use management practices (if any). Additional background information for each study site is included in *Transit in Parks Project Analysis: Data Assessment Report* (Appendix BB). This report was compiled by RSG prior to the ARNF Transportation System Alternatives Study and provided context for the present study.

Brainard Lake Recreation Area

BLRA is the most popular destination on the Boulder Ranger District of the ARNF. BRLA serves as a "gateway" to the Indian Peaks Wilderness (IPW), the most-accessible Wilderness area from the Denver metro area. Two hours from Denver via I-70 and the Peak-to-Peak Scenic Byway, BLRA provides year-round and day use activities in a high-mountain, forested setting. The trailheads for Wilderness camping or popular day hikes, as well as fishing, camping, picnicking, hiking, snowshoeing, cross-country skiing, and other dispersed recreation opportunities both in and outside the IPW all begin in BLRA.

There are a number of developed recreation facilities at BLRA that are accessible to visitors during the summer, including an entrance station (referred to hereafter as the "Courtesy Station"), picnic sites, parking lots, restroom facilities, information kiosks, and a boat launch (Figure 0-3). In addition, there is a 47-site campground at BLRA that accommodates tents, campers, trailers, and RV's up to 45 feet in length. Brainard Lake Recreation Area also has a number of trailheads, some of which provide direct access to the IPW.

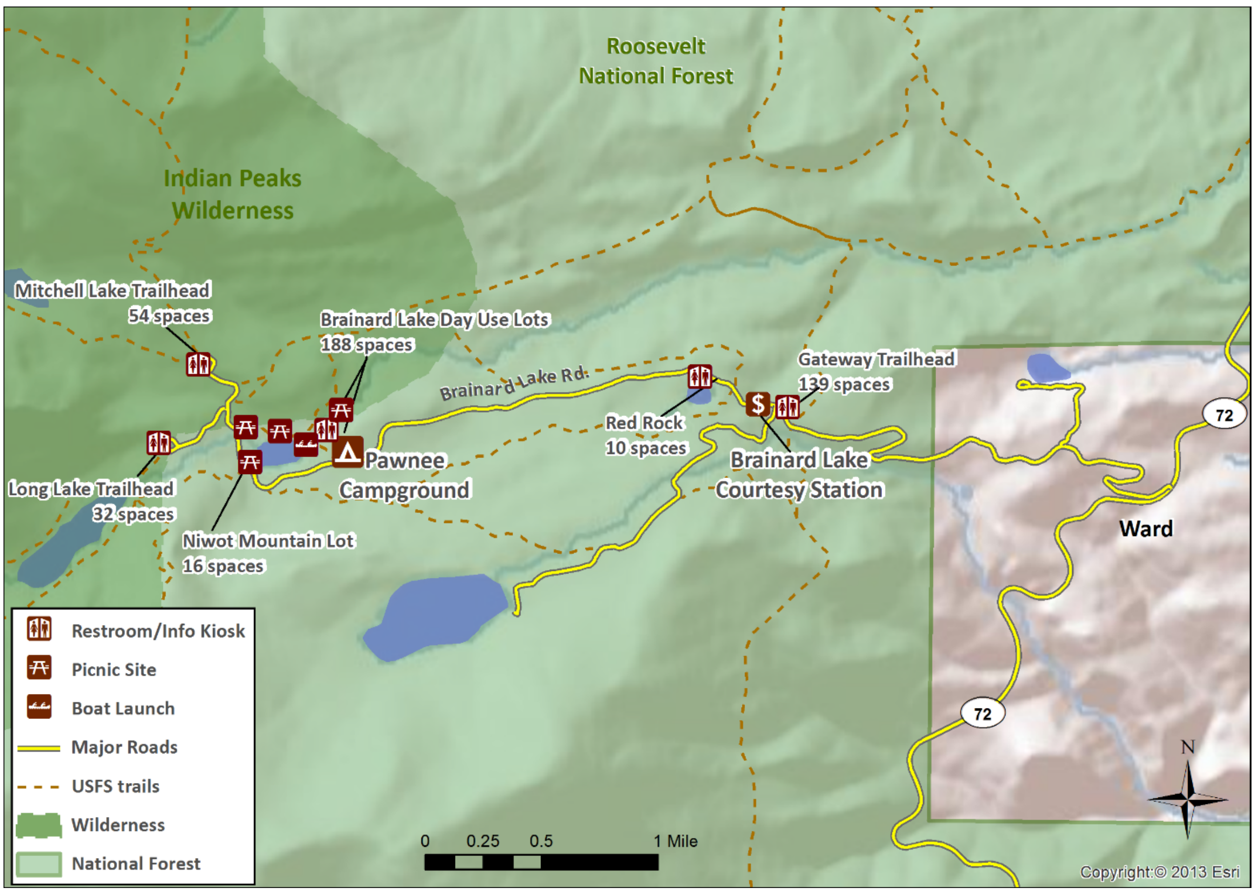


Figure 0-3. Brainard Lake Recreation Area study area map.

There are two trailhead parking lots at BLRA that provide direct access to the IPW during the summer; one at the Mitchell Lake Trailhead (54 parking spaces), and the other at the Long Lake Trailhead (32 parking spaces; Figure 0-3). The Niwot Mountain Parking Lot (16 parking spaces) is a relatively short distance east of the Long Lake and Mitchell Lake Trailhead Parking Lots, and provides nearby access to the IPW during the summer hiking season.

In 2012, the USFS built a parking lot directly next to Brainard Lake with 188 parking spaces that is open to visitors during the summer — this lot is referred to hereafter as the Day Use Lot. This parking area is primarily intended for day use visitors to BLRA, and is located in BLRA but away from the IPW trailhead parking lots to help shift some use away from the IPW (Figure 0-3). The USFS also recently constructed another parking lot just outside of BLRA before the Courtesy Station on Brainard Lake Road, with parking capacity for 139 automobiles — this parking area is hereafter referred to as the Gateway Trailhead Parking Lot. This parking area is open to BLRA visitors year-round, and serves as the main parking area for winter recreationists at BLRA (Figure 0-3). While a parking fee is collected from BLRA visitors during the summer months as they enter at the Courtesy Station, those visitors who park in the Gateway Trailhead Parking Lot do not have to pay the parking fee to enter BLRA.

In addition to the recently constructed parking areas within BLRA, the USFS also made changes to vehicle access within BLRA and implemented parking enforcement. The north side of the Brainard Lake Road loop was closed to vehicles in 2013. The USFS now only allows pedestrian or bicycle use along this section of the roadway. Prior to its closure to vehicle traffic, this section of road provided vehicular access to the boat launch, a number of picnic areas, and the beach area of Brainard Lake. Additionally, prior to its closure, visitors were allowed to park along the roadside on this section of road. Since 2012, the USFS has employed an onsite parking management team to limit visitor parking to designated spaces within BLRA and to prevent the use of unendorsed roadside parking within BLRA. The parking management team staffs one parking attendant at the Long Lake Trailhead Parking Lot, one parking attendant at the Mitchell Lake Trailhead Parking Lot, and a "roving" parking attendant who monitors roadside parking, closes off sections of road once parking areas are full, and manages parking within the Brainard Lake Day Use Parking Lot. The parking management team has been highly effective in preventing unendorsed roadside parking in BLRA and limiting vehicle entries into BLRA to the number of available parking spaces.

Guanella Pass Scenic Byway

Guanella Pass Road is a National Forest Scenic Byway located approximately 40 miles west of the Denver Metropolitan Region. The Scenic Byway is 24 miles in length, passes through the ARNF and the Pike and San Isabel National Forests. The road connects Georgetown, Colorado, to Grant, Colorado, via the 11,669' Guanella Pass (Figure 4). The paved and gravel Scenic Byway carries visitors up the flank of Mount Bierstadt and down to State Highway 285 to either Denver or destinations such as Breckenridge, Copper Mountain, and Vail. This is a popular "loop drive" for thousands in the Denver metro area seeking a one-day "top of the Rockies" experience.

Figure 0-4. Guanella Pass Scenic Byway study area map.

The Guanella Pass Scenic Byway provides outstanding opportunities for scenic driving and year-round access to backcountry recreational opportunities. Recreational use is particularly concentrated at GP during the summer months. The area has two main parking areas with bathroom facilities, including the "Lower Lot" with 48 spaces, and the "Upper Lot" with 58 spaces (Figure 4). The parking lots at GP provide trailhead access to the Mount Evans Wilderness to the east of GP and the Square Top Mountain area to the west.

The most popular recreation destination accessed via the Guanella Pass Scenic Byway is Mount Bierstadt, one of the most easily accessible 14,000'+ peaks in Colorado. The Mount Bierstadt trail provides recreationists with a moderate hike to the summit of Mount Bierstadt, totaling less than seven miles for a round-trip day hike. The Upper and Lower parking lots mentioned above serve as the parking areas for the Mount Bierstadt trailhead.

Mount Evans Recreation Area

MERA is located approximately 70 miles southwest of the Denver Metropolitan area, and 28 miles southwest of Idaho Springs, Colorado. Primary access to MERA is from I-70 via Idaho Springs and Colorado Highway 103 to the intersection of Colorado Highway 5 and the Mount Evans Highway. The entrance gate to MERA (hereafter referred to as the "Welcome Station") is situated at the base of the Mount Evans Highway, which travels from the MERA Welcome Station 14 miles to the summit of Mount Evans (Figure 0-5). The summit of Mount Evans is 14,264 feet in elevation, making the Mount Evans Highway the highest elevation paved road in North America. The entire route from Idaho Springs to the summit of Mount Evans is designated as the Mount Evans Scenic and Historic Byway.

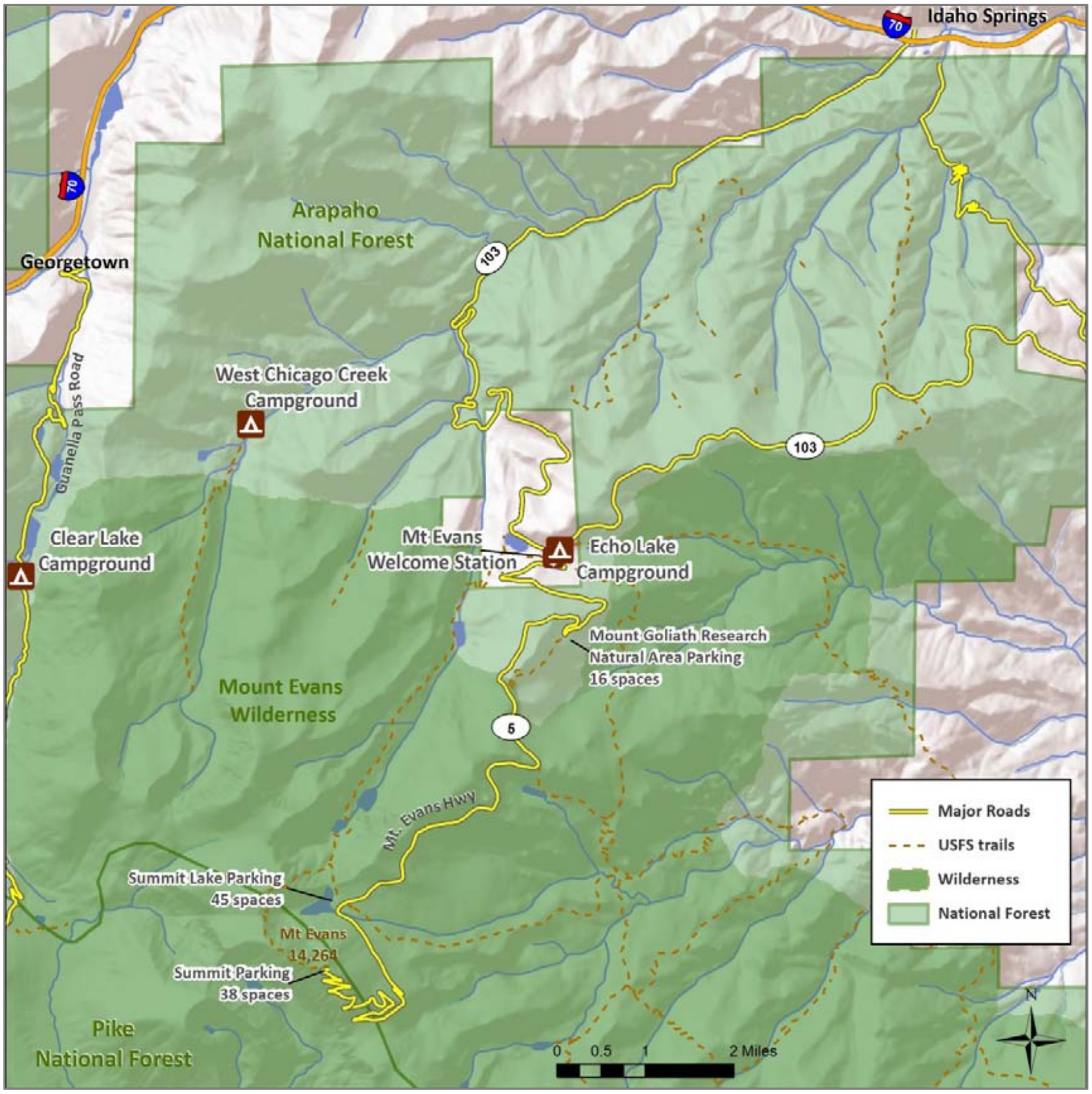


Figure 0-5. Mount Evans Recreation Area study area map.

The Mount Evans Highway is location within both the ARNF and Pike and San Isabel National Forests, and is bordered on either side by the Mount Evans Wilderness Area (Figure 0-5). The Mount Evans Highway is open seasonally depending on weather and road conditions, roughly between Memorial Day and the first weekend in October. The road beyond Summit Lake is closed on the Tuesday after Labor Day. Visitor use in MERA is concentrated within three main recreation areas along the Mount Evans Highway, including:

1. Mount Goliath Research Natural Area, which has parking for 16 vehicles, provides access to the Alpine Interpretive Garden, Dos Chappell Nature Center, universally accessible nature trails, and the M. Walter Pesman Trail.
2. Summit Lake Park, National Natural Landmark, which has parking for 45 vehicles, provides access to the Summit via Lake Trail and Chicago Lakes Trail, rock climbing, fishing, and interpretive programs at the Shelter House.

3. Mount Evans summit area, which has parking for 38 vehicles, offers panoramic views, interpretive programs on the summit and at the Crest House, wildlife viewing, and a short trail to the Mount Evans summit.

The Mount Evans Highway is a steep, narrow roadway providing driving access to the summit of Mount Evans. The outstanding scenic views from the Mount Evans Highway, combined with the physical condition of the roadway, are sources of concern among visitors and USFS managers about visitors' safety while driving on the roadway. Furthermore, the Mount Evans "ride" has become an increasingly popular challenge for thousands of bicyclists who mix with heavily-congested vehicular traffic along the roadway. Accidents involving bicyclists have occurred in recent years, increasing the salience of resolving traffic and visitor safety issues along the roadway.

Chapter 1: Brainard Lake Recreation Area Summary of Data Findings

Brainard Lake Recreation Area Transportation and Visitor Use, Winter 2011-2012

During winter 2012, RSG and Colorado State University (CSU) conducted a field study and data collection effort in BLRA. The purpose of the study was to collect transportation and visitor use data during the area's peak winter visitation period, from December 15th through April 1st. The following data were collected at Brainard Lake Recreation Area during winter 2012:

- Vehicle traffic volumes
- Parking accumulation and turnover rates at the Entrance Portal parking area
- Visitor use counts on Brainard Lake Road, Left Hand Park Reservoir Road, and the winter use trails
- GPS-based tracking of visitor use patterns in the study area

This section of *Chapter 1: Brainard Lake Recreation Area Summary of Data and Findings* provides a summary of the winter 2012 data collection effort at BLRA and results. This section is organized into subsections that describe the data collection methods and statistical results for each of the types of data listed above.

Brainard Lake Recreation Area (BLRA) is a popular winter recreation area for both local and out of town visitors. During the winter months, the road is plowed from Ward to the BLRA entrance gate. While the entrance gate remains closed throughout the winter, recreationists can park in the Entrance Portal parking lot, which is a 141 space parking facility with bathrooms and a warming hut (Figure 1-1 and Figure 1-2).

Figure 1-1. Aerial view of BLRA entrance gate and Entrance Portal parking lot (summer).

Figure 1-2. BLRA Entrance Portal parking lot (winter).

From the Entrance Portal parking lot, recreationists can snowshoe, ski, or hike in BLRA along Brainard Lake Road, Lefthand Reservoir Road, and/or a number of winter recreation trails. Recreationists can also enter the Indian Peaks Wilderness using the winter trail system in BLRA (Figure 1-3).

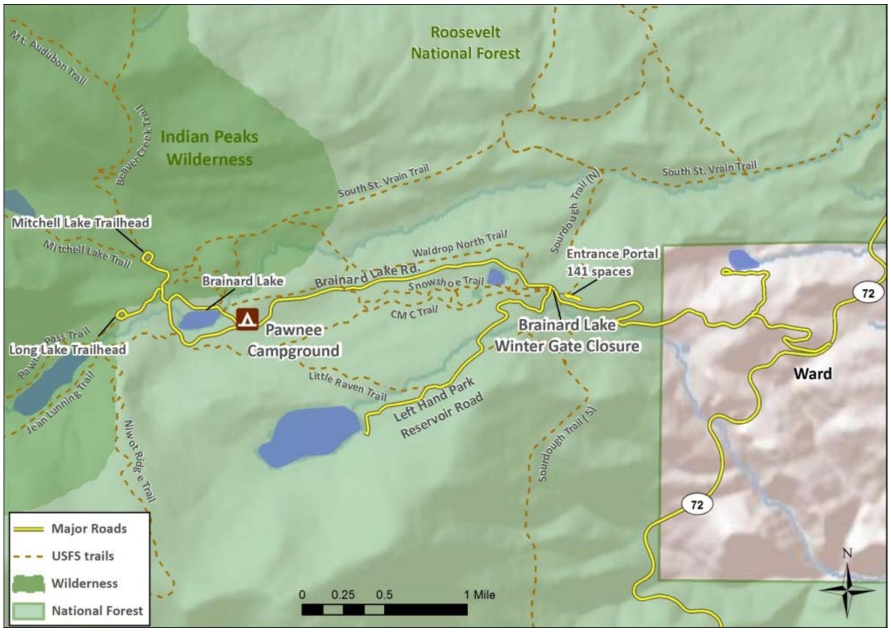


Figure 1-3. Brainard Lake Recreation Area, winter trail system.

Vehicle Traffic Volumes

Data Collection Method

- Vehicle traffic data were recorded with an Automatic Traffic Recorder (ATR) on Brainard Lake Road, east of the Entrance Portal parking area and fee station (see Figure 1-4 and Figure 1-5).
- The ATR recorded inbound and outbound vehicle traffic counts in hourly bins, 24 hours per day from December 15th, 2011 through April 1st, 2012.

Figure 1-4. ATR Location, BLRA winter 2011/2012.

- Field staff conducted vehicle traffic volume counts via direct observation at the ATR location on nine weekend days throughout the winter season. The direct observation counts were used to correct and adjust (i.e., calibrate) the raw ATR counts, as described below.

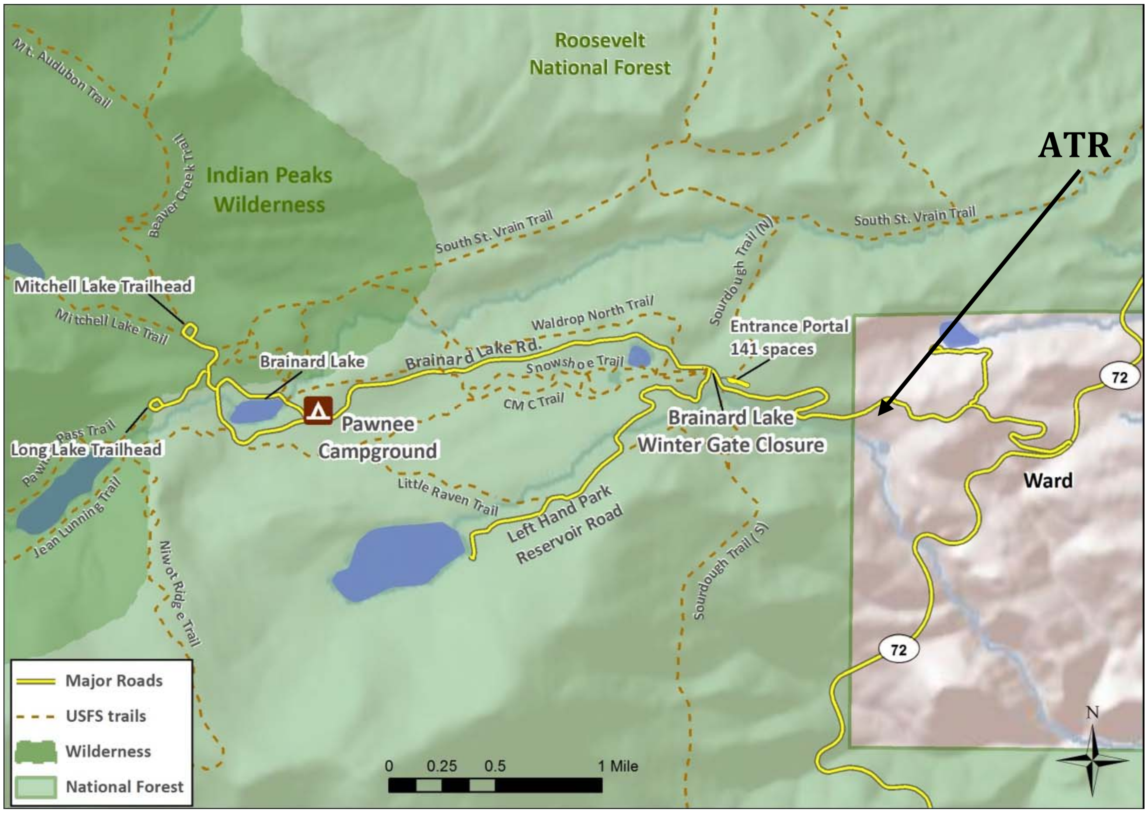


Figure 1-5. Approximate location of ATR, BLRA winter 2011/2012.

Analysis and Results

Regression analysis was conducted to estimate correction factors for the hourly vehicle traffic volumes recorded by the ATR, based on the direct observation counts of hourly vehicle traffic volumes. In particular, regression models were estimated with the direct observation counts of hourly vehicle traffic volumes entered as the dependent variable and corresponding hourly traffic volumes recorded by the ATR as the independent variable. Separate models were estimated for inbound vehicle traffic and outbound vehicle traffic.

The results of the regression models suggest there are strong statistical relationships ($R^2 = 0.98$) between the direct observation counts and ATR counts of both inbound and outbound vehicle traffic volumes on Brainard Lake Road. Further, the parameter estimates for the regression models were statistically significant in both models. These results provide a high degree of confidence that applying the correction factors to calibrate the vehicle traffic volumes recorded by the ATR (i.e., multiplying the ATR counts by the regression model parameter estimates) results in very accurate estimates of inbound and outbound vehicle traffic on Brainard Lake Road.

The calibrated daily inbound vehicle traffic volumes are reported in Figure 1-6, by date from December 15th, 2011 to April 1st, 2012; the red bars in the figure highlight days when parking accumulation and turnover data were collected by field technicians.

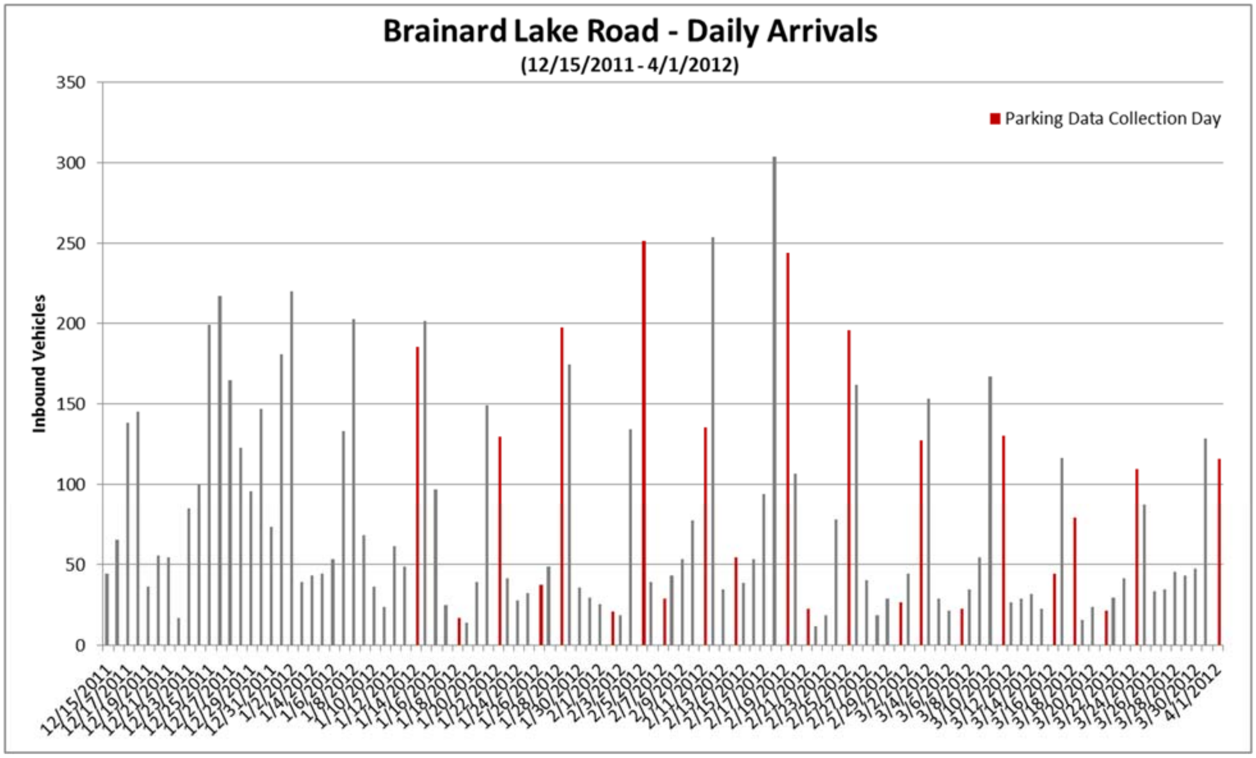


Figure 1-6. Daily inbound vehicle traffic volumes on BLRA Road, by date, winter 2011/2012.

The calibrated inbound vehicle traffic volume data were used to help identify a “design day” for analysis and planning that represents a “typically busy” day during the BLRA winter visitor use season. In particular, the calibrated inbound vehicle traffic volumes were organized in descending order, from the busiest day (February 18, 2012) to the least busy day (February 22, 2012) of the study period (Figure 1-7). Potential design day levels are depicted with horizontal lines positioned in Figure 1-7 at the 85th, 90th, and 95th percentile days of inbound vehicle traffic during the study period.

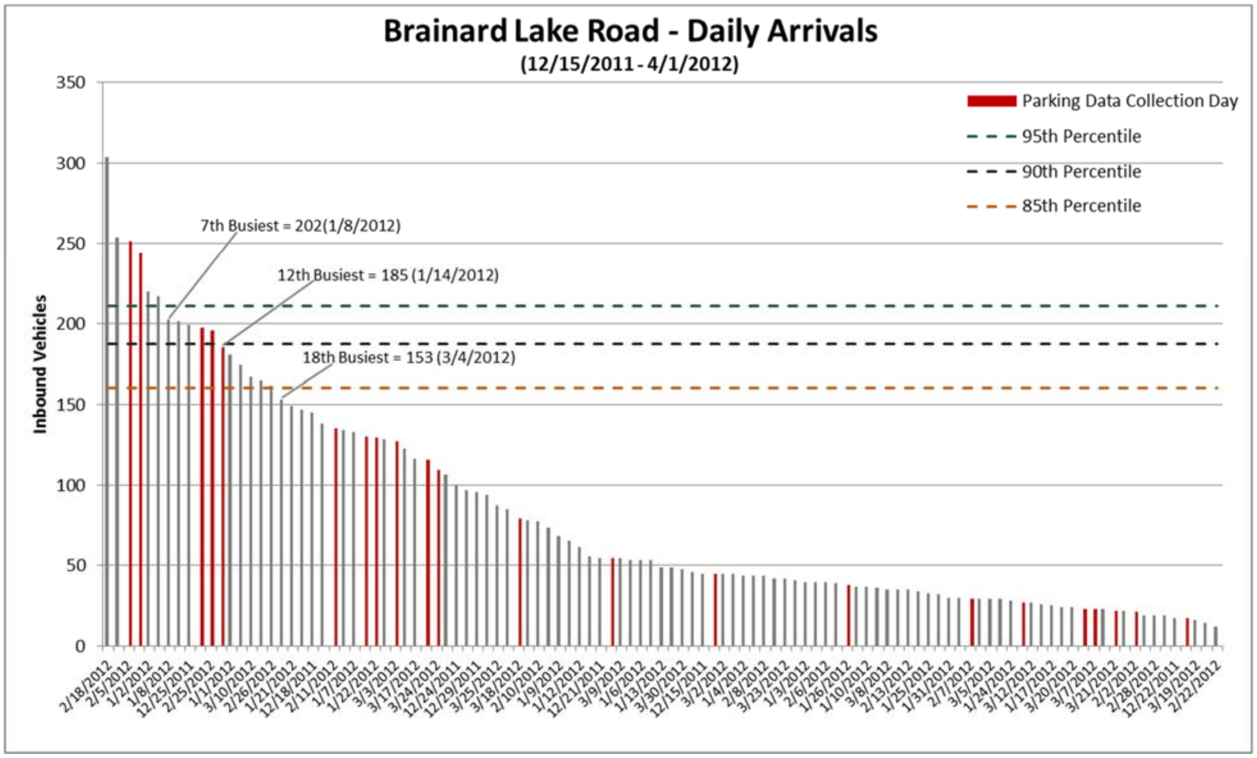


Figure 1-7. Daily inbound vehicle traffic volumes on BLRA Road, in descending order, winter 2011/2012.

Commonly, the 85th percentile day is used for “conventional” transportation planning and engineering. If the 85th percentile day were selected as the design day, on average, less than 15% of the days during a “typical winter visitor use season” would exceed what was planned for under the design day. The 85th percentile day is arguably less suitable, however, for transportation planning in parks and recreation areas, because visitor use tends to be temporally concentrated. To further inform the selection of a design day to represent a typically busy winter visitor use day at BLRA, RSG, USFS, and FHWA reviewed estimates of the percentage of BLRA winter season visitors that would visit BLRA on days when visitor use, traffic, and parking conditions exceeded design day levels, based on using the 85th, 90th, 95th, and 99th percentile days of vehicle traffic volumes as the design day (Table 1-1). It should be noted that for all four design day levels considered, 100% of the days above the design day level of visitor use were weekend days or holidays.

Table 1-1. Estimated percent of BLRA winter season visitors that would experience visitor use, traffic, and parking conditions in excess of design day conditions.

Day Rank	Potential Design Day	% of Visitors	Date
3rd Busiest Day	99th Percentile	6%	2/5/2012
7th Busiest Day	95th Percentile	17%	1/8/2012
12th Busiest Day	90th Percentile	28%	1/14/2012
18th Busiest Day	85th Percentile	39%	3/4/2012

A review and discussion by RSG, USFS, and FHWA of the estimates in Table 1-1 led the group to conclude that the 85th and 90th percentile days of vehicle traffic volumes would result in too large a proportion of winter season visitors to experience conditions beyond those planned for in the feasibility study (39% and 28%, respectively). The RSG, USFS, and FHWA team further concluded that the 95th percentile day of vehicle traffic would allow for a more acceptable proportion of BLRA winter season visitors (83%) to experience visitor use, traffic, and parking conditions at or below design day levels. The group noted that while RSG parking data collection did not occur on the 95th percentile day (7th busiest day during the study period), parking data were collected on the 10th busiest day of the study period, and total daily inbound vehicle traffic volumes differed from that on the 95th percentile day by only 5 fewer cars.

Thus, RSG, USFS, and FHWA selected the 10th busiest day of the study period (January 28th, 2012) as the BLRA Winter Visitor Use Season Design Day for analysis and planning in this project. As described, this decision was informed and substantiated by the BLRA vehicle traffic volume, group size, and parking data collected by RSG during the 2011/2012 winter visitor use season. The design day is used as a reference point for analyzing most of the transportation and visitor use data collected at BLRA during the 2011/2012 winter visitor use season and reported in this chapter.

Arriving and departing vehicles on the design day are displayed in Figure 1-8. The ATR also recorded vehicle speeds and vehicle class, as defined by the Federal Highway Administration. The average speed observed on the design day was approximately 32 mph on the section of road where the ATR was located, and the 85th percentile speed[10] (often used for traffic safety studies) was 36 mph. All of the vehicles observed on the design day were classified as passenger vehicles, under the FHWA Scheme F classification.[11]

[10] *A Policy on Geometric Design of Highways and Streets, Sixth Edition*. (2011) American Association of State Highway and Transportation Officials (AASHTO): Washington, DC.
[11] *Vehicle Classification Scheme F Report*. (2011) Federal Highway Administration (FHWA): Washington, DC.

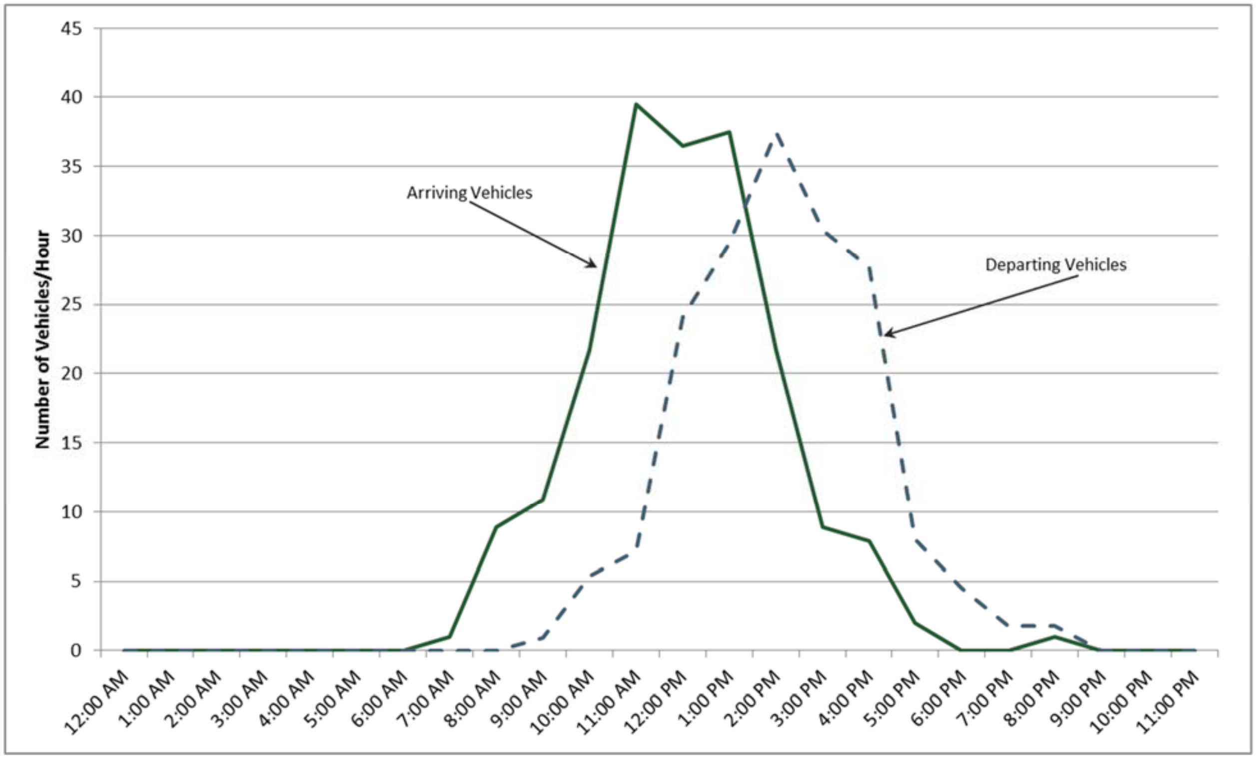


Figure 1-8. Design day vehicle traffic volumes, by hour and direction of travel, Saturday, January 28, 2012.

Parking Accumulation & Turnover

Data Collection Method

- At the Entrance Portal parking area, a license plate recording method (Figure 1-9) was used to record:
  - An hourly count of parked vehicles, by location (i.e., parking accumulation)
  - The amount of time vehicles were parked, by parking lot location (i.e., parking turnover)
- Parking data collection was conducted from 9:00 AM to 5:00 PM on 10 weekdays and 12 weekend days between January 14th and April 1st, 2012 (Figure 1-10). License plates were recorded by subarea of the parking lot, and by specific parking space.

Figure 1-9. Parking accumulation & turnover data collection.

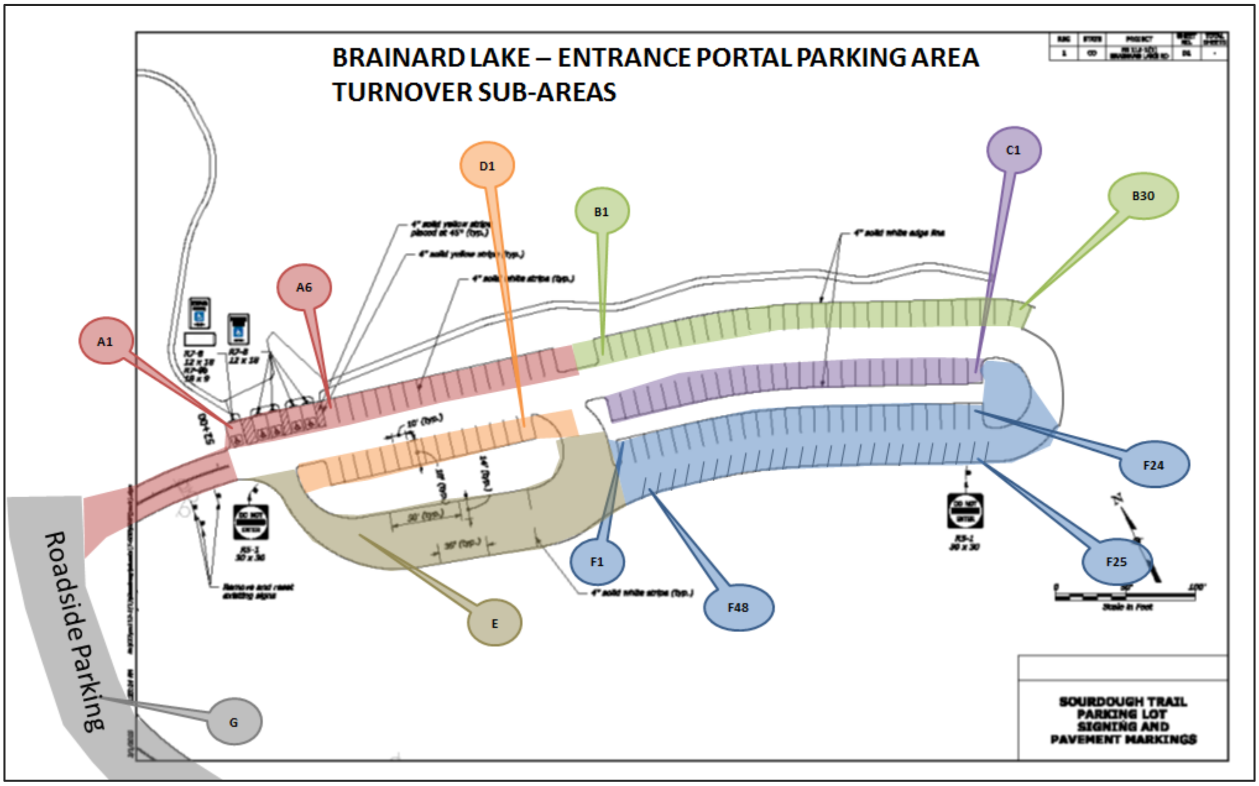


Figure 1-10. BLRA Entrance Portal parking area parking turnover data collection map.

Analysis and Results

Figure 1-11 displays the parking accumulation for the 10th busiest day of the 2011/2012 winter visitor use season (Saturday, January 28, 2012), which was selected as the "design day" for this study, as described in the preceding section. The design day peak parking accumulation occurred at noon (86 vehicles), and reached just over half (61%) of the capacity of the Entrance Portal parking area; there was no roadside parking observed at anytime during the day. In fact, roadside parking outside of the designated parking area was observed on only three of the 22 days of parking data collection during the 2011/2012 winter visitor use season. Moreover, on two of the three days when roadside parking was observed, visitors chose to park on the road, even though there were open spaces in the Entrance Portal parking lot. These data suggest that the Entrance Portal parking lot is large enough to accommodate demand (often with substantially excess parking capacity) during the winter visitor use season at BLRA.

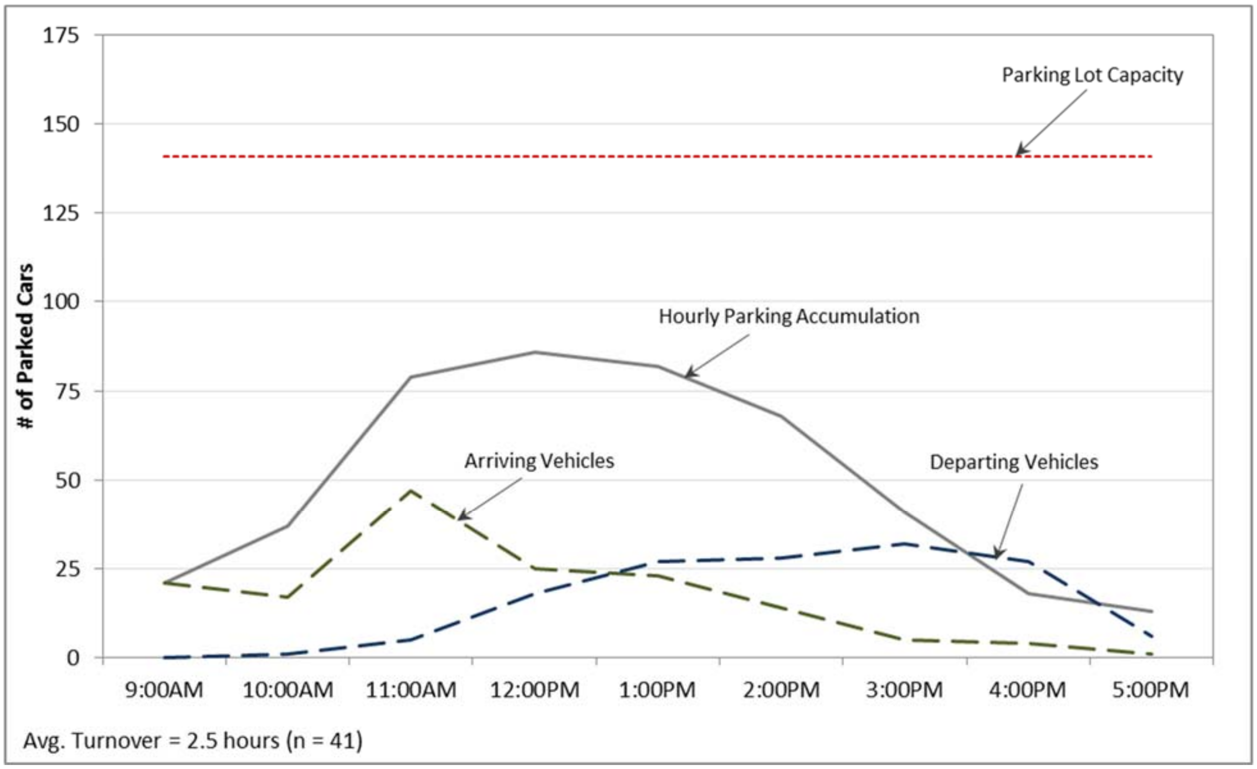


Figure 1-11. Design day parking accumulation at the Entrance Portal parking lot, Saturday, January 28, 2012.

Figure 1-12 is a graphical display of the parking accumulation at distinct time periods throughout the morning, afternoon, and early evening of the design day. The graphics in Figure 1-12 display the spatial pattern by which visitors use the Entrance Portal parking area, on a "typically busy" day during the winter visitor use season at BLRA.

9:00 AM: 21 vehicles, 15% full

11:00 AM: 79 vehicles, 56% full

Location of parked vehicles

*12:00 PM (**PEAK**): 86 vehicles, 61% full*

3:00 PM: 41 vehicles, 29% full

5:00 PM: 13 vehicles, 9% full

Figure 1-12. Design day parking accumulation at Entrance Portal parking area, Saturday, January 28, 2012.

The license plate recording method was also used to record turnover rates for vehicles parked in the Entrance Portal parking area. Data were recorded every hour, therefore, parking turnover rates (i.e., the duration of time vehicles are parked in the Entrance Portal parking lot) are estimated in hourly bins. On average, vehicles were parked in the Entrance Portal parking lot for approximately three hours (Table 1-2). There were no significant differences in the average duration of time vehicles parked in the Entrance Portal parking lot on weekends versus weekdays, nor were there differences in the turnover rate for different subareas of the parking lot ($F = 1.677$, $p = 0.124$). (Table 1-2 and Figure 1-13). There were differences in parking duration, however, based on the time of day visitors arrived ($t = -10.268$, $p < 0.001$). In particular, visitors who arrived before 11:00 AM (mean = 4.1 hours) parked their vehicles for longer, on average, than those who arrived after 11:00 AM (mean = 2.2 hour).

Table 1-2. Visitor parking duration in Entrance Portal parking lot, BLRA winter 2011/2012.

Hours Parked	Weekday	Weekend	Overall
1 - <2	12%	14%	13%
2 - <3	26%	25%	25%
3 - <4	35%	30%	31%
4 - <5	15%	19%	18%
5 - <6	7%	7%	7%
6 - <7	2%	2%	2%
7 - <8	0%	0%	0%
8 - <9	0%	0%	0%
9	4%	3%	3%
Average	3.1	3.0	3.0
t-test	$t = 0.335$		-
p-value	$p = 0.738$		

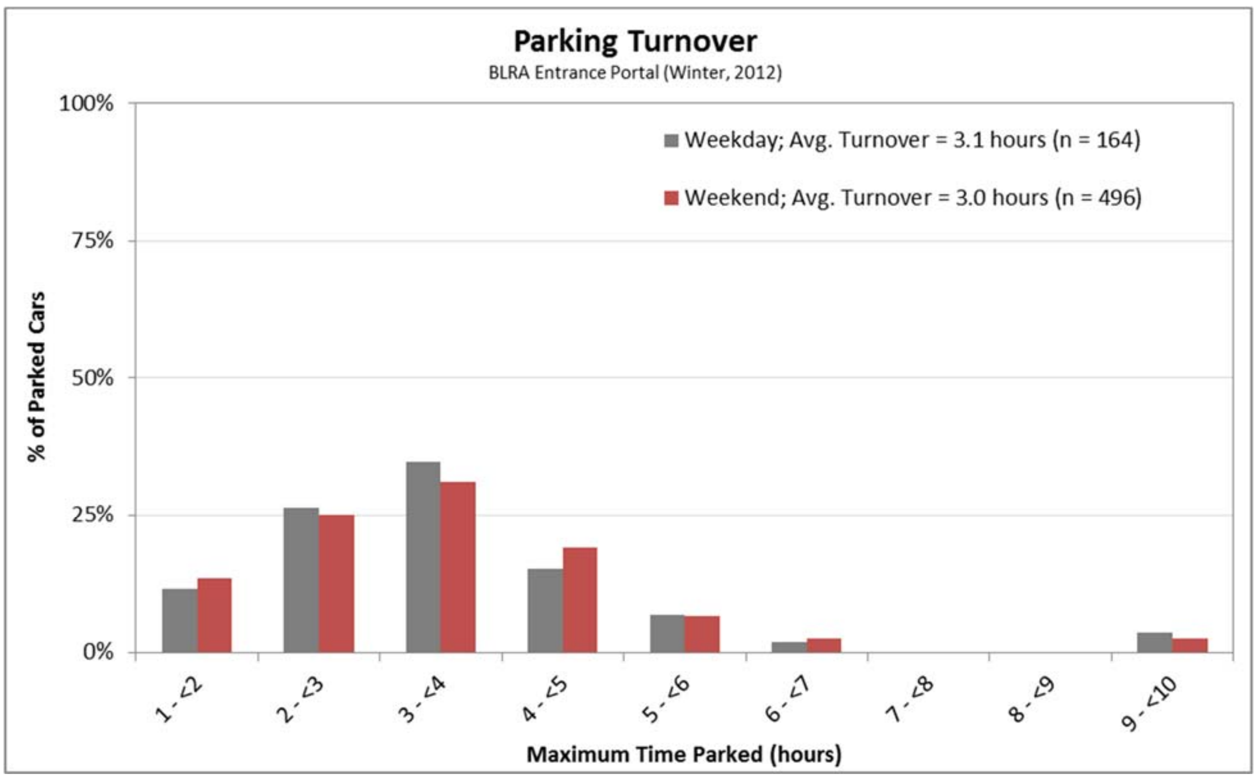


Figure 1-13. Visitor parking duration in Entrance Portal parking lot, BLRA winter 2011/2012.

Finally, 93% of all license plates recorded as part of the parking data collection effort were Colorado license plates; this finding suggests the vast majority of visitors to BLRA during the winter visitor use season are residents of the state of Colorado, though some Colorado license plates that were observed may have been on rental cars driven by out-of-state visitors.

Visitor Use Counts

Data Collection Method

- Visitor use counts were recorded with infrared trail counters (Figure 1-14) located on Brainard Lake Road, Lefthand Reservoir Road, and selected winter use trails in BLRA.
- The infrared trail counters recorded visitor use counts in hourly bins, 24 hours per day during the winter peak season, from January 15, 2012 through April 1, 2012.
- The locations of the infrared trail counters used to record visitor use data during the study period are depicted in Figure 1-15. The visitor use counting locations were selected in consultation with USFS staff and capture all of the visitor use access points into BLRA.
- Field staff conducted visitor use counts via direct observation at each of the infrared trail counter locations, for a minimum of 15 hours at each trail counter location. The direct observation counts were used to correct and adjust (i.e., calibrate) the raw infrared trail counter data.

Figure 1-14. Trail counter setup, Sourdough Trail-North Section.

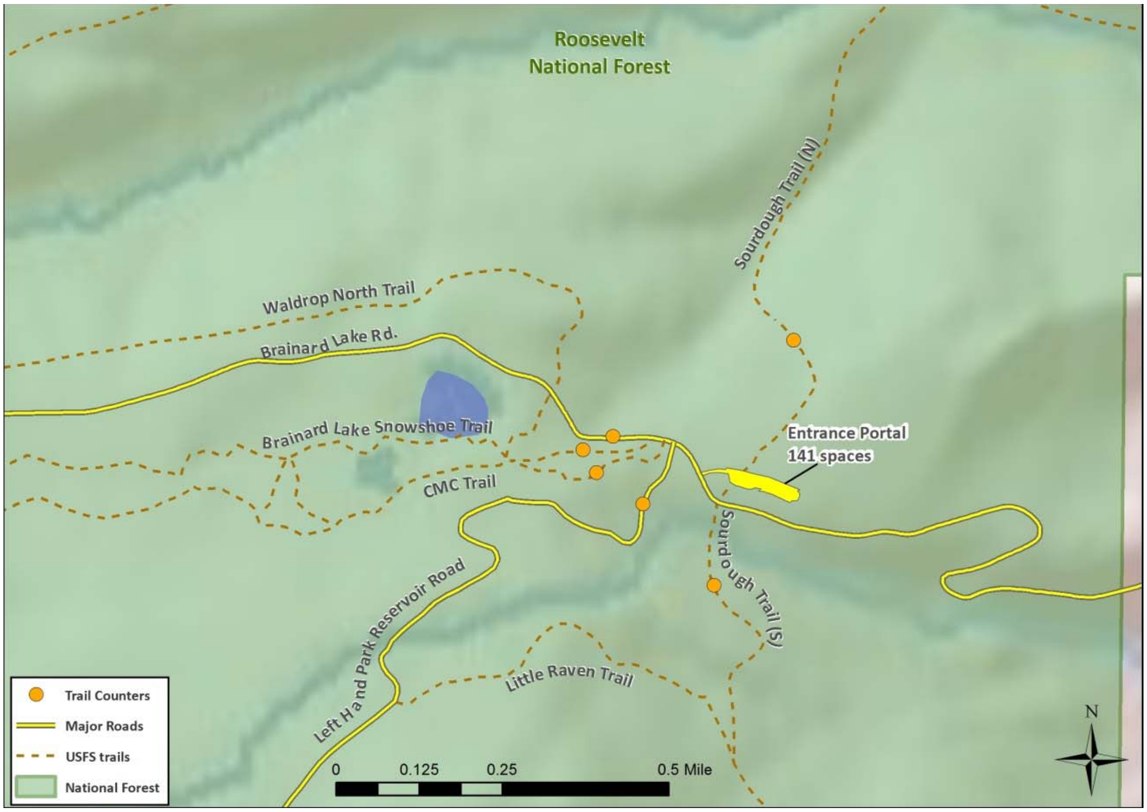


Figure 1-15. Approximate locations of infrared trail counters used to record visitor use counts, BLRA winter 2011/2012.

Analysis and Results

Regression analyses were conducted with the direct observation counts of visitor use and corresponding infrared trail counter data to estimate correction factors for the infrared trail counter data. Regression results suggest there are strong statistical relationships (R^2 values ranging from 0.88 to 0.97) between the direct observation counts and visitor use counts recorded by the infrared trail counters. Further, the parameter estimates for the regression models were statistically significant in all cases. These results provide a high degree of confidence that applying the correction factors to calibrate the visitor use counts recorded with the infrared trail counters (i.e., multiplying the infrared trail counter data by the corresponding parameter estimates from the regression models) results in very accurate estimates of visitor use on the roads and trails in BLRA. The calibrated trail counter data were used for analysis and results reported in this chapter.

The Brainard Lake Road was the most popular point of entry into BLRA during winter 2011/2012, with an average of 23 visitor arrivals per day on weekdays and over 100 visitor arrivals per day on weekend days (Figure 1-16). The Sourdough Trail (north section), CMC Trail, and Lefthand Reservoir Road were all about equally popular points of entry into BLRA, with an average of about 10 visitor arrivals per day on weekdays and roughly 45 visitors per day on weekend days. Visitors were less likely to use the Brainard Lake Snowshoe Trail as a point of entry into BLRA, but still received an average of 5 visitor arrivals per day on weekdays and about 20 visitor arrivals per day on weekends. Similarly, the Sourdough Trail-South Section received an average of about 5 visitors per day on weekdays, but an average of only about 10 visitors per day on weekends. Generally, trails in the study area received nearly four times more visitor use on weekend days than on weekdays.

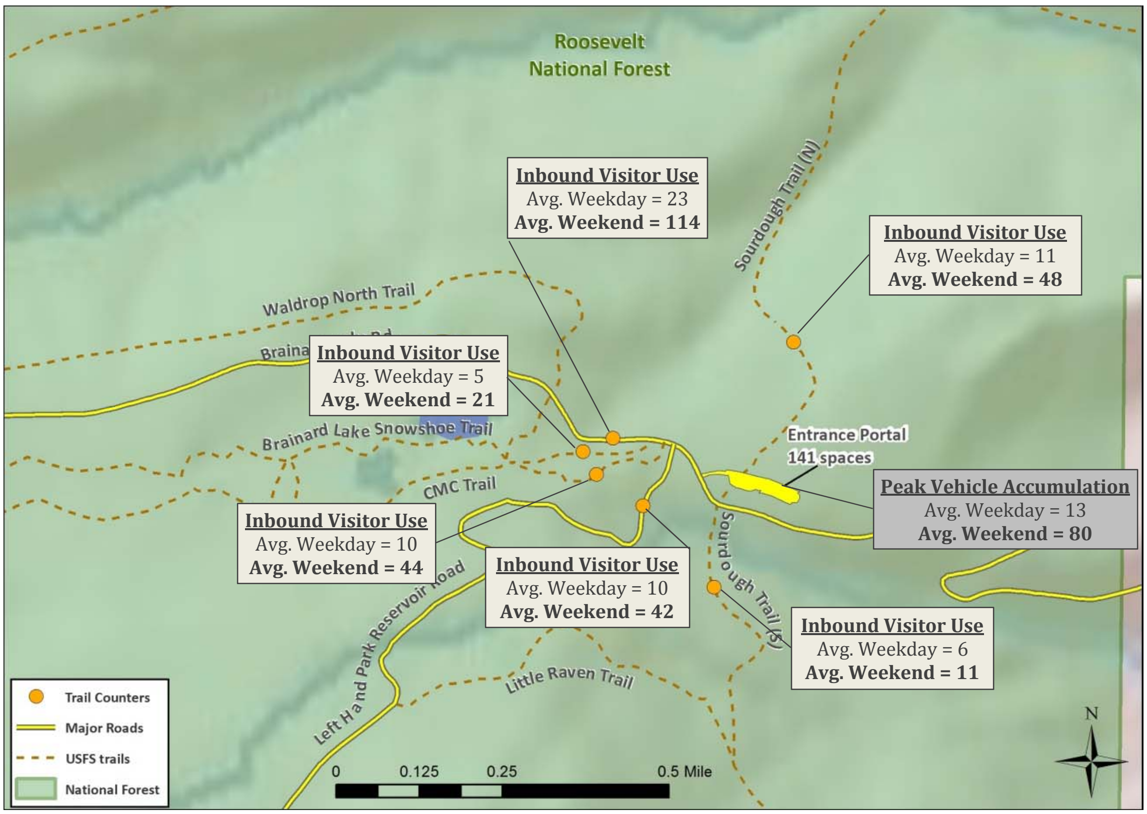


Figure 1-16. Average weekday and weekend day inbound visitor use, by trailhead, and average peak vehicle accumulation, BLRA winter 2011/2012.

Figure 1-17 reports calibrated visitor use counts for the design day (Saturday, January 28, 2012), by trailhead location. Visitor use on the design day was distributed across the trailhead locations consistently with the seasonal averages reported in Figure 1-16; however, as expected, the design day volumes of visitor use were higher than seasonal averages on all of the trails (except the Sourdough Trail-South Section).

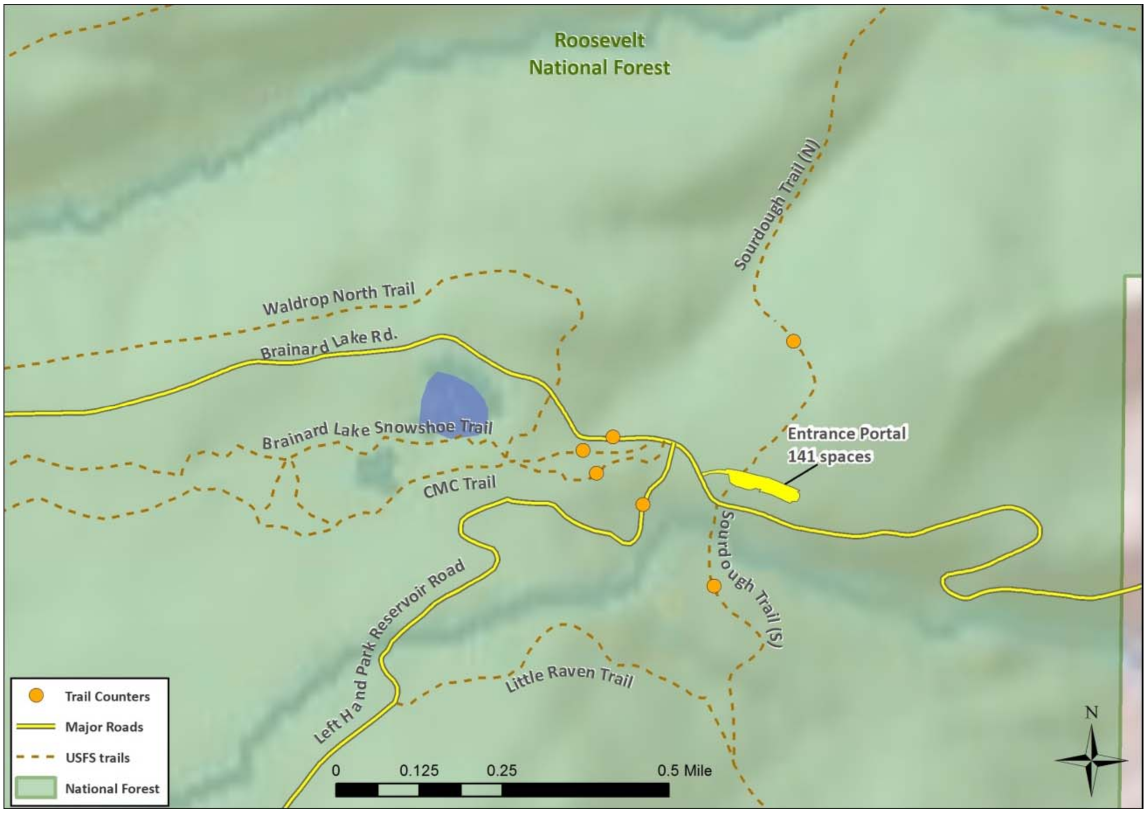


Figure 1-17. Design day inbound visitor use, by trailhead, and peak vehicle accumulation (Saturday, January 28, 2012).

Figure 1-18 graphs the design day hourly visitor use (inbound direction), by trailhead. The temporal pattern of visitor use throughout the day is generally consistent across trailheads, though Brainard Lake Road, the CMC Trail, and the Brainard Lake Snowshoe Trail sustain longer peaks of inbound visitor use than the other trailheads.

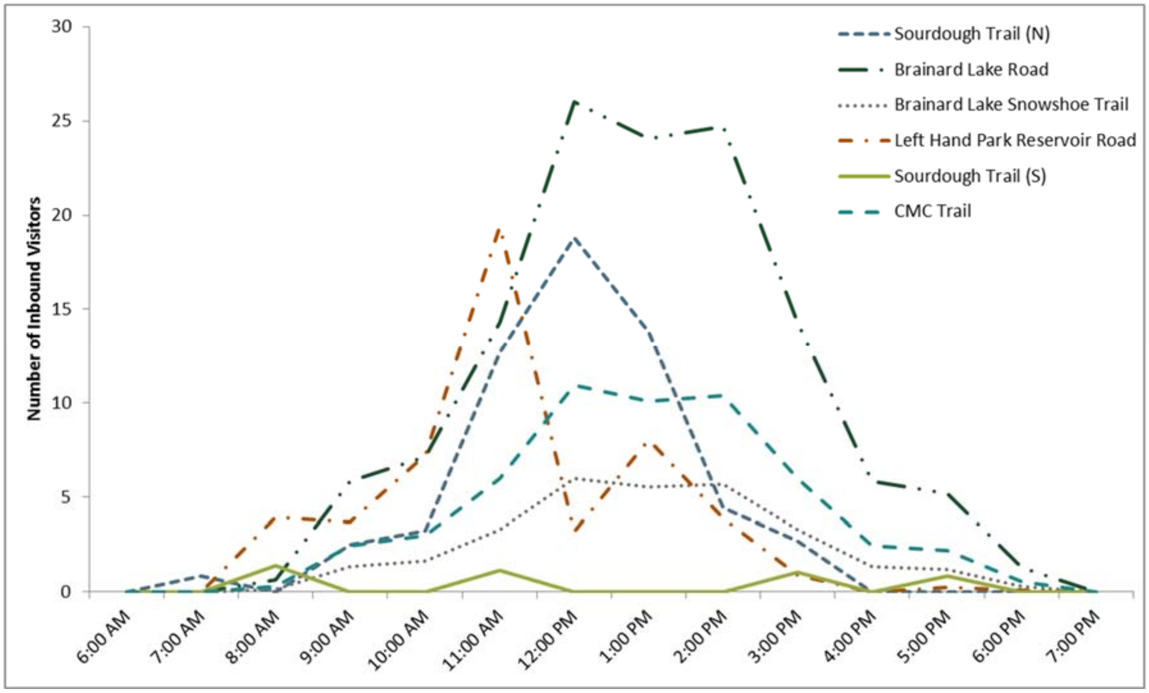


Figure 1-18. Design day hourly inbound visitor use, by trailhead (Saturday, January 28, 2012).

During the winter 2011/2012 study period (mid-January through March, 2012), monthly visitor use during the study period was highest in February, 2012, and at its lowest during March, 2012 (Table 1-3). It should be noted, by the second half of March, 2012, there had been substantial snowmelt in BLRA[12], at which point visitors tended to use the area less for winter recreation (i.e., snowshoeing and skiing), and more for hiking. In fact, by the end of March, some cyclists were observed on Brainard Lake Road.

Table 1-3. Monthly inbound visitor use totals, by trailhead, BLRA winter 2011/2012.

	Sourdough Trail (N)	Brainard Lake Road	Brainard Lake Snowshoe Trail	Left Hand Park Reservoir Road	Sourdough Trail (S)	CMC Trail	**Monthly Total**
January [a]	735	1,733	400	789	204	729	**4,588**
February	782	1,748	400	596	376	751	**4,652**
March	476	1,107	151	420	73	378	**2,605**
Overall	1,993	4,588	950	1,804	654	1,857	**11,845**

[a] Visitor use during first half of January, 2012 estimated using regression model of vehicle traffic and trail use data.

[12] By the end of March, 2012, the snowpack was reported to be 52% of average by the Colorado Natural Resources Conservation Service.

Visitor Use Tracking

Data Collection Method

Figure 1-19. GPS-based visitor use tracking, BLRA winter 2011/2012.

- Visitor use patterns were measured using GPS-based tracking (Figure 1-19). GPS units were administered to visitor groups at the Entrance Portal parking lot at the start of their visit to BLRA. Visitors were asked to carry the GPS unit while recreating in the area, and return the unit at the end of their visit to BLRA. Visitors were instructed to use a locked drop box to return their GPS units, if they returned to the Entrance Portal parking lot after data collection staff had left the study area for the day.
- GPS units were administered on 8 weekend days, and 9 weekdays from January 14, 2012 – March 21, 2012 (Table 1-4).
- GPS administration was discontinued after March 21 due to poor snow conditions — it was determined that recreational use of the area was no longer typical winter use, but had transitioned into the shoulder season between winter and spring.
- On each data collection day, GPS units were administered to visitors from 9 AM to approximately 2 PM, and collected from visitors from 9 AM to approximately 5 PM.
- Overall, 479 visitor groups were contacted and 463 GPS units were administered to visitor groups during the 2011/2012 winter visitor use season at BLRA, resulting in a 97% response rate for the GPS-tracking study (Table 1-4).
- For each visitor group that participated in the GPS-tracking study, data collection staff recorded the group's activity as one of three types: 1) snowshoeing; 2) skiing; and 3) walking/hiking. This information was used to summarize some aspects of the GPS-tracking study results by activity type.
- Algorithms were developed to process the GPS tracks and eliminate cases with more than 15-minutes of missing data (primary causes of missing data included poor satellite reception and/or equipment malfunction). For cases with less than 15-minutes of missing data, interpolation was used to estimate location coordinates to populate the data gaps. The reduced, "clean" set of GPS track data were used to analyze and model visitor use patterns in BLRA during winter 2011/2012.

Table 1-4. GPS sampling schedule and response rate, BLRA winter 2011/2012.

Date	Weekend	Count	Refusals	Response Rate
1/14/2012	Yes	47	1	98%
1/18/2012	No	7	0	100%
1/22/2012	Yes	40	1	98%
1/26/2012	No	19	0	100%
1/28/2012	Yes	39	0	100%
2/2/2012	No	6	0	100%
2/5/2012	Yes	69	0	100%
2/7/2012	No	13	4	76%
2/11/2012	Yes	78	1	99%
2/14/2012	No	17	0	100%
2/25/2012	Yes	47	2	96%
3/1/2012	No	10	0	100%
3/3/2012	Yes	26	1	96%
3/7/2012	No	10	2	83%
3/16/2012	No	13	2	87%
3/18/2012	Yes	17	2	89%
3/21/2012	No	5	0	100%
Overall		**463**	**16**	**97%**

Analysis and Results

On both weekend days and weekdays, a majority (55%) of visitor groups were snowshoeing in BLRA on the day they participated in the GPS-tracking study, while about one-third (35%) were cross-country skiing (Table 1-5). A small percentage (8%) of visitor groups hiked (without snowshoes) in BLRA.

Table 1-5. Visitor activity type, BLRA winter 2011/2012.

	Weekday (n=99)	**Weekend** (n=365)	**Overall** (n=464)
Snowshoe	43%	58%	55%
Cross-country Ski	39%	37%	37%
Hike	17%	5%	8%
	χ^2 = 15.477, $p < 0.001$		

Nearly three-quarters (73%) of all visitor groups were in groups of 2-4 people during their visit to BLRA during winter 2011/2012 (Table 1-6); however, weekday visitors (26%) were more likely than weekend visitors (14%) to visit BLRA alone. Visitor groups who went snowshoeing or hiked (mean group size = 3 people) tended to visit BLRA in slightly larger groups than those who skied (mean group size = 2 people), and skiers (25%) were more likely than snowshoeing or hiking visitors (12%) to visit BLRA alone.

Table 1-6. Visitor group size, BLRA winter 2011/2012.

Group Size	Weekday (n=99)	Weekend (n=365)	Overall (n=464)	Snowshoe/Hike (n=301)	XC Ski (n=180)
1 person	26%	14%	16%	12%	25%
2 people	54%	51%	51%	52%	50%
3-4 people	11%	25%	22%	24%	17%
5 or more people	9%	11%	11%	12%	8%
Chi-square	χ2 = 14.451, p = 0.002		n/a	χ2 = 15.189, p = 0.002	
Mean	**2.3**	**2.8**	**2.7**	**2.9**	**2.4**

The vast majority (86%) of visitor groups, regardless of day of week or type of activity, traveled to BLRA during winter 2011/2012 in a single vehicle; while less than one-fifth (14%) traveled to BLRA in two or more vehicles (Table 1-7).

Table 1-7. Number of vehicles per group, BLRA winter 2011/2012.

Number of Vehicles per Group	Weekday (n=99)	Weekend (n=365)	Overall (n=464)	Snowshoe/Hike (n=301)	XC Ski (n=180)
1 vehicle	88%	85%	86%	86%	86%
2 vehicles	11%	10%	10%	9%	12%
3 vehicles	1%	4%	3%	4%	1%
4 or more vehicles	0%	1%	1%	1%	2%
Chi-square	χ2 = 3.271, p = 0.352		n/a	χ2 = 5.334, p = 0.149	
Mean	**1.1**	**1.2**	**1.2**	**1.2**	**1.2**

Three-quarters (73%) of visitor groups had a vehicle occupancy rate of 1 to 2 people per vehicle. On weekdays, average vehicle occupancy was 2.0 people per vehicle, compared to a weekend average vehicle occupancy of 2.3 people per vehicle. Visitor groups who went snowshoeing or hiked tended to have higher vehicle occupancies than those who cross-country skied (Table 1-8).

Table 1-8. Vehicle occupancy rates, BLRA winter 2011/2012.

Number of People per Vehicle	Weekday (n=99)	Weekend (n=366)	Overall (n=465)	Snowshoe/Hike (n=292)	XC Ski (n=172)
1 person	28%	15%	18%	13%	26%
2 people	56%	55%	55%	56%	55%
3-4 people	12%	27%	24%	28%	17%
5 or more people	4%	2%	3%	3%	2%
Chi-Square	χ2 = 16.236, p = 0.001			χ2 = 18.238, p < 0.001	
Mean	**2.0**	**2.3**	**2.2**	**2.4**	**2.0**

Over three-quarters (approximately 80%) of visitor groups, regardless of day of week or type of activity, spent two or more hours recreating in BLRA during winter 2011/2012 (Table 1-9). On average, visitor groups spent about 2.5 hours snowshoeing, cross-country skiing, or hiking in BLRA during winter 2011/2012.

Table 1-9. Length of stay, BLRA winter 2011/2012.

Travel Time	Weekday (n=92)	Weekend (n=336)	Overall (n=428)	Snowshoe/Hike (n=269)	XC Ski (n=160)
<1 hour	4%	2%	3%	2%	4%
1 hour - <2 hours	20%	16%	17%	20%	11%
2 hours - <3 hours	35%	33%	33%	34%	32%
3 hours - <4 hours	24%	26%	25%	25%	26%
4 or more hours	17%	23%	22%	19%	28%
Chi-square	$\chi2 = 3.073$, $p = 0.546$		n/a	$\chi2 = 10.483$, $p = 0.033$	
Mean (in minutes)	**175.3**	**186.1**	**183.7**	**175.1**	**198.2**

On average, visitor groups traveled about 4.5 miles on snow-covered roads and trails in BLRA during winter 2011/2012 (Table 1-10). Cross-country skiers (mean = 5.1 miles) tended to cover more ground than snowshoeing visitors (mean = 4.2 miles), with about one-third (35%) of cross-country skiers covering 6 or more miles during their visit.

Table 1-10. Miles traveled during snowshoe/hike/ski, BLRA winter 2011/2012.

Trip Length	Weekday (n=49)	Weekend (n=165)	Overall (n=239)	Snowshoe/Hike (n=131)	Ski (n=83)
<1 - <2 miles	2%	9%	9%	8%	6%
2 - <3 miles	8%	10%	10%	11%	6%
3 - <4 miles	27%	18%	21%	24%	13%
4 - <5 miles	33%	26%	26%	34%	17%
5 - <6 miles	8%	19%	16%	13%	23%
6 - <7 miles	18%	10%	10%	5%	23%
7+ miles	4%	9%	7%	5%	12%
Chi-square	$\chi2 = 11.330$, $p = 0.079$		n/a	$\chi2 = 30.458$, $p < 0.001$	
Mean	**4.6**	**4.6**	**4.4**	**4.2**	**5.1**

"Heat maps" are included to provide precise information about the spatial characteristics of winter visitor use at BLRA (i.e., where visitor use is most concentrated, and where there is less intensive or no visitor use). Generally, the information contained in visitor use heat maps can inform transportation planning by identifying locations within a recreation area with high visitor demand that might benefit from improved transportation services and facilities. Moreover, heat maps help identify low use locations to which visitor use could potentially be dispersed (using ITS, trail improvements, etc.) to alleviate congestion in areas that experience excessive traffic, parking congestion, crowding, and/or resource impacts.

The heat map in Figure 1-20 depicts the relative intensity of visitor use throughout the trail and snow-covered road network in BLRA during winter 2011/2012. The heat map is derived from the GPS track data, with "cooler colors" (i.e., green shades) representing sections of the trail and road network with relatively low concentrations of visitor use, and "hotter colors" (i.e., yellow and red shades) representing sections of the trail and road network with relatively high concentrations of visitor use. For example, the "hotter color tones" on Brainard Lake Road suggest this is one of the more heavily traveled segments of the overall trail and road network in BLRA.

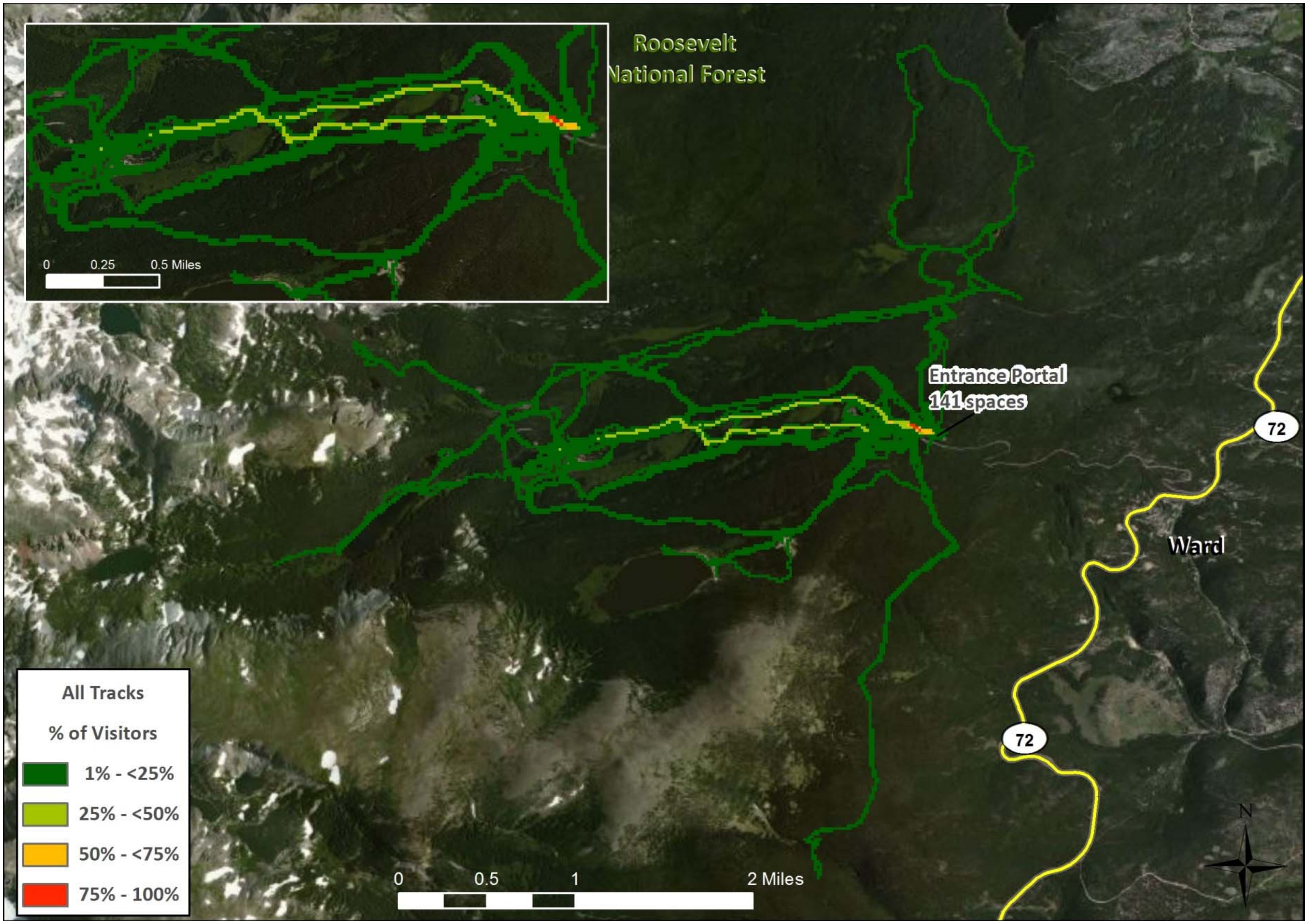


Figure 1-20. Heat map of GPS-based visitor use tracks, BLRA winter 2011/2012.

Activity-specific heat maps are depicted in Figure 1-21 and Figure 1-22, and are derived from the GPS tracks of snowshoeing/hiking routes and cross-country skiing routes, respectively. The overall pattern of visitor use in the activity-specific heat maps are very similar to that in the overall heat map in Figure 1-20. However, the activity-specific heat maps do suggest some differences in visitor use patterns based on activity type. In particular, snowshoeing and hiking visitors are generally concentrated more on Brainard Lake Road and the Brainard Lake Snowshoe Trail, while cross-country skiers tend to be more concentrated on the Waldrop and CMC Trails. In addition, the activity-specific heat maps suggest that cross-country skiing routes extend further out from the Entrance Portal parking lot than snowshoeing and hiking routes. For example, GPS tracks of cross-country skiing routes include the Wapiti Trail/Sourdough Trail-North Section loop and more southerly sections of the Sourdough Trail-South Section.

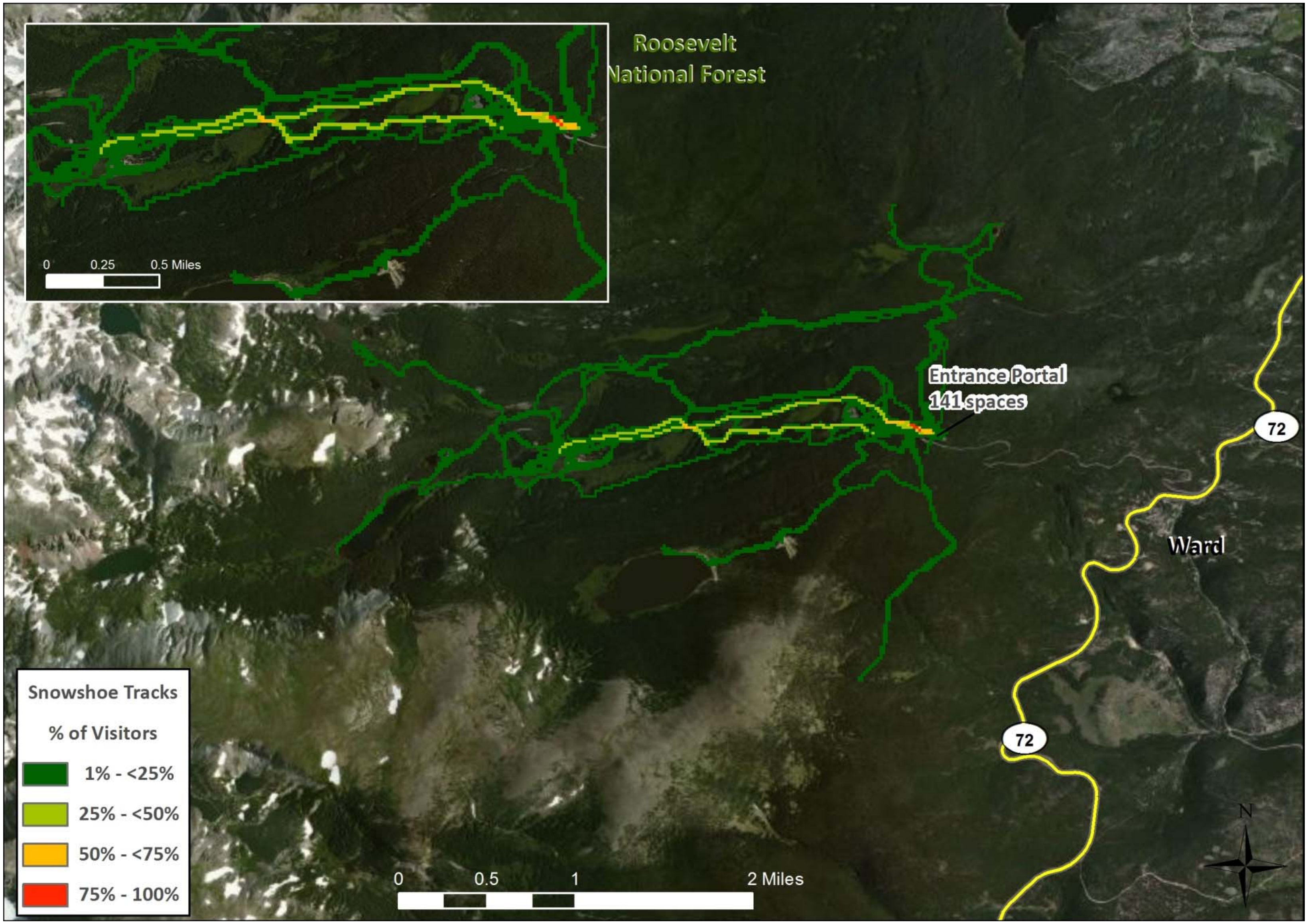


Figure 1-21. Heat map of GPS-based snowshoeing and hiking tracks, BLRA winter 2011/2012.

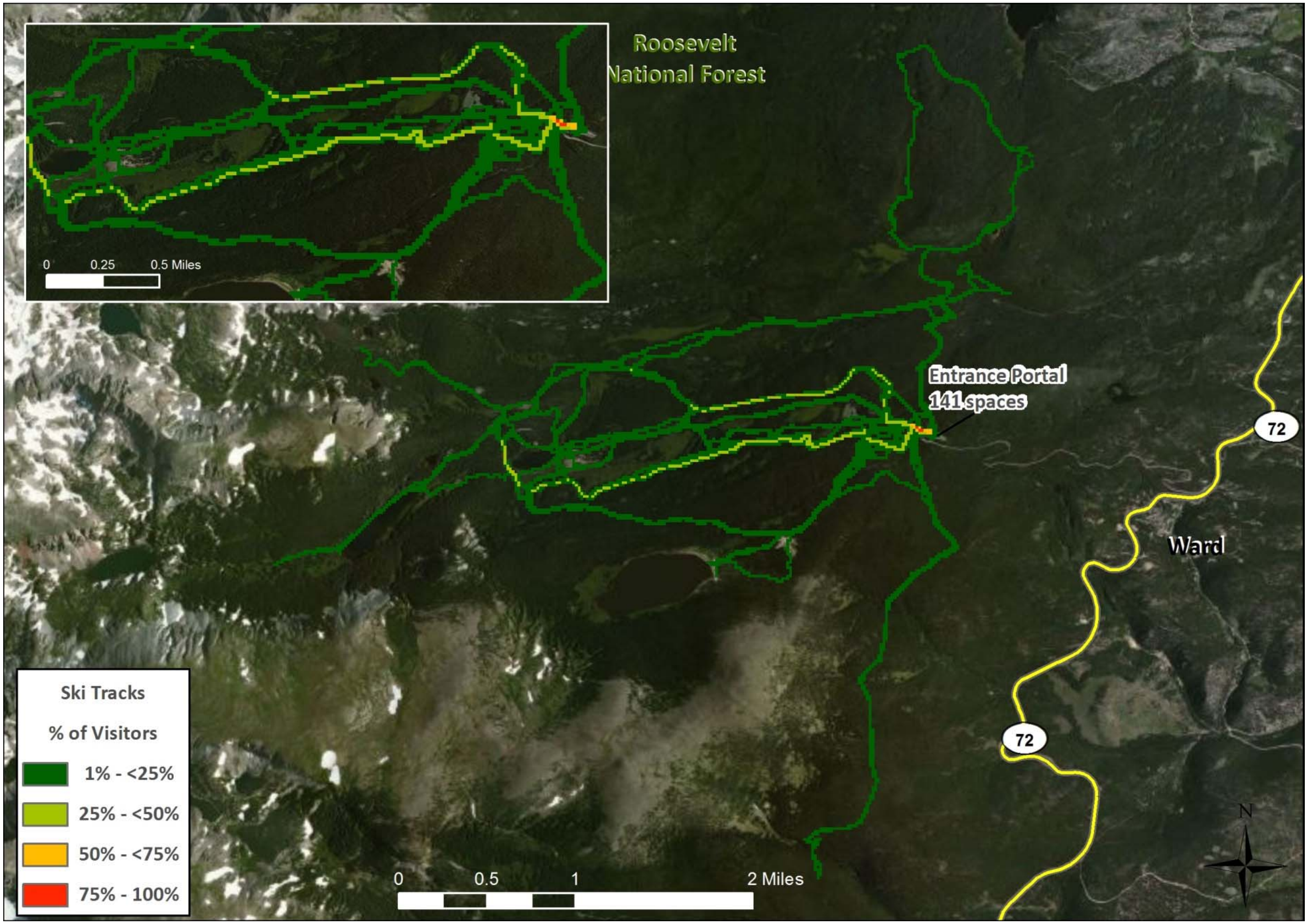


Figure 1-22. Heat map of GPS-based cross-country skiing tracks, BLRA winter 2011/2012.

The above heat maps provide a composite view of winter visitor use patterns in BLRA. Additional analysis of the GPS tracks was conducted to summarize and map the relative popularity of particular routes or subsets of routes in BLRA. Each GPS track was visually inspected and categorized into one of several unique routes or "route groupings" distinguished based on the trail(s) and destinations encompassed by the GPS track.

Three-quarters (76%) of all GPS tracks could be categorized into one of eight route groupings, which are depicted and given descriptive names in Figure 1-23 through Figure 1-30. Half (50%) of all the GPS tracks were assigned to route groupings that included travel on some combination of Brainard Lake Road and the directly surrounding trails (i.e., Brainard Lake Snowshoe Trail, Waldrop Trail, and CMC Trail) all or part of the way to Brainard Lake (Figure 1-23, Figure 1-24, Figure 1-26, and Figure 1-28). About 10% of the GPS tracks followed routes on Left Hand Park Reservoir Road all or part of the way to Left Hand Reservoir (Figure 1-27); similarly, just over 10% of the GPS tracks followed routes on the Sourdough Trail (North or South Section; Figure 1-25). Very few GPS tracks extended beyond Brainard Lake to the Niwot/Pawnee Trails (4%; Figure 1-29) or the Mitchell Lake Trail (2%; Figure 1-30). Snowshoeing visitors were more likely than cross-country skiers to travel on Brainard Lake Road and Left Hand Park Reservoir Road.

Approximately one-quarter (24%) of the GPS tracks collected during the study covered routes that were not sufficiently similar to other GPS tracks to be grouped into a route category. These "other" routes were generally longer trips, in terms of both time and distance, and tended to be those of cross-country skiers, rather than visitor groups who were snowshoeing or hiking in BLRA. An example of such a route is depicted in (Figure 1-31), and follows the Sourdough Trail-North Section to the South St. Vrain Trail, and from there to the Little Raven Trail, before returning to the Entrance Portal parking lot via Left Hand Park Reservoir Road.

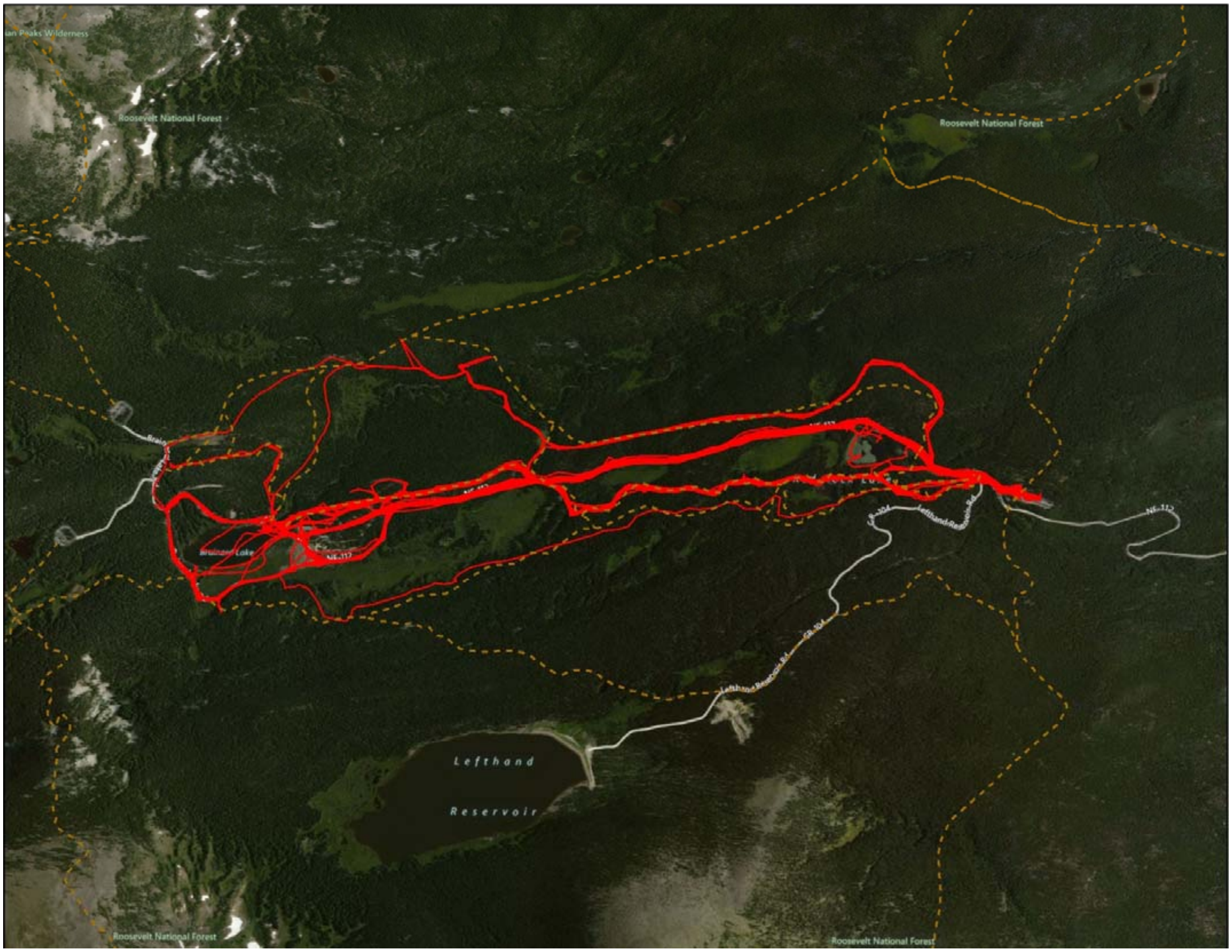


Figure 1-23. Route Grouping #1: Brainard Lake Road and directly surrounding trails to Brainard Lake.

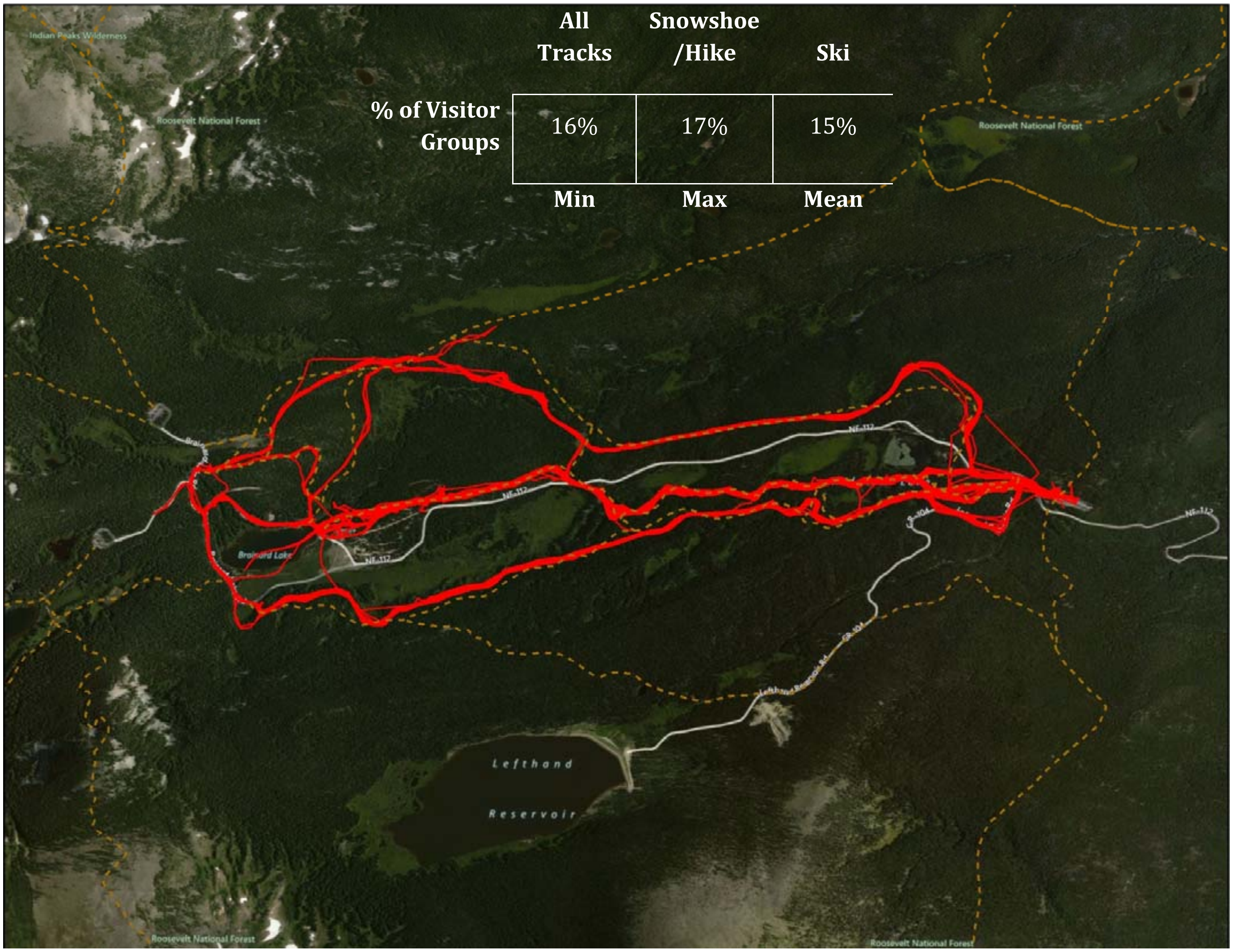


Figure 1-24. Route Grouping #2: Brainard Lake Snowshoe Trail, Waldrop Trail, and/or CMC Trail to Brainard Lake.

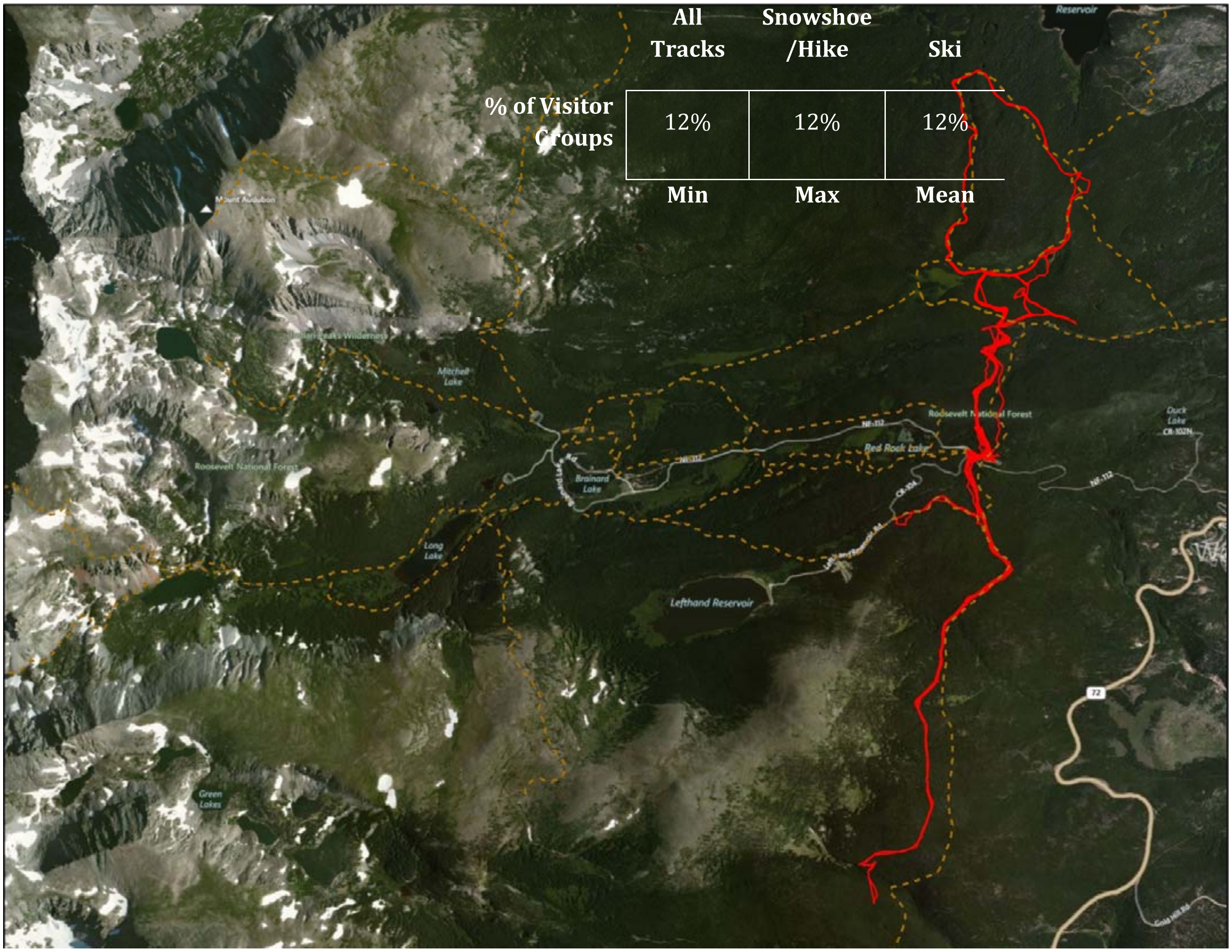


Figure 1-25. Route Grouping #3: Sourdough Trail (North or South Section), including a subset that uses Wapiti Trail.

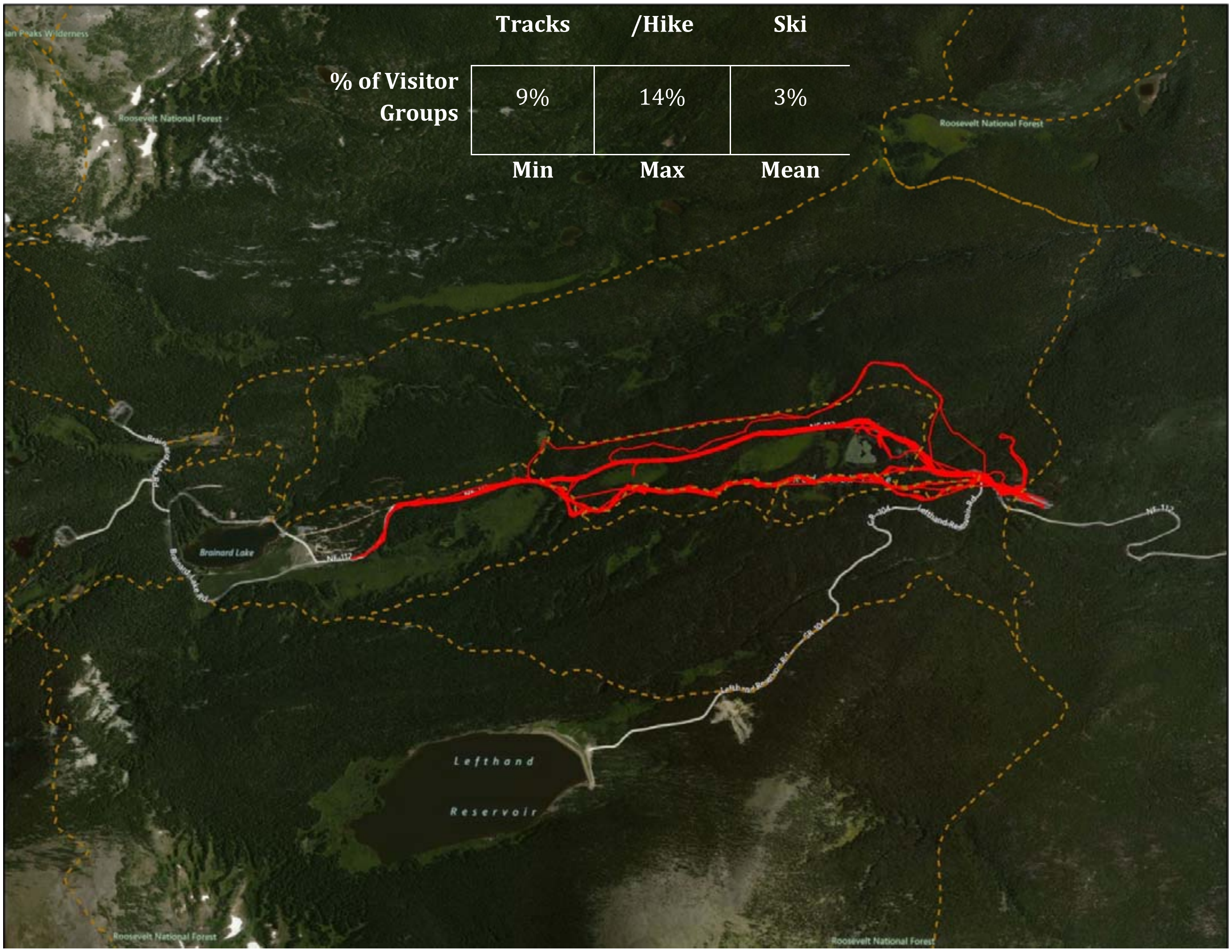
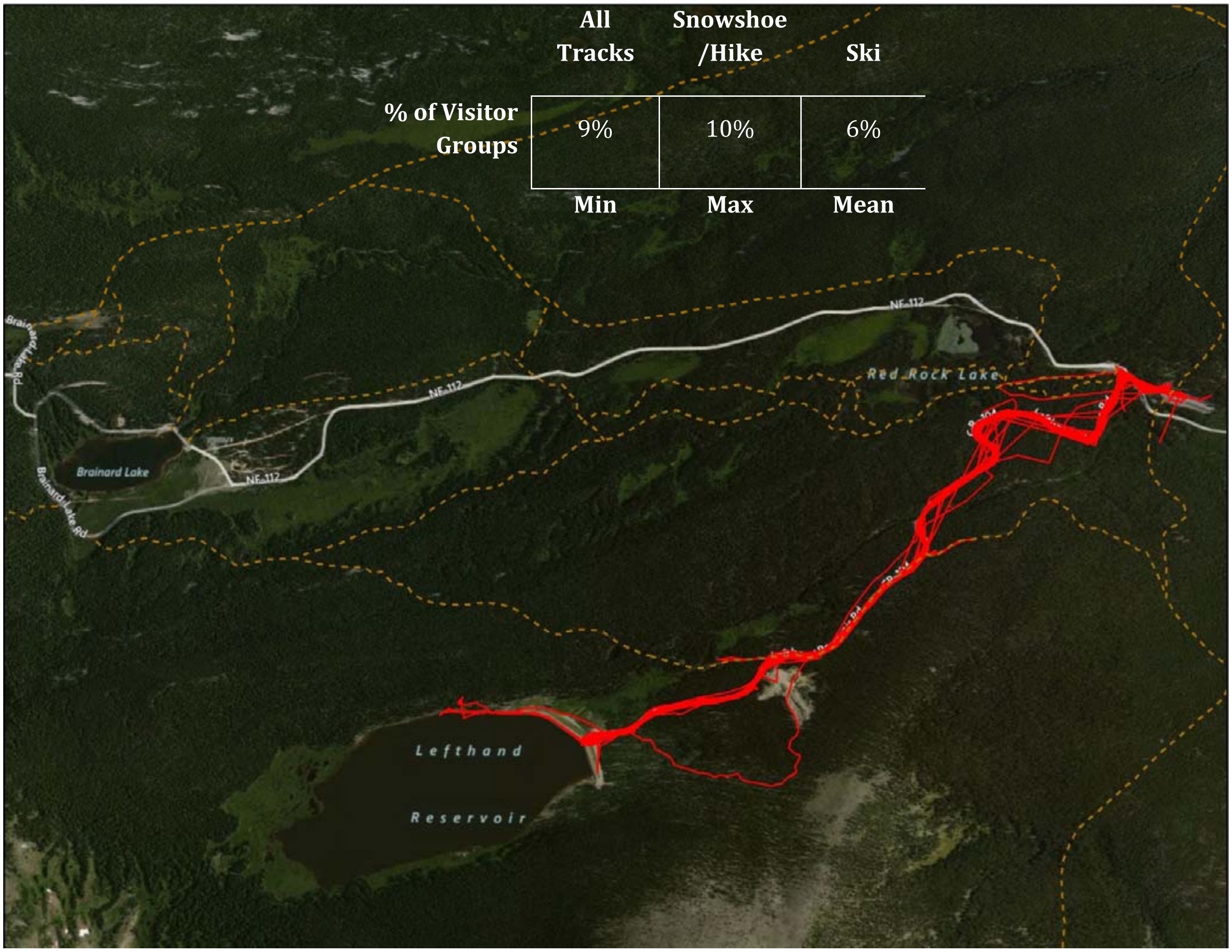
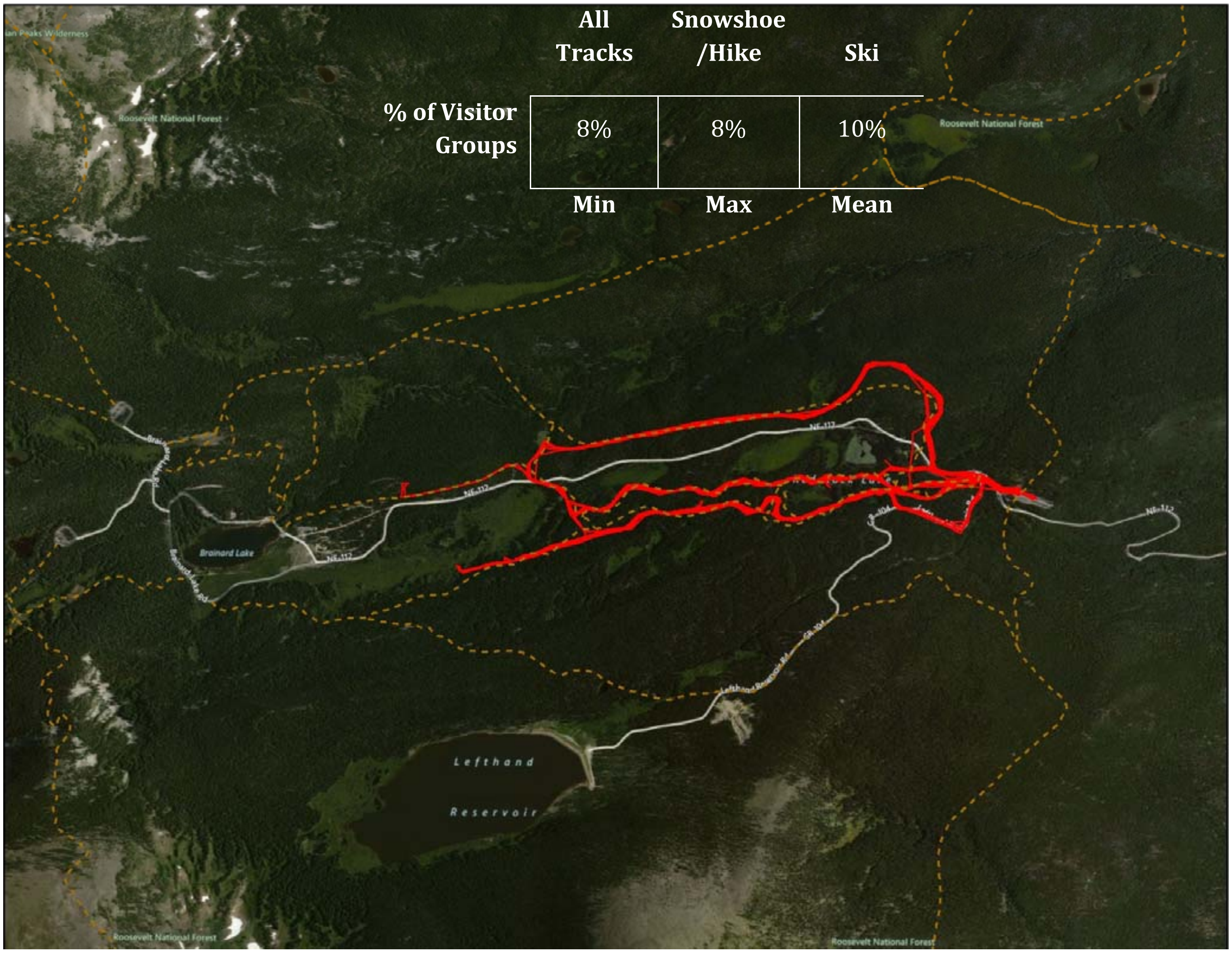


Figure 1-26. Route Grouping #4: Brainard Lake Road and directly surrounding trails part of the way to Brainard Lake.



	All Tracks	Snowshoe /Hike	Ski
% of Visitor Groups	9%	10%	6%
	Min	Max	Mean

Figure 1-27. Route Grouping #5: Left Hand Park Reservoir Road all or part of the way to Left Hand Reservoir.



	All Tracks	Snowshoe /Hike	Ski
% of Visitor Groups	8%	8%	10%
	Min	Max	Mean

Figure 1-28. Routing Group #6: Brainard Lake Snowshoe Trail, Waldrop Trail, and/or CMC Trail part of the way to Brainard Lake.

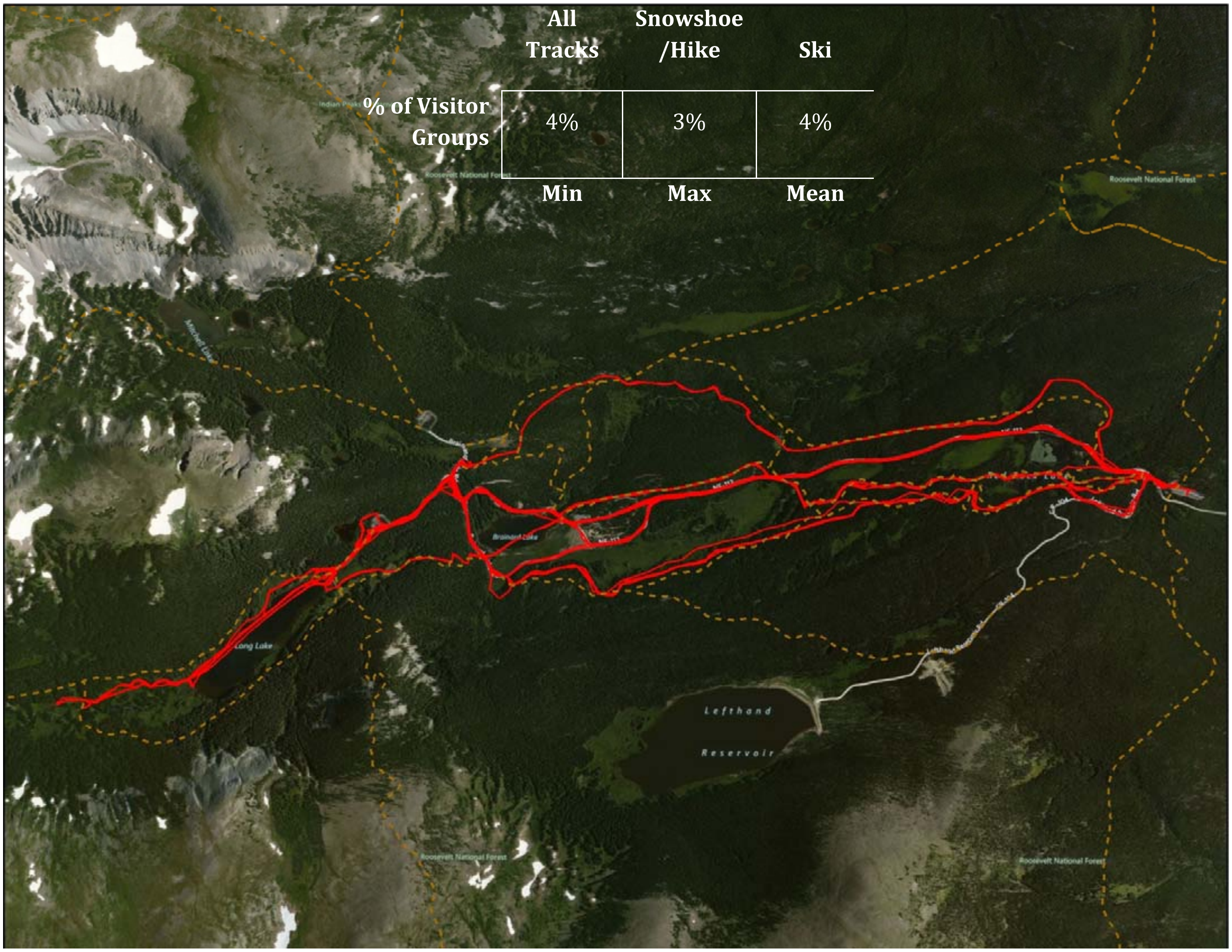
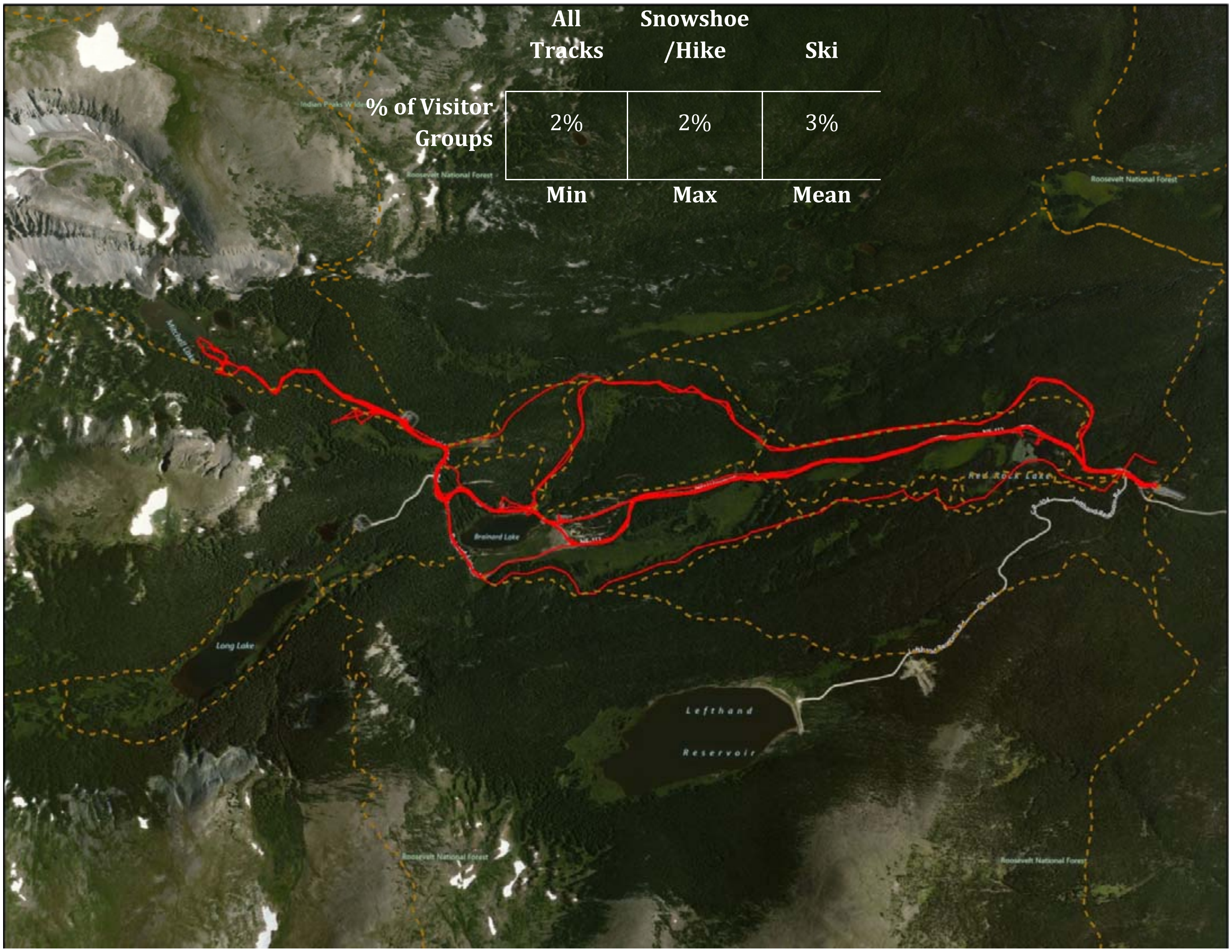


Figure 1-29. Route Grouping #7: Brainard Lake Road and directly surrounding trails to Brainard Lake and Niwot and/or Pawnee Trails.



	All Tracks	Snowshoe /Hike	Ski
% of Visitor Groups	2%	2%	3%
	Min	Max	Mean

Figure 1-30. Route Grouping #8: Brainard Lake Road and directly surrounding trails to Brainard Lake and Mitchell Lake Trail.

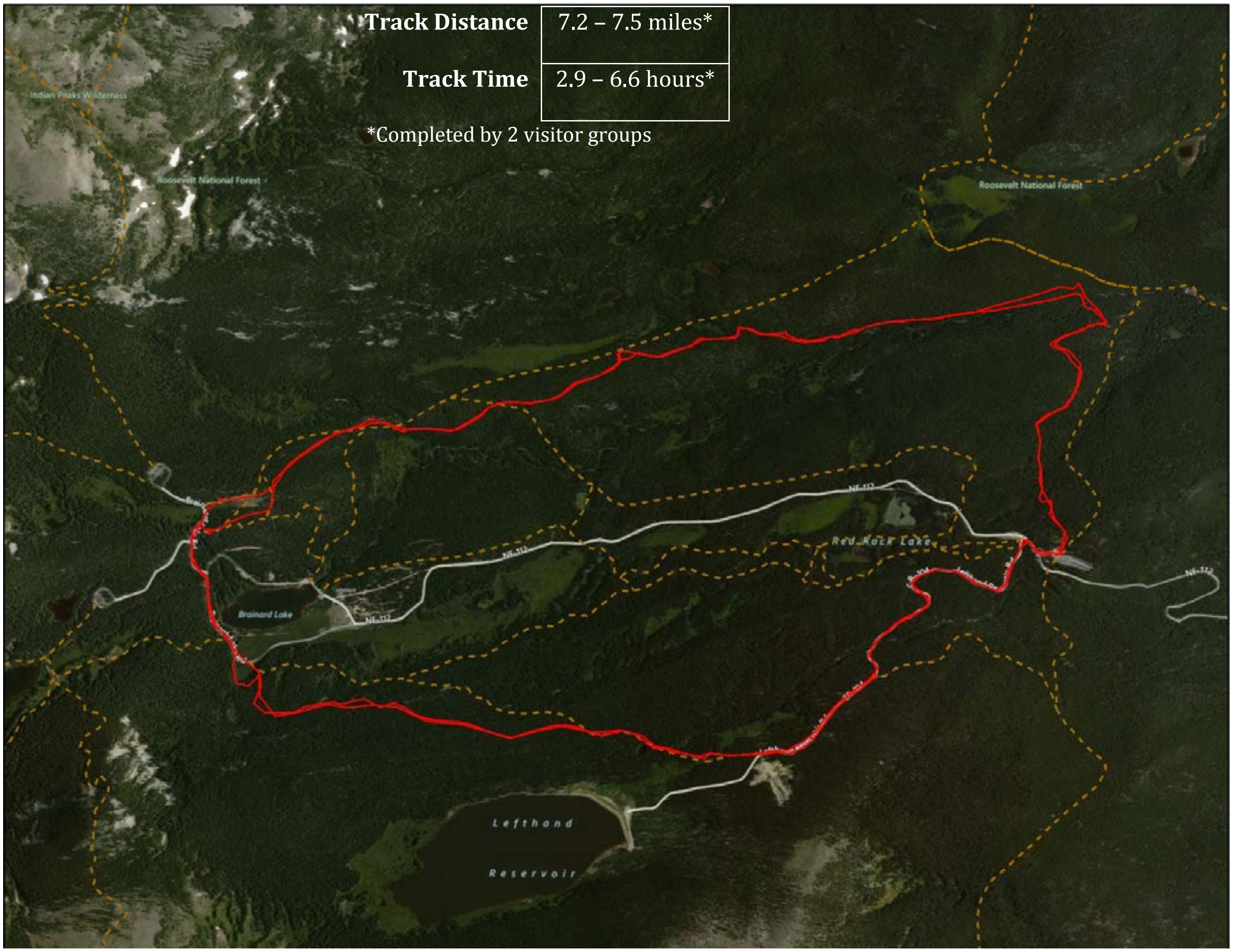


Figure 1-31. Example of “other” route, not included in one of the eight route groupings.

Brainard Lake Recreation Area Transportation and Visitor Use, Summer 2013

During summer 2013, RSG conducted a field study and data collection effort in BLRA. The purpose of the study was to collect transportation and visitor use data during the area's peak summer visitation period, from June 12th through September 3rd. The following data were collected at BLRA during summer 2013:

- Vehicle traffic volumes
- Parking accumulation and turnover rates at the Gateway Trailhead, Brainard Lake Day Use, Mitchell Lake Trailhead, Long Lake Trailhead, and Red Rock Parking Lots, as well as along the roadside
- Visitor use counts on the Long Lake, Niwot Cutoff, Mitchell Lake, Beaver Creek, and Lake Isabelle Trails
- GPS-based tracking of visitor use patterns in the study area

This section of *Chapter 1: Brainard Lake Recreation Area Summary of Data and Findings* provides a summary of the summer 2013 data collection effort at BLRA and results. This section is organized into subsections that describe the data collection methods and statistical results for each of the data types.

Vehicle Traffic Volumes

Data Collection Method

- Vehicle traffic data were recorded with two Automatic Traffic Recorders (ATRs) on Brainard Lake Road. One counter (labeled BLRA1 in Figure 1-32 and Figure 1-33) was located east of the Gateway Trailhead Lot and Courtesy Station near the USFS boundary; the other counter (labeled BLRA2 in Figure 1-32) was located just west of the Courtesy Station.
- The ATRs recorded inbound and outbound vehicle traffic counts in hourly bins, 24 hours per day from June 12th, 2013 through September 2nd, 2013.

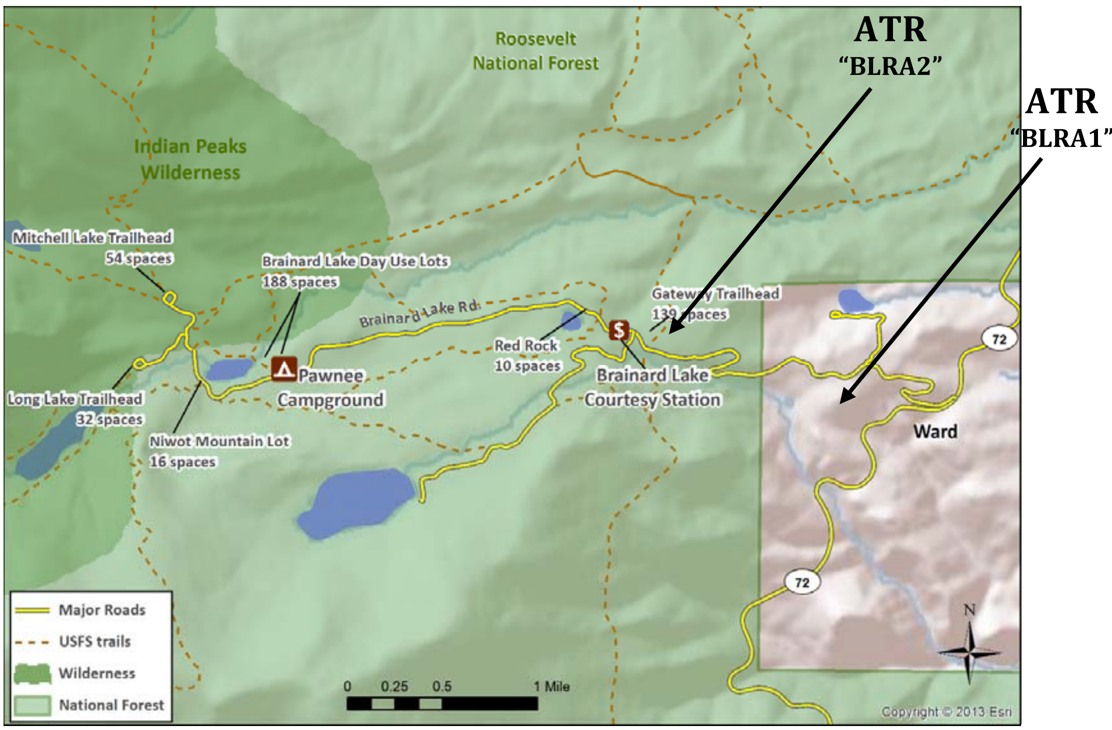


Figure 1-32. Approximate location of ATRs on Brainard Lake Road, summer 2013.

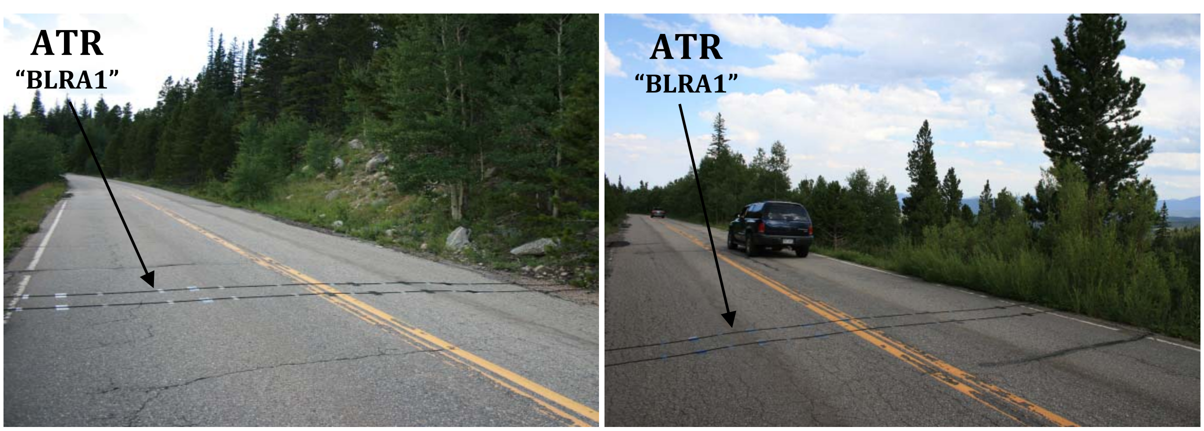


Figure 1-33. ATR setup on Brainard Lake Road (BLRA1), summer 2013.

Analysis and Results

Figure 1-34 displays average daily "inbound" (i.e., traveling eastbound toward Brainard Lake) traffic volumes on Brainard Lake Road during summer 2013, by counter location and day of week category (i.e., weekday, weekend day, and all days combined). The data in Figure 1-34 suggest, on average, there are roughly twice as many vehicles traveling on Brainard Lake Road on summer weekend days than on summer weekdays. The data in Figure 1-34 also suggest the vast majority (90% overall) of inbound vehicles on Brainard Lake Road that travel past BLRA1 pass through the BLRA Courtesy Station; this finding is one indicator that relatively few BLRA visitors use the Gateway Trailhead Parking Lot. In particular, the 10% of inbound vehicles that travel past BLRA1 but do not pass through the BLRA Courtesy Station could have done one of three things: 1) park at the Gateway Trailhead Parking Lot; 2) visited Lefthand Reservoir; or 3) turn around and leave the area altogether. The traffic data further suggest that, on weekend days, a slightly larger percentage of vehicles that pass BLRA1 stop before the Courtesy Station (presumably to park in the Gateway Trailhead Parking Lot, visit Lefthand Reservoir, or turn around) than on weekdays (16% on weekend days, compared to 4% on weekdays). The weekend versus weekday difference is likely due to the fact that parking lots within BLRA rarely filled to capacity during weekdays, but did so regularly on weekends; thus, there was more of a need to use the Gateway Trailhead Parking Lot for overflow parking on weekends than on weekdays.

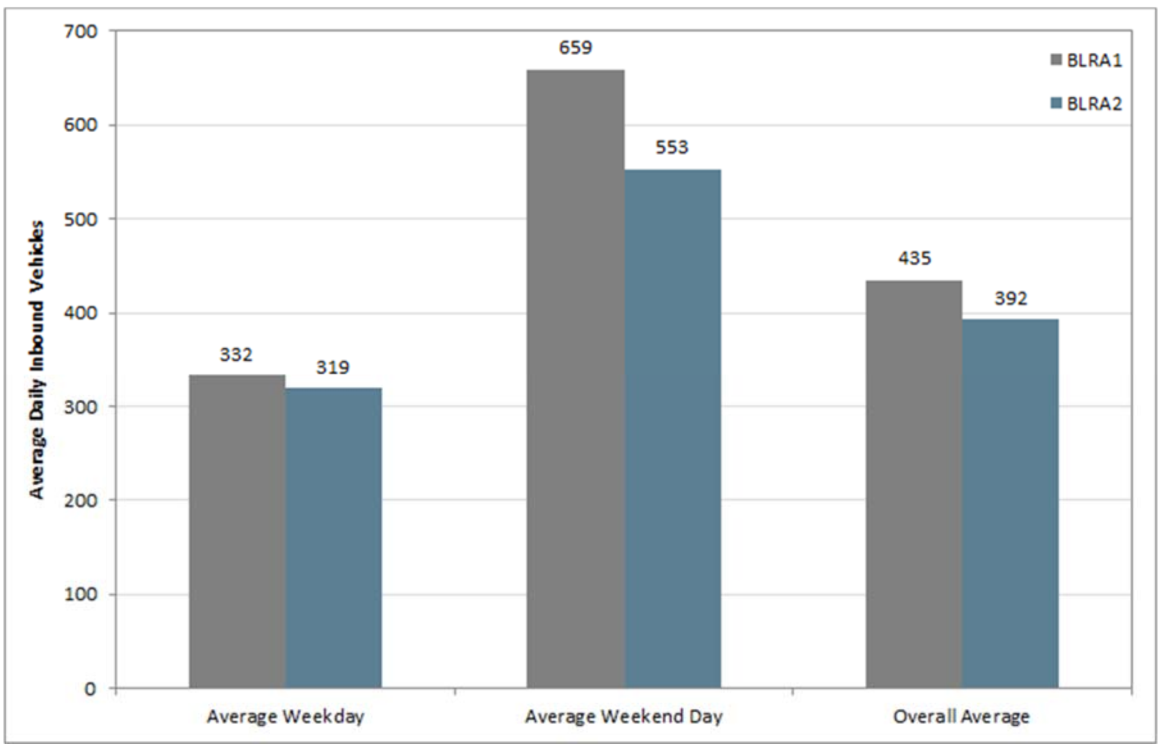


Figure 1-34. Average daily inbound vehicle traffic on Brainard Lake Road, by ATR location and day of week category, summer 2013.

The daily inbound vehicle traffic volumes are reported in Figure 1-35, by date from June 25th, 2013 to September 2nd, 2013; the red arrows in the figure highlight days when parking accumulation and turnover data were collected by field technicians. Due to a technical problem, BLRA1 failed to collect traffic volume data on five days during the study period (August 13th through August 17th); these missing data were replaced with estimates based on the correlation between daily inbound traffic volumes recorded at BLRA1 and BLRA2.

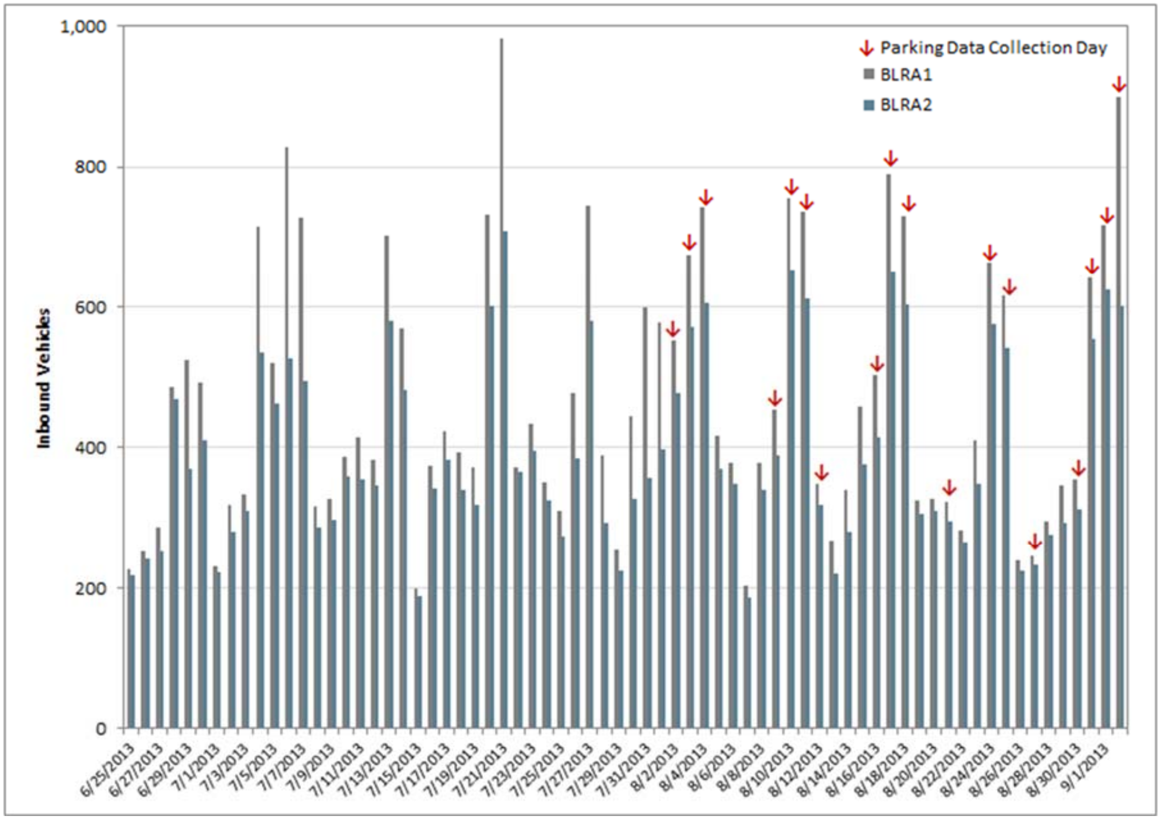


Figure 1-35. Daily inbound vehicle traffic volumes on Brainard Lake Road (BLRA1 and BLRA2), by date, summer 2013.

As noted, all BLRA visitors during the study period passed BLRA1, while most, but not all BLRA visitors drove their vehicles past BLRA2. Therefore, the daily inbound vehicle traffic volume data recorded at BLRA1 provides a slightly more comprehensive measure of BLRA visitation, and were correspondingly used to help identify a "design day" for analysis and planning that represents a "typically busy" day during the BLRA summer visitor use season. In particular, the inbound vehicle traffic volumes recorded at BLRA1 were organized in descending order, from the busiest day (July 21, 2013) to the least busy day (June 13, 2013) of the study period (Figure 1-36). Potential design day levels are depicted with horizontal lines positioned in Figure 1-36 at the 85th, 90th, and 95th percentile days of inbound vehicle traffic at BLRA1 during the study period.

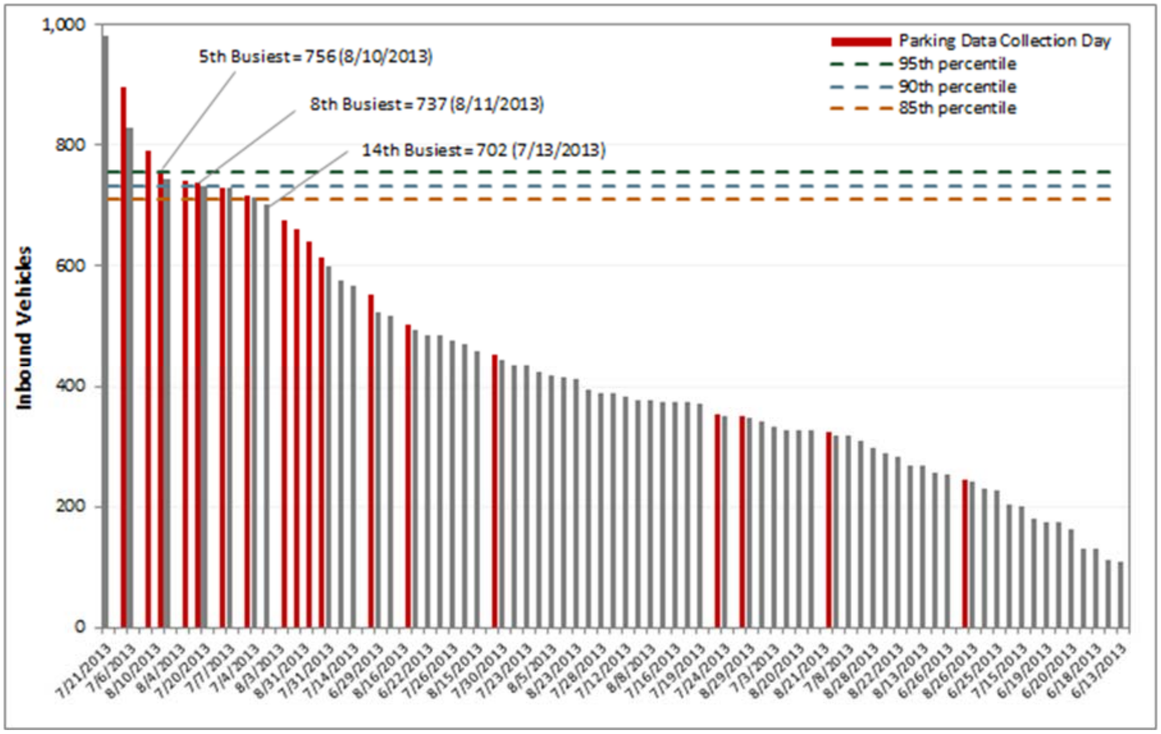


Figure 1-36. Daily inbound vehicle traffic volumes on Brainard Lake Road (BLRA1), in descending order, summer 2013.

Commonly, the 85th percentile day is used for "conventional" transportation planning and engineering. If the 85th percentile day were selected as the design day, on average, less than 15% of the days during a "typical summer visitor use season" would exceed what was planned for under the design day. The 85th percentile day is arguably less suitable, however, for transportation planning in parks and recreation areas, because visitor use tends to be temporally concentrated. To further inform the selection of a design day to represent a typically busy summer visitor use day at BLRA, estimates were calculated of the percentage of summer season visitors that would visit BLRA on days when visitor use, traffic, and parking conditions exceeded design day levels, based on using the 85th, 90th, 92nd, 95th, and 99th percentile days of vehicle traffic volumes as the design day (Table 1-11). It should be noted that for all five design day levels considered, 100% of the days above the design day level of visitor use were weekend days or holidays.

Table 1-11. Estimated percent of BLRA summer season visitors that would experience visitor use, traffic, and parking conditions in excess of design day conditions.

Day Rank	Potential Design Day	% of Visitors	Date
2nd Busiest Day	99th Percentile	3%	9/2/2013
5th Busiest Day	95th Percentile	10%	8/10/2013
8th Busiest Day	92nd Percentile	16%	8/11/2013
10th Busiest Day	90th Percentile	20%	8/18/2013
14th Busiest Day	85th Percentile	28%	7/13/2013

Using standards developed in consultation with the USFS and FHWA to assess the results in Table 1-11, it was concluded that the 85th and 90th percentile days of vehicle traffic volumes would result in too large a proportion of summer season visitors to experience conditions beyond those planned for in the feasibility study (28% and 20%, respectively). It was concluded that the 92nd percentile day of vehicle traffic would allow for a more acceptable proportion of BLRA summer season visitors (84%) to experience visitor use, traffic, and parking conditions at or below design day levels.

Thus, the 8th busiest day of the study period (August 11th, 2013) was selected as the BLRA Summer Visitor Use Season Design Day for analysis and planning in this project. As described, this decision was informed and substantiated by the BLRA vehicle traffic volume, group size, and parking data collected by RSG during the 2013 summer visitor use season. The design day is used as a reference point for analyzing most of the transportation and visitor use data collected at BLRA during the 2013 summer visitor use season and reported in this memo.

Arriving and departing vehicles on the design day are displayed in Figure 1-37 (BLRA1) and Figure 1-38 (BLRA2). The arriving and departing vehicle traffic data in Figure 1-37 and Figure 1-38 suggest visitors begin arriving in BLRA during the early morning hours; the number of arrivals grows sharply from 6:00 AM through the morning hours, and reaches its peak around 10:00 AM. The traffic data further suggest that visitors begin departing from BLRA in substantive numbers beginning around 10:00 AM, and departures exceed arrivals from approximately 11:00 AM through the end of the day.

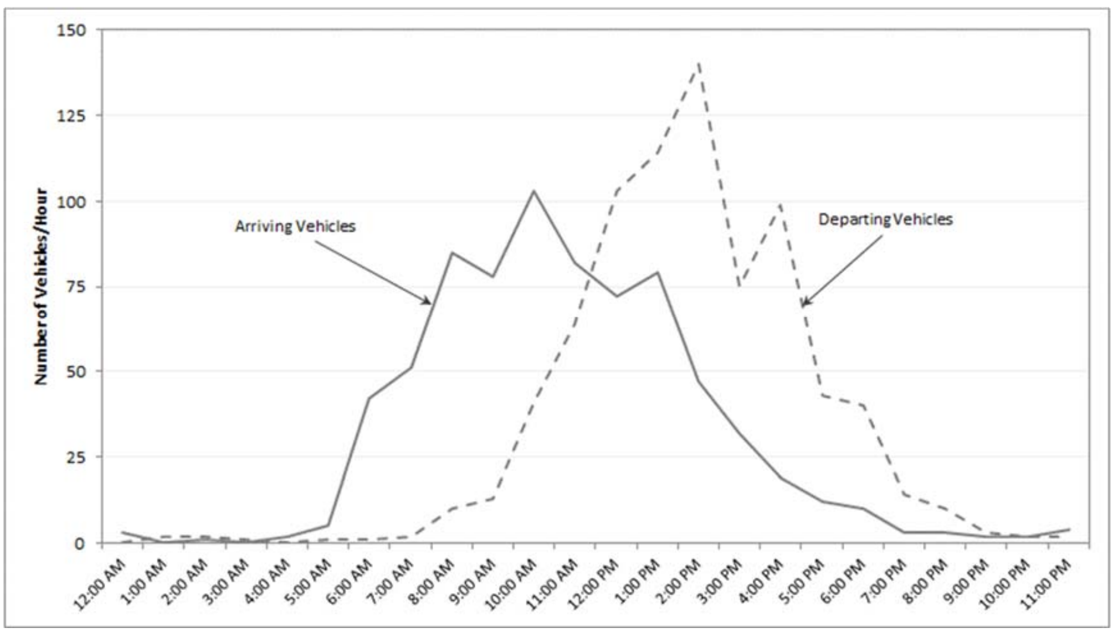


Figure 1-37. Design day vehicle traffic volumes on Brainard Lake Road (BLRA1), by hour and direction of travel, Sunday, August 11th, 2013.

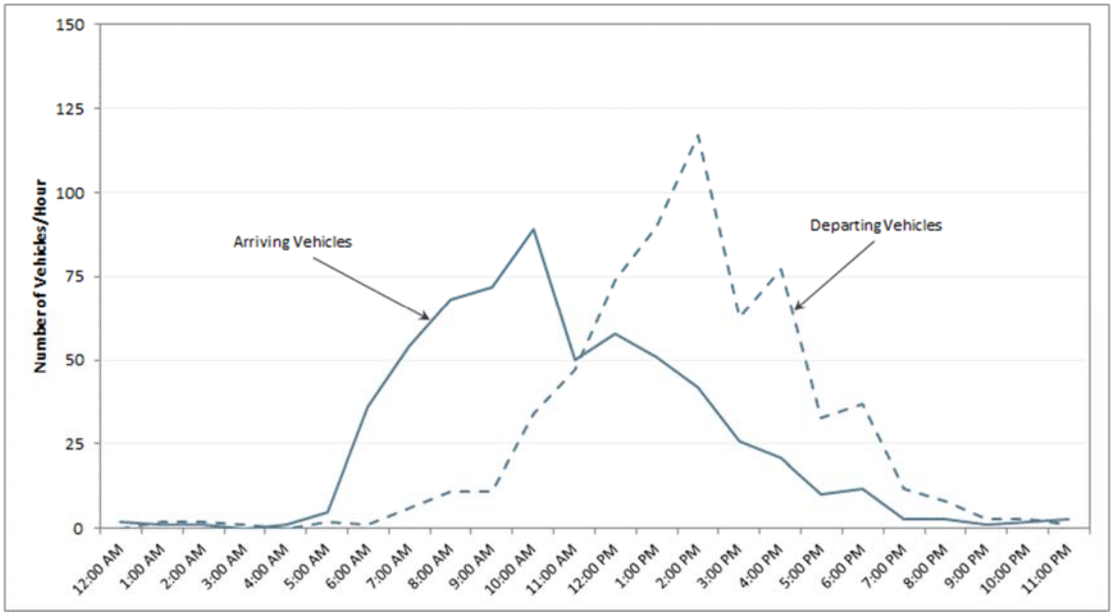


Figure 1-38. Design day vehicle traffic volumes on Brainard Lake Road (BLRA2), by hour and direction of travel, Sunday, August 11th, 2013.

The ATRs also recorded vehicle class, as defined by FHWA, the results of which are summarized in Table 1-12.[13] Nearly all of the vehicles recorded on the design day at BLRA1 (92%) and at BLRA2 (91%) were classified as passenger vehicles; very few were classified as motorcycles (1% at each ATR location) or heavy trucks or buses (5% at BLRA1 and 6% at BLRA2). A very small percentage of vehicles at BLRA1 and BLRA2 were of unknown classification (3% and 2%, respectively).

Table 1-12. FHWA classification of vehicles at BLRA, by ATR location, summer 2013.

ATR Location	Motorcycle	Passenger Vehicles	Heavy Truck/Bus	Unknown
USFS Boundary (BLRA1)	1%	92%	5%	3%
Inside Courtesy Station (BLRA2)	1%	91%	6%	2%

[13] *Vehicle Classification Scheme F Report*. (2011) Federal Highway Administration (FHWA): Washington, DC.

Parking Accumulation & Turnover

Data Collection Method

- A license plate recording method (Figure 1-39) was used in designated parking lots and in undesignated roadside parking locations at BLRA to record:
- An hourly count of parked vehicles, by location (i.e., parking accumulation).
- The amount of time vehicles were parked, by location (i.e., parking turnover).
- Parking data collection was conducted from 7:00 AM to 5:00 PM on 7 weekdays, 10 weekend days, and 1 holiday between August 2nd and September 2nd, 2013. License plates were recorded by subarea of the designated parking lots and roadside parking locations, and by specific parking space in the designated lots.

Figure 1-39. Parking accumulation & turnover data collection at BLRA.

Analysis and Results

Summaries of hourly parking accumulation in the designated parking lots and undesignated roadside parking areas at BLRA are reported in the following subsections for the 8th busiest day of the 2013 summer visitor use season (Sunday, August 11th, 2013), which was selected as the "design day" for this study, as described in the preceding section. Each of the following subsections also includes a map of the corresponding parking lot or undesignated roadside parking area, including the subareas by which the parking data were recorded. The subsections are organized according to the sequence in which the parking lots at BLRA are filled by visitors on "typically busy" summer days, starting with the Long Lake and Mitchell Lake Trailhead Parking Lots, followed by the Niwot Mountain Parking Lot and then the Brainard Lake Day Use Parking Lot, and finishing up with the Gateway Trailhead Parking Lot.

Long Lake and Mitchell Lake Trailhead Parking Lots

As noted, the Long Lake and Mitchell Lake Trailhead Parking Lots provide direct access to the IPW during the summer, and have 32 and 54 striped parking spaces, respectively. The subareas and parking spaces by which parking data were collected in the Long Lake and Mitchell Lake Trailhead Parking Lots are represented with color coding in Figure 1-40 and Figure 1-41, respectively. As illustrated in Figure 1-40 and Figure 1-41, roadside areas were included among the subareas for which parking data were recorded.

Figure 1-40. Long Lake Trailhead Parking Lot parking accumulation and turnover data collection map.

Figure 1-41. Mitchell Lake Trailhead Parking Lot parking accumulation and turnover data collection map.

Figure 1-42 displays design day hourly parking accumulation in the Long Lake Trailhead Parking Lot. As depicted in Figure 1-42, the Long Lake Trailhead Parking Lot was nearly two-thirds (63%) full when the first parking count was conducted at 7:00 AM on the design day, and was effectively full from 8:00 AM to approximately 2:00 PM (with the exception of a small number of handicap and administrative vehicle parking spaces that were infrequently occupied).

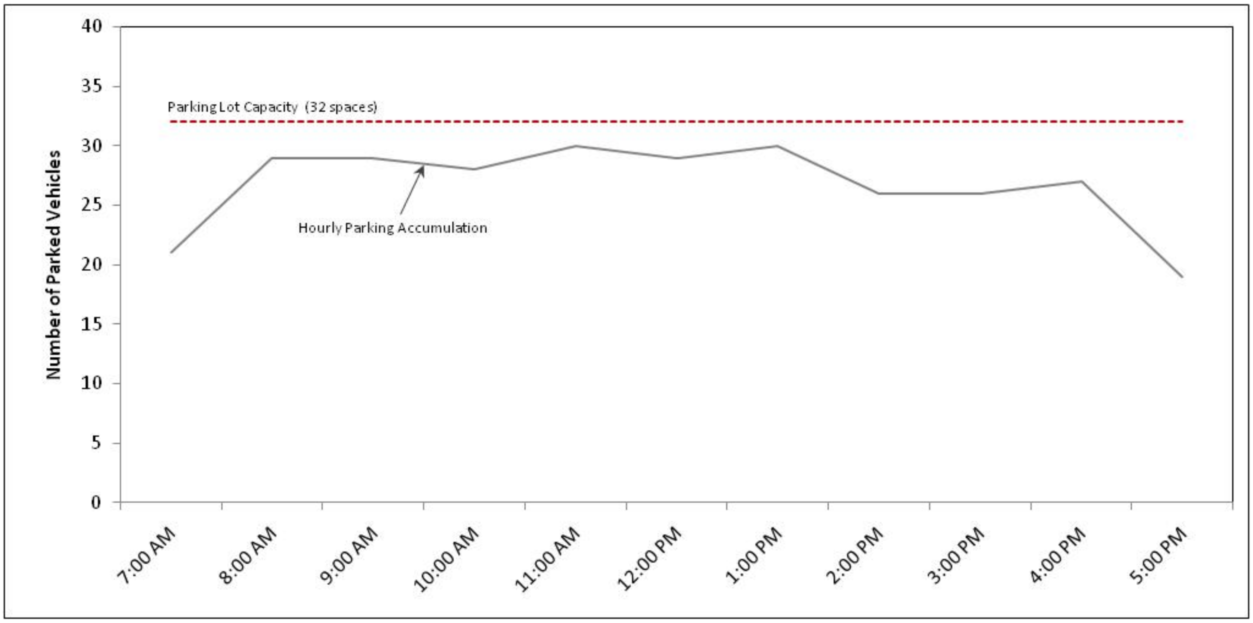


Figure 1-42. Design day parking accumulation in the Long Lake Trailhead Parking Lot, Sunday, August 11th, 2013.

The pattern of design day hourly parking accumulation at the Mitchell Lake Trailhead Parking Lot was similar to that in the Long Lake Trailhead Parking Lot (Figure 1-43). In particular, the number of cars parked in the Mitchell Lake Trailhead Parking Lot reached the lot's capacity by 8:00 AM, and the lot remained full until approximately 1:00 PM (with the exception of a small number of handicap and administrative vehicle parking spaces that were infrequently occupied).

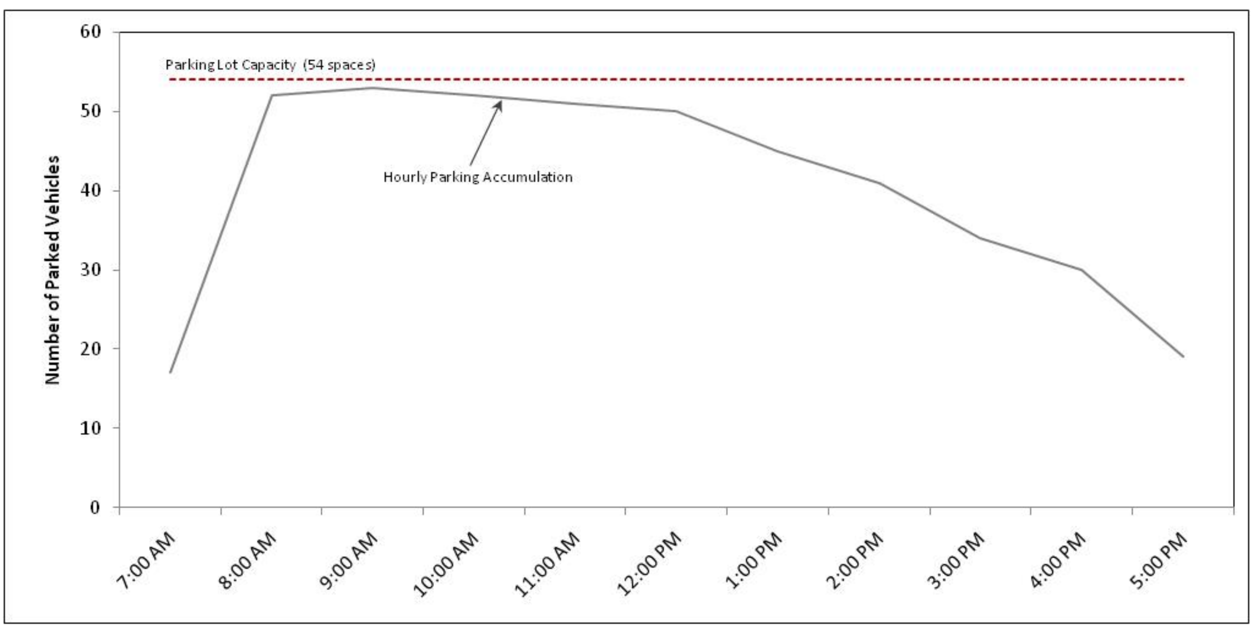


Figure 1-43. Design day parking accumulation in the Mitchell Lake Trailhead Parking Lot, Sunday, August 11th, 2013.

Figure 1-44 and Figure 1-45 are graphical displays of parking accumulation in the Long Lake and Mitchell Lake Trailhead Parking Lots, respectively, at distinct time periods throughout the morning and afternoon of the design day. As depicted, the spaces closest to the trailheads fill first, during the 7:00 AM and 8:00 AM hours. By 9:00 AM, both trailhead parking lots are relatively full, except for a few handicap and administrative parking spaces. These lots then remain full until early afternoon. No visitors were observed parking along the roadside at either location.

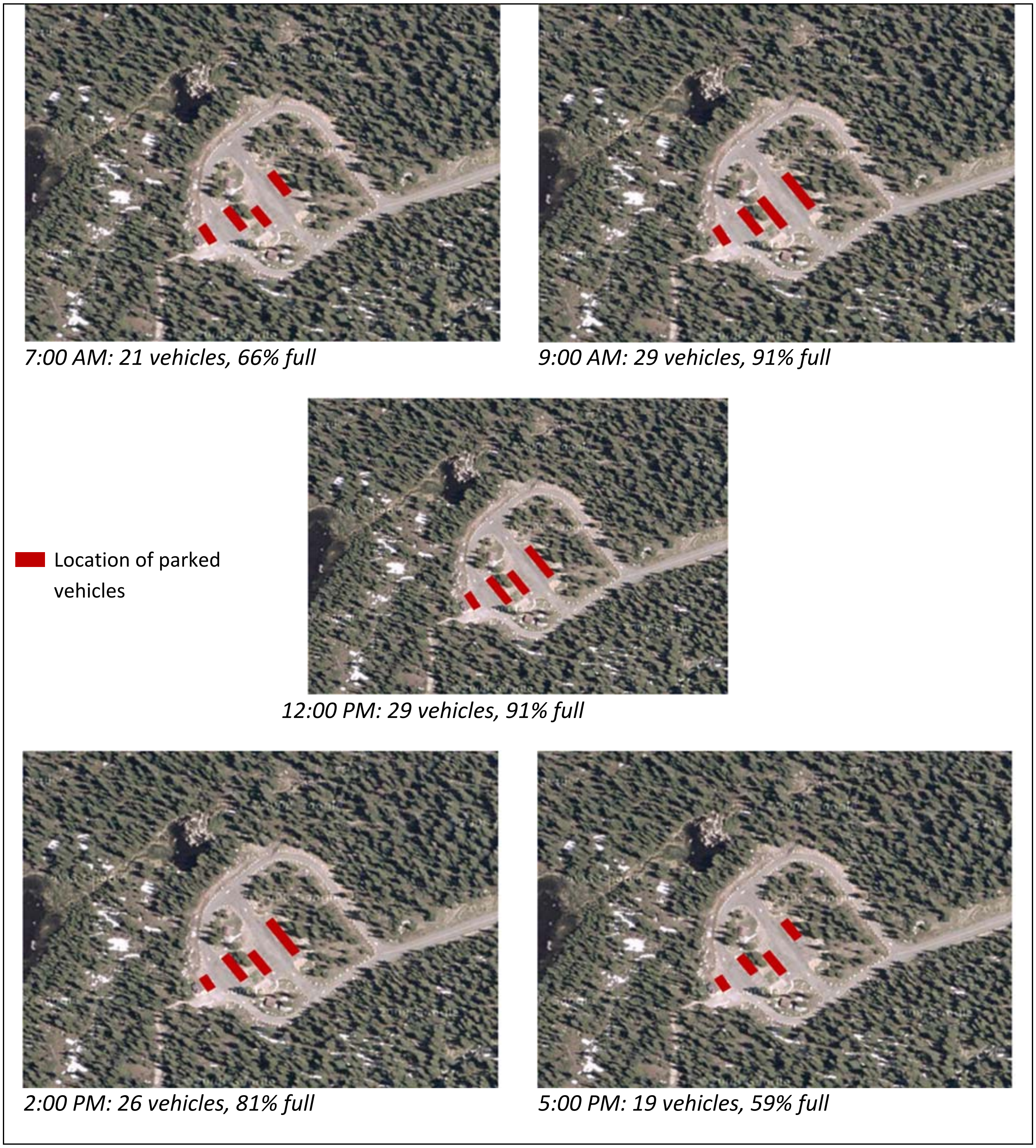


Figure 1-44. Design day parking accumulation in the Long Lake Trailhead Parking Lot, Sunday, August 11th, 2013.

7:00 AM: 17 vehicles, 31% full

9:00 AM: 53 vehicles, 98% full

Location of parked vehicles

12:00 PM: 50 vehicles, 93% full

2:00 PM: 41 vehicles, 76% full

5:00 PM: 19 vehicles, 35% full

Figure 1-45. Design day parking accumulation in the Mitchell Lake Trailhead Parking Lot, Sunday, August 11th, 2013.

The parking accumulation data reported in Figure 1-42 through Figure 1-45 should not be interpreted as representing the total parking demand for the Long Lake and Mitchell Lake Trailhead Parking Lots. In particular, parking management staff at BLRA do not allow vehicles to drive to the Long Lake or Mitchell Lake Trailhead Parking Lots, once they are full. Rather, once the trailhead parking lots are full, visitors who wish to hike in the IPW are directed to park in the Niwot Mountain Parking Lot or Brainard Lake Day Use Parking Lot and walk from there to the IPW trailheads. It is expected that without parking management staff onsite at BLRA, a substantial number of visitors would park in unendorsed locations in the trailhead parking lots and nearby roadside, and parking accumulation would correspondingly be substantially higher than the capacities of the trailhead parking lots.

Niwot Mountain Parking Lot

As noted, the Niwot Mountain Parking Lot is located a relatively short distance from the Long Lake and Mitchell Lake Trailheads, providing a small amount of overflow parking (16 parking spaces) during the summer for visitors destined for the IPW. Because of its small size, the Niwot Mountain Parking Lot was not organized into subareas for data collection; rather, parking data were collected by parking space in the lot and for subareas along the nearby roadside, as denoted in Figure 1-46.

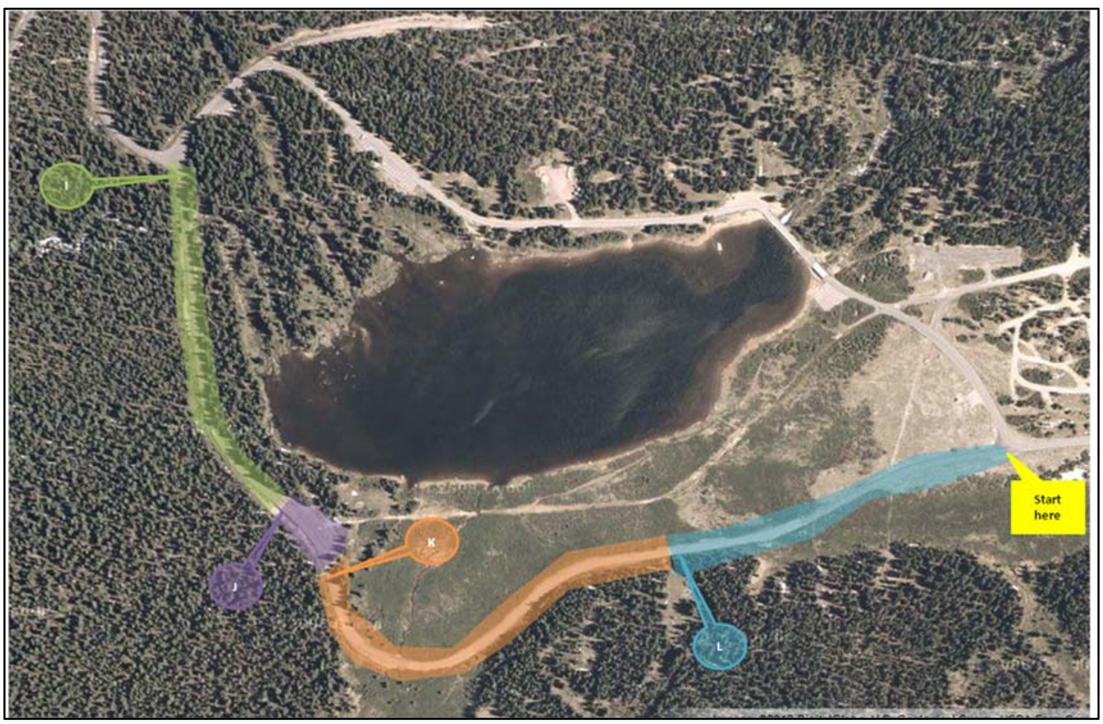


Figure 1-46. Niwot Mountain Parking Lot and nearby roadside parking accumulation and turnover data collection map.

Figure 1-47 displays design day hourly parking accumulation in the Niwot Mountain Parking Lot. As depicted in Figure 1-47, the Niwot Mountain Parking Lot filled to near its capacity soon after the Long Lake and Mitchell Lake Trailhead Parking Lots filled up, and remained at or near capacity until 2:00 PM.

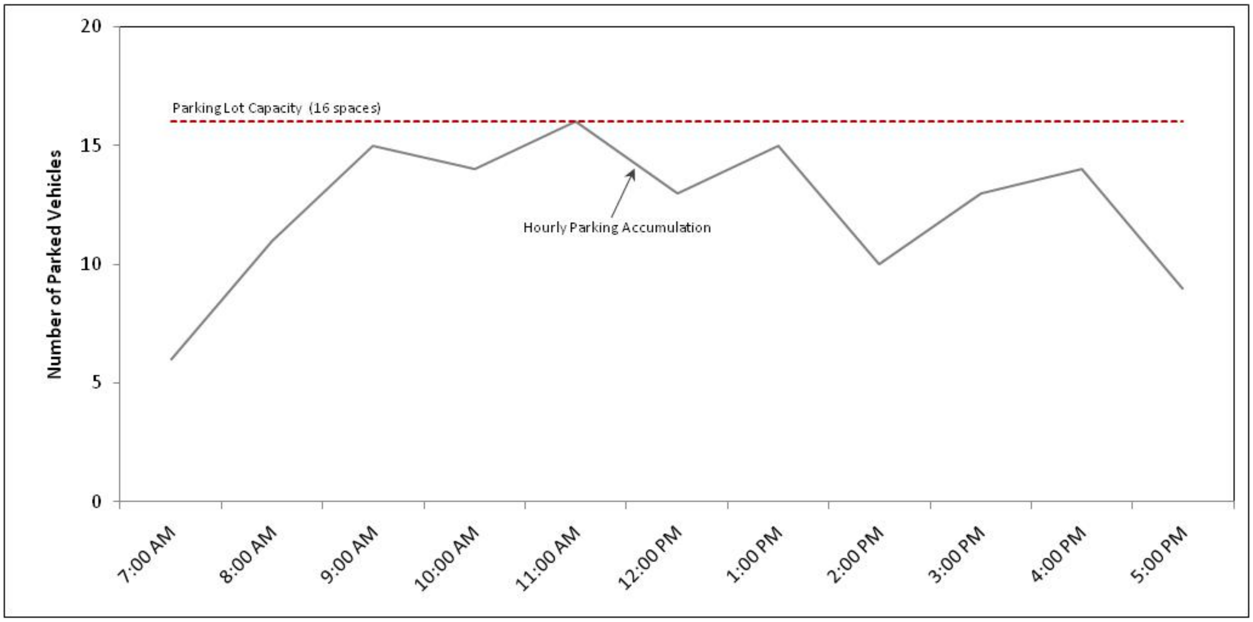


Figure 1-47. Design day parking accumulation in the Niwot Mountain Parking Lot, Sunday, August 11th, 2013.

Results of the parking data collection suggest virtually no overflow parking occurs along the shoulder of Brainard Lake Road. This is attributable to the fact that when the IPW trailhead parking lots and the Niwot Mountain Parking Lot are full, traffic management staff direct visitors to the Brainard Lake Day Use Parking Lot. It is expected that, if visitors were allowed to drive past the Brainard Lake Day Use Parking Lot when the trailhead and Niwot Mountain Parking Lots are full, overflow parking would occur on Brainard Lake Road. While overflow parking generally does not occur along the shoulder of Brainard Lake Road, roadside parking does occur sporadically throughout the day on Brainard Lake Road when moose are sighted along the south side of Brainard Lake. When these “moose jams” occur, visitors will often stop their vehicles on the side of the road, impacting forest resources, or in the middle of the road, causing traffic conflicts.

Figure 1-48 is a graphical display of parking accumulation in the Niwot Mountain Parking Lot at distinct time periods throughout the morning and afternoon of the design day. As depicted in *Figure 1-48*, visitors fill the Niwot Mountain Parking Lot by 9:00 AM, just after the Long Lake and Mitchell Lake Parking Lots fill. The Niwot Mountain Parking Lot remains full until early afternoon, and then remains over half full until early evening (5:00 PM).

7:00 AM: 6 vehicles, 38% full

9:00 AM: 15 vehicles, 94% full

Location of parked vehicles

12:00 PM: 13 vehicles, 81% full

2:00 PM: 10 vehicles, 63% full

5:00 PM: 9 vehicles, 56% full

Figure 1-48. Design day parking accumulation in the Niwot Mountain Parking Lot, Sunday, August 11th, 2013.

Brainard Lake Day Use Parking Lot

As noted, there is a roughly 200-space parking lot located directly east of Brainard Lake which is intended primarily for day use visitors. The lot is divided into two sections, including: 1) the Main Lot, with 147 parking spaces; and 2) the Overflow Parking and Large Vehicle Lot, with 41 parking spaces, including 4 spaces designated for large vehicles (e.g., RV's, car and trailer, etc.). The subareas and parking spaces by which parking data were collected in the Main Lot and Overflow Parking and Large Vehicle Lot are depicted in Figure 1-49 and Figure 1-50, respectively.

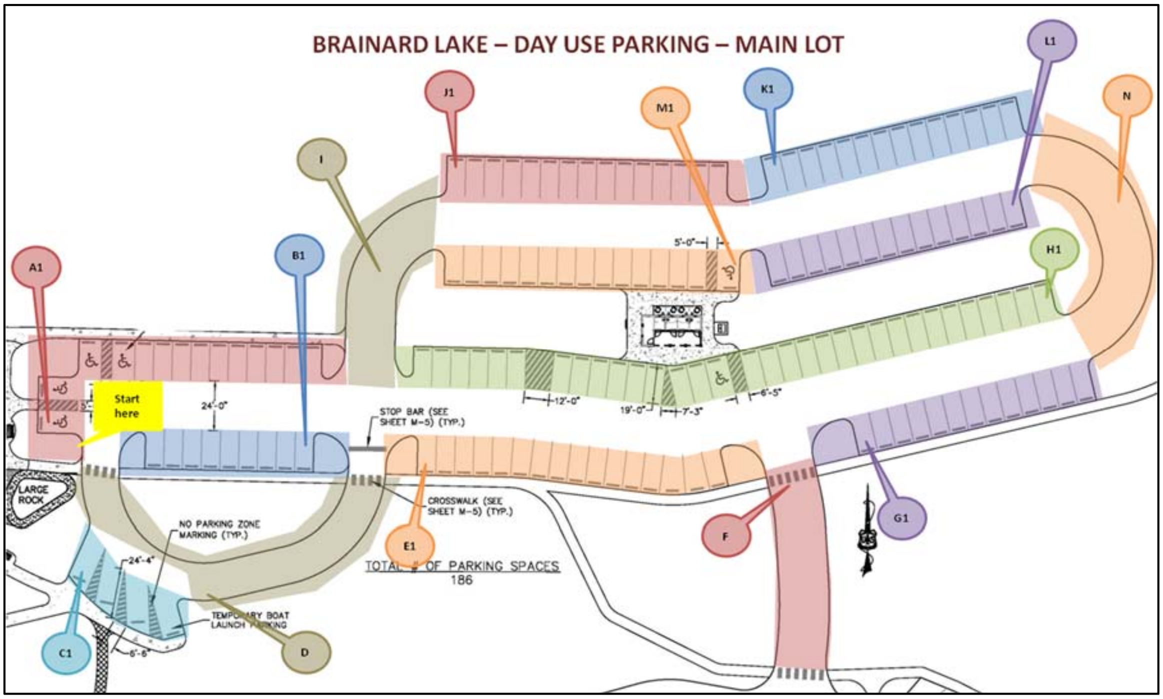


Figure 1-49. Brainard Lake Day Use Parking Lot – Main Lot parking accumulation and turnover data collection map.

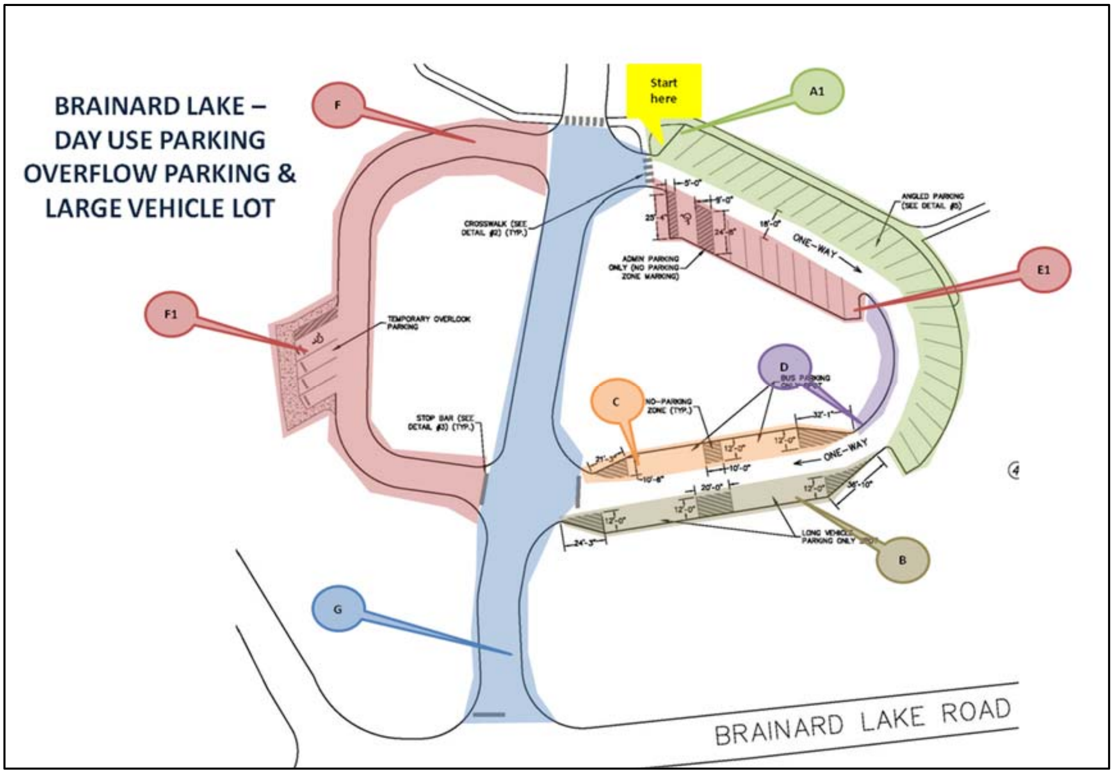


Figure 1-50. Brainard Lake Day Use Parking Lot – Overflow Parking and Large Vehicle Lot parking accumulation and turnover data collection map.

Figure 1-51 and Figure 1-52 display design day hourly parking accumulation in the Brainard Lake Day Use Main Lot and Overflow Parking and Large Vehicle Lot, respectively. As depicted in Figure 1-51, parking demand was near or at capacity in the Main Lot from 11:00 AM to 2:00 PM. Similarly, parking demand was at or above the designated parking capacity in the Overflow Parking and Large Vehicle Lot during the three-hour period from 11:00 AM to 2:00 PM. While the data in Figure 1-52 indicate a parking shortage in the Overflow Parking and Large Vehicle Lot during the peak period of the design day, it should be noted parking management staff directed visitors to park regularly sized automobiles in designated large vehicle spaces during the peak hours. Thus, vehicles were parked within the paved footprint of the lot, but not according to the striping plan for the lot; this was done to maximize the number of visitors that could be accommodated in the lot and because there was generally little or no demand for large vehicle parking. Together, the findings in Figure 1-51 and Figure 1-52 suggest the Brainard Lake Day Use Parking Lot fills to its capacity and beyond during “typically busy” summer days; the findings also suggest parking demand begins to spike in the lot during the 9:00 AM hour, after the Long Lake and Mitchell Lake Trailhead Parking Lots fill to their capacities.

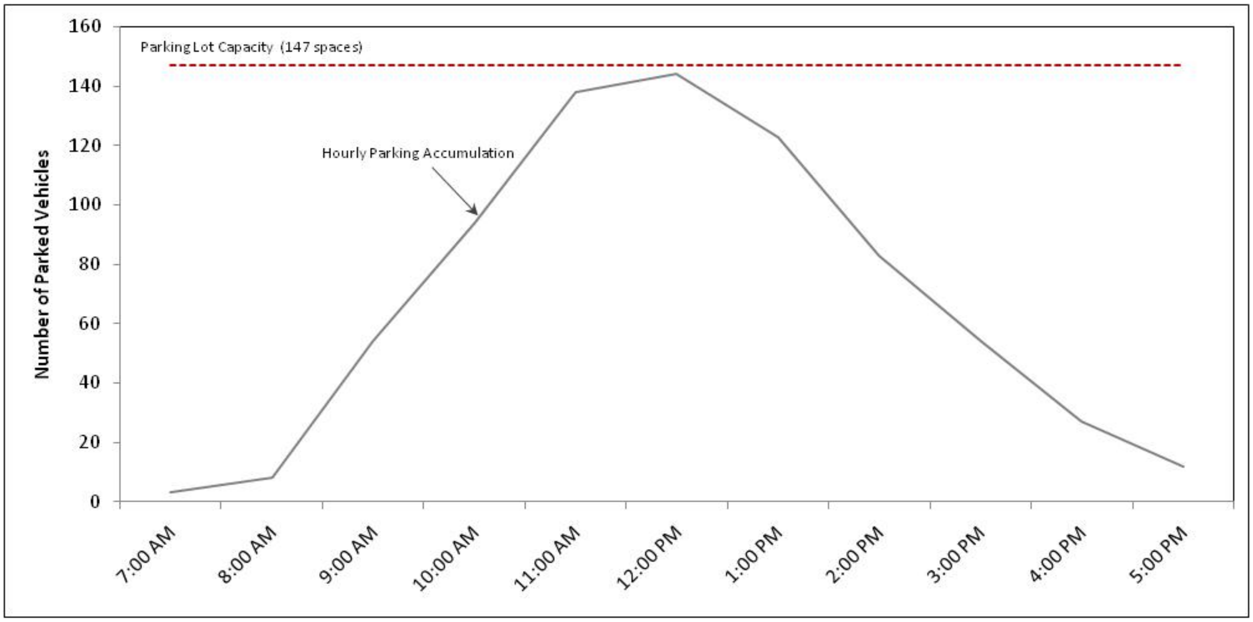


Figure 1-51. Design day parking accumulation in the Main Lot of the Brainard Lake Day Use Parking Lot, Sunday, August 11th, 2013.

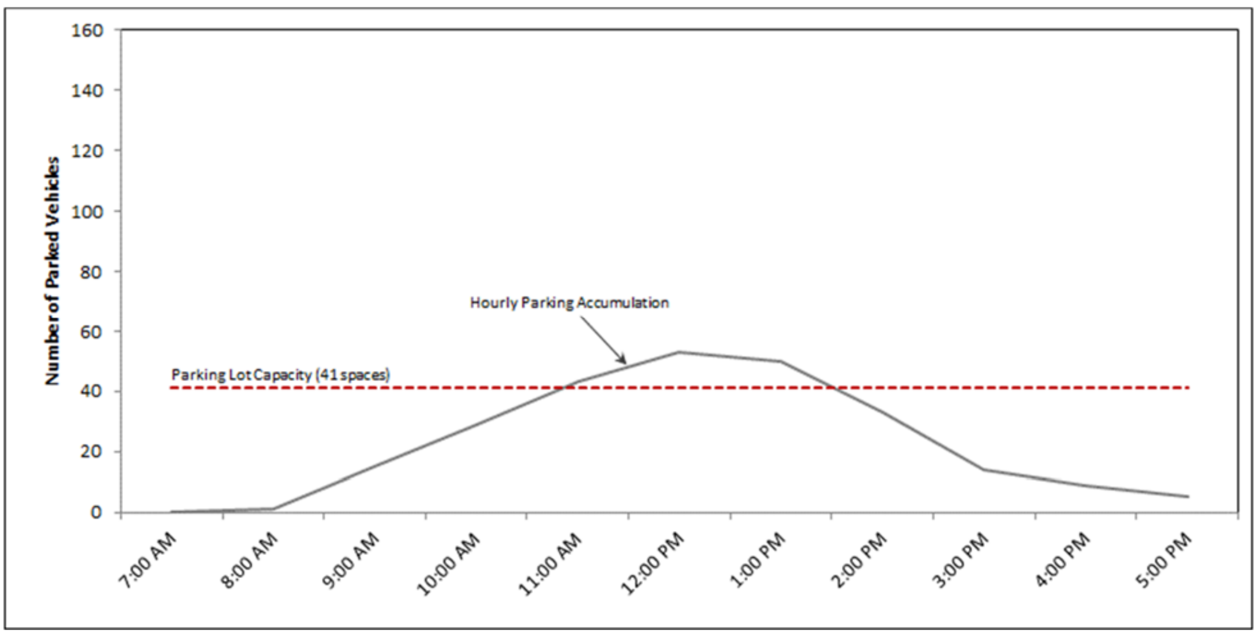
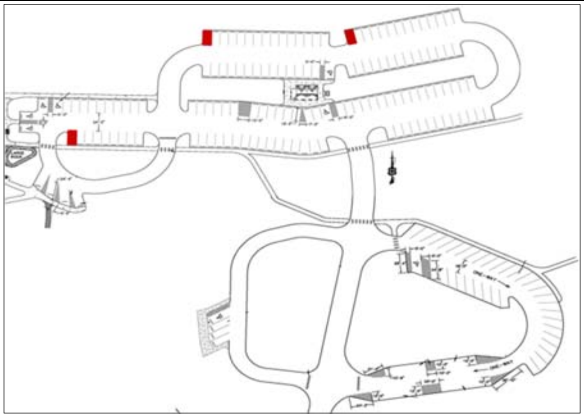
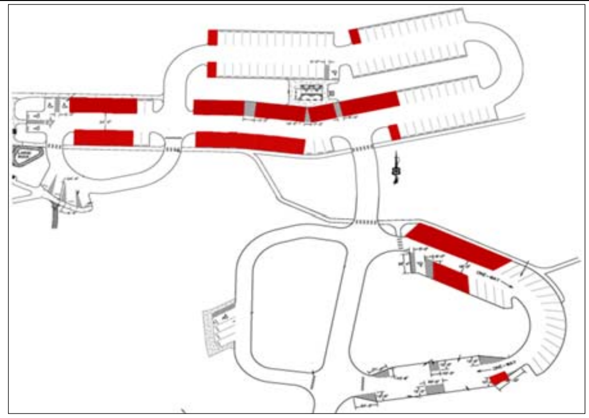


Figure 1-52. Design day parking accumulation in the Overflow Parking and Large Vehicle Lot of the Brainard Lake Day Use Parking Lot, Sunday, August 11th, 2013.

Figure 1-53 is a graphical display of parking accumulation in the Brainard Lake Day Use Parking Lot at distinct time periods throughout the morning and afternoon of the design day. The spaces closest to the bathrooms fill first, during the 9:00 AM hour. By noon, the lot is completely full, and standard sized vehicles fill the RV/large vehicles spaces, per direction from parking management staff. The lot starts to empty during the early afternoon hours, and is almost completely empty by 5:00 PM.

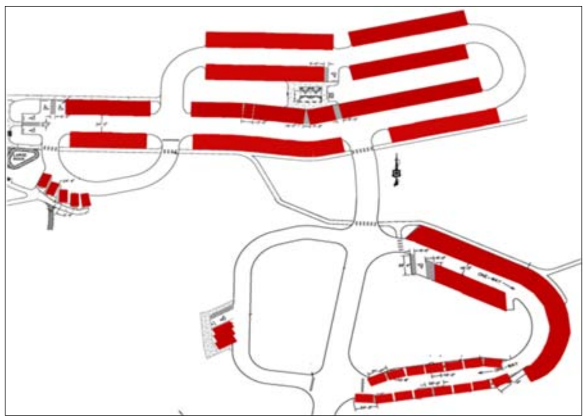


7:00 AM: 3 vehicles, 2% full

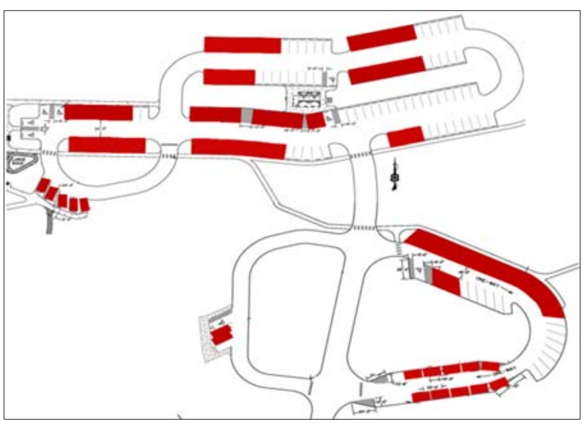


9:00 AM: 69 vehicles, 37% full

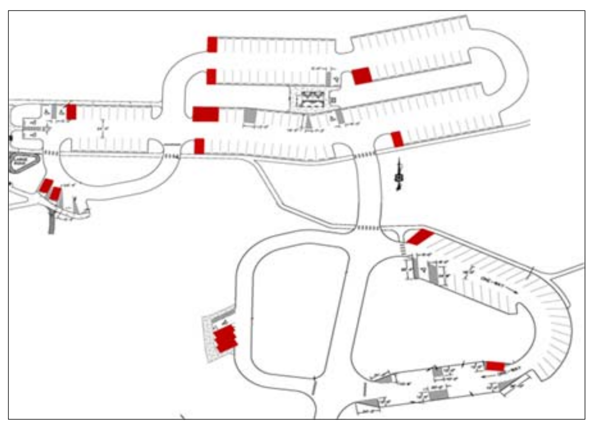
Location of parked vehicles



12:00 PM: 197 vehicles, 105% full



2:00 PM: 116 vehicles, 62% full



5:00 PM: 17 vehicles, 9% full

Figure 1-53. Design day parking accumulation in the Brainard Lake Day Use Parking Lot, Sunday, August 11th, 2013.

As in the case of the parking accumulation results for the Long Lake and Mitchell Lake Trailhead Parking Lots, the parking accumulation data reported in Figure 1-51 through Figure 1-53 should not be interpreted as representing the total parking demand for the Brainard Lake Day Use Parking Lot. In particular, once the IPW trailhead and Brainard Lake Day Use Parking Lots are full, visitors are stopped at the Courtesy Station and not allowed to enter BLRA until other visitors leave and parking spaces become available. It is expected that, if visitors were not stopped at the Courtesy Station when the Brainard Lake Day Use Parking Lot is full, a substantial number of visitors would park in unendorsed locations in the parking lot and nearby roadside, and parking accumulation in and around the Brainard Lake Day Use Parking Lot would correspondingly be substantially higher than the lot's capacity.

Gateway Trailhead Parking Lot

As noted, the Gateway Trailhead Parking Lot is a 150-space, designated parking lot located just east of the BLRA Courtesy Station. The subareas and parking spaces by which parking data were collected in the Gateway Trailhead Parking Lot are depicted in Figure 1-54.

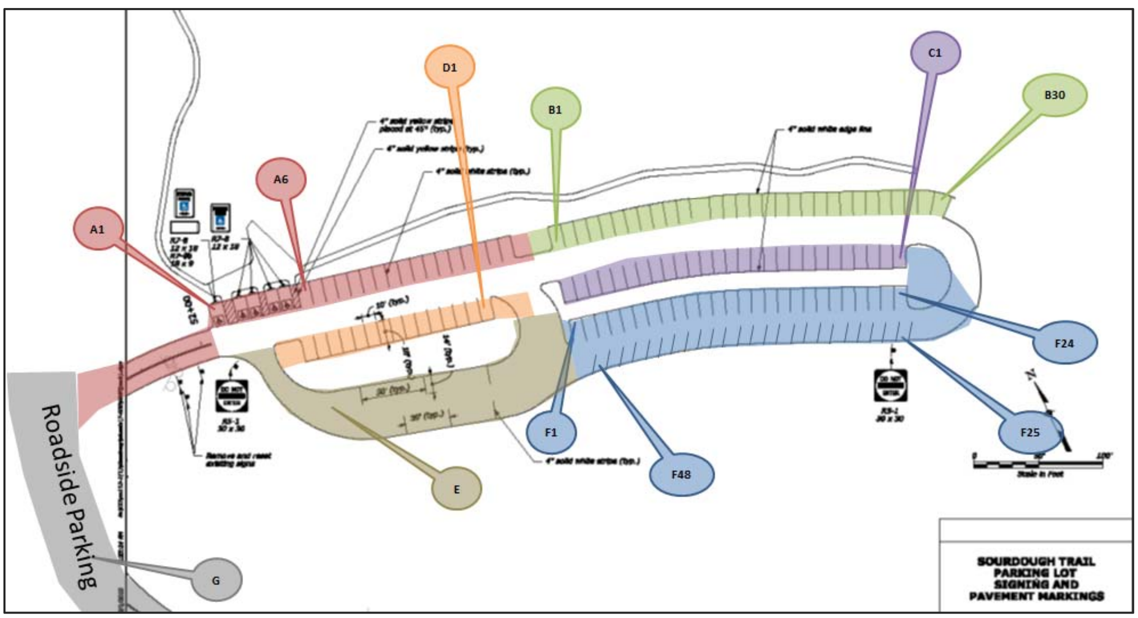


Figure 1-54. Gateway Trailhead Parking Lot parking accumulation and turnover data collection map.

Figure 1-55 displays design day hourly parking accumulation in the Gateway Trailhead Parking Lot. As depicted in Figure 1-55, parking demand was well below capacity for the entire day in the Gateway Trailhead Parking Lot, and at its peak during the 12:00 PM hour, parking demand was just 21% of the lot's parking capacity. The results in Figure 1-55 suggest there is more than adequate parking capacity at the Gateway Trailhead Parking Lot to accommodate overflow parking on "typically busy" summer days in BLRA.

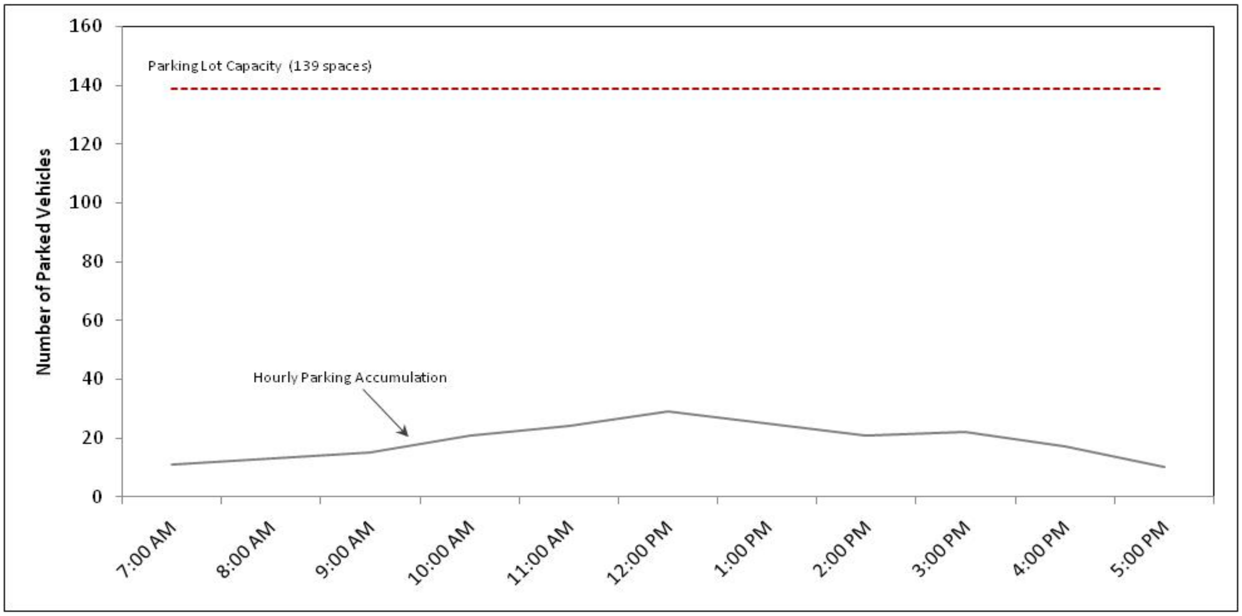


Figure 1-55. Design day parking accumulation in the Gateway Trailhead Parking Lot, Sunday, August 11th, 2013.

Figure 1-56 is a graphical display of parking accumulation in the Gateway Trailhead Parking Lot at distinct time periods throughout the morning and afternoon of the design day. The Gateway Trailhead Parking Lot remains relatively empty on a typically busy day during the summer visitor use season. During the peak hour, even the parking spaces closest to the bathrooms and kiosk are not completely full.

7:00 AM: 11 vehicles, 8% full

9:00 AM: 15 vehicles, 11% full

Location of parked vehicles

12:00 PM: 29 vehicles, 21% full

2:00 PM: 21 vehicles, 15% full

5:00 PM: 10 vehicles, 7% full

Figure 1-56. Design day parking accumulation in the Gateway Trailhead Parking Lot, Sunday, August 11th, 2013.

Analysis and Results
Figure 1-57 displays the parking accumulation in BLRA, by location and overall, for the design day. The IPW trailhead parking lots filled to their capacities early in the morning, and remained full or nearly full until early afternoon. The Brainard Lake Day Use Parking Lot was nearly empty during the early morning hours, but filled steadily starting around 8:00 AM, once the Long Lake and Mitchell Lake Trailhead Parking Lots reached their capacities, and reached its capacity by noon. Parking accumulation in the Gateway Trailhead Parking Lot remained relatively low throughout the entire day, reaching its peak during the 12:00 PM hour, at which time the parking lot was only about 20% full. These findings suggest that, in total, there is sufficient parking capacity at BLRA to meet demand, but that there is a substantial shortage of parking where visitors would like to park and an abundance of parking located where visitors do not choose to park voluntarily.

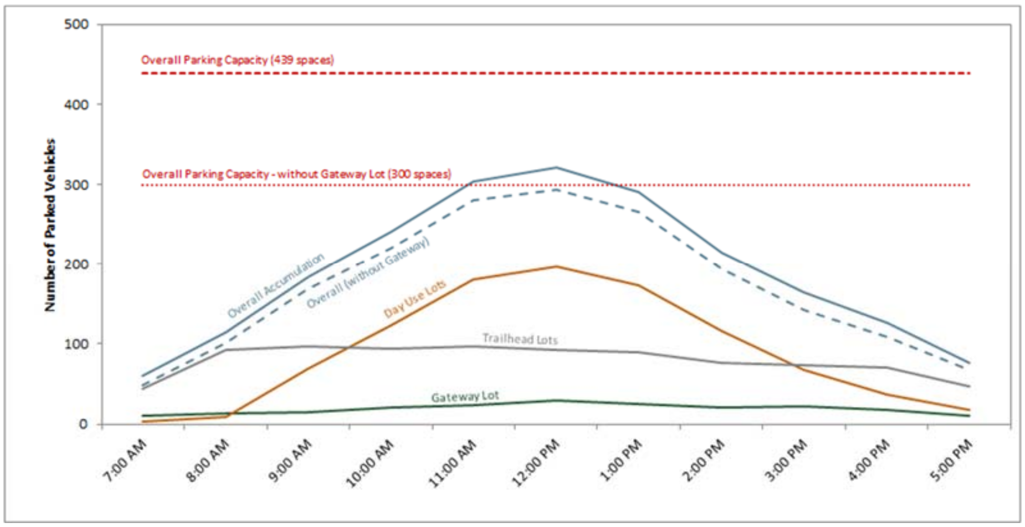


Figure 1-57. Design day parking accumulation in BLRA, by location and overall, Sunday, August 11th, 2013.

As noted, the license plate recording method was also used to record turnover rates for vehicles parked in the designated parking lots and roadside parking locations in BLRA. Data were recorded every hour, therefore, parking turnover rates (i.e., the duration of time vehicles are parked in the parking areas) are estimated in hourly bins.

There were no statistical differences in parking duration between the Long Lake and Mitchell Lake Trailhead Parking Lots; thus, the data from the two lots have been combined for the following analyses. On average, vehicles were parked in the trailhead parking lots for approximately four hours (Table 1-13 and Figure 1-58). There was not a significant difference in the average duration of time vehicles parked in the trailhead parking lots on weekends versus weekdays (t = 0.021, p = 0.984) However, there was a significant difference in parking duration, depending on the time of day visitors arrived (t = 17.674, p < 0.001). In particular, visitors who arrived at the trailhead parking lots before 10:00 AM (mean = 5.6 hours) parked their vehicles for longer, on average, than those who arrived after 10:00 AM (mean = 2.6 hours); the 10:00 AM cut point was used because it provided the greatest differentiation between visitor groups, based on parking duration and sample sizes.

Table 1-13. Visitor parking duration in the IPW trailhead parking lots, by day of week category, summer 2013.

Hours Parked	**Weekday (n=250)**	**Weekend (n=396)**	**Overall (n=646)**
1 - <2	12%	18%	15%
2 - <3	22%	20%	21%
3 - <4	17%	15%	16%
4 - <5	17%	16%	16%
5 - <6	12%	10%	11%
6 - <7	9%	6%	7%
7 - <8	5%	6%	6%
8 - <9	0%	2%	2%
9 - <10	0%	2%	1%
10 - <11	0%	0%	0%
11+	5%	5%	5%
Average	3.8	3.8	3.8
t-test *p*-value	t = 0.021 p = 0.984		

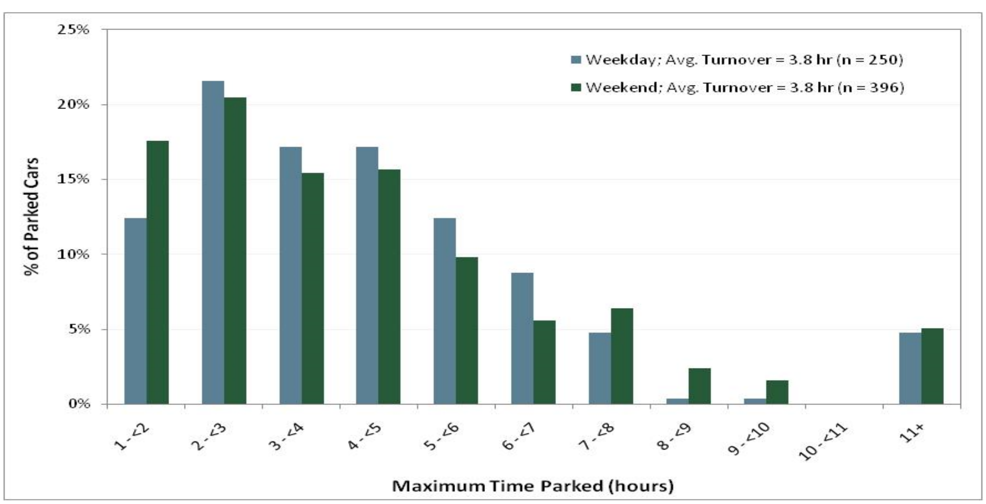


Figure 1-58. Visitor parking duration in the IPW trailhead parking lots, by day of week category, summer 2013.

On average, vehicles were parked in the Niwot Mountain Parking Lot for approximately three hours (Table 1-14 and Figure 1-59). There was not a significant difference in the average duration of time vehicles parked in the Niwot Mountain Parking Lot on weekends versus weekdays ($t = 0.800$, $p = 0.425$). However, there was a significant difference in parking duration, depending on the time of day visitors arrived ($t = 9.874$, $p < 0.001$). In particular, visitors who arrived at the Niwot Mountain Parking Lot before 10:00 AM (mean = 4.6 hours) parked their vehicles for longer, on average, than those who arrived after 10:00 AM (mean = 2.4 hours).

Table 1-14. Visitor parking duration in the Niwot Mountain Parking Lot, by day of week category, summer 2013.

Hours Parked	Weekday (n=113)	Weekend (n=180)	Overall (n=293)
1 - <2	28%	23%	25%
2 - <3	17%	19%	18%
3 - <4	17%	13%	14%
4 - <5	12%	16%	15%
5 - <6	13%	14%	14%
6 - <7	8%	7%	8%
7 - <8	3%	6%	4%
8 - <9	0%	1%	0%
9 - <10	0%	1%	1%
10 - <11	0%	0%	0%
11+	2%	0%	1%
Average	3.1	3.3	3.3
t-test	$t = 0.800$		
p-value	$p = 0.425$		

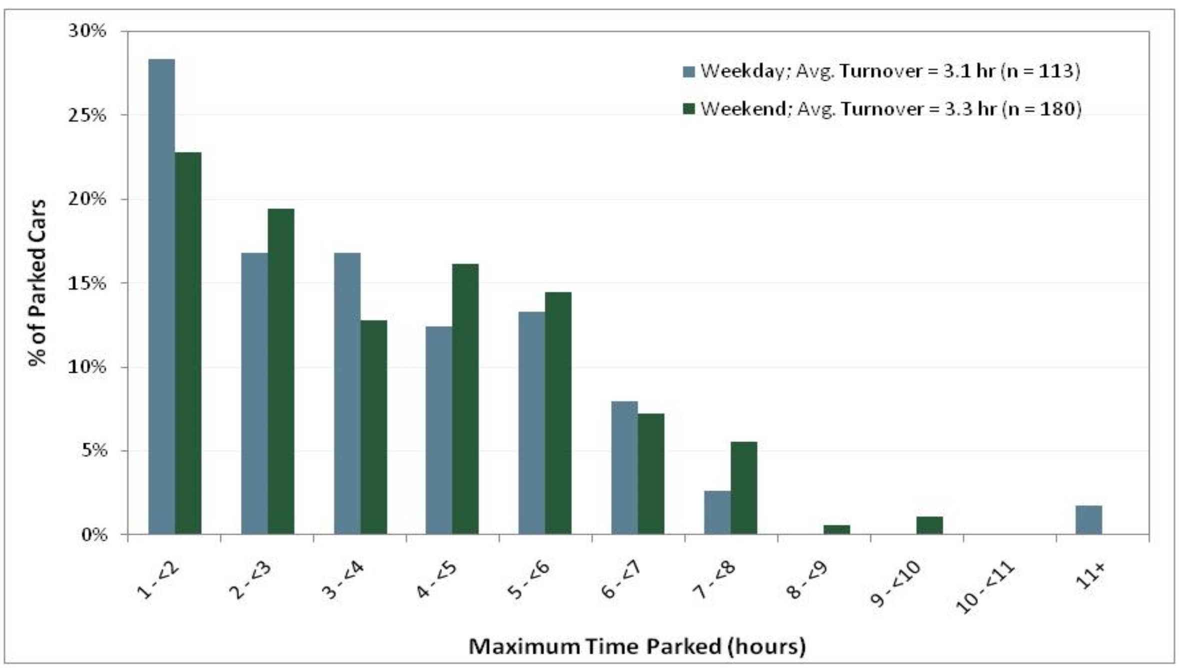


Figure 1-59. Visitor parking duration in the Niwot Mountain Parking Lot, by day of week category, summer 2013.

There were no statistical differences in parking duration between the Main Lot and Overflow Parking and Large Vehicle Lot of the Brainard Lake Day Use Parking Lot; thus, the data from the two lots have been combined for the following analyses. On average, vehicles were parked in the Brainard Lake Day Use Parking Lot for approximately three and a half hours (Table 1-15 and Figure 1-60). There was a significant difference ($t = 6.071$, $p < 0.001$) in the average duration of time vehicles parked in the Brainard Day Use Parking Lot on weekends (mean = 3.6 hours) versus weekdays (mean = 2.7 hours). There was also a significant difference in parking duration, depending on the time of day visitors arrived ($t = 13.094$, $p < 0.001$). In particular, visitors who arrived at the Brainard Lake Day Use Parking Lot before 10:00 AM (mean = 4.9 hours) parked their vehicles for longer, on average, than those who arrived after 10:00 AM (mean = 3.0 hours).

Table 1-15. Visitor parking duration in the Brainard Lake Day Use Parking Lot, by day of week category, summer 2013.

Hours Parked	Weekday (n=205)	Weekend (n=872)	Overall (n=1,077)
1 - <2	34%	16%	19%
2 - <3	19%	15%	15%
3 - <4	17%	19%	18%
4 - <5	13%	21%	19%
5 - <6	12%	17%	16%
6 - <7	4%	8%	7%
7 - <8	0%	3%	3%
8 - <9	0%	2%	1%
9 - <10	0%	0%	0%
10 - <11	0%	0%	0%
11+	1%	0%	1%
Average	2.7	3.6	3.4
t-test	$t = 6.071$		
p-value	$p < 0.001$		

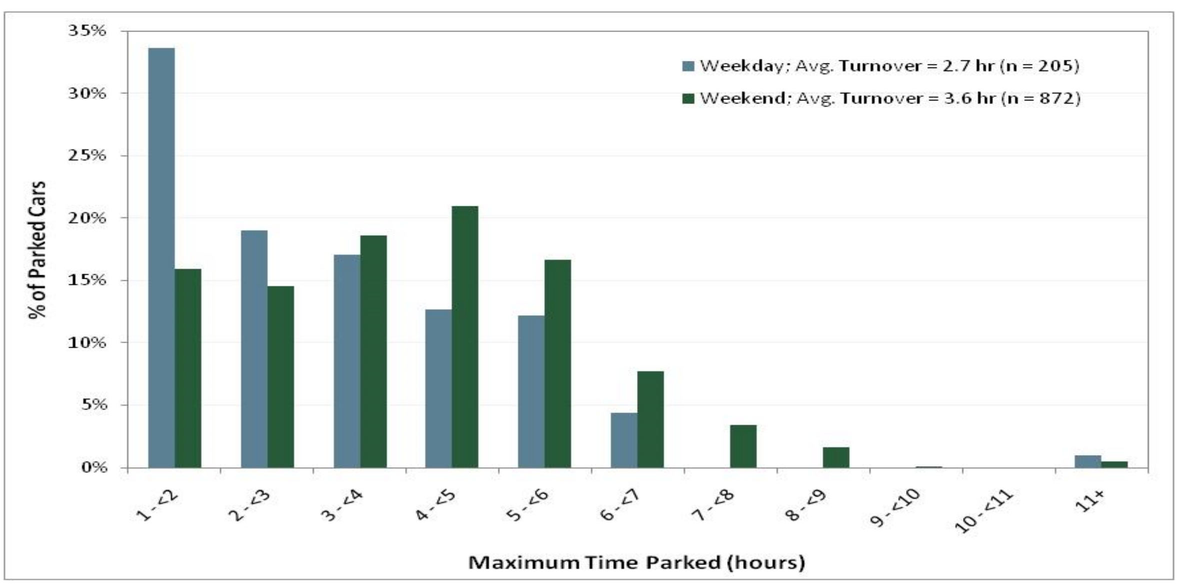


Figure 1-60. Visitor parking duration in the Brainard Lake Day Use Parking Lot, by day of week category, summer 2013.

On average, vehicles were parked in the Gateway Trailhead Parking Lot for approximately three hours (Table 1-16 and Figure 1-61). There was not a statistically significant difference in the average duration of time vehicles parked in the Gateway Trailhead Parking Lot on weekends versus weekdays (t = 1.322, p = 0.187); results of this comparison should be interpreted with caution, however, due to the small number of weekday parking duration observations. There was a significant difference in parking duration, depending on the time of day visitors arrived (t = 5.548, p < 0.001). In particular, visitors who arrived at the Gateway Trailhead Parking Lot before 10:00 AM (mean = 4.8 hours) parked their vehicles for longer, on average, than those who arrived after 10:00 AM (mean = 2.4 hours).

Table 1-16. Visitor parking duration in the Gateway Trailhead Parking Lot, by day of week category, summer 2013.

Hours Parked	Weekday (n=11)[1]	Weekend (n=331)	Overall (n=342)
1 - <2	55%	27%	28%
2 - <3	9%	26%	25%
3 - <4	18%	22%	22%
4 - <5	18%	13%	13%
5 - <6	0%	8%	7%
6 - <7	0%	1%	1%
7 - <8	0%	2%	1%
8 - <9	0%	1%	1%
9 - <10	0%	0%	0%
10 - <11	0%	0%	0%
11+	0%	2%	2%
Average	2.0	2.8	2.8
t-test	t = 1.322		
p-value	p = 0.187		

[1] Small sample size, thus, summary statistics and statistical tests may not be applicable for weekday data

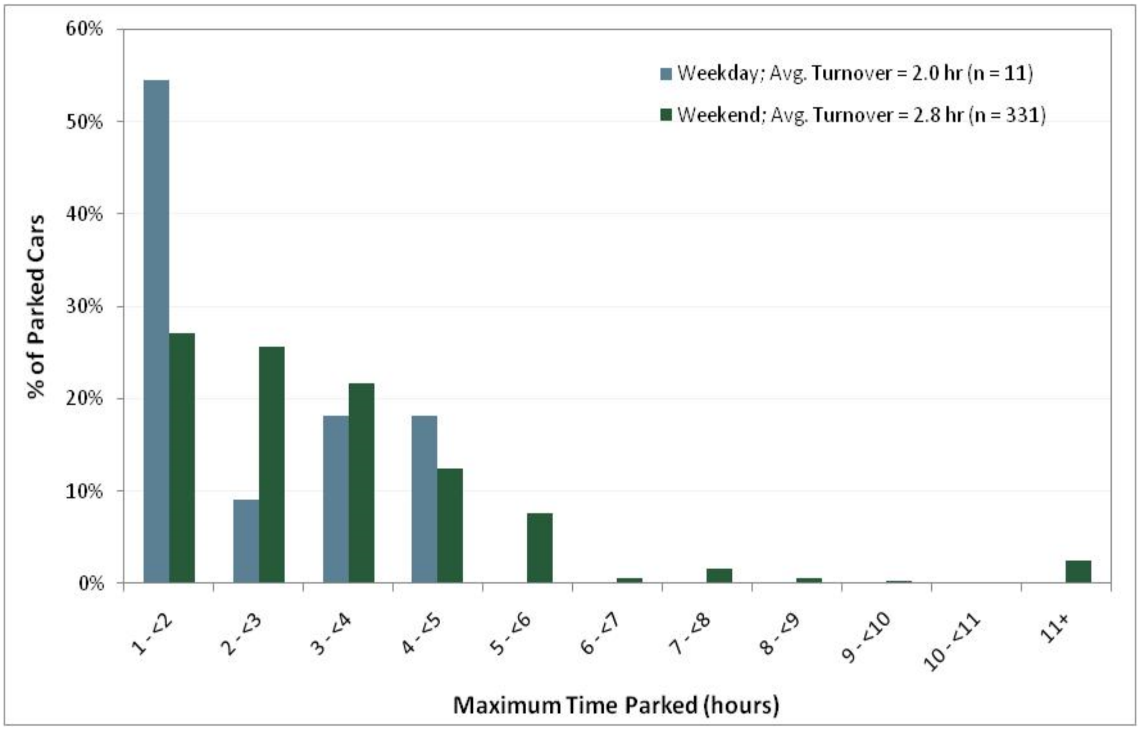


Figure 1-61. Visitor parking duration in the Gateway Trailhead Parking Lot, by day of week category, summer 2013.

Finally, 90% of all license plates recorded as part of the parking data collection effort were Colorado license plates; this finding suggests the vast majority of visitors to BLRA during the summer visitor use season are residents of the state of Colorado, though some Colorado license plates that were observed may have been on rental cars driven by out-of-state visitors.

Visitor Use Counts

Data Collection Method

- Visitor use counts were recorded with infrared trail counters (Figure 1-62) located on the Long Lake, Niwot Cutoff, Mitchell Lake, Beaver Creek, and Lake Isabelle Trails. The purpose of the visitor use counts was to provide precise measures of visitor use in BLRA, by time of day and key trailhead locations.
- The infrared trail counters recorded visitor use counts in hourly bins, 24 hours per day during the summer peak season. The visitor use counts were recorded from early August through Labor Day Weekend, 2013 on all trails noted, except the Lake Isabelle Trail, where visitor use counts were recorded from mid-August through Labor Day Weekend.
- The locations of the infrared trail counters used to record visitor use data during the study period are depicted in Figure 1-63. The visitor use counting locations were selected in consultation with USFS staff and capture the primary visitor use access points into the IPW.

- Field staff conducted visitor use counts via direct observation at each of the infrared trail counter locations. Direct observation hours ranged from 9.25 hours on the Beaver Creek Trail to 31.75 hours on the Mitchell Lake Trail. The direct observation counts were used to correct and adjust (i.e., calibrate) the raw infrared trail counter data, as described below.

Figure 1-62. Infrared trail counter setup, BLRA, summer 2013.

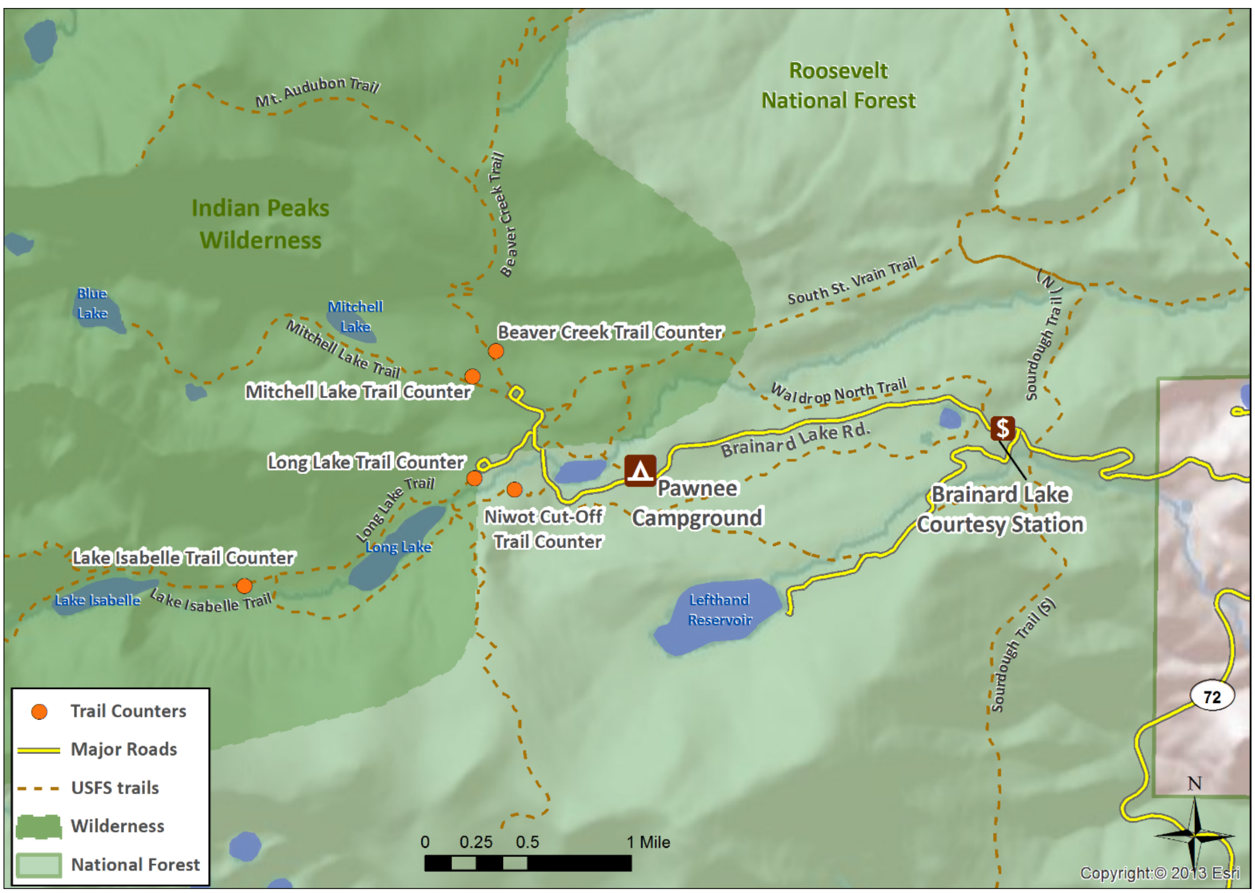


Figure 1-63. Approximate locations of infrared trail counters used to record visitor use counts, BLRA, summer 2013.

Analysis and Results

Regression analyses were conducted with the direct observation counts of visitor use and corresponding infrared trail counter data to estimate correction factors for the infrared trail counter data. Regression results suggest there are very strong statistical relationships (R^2 values of 0.99 for all trail counters) between the direct observation counts and visitor use counts recorded by the infrared trail counters. Further, the parameter estimates for the regression models were statistically significant in all cases. These results provide a high degree of confidence that applying the correction factors to calibrate the visitor use counts recorded with the infrared trail counters (i.e., multiplying the infrared trail counter data by the corresponding parameter estimates from the regression models) results in very accurate estimates of visitor use on the trails in BLRA. The calibrated trail counter data were used for analysis and results reported in this memo.

The Long Lake and Mitchell Lake Trails were the most popular of the study trails during summer 2013, with an average of 228 and 195 visitor arrivals per day, respectively, on weekdays and over 400 visitor arrivals per day on weekend days (Figure 1-64). The Lake Isabelle Trail received the next highest level of use, with an average of 110 visitor arrivals per day on weekdays and 217 daily visitor arrivals on weekend days. Visitor use on the Niwot Cutoff and Beaver Creek Trails was substantially lower than on the other study trails noted, with an average of 57 and 38 visitor arrivals per day, respectively, on weekdays and 156 and 103 visitors per day, respectively, on weekend days. Generally, trails in the study area received approximately 2 to 3 times more visitor use on weekend days than on weekdays.

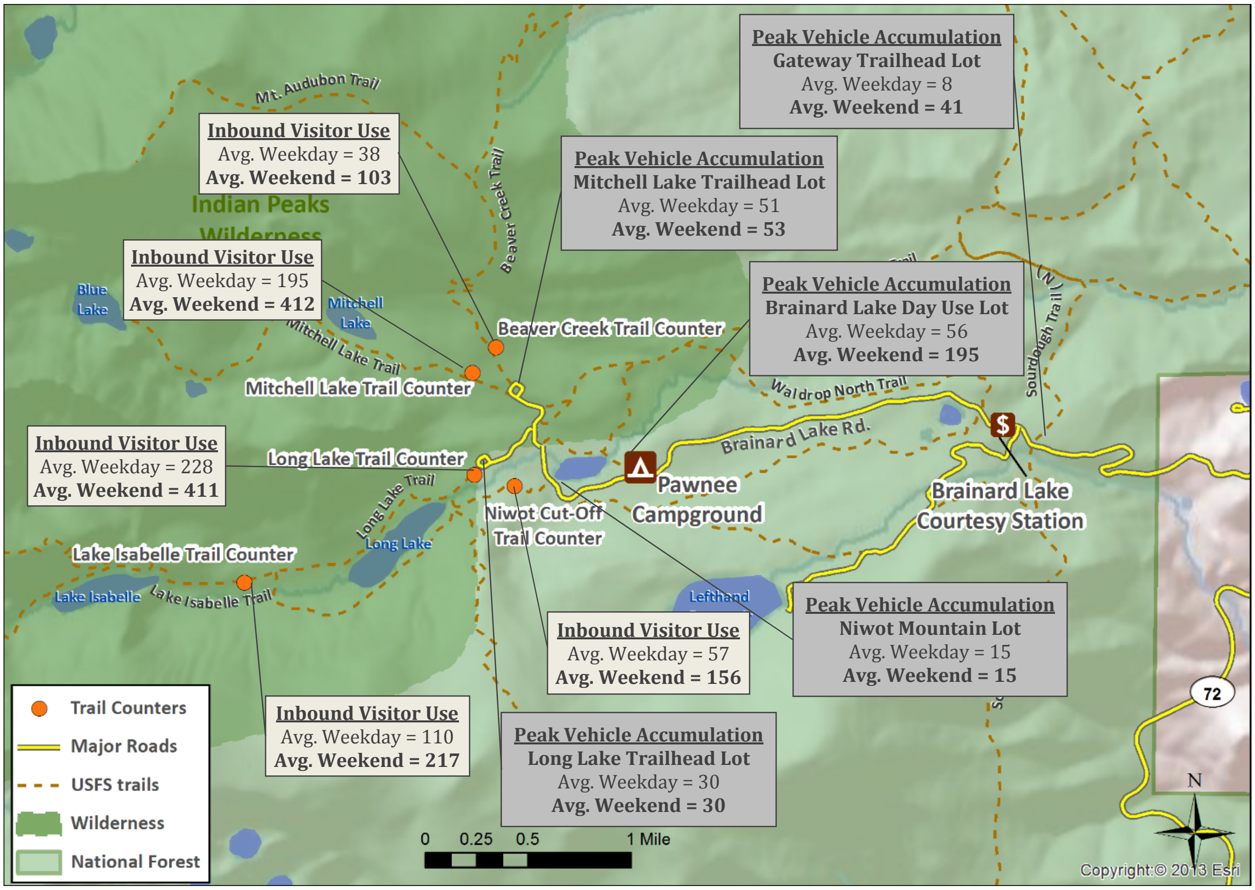


Figure 1-64. Average weekday and weekend day inbound visitor use, by trailhead, and average peak vehicle accumulation, by location in BLRA, summer 2013.

Figure 1-65 reports calibrated visitor use counts for the design day (Sunday, August 11th, 2013), by trailhead location. Visitor use on the design day was distributed across the trailhead locations consistently with the seasonal averages reported in Figure 1-64; however, as expected, the design day volumes of visitor use were higher than seasonal averages on all of the trails. As noted, the design day for the study was Sunday, August 11th, 2013, at which time a trail counter was not yet installed on the Lake Isabelle Trail. Therefore, the design day visitor use level of the Lake Isabelle Trail was estimated based on the statistical relationship[14] between visitor use on the Long Lake Trail and Lake Isabelle Trail.

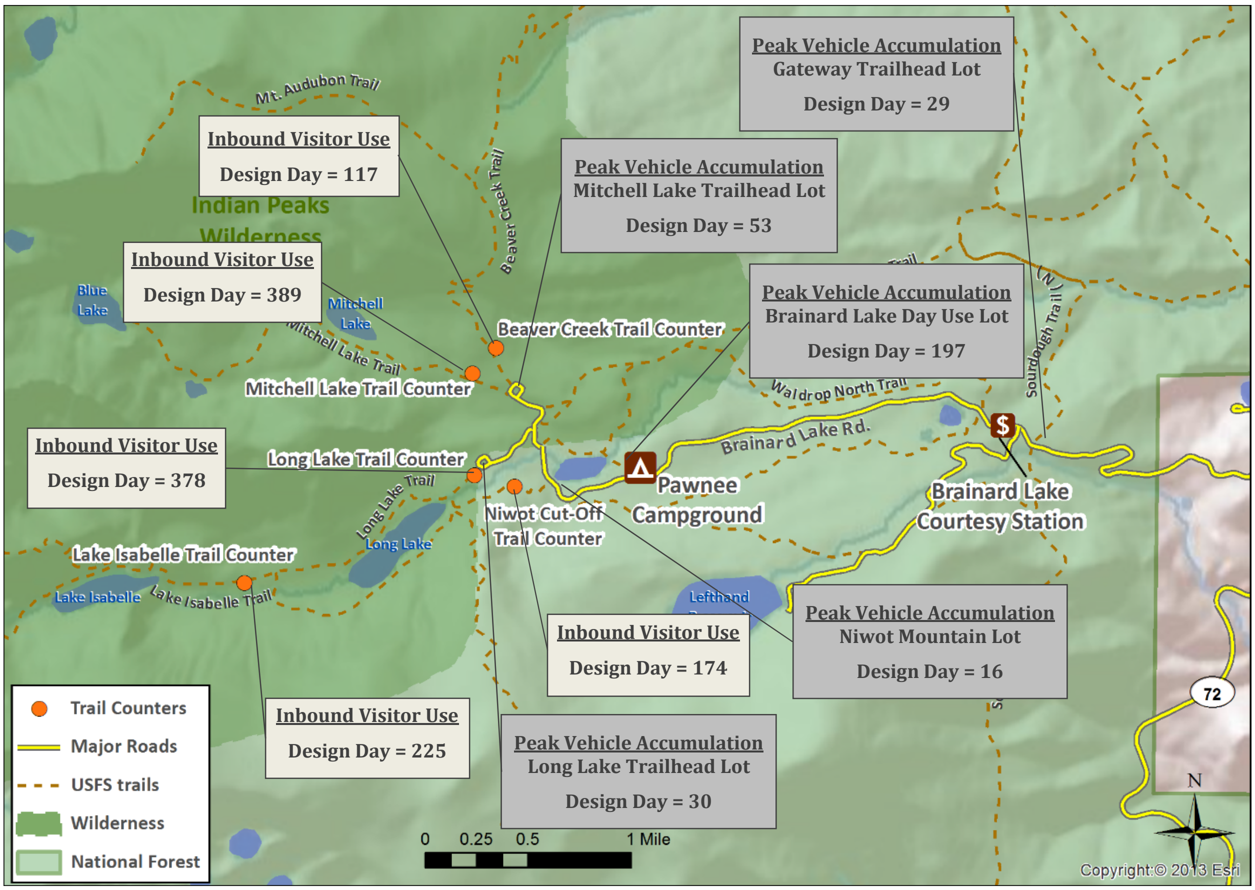


Figure 1-65. Design day inbound visitor use, by trailhead, and peak vehicle accumulation by location in BLRA, Sunday, August 11th, 2013.

Figure 1-66 graphs the design day hourly visitor use (inbound direction), by trail, for those trails where visitor use counts were recorded during summer 2013. The temporal pattern of visitor use throughout the day is generally consistent across trails, with relatively intense surges of inbound visitor use from early in the morning through late morning. Inbound visitor use is particularly intensive during the 8:00 AM to 9:00 AM time period on the Long Lake Trail, and from 7:00 AM to 11:00 AM on the Mitchell Lake Trail. Interestingly, there is a very early morning surge of inbound

[14] Lake Isabelle Hourly Inbound Visitor Use = 0.559 * *Long Lake Hourly Inbound Visitor Use*; Adjusted R^2 = 0.70.

visitors on the Long Lake Trail during the 6:00 AM hour. The data in Figure 1-66 suggest there is an AM peak and a PM peak of inbound visitor use on the Beaver Creek Trail, though in both cases, the peak is much less pronounced than on the Long Lake and Mitchell Lake Trails. As expected, the peak period of visitor use on the Lake Isabelle Trail appears to be highly correlated with and about an hour later than that on the Long Lake and Niwot Cutoff Trails.

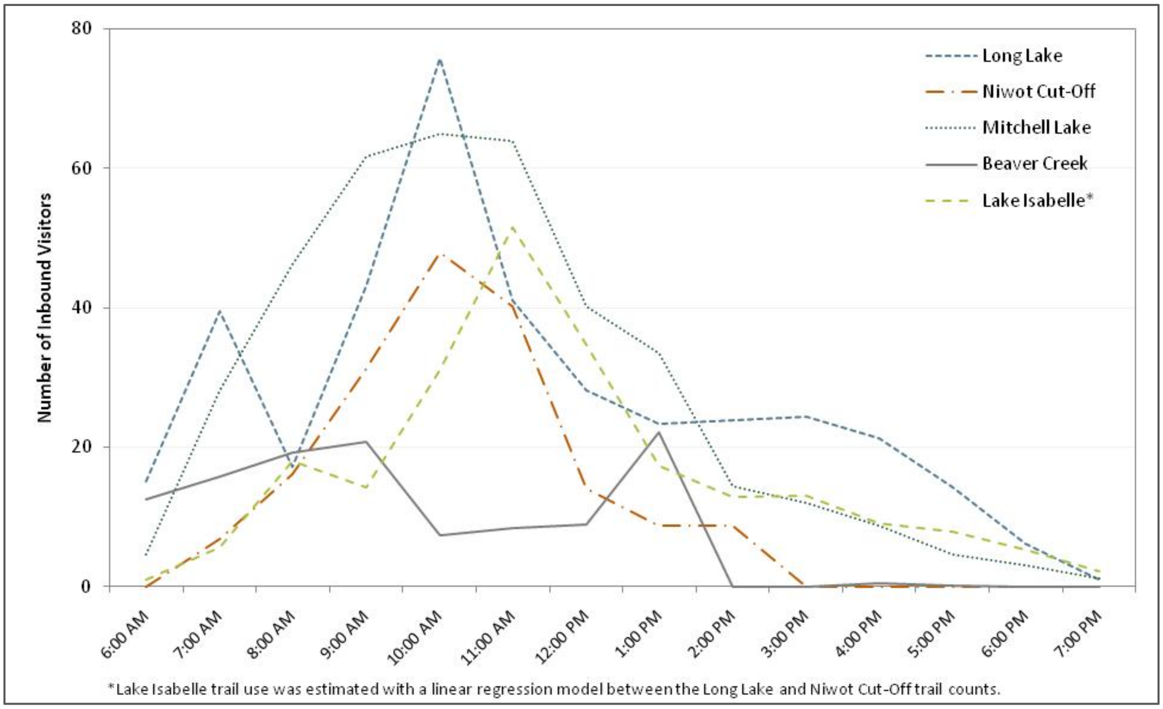


Figure 1-66. Design day hourly inbound visitor use, by trailhead (Sunday, August 11th, 2013).

Visitor Use Tracking

Data Collection Method

- Visitor use patterns in BLRA and the IPW were measured using GPS-based tracking (Figure 1-67). GPS units were administered to three subsets of visitor groups, including: 1) day use and overnight backpacking visitor groups who drove through the Courtesy Station and parked in BLRA; 2) day use and overnight backpacking visitor groups who parked in the Gateway Trailhead Parking Lot; and 3) visitor groups who camped overnight in the Pawnee Campground. Visitors were asked to carry the GPS unit while recreating in the area; day use visitor groups and those camping in the Pawnee Campground were asked to return the GPS units at the end of the day on which they were administered the unit, while backpacking visitor groups were asked to return the GPS units at the end of their visit to BLRA. Visitors were instructed to use a locked drop box to return their GPS units, if they returned to the distribution points after data collection staff had left the study area for the day. The purpose of the GPS-based tracking was to collect precise measures of the spatial patterns of visitor use in BLRA; the manner in which these data can help information transportation planning and visitor use management at BLRA are described in a subsequent section.

- GPS units were administered on 9 weekend days, 8 weekdays, and 1 holiday from August 1, 2013 – September 2, 2013 (Table 1-17). On each data collection day, GPS units were administered to visitors from 7:00 AM to approximately 2:00 PM, and collected from visitors from 7:00 AM to approximately 5:00 PM.
- Overall, 841 visitor groups were contacted and 782 GPS units were administered to visitor groups during the 2013 summer visitor use season at BLRA, resulting in a 93% response rate for the GPS-tracking study (Table 1-17).
- Algorithms were developed to process the GPS tracks and eliminate cases with 5-minutes or more of missing data (primary causes of missing data included poor satellite reception and/or equipment malfunction). For cases with less than 5-minutes of missing data, interpolation was used to estimate location coordinates to populate the data gaps. The reduced, "clean" set of GPS track data were used to analyze and model visitor use patterns in BLRA during summer 2013.

Figure 1-67. Administration of GPS units for visitor use tracking, BLRA, summer 2013.

Table 1-17. GPS sampling schedule and response rate, by administration site, BLRA, summer 2013.

		Gateway Trailhead Lot			Courtesy Station				Pawnee Campground		
Date	Weekend	Count	Refusals	Resp. Rate	Day Users	Backpackers	Refusals	Resp. Rate	Count	Refusals	Resp. Rate
8/1/2013	No	.	.	.	26	0	0	100%	.	.	.
8/2/2013	No	.	.	.	67	0	2	97%	.	.	.
8/3/2013	Yes	19	4	83%	33	5	0	87%	10	2	83%
8/9/2013	No	13	0	100%	21	1	2	88%	12	1	92%
8/10/2013	Yes	14	2	88%	22	2	1	88%	9	2	82%
8/11/2013	Yes	13	0	100%	24	0	2	92%	9	0	100%
8/12/2013	No	9	0	100%	22	1	0	96%	10	1	91%
8/16/2013	No	9	3	75%	30	2	4	83%	13	0	100%
8/17/2013	Yes	18	1	95%	22	1	3	85%	11	1	92%
8/18/2013	Yes	12	1	92%	30	0	0	100%	7	2	78%
8/21/2013	No	8	0	100%	27	1	2	90%	10	0	100%
8/24/2013	Yes	.	.	.	.	.	.	.	7	0	100%
8/25/2013	Yes	14	1	93%	24	1	0	96%	10	2	83%
8/27/2013	No	4	1	80%	26	1	3	87%	8	1	89%
8/30/2013	No	8	0	100%	22	2	2	85%	5	5	50%
8/31/2013	Yes	12	1	92%	20	5	3	71%	8	3	73%
9/1/2013	Yes	8	0	100%	10	2	0	83%	5	0	100%
9/2/2013	No*	10	0	100%	21	0	1	95%	6	0	100%
Overall		**171**	**14**	**92%**	**447**	**24**	**25**	**95%**	**140**	**20**	**88%**

*Labor Day holiday

Analysis and Results

Nearly three-quarters (73%) of all summer 2013 BLRA visitor groups were groups of 2-4 people (Table 1-18); however, weekday visitors (19%) were more likely than weekend visitors (14%) to visit BLRA alone. Eleven percent of all visitor groups were in groups of at least 5 people. On average, Pawnee Campground visitors had the largest group size (3.6 people), while Gateway Trailhead Parking Lot visitors had the smallest group size (2.2 people). Approximately one-quarter (24%) of Pawnee Campground groups were at least 5 people.

Table 1-18. Visitor group size, BLRA, summer 2013.

Number of People per Group	Weekday (n=385)	Weekend (n=456)	Overall (n=841)	Day User (n=461)	Gateway (n=190)	Backpacker (n=30)	Campground (n=160)
1 person	19%	14%	16%	15%	26%	10%	9%
2 people	49%	45%	47%	49%	49%	67%	35%
3-4 people	23%	29%	26%	27%	21%	17%	32%
5 or more people	8%	13%	11%	9%	4%	7%	24%
Chi-square	$\chi2$ = 15.278, p = 0.170		n/a	$\chi2$ = 99.156, p < 0.001			
Mean[1]	**2.5**	**2.9**	**2.7**	**2.6**^{a}	**2.2**^{b}	**2.4**^{ab}	**3.6**^{c}
T-test/ANOVA	t = 3.361, p < 0.001		n/a	F = 22.067, p < 0.001			

[1] Different superscripts represent significant differences between mean scores from Tamhane's T2 post hoc tests

The vast majority (90%) of visitor groups, regardless of day of week, traveled to BLRA during summer 2013 in a single vehicle, while only 9% traveled to BLRA in two or more vehicles (Table 1-19). However, one-third (33%) of Pawnee Campground groups traveled to BLRA in two or more vehicles.

Table 1-19. Number of vehicles per group, BLRA, summer 2013.

Number of Vehicles per Group	**Weekday** (n=384)	**Weekend** (n=455)	**Overall** (n=839)	**Day User** (n=460)	**Gateway** (n=190)	**Backpacker** (n=30)	**Campground** (n=159)
1 vehicle	96%	86%	90%	97%	93%	90%	68%
2 vehicles	4%	11%	8%	3%	6%	10%	26%
3 vehicles	0%	2%	1%	0%	1%	0%	6%
4 or more vehicles	0%	0%	0%	0%	1%	0%	1%
Chi-square	$\chi 2$ = 24.930, p < 0.001		n/a	$\chi 2$ = 125.891, p < 0.001			
Mean[1]	**1.0**	**1.2**	**1.1**	**1.0**[a]	**1.1**[a]	**1.1**[a]	**1.4**[b]
T-test/ANOVA	t = 5.186, p < 0.001		n/a	F = 38.769, p < 0.001			

[1] Different superscripts represent significant differences between mean scores from Tamhane's T2 post hoc tests

Two-thirds (67%) of visitor groups had a vehicle occupancy rate of 1 to 2 people per vehicle (Table 1-20). There was no difference in vehicle occupancy rate between weekday (mean = 2.4 people per vehicle) and weekend (mean = 2.5 people per vehicle) visitor groups. However, Pawnee Campground groups averaged 2.7 people per vehicle, while Gateway Trailhead Parking Lot groups and backpackers averaged 2.0 and 2.1 people per vehicle, respectively.

Table 1-20. Vehicle occupancy rates, BLRA, summer 2013.

Number of People per Vehicle	**Weekday** (n=377)	**Weekend** (n=436)	**Overall** (n=813)	**Day User** (n=456)	**Gateway** (n=189)	**Backpacker** (n=29)	**Campground** (n=139)
1 person	20%	17%	18%	16%	29%	10%	13%
2 people	50%	48%	49%	48%	49%	72%	45%
3-4 people	24%	30%	27%	29%	22%	14%	33%
5 or more people	6%	6%	6%	7%	1%	3%	9%
Chi-square	$\chi 2$ = 21.719, p = 0.245		n/a	$\chi 2$ = 143.928, p < 0.001			
Mean[1]	**2.4**	**2.5**	**2.4**	**2.5**[a]	**2.0**[b]	**2.1**[ab]	**2.7**[ac]
T-test/ANOVA	t = 0.881, p = 0.378		n/a	F = 10.149, p < 0.001			

[1] Different superscripts represent significant differences between mean scores from Tamhane's T2 post hoc tests

The vast majority (84%) of visitor groups, regardless of day of week or group type, spent two or more hours recreating in BLRA during summer 2013 (

Table 1-21). There was no difference in travel times between weekday (mean = 4.0 hours) and weekend (mean = 3.9 hours) visitor groups. On average, Pawnee Campground groups spent the longest time recreating in BLRA in summer 2013 (mean = 5.8 hours), while day use groups who drove through the Courtesy Station (mean = 3.9 hours) and Gateway Trailhead Parking Lot groups (mean = 3.0 hours) had shorter travel times in BLRA. In the case of some backpackers, the GPS units ran out of battery power before the end of their trips; thus, backpackers were excluded from the analysis of length of stay/trip duration.

Table 1-21. Length of stay, BLRA, summer 2013.

Travel Time	**Weekday** (n=321)	**Weekend** (n=365)	**Overall** (n=686)	**Day User** (n=427)	**Gateway** (n=168)	**Backpacker** (n=n/a)	**Campground** (n=91)
<1 hour	8%	5%	6%	5%	11%	.	3%
1 hour - <2 hours	12%	10%	11%	10%	14%	.	9%
2 hours - <3 hours	17%	21%	19%	17%	30%	.	7%
3 hours - <4 hours	17%	20%	19%	20%	21%	.	9%
4 hours - <5 hours	14%	21%	18%	20%	14%	.	12%
5 hours - <6 hours	12%	10%	11%	12%	5%	.	16%
6 or more hours	20%	13%	17%	15%	5%	.	44%
Chi-square	$\chi2 = 16.242$, $p < 0.050$		n/a	$\chi2 = 105.876$, $p < 0.001$			
Mean[1]	**4.0**	**3.9**	**4.0**	**3.9^{a}**	**3.0^{b}**	**n/a**	**5.8^{c}**
T-test/ANOVA	$t = 0.885$, $p = 0.377$		n/a	$F = 59.106$, $p < 0.001$			

[1] Different superscripts represent significant differences between mean scores from Tamhane's T2 post hoc tests.

"Heat maps" are included to provide precise information about the spatial characteristics of winter visitor use at BLRA (i.e., where visitor use is most concentrated, and where there is less intensive or no visitor use). The heat map in Figure 1-68 depicts the relative intensity of visitor use throughout the trail and road network in BLRA during summer 2013. Generally, information contained in visitor use heat maps can inform transportation planning by identifying locations within a recreation area with high visitor demand that might benefit form improved transportation services and facilities. Moreover, heat maps like this help identify locations to which visitor use could potentially be dispersed (using ITS, trail improvements, etc.) to alleviate congestion in areas that experience excessive traffic, parking congestion, crowding, and/or resource impacts.

The heat map is derived from the GPS track data, with "cooler colors" (i.e., green shades) representing sections of the trail and road network with relatively low concentrations of visitor use, and "hotter colors" (i.e., yellow and red shades) representing sections of the trail and road network with relatively high concentrations of visitor use. For example, the "hotter color tones" around Brainard Lake suggest this is one of the more heavily traveled segments of the overall trail and road network in BLRA.

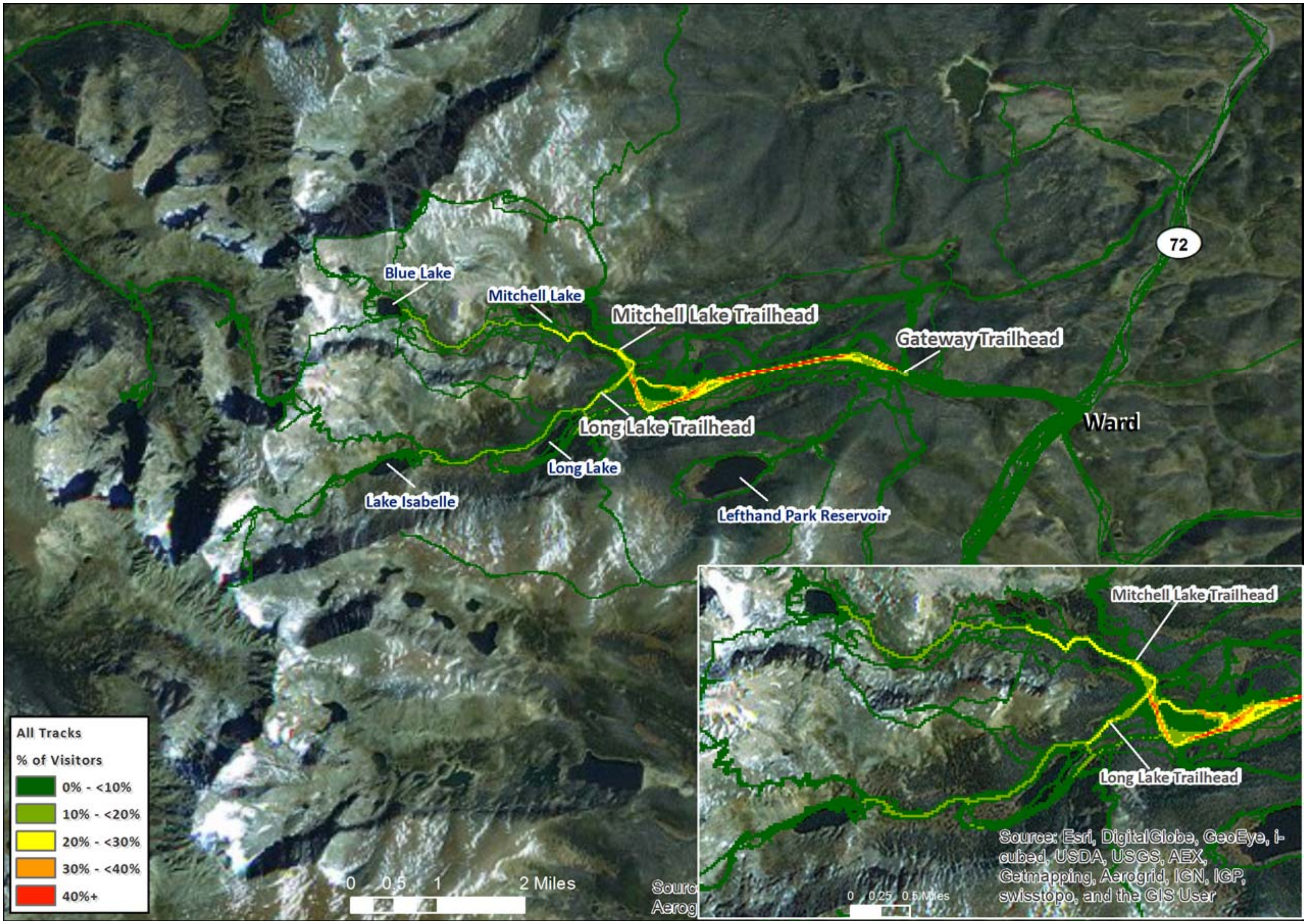


Figure 1-68. Heat map of GPS-based visitor use tracks for all visitor groups intercepted at BLRA, summer 2013.

User group-specific heat maps derived from the GPS tracks of hiking routes are presented (Figure 1-69 through Figure 1-72), and suggest visitor use patterns within BLRA differ across the subgroups of visitors that were included in the GPS-tracking study. In particular, day use visitor groups intercepted at the Gateway Trailhead Parking Lot were generally concentrated more on the trails originating near the Gateway Trailhead and in the eastern section of BLRA, with fewer trips to Brainard Lake and the IPW trailheads than the other user groups (Figure 1-70). Visitor groups camping in the Pawnee Campground tended to concentrate their use around Brainard Lake (Figure 1-71), while GPS tracks of day use visitor groups intercepted at the Courtesy Station indicated more intensive use of the IPW hiking trails, particularly to Mitchell Lake and Long Lake (Figure 1-69). The heat map in Figure 1-72 suggests that backpacking visitor groups intercepted at the Courtesy Station were most heavily concentrated in the IPW, and particularly on the trails originating from the Long Lake Trailhead (Figure 1-72).

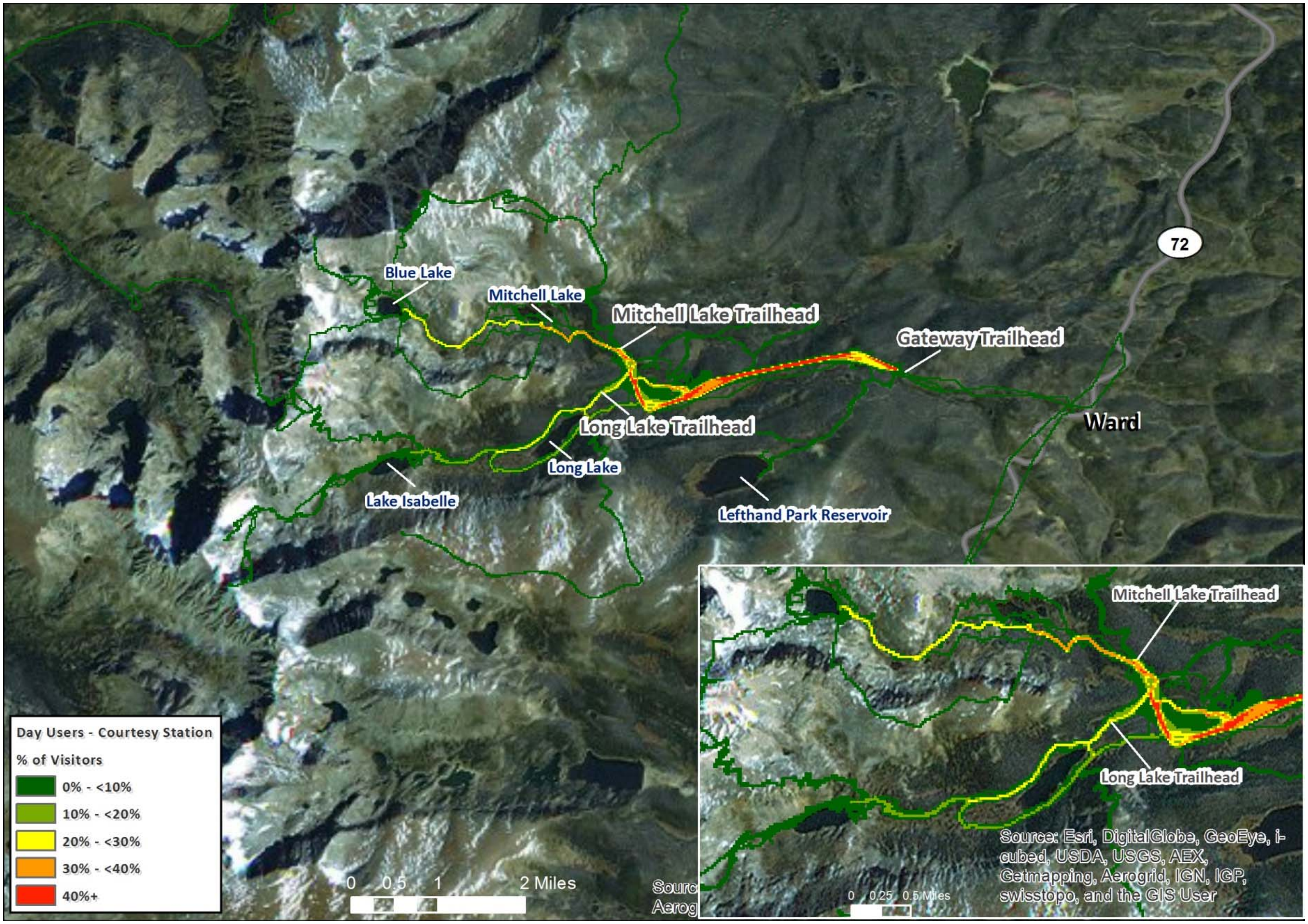


Figure 1-69. Heat map of GPS-based visitor use tracks for day use visitor groups intercepted at the Courtesy Station, summer 2013.

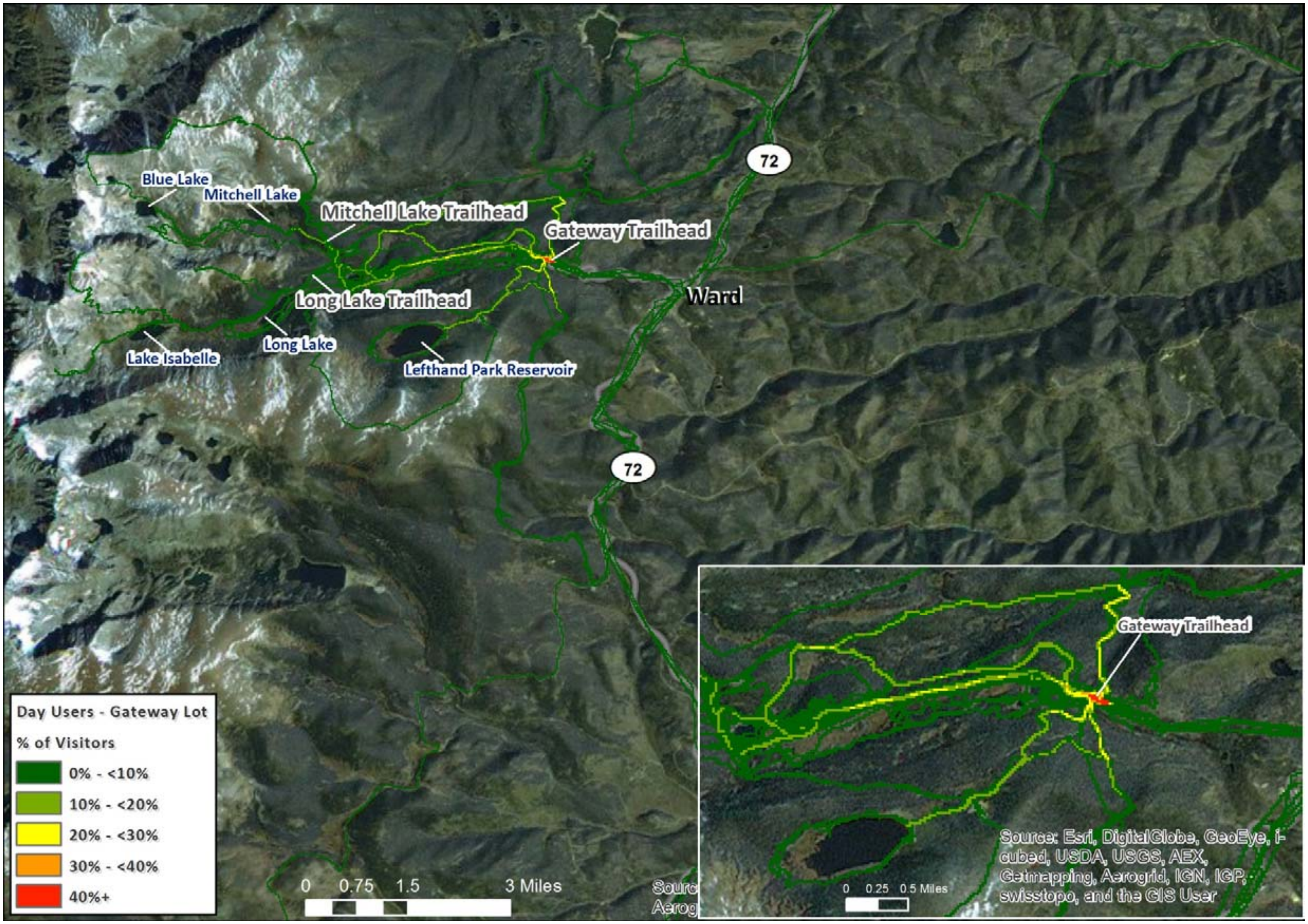


Figure 1-70. Heat map of GPS-based visitor use tracks for day use visitor groups intercepted at the Gateway Trailhead Parking Lot, summer 2013.

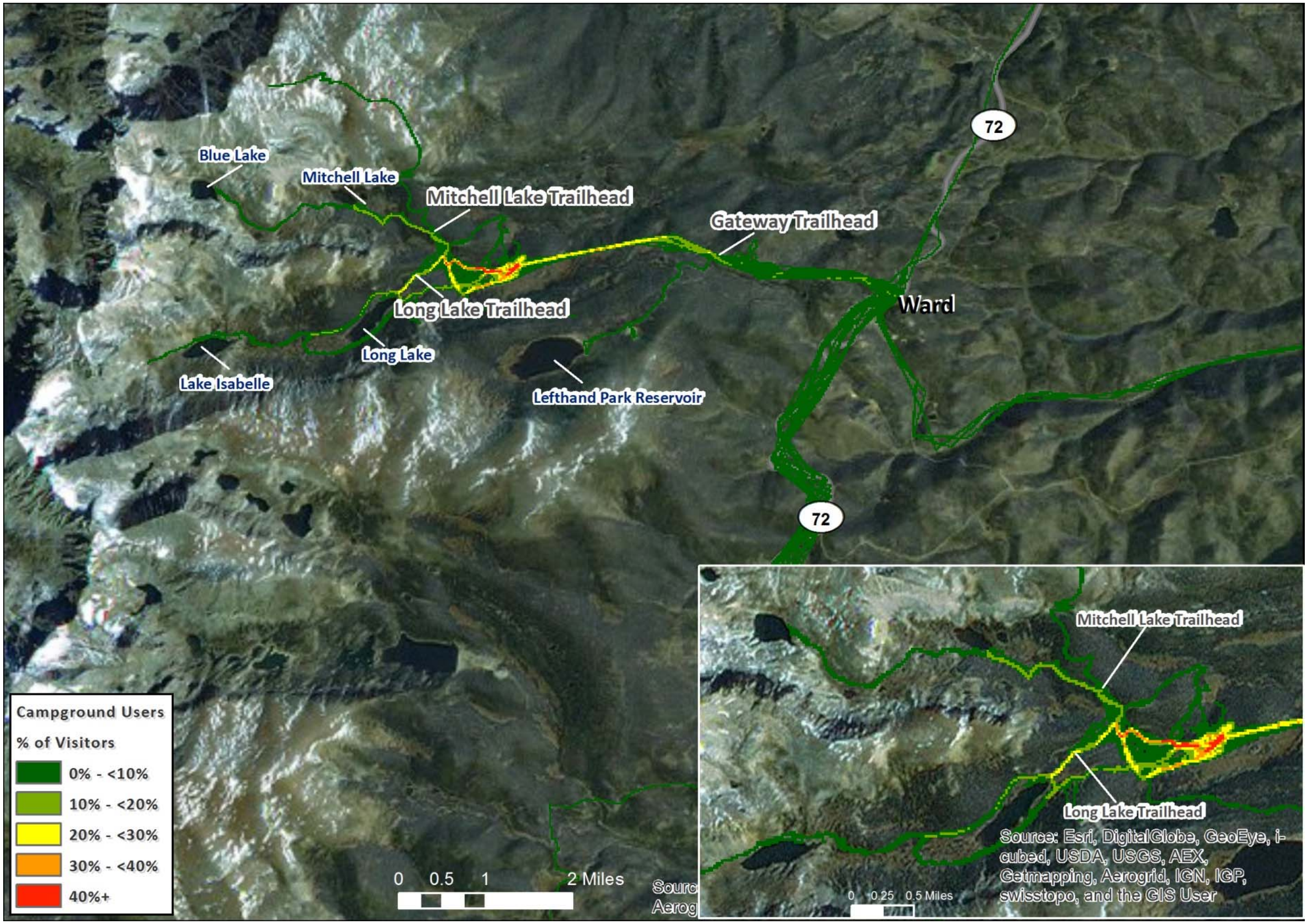


Figure 1-71. Heat map of GPS-based visitor use tracks for visitor groups intercepted in the Pawnee Campground, summer 2013.

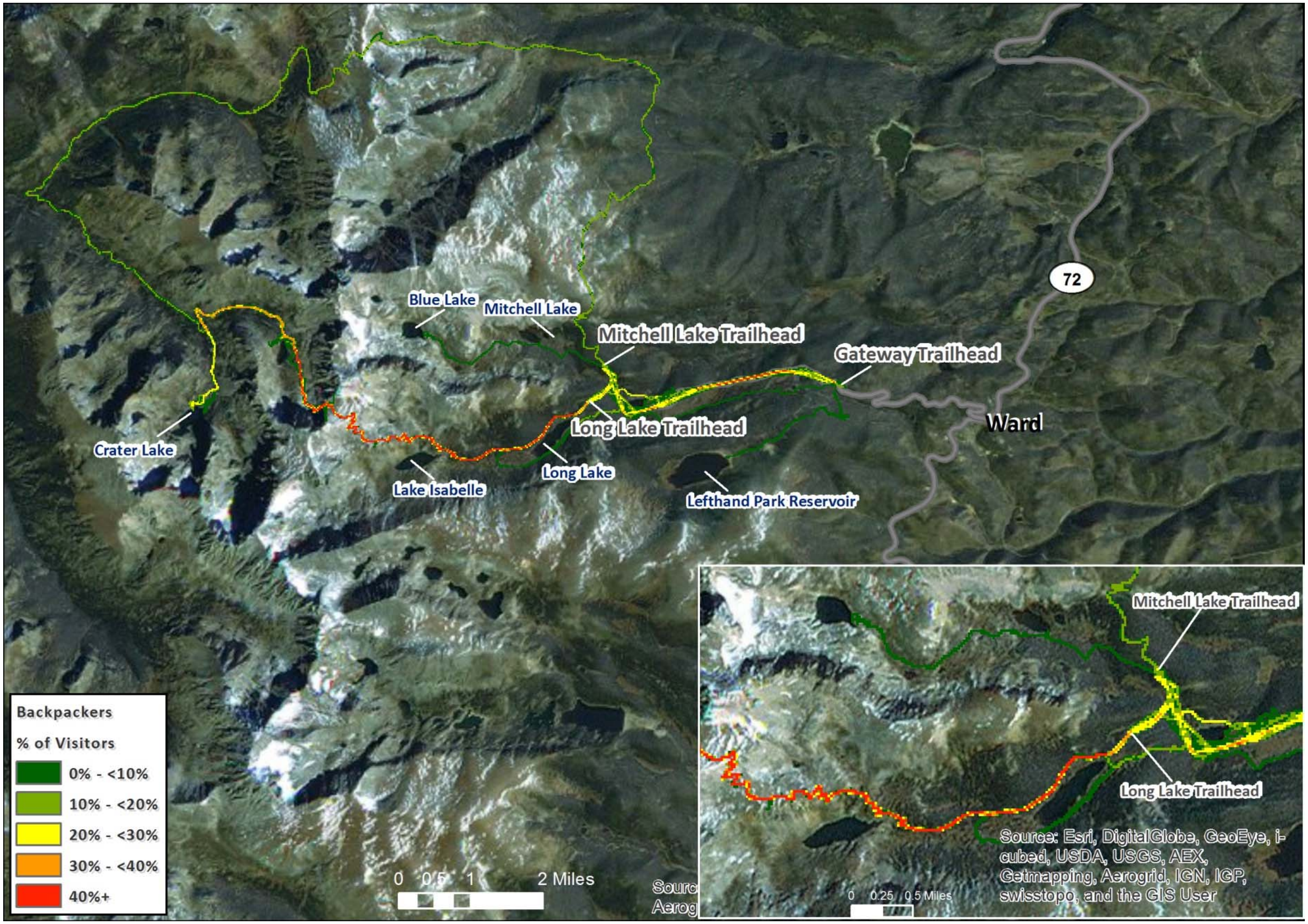


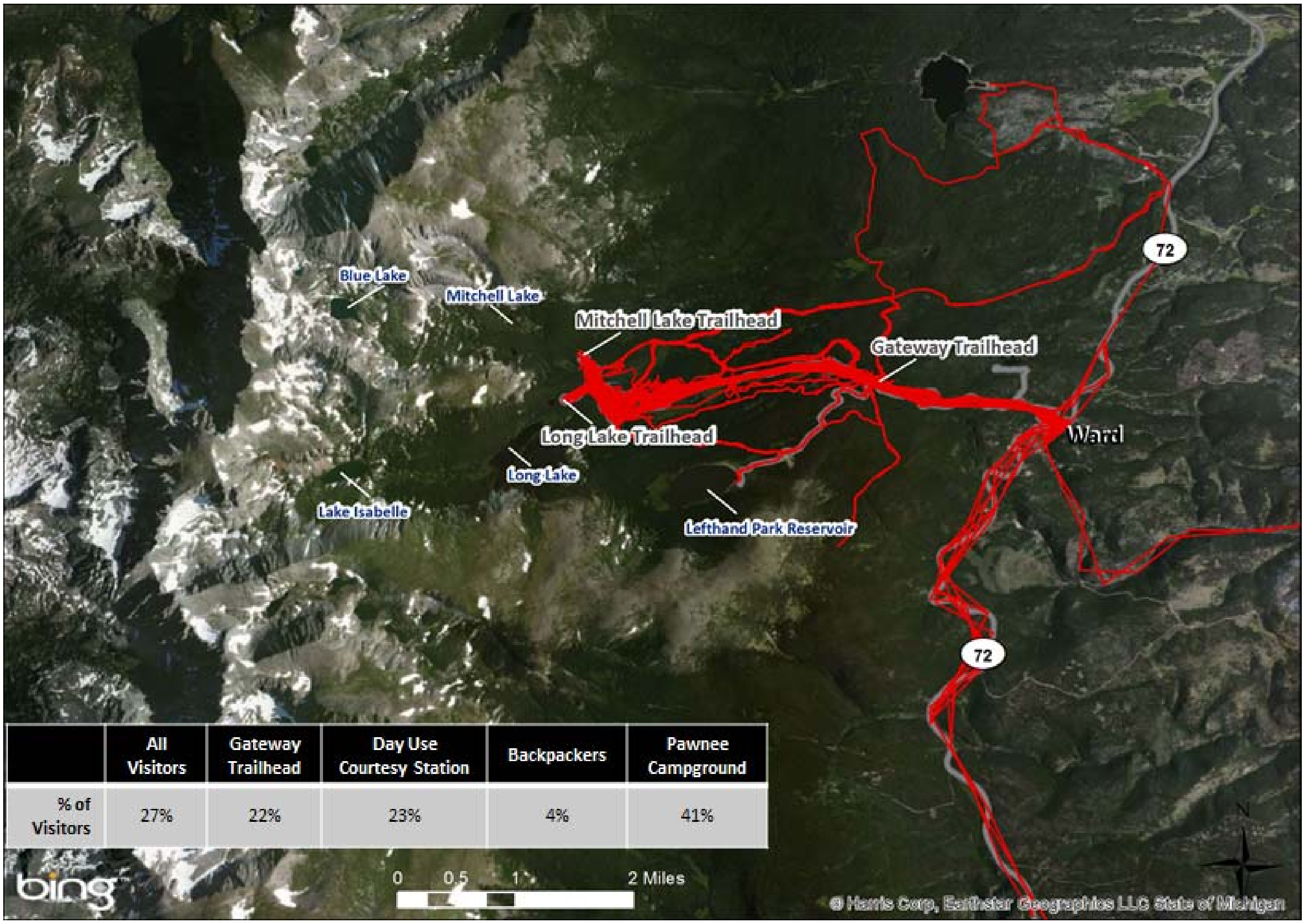
Figure 1-72. Heat map of GPS-based visitor use tracks for backpacking visitor groups intercepted at the Courtesy Station, summer 2013.

The heat maps in Figure 1-68 through Figure 1-72 provide composite views of summer visitor use patterns in BLRA. Additional analysis of the GPS tracks was conducted to summarize and map the relative popularity of particular routes or subsets of routes in BLRA. Each GPS track was visually inspected and categorized into one of several unique routes or "route groupings" distinguished based on the trail(s) and destinations encompassed by the GPS track. In particular, visitor groups were classified into one of three route groupings:

- Visitors whose routes included visiting Brainard Lake, but not hiking in the IPW (Figure 1-73)
- Visitors whose routes included hiking in the IPW (Figure 1-74)
- Visitors whose route did not include visiting Brainard Lake or hiking in the IPW (Figure 1-75).

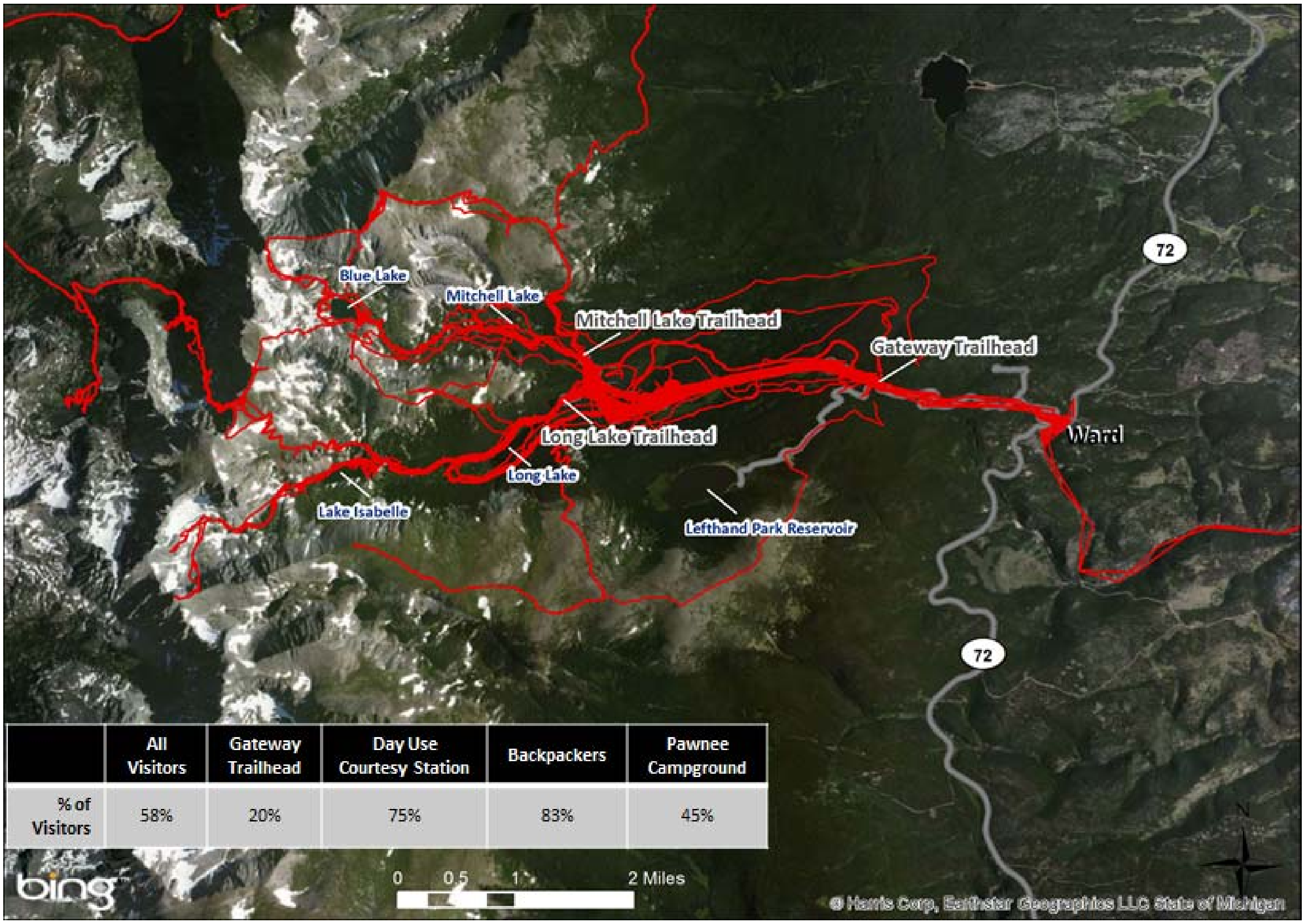
The GPS-tracking results presented in Figure 1-73 through Figure 1-75 provide several important insights about summer visitor use patterns in BLRA. In particular, the results suggest that more than half (58%) of all BLRA visitor groups, regardless of whether they park at the IPW trailheads, Brainard Lake Day Use Parking Lot, Gateway Trailhead Parking Lot, or Pawnee Campground, are destined for hikes in the IPW (Figure 1-74). Moreover, three-quarters of all day use visitors who drive through the Courtesy Station hike in the IPW, regardless of whether they park at the IPW trailheads or in the Brainard Lake Day Use Parking Lot. These findings suggest that parking management strategies alone may not be sufficient to manage visitor use, crowding, and recreation-related resource impacts in the IPW; analysis of crowding-related capacities of the Wilderness trails would help assess whether or not parking management alone is sufficient. Interestingly, most (83%), but not all backpacking visitor groups hike in the IPW (Figure 1-74); other backpacking groups hike routes north and south of the Gateway Trailhead Parking Lot and connecting to Highway 72 (Figure 1-75).

The GPS-tracking results further suggest that relatively few (27%) BLRA visitor groups visit Brainard Lake without also hiking in the IPW, though this is somewhat more common (41%) for visitor groups camping in the Pawnee Campground. Finally, the GPS-tracking results suggest that more than half of all visitor groups who park in the Gateway Trailhead Parking Lot do not visit Brainard Lake or hike in the IPW, but instead use trails in BLRA east of Brainard Lake. That being said, one-fifth of visitor groups who park in the Gateway Trailhead Parking Lot hike in the IPW, even though it requires walking approximately three miles on Brainard Lake Road just to reach the IPW trailheads. Similarly, nearly one-fifth (17%) of visitor groups who park in the Gateway Trailhead Parking Lot visit Brainard Lake, even though it requires walking approximately two miles on Brainard Lake Road to reach the lake. These findings suggest a substantive proportion of visitor groups who park in the Gateway Trailhead Parking Lot would likely support improved access from the lot to Brainard Lake and the IPW trailheads.



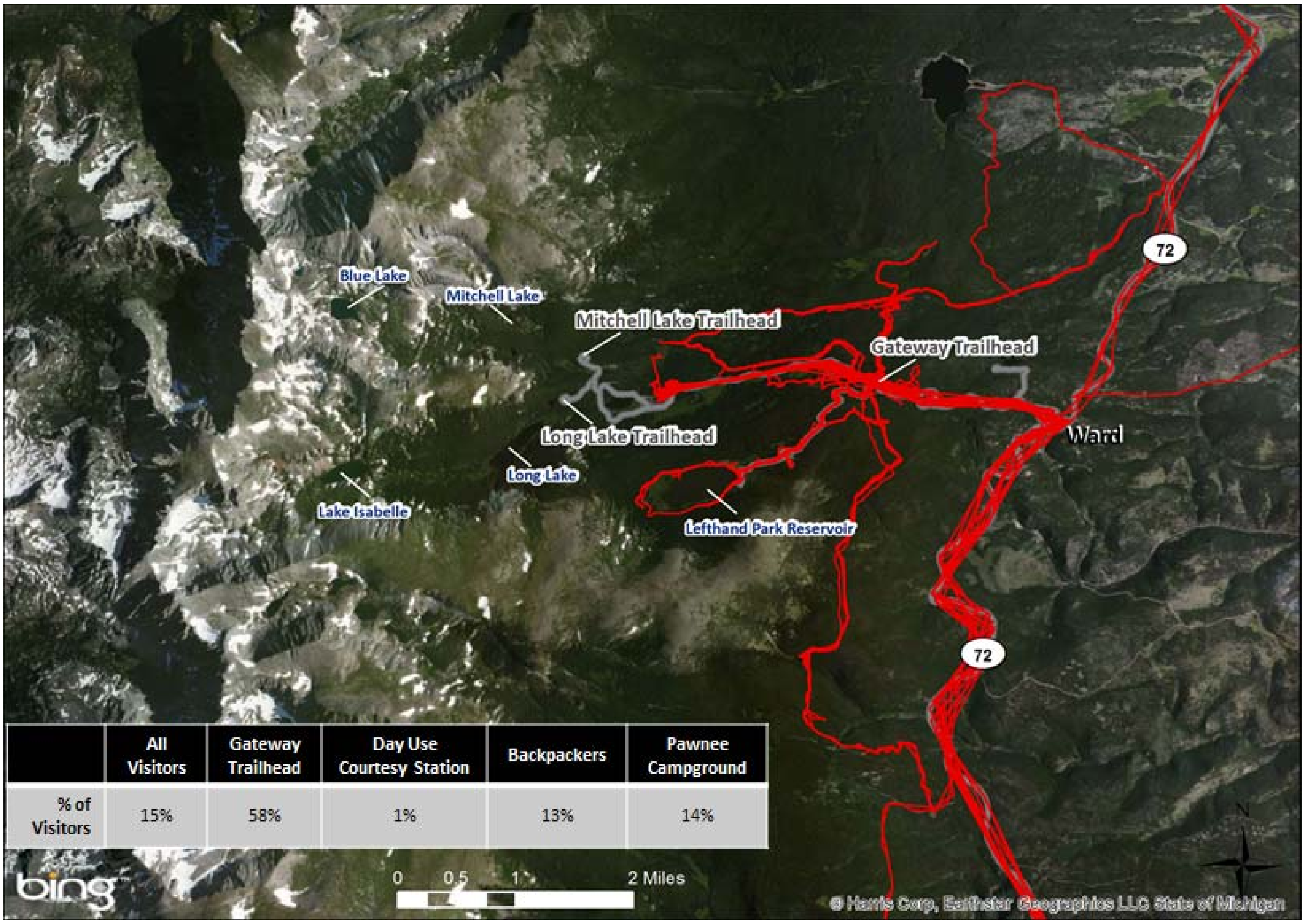
	All Visitors	Gateway Trailhead	Day Use Courtesy Station	Backpackers	Pawnee Campground
% of Visitors	27%	22%	23%	4%	41%

Figure 1-73. Route Grouping #1: Visitors whose routes included visiting Brainard Lake, but not hiking in the Indian Peaks Wilderness, summer 2013.



	All Visitors	Gateway Trailhead	Day Use Courtesy Station	Backpackers	Pawnee Campground
% of Visitors	58%	20%	75%	83%	45%

Figure 1-74. Route Grouping #2: Visitors whose routes included hiking in the Indian Peaks Wilderness, summer 2013.



	All Visitors	Gateway Trailhead	Day Use Courtesy Station	Backpackers	Pawnee Campground
% of Visitors	15%	58%	1%	13%	14%

Figure 1-75. Route Grouping #3: Visitors whose routes did not include visiting Brainard Lake or hiking in the Indian Peaks Wilderness, summer 2013.

Brainard Lake Recreation Area Visitor Survey, Summer 2014

During summer 2014, RSG conducted a series of three visitor surveys at Brainard Lake Recreation Area (BLRA), each survey targeting one of the following three visitor group types:

1. Visitors who parked in BLRA and visited the Indian Peaks Wilderness (IPW) on the day they were contacted for the survey. This survey is hereafter referred to as the IPW visitor survey.

2. Visitors who parked in BLRA and did not visit the IPW on the day they were contacted for the survey. This survey is hereafter referred to as the BLRA visitor survey.

3. Visitors who parked at the Gateway Trailhead Parking Lot, regardless of whether or not they did or did not visit the IPW that day. This survey is hereafter referred to as the Gateway visitor survey.

The purpose of the surveys was to collect information that will help the US Forest Service (USFS) improve transportation conditions, and recreation and resource management at BLRA and in the IPW. In particular, the survey instruments were designed to collect the following information from visitors to BLRA:

- Visitors’ perceptions, experiences, and expectations, with respect to transportation conditions and services, recreation opportunities, and visitor experience quality at BLRA and in the IPW.
- Visitors’ opinions about potential changes in operations to modify and improve transportation services and facilities.
- Visitors’ experiences with transportation-related issues at BLRA.

The surveys had a particular focus on traffic congestion and parking shortages at the study site during the summer peak visitation period, and potential alternative transportation systems (ATS) strategies to help mitigate and manage these issues. Potential ATS strategies of focus in the surveys include shuttle/transit service to and/or within BLRA; visitor information and Intelligent Transportation Systems (ITS) to manage demand during peak periods; and on-the-ground parking and traffic management to optimize the use of existing parking and roadway infrastructure. The survey of IPW visitors was also designed to measure visitors’ perceptions and tolerances for crowding while hiking in the IPW.

This section of *Chapter 1: Brainard Lake Recreation Area Summary of Data and Findings* reports a summary of each of the three BLRA visitor survey results and methods.

Methods

Survey Instruments

The summer 2014 visitor survey instruments (Appendix A, B, C) and methods were developed by RSG, in cooperation with the Federal Highway Administration Central Federal Lands Highway Division (CFL), USFS, and US Department of Transportation Volpe Center. Further, the survey instruments and methods were reviewed and approved by the USFS Office of Regulatory and Management Services and the Office of Management and Budget (OMB). This section describes the survey instruments and the methods used to administer the visitor surveys. Each of the three survey instruments administered at BLRA during summer 2014 is organized into four sections. The first section of the survey instruments, titled "Trip Description," includes questions concerning respondents' group sizes, the presence or absence of children under the age of 16 in respondents' groups, activities engaged in and locations visited during their visit. The IPW visitor survey also includes questions in this section that ask about visitors' perceptions of and tolerances for crowding while hiking in the IPW, and attitudes about potential management actions to prevent crowding, environmental impacts, and safety issues.

The second section of the survey instruments, titled "Travel and Parking," includes questions concerning visitors' routes of travel to and from BLRA, the number of vehicles in which visitor groups traveled there, visitors' time of arrival, the location(s) and perceptions about where visitors parked their vehicle(s), and visitors' attitudes about potential actions to manage parking congestion during peak visitation periods. The Gateway visitor survey also includes questions in this section that ask about the reasons visitors parked in the Gateway Trailhead Parking Lot and whether or not parking there interfered with what they were planning to do at BLRA that day.

The third section of the survey instruments, titled "Planning Your Trip to BLRA," includes questions about when visitors decided to take a trip to the recreation area, the potential effects of parking conditions at BLRA on their trip planning, and the likelihood they would use various sources for information about parking and crowding conditions at BLRA, if it was available for planning a future trip.

The fourth section of the survey instruments, titled "Background Information," includes questions concerning respondents' gender, age, state or country of residence, level of formal education, ethnicity, and race.

Survey Sampling and Administration

The population to which statistical generalization is intended for each of the summer 2014 visitor surveys is as follows:

IPW Visitor Survey: All visitor groups who parked at BLRA and visited the IPW during the 2014 peak visitation period at BLRA.

BLRA Visitor Survey: All visitor groups who parked at BLRA and did not visit the IPW during the 2014 peak visitation period at BLRA.

Gateway Visitor Survey: All visitor groups who parked at the Gateway Trailhead Parking Lot during the 2014 peak visitation period at BLRA, regardless of whether they visited the IPW or not.

It should be noted, for a subset of questions within each visitor survey instrument, the study population is visitors (rather than visitor groups); for example, questions asking about the race, ethnicity, age, and gender of respondents is intended to be generalizable to visitors, not visitor groups. In contrast, results for questions about parking locations, recreation activities, and similar group-oriented questions are intended to be generalizable to visitor groups. Survey results are presented in this technical memorandum according to the target population for each individual question.

The visitor survey sampling season was selected in consultation with CFL and USFS staff to coincide with the peak summer visitation period at BLRA and including weekend and weekday sampling (Table 1-22 and Table 1-23). On each sampling day, the visitor surveys were administered from 10:00 AM to 6:00 PM to coincide with the peak hours of visitor use at BLRA.

Table 1-22. Summer 2014 IPW and BLRA visitor survey sampling effort.

Date	Day of Week	Solicitations	IPW Completes	BLRA Completes	Refusals	Unusable	Response Rate
8/14/2014	Thursday	65	23	16	26	1	60%
8/15/2014	Friday	68	27	11	30	1	56%
8/16/2014	Saturday	96	43	10	43	0	55%
8/17/2014	Sunday	109	41	16	52	0	52%
8/20/2014	Wednesday	96	35	20	41	1	57%
8/21/2014	Thursday	91	30	21	40	0	56%
8/22/2014	Friday	47	16	11	20	0	57%
8/23/2014	Saturday	103	32	11	60	0	42%
8/24/2014	Sunday	101	37	14	50	0	50%
Total	**-**	**776**	**284**	**130**	**362**	**3**	**53%**

Note: "Unusable" are cases where a visitor group agreed to participate but returned an incomplete questionnaire.

Table 1-23. Summer 2014 Gateway visitor survey sampling effort.

Date	Day of Week	Solicitations	Completes	Refusals	Unusable	Response Rate
8/14/2014	Thursday	6	6	0	0	100%
8/15/2014	Friday	4	4	0	0	100%
8/16/2014	Saturday	26	22	4	0	85%
8/17/2014	Sunday	34	26	8	0	76%
8/23/2014	Saturday	13	12	1	0	92%
8/24/2014	Sunday	21	14	7	0	67%
Total	**-**	**104**	**84**	**20**	**0**	**81%**

Note: "Unusable" are cases where a visitor group agreed to participate but returned an incomplete questionnaire.

Survey sample procedures differed across the three sites, with sampling for the IPW and BLRA visitor surveys following the same procedure while sampling for the Gateway survey followed a separate procedure. Each procedure is described in detail below.

IPW and BLRA Visitor Surveys: On each sampling day, two survey administrators were stationed at the Red Rock Lake short-term parking area to intercept visitors while they were driving on Brainard Lake Road (Figure 1-76). The survey administrators wore traffic safety vests and installed traffic cones and signs on the roadway to help manage the traffic intercept procedures.

At the start of each sampling day, one survey administrator used hand signals to intercept the first automobile to approach and direct the driver into the parking area. Once the vehicle was safely off the road, the survey administrator approached the automobile and requested the group's participation in the survey. At the same time, a second survey administrated used hand signals to intercept the next automobile to approach and direct the driver into the parking area. Once the vehicle was safely off the road, the second survey administrator approached the automobile and requested the group's participation in the survey.

If an intercepted group had not previously participated in the survey and agreed to participate, a randomly selected adult member (18 years of age or older whose birthday was the next in the group to occur) of the group was given a copy of the survey instrument and asked to complete it onsite. Visitor groups who were unwilling or unable to participate in the survey were thanked for their consideration.

After each visitor group contact, the survey administrator working with the group directed them to safely exit the parking area onto Brainard Lake Road. The survey administrator then returned to the parking area entrance and intercepted the next approaching automobile. The survey administrators repeated this intercept process throughout the day.

Figure 1-76. Survey administration at the Red Rock Lake parking area, summer 2014

Gateway Visitor Survey: At the start of each sampling day, a survey administrator was stationed at the Gateway Trailhead Parking Lot and intercepted the first visitor group they observed returning to the parking lot at the end of their visit.

The survey administrator asked each intercepted group if they had previously participated in the visitor survey; visitor groups who had not previously participated in the survey were asked to participate in the survey. A randomly selected adult member (18 years of age or older whose birthday was the next in the group to occur) of each visitor group who agreed to participate in the survey was given a copy of the survey instrument and asked to complete it onsite. Visitor groups who were unwilling or unable to participate in the survey were thanked for their consideration. After the survey administrator completed each visitor group contact, she intercepted the next arriving visitor group and repeated the participant screening and recruitment process throughout the sampling period.

Survey Nonresponse

To track visitor survey response rates, survey administrators recorded a survey log entry for each visitor group asked to participate in the summer 2014 visitor surveys (Figure 1-77). Information recorded on the survey log for each contacted group included: 1) current time; 2) visitor group size; 3) the number of vehicles in which the group traveled to BLRA; 4) whether or not the group hiked in the IPW; 5) whether the group accepted or refused to participate in the survey; 6) whether the survey respondent was the driver or a passenger in his/her group's car(s); 7) the survey ID number for those groups who participated; 8) current weather conditions; and 9) comments concerning the contact, as needed (e.g., if a group previously participated or declined to participate due to a language barrier).

ARNF Visitor Survey Log Page ____ of ____

Site: ______________________ **Location:** ____________________________ **Date:** ___________ **Initials:** _____________

Special Event: No / Yes: ___________________________ **Start:** ___________ **End:** ___________

Time	**Group Size**	**# of Veh. per Group**	**Summit / Wilderness**	**Participated?** (*Y* or *N*)	**Driver** (D or P)	**Survey ID #** *If Yes*	**Weather** (*S*, *P*, *O* or *R*)	**Comments** (DB, LB, PP)

Comment Codes: DB – drive-by; LB – unable to recruit due to language barrier; PP – previously participated
Weather: S = Sunny, P = Partly, O = Overcast, R = Raining (or other precipitation)

Figure 1-77. Summer 2014 BLRA visitor survey log form.

After removing surveys that were unusable (i.e., had incomplete data and were consequently removed from analysis), the overall response rate to the visitor survey was 53% for the IPW and BLRA visitor surveys, and 81% for the Gateway visitor survey. The survey log data were used to conduct statistical tests for differences between visitor groups who participated in the surveys and those that did not, based on group size, number of vehicles used to travel to BLRA, vehicle occupancy, and whether or not the group hiked in the IPW.

Results of independent samples t-tests of means and chi-square tests suggest groups who participated in the surveys do not differ significantly from those that did not participate, in terms of group size (t=0.282, p=0.778 for IPW and BLRA visitor surveys; t=0.344, p=0.732 for Gateway visitor survey); number of vehicles (t=-1.499, p=0.134 for IPW and BLRA visitor surveys; t=-1.754, p=0.083 for Gateway visitor survey); vehicle occupancy (t=1.671, p=0.096 for IPW and BLRA visitor surveys; t=1.663, p=0.099 for Gateway visitor survey); and whether or not they hiked in the IPW (χ^2=0.006, p=0.940 for IPW and BLRA visitor surveys; χ^2=0.023, p=0.880 for Gateway visitor survey).

In summary, nonresponse bias tests found no significant differences between respondents and nonrespondents for group size, number of vehicles, vehicle occupancy, and IPW hikes. Therefore, it is reasonable to conclude the survey data are representative of the target study populations.

Survey Data Analysis

Survey data analysis procedures used in this study are based on standard methods for survey research in parks and recreation settings (Vaske, 2008)[15]. Key estimates from the data are descriptive in nature, primarily measures of central tendency (mean) and frequency distributions.

In addition, statistical tests for differences between visitors' survey responses on weekdays and weekend days were conducted. For questions with statistically significant differences in responses between weekday and weekend respondents (p-values ≤ 0.05), results are presented separately for weekday and weekend visitors (groups distinguished with orange and blue bars in figures). When responses do not vary significantly, overall results (rather than separate weekend and weekday results) are presented (groups overall represented with a black bar in figures).

Some additional statistical tests for differences in survey responses by various subgroups were performed. For example, responses to questions in the IPW visitor survey about parking conditions from visitors who parked at the IPW trailhead parking lots were compared to those from IPW visitors who parked in the BLRA Day Use Lot. Results are reported for subgroups when there are statistically significant differences (groups distinguished with yellow and green bars in figures); otherwise, overall results are presented.

Results for each of the three survey instruments are reported in the following sections of this chapter in the following order:

1. IPW Visitor Survey Results
2. BLRA Visitor Survey Results
3. Gateway Visitor Survey Results

IPW Visitor Survey Results

Results in this section are representative of all visitor groups/visitors who parked at BLRA and visited the IPW during the 2014 peak visitation period at BLRA (referred to hereafter as IPW visitor groups/visitors).

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[15] Vaske, J. (2008). *Survey Research and Analysis: Applications in Parks, Recreation, and Human Dimensions*. State College, PA: Venture Publishing, Inc.

Trip Description

- The distribution of group sizes did not vary significantly between weekend day and weekday visitor groups (χ^2=2.496, p=0.476).
- A majority (52%) of all groups to IPW were groups of two people.
- Solo hikers (19%) and groups of 3 or 4 people (20%) were about equally common.
- There were few (9%) groups to IPW with five or more people.
- On average, visitors to IPW hiked in groups of about 2 or 3 people.

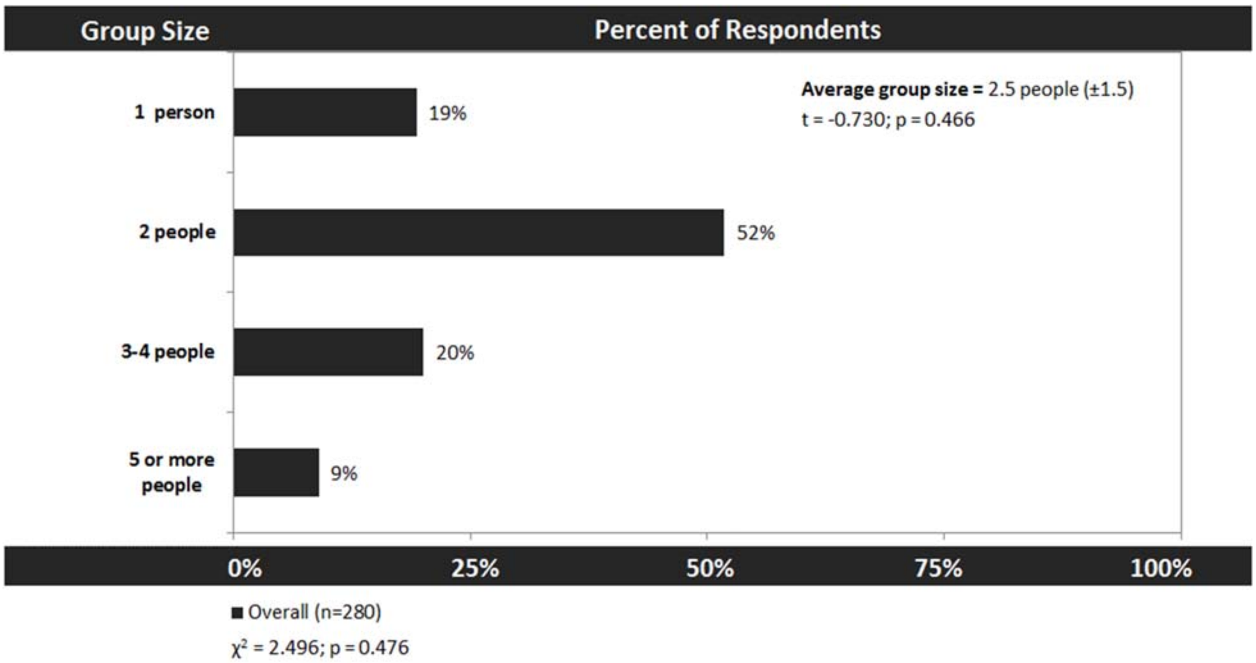


Figure 1-78. Including yourself, how many people were in your personal group during your hike today?

- The percentage of groups hiking in IPW with children under the age of 16 differed significantly between weekend day and weekday visitor groups (χ^2=7.357, p=0.007).
- On weekend days, about one-fifth (19%) of visitor groups to IPW were hiking with one or more children under the age of 16. On weekdays, only 8% of visitor groups were hiking with a child under the age of 16.

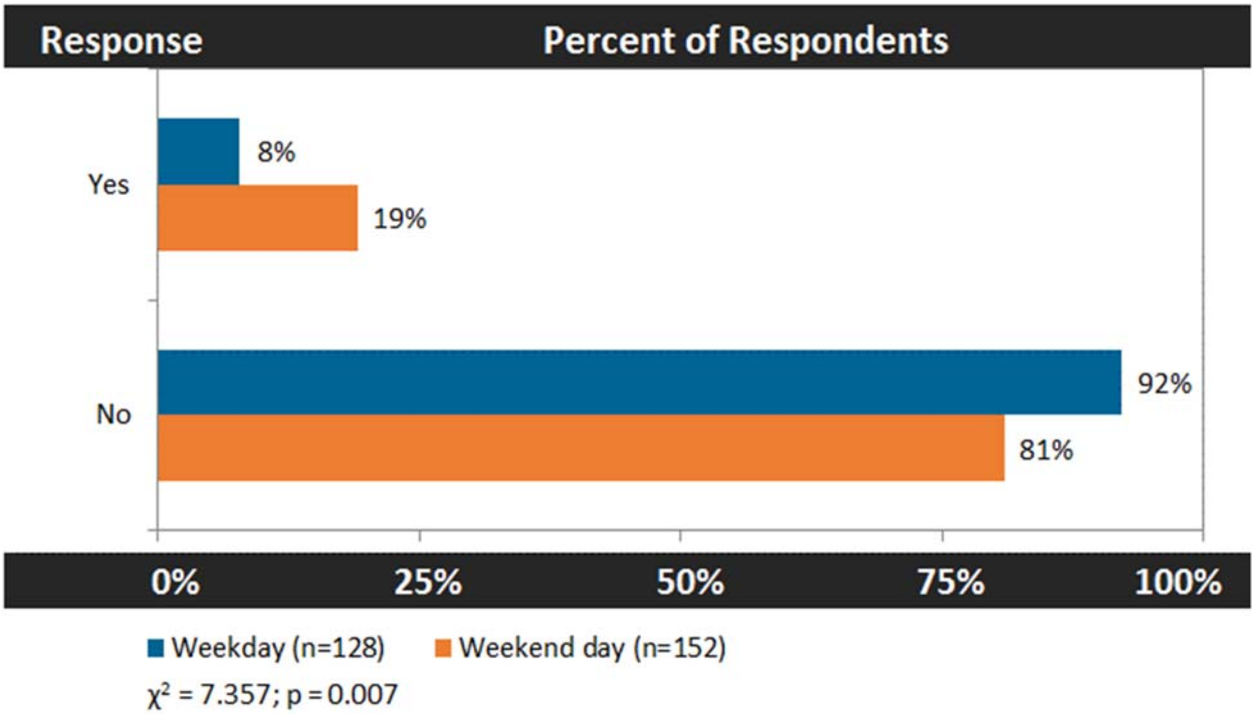


Figure 1-79. Were there any children under the age of 16 in your personal group on your hike today?

- The number of children (in groups with children) did not differ significantly between weekdays and weekend days (χ^2=3.444, p=0.328).
- Regardless of the day of week, there was an average of two children in groups with children (t=1.035, p=0.326).
- Of the relatively few groups hiking in IPW with children under the age of 16, the vast majority (82%) were with only one or two children.
- Very few groups with children (3%) had five or more children.

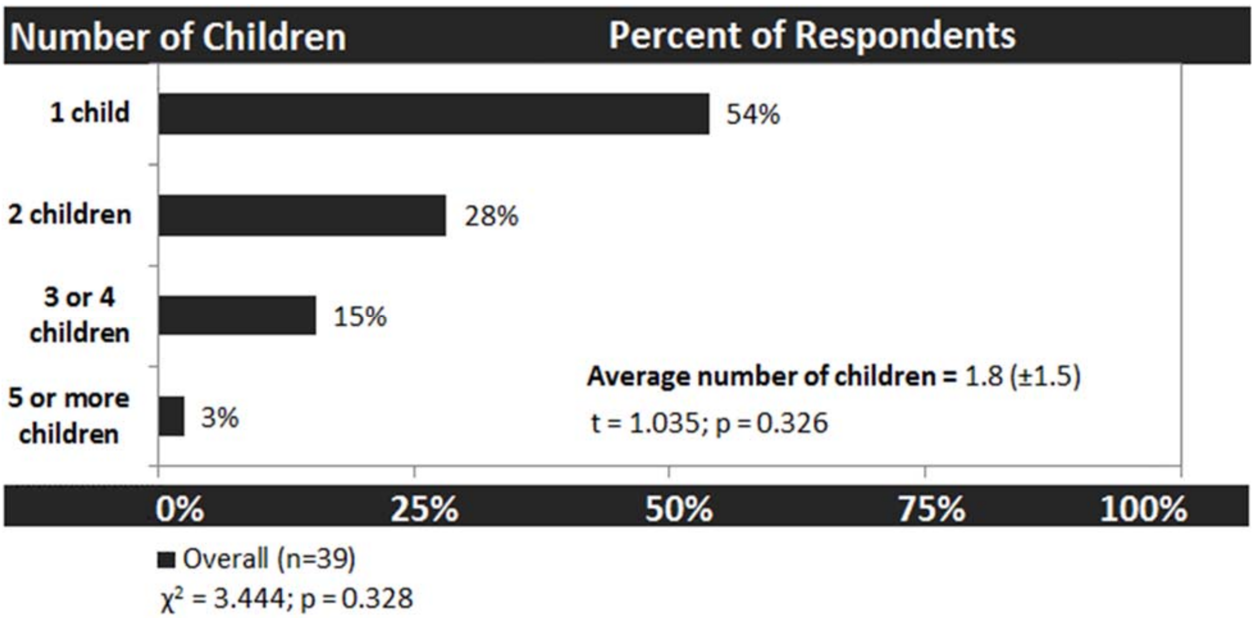


Figure 1-80. For groups with children: how many children under the age of 16 are in your personal group today?

- The proportion of visitor groups to IPW who were on a day hike versus an overnight backpacking trip did not differ significantly between weekdays and weekend days ($\chi2=0.069$, $p=0.792$).
- Regardless of the day of week, the large majority (96%) of respondents were on a day hike and not an overnight backpacking trip.

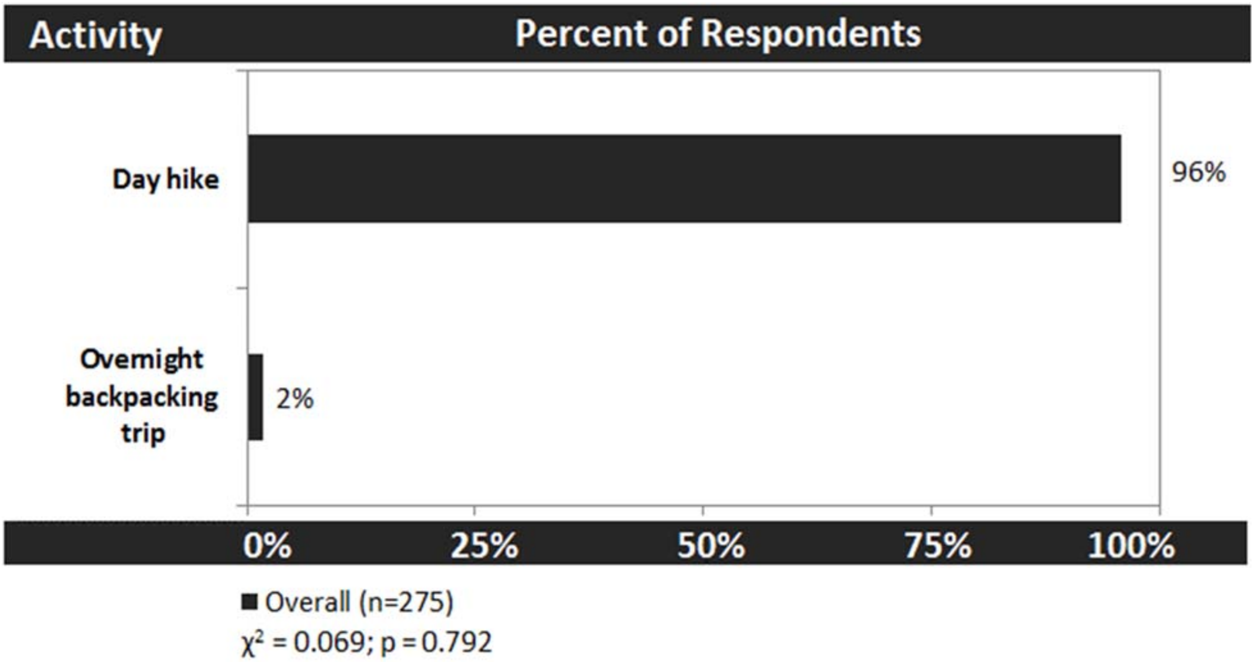


Figure 1-81. Was your hike today a day hike or part of an overnight backpacking trip?

- Among visitor groups to IPW who went on an overnight backpacking trip, the proportion of visitor groups who started at each trailhead did not differ significantly between weekdays and weekend days (χ^2=5.000, p=0.082).
- Regardless of the day of week, equal proportions (40%) of visitor groups started at the Mitchell Lake and Long Lake Trailheads. A smaller proportion (20%) started at the Day Use Lot.

Very Low Sample Size on This Question Suggests Results May not Be Applicable.

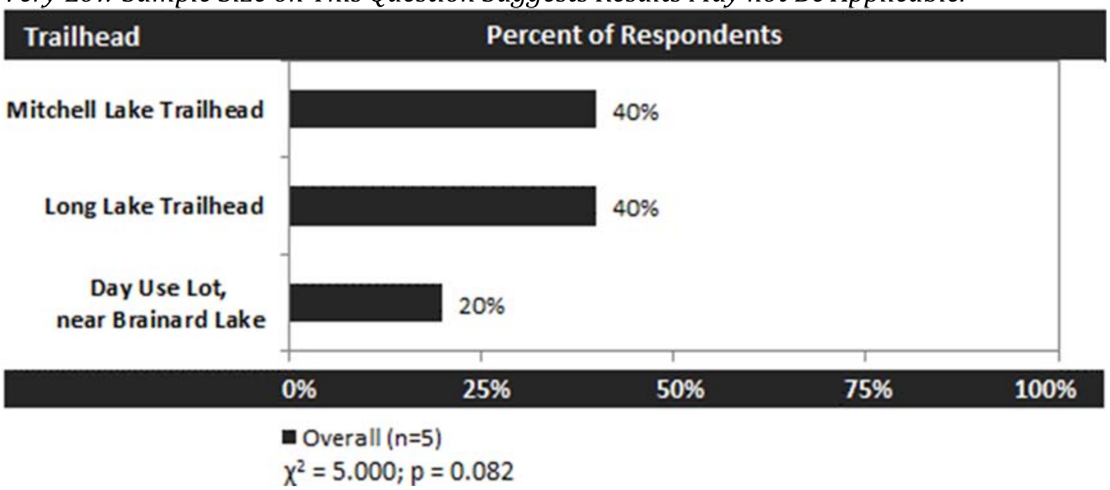


Figure 1-82. If you were on an overnight backpacking trip, at which trailhead did you start?

- The number of hours that visitor groups hiked in the IPW varied significantly between weekday and weekend day visitors (χ^2=11.682, p=0.039; t=-2.374, p=0.018).
- On average, weekday visitor groups hiked approximately 3.5 hours and weekend day visitor groups hiked about 4 hours.
- The vast majority of visitor groups on weekdays (78%) and weekend days (78%) hiked between 2 and 5 hours.
- More than half (55%) of weekday visitors groups hiked for 3 hours or less, while nearly two-thirds (61%) of weekend day visitor groups hiked 4 or more hours.

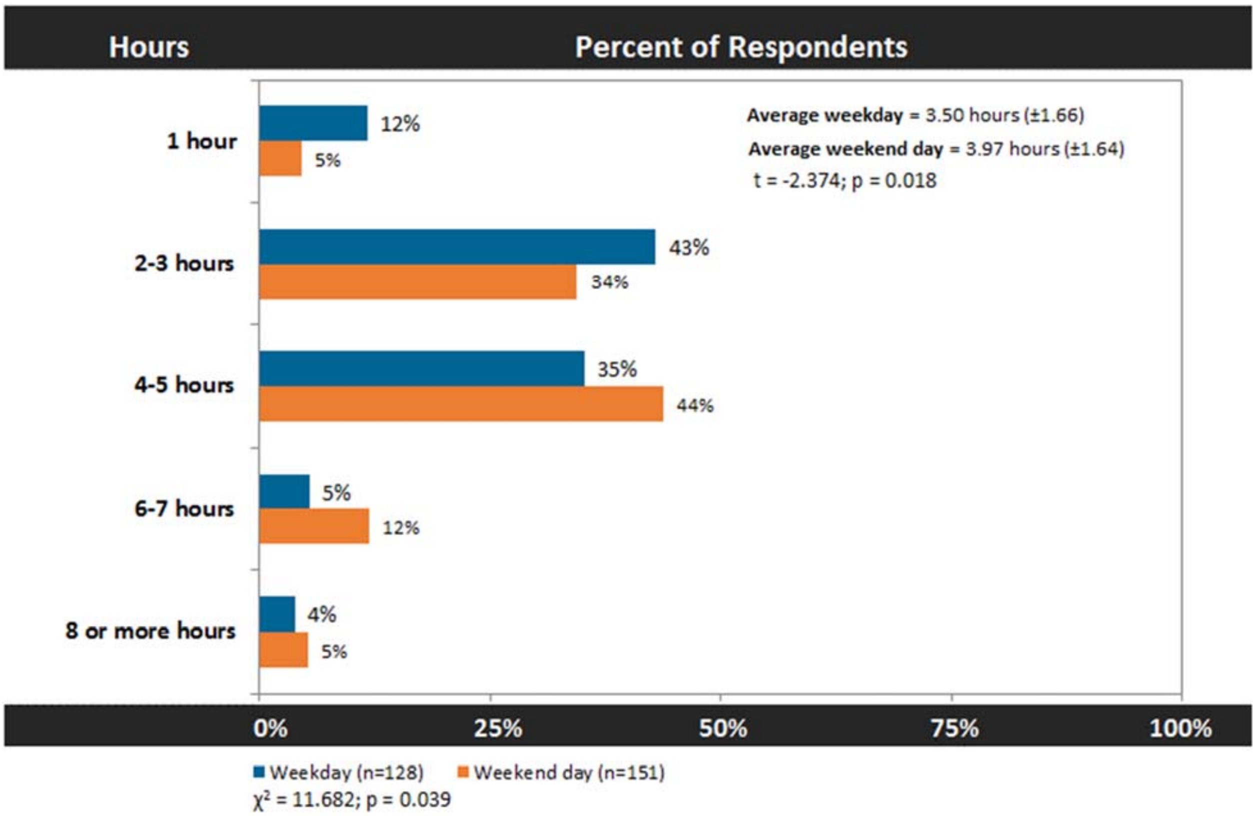


Figure 1-83. How many hours did you hike in the Indian Peaks Wilderness today?

- The locations where IPW visitor groups started their hike did not vary significantly between weekday and weekend day visitor groups (χ^2=9.948, p=0.077), but did differ substantively.
- Just over half (54%) of weekend day visitors to IPW started their hike at Mitchell Lake Trailhead. Mitchell Lake Trailhead was less popular among weekday visitors (37%).
- Half (50%) of weekday visitors to IPW started their hike at Long Lake Trailhead. Long Lake Trailhead was less popular among weekend day visitors (38%).
- Regardless of the day of week, very few visitors to IPW started their hike at a backcountry campsite, the Day Use Parking Lot, or the Pawnee Campground.
- A verbatim list (including respondents' typos) of backcountry campsites reported by respondents is included in Table 1, and a list of "other" locations reported by respondents is included in Table 1 in Appendix G.

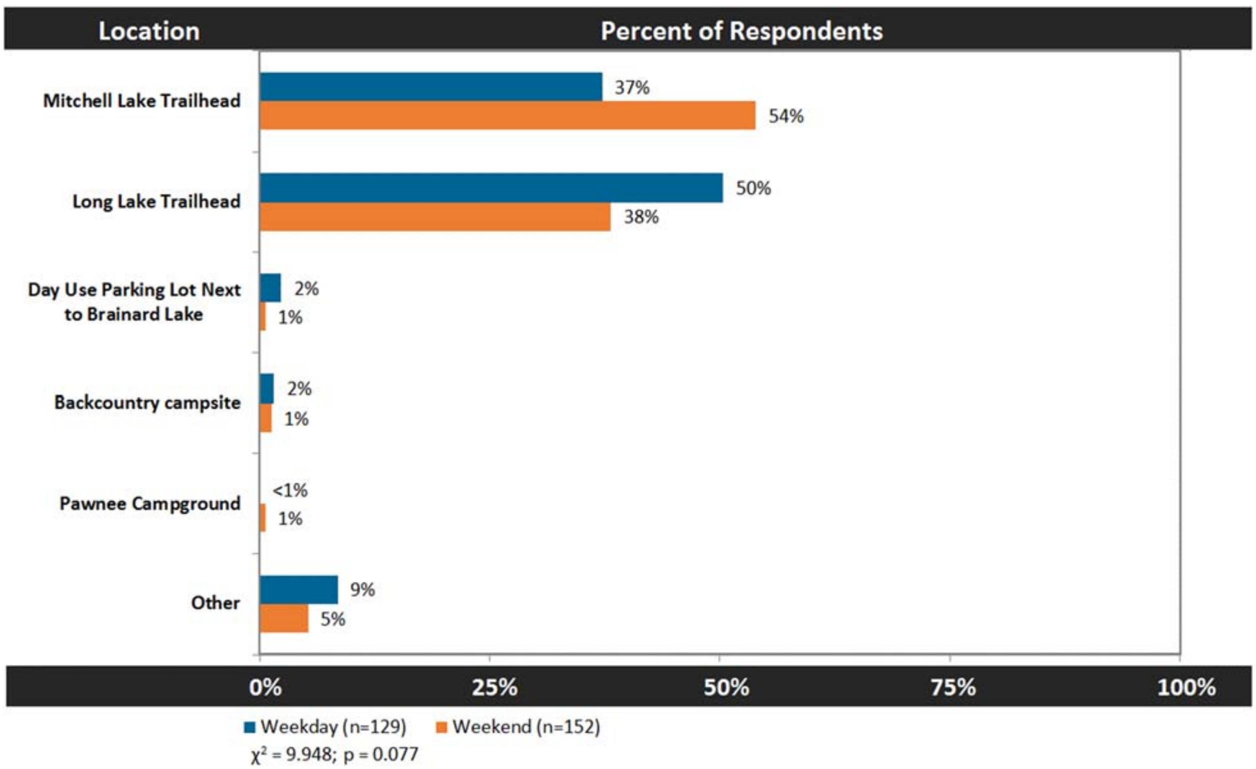


Figure 1-84. Where did you start your hike today?

- The locations where IPW visitor groups ended their hike did not vary significantly between weekday and weekend day visitor groups (χ^2=9.267, p=0.055); however, results differed substantively.
- Just over half (55%) of weekend day visitors to IPW ended their hike at Mitchell Lake Trailhead. Mitchell Lake Trailhead was less popular among weekday visitors (39%).
- Half (51%) of weekday visitors to IPW ended their hike at Long Lake Trailhead. Long Lake Trailhead was less popular among weekend day visitors (37%).
- Regardless of the day of week, very few visitors to IPW started their hike at a backcountry campsite, the Day Use Parking Lot, or the Pawnee Campground.
- A verbatim list (including respondents' typos) of backcountry campsites reported by respondents is included in Table 3, and a list of "other" locations reported by respondents is included in Table 4 in Appendix G.

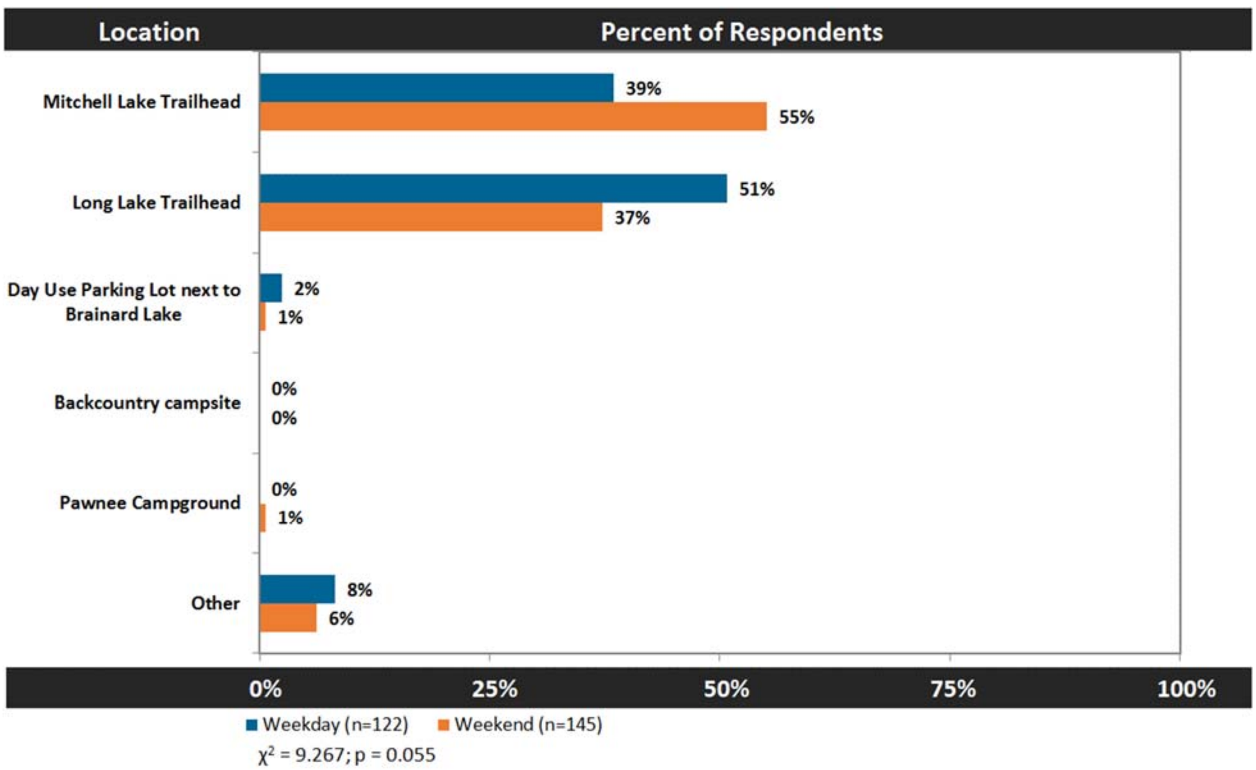


Figure 1-85. Where did you end your hike today?

- Over half (57%) of weekday visitor groups to IPW hiked to Long Lake, in comparison to only 42% of weekend day visitor groups (χ^2=5.942, p=0.015).
- Exactly half (50%) of weekend day visitor groups to IPW hiked to Mitchell Lake, in comparison to only one-third (31%) weekday visitor groups (χ^2=10.568, p=0.001).
- While Long Lake was more popular on weekdays, and Mitchell Lake was more popular on weekend days, Lake Isabelle and Blue Lake were equally popular, regardless of the day of week.
- Mount Audubon was a significantly more popular destination among IPW hiker groups on weekend days (18% versus 3%; χ^2=15.260, p<0.001).
- A verbatim list (including respondents' typos) of "other" locations reported by respondents is included in Appendix G.

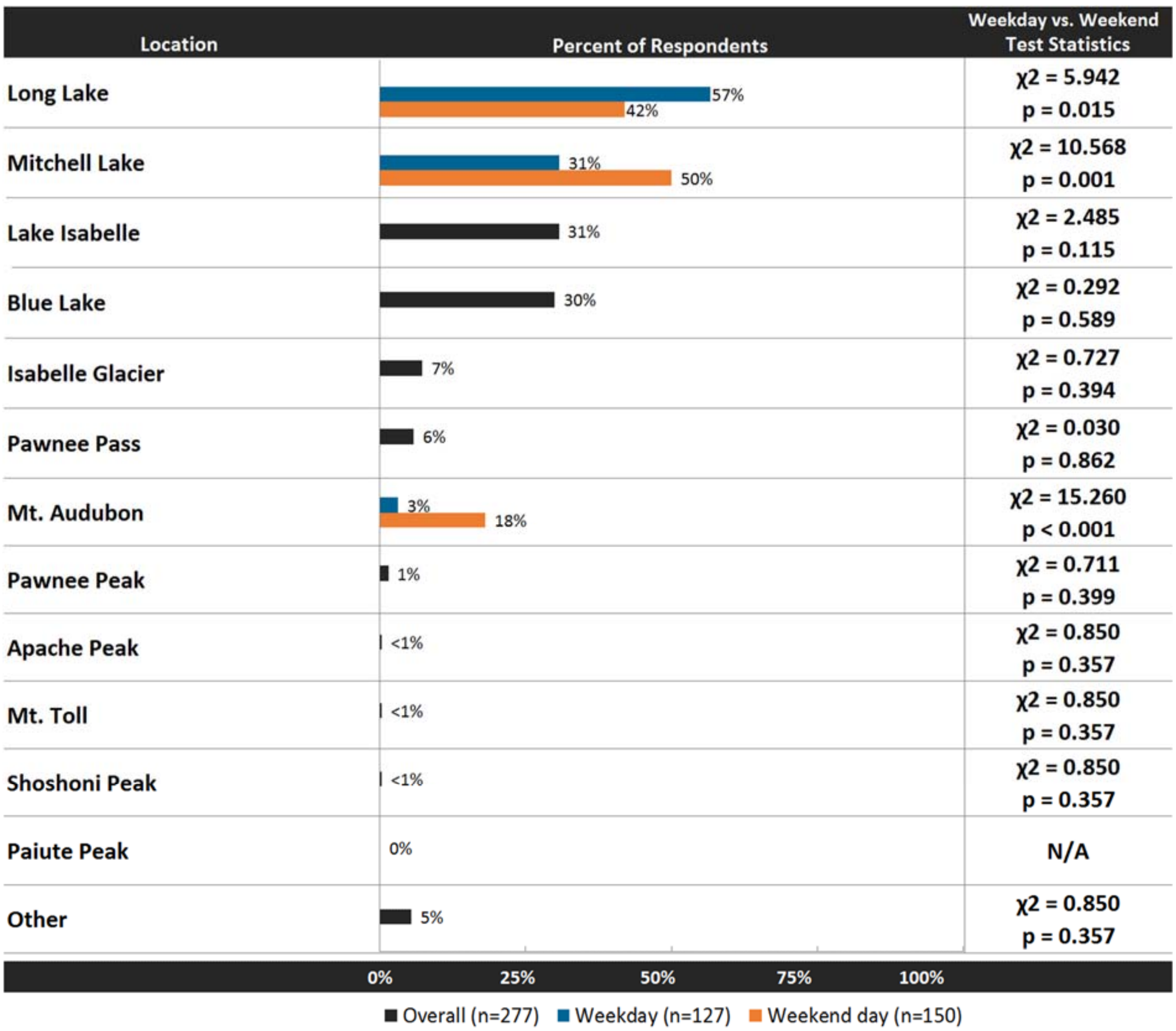


Figure 1-86. Which of the following locations did you hike to or pass through?

- Indian Peaks Wilderness hiking groups' primary destinations varied significantly between weekday and weekend day groups (χ^2=26.842, p=0.008).
- Several primary destinations were more popular among weekday hiking groups, including Lake Isabelle (25% versus 19%), Long Lake (20% versus 12%) and Isabelle Glacier (8% versus 2%).
- Primary destinations more popular among hiking groups on weekend days included Mount Audubon (16% versus 3%) and Mitchell Lake (9% versus 5%).
- Blue Lake was the most popular primary destination reported by visitor groups. There was no substantive difference in the proportion of weekday and weekend day hiking groups who visited Blue Lake as their primary destination (26% versus 27%).

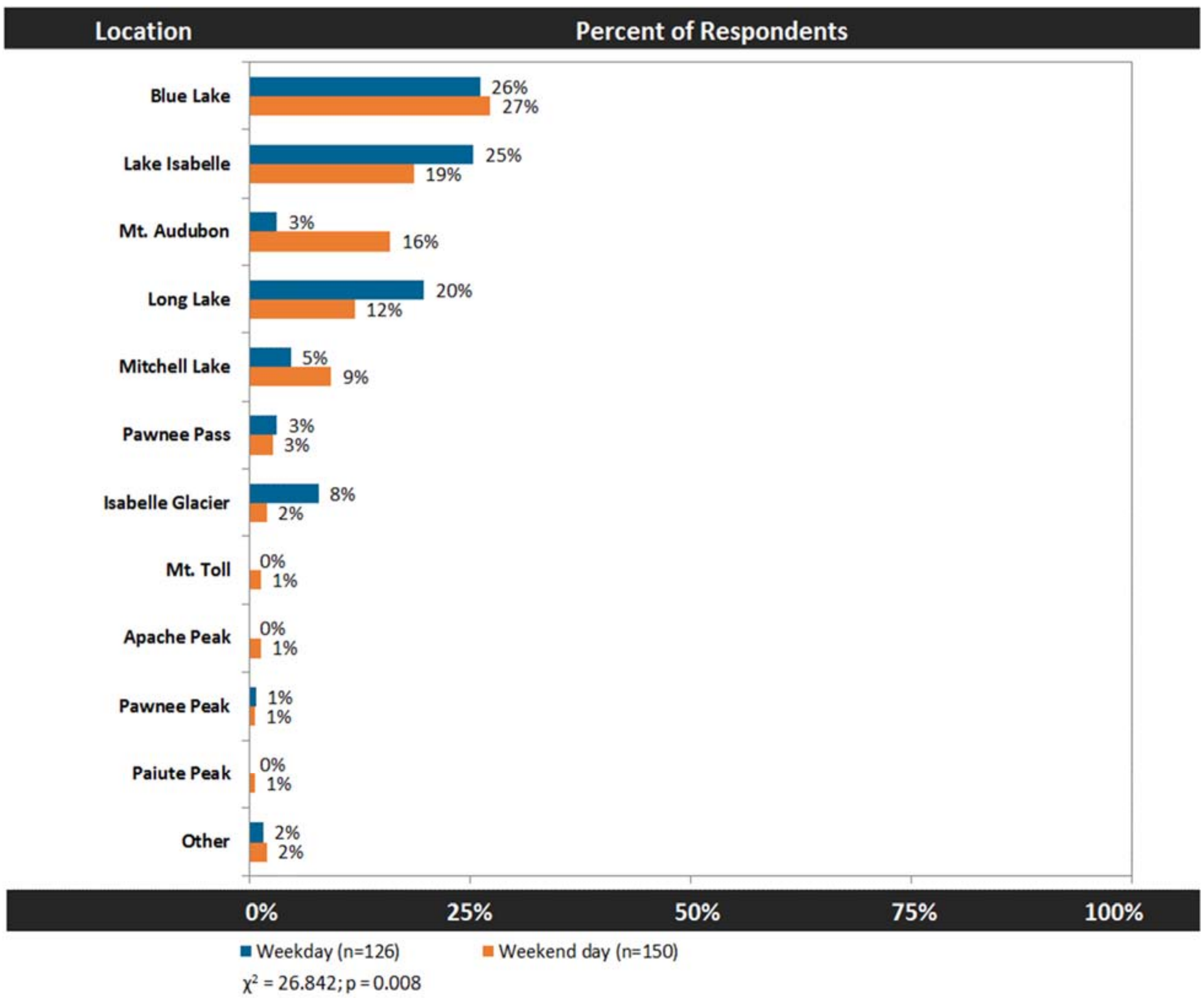


Figure 1-87. Which of the following was your primary destination on your hike today?

- The likelihood of feeling crowded while hiking on trails or at destinations in the IPW did not vary significantly between weekday and weekend day visitors (*p*>0.05 for all tests).
- Regardless of the day of week, the large majority (85%) of all visitors to IPW did not feel crowded during their hike. Only 13% of visitors did feel crowded during their hike.
- Only 5% of visitors to IPW felt crowded at their destinations, regardless of the day of week.

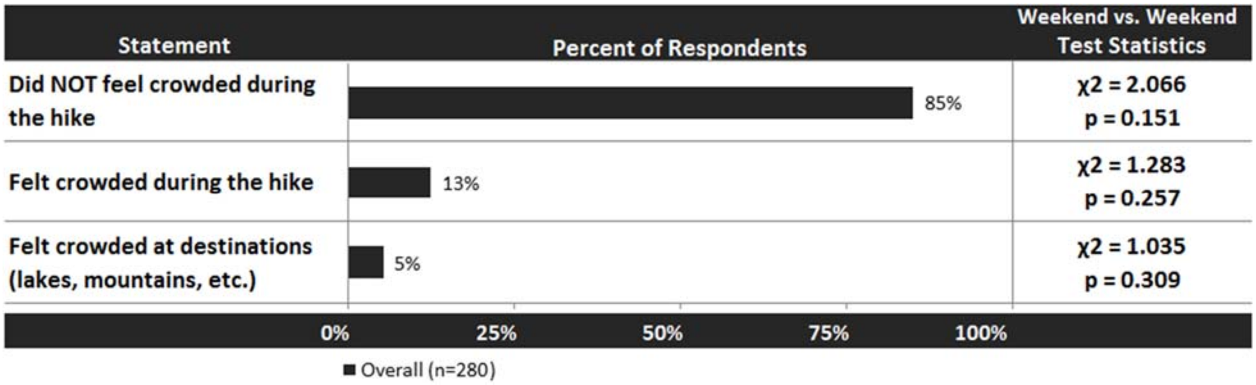


Figure 1-88. Did you feel crowded on the trail and/or at the destinations today?

- The likelihood of feeling rushed or slowed down during their hike, as a result of other people on the trail, did not vary significantly between weekday and weekend day visitors (χ^2=0.321, p=0.571).
- Regardless of the day of week, a significant majority (90%) of visitors to IPW did not feel rushed or slowed down by others at some point during their hike.

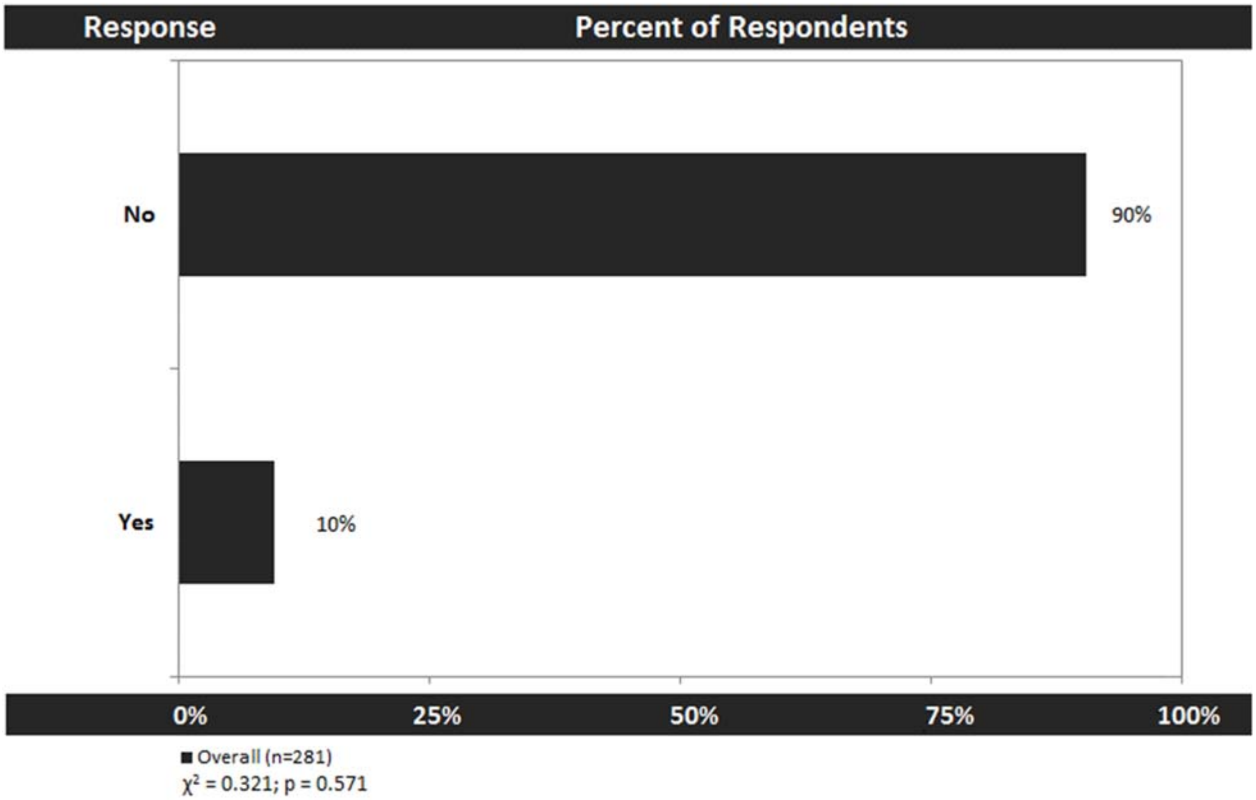


Figure 1-89. *Did the presence of other people on the trail make you feel rushed or slow you down at any point during your hike?*

- Respondents were asked to report the maximum number of people they could pass or be passed by during a hike in the IPW and not feel crowded. Responses to the crowding-related question did not vary significantly between weekday and weekend day visitors (χ^2=10.127, p=0.256).
- A majority (53%) of visitors would feel crowded seeing a total of 20 or more people during a hike in the IPW.
- Regardless of the day of week, the largest proportion (28%) of visitors to IPW could encounter a total of 20 to 29 people during their hike without feeling crowded.
- The second-largest proportion (19%) of visitors to IPW could encounter a total of 10 to 19 people without feeling crowded.
- Close to equal proportions of visitors to IPW could encounter a total of 2 to 9 people (13%), 30 to 30 people (13%) or 40 or more people (12%) without feeling crowded during their hike.
- A small proportion (8%) of visitors to IPW reported that the number of people they encounter doesn't affect whether or not they feel crowded.

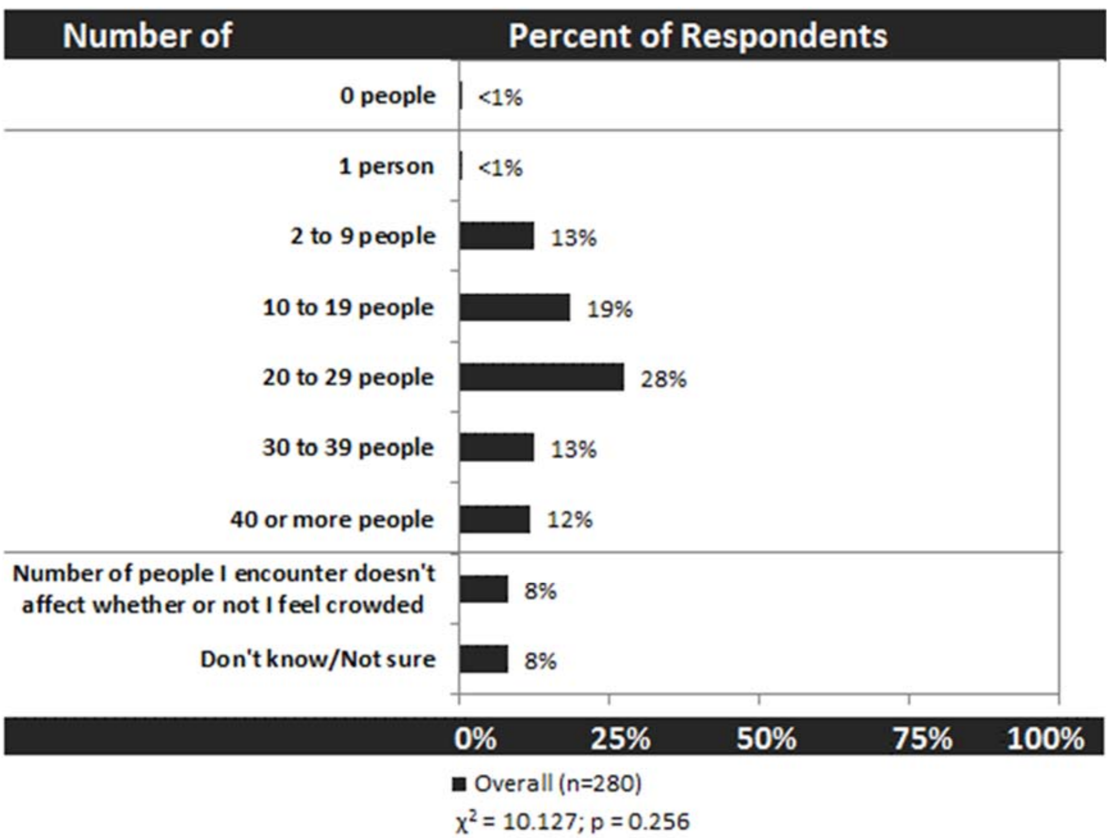


Figure 1-90. What is the maximum number of people you could pass/be passed by over the duration of a hike and not feel crowded?

Weekday and weekend day visitors to IPW did not differ significantly in their opinions about whether or not visitor use should be limited in the IPW, regardless of the reason for the use limit (p>0.05 for all tests).

- Regardless of the day of week, over half (53%) of visitors to IPW believe that the number of people allowed to hike in this area each day should be limited to reduce environmental impacts, even if it limits when they can hike there.
- About one-quarter (26%) of all visitors to IPW believe the number of hikers on the Mount Bierstadt Trail should be limited to protect the quality of visitors' experiences, even if it limits when they can hike there.

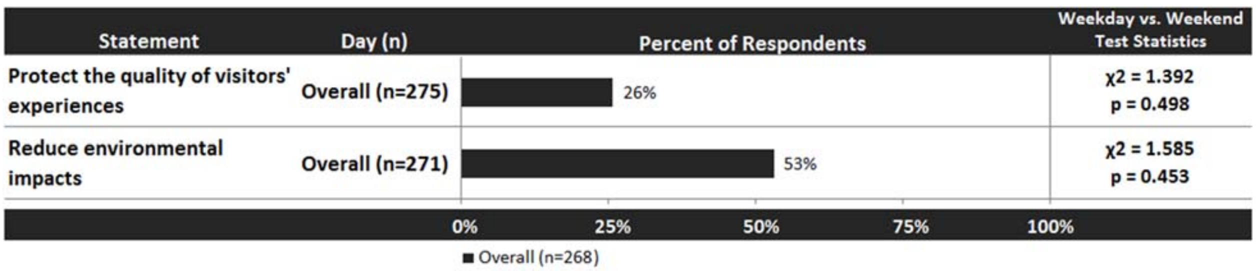


Figure 1-91. Percentage who agree that the number of people allowed to hike in this area each day should be limited, even if it limits when they can hike on the trail, if it is needed to a) protect the quality of visitors' experiences, or b) reduce environmental impacts.

Travel and Parking

- There was no significant difference in the routes that weekday and weekend day visitor groups used to travel to and from BLRA (χ^2=15.145 p=0.234).
- The largest proportion (27%) of visitors to IPW, regardless of the day of week, traveled to and from BLRA via Left Hand Canyon. A slightly smaller proportion (24%) traveled to and from BLRA via Boulder Canyon, regardless of the day of week.
- Over three-quarters (77%) of visitors to IPW took the same route home that they took to get to BLRA.
- A verbatim list (including respondents' typos) of "other" routes reported by respondents is included in Table 6 in Appendix G.

Table 1-24. Which routes did you use to travel to and from BLRA on this trip?

	Percent of Respondents (n=241)			
	Route home			
Route to BLRA	Left Hand Canyon	Boulder Canyon	Peak-to-Peak Highway	Rt. 119
Left Hand Canyon	**27%**	10%	2%	1%
Boulder Canyon	5%	**24%**	1%	2%
Peak-to-Peak Highway	0%	1%	**18%**	1%
Rt. 119	0%	0%	0%	**8%**

- Visitor groups' arrival time at BLRA varied significantly between weekdays and weekend days (χ^2=12.542, p=0.028).
- Nearly half (47%) of visitor groups on weekend days arrived before 9 AM, compared to less than one-third (31%) on weekdays. In contrast, more than half (53%) of weekday visitor groups arrived between 9 AM and 1 PM, compared to just over one-third (37%) on weekend days.
- A notable proportion (12%) of weekend visitor groups arrived before 7 AM, compared to only 3% of weekday visitor groups.
- Relatively few weekday (15%) and weekend day (16%) visitor groups to IPW arrived after 1 PM.

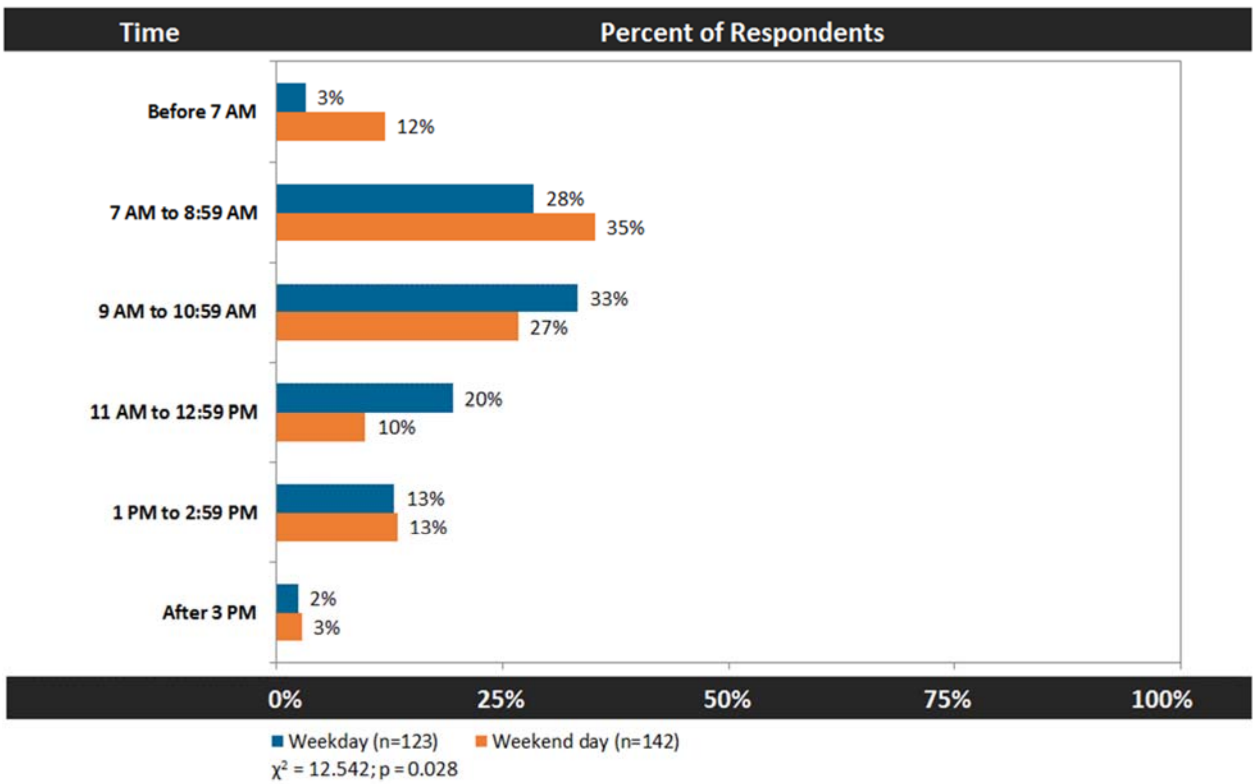


Figure 1-92. At approximately what time did you arrive at BLRA today?

- The vast majority (96%) of all visitor groups to IPW arrived at BLRA on the same day they took the survey, regardless of the day of week (χ^2=0.050, p=0.823).

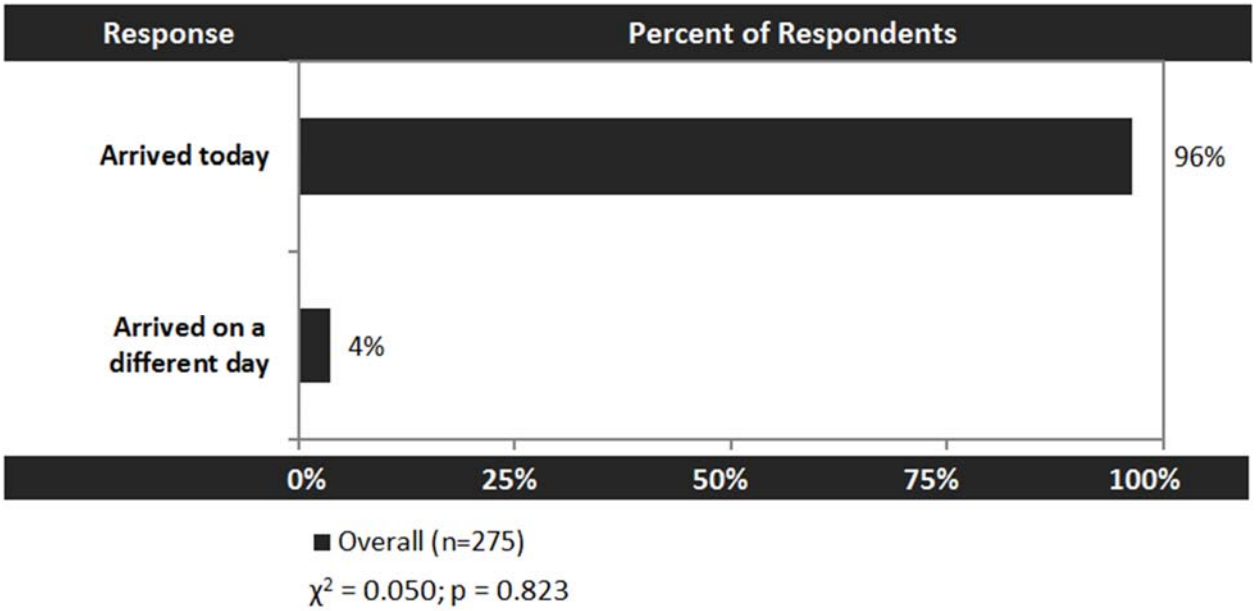


Figure 1-93. Did you arrive on a different day?

- The majority of all visitor groups (95%) to IPW traveled to BLRA in a single vehicle, regardless of the day of week (χ^2=0.014, p=0.993).

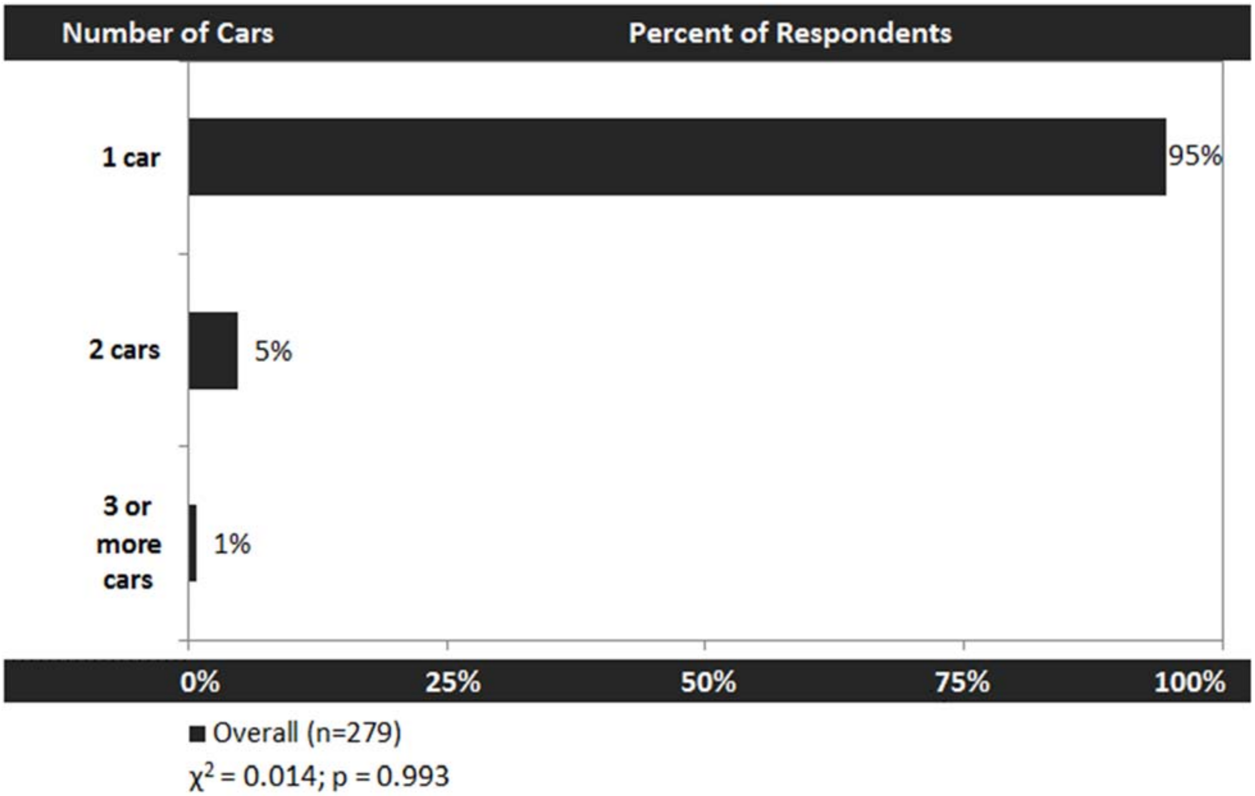


Figure 1-94. In how many vehicles did you and your group travel to BLRA on this trip?

- Visitor groups' parking locations at BLRA varied significantly between weekdays and weekend days (χ^2=23.436, p<0.001).
- Weekend visitor groups to IPW were significantly more likely to park at the Day Use Parking Lot next to Brainard Lake; 37% of weekend visitor groups parked there, in comparison with only 18% of weekday visitor groups.
- In contrast, weekday visitor groups to IPW were significantly more likely to park at the Long Lake Trailhead Parking Lot; 38% of weekday visitor groups parked at the trailhead, in comparison with 16% of weekend visitor groups.
- About one-third of visitor groups parked at the Mitchell Lake Trailhead Parking Lot on weekdays (34%) and weekend days (39%).
- None of the visitors contacted for this survey parked in the Gateway Trailhead Parking Lot, by virtue of the sampling procedures used for this survey (described previously in "Survey Sampling and Administration). Visitors who parked in the Gateway Trailhead Parking Lot were surveyed as part of the Gateway visitor survey (reported in "Gateway Visitor Survey Results").
- A verbatim list (including respondents' typos) of "other" locations reported by respondents is included in Appendix G.

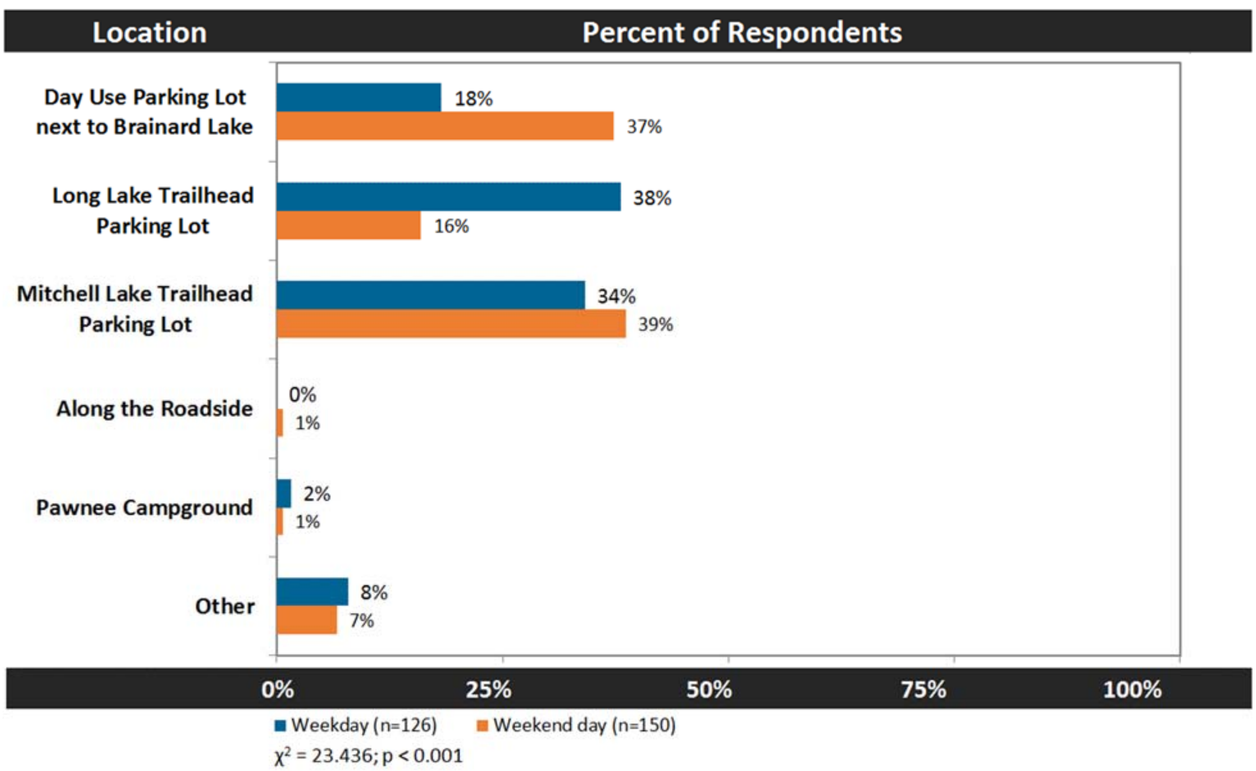


Figure 1-95. Where did you park in BLRA for your hike?

- IPW visitors' perceptions of their parking locations did not vary significantly between weekdays and weekend days (*p*>0.05 for all tests).
- Regardless of the day of week, the large majority of visitors to IPW thought their parking locations were safe (98%), easy to find (96%), and well-marked (96%).
- Slightly smaller proportions of visitors to IPW thought their parking locations were convenient (88%) and close to their destination (82%).
- The smallest proportion (59%) of visitors to IPW agreed that their parking location was uncongested. In other words, approximately 40% thought that where they parked was congested, regardless of the day of the week.

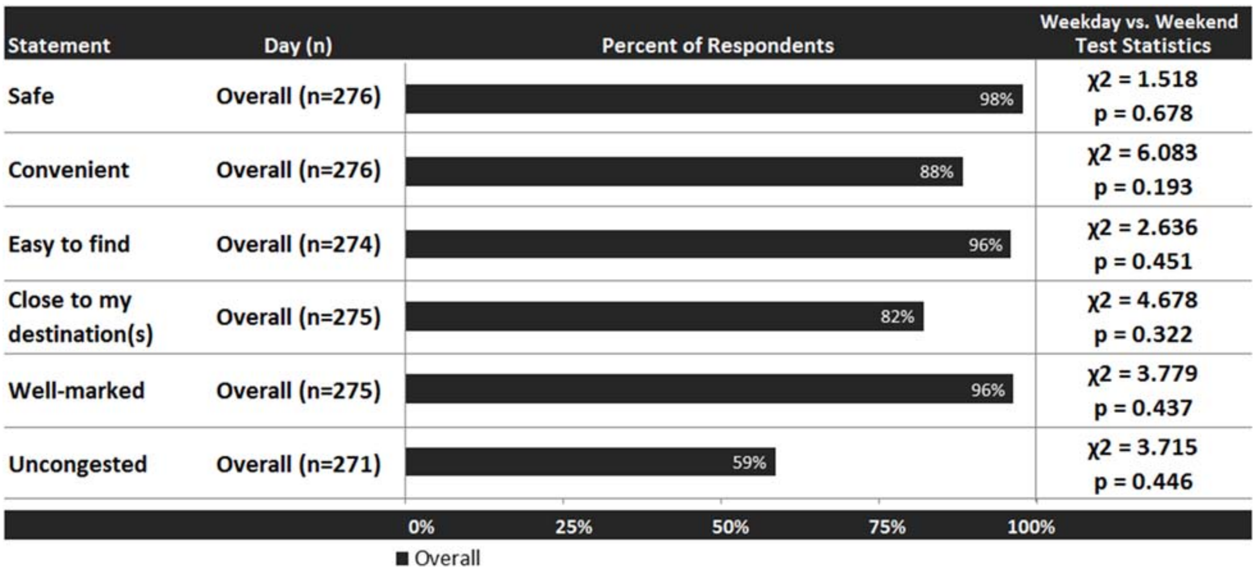


Figure 1-96. Percentage who agree with each of the descriptions of where they parked at BLRA on the day they took the survey.

- IPW visitors' perceptions of their parking locations did vary significantly, depending on where they parked at BLRA (i.e., in the Day Use Parking Lot versus in one of the two IPW Trailhead Parking Lots).
- Visitors who parked in the Long Lake or Mitchell Lake Trailhead Parking Lot were significantly more likely than those who parked in the Day Use Parking Lot to think their parking location was convenient (95% versus 75%), easy to find (98% versus 91%), and close to their destinations (94% versus 57%).
- There was a statistical, but not substantive, difference in whether visitors thought their parking location was safe; 97% of those who parked in the Day Use Parking Lot thought where they parked was safe, and 98% of those who parked at a Trailhead Parking Lot thought it was safe.
- Visitors to IPW were equally likely to describe their parking location as well-marked (96%) and uncongested (60%), regardless of where they parked.

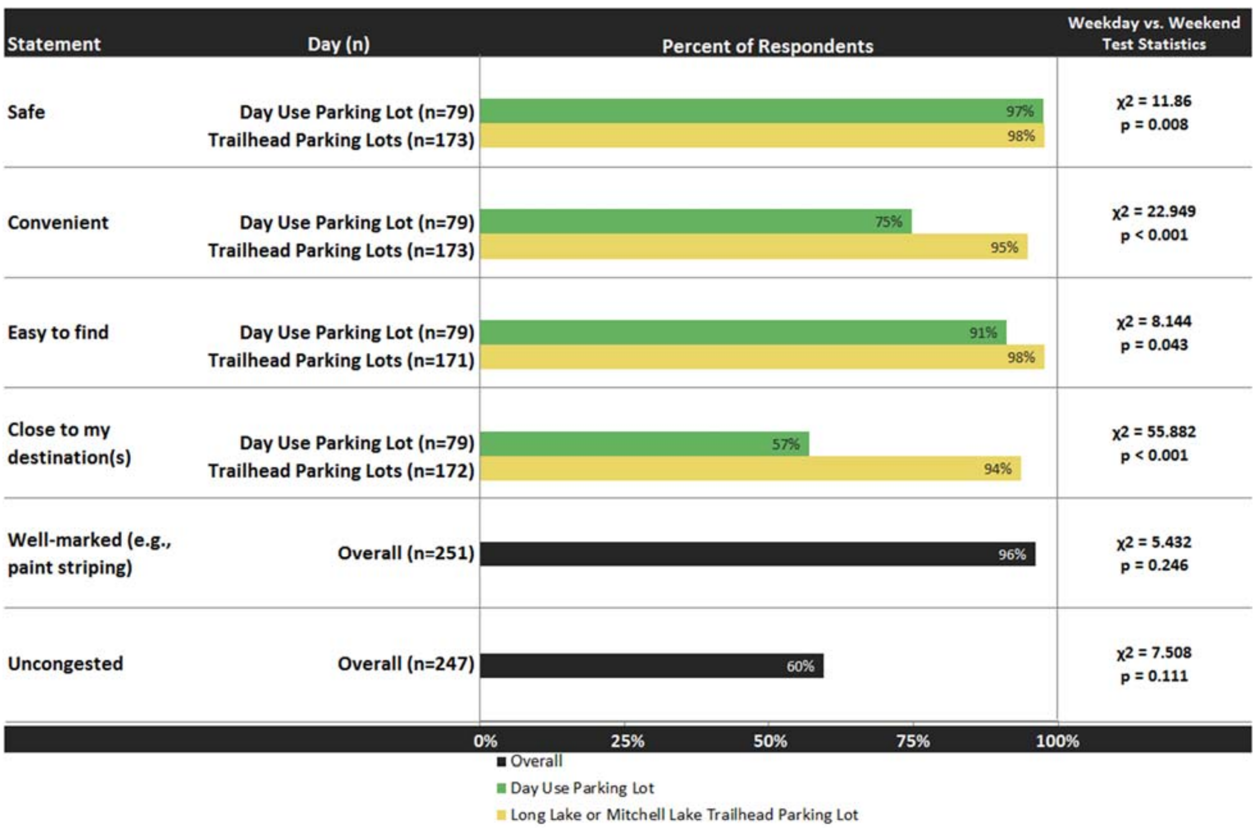


Figure 1-97. Percentage, by parking location, who agree with each of the descriptions of where they parked at BLRA on the day they took the survey.

- Weekday visitors' perceptions of parking congestion at BLRA differed significantly from those of visitors on weekend days (χ^2=22.126, p=0.005; t=-4.078, p<0.001).
- Three-quarters (75%) of visitors to IPW on weekend days thought that parking congestion at BLRA was moderate to extreme, and virtually all (93%) thought there was at least slight parking congestion on the day they visited.
- Weekday visitors to IPW were less likely than weekend visitors to report that there was parking congestion at BLRA; however, more than half (57%) of weekday visitors thought that parking congestion was moderate to extreme, and 87% thought there was at least slight parking congestion on the day they visited.

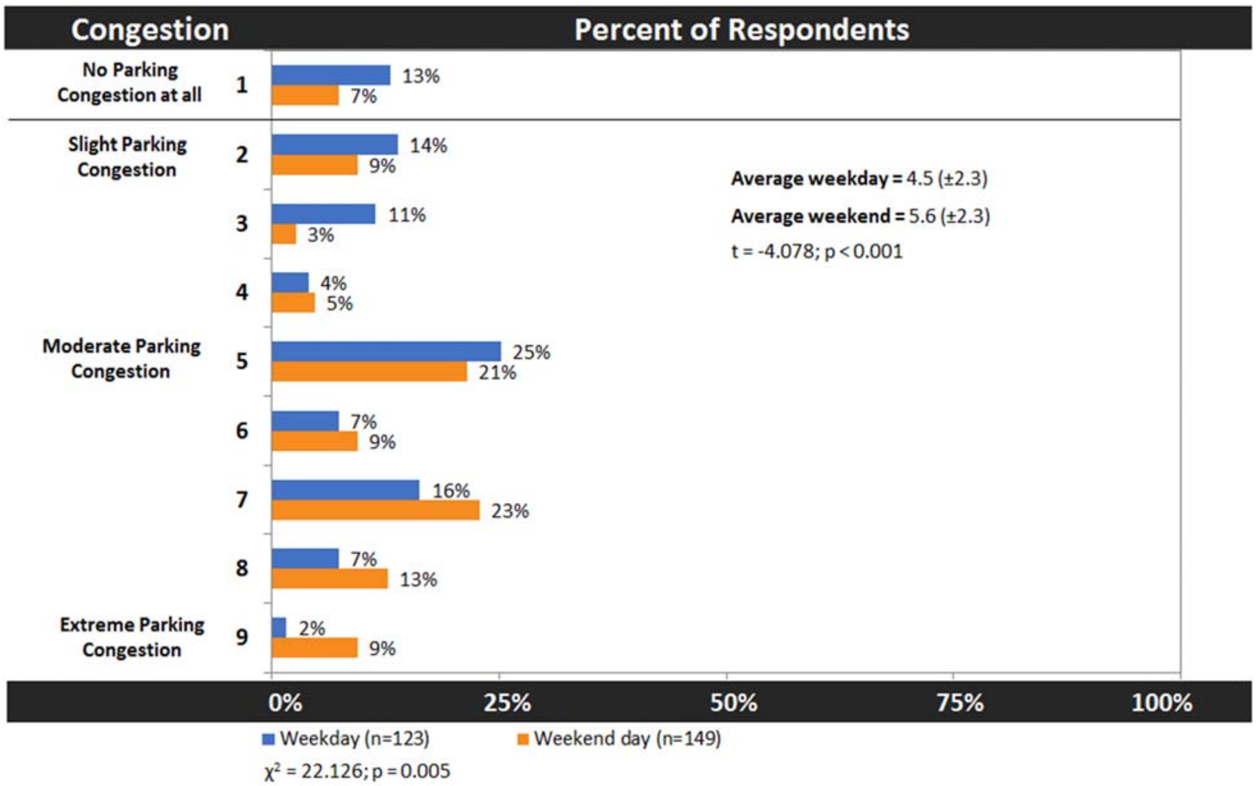


Figure 1-98. How much parking congestion do you think there is at BLRA today?

- There was no statistical difference between IPW visitor group's awareness of the Gateway Trailhead Parking Lot on weekend days versus weekdays (χ^2=4.962, p=0.175).
- Regardless of the day of week, nearly two-thirds (63%) of IPW visitor groups did not know that if you park at the Gateway Trailhead Parking Lot you do not have to pay the amenity fee to visit BLRA. Of those, more than half (55%) indicated that they would not have chosen to park there anyway.
- Approximately one-third (34%) of IPW visitor groups, regardless of the day of the week, were aware that they could park at the Gateway Trailhead Parking Lot and visit BLRA for free, but did not park there anyway.
- A very small proportion (4%) of visitors to IPW used the Gateway Trailhead Parking Lot to carpool, and a similarly small proportion (8%) of visitors indicated that they would have used the Gateway Trailhead Parking Lot had they known about it.

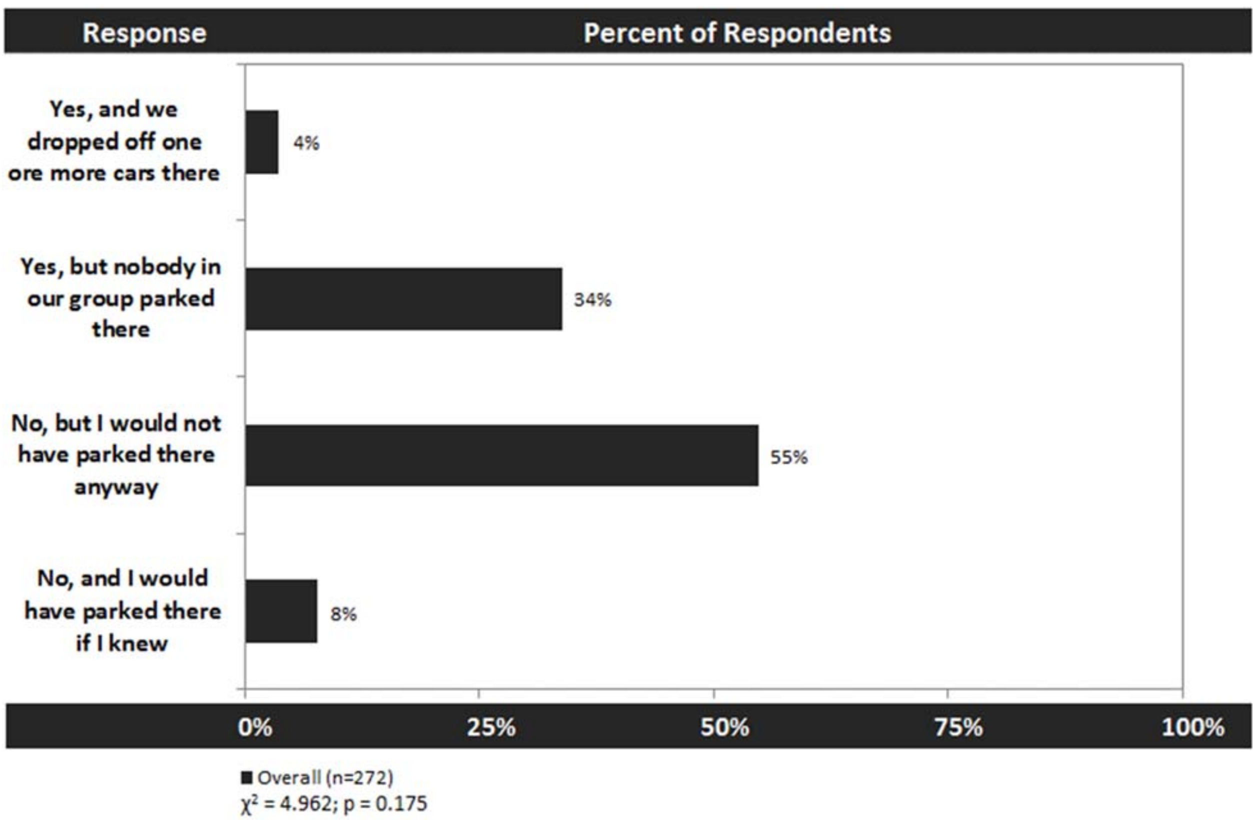


Figure 1-99. Did you know that if you park in the lot near the entrance station (Gateway Trailhead Parking Lot) you don't have to pay the fee to visit BLRA?

- Visitors to IPW were asked if they would be likely to visit BLRA on a future trip if their only option was to park in the Gateway Trailhead Parking Lot and hike/walk or take a shuttle, or park outside of BLRA and take a shuttle from there. Visitors' responses to the questions did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, just over three-quarters (76%) of visitors said they would be likely to visit BLRA on a future trip, even if they had to park at the Gateway Trailhead Parking Lot and take a 10 minute shuttle bus ride to the starting point of their hike.
- However, less than one-third (30%) of visitors said they would be likely to visit BLRA on a future trip, even if they had to park in the Gateway Trailhead Parking Lot and then walk/hike 3 miles to the starting point of their hike.
- An even smaller proportion (19%) indicated that they would be likely to visit BLRA on a future trip, even if they had to park in town and then take a 40 minute shuttle bus ride to the starting point of their hike.

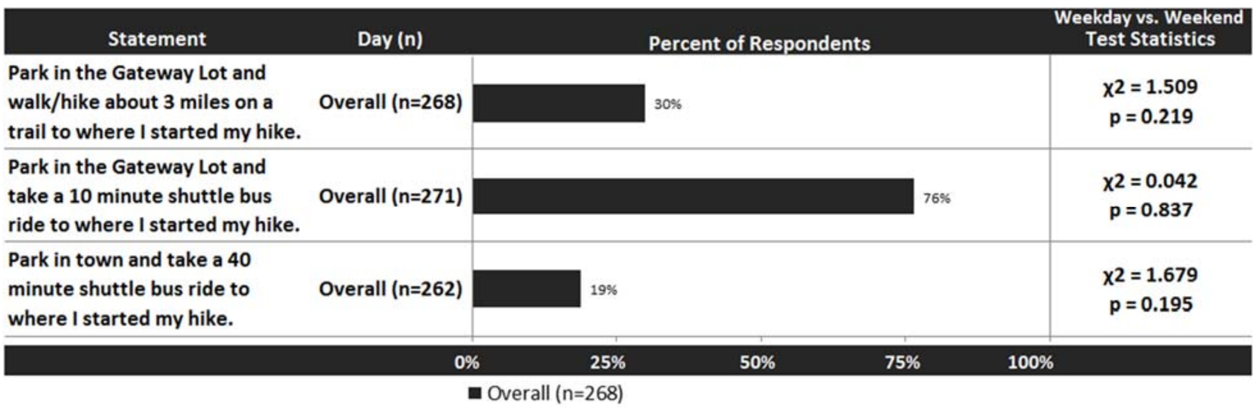


Figure 1-100. Percentage who would be likely to visit BLRA on a future trip, even if this was their only option for visiting because parking lots were full.

- Visitors' attitudes about two potential parking management actions at BLRA varied significantly between weekdays and weekend days ($p<0.05$). Attitudes about four other potential parking management actions did not vary significantly.
- Regardless of the day of week, more than three-quarters (80%) of visitors to IPW agreed that when parking lots at BLRA are full, visitors should be directed to park at the Gateway Trailhead Parking Lot and then take a 10 minute shuttle.
- Nearly two-thirds (66%) of weekend visitors thought that visitors should be stopped at the entrance station until some parking spaces open up, and only then allowed to enter. Fewer than half (49%) of weekday visitors agreed with the same.
- Just over half (53%) of weekend visitors agreed that visitors should be directed to park at the Gateway Trailhead Parking Lot and then walk/hike to their starting point. Weekday visitors were less supportive of this option; only 39% agreed.
- Regardless of the day of week, about one-third (32%) of IPW visitors agree that visitors should be allowed to enter BLRA around until a parking space opens up.
- Similarly, about one-third (34%) of visitors to IPW, regardless of the day of the week, agreed that visitors should be directed to other recreation areas when parking lots are full at BLRA.
- Regardless of the day of week, only a small proportion (19%) of visitors to IPW agreed that visitors should be directed to park in town and take a 40 minute shuttle bus ride to the starting point of their hike.

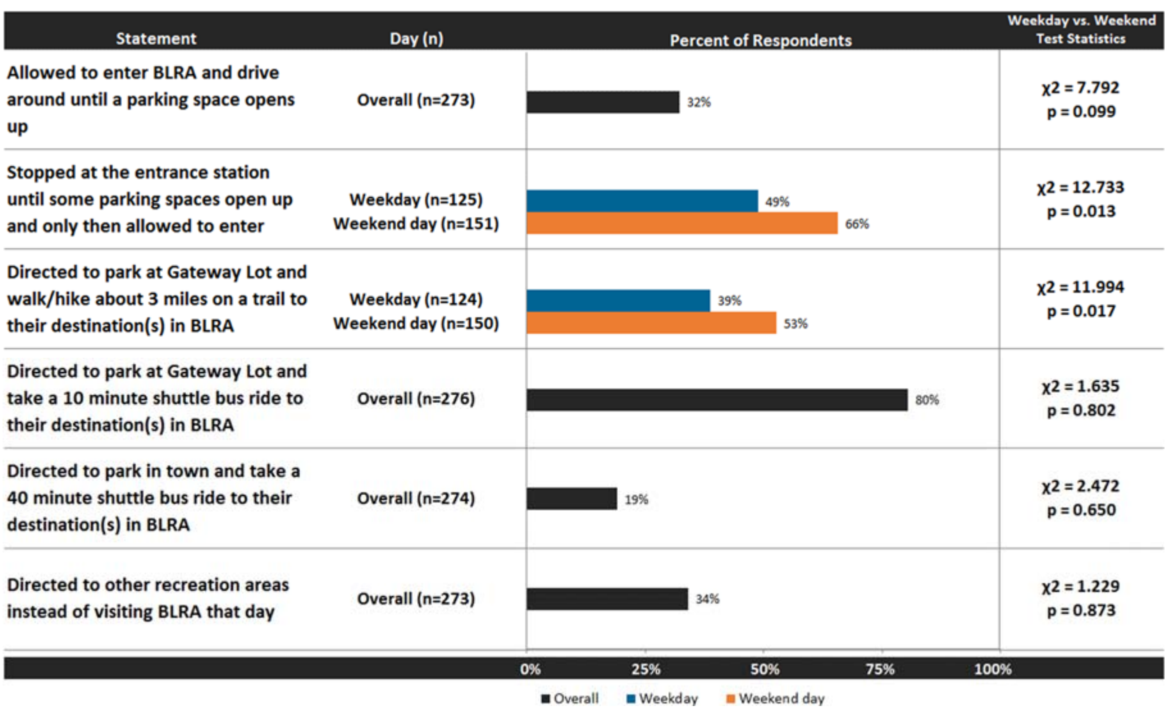


Figure 1-101. Percentage who agree with each of the statements about potential actions when parking lots are full at BLRA.

Planning Your Trip to BLRA

- The time frame in which visitors to IPW planned their trips to BLRA did not vary significantly between weekdays and weekend days (χ^2=8.903, p=0.064).
- Regardless of the day of week, a large majority (86%) of visitors planned their trips to BLRA within a week prior to visiting. More specifically, over half (58%) planned their trip within the 24-hours prior to their trip.
- Very few (15%) visitors planned their trip more than a week prior to visiting BLRA.

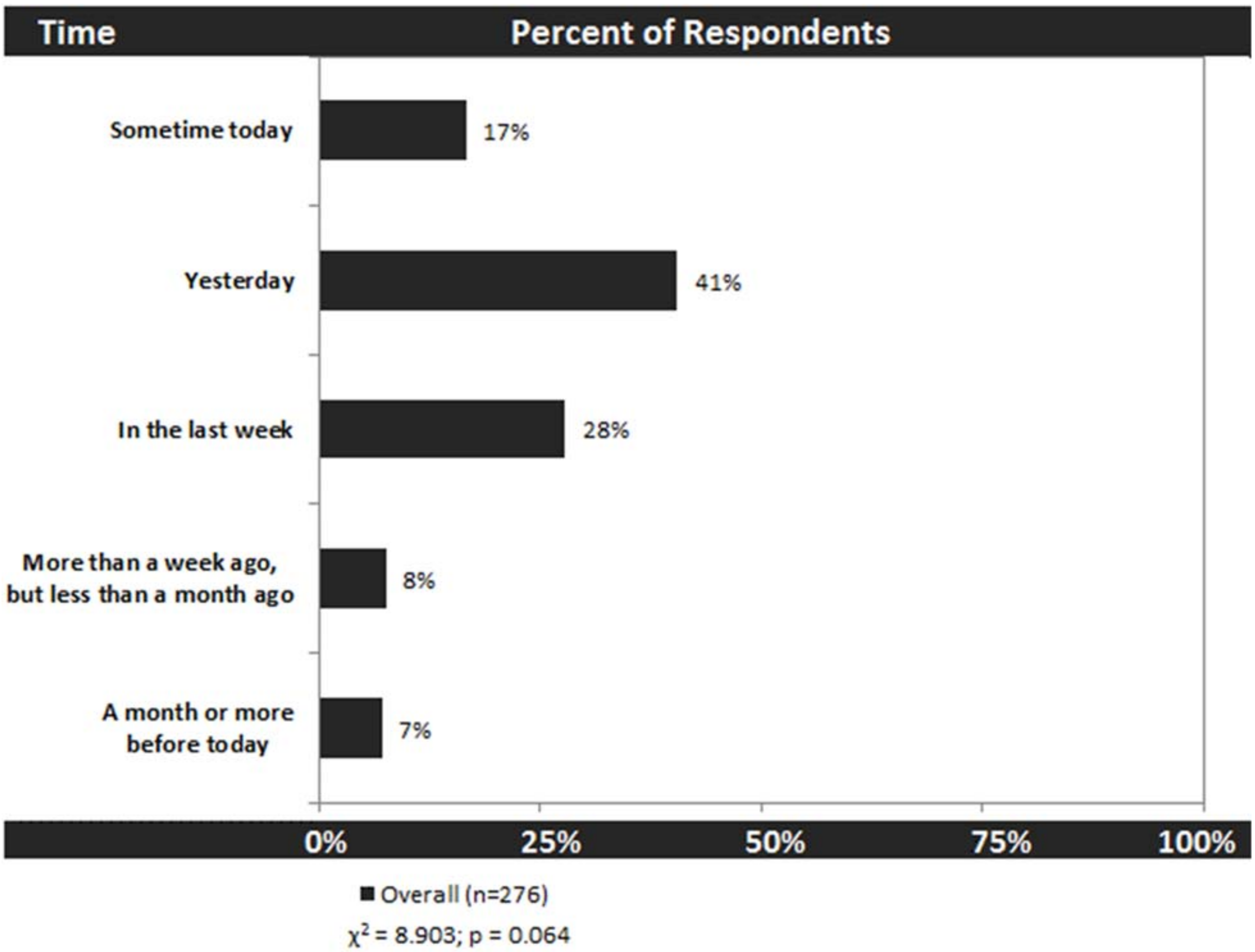


Figure 1-102. How long ago did you decide to take this trip to BLRA?

- Significantly more weekend than weekday visitors to IPW anticipated that it would be difficult to find parking at BLRA (χ^2=3.988, p=0.046).
- The majority (58%) of weekend visitors anticipated that it would be difficult to find parking at BLRA, while the majority (54%) of weekday visitors did not anticipate that it would be difficult.

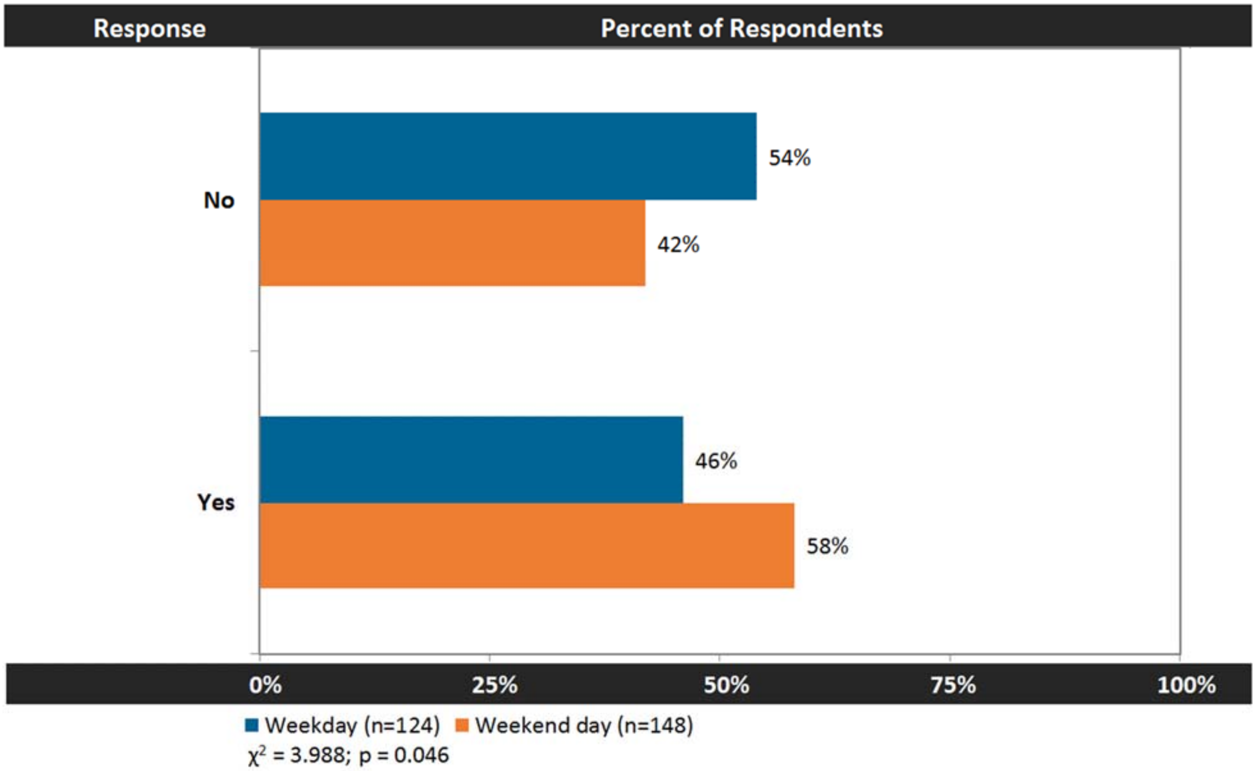


Figure 1-103. When you planned this trip to BLRA, did you think about the possibility that it might be difficult to find parking here?

- For visitors to IPW who thought about the possibility that it might be difficult to find parking at BLRA, a follow-up question asked how that affected their trip plans.
- Regardless of the day of week, close to two-thirds (62%) of visitors who thought about the possibility that it might be difficult to find parking at BLRA when they planned their trip reported that this did not affect their trip plans.
- Weekday visitors (30%) were much more likely than weekend day visitors (1%) to plan their visit to BLRA for a day of the week that they thought would be less crowded (χ^2=25.813, p<0.001).
- Weekday and weekend day visitors did not differ significantly in their responses to any of the other statements included in this question.
- Of note, one-third (35%) of all visitors who thought about the possibility of parking congestion visited at a time of day they thought would be less crowded, regardless of the day of week.
- A verbatim list (including respondents' typos) of "other" effects reported by respondents is included in Appendix B.

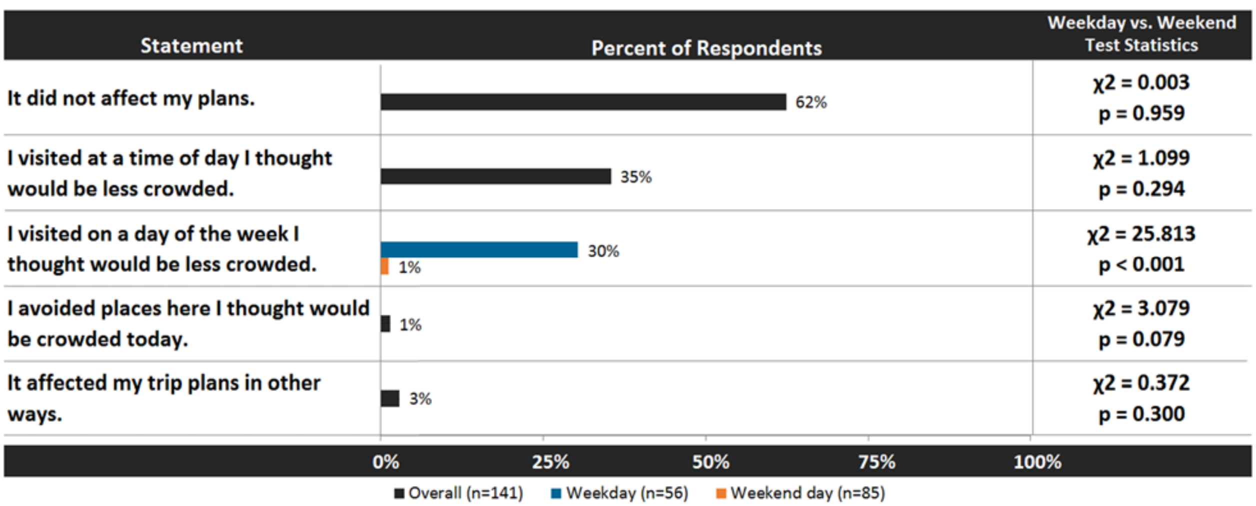


Figure 1-104. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to BLRA, how did it affect your trip plans?

- Visitors were asked how likely they would be to use each of several sources for information about parking and crowding conditions at BLRA, if it were available for planning a future trip to BLRA. Responses to the question did not vary significantly between weekday and weekend day visitor groups.
- The vast majority (82%) of visitors to IPW indicated they would be likely to use a website for information about parking and crowding at BLRA when planning a future trip.
- A smartphone app ranked second among the information sources, with over half (56%) of visitors indicating they'd be likely to use one to plan a future trip to BLRA.
- Over one-third of visitors to IPW indicated they'd be likely to use social media (44%), text updates on a cellular phone/smartphone (34%), and an AM radio station (34%) for information about parking and crowding at BLRA. Just under one-third (31%) indicated they would use a telephone information line with a message updated daily.
- A verbatim list (including respondents' typos) of "other" effects reported by respondents is included in Appendix B.

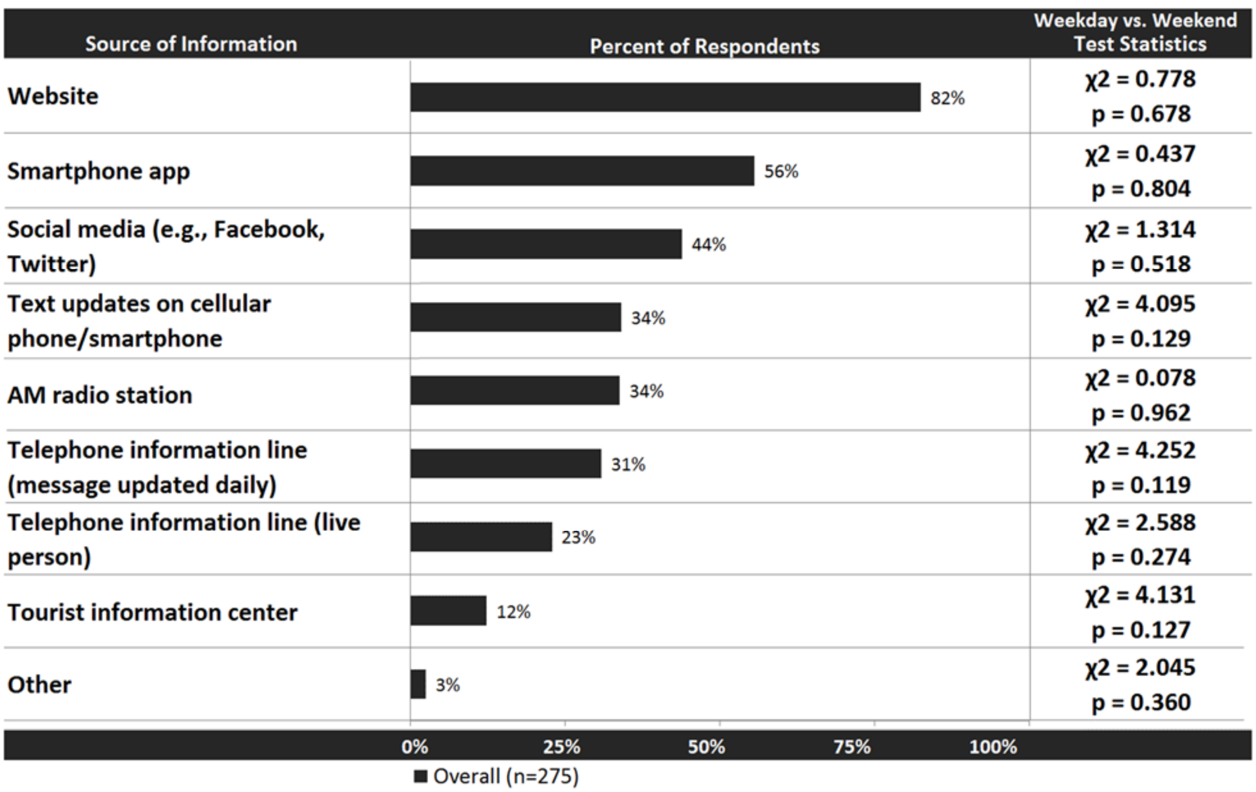


Figure 1-105. Percentage who would be likely to use each of the sources for information about parking and crowding conditions at BLRA, if it was available for planning a future trip to BLRA.

Background Information

- There were no significant differences in the gender of IPW visitors on weekdays and weekend days (χ^2=2.425, p=0.119).
- Slightly more than half (55%) of respondents were male, and slightly less than half (45%) were female.

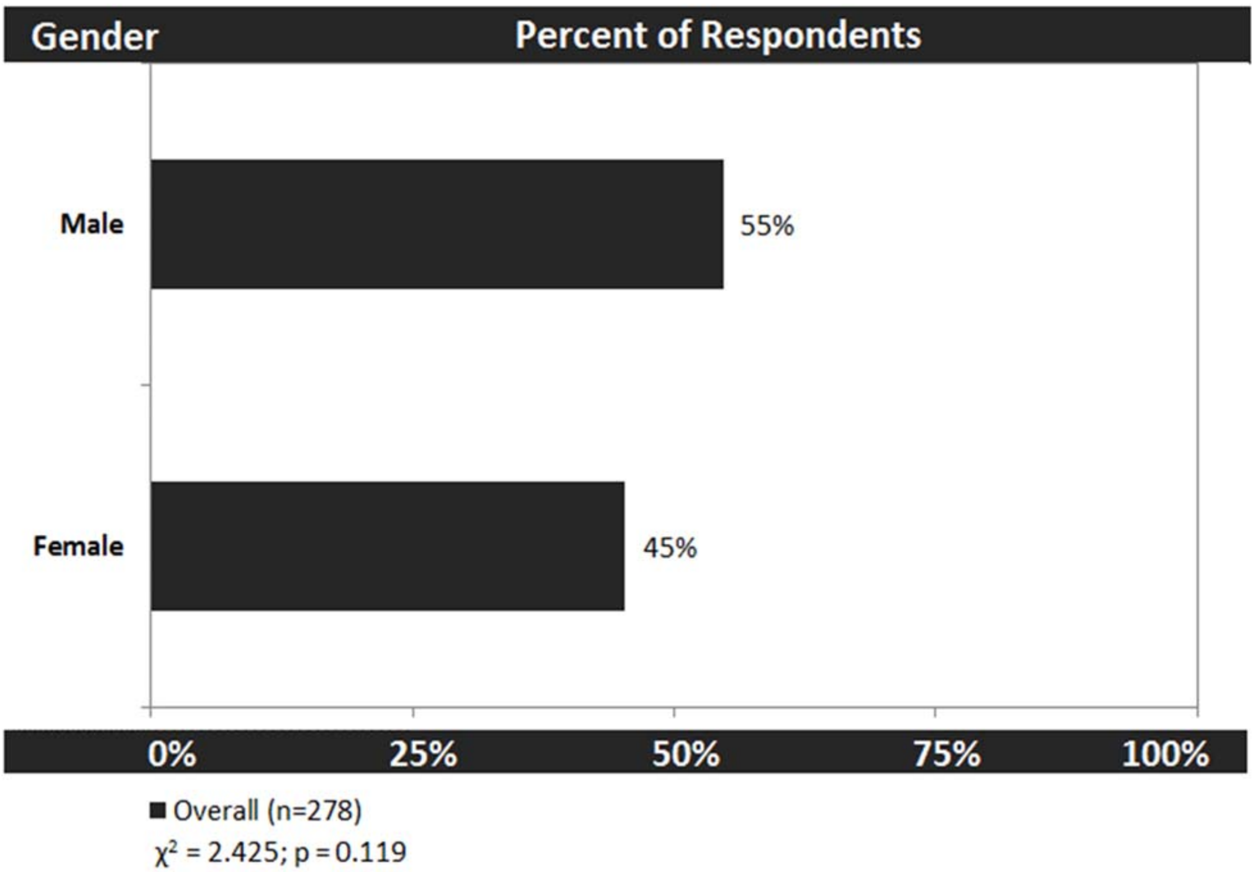


Figure 1-106. What is your gender?

- On average, visitors contacted on weekdays (mean = 51 years of age) were slightly older than those contacted on weekend days (mean = 45 years of age; t=3.093, p=0.002).
- The majority (58%) of weekday visitors were 55 years of age or older, while half (50%) of weekend day visitors were between 18 and 44 years of age (χ^2=37.249, p<0.001).

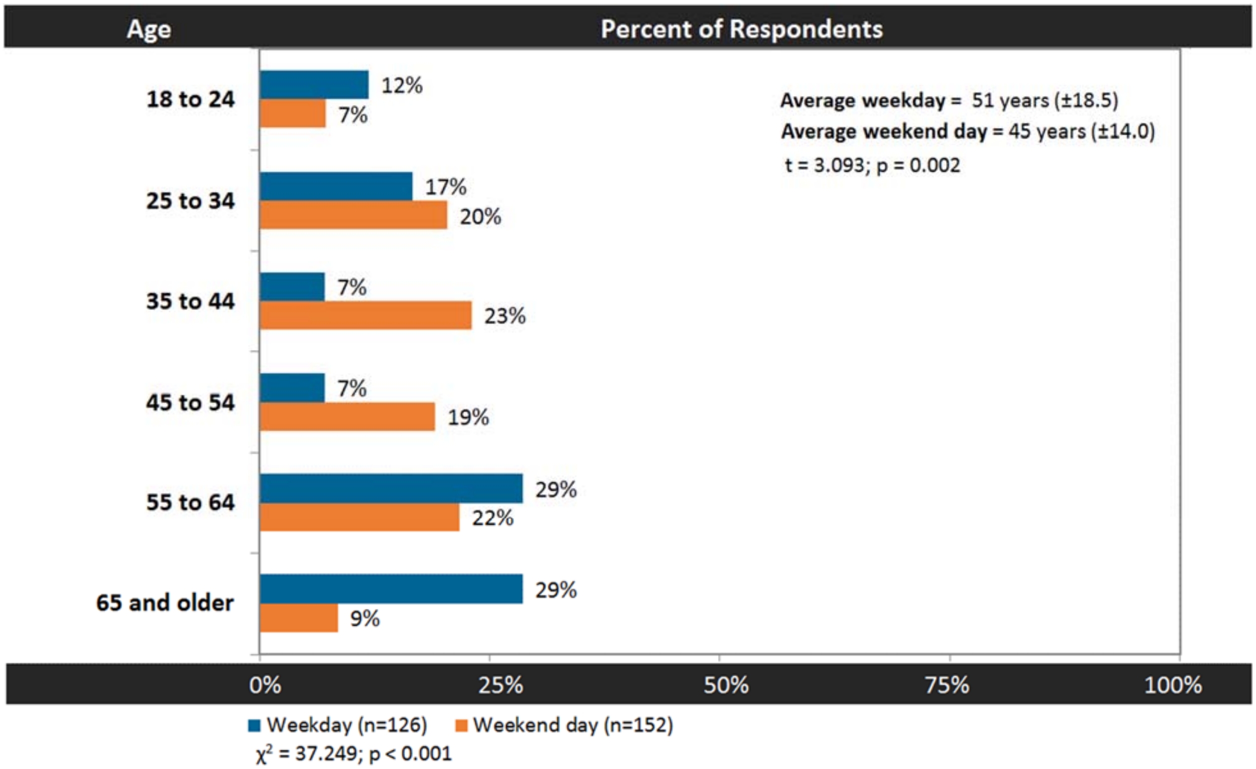


Figure 1-107. How old are you?

- Visitors were overwhelmingly (97%) residents of the United States, regardless of the day of the week when they visited IPW (χ^2=0.355, p=0.551).
- A frequency distribution of all countries of residence reported by respondents is included in Table 10 in Appendix G.

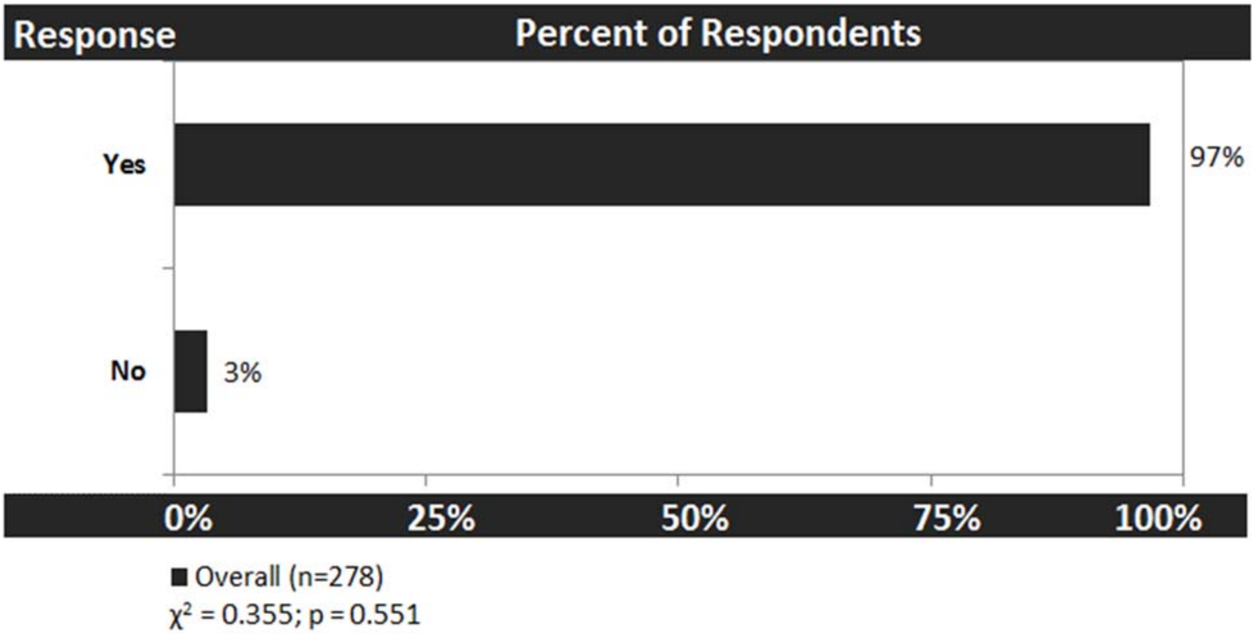


Figure 1-108. Do you live in the United States?

- The state of residence of visitors to IPW varied significantly between weekdays and weekend days (χ^2=10.795, p=0.001).
- The vast majority (89%) of visitors on weekend days were residents of Colorado and few (11%) were residents of other states.
- A slightly smaller majority (72%) of weekday visitors were residents of Colorado, with over one-quarter (28%) of visitors residing in other states.
- A frequency distribution of all states of residence reported by respondents is included in Table 11 in Appendix G.

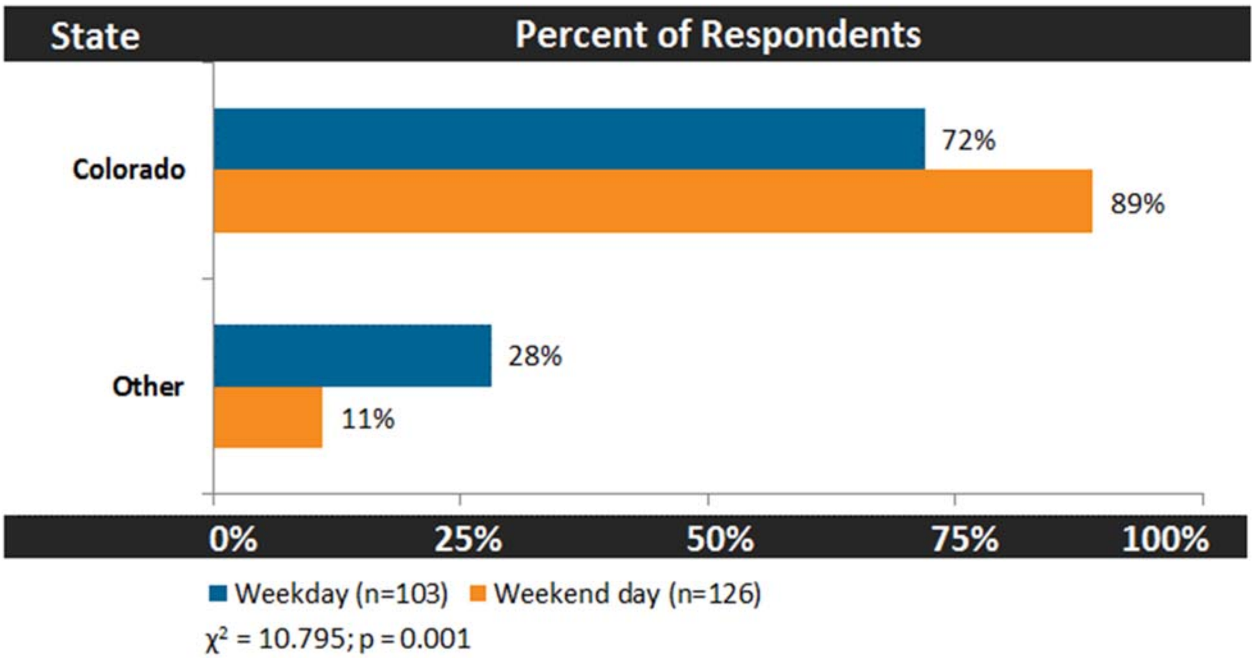


Figure 1-109. If you live in the United States, what state do you live in?

- Among Colorado residents who visited the IPW, visitors' city of residence did not vary significantly between weekdays and weekend days ($\chi2$=2.115, p=0.715).
- Among Colorado residents who visited the IPW, over half (56%) reside in the Boulder metropolitan area.
- Over one-third (38%) of Colorado residents who visited IPW live in the Denver-Aurora-Lakewood metropolitan area.
- A frequency distribution of all zip codes reported by respondents who are residents of Colorado is included in Table 12 in Appendix G.

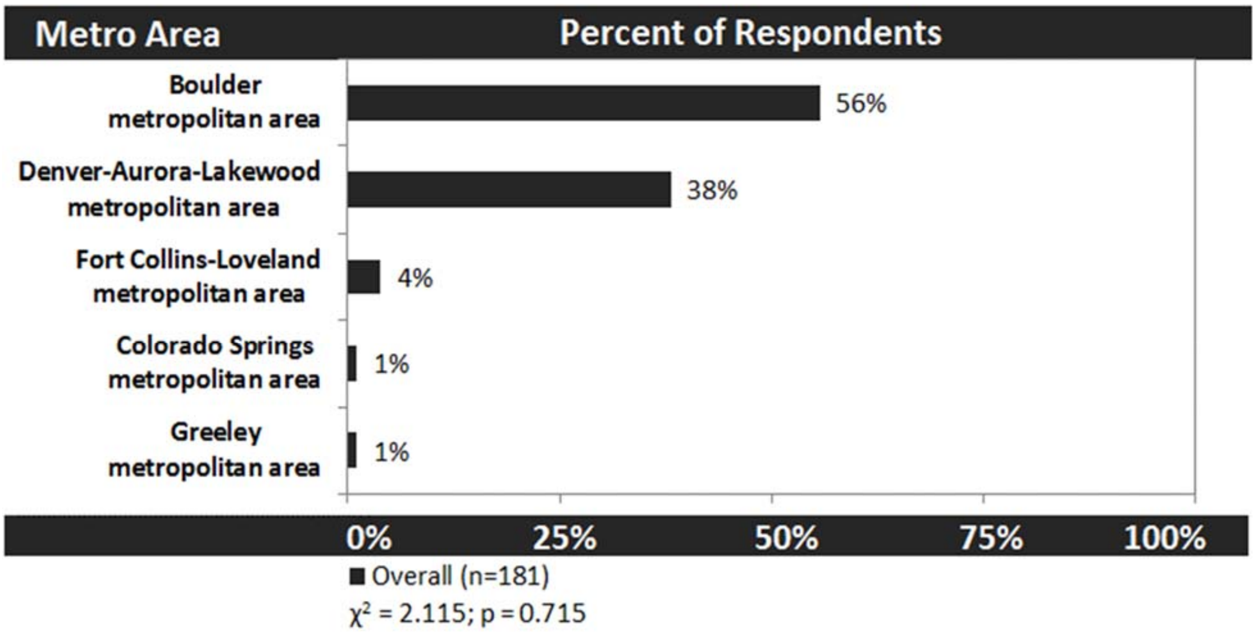


Figure 1-110. If you live in Colorado, what town or city do you live in?

- The education level of visitors varied significantly between weekdays and weekend days (χ^2=12.584, p=0.013).
- Regardless of the day of week, the vast majority (81% on weekdays, 88% on weekends) of IPW visitors have earned a college, business or trade school degree or higher.

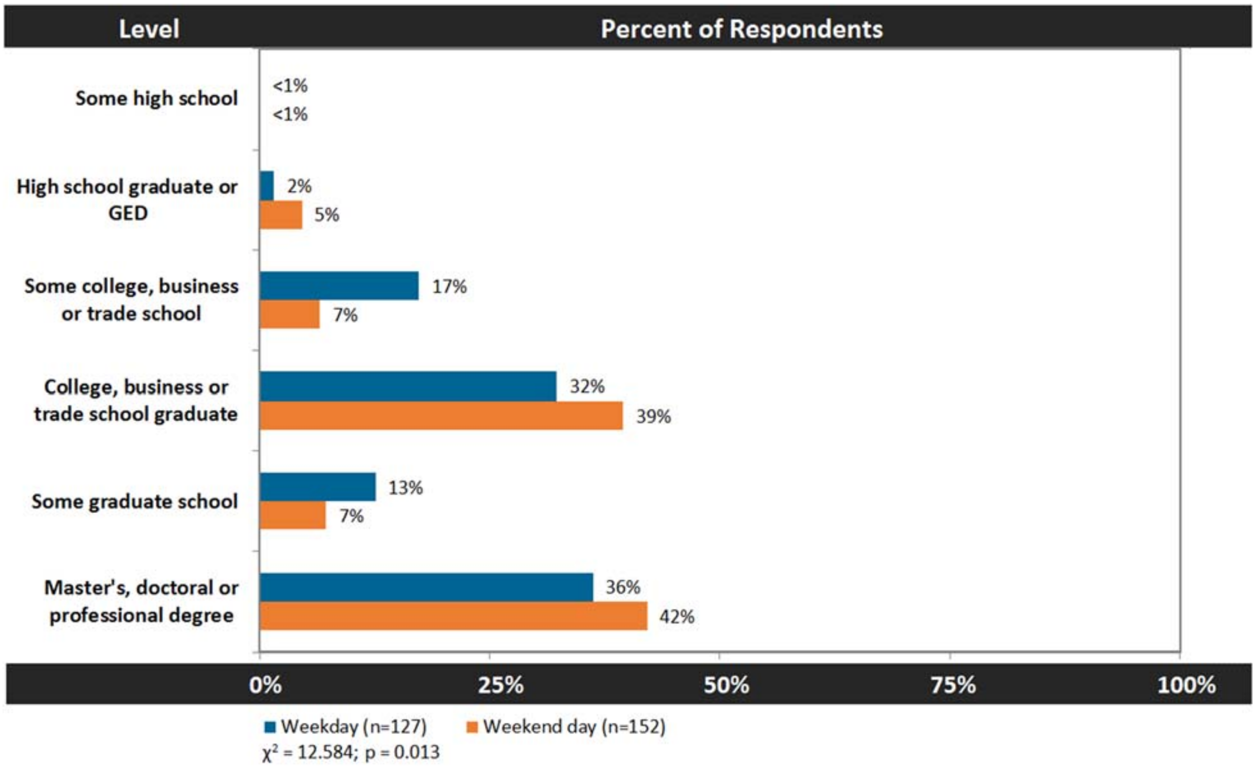


Figure 1-111. What is the highest level of formal education you have completed?

- Very few (3%) visitors reported being Hispanic or Latino, regardless of the day of the week when they visited IPW (χ^2=1.394, p=0.238).

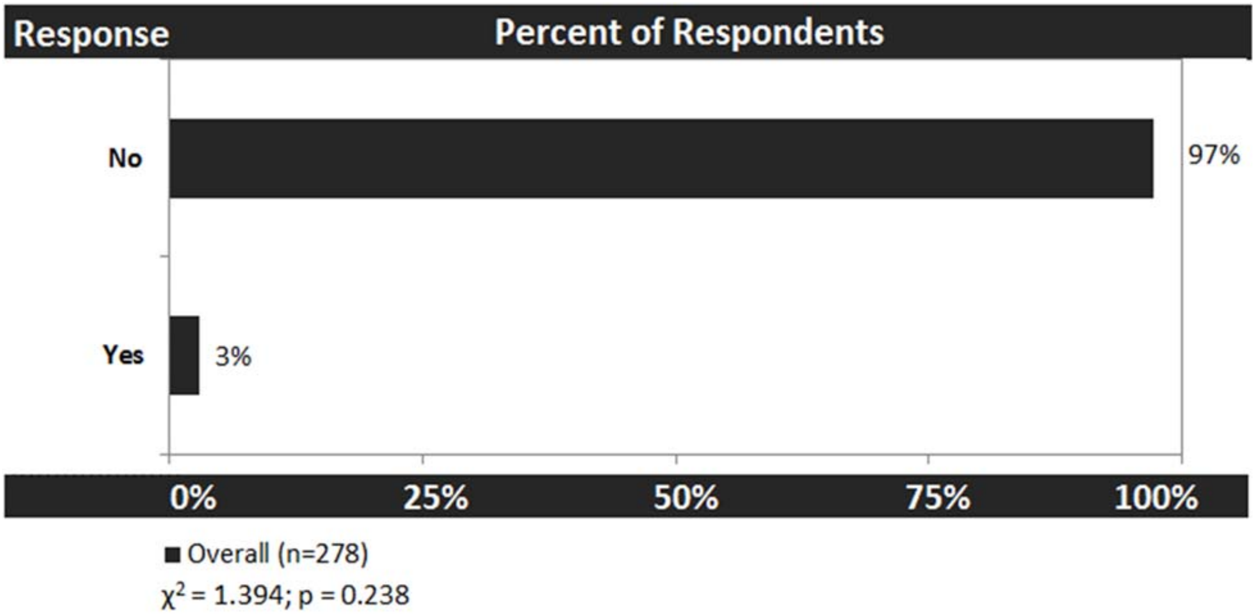


Figure 1-112. Are you Hispanic or Latino?

- Visitors' self-reported race did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, the vast majority (97%) of visitors reported their race as white.

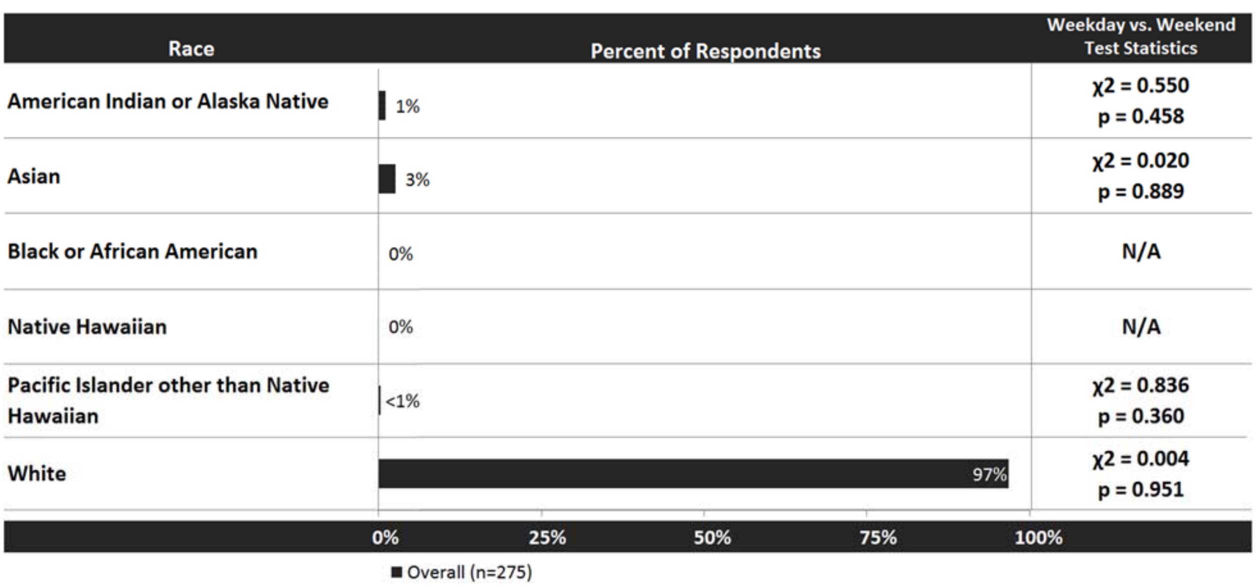


Figure 1-113. What is your race?

BLRA Visitor Survey Results

Results in this section are representative of all visitor groups/visitors who parked at BLRA and did no visit the IPW during the 2014 peak visitation period at BLRA (referred to hereafter as visitor groups/visitors to BLRA's developed recreation area).

Trip Description

- The distribution of group sizes did not vary significantly between weekend day and weekday visitor groups at BLRA's developed recreation area (χ^2=2.451, p=0.484).
- A majority (53%) of all visitors groups at BLRA's developed recreation area were groups of two people.
- One-fifth (20%) of all BLRA developed recreation area visitor groups were groups of 3 or 4 people.
- Solo visitors (14%) and groups of 5 or more people (13%) were about equally common.
- On average, BLRA developed recreation area visitors were in groups of 3 people, regardless of day of week (t=-1.658, p=0.101).

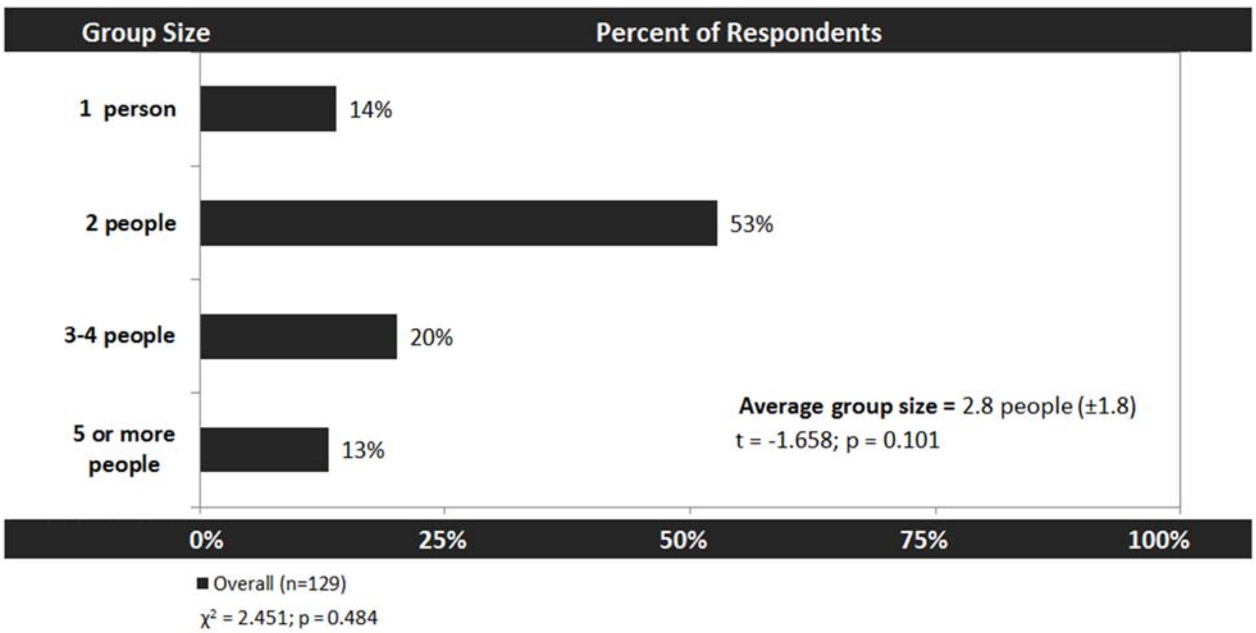


Figure 1-114. Including yourself, how many people are in your personal group on this trip to Brainard Lake Recreation Area (BLRA)?

- The percentage of groups visiting BLRA's developed recreation area with children under the age of 16 did not differ significantly between weekend day and weekday visitor groups (χ^2=2.790, p=0.095).
- Regardless of the day of week, most (80%) of BLRA developed recreation area visitor groups were visiting without children under the age of 16.

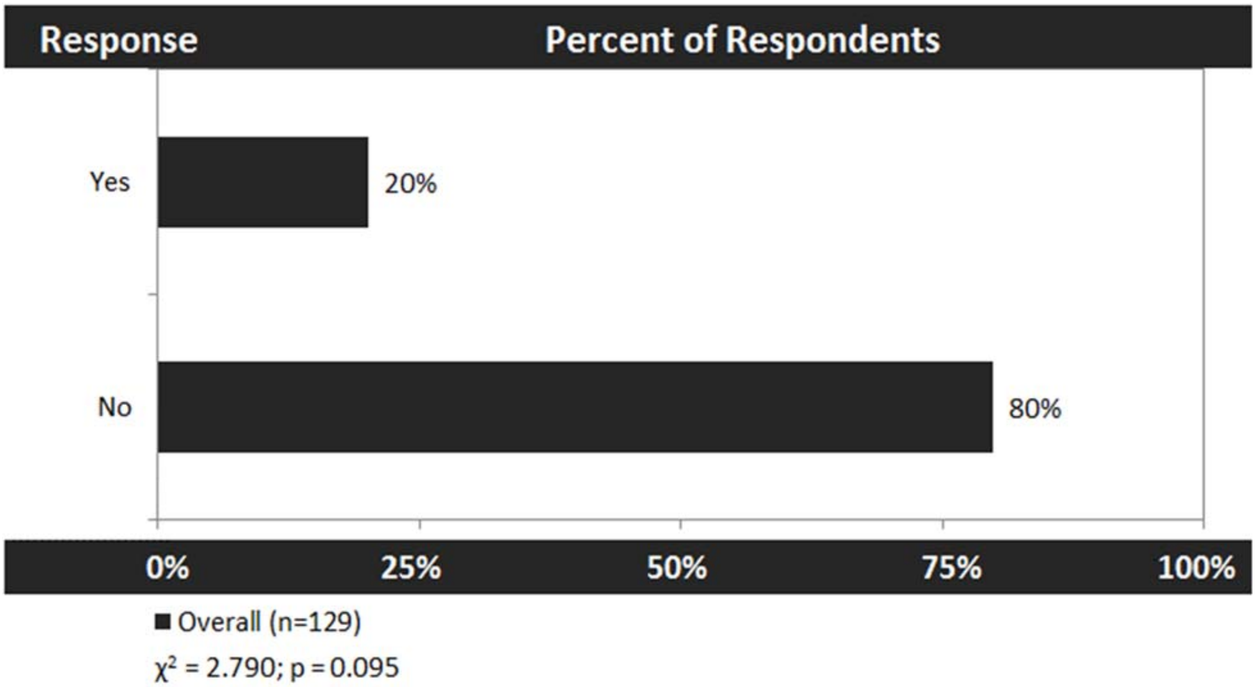


Figure 1-115. Are there any children under the age of 16 in your personal group on your trip to BLRA?

- The number of children in groups with children did not differ significantly between weekdays and weekend days ($\chi^2 = 3.840$, p=0.279).
- Regardless of the day of week, there was an average of just over two children in groups with children (t=-1.166, p=0.255).
- Of the relatively few groups visiting BLRA's developed recreation area with children under the age of 16, approximately three-quarters (73%) were with only one or two children.

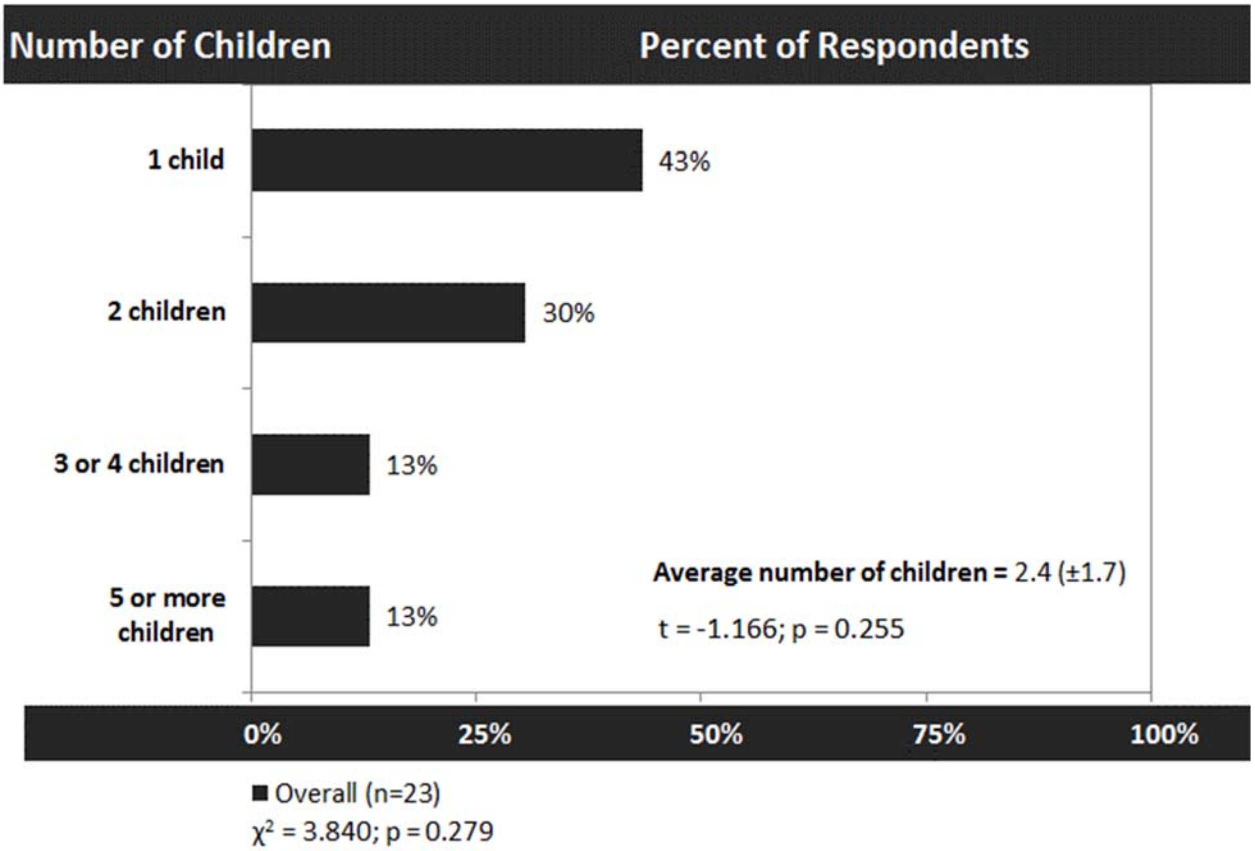


Figure 1-116. For groups with children: how many children under the age of 16 are in your personal group today?

- For most locations visited in BLRA's developed recreation area, the proportion of respondents who visited those locations did not vary significantly between weekday and weekend visitors (p>0.05).
- The number of BLRA developed recreation area visitor groups that stopped at Red Rock Lake did vary significantly between weekday (15%) and weekend day (4%) visitor groups (χ^2=4.188, p=0.041).
- The vast majority (98%) of BLRA developed recreation area visitor groups visited Brainard Lake.
- Smaller proportions of BLRA developed recreation area visitor groups visited Pawnee Campground (43%), Long Lake Trail (23%), and the Mitchell Lake Trail (12%).
- A verbatim list (including respondents' typos) of "other" locations reported by respondents is included in Table 13 in Appendix H.

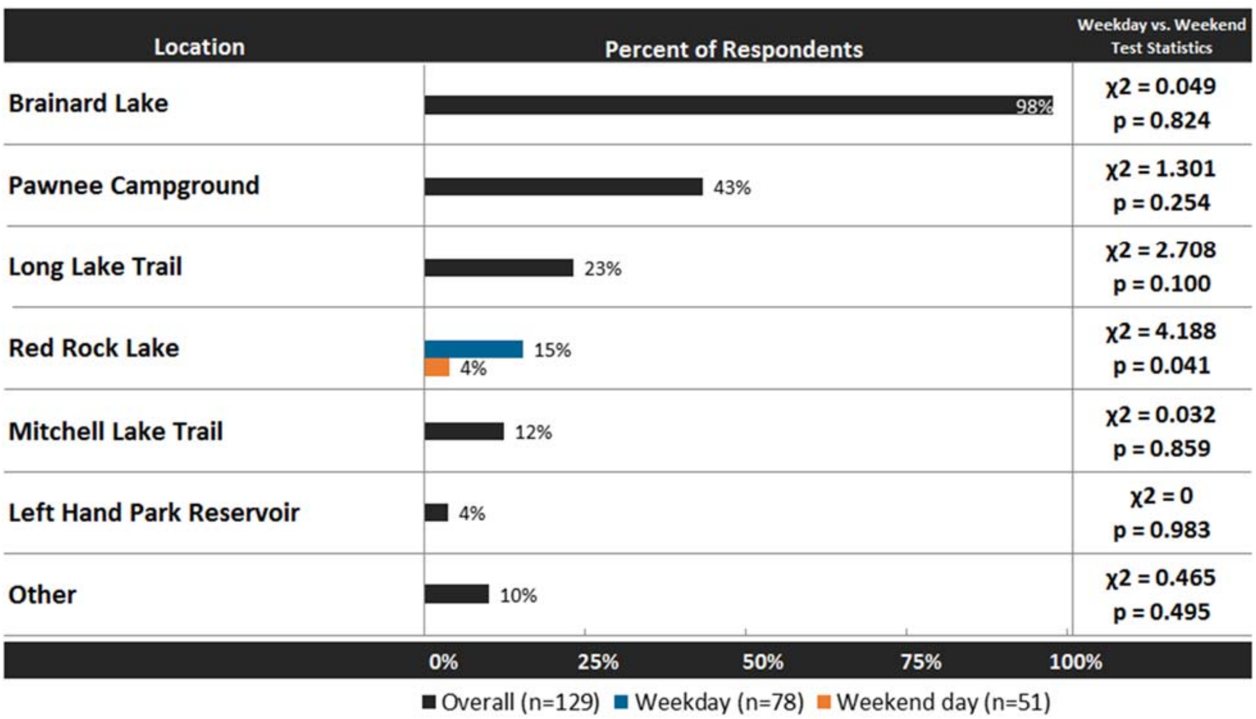


Figure 1-117. Which of the following locations in BLRA have you/will you visit on this trip?

- The primary destination of BLRA developed recreation area visitor groups contacted on weekdays did not vary significantly from that of visitor groups contacted on weekend days (χ^2=9.797, p=0.200).
- Brainard Lake was the most popular primary destination reported by visitor groups to BLRA's developed recreation area, with over half (58%) of visitor groups reporting this.
- A few (8%) BLRA developed recreation area visitor groups reported that they did not have a primary destination on their trip to BLRA.

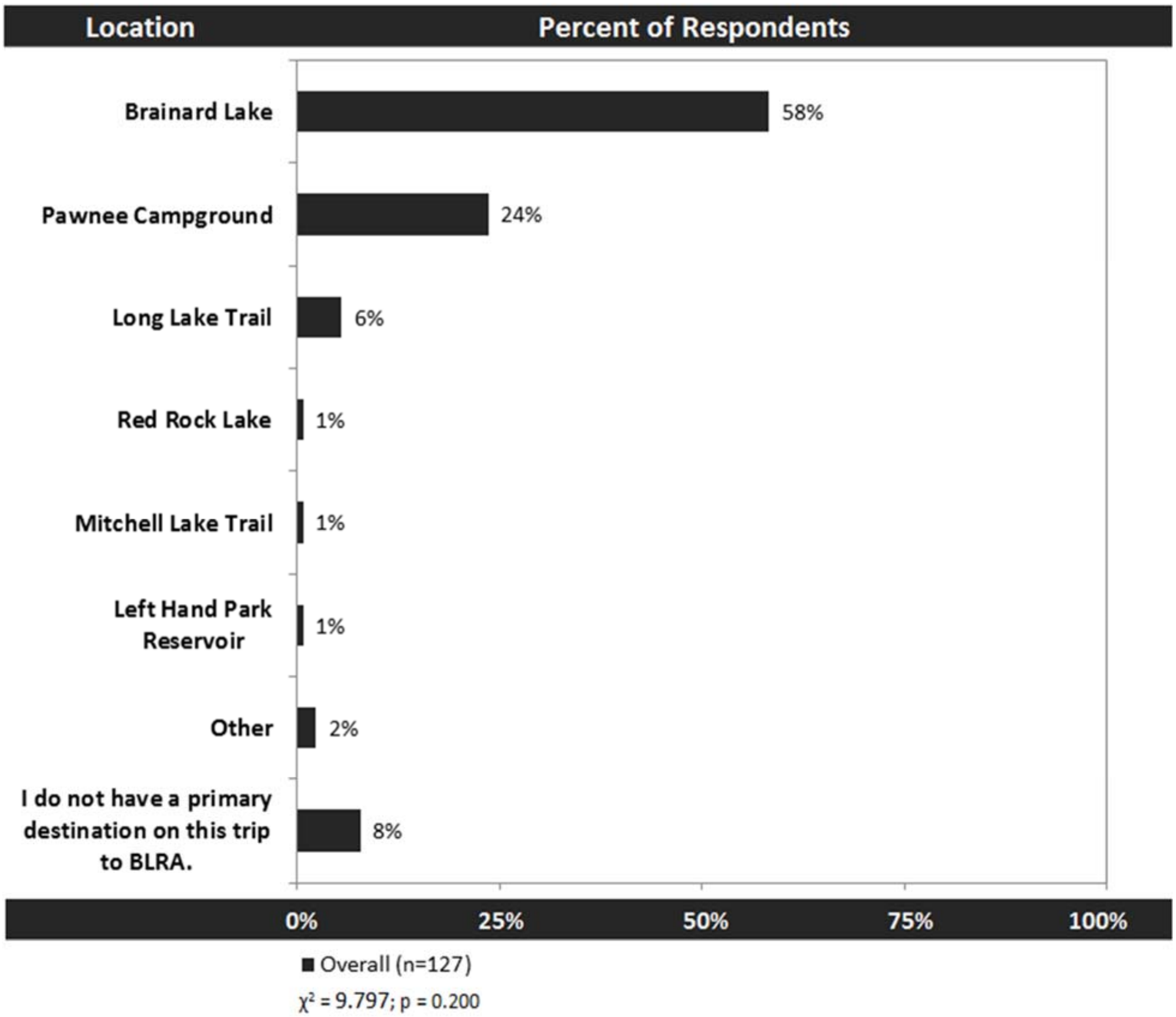


Figure 1-118. Which of the locations listed in Question 3 was your primary destination on this trip to BLRA?

- The activities participated in by BLRA developed recreation area visitor groups did not vary significantly between weekday and weekend day visitor groups (p>0.05 for all tests, except for “Other” responses).
- Nearly three-quarters (71%) of BLRA developed recreation area visitor groups walked or hiked for less than one hour.
- Close to one-third of BLRA developed recreation area visitor groups, regardless of the day of the week, participated in camping in Pawnee Campground (32%) and day hiking of more than 1 hour (31%).
- About one-quarter of BLRA developed recreation area visitor groups participated in picnicking (27%) and creative arts (24%), regardless of the day of week.
- A verbatim list (including respondents’ typos) of “other” located reported by respondents is included in Appendix B.

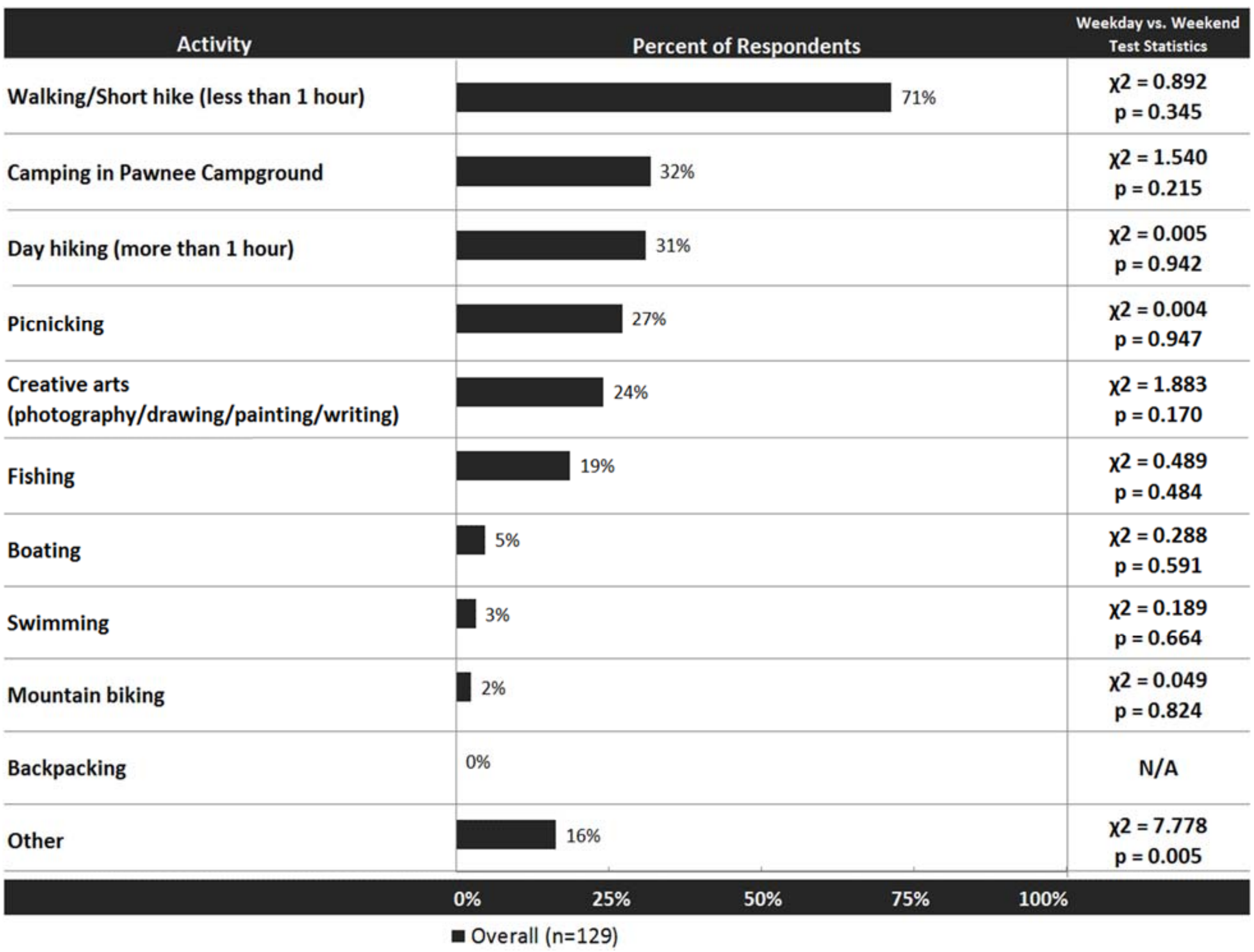


Figure 1-119. Which of the following activities have you done during this trip to BLRA?

- The primary activity of BLRA developed recreation area visitor groups did not vary significantly between weekday and weekend day visitor groups (χ^2=12.671, p=0.081).
- Camping in Pawnee Campground was the primary activity for the largest proportion (25%) of BLRA developed recreation area visitor groups.
- A slightly smaller proportion (20%) of BLRA developed recreation area visitor groups indicated that a walk or short hike of less than one hour was their primary activity in BLRA.

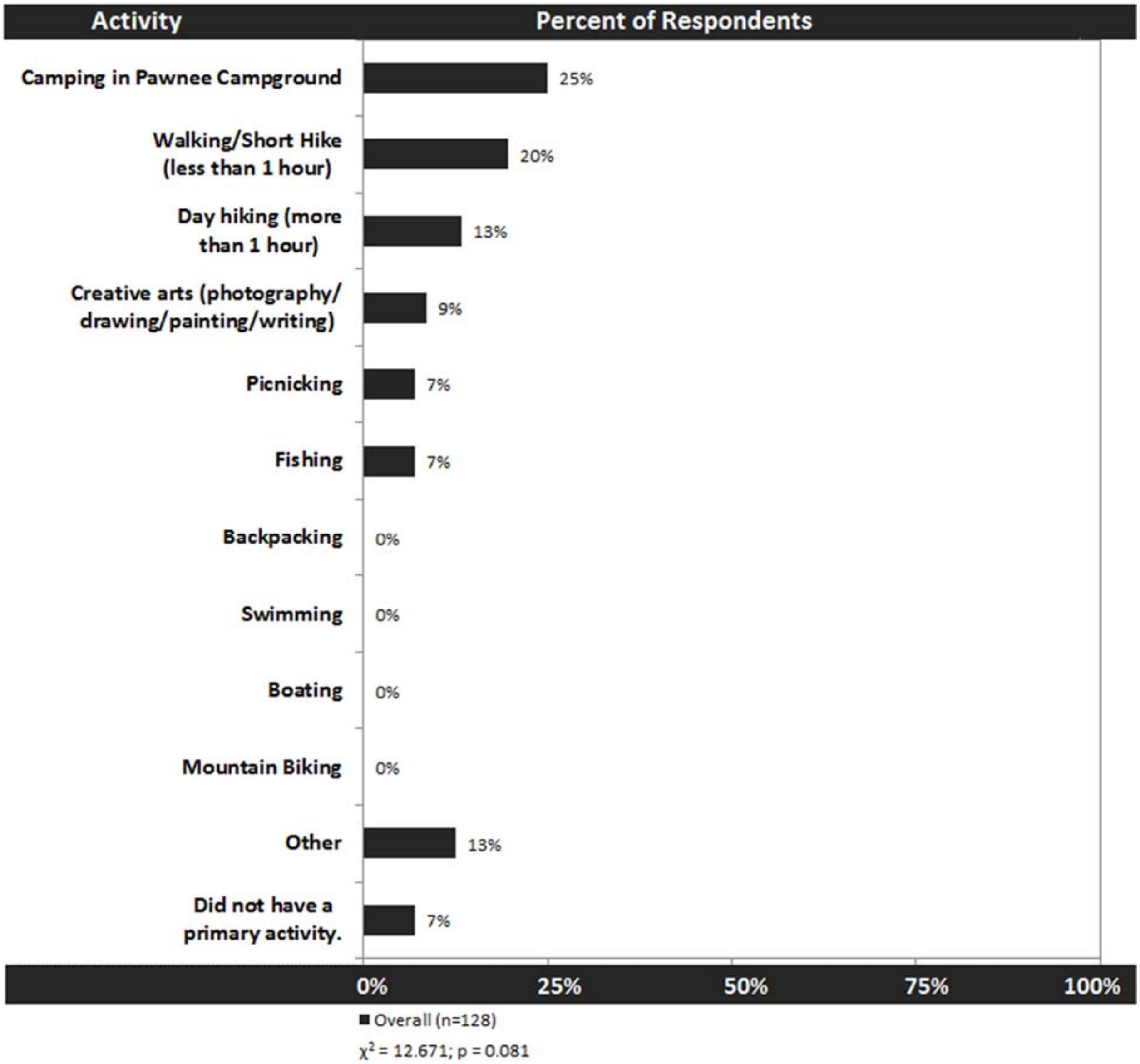


Figure 1-120. Which of the following activities was your primary activity on this trip to BLRA?

- Among BLRA developed recreation area visitor groups who camped in the Pawnee Campground, the number of nights spent camping did not vary significantly between weekday and weekend day visitor groups (χ^2=1.086, p=0.581; t=0.288, p=0.775).
- Nearly half (49%) of all BLRA developed recreation area visitor groups who camped in Pawnee Campground spent two nights there. Nearly one-third (31%) spent 3 or more nights, and 20% spent 1 night.

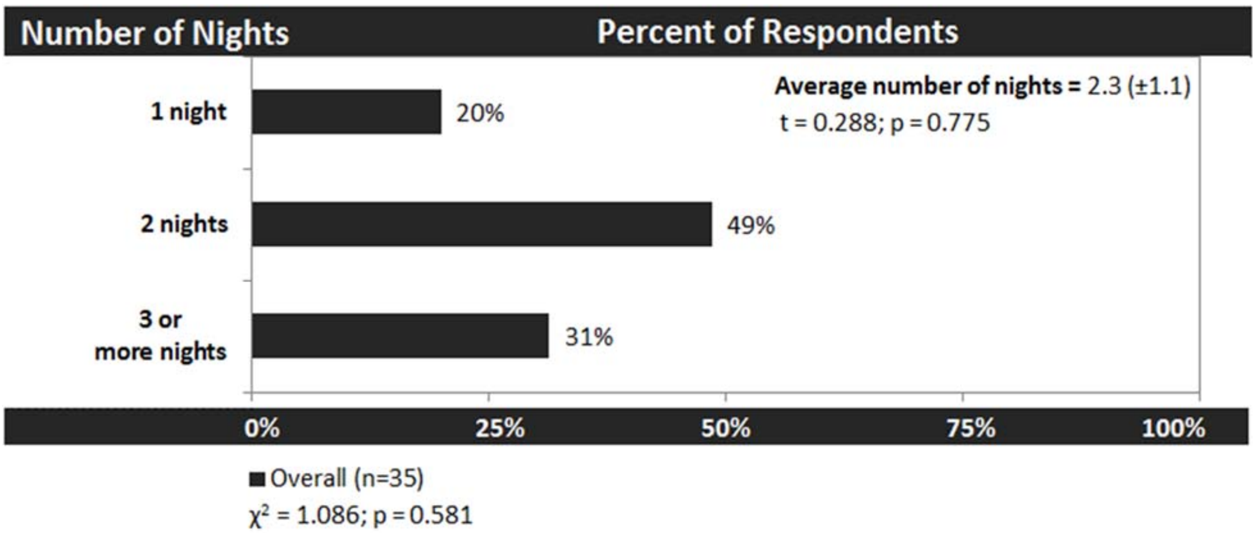


Figure 1-121. If you camped in the Pawnee Campground, how many nights did you spend there?

Travel and Parking

- There was no significant difference in the routes that weekday and weekend day BLRA developed recreation area visitor groups used to travel to and from BLRA (χ^2=11.416 p=0.653).
- The largest proportion (21%) of BLRA developed recreation area visitor groups traveled to and from BLRA via the Peak-to-Peak Highway, regardless of the day of the week. Slightly smaller proportions (20% and 19%, respectively) traveled to and from BLRA via Left Hand Canyon and Boulder Canyon, regardless of the day of the week.
- Close to three-quarters (73%) of BLRA developed recreation area visitors took the same route home that they took to get to BLRA.
- A verbatim list (including respondents' typos) of "other" routes reported by respondents is included in Table 15 in Appendix H.

Table 1-25. Which routes did you use to travel to and from BLRA on this trip?

	Percent of Respondents (n=106)			
	Route home			
Route to BLRA	**Left Hand Canyon**	**Boulder Canyon**	**Peak-to-Peak Highway**	**Rt. 119**
Left Hand Canyon	**20%**	6%	3%	2%
Boulder Canyon	1%	**19%**	4%	1%
Peak-to-Peak Highway	1%	2%	**21%**	3%
Rt. 119	0%	1%	6%	**13%**

- BLRA developed recreation area visitor groups' arrival times at BLRA did not vary significantly between weekdays and weekend days (χ^2=7.350, p=0.196).
- Approximately one-third (34%) of BLRA developed recreation area visitor groups arrived at BLRA between 9 AM and 11 AM, regardless of the day of week.
- Just over one-quarter (26%) of BLRA developed recreation area visitor groups arrived between 1 PM and 3 PM.
- Equal proportions of visitors arrived prior to 9 AM (12%) and after 3 PM (12%), regardless of the day of week.

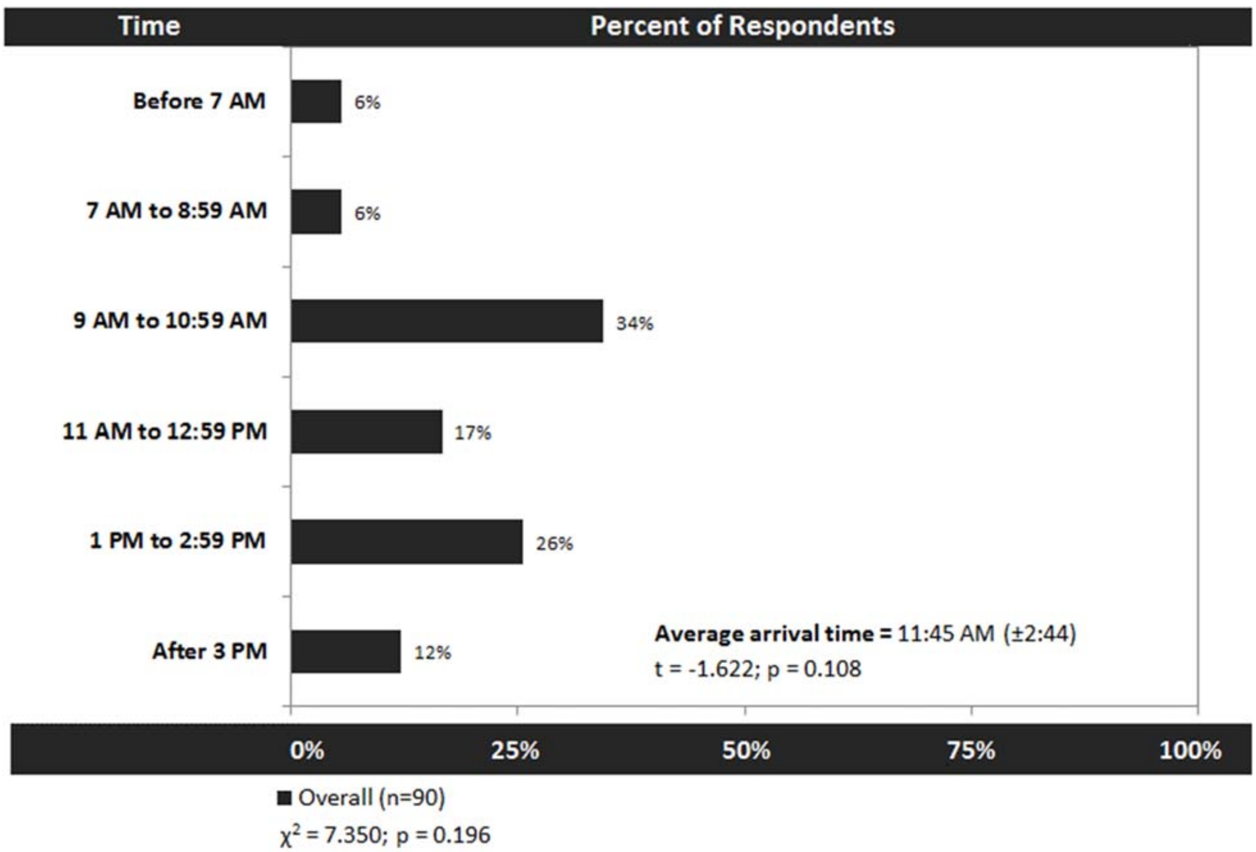


Figure 1-122. At approximately what time did you arrive at BLRA today?

- Nearly three-quarters (72%) of BLRA developed recreation area visitor groups arrived at BLRA on the same day they took the survey, regardless of the day of week (χ^2=0.165, p=0.684).
- Slightly over one-quarter (28%) of BLRA developed recreation area visitors arrived at BLRA prior to the day they took the survey.

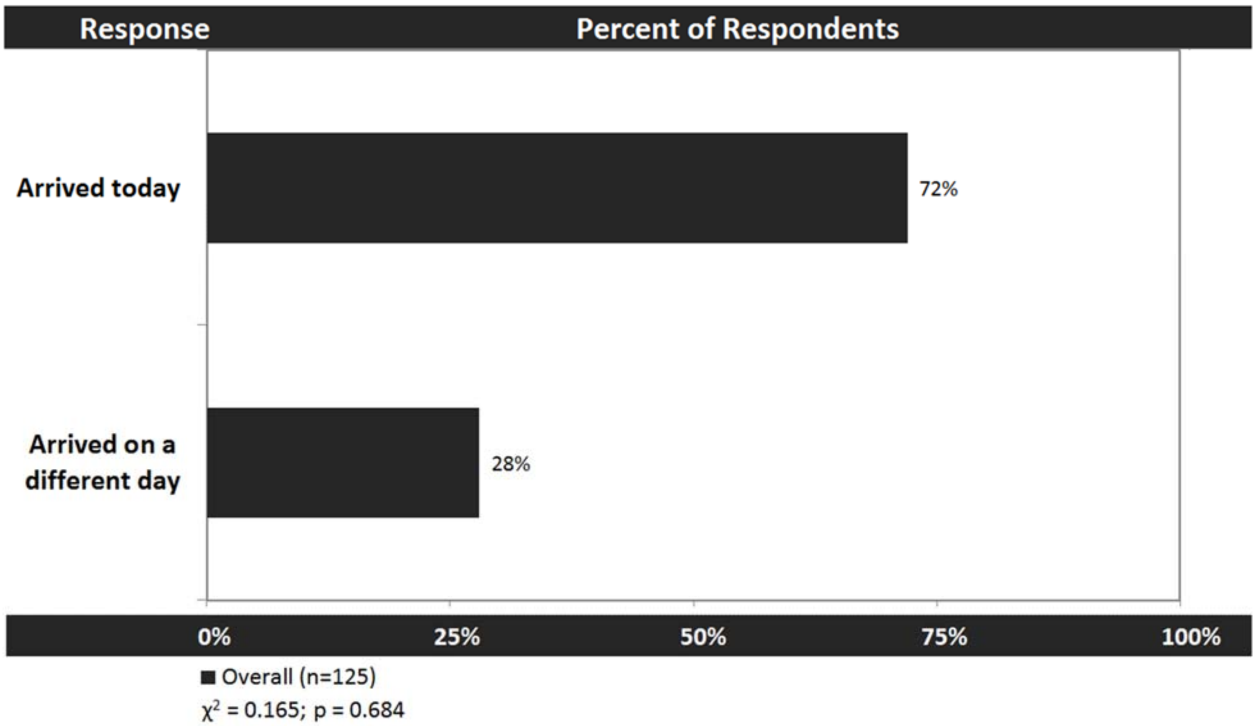


Figure 1-123. Did you arrive on a different day?

- The vast majority (83%) of all BLRA developed recreation area visitor groups traveled to BLRA in a single vehicle, regardless of the day of week (χ^2=2.398, p=0.302).

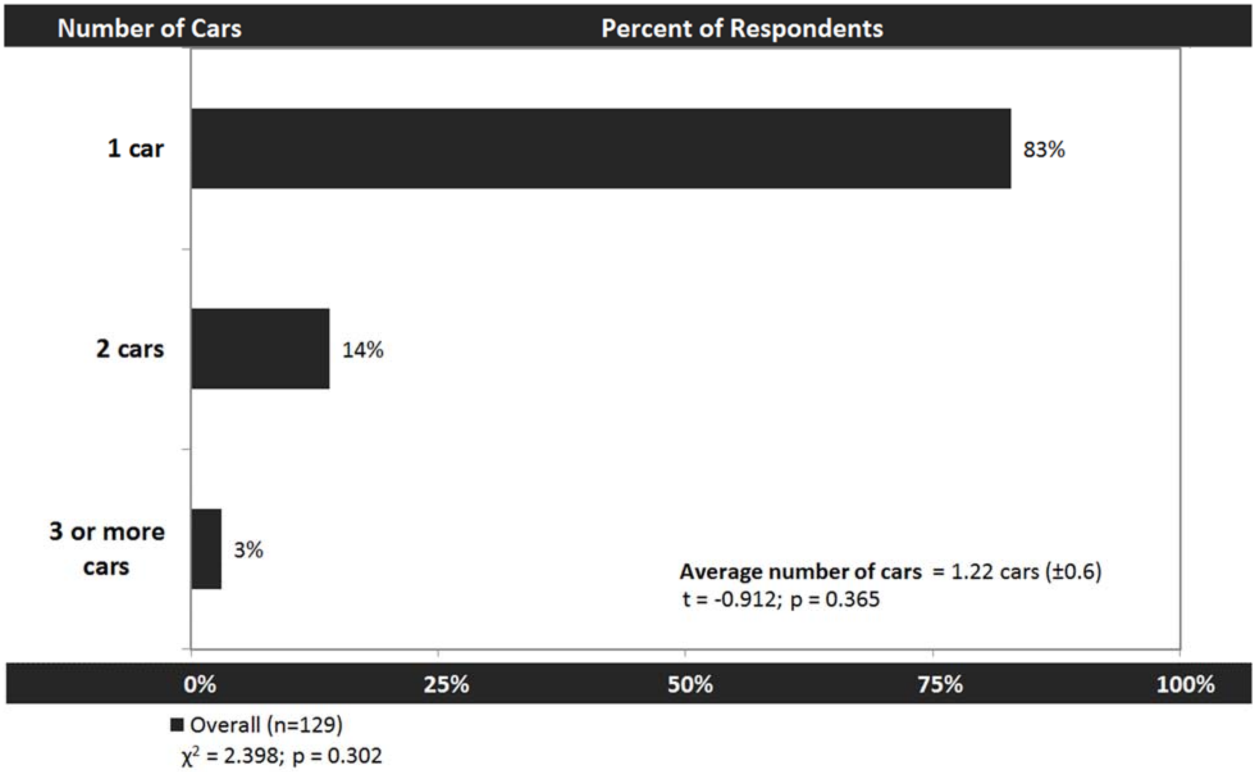


Figure 1-124. In how many vehicles did you and your personal group travel to BLRA on this trip?

- BLRA developed recreation area visitor groups' parking location at BLRA did not vary significantly between weekday and weekend day visitor groups (p>0.05 for all tests).
- The vast majority (88%) of BLRA developed recreation area visitor groups parked in the Day Use Parking Lot next to Brainard Lake (56%) or their campsite in the Pawnee Campground (32%), regardless of the day of week.
- A verbatim list (including respondents' typos) of "other" locations reported by respondents is included in Table 16 in Appendix H.

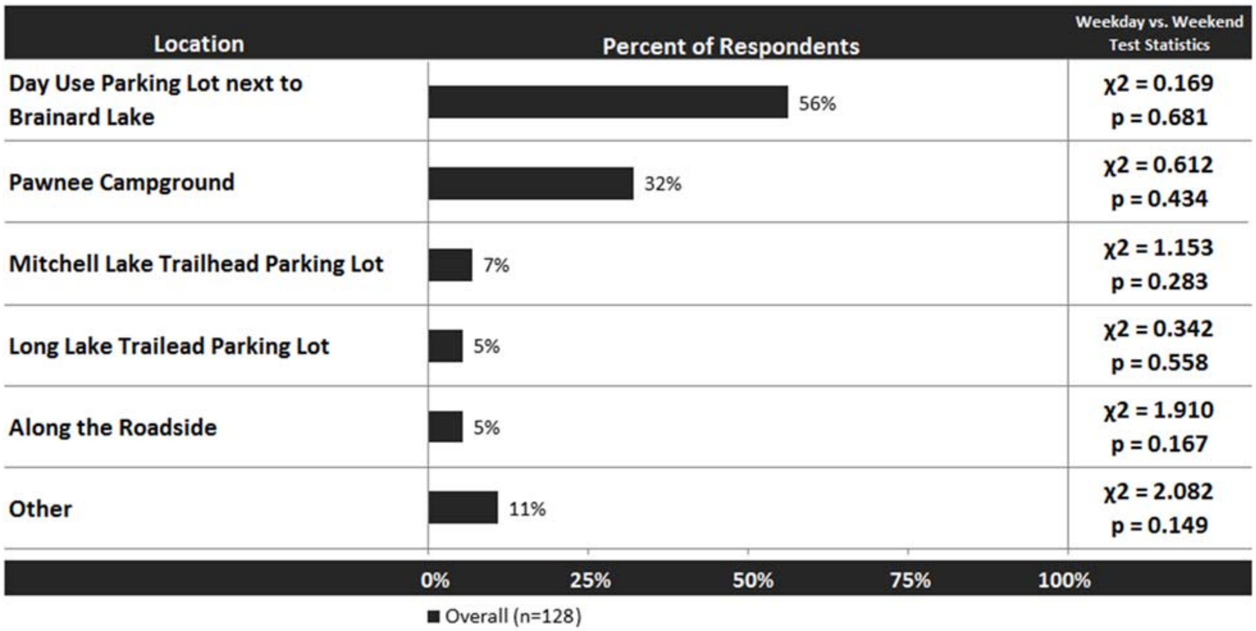


Figure 1-125. Where did you park in BLRA today?

- BLRA developed recreation area visitors' perceptions of their parking locations did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, the significant majority of visitors to BLRA's developed recreation area thought their parking locations were safe (99%), well-marked (99%), easy to find (98%), and convenient (97%).
- A slightly smaller proportion (88%) of BLRA developed recreation area visitors agreed that their parking locations were close to their destination.
- The smallest proportion (63%) of visitors to BLRA's developed recreation area thought their parking location was uncongested. That is, just under 40% of visitors thought their parking location was congested.

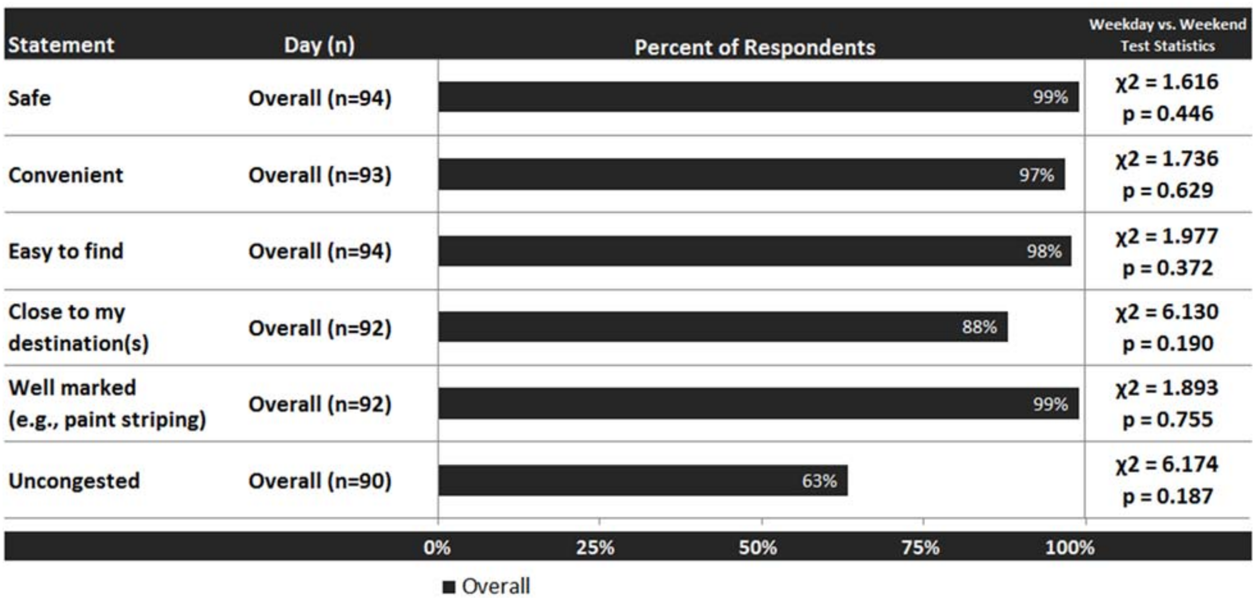


Figure 1-126. Percentage, by parking location, who agree with each of the descriptions of where they parked at BLRA on the day they took the survey.

- BLRA developed recreation area visitors' perceptions of parking congestion at BLRA did not vary significantly between weekdays and weekend days (χ^2=14.447, *p*=0.071).
- Just over one-third (36%) of visitors to BLRA's developed recreation area indicated that there was no parking congestion at BLRA on the day they took the survey.
- Close to half (42%) of visitors to BLRA's developed recreation area thought that there was moderate to extreme parking congestion at BLRA, and 64% thought there was at least slight parking congestion.

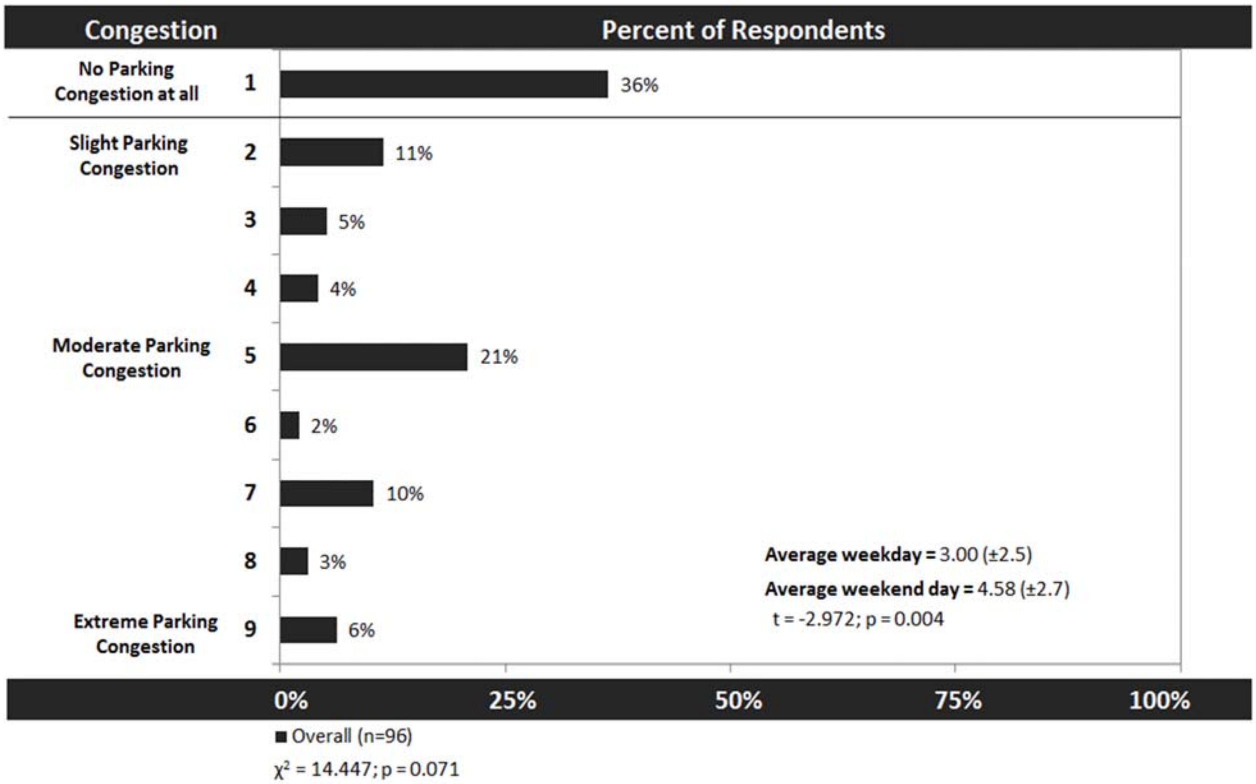


Figure 1-127. How much parking congestion do you think there is at BLRA today?

- There was not statistical difference between BLRA developed recreation area visitor groups' awareness of the Gateway Trailhead Parking Lot on weekend days versus weekdays (χ^2=3.055, p=0.383).
- Regardless of the day of week, nearly three-quarters (71%) of visitors to BLRA's developed recreation area did not know that if you park at the Gateway Trailhead Parking Lot you do not have to pay the amenity fee to visit BLRA. Of those, about two-thirds (65%) indicated that they would not have chosen to park there anyway.
- Approximately one-quarter (26%) of visitors to BLRA's developed recreation area, regardless of the day of the week, were aware that they could park at the Gateway Trailhead Parking Lot and visit BLRA for free, but no one in their group parked there.
- A very small proportion (3%) of visitors to BLRA's developed recreation area used the Gateway Trailhead Parking Lot to carpool, and a slightly larger proportion (6%) indicated that they would have used the Gateway Trailhead Parking Lot had they known about it.

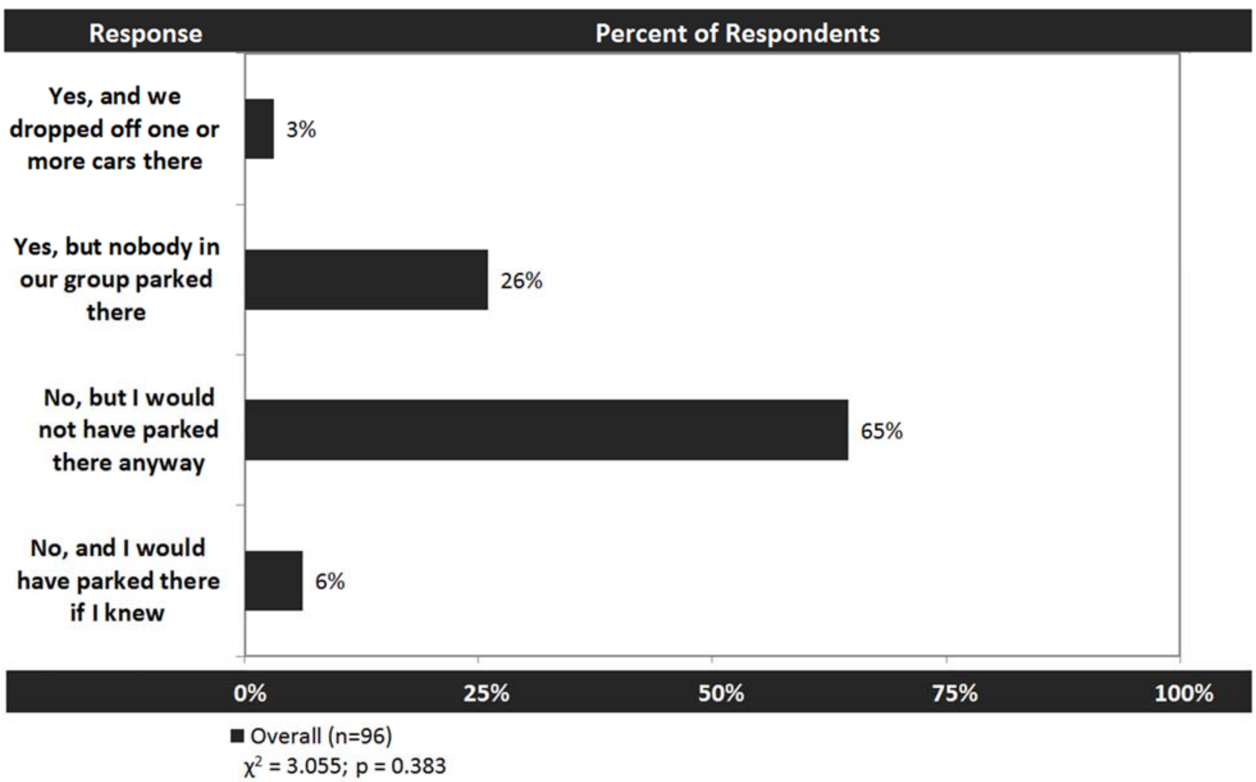


Figure 1-128. Do you know that if you park in the lot near the entrance station (Gateway Trailhead Parking Lot) you don't have to pay the fee to visit BLRA?

- Visitors to BLRA's developed recreation were asked if they would be likely to visit BLRA on a future trip if their only option was to park in the Gateway Trailhead Parking Lot and hike/walk or take a shuttle, or park outside of BLRA and take a shuttle from there. Visitors' responses to the questions did not vary significantly between weekdays and weekend days ($p>0.05$ for all tests).
- Regardless of the day of week, approximately two-thirds (68%) of visitors said they would be likely to visit BLRA on a future trip, even if they had to park in the Gateway Trailhead Parking Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA.
- Just under half (43%) of BLRA developed recreation area visitors said they would be likely to visit BLRA on a future trip, even if they had to park in the Gateway Trailhead Parking Lot and then walk/hike 2 miles to their destination(s) in BLRA.
- Only 16% of BLRA developed recreation area visitors indicated that they would be likely to visit BLRA on a future trip, even if they had to park in town and then take a 40 minute shuttle bus ride to their destination(s) in BLRA.

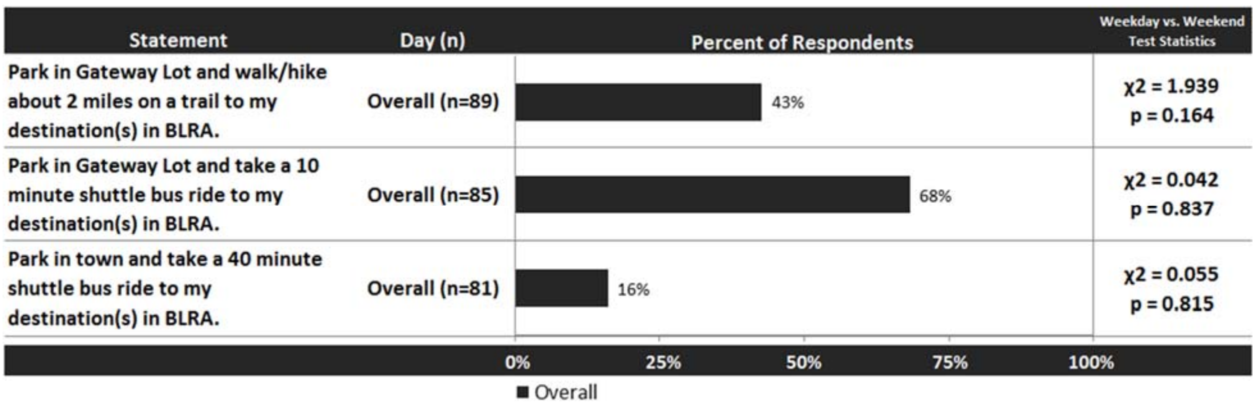


Figure 1-129. Percentage who would be likely to visit BLRA on a future trip, even if this was their only option for visiting because parking lots were full.

- BLRA developed recreation area visitors' attitudes about potential parking management actions at BLRA did not vary significantly between weekdays and weekend days ($p>0.05$ for all tests).
- Regardless of the day of week, nearly three-quarters (73%) of BLRA developed recreation area visitors agreed that when parking lots at BLRA are full, visitors should be directed to park in the Gateway Trailhead Parking Lot and take a 10 minute shuttle to their destination in BLRA.
- Over half (53%) of BLRA developed recreation area visitors thought that visitors should be allowed to enter BLRA and drive around until a parking space opens up.
- Nearly equal proportions of BLRA developed recreation area visitors thought that visitors to BLRA should be stopped at the entrance station until some parking spaces open up and only then allowed to enter (43%) or should park at the Gateway Trailhead Parking Lot and then walk/hike about 2 miles on a trail to their destination in BLRA (45%).
- The smallest proportions of BLRA developed recreation area visitors thought that visitors should be directed to other recreation areas instead of BLRA (29%) or directed to park in town and then take a 40 minute shuttle bus ride to BLRA (22%).

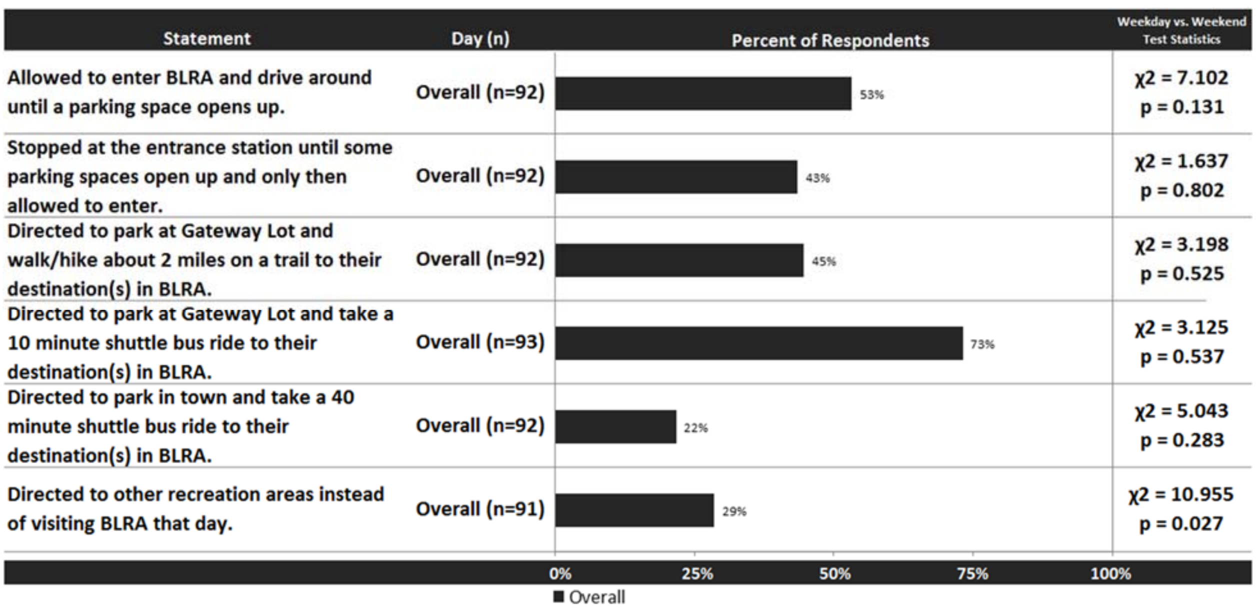


Figure 1-130. Percentage who agree with each of the statements about potential actions when parking lots are full at BLRA.

Planning Your Trip to BLRA

- The time frame in which visitors to BLRA's developed recreation area planned their trips did not vary significantly between weekdays and weekend days (χ^2=1.078, p=0.898).
- Regardless of the day of week, more than half (55%) of BLRA developed recreation area visitors planned their trip within 24 hours of their visit, and over one-third (35%) planned their trip on the day they visited.
- About one-quarter (27%) of BLRA developed recreation area visitors planned their trip more than a week prior to visiting.

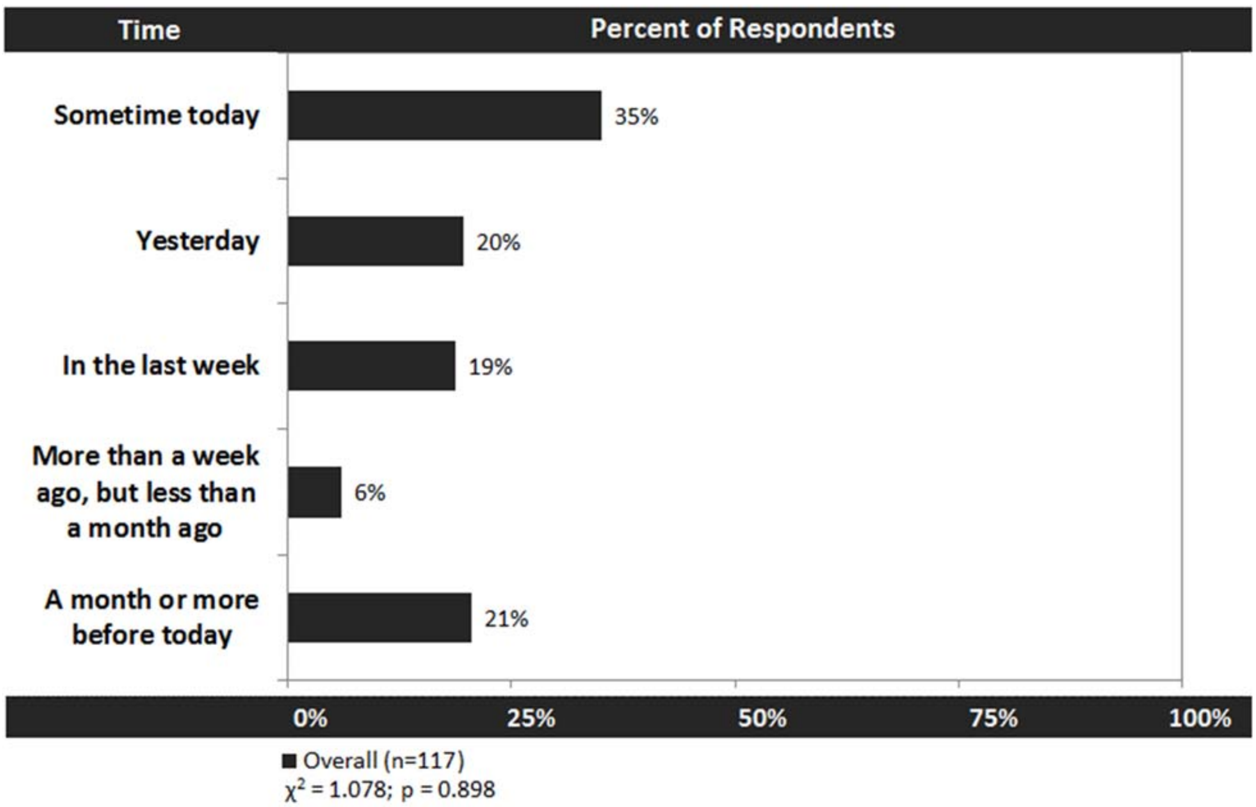


Figure 1-131. How long ago did you decide to take this trip to BLRA?

- The number of visitors to BLRA's developed recreation area who anticipated that it would be difficult to find parking did not vary significantly between weekday and weekend day visitors (χ^2=0.413, p=0.521).
- Close to three-quarters (72%) of BLRA developed recreation area visitors did not anticipate that it would be difficult to find parking at BLRA.

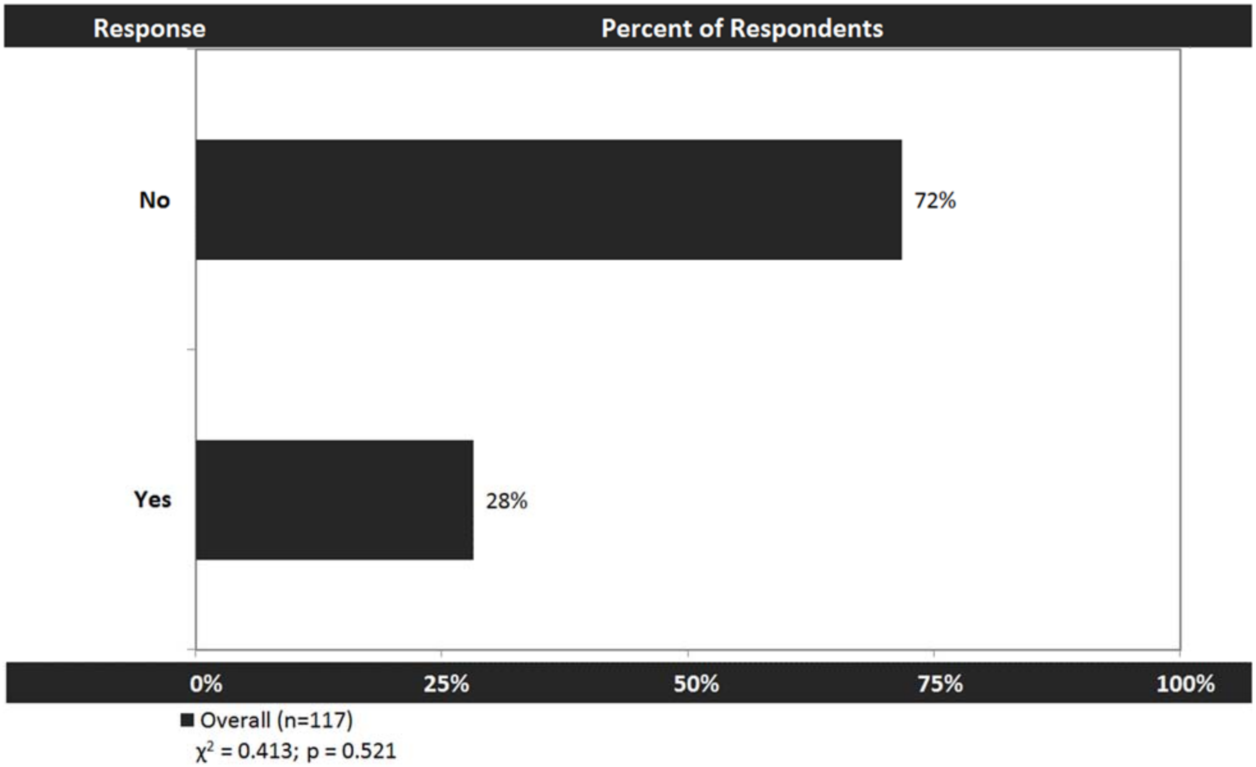


Figure 1-132. When you planned this trip to BLRA, did you think about the possibility that it might be difficult to find parking here?

- For visitors to BLRA's developed recreation area who thought about the possibility that it might be difficult to find parking at BLRA, a follow-up question asked how that affected their trip plans.
- Regardless of day of week, over one-quarter (27%) of visitors to BLRA's developed recreation area who thought about the possibility that it might be difficult to find parking at BLRA when they planned their trip reported that this did not affect their plans.
- Weekday visitors (43%) were significantly more likely than weekend day visitors (8%) to plan their visit to BLRA for a day of the week that they thought would be less crowded (χ^2=4.309, p=0.038).
- Weekday and weekend day visitors did not differ significantly in their responses to any of the other statements included in this question.
- Over one-third (39%) of all BLRA developed recreation area visitors who thought about the possibility of parking congestion visited at a time of day they thought would be less crowded, regardless of the day of week.
- A verbatim list (including respondents' typos) of "other" effects reported by respondents is included in Table 17 in Appendix H.

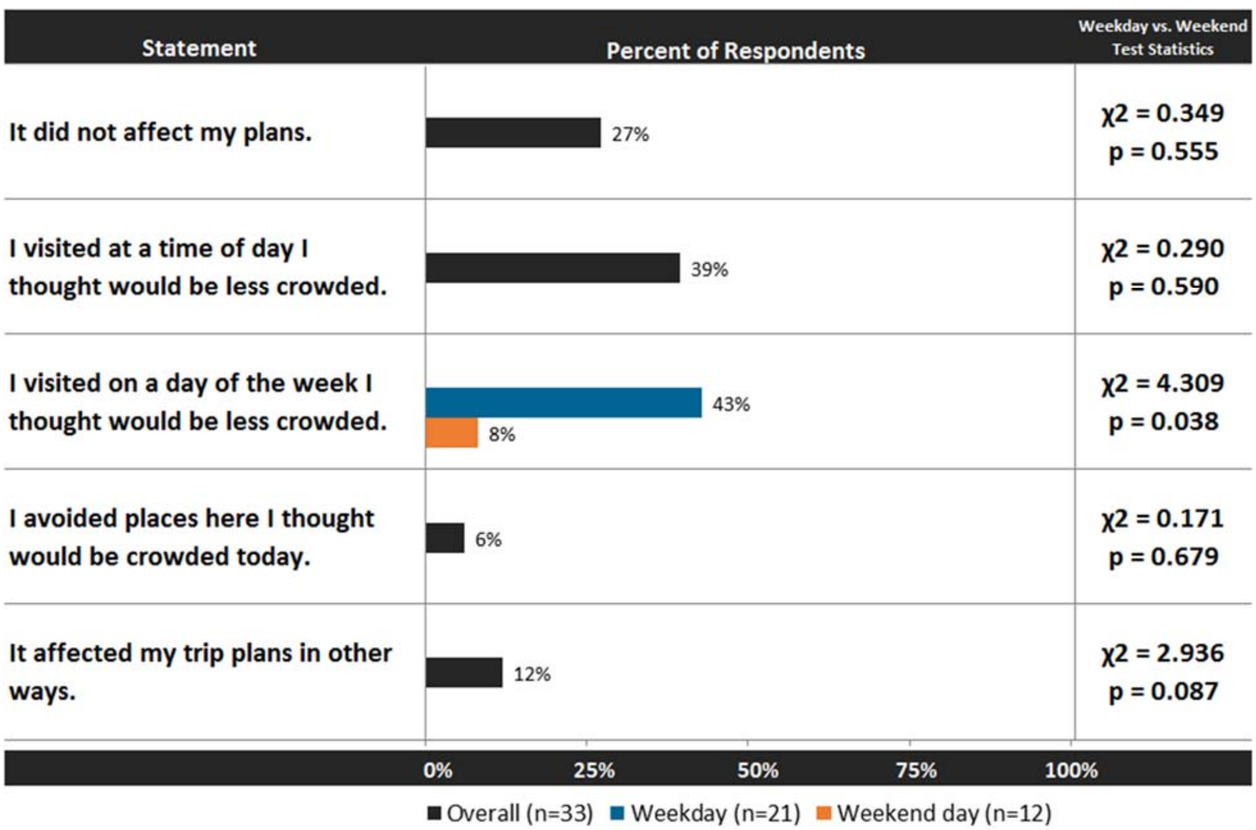


Figure 1-133. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to BLRA, how did it affect your trip plans?

BLRA developed recreation area visitors were asked how likely they would be to use each of several sources for information about parking and crowding conditions at BLRA, if it were available for planning a future trip to BLRA. Responses to the question did not vary significantly between weekday and weekend day visitor groups (p>0.05 for all tests).

- The large majority (83%) of visitors to BLRA's developed recreation area indicated they would be likely to use a website for information about parking and crowding at BLRA when planning a future trip.
- Approximately half of all visitors to BLRA's developed recreation area said they would be likely to use an AM radio station (53%) or a tourist information center (52%).
- Over one-third (37%) of all visitors to BLRA's developed recreation area indicated that they would be likely to use text updates on a cell phone or smartphone. About one-quarter said they would be likely to use social media (28%), a smartphone app (24%), or a telephone information line with a live person (24%).

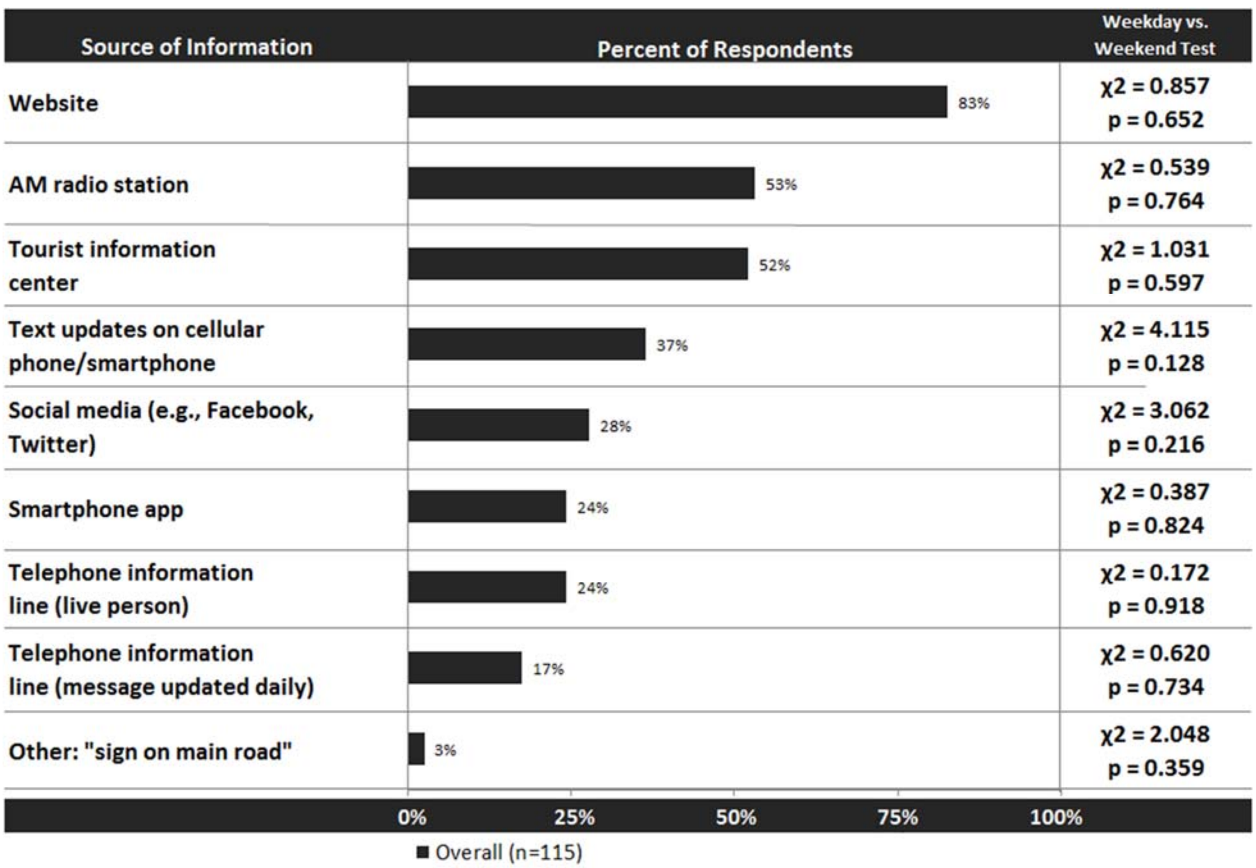


Figure 1-134. Percentage who would be likely to use each of the sources for information about parking and crowding conditions at BLRA, if it was available for planning a future trip to BLRA.

Background Information

- There were no significant differences in the gender of visitors on weekdays and weekend days (χ^2=0.001, p=0.973).
- Roughly half of all visitors to BLRA's developed recreation area were male (53%) and half were female (47%).

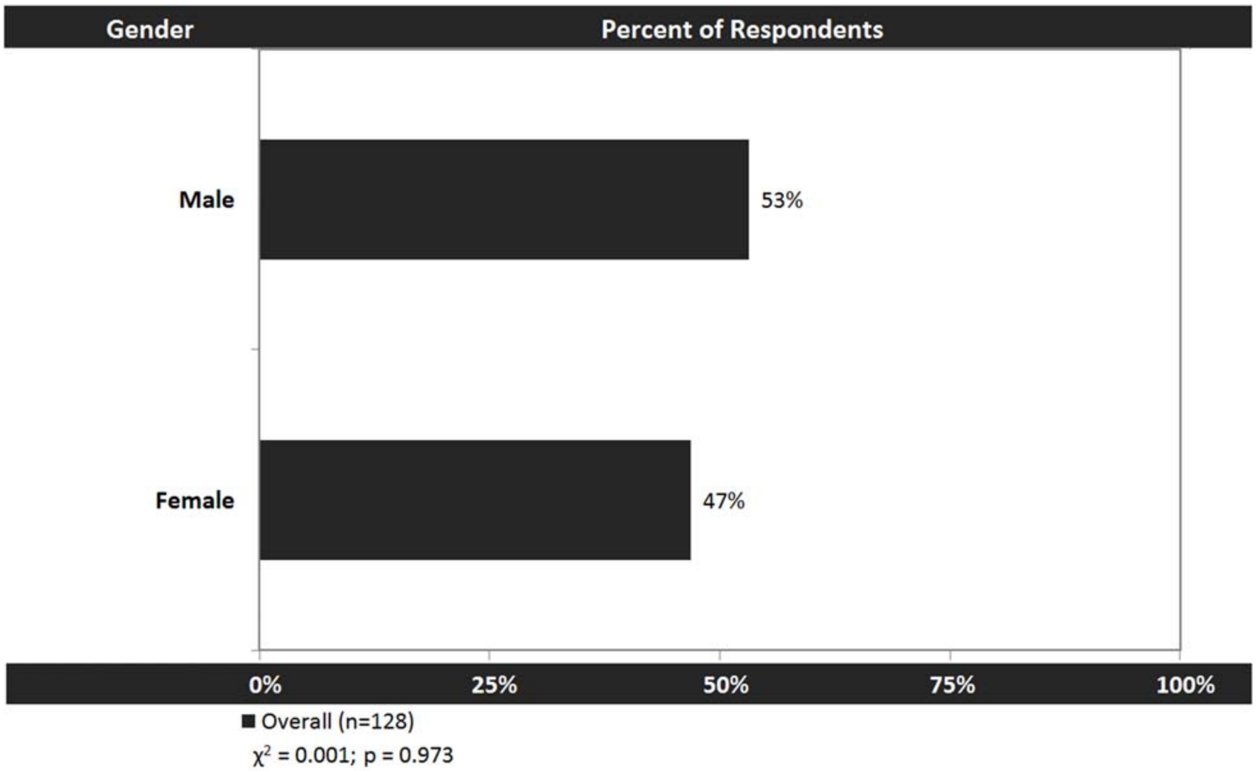


Figure 1-135. What is your gender?

- On average, BLRA developed recreation area visitors contacted on weekdays (mean = 58 years of age) were slightly older than those contacted on weekend days (mean = 49 years of age; t=3.019, p=0.003).
- When grouped by age category, there was no significant difference in the ages of weekday and weekend day visitors to BLRA's developed recreation area (χ^2=10.407, p=0.064).
- Regardless of the day of week, the majority (52%) of visitors to BLRA's developed recreation area were 55 years old or older.

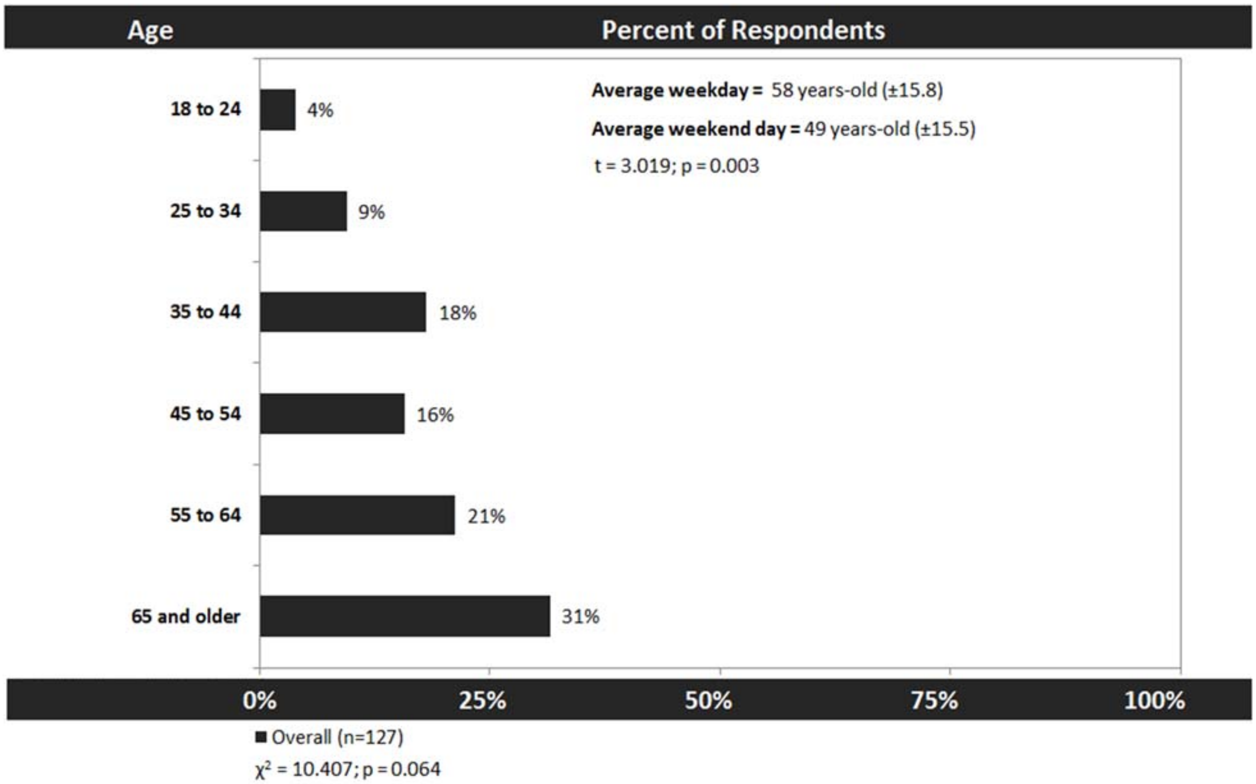


Figure 1-136. How old are you?

- Visitors to BLRA's developed recreation area were overwhelming (98%) residents of the United States, regardless of the day of the week when they visited BLRA (χ^2=1.346, p=0.246).
- A frequency distribution of all countries of residence reported by respondents is included in Table 18 in Appendix H.

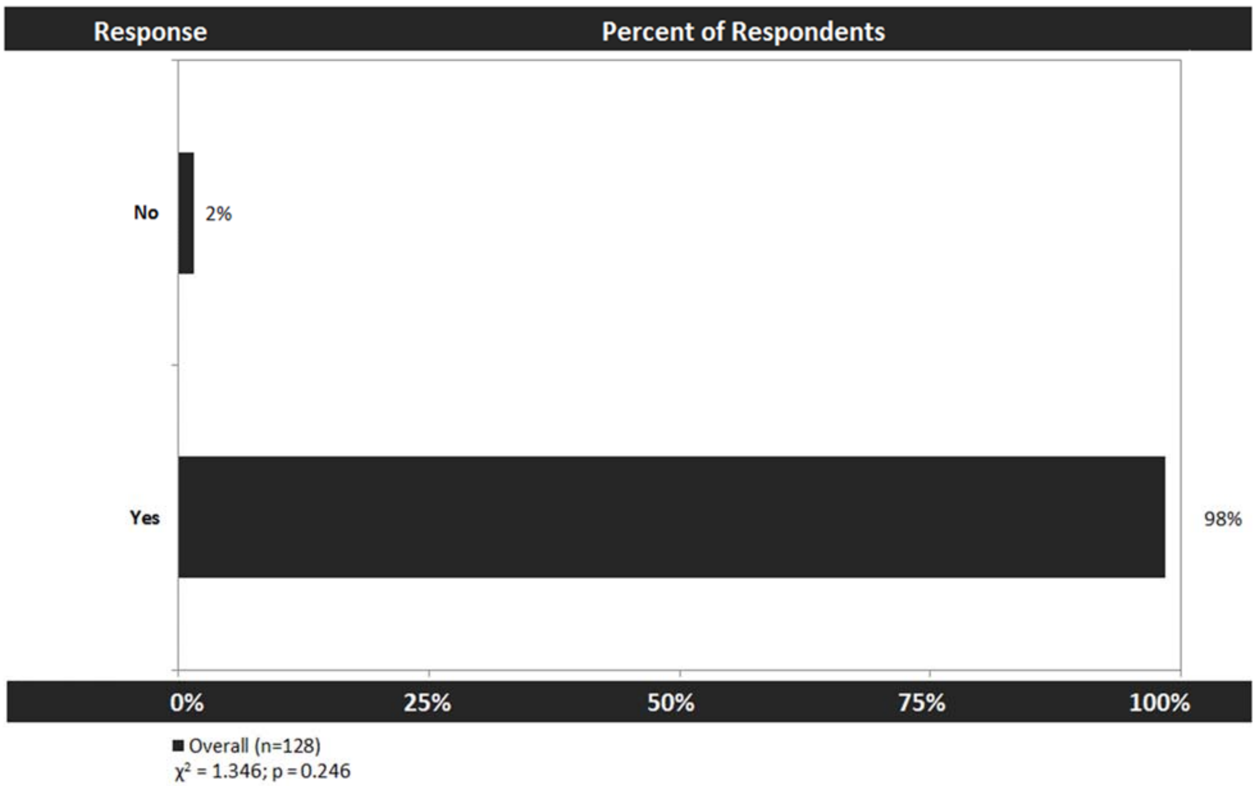


Figure 1-137. Do you live in the United States?

- The state of residence of visitors to BLRA's developed recreation area did not vary significantly between weekdays and weekend days (χ^2=0.089, p=0.766).
- The large majority (85%) of visitors to BLRA's developed recreation area were residents of Colorado, regardless of the day of week.
- A frequency distribution of all states of residence reported by respondents is included in Table 19 in Appendix H.

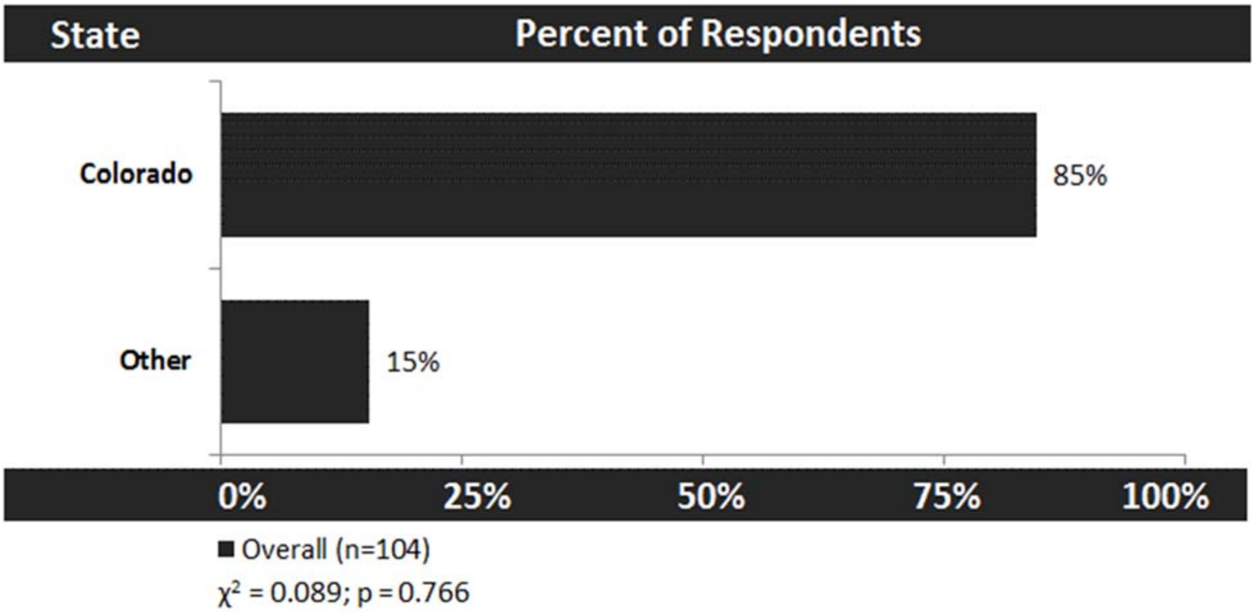


Figure 1-138. If you live in the United States, what state do you live in?

- Among Colorado residents at BLRA's developed recreation area, visitors' city of residence did not vary significantly between weekdays and weekend days (χ^2=5.875, p=0.209).
- Among Colorado residents at BLRA's developed recreation area, over half (56%) live in the Denver-Aurora-Lakewood metropolitan area and just over one-third (37%) live in the Boulder metropolitan area.
- A frequency distribution of all zip codes reported by respondents who are residents of Colorado is included in Table 20 in Appendix H.

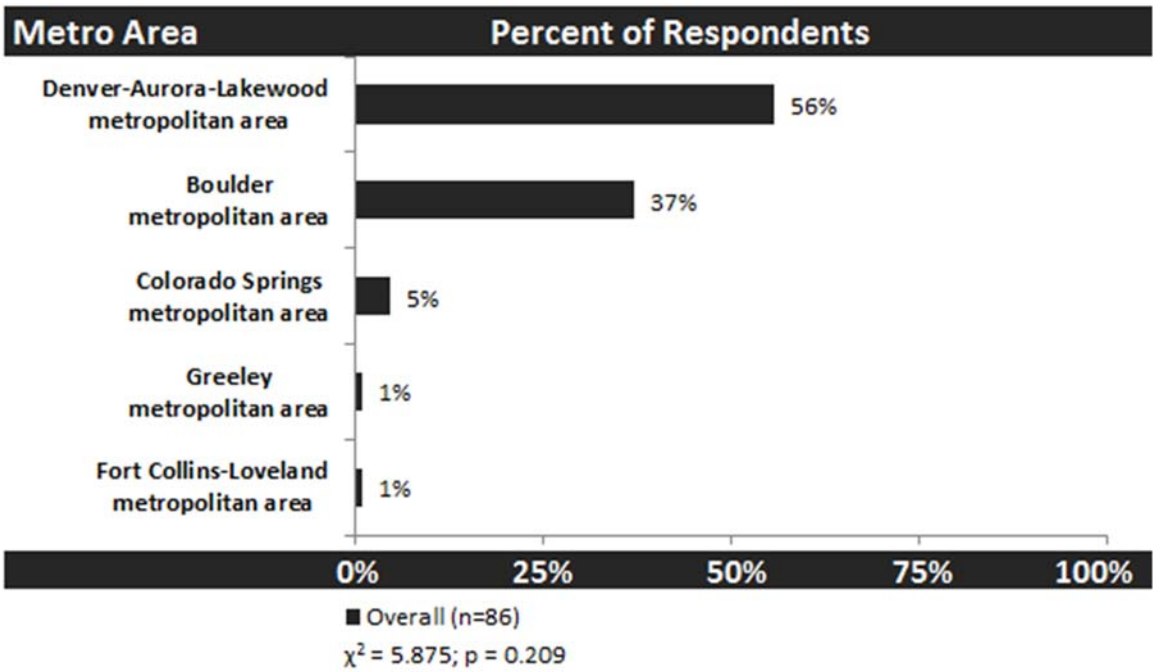


Figure 1-139. If you live in Colorado, what metropolitan area do you live in?

- The education level of visitors to BLRA's developed recreation area did not vary significantly between weekdays and weekend days (χ^2=3.784, p=0.581).
- Approximately three-quarters (76%) of visitors to BLRA's developed recreation area have earned a college, business or trade school degree or higher.

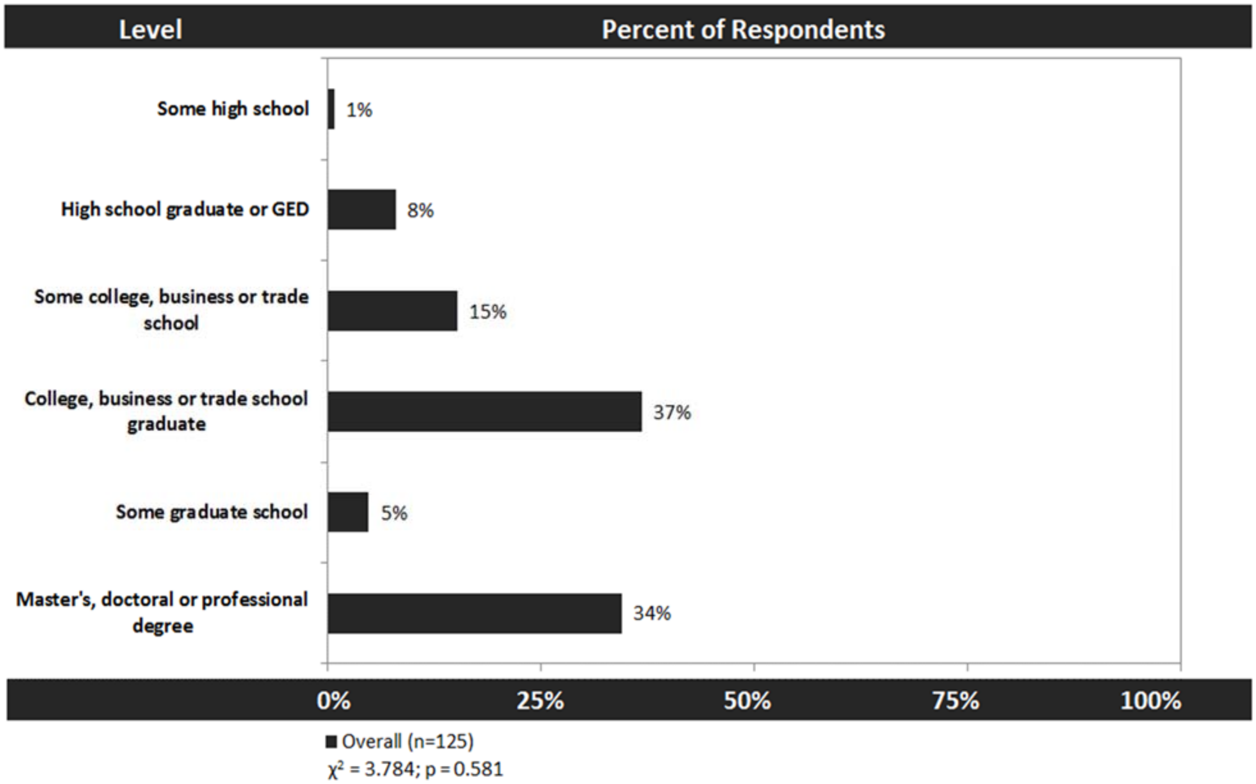


Figure 1-140. What is the highest level of formal education you have completed?

- Very few (4%) visitors to BLRA's developed recreation area reported being Hispanic or Latino, regardless of the day of the week they visited BLRA (χ^2=0.868, p=0.351).

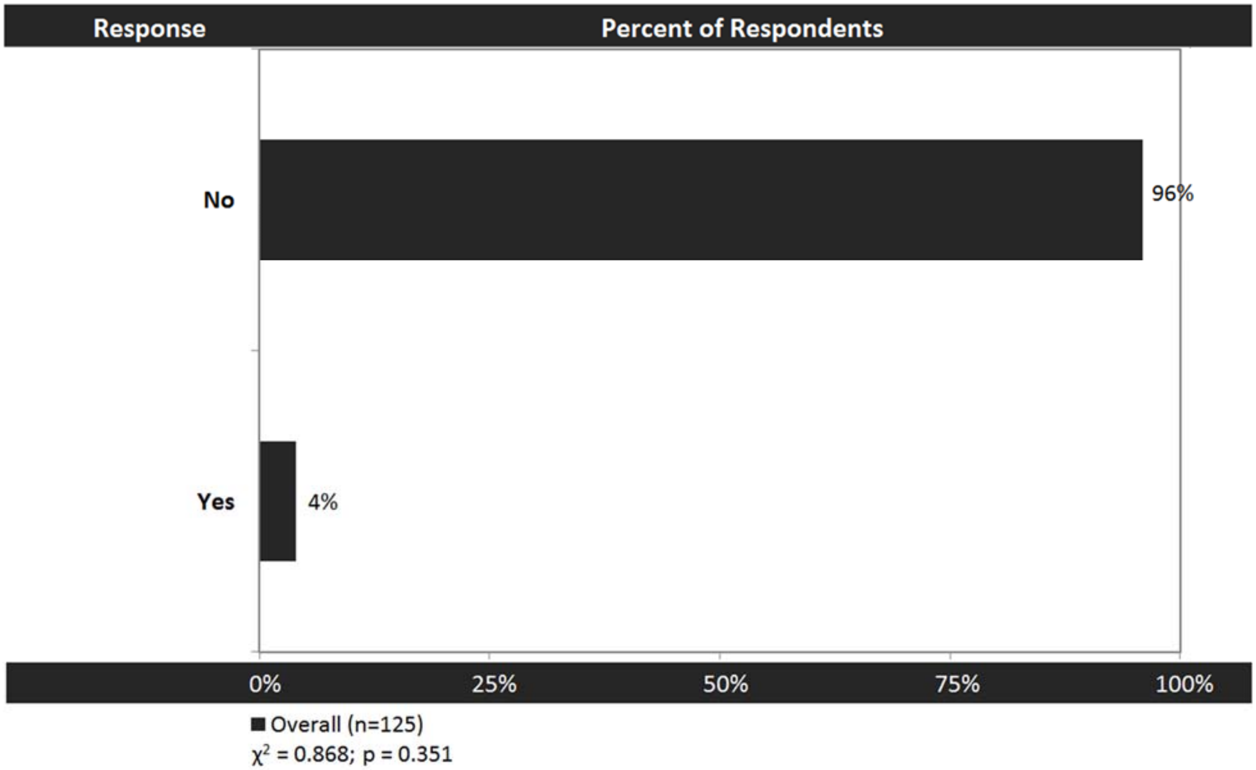


Figure 1-141. Are you Hispanic or Latino?

- Weekend day visitors (100%) to BLRA's developed recreation area were statistically (but not substantively) more likely than weekday visitors (94%) to report their race as white (χ^2=4.847, p=0.028).
- There was no substantive difference between the proportions of weekday visitors and weekend day visitors who reported their race as white.
- Otherwise, the self-reported race of visitors to BLRA's developed recreation area did not vary significantly between weekdays and weekend days, and there were essentially no nonwhite visitors to BLRA's developed recreation area on weekdays or weekend days.

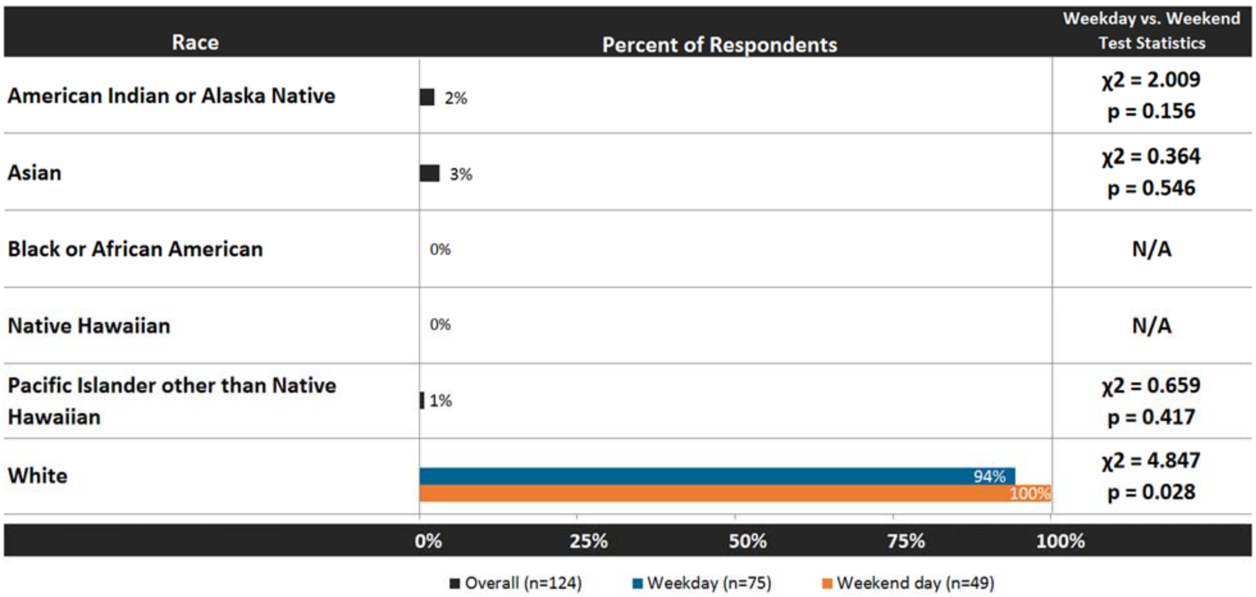


Figure 1-142. *What is your race?*

Gateway Trailhead Parking Lot Visitor Survey Results

Results in this section are representative of all visitor groups/visitors who parked at the Gateway Trailhead Parking Lot during the 2014 peak visitation period at BLRA, regardless of whether or not they visited the IPW (referred to hereafter as Gateway visitor groups/visitors).

Trip Description

- The distribution of Gateway visitor group sizes varied significantly between weekday and weekend day visitor groups (χ^2=11.940, p=0.008).
- On average, weekday visitor groups to the Gateway Trailhead had two people and weekend day visitor groups had three people (t=-2.360, p=0.028).
- Nearly two-thirds (60%) of weekday visitor groups to the Gateway Trailhead were solo groups, in contrast to only 15% of weekend day visitor groups.
- One-half (50%) of weekend day visitor groups to the Gateway Trailhead had two people, while only 30% of weekday groups had two people.
- One-third (35%) of Gateway visitor groups on weekend days were in groups of 3 or more people, compared to just 12% on weekdays.

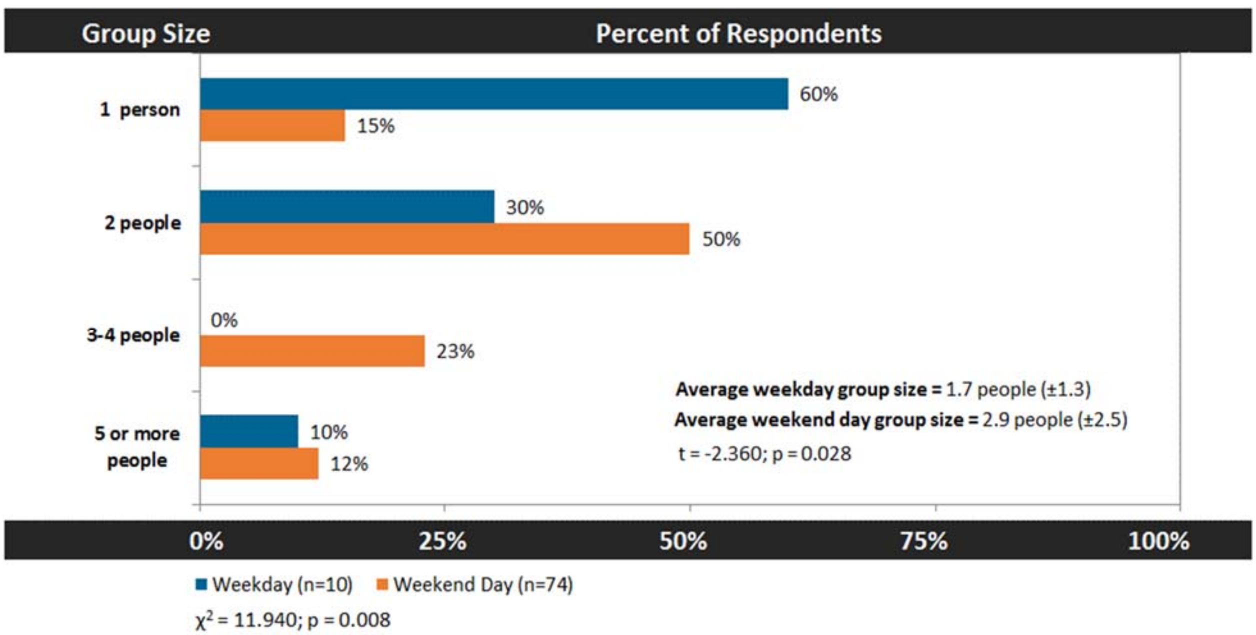


Figure 1-143. Including yourself, how many people are in your personal group on this trip to Brainard Lake Recreation Area (BLRA)?

- The percentage of Gateway visitor groups hiking with children under the age of 16 did not differ significantly between weekday and weekend day visitor groups (χ^2=0.737, p=0.391).
- Regardless of the day of week, the vast majority (80%) of Gateway visitor groups visited without children under the age of 16.

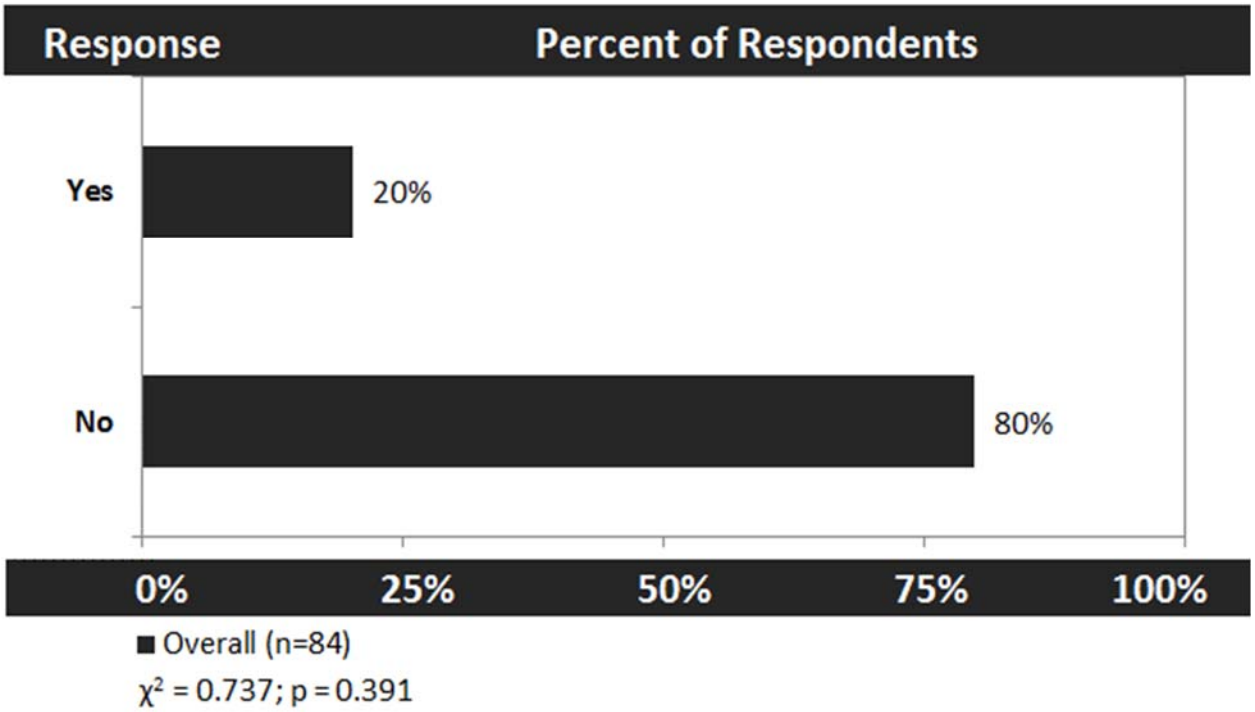


Figure 1-144. Are there any children under the age of 16 in your personal group on this trip to BLRA?

- The number of children (in visitor groups with children) did not vary significantly between weekdays and weekend days (χ^2=3.200, p=0.202).
- Regardless of the day of week, there was an average of just over two children per group in Gateway visitor groups with children (t=1.235, p=0.237).
- Of the relatively few Gateway visitor groups with children under the age of 16, three-quarters (75%) had one or two children.

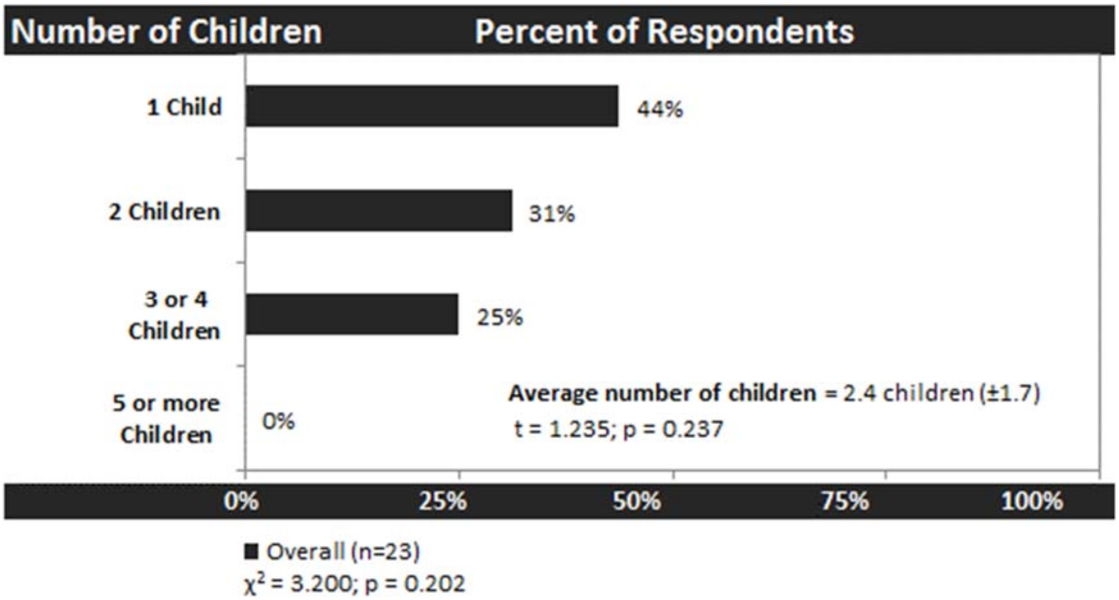


Figure 1-145. For groups with children: how many children under the age of 16 are in your personal group?

- The activities that visitors to the Gateway Trailhead participated in did not vary significantly between weekday and weekend day visitor groups, with the exception of camping in the Pawnee Campground (χ^2=7.489, p=0.006).
- Over three-quarters (77%) of visitors to Gateway Trailhead were day hiking for more than one hour.
- One-third (33%) of visitors to Gateway Trailhead were going on a walk or hike of less than one hour.
- While 10% of weekday visitors to the Gateway Trailhead were also camping in Pawnee Campground, there were no weekday visitors to the Gateway Trailhead who were camping in the Pawnee Campground.
- A verbatim list (including respondents' typos) of "other" activities reported by respondents is included in Table 21 in Appendix I.

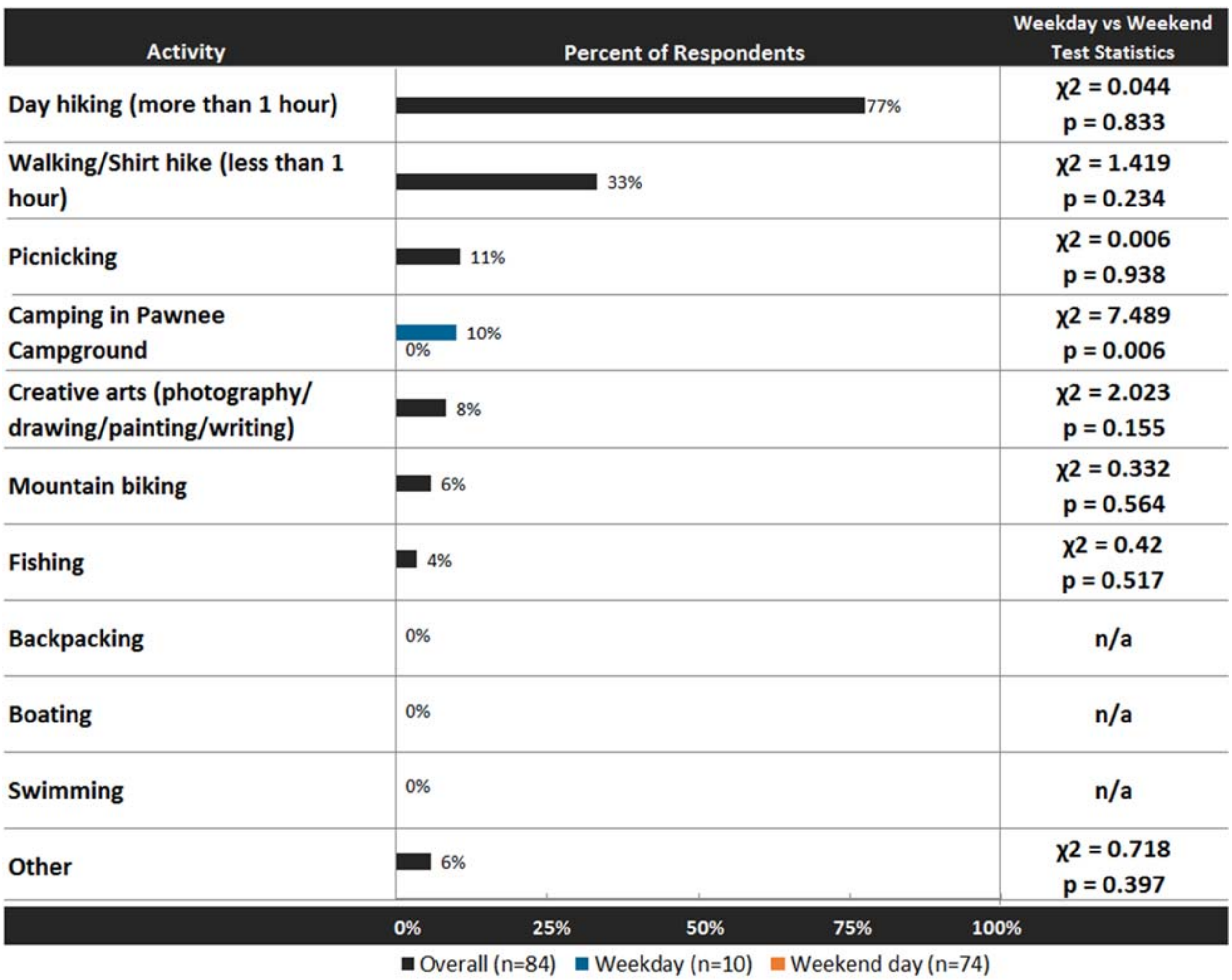


Figure 1-146. Which of the following activities have you done during this trip to BLRA?

- Gateway visitor groups' primary activity at BLRA did not vary significantly between weekdays and weekend days (χ^2=12.220, p=0.142).
- Regardless of the day of week, day hiking for more than one hour was the primary activity for the majority (67%) of visitors to the Gateway Trailhead.

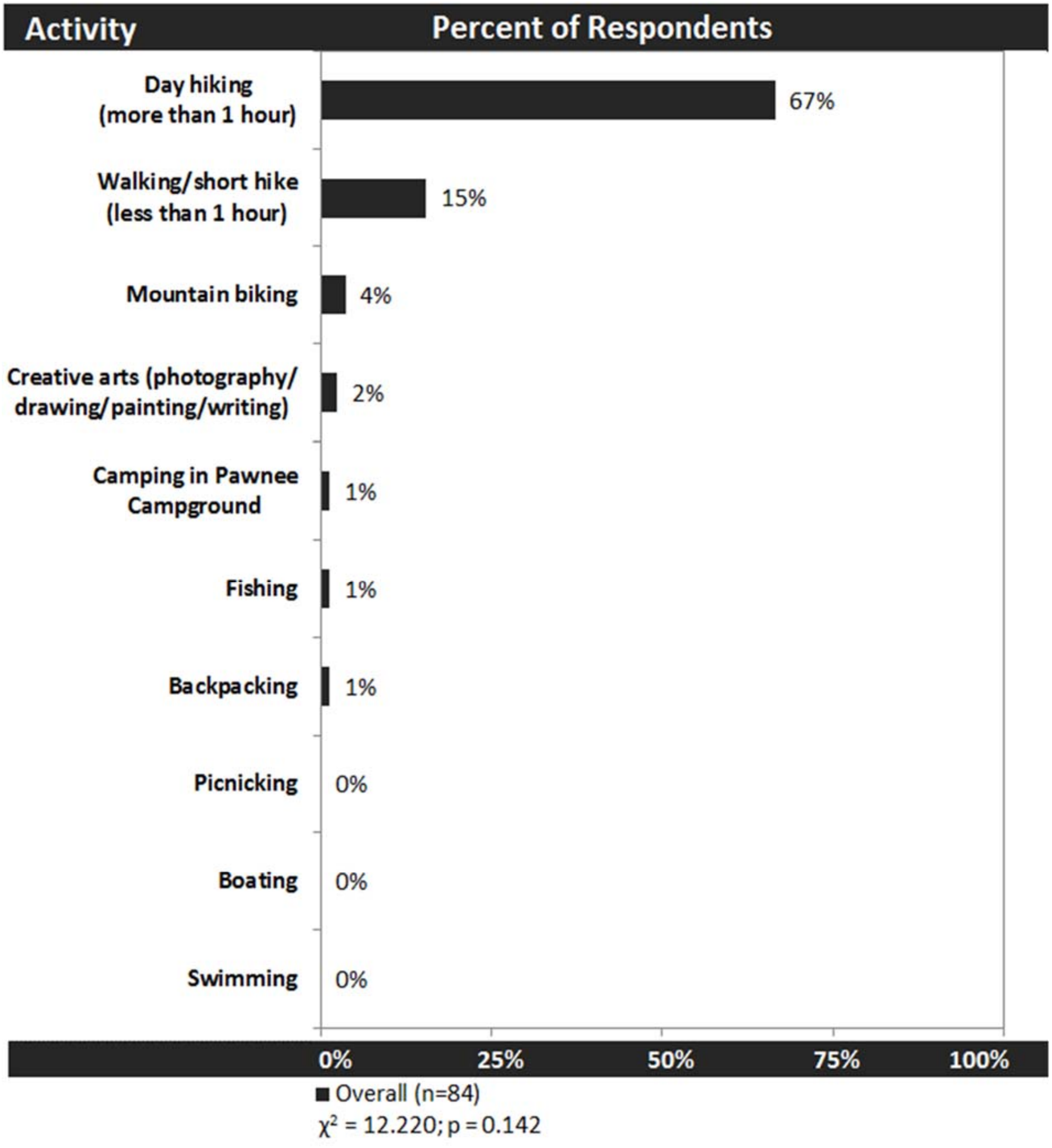


Figure 1-147. Which of the activities listed in Question 3 was your primary activity on this trip to BLRA?

Visitors to the Gateway Trailhead were given a map of BLRA and asked to mark their route of travel through BLRA on the day they were contacted for the survey. These results are summarized below.

- Gateway visitor groups' route of travel through BLRA did not vary significantly between weekdays and weekend days (χ^2=6.552, *p*=0.088).
- Regardless of the day of the week, nearly half (46%) of Gateway visitor groups indicated that they used trails in the Gateway area of BLRA (e.g., Sourdough Trail, South St. Vrain Trail, etc.), and did not venture to Brainard Lake or the IPW.
- Just under one-third (29%) of Gateway visitor groups walked/hiked to Brainard Lake via trails and/or Brainard Lake Road, regardless of the day of the week.
- Relatively few Gateway visitor groups walked/hiked to the IPW via trails and/or roads (11%) or visited Lefthand Reservoir and/or Red Rock Lake (14%), regardless of the day of the week.

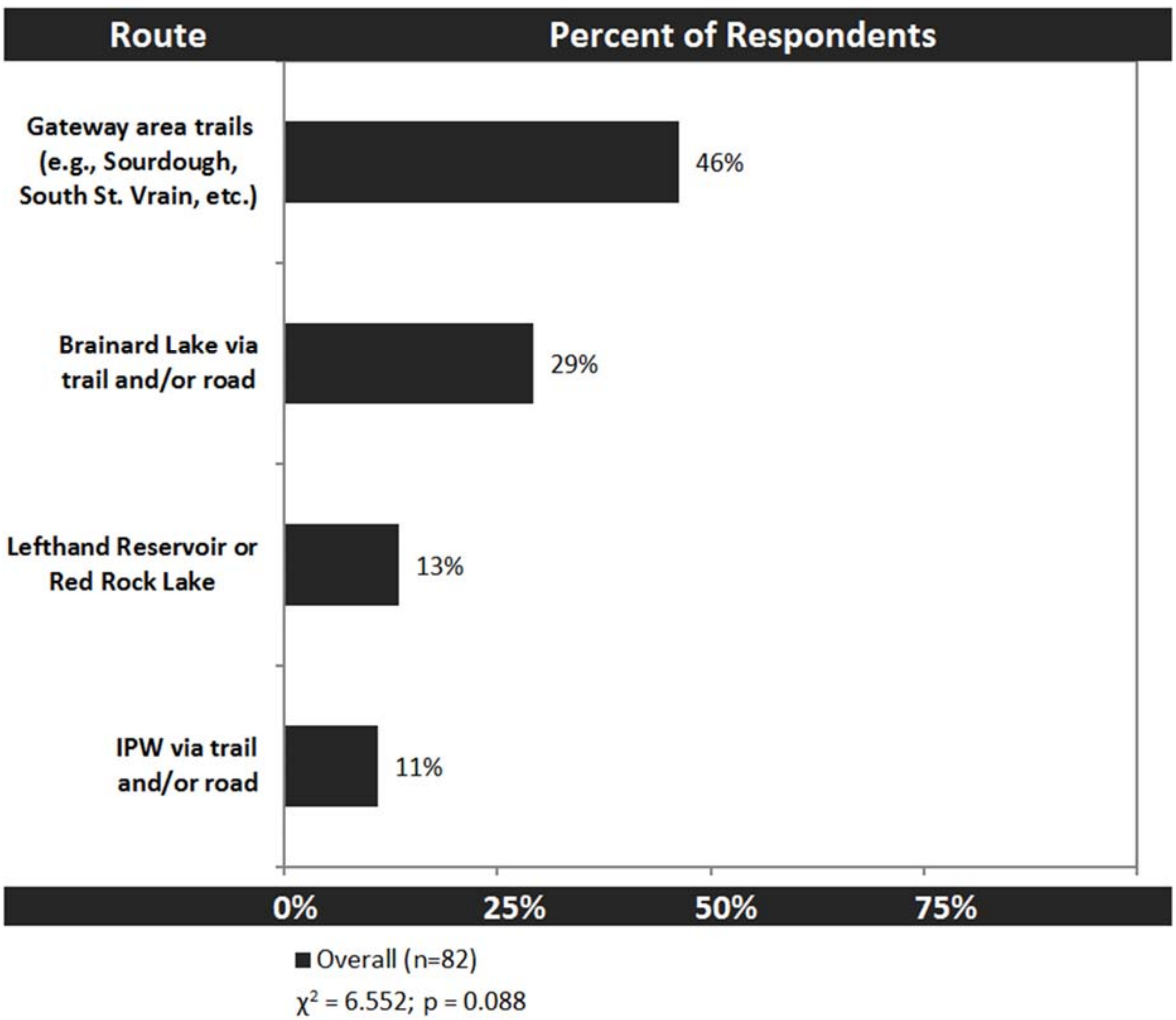


Figure 1-148*. Which route of travel through BLRA did you use today?*

- Gateway visitor groups' primary destinations in BLRA did not vary significantly between weekdays and weekend days ($\chi 2=3.703$, $p=0.593$).
- Regardless of the day of the week, close to one-third of Gateway visitor groups indicated that Brainard Lake was their primary destination (31%) or that they did not have a primary destination (31%).
- Close to equal proportions of visitors to the Gateway Trailhead listed the IPW (13%), trails in the Gateway area (10%), and Lefthand Reservoir and/or Red Rock Lake (10%) as their primary destination in BLRA, regardless of the day of the week.
- A verbatim list (including respondents' typos) of "other" locations reported by respondents is included in Table 22 in Appendix I.

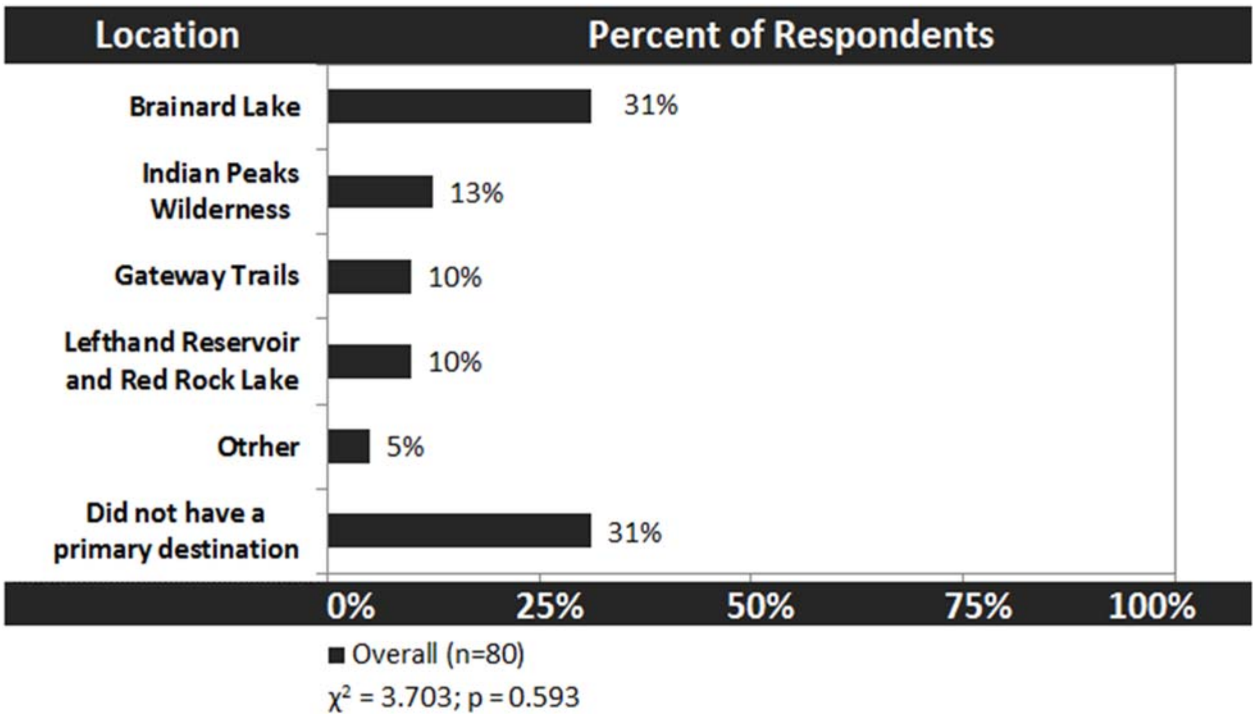


Figure 1-149. Which location in BLRA was your primary destination on this trip?

Travel and Parking

- There was no significant difference in the routes that weekday and weekend day Gateway visitor groups used to travel to and from BLRA (χ^2=16.322, p=0.091).
- The largest proportion (38%) of visitors to the Gateway Trailhead traveled to and from BLRA via Left Hand Canyon. The second-largest proportion (28%) traveled to and from BLRA via Boulder Canyon.
- Nearly three-quarters (72%) of visitors to the Gateway Trailhead used the same route to travel to and from BLRA.
- A verbatim list (including respondents' typos) of "other" routes reported by respondents is included in Appendix B.

Table 1-26. Which route did you use to travel to and from BLRA on this trip?

	Percent of Respondents (n=64)			
	Route home			
Route to BLRA	**Left Hand Canyon**	**Boulder Canyon**	**Peak-to-Peak Highway**	**Rt. 119**
Left Hand Canyon	**38%**	11%	3%	2%
Boulder Canyon	6%	**28%**	0%	0%
Peak-to-Peak Highway	2%	2%	**5%**	0%
Rt. 119	0%	0%	2%	**3%**

- Gateway visitors groups' arrival time at BLRA did not vary significantly between weekdays and weekend days ($\chi2$=2.238, p=0.815).
- The vast majority (80%) of Gateway visitor groups arrived at BLRA between 9 AM and 1 PM, and about one-half (49%) arrived between 9 AM and 11 AM, regardless of the day of week.
- Few Gateway visitor groups arrived at BLRA prior to 9 AM (7%) or after 1 PM (14%).

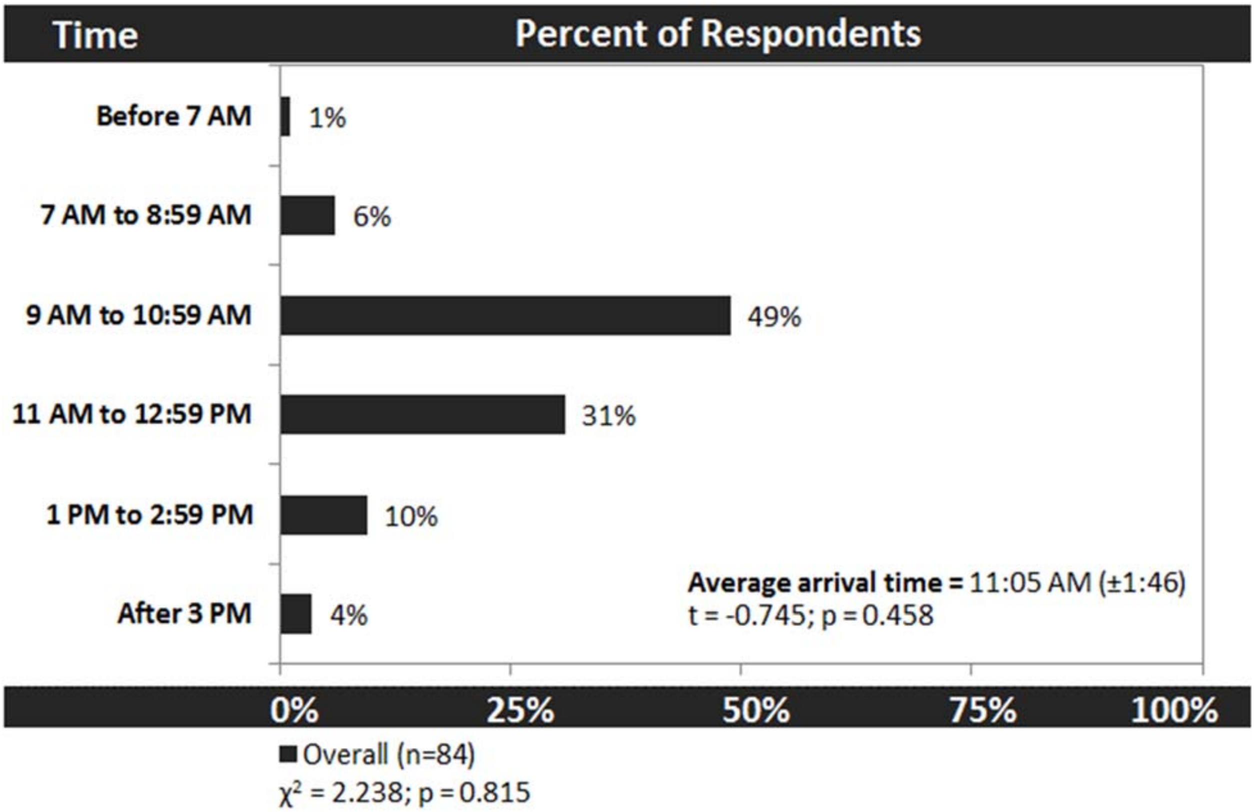


Figure 1-150. At approximately what time did you arrive at BLRA today?

- Whether or not visitors to the Gateway Trailhead arrived on the day they completed the or prior to that day varied significantly, but not substantively, between weekday and weekend day groups (χ^2=7.489, p=0.006).
- Nearly all Gateway visitor groups (90%) on weekdays and almost all (99%) on weekend days arrived at BLRA on the same day they took the survey.

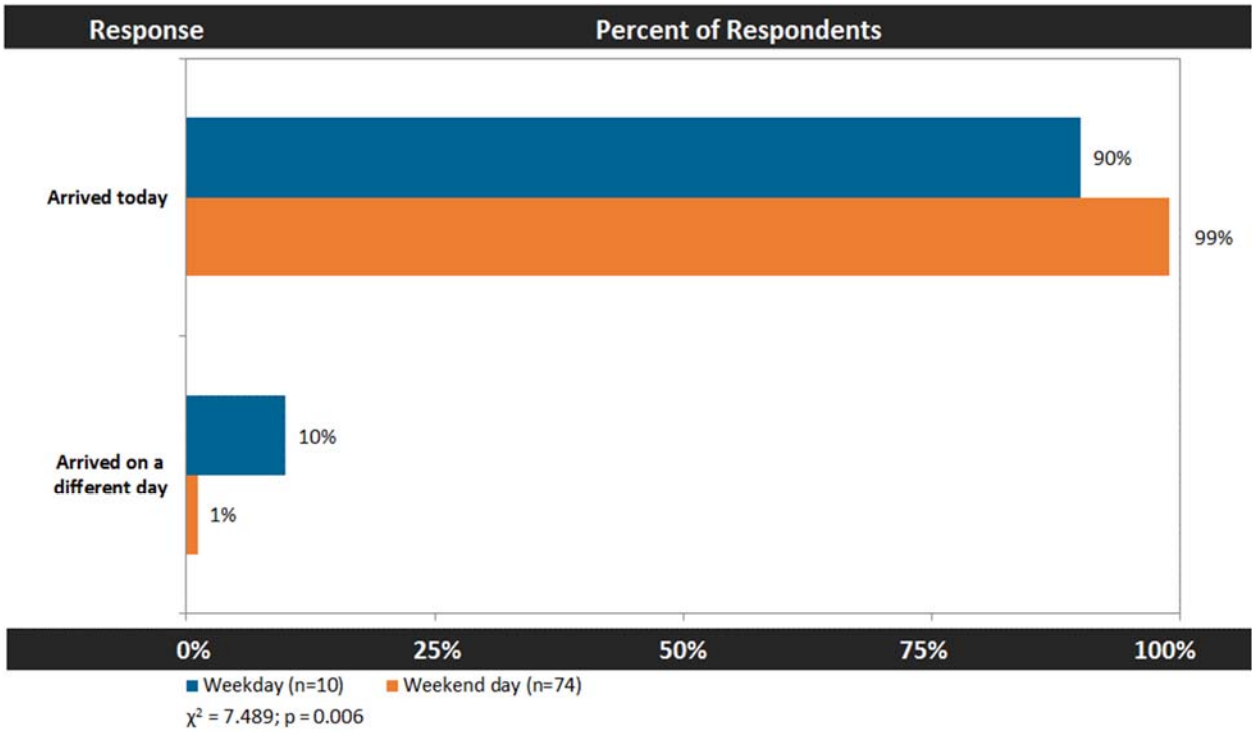


Figure 1-151. Did you arrive on a different day?

- The vast majority (96%) of all Gateway visitor groups traveled to BLRA in a single vehicle, regardless of the day of week (χ^2=0.426, p=0.514).

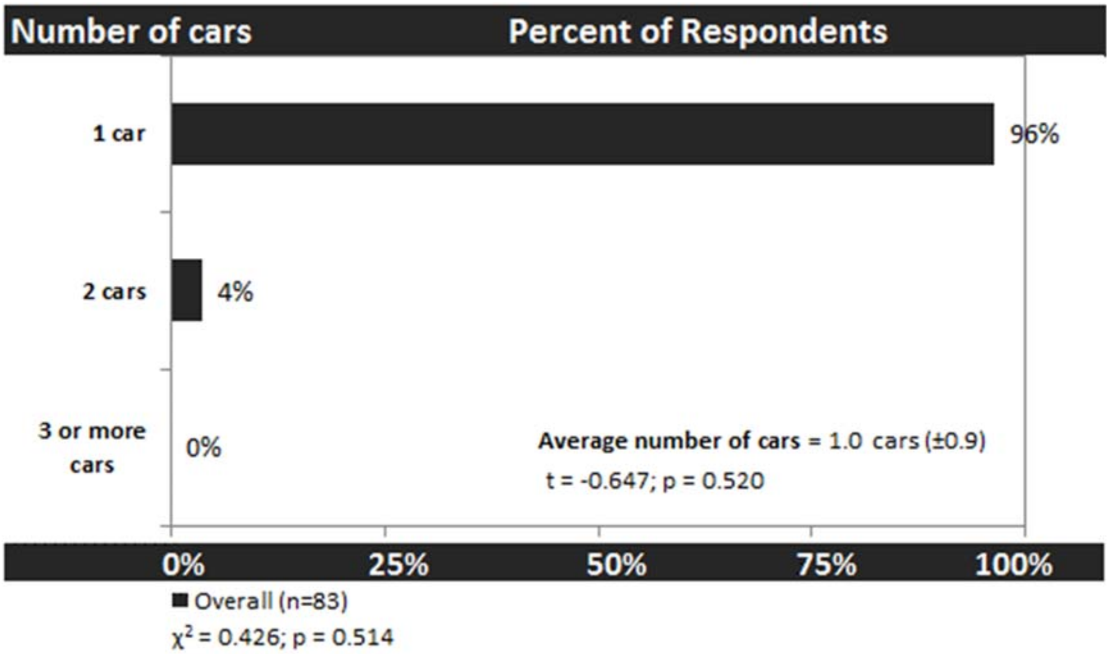


Figure 1-152. In how many vehicles did you and your personal group travel to BLRA on this trip?

- Gateway visitors' perceptions of parking in the Gateway Trailhead Parking Lot did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, virtually all Gateway visitors thought their parking locations in the Gateway Trailhead Parking Lot were safe (99%), easy to find (99%), well-marked (94%), and convenient (93%).
- Most (86%) Gateway visitors thought that their parking locations in the Gateway Trailhead Parking Lot were uncongested.
- A smaller majority (67%) of Gateway visitors thought that their parking location in the Gateway Trailhead Parking Lot was close to their destination.

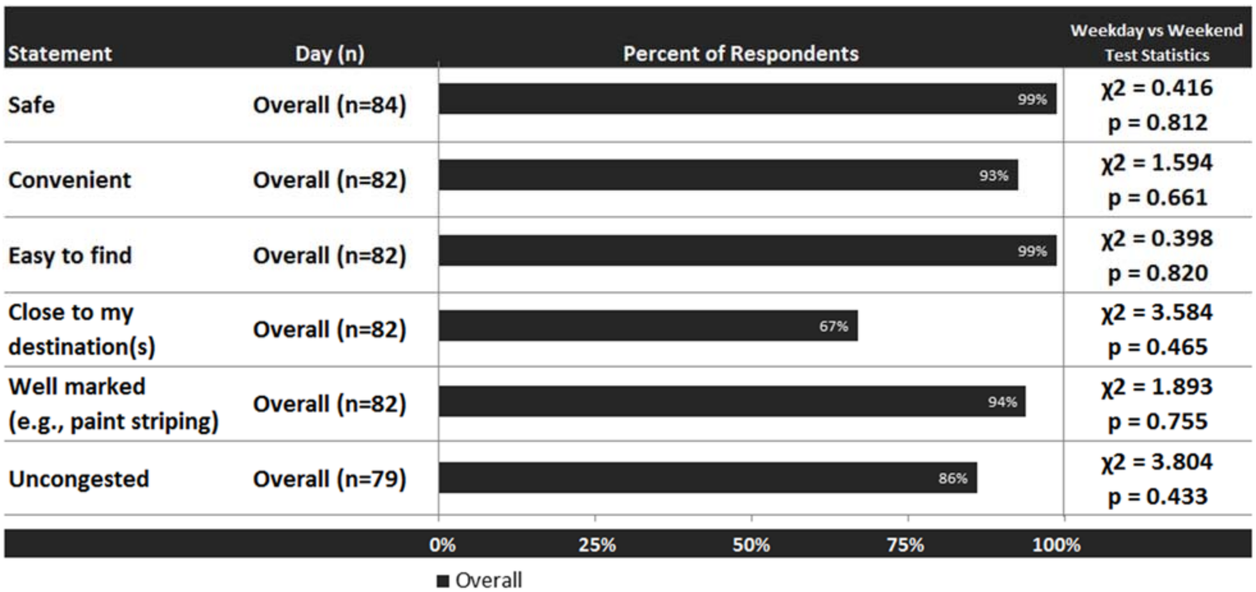


Figure 1-153. Percentage who agree with each of the descriptions of parking in the Gateway Trailhead Parking Lot on the day they took the survey.

- Gateway visitors were asked whether parking in the Gateway Trailhead Parking Lot interfered with what they were planning to do at BLRA that day. Responses did not vary significantly between weekday and weekend day visitor groups ($p>0.05$ for all tests).
- Regardless of the day of the week, more than three-quarters (79%) of Gateway visitors reported that parking in the Gateway Trailhead Parking Lot did not interfere with their plans.
- However, nearly one-fifth (18%) of Gateway visitors reported that parking in the Gateway Trailhead Parking Lot interfered with their plans to hike in the IPW (i.e., on the Mitchell Lake Trail or Long Lake Trail).
- A small proportion (4%) of Gateway visitors indicated that parking in the Gateway Trailhead Parking Lot interfered with their plans to visit Brainard Lake.
- A verbatim list (including respondents' typos) of "other" ways parking in the Gateway Trailhead Parking Lot interfered with respondents plan reported by respondents is included in Table 24 in Appendix I.

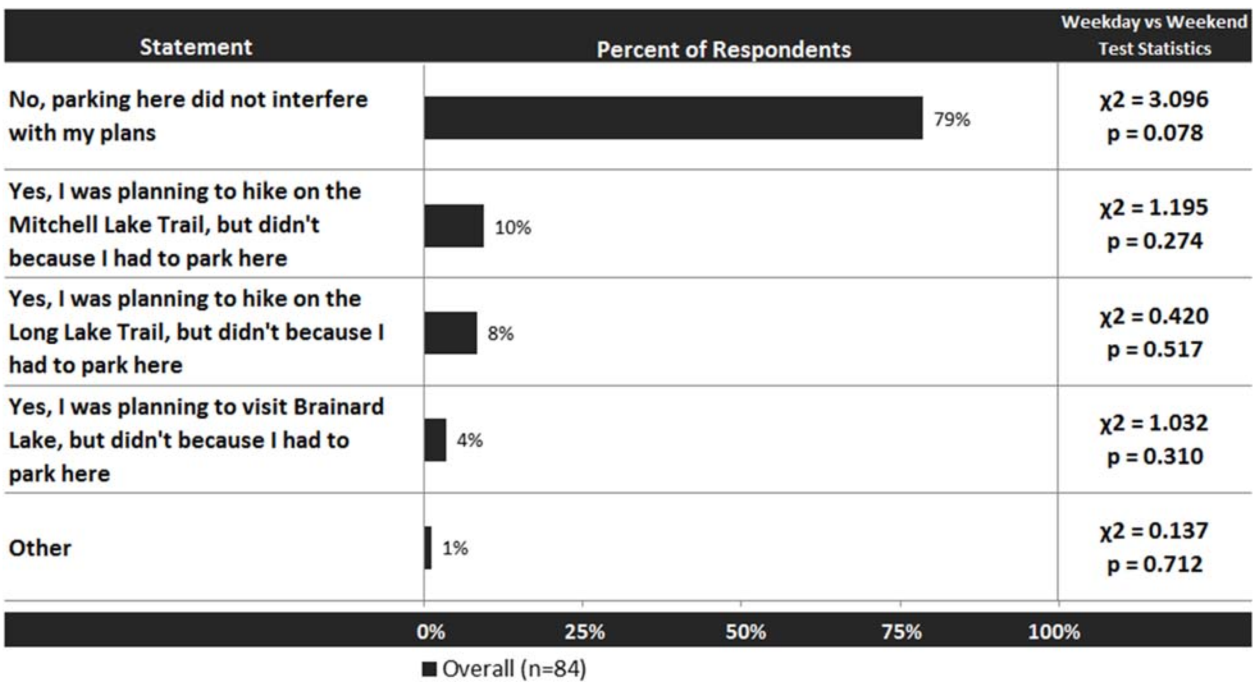


Figure 1-154. Did parking in the Gateway Trailhead Parking Lot interfere with what you were planning to do at BLRA today?

- Among Gateway visitors who responded that parking at the Gateway Trailhead Parking Lot interfered with what they were planning to do at BLRA that day, the majority (59%) chose to hike on the trails from the Gateway Trailhead instead.
- A verbatim list (including respondents' typos) of "other" activities reported by respondents is included in Appendix B.

Low Sample Size on This Question Suggests Results May not Be Applicable.

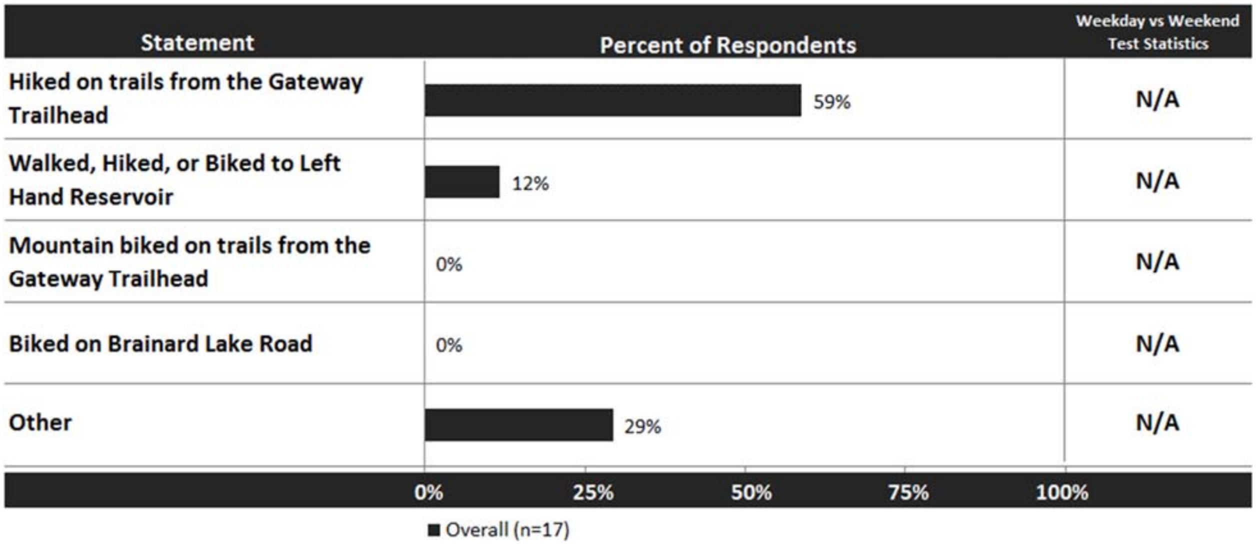


Figure 1-155. If parking in the Gateway Trailhead Parking Lot interfered with what you were planning to do at BLRA today, what did you do instead?

- Gateway visitors were asked to indicate which description best explained why they parked in the Gateway Trailhead Parking Lot on the day they were contacted for the survey. Responses did not vary significantly between weekday and weekend day visitor groups (*p*>0.05 for all tests).
- Approximately one-third (30%) of all Gateway visitor groups parked in the Gateway Trailhead Parking Lot there to avoid paying the BLRA entrance fee.
- Additionally, one-quarter (24%) of all Gateway visitor groups parked in the Gateway Trailhead Parking Lot because parking lots closer to their destination in BLRA were full, and relatively few (11%) indicated that they parked there because it was the closest parking lot to their destination in BLRA.
- Just under one-quarter (23%) of all Gateway visitor groups parked in the Gateway Trailhead Parking Lot because they wanted to hike or bike from there.
- A verbatim list (including respondents' typos) of "other" reasons reported by respondents is included in Table 26 in Appendix I.

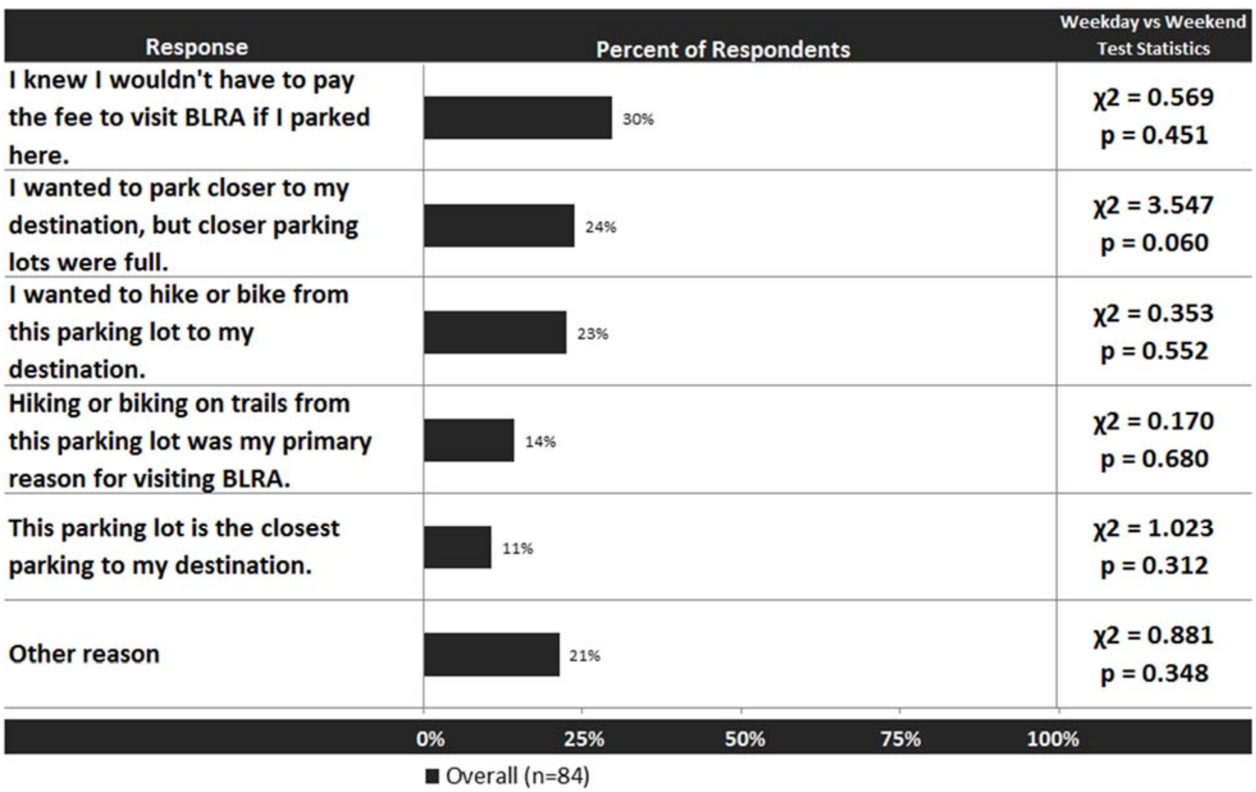


Figure 1-156. What reasons best explain why you parked in the Gateway Trailhead Parking Lot today?

- Gateway visitors' perceptions of parking congestion in the Gateway Trailhead Parking Lot did not vary significantly between weekdays and weekend days (χ^2=8.220, p=0.314).
- Regardless of the day of week, nearly two-thirds (64%) of Gateway visitors thought there was slight or no parking congestion at all in the Gateway Trailhead Parking Lot on the day they took the survey.

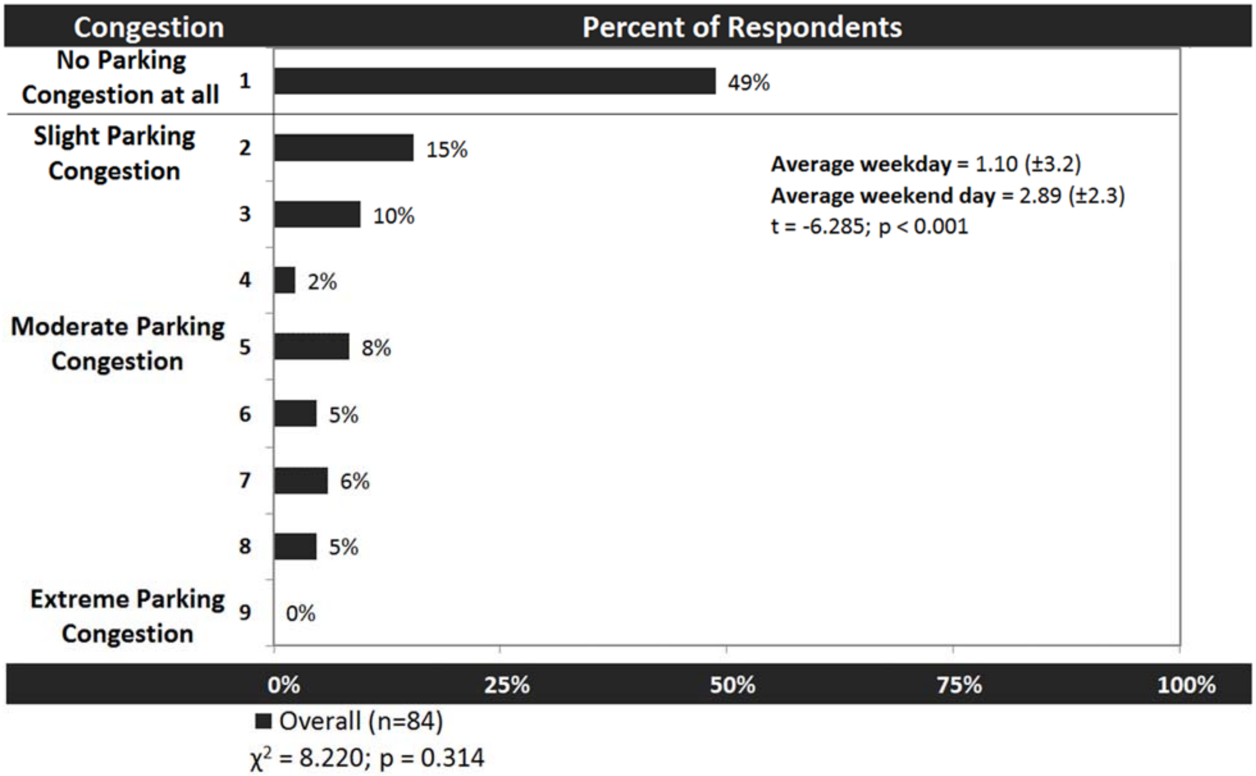


Figure 1-157. How much parking congestion do you think there is in the Gateway Trailhead Parking Lot today?

- Gateway visitors were asked whether they agree with two statements about parking in the Gateway Trailhead Parking Lot. Responses did not vary significantly between weekday and weekend day visitor groups (p>0.05 for both tests).
- Over half (55%) of visitors to the Gateway Trailhead agreed that it is worth it to park in the Gateway Trailhead Parking Lot to avoid paying the entrance fee.
- Only 15% of visitors to the Gateway Trailhead indicated that they would not have come to BLRA had they known that they would have to park so far from their destination.

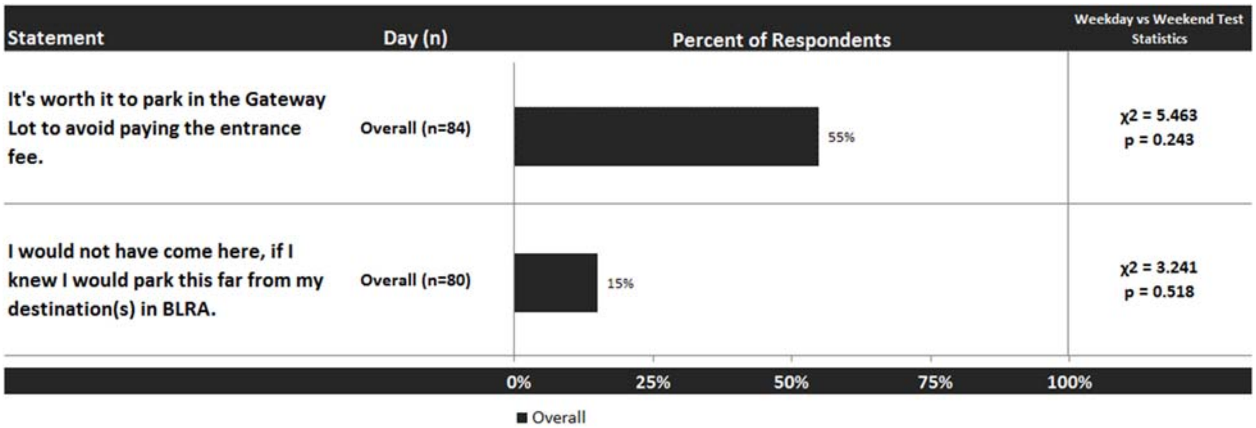


Figure 1-158. Percentage who agree with each of the following statements about parking in the Gateway Trailhead Parking Lot.

- Visitors to the Gateway Trailhead were asked if they would be likely to visit BLRA on a future trip if their only option was to park in the Gateway Trailhead Parking Lot and hike/walk or take a shuttle, or park outside of BLRA and take a shuttle from there. Visitors' responses to the questions did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Nearly three-quarters (72%) of Gateway visitors said they would be likely to visit BLRA on a future trip, even if they had to park in the Gateway Trailhead Parking Lot and walk/hike about 2 miles on a trail to their destination(s) in BLRA.
- A similar proportion (70%) of Gateway visitors said they would be likely to visit BLRA on a future trip, even if they had to park in the Gateway Trailhead Parking Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA.
- Only 17% of Gateway visitors indicated that they would be likely to visit BLRA on a future trip, even if they had to park in town and then take a 40 minute shuttle bus ride to their destination(s) in BLRA.

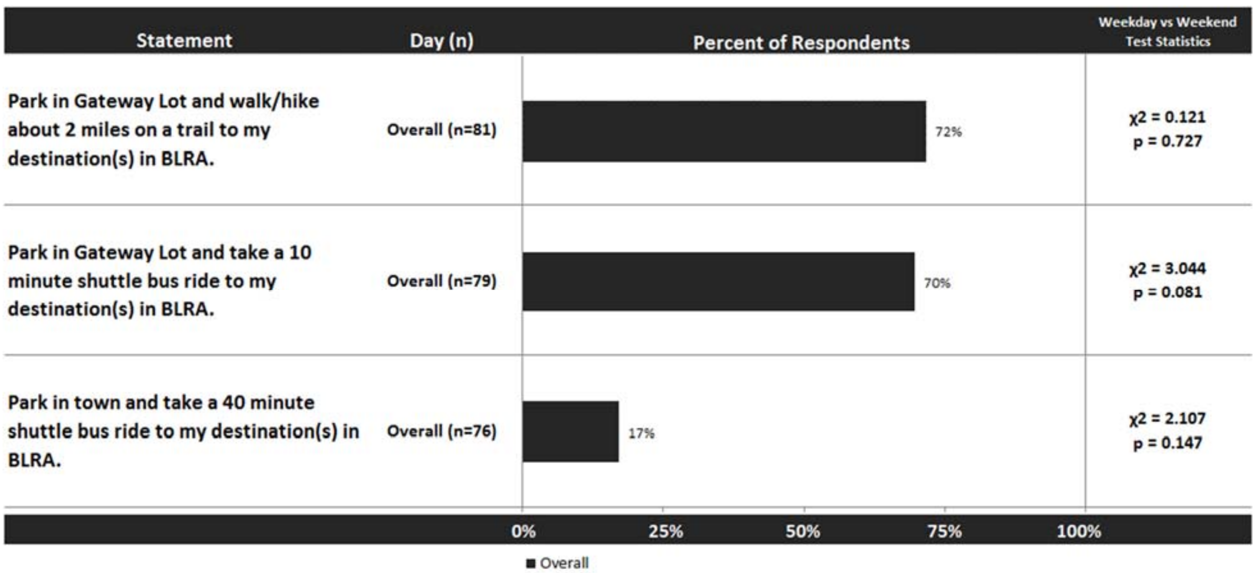


Figure 1-159. Percentage who would be likely to visit BLRA on a future trip, even if this was their only option for visiting because parking lots were full.

- Gateway visitors' attitudes about potential parking management actions at BLRA did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, approximately two-thirds (68%) of Gateway visitors agreed that when parking lots at BLRA are full, visitors should be directed to park in the Gateway Trailhead Parking Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA.
- A similar proportion (67%) of Gateway visitors agreed that when parking lots at BLRA are full, visitors should be directed to park in the Gateway Trailhead Parking Lot and walk or hike 2 miles to their destination(s) in BLRA.
- Just under half (48%) of Gateway visitors agreed that when parking lots are BLRA are full, visitors should be stopped at the entrance station until parking spaces open up, and only then allowed to enter. A slightly smaller proportion (44%) of Gateway visitors indicated that when parking lots at BLRA are full, visitors should be allowed to enter BLRA and drive around until a space opens up.
- Over one-third (39%) of Gateway visitors thought that when parking lots are full, visitors should be directed to other recreation areas instead of visiting BLRA that day.

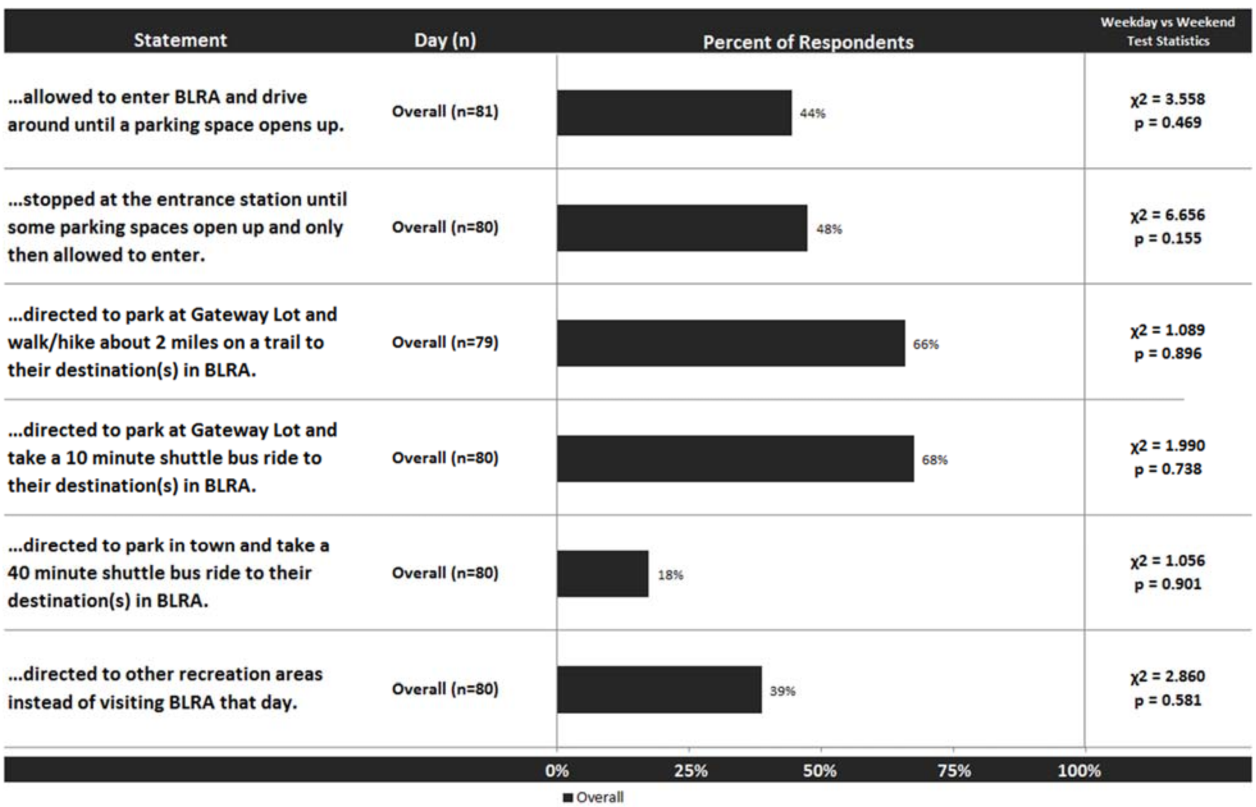


Figure 1-160. Percentage who agree with each of the statements about potential actions when parking lots are full.

Planning Your Trip to BLRA

- The time frame in which visitors to the Gateway Trailhead planned their trips varied significantly between weekdays and weekend days (χ^2=9.762, p=0.045).
- Nearly two-thirds (60%) of weekday visitors to the Gateway Trailhead planned their trip on the same day they were contacted for the survey, in comparison to only 41% of weekend day visitors.
- Nearly half (45%) of weekend day visitors planned their trip the day before they visited Gateway, while only 20% of weekday visitors did the same.
- However, the vast majority of Gateway visitors on weekdays (80%) and weekend days (86%) planned their trip to BLRA within 24 hours of the day they were contacted for the survey.
- Weekday visitors to the Gateway Trailhead (10%) were more likely weekend day visitors (3%) to plan their trip more than a week in advance.

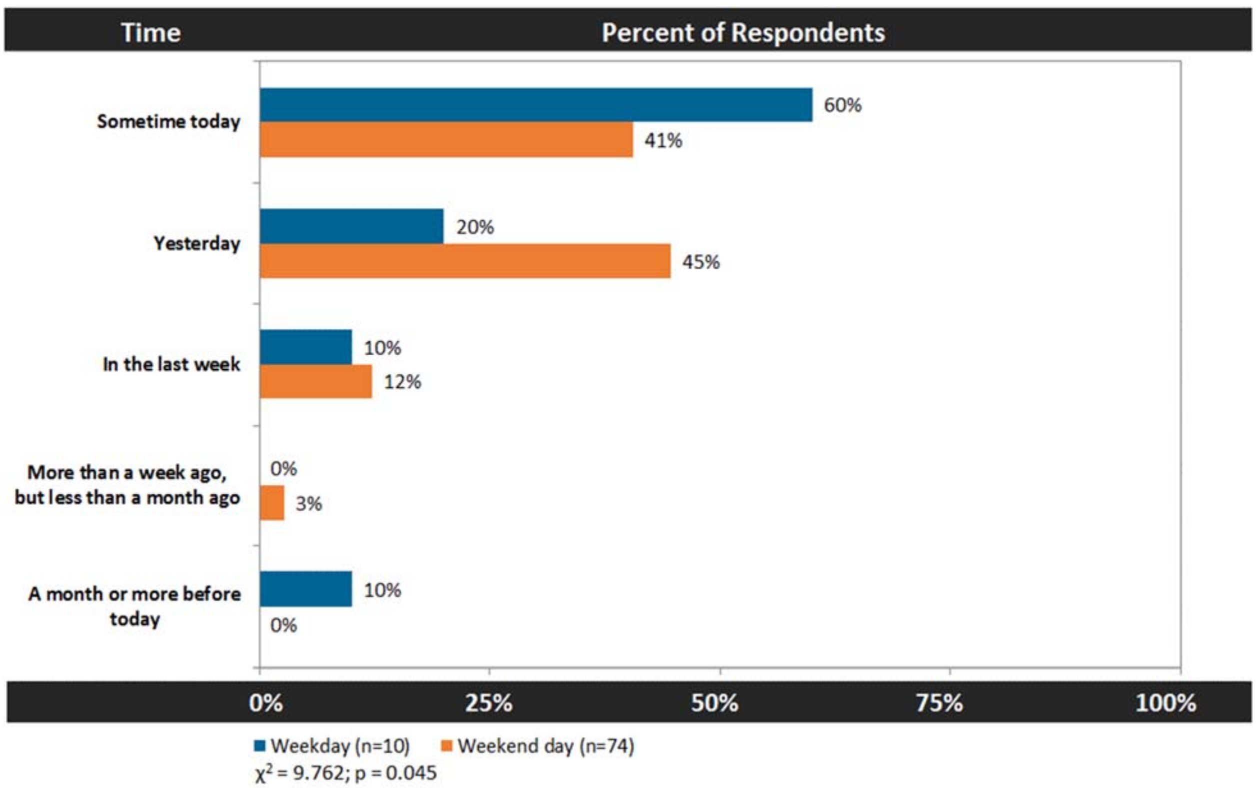


Figure 1-161. How long ago did you decide to take this trip to BLRA?

- The percentage of visitors to the Gateway Trailhead who anticipated that it would be difficult to find parking at BLRA did not vary significantly between weekday and weekend day visitors (χ^2=0.881, p=0.348).
- The majority (79%) of Gateway visitors did not anticipate that it would be difficult to find parking at BLRA.

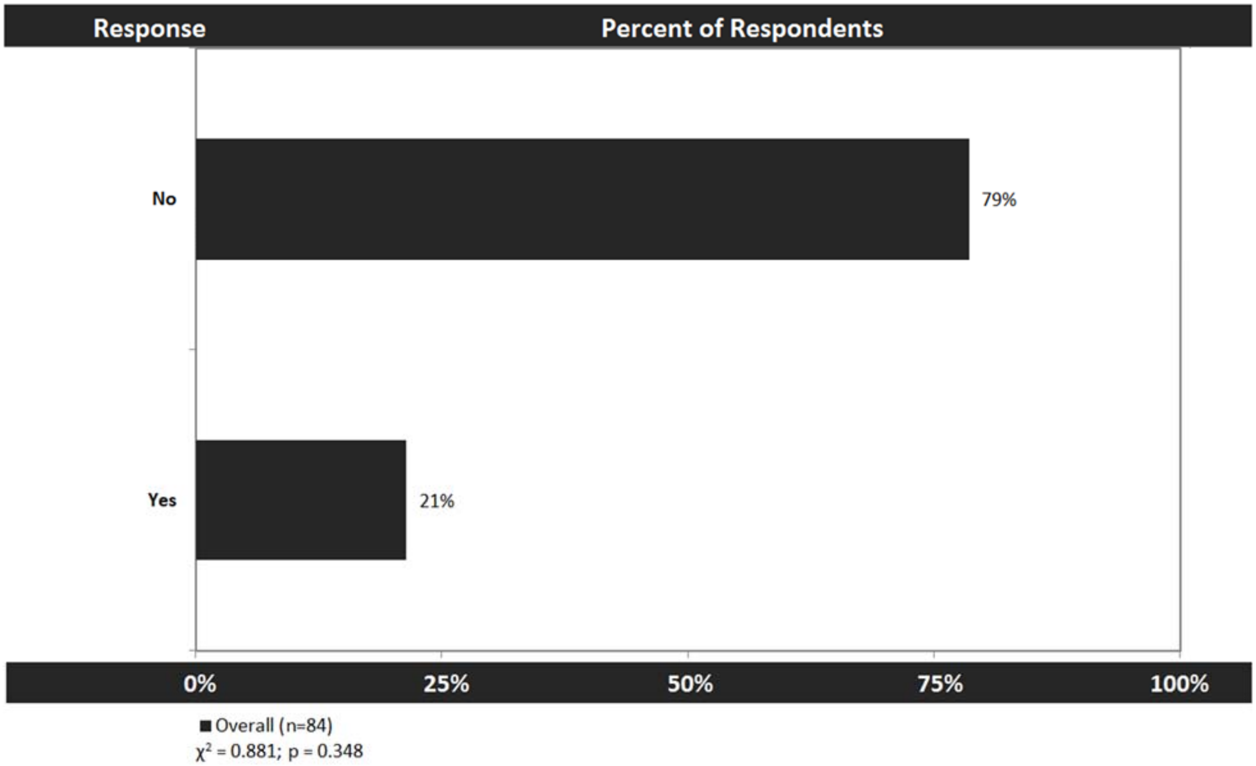


Figure 1-162. When you planned this trip to BLRA, did you think about the possibility that it might be difficult to find parking here?

- For visitors to the Gateway Trailhead who thought about the possibility that it might be difficult to find parking at BLRA, a follow-up question asked how that affected their trip plans. Responses did not vary significantly between weekday and weekend day visitors (*p*>0.05 for all tests).
- The possibility that it might be difficult to find parking did not affect the plans of over half (59%) of all visitors to the Gateway Trailhead, regardless of the day of week.
- Of the Gateway visitors who thought about the possibility that it might be difficult to find parking at BLRA, just under one-third (29%) visited at a time of day they thought would be less crowded. A slightly smaller proportion (18%) indicated that they avoided places they thought would be crowded.

Low Sample Size on This Question Suggests Results May not Be Applicable.

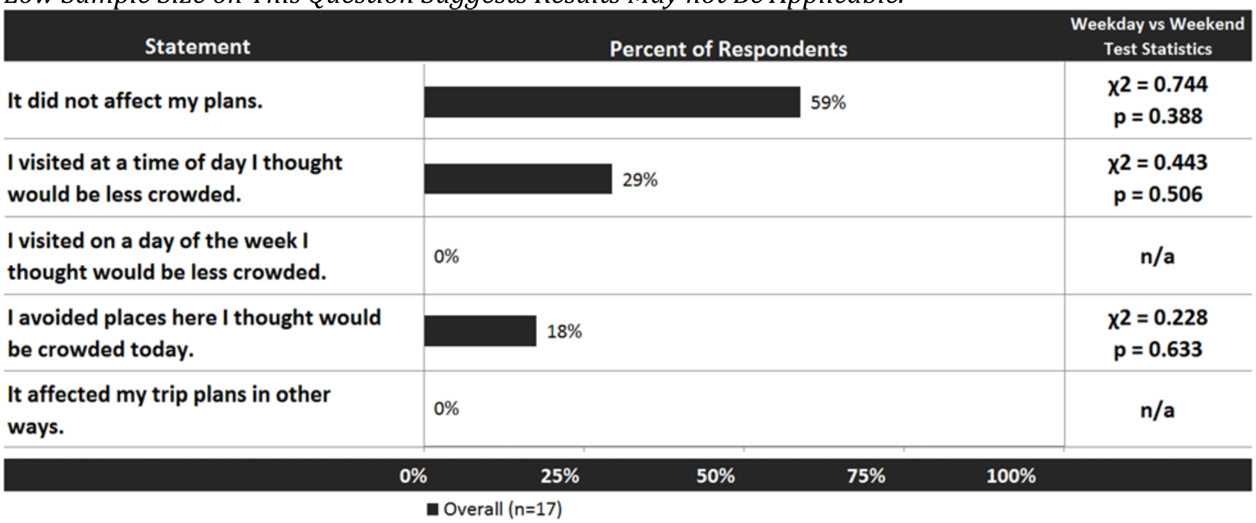


Figure 1-163. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to BLRA, how did it affect your trip plans?

- Gateway visitors were asked how likely they would be to use each of several sources for information about parking and crowding conditions at BLRA, if it were available for planning a future trip to BLRA. Responses to the question did not vary significantly between weekday and weekend day visitor groups (p>0.05 for all tests).
- The vast majority (85%) of visitors to the Gateway Trailhead indicated they would be likely to use a website for information about parking and crowding at BLRA when planning a future trip.
- Over half of all Gateway visitors said they would be likely to use a smartphone app (58%) and a tourist information center (55%).
- Between one-quarter and one-third of all visitors to the Gateway Trailhead indicated that they would be likely to use text updates on a cell phone or smartphone (30%), a telephone information line with a live person (30%), a telephone information line with a message updated daily (27%), and social media (26%) for information.
- A verbatim list (including respondents' typos) of "other" sources reported by respondents is included in Table 27 in Appendix I.

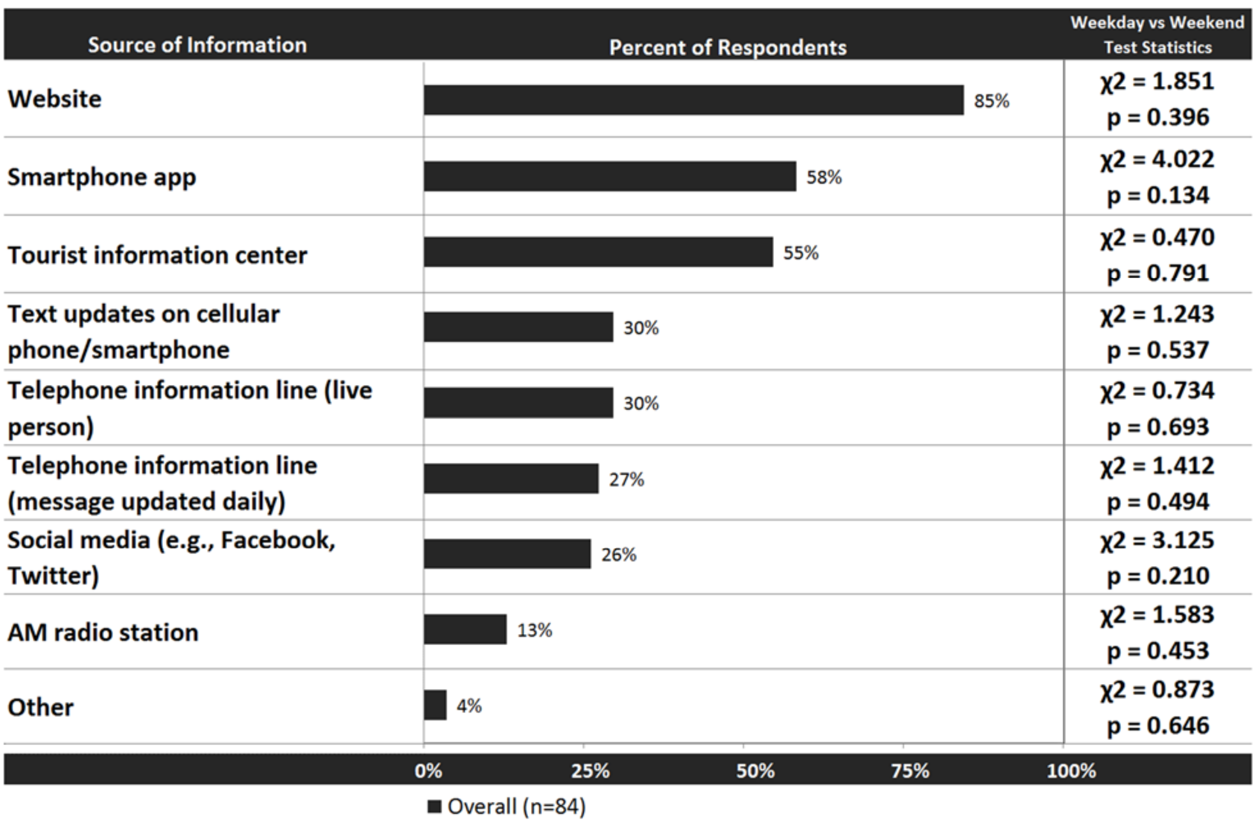


Figure 1-164. Percentage who would be likely to use each of the sources for information about parking and crowding conditions at BLRA, if it was available for planning a future trip to BLRA.

Background Information

- There were no significant differences in the gender of Gateway visitors on weekdays and weekend days (χ^2=0.236, p=0.627).
- Slightly under half (43%) of all Gateway visitors were male, and slightly over half (57%) were female.

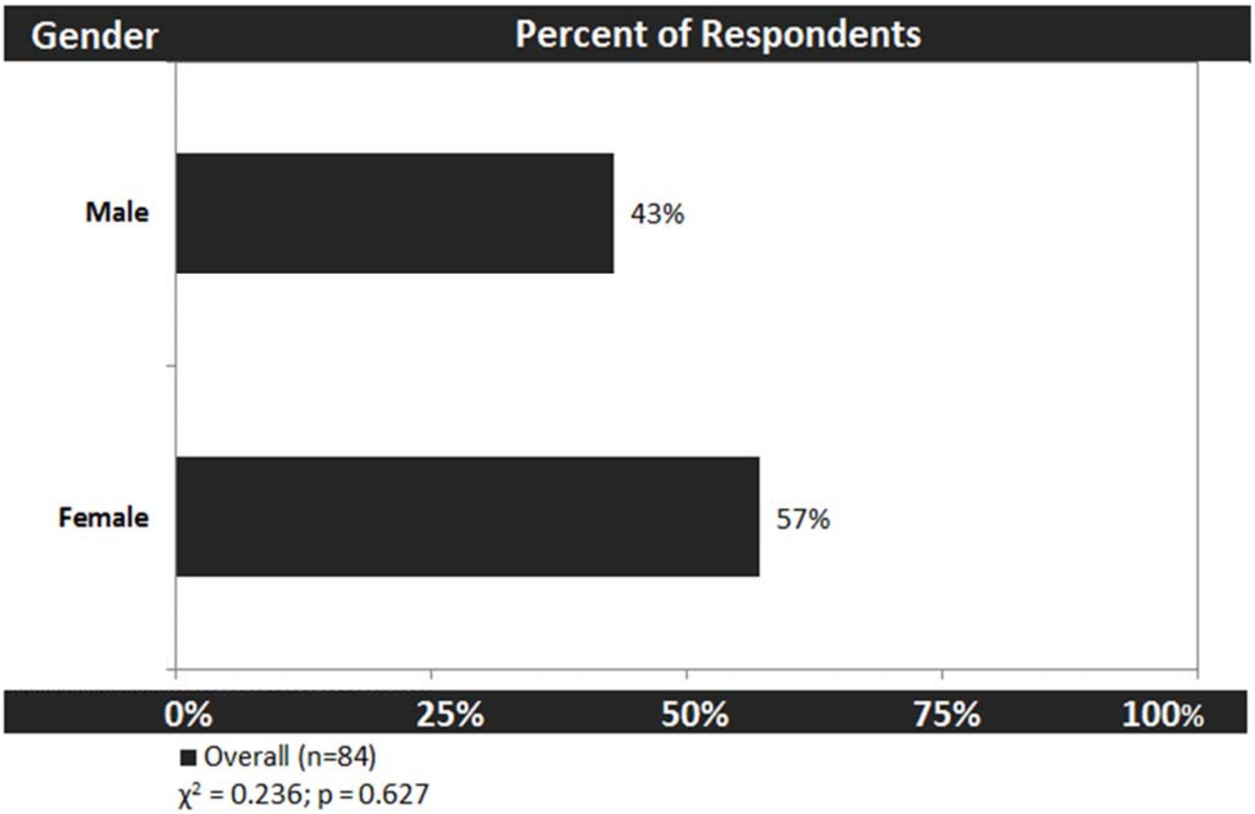


Figure 1-165. What is your gender?

- The age of Gateway visitors did not vary significantly between weekdays and weekend days (χ^2=4.416, p=0.491).
- On average, Gateway visitors were 46 years of age (t=0.972, p=0.334).
- One-half (50%) of Gateway visitors were 18 to 44 years of age, and one-half (50%) were 45 years of age or older.
- Close to one-third (29%) of all Gateway visitors were between 35 and 44 years of age, and one-fifth were 55 to 64 years of age.

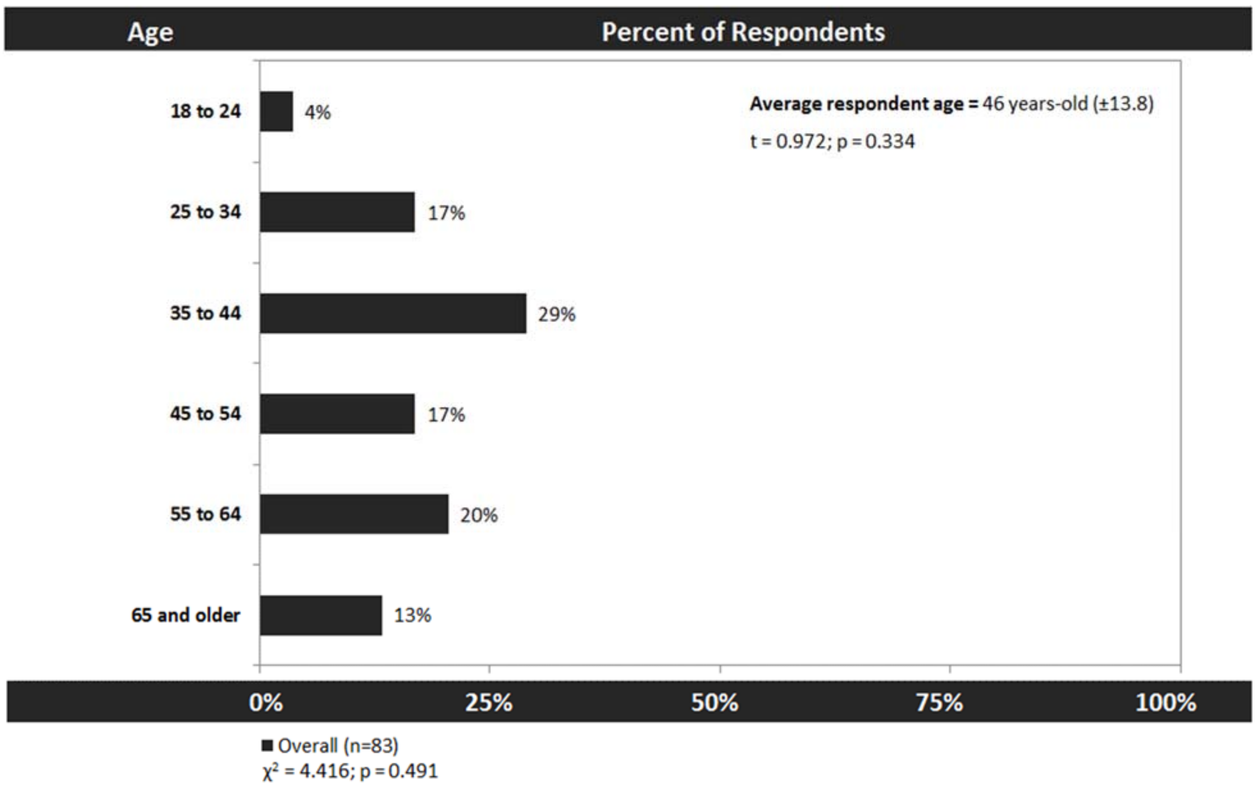


Figure 1-166. How old are you?

- Nearly all (99%) of visitors to the Gateway Trailhead were residents of the United States, regardless of the day of week when they visited (χ^2=0.137, p=0.712).
- A frequency distribution of all countries of residence reported by respondents is included in Table 28 in Appendix I.

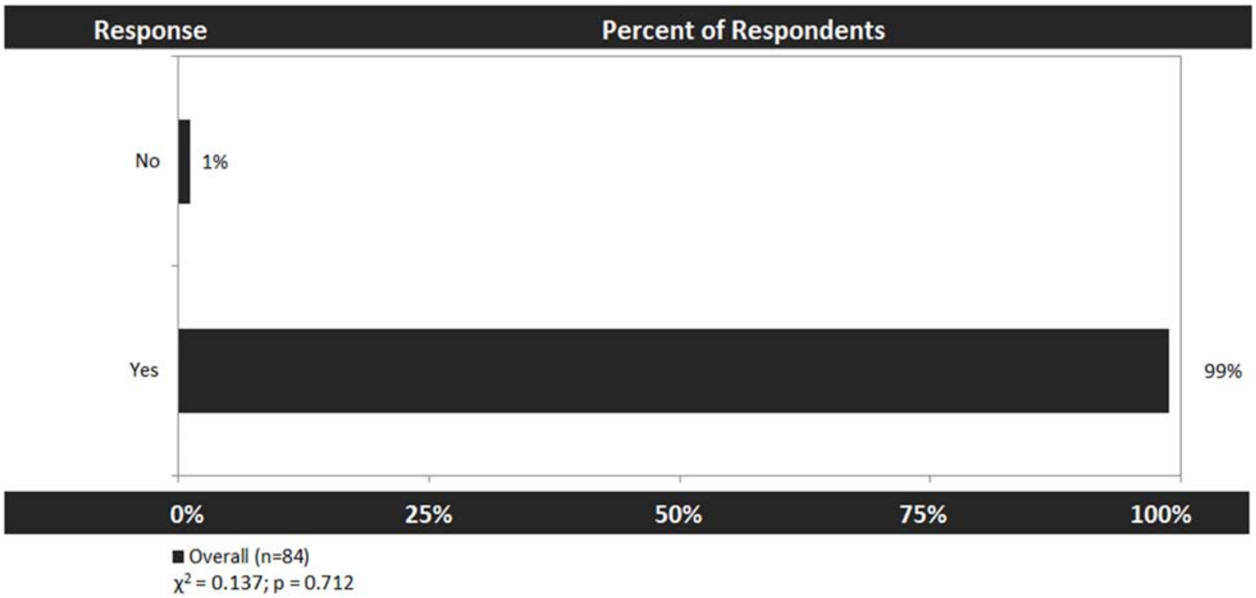


Figure 1-167. Do you live in the United States?

- Gateway visitors' state of residence did not vary significantly between weekdays and weekend days (χ^2=0.953, p=0.329).
- The large majority (90%) of Gateway visitors were residents of Colorado, regardless of the day of week.
- A frequency distribution of all states of residence reported by respondents is included in Table 29 in Appendix I.

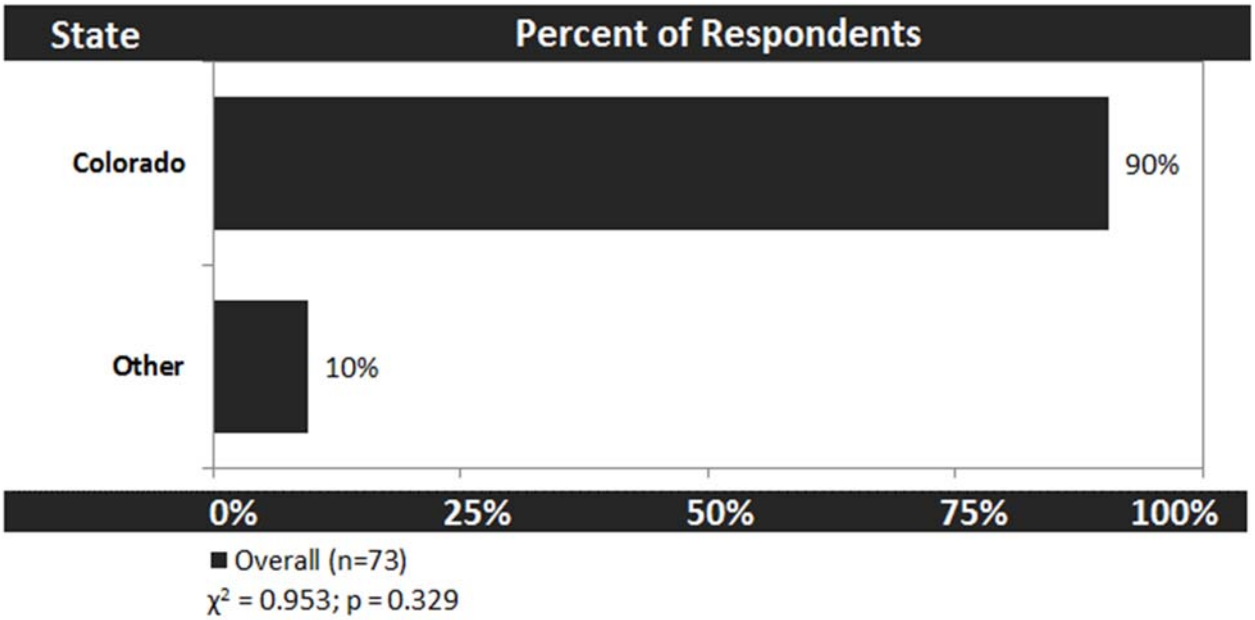


Figure 1-168. If you live in the United States, what state do you live in?

- Among Colorado residents who visited the Gateway Trailhead, visitors' city of residence did not vary significantly between weekdays and weekend days (χ^2=0.249, p=0.883).
- Among Colorado residents who visited the Gateway Trailhead, over half (55%) live in the Boulder metropolitan area, and just under half (44%) live in the Denver-Aurora-Lakewood metropolitan area.
- A frequency distribution of all zip codes reported by respondents who are residents of Colorado is included in Table 30 in Appendix I.

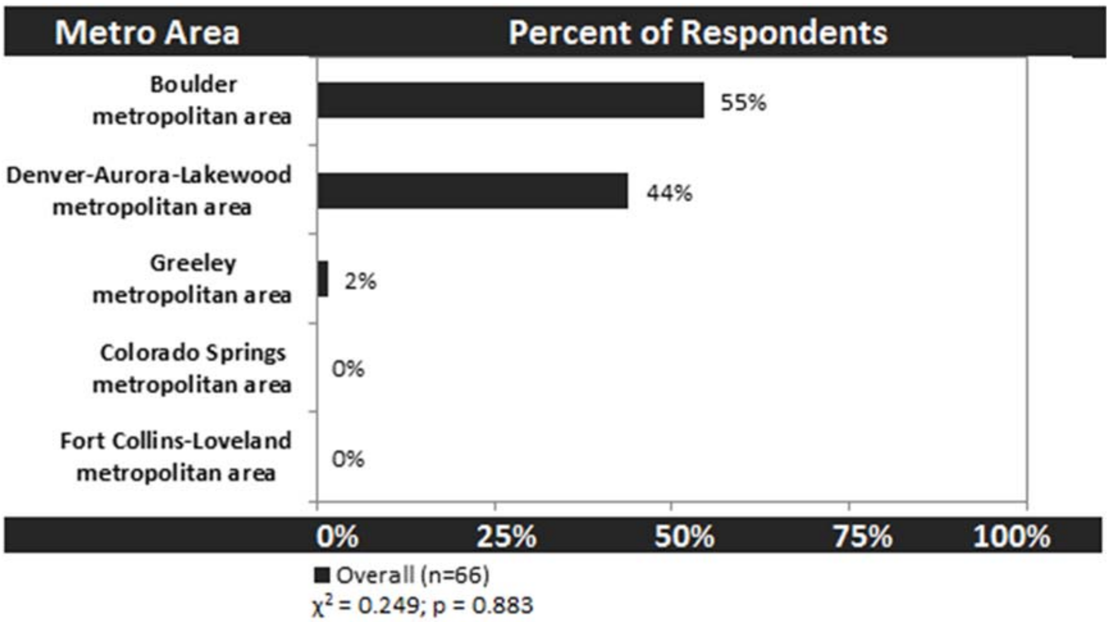


Figure 1-169. If you live in Colorado, what metropolitan area do you live in?

- The education level of visitors to the Gateway Trailhead did not vary significantly between weekdays and weekend days (χ^2=1.157, p=0.885).
- The large majority (90%) of Gateway visitors have earned a college, business or trade school degree or higher.

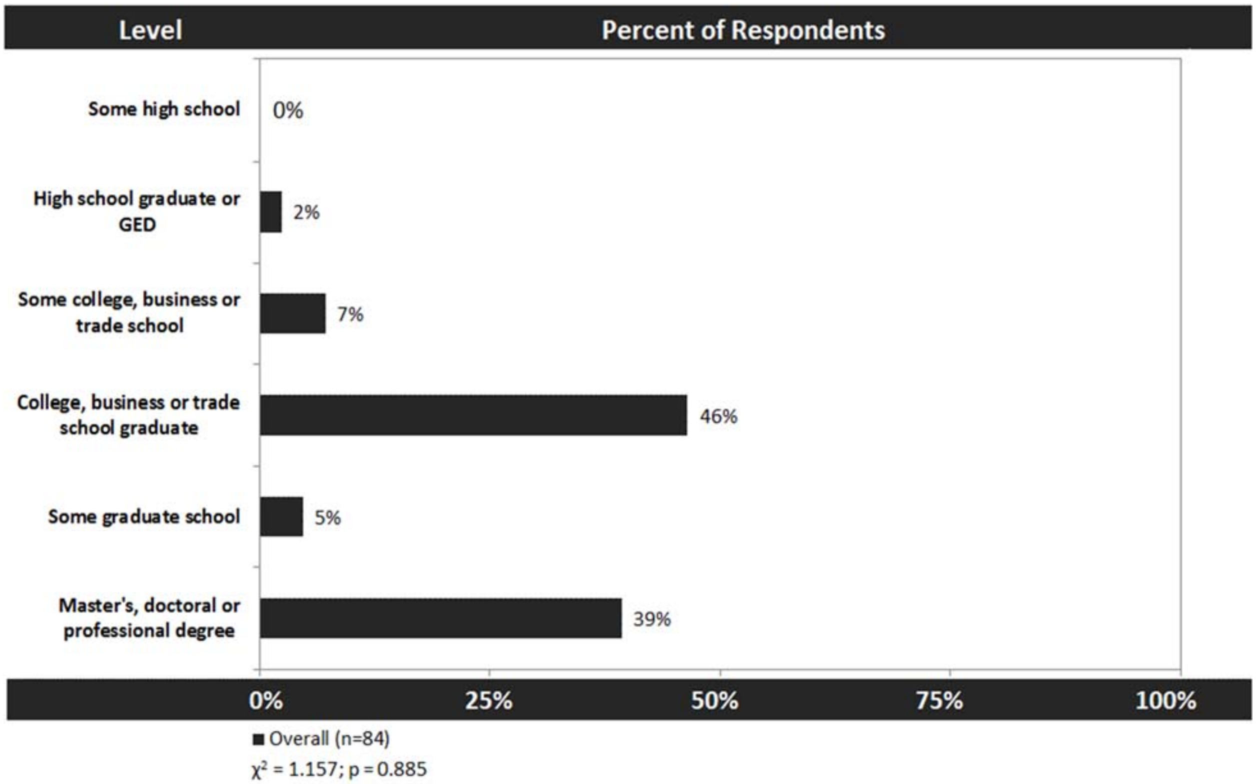


Figure 1-170. What is the highest level of formal education you have completed?

- Very few (4%) visitors to the Gateway Trailhead reported being Hispanic or Latino, regardless of the day of week (χ^2=0.384, p=0.536).

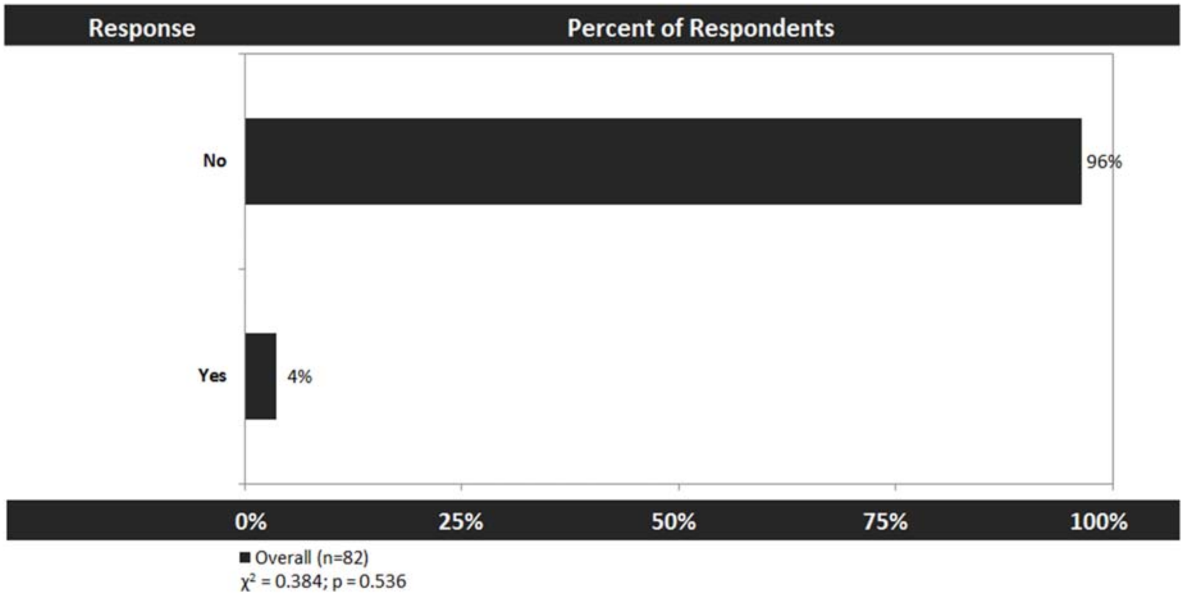


Figure 1-171. Are you Hispanic or Latino?

- Gateway visitors' self-reported race did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, the vast majority (96%) of visitors to the Gateway Trailhead reported their race as white.

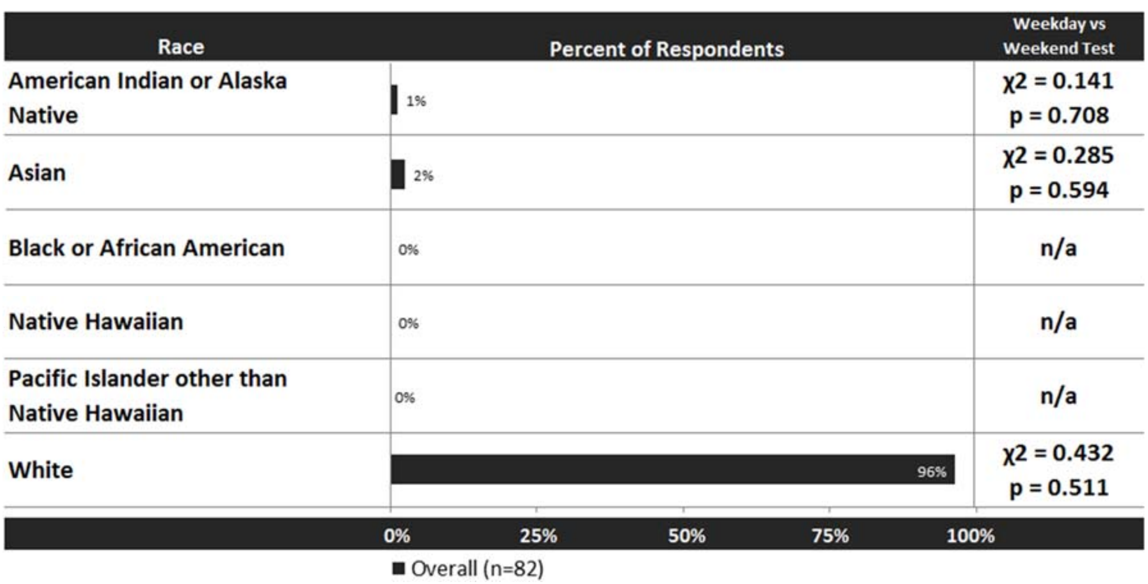


Figure 1-172. What is your race?

Brainard Lake Recreation Area Alternative Trail Alignment Analysis, Summer 2012

Utah State University (USU), in partnership with RSG, conducted an analysis of potential alignments for new trails in BLRA during summer 2012. The trail alignment analysis included in this section was included in the overall ARNF Alternative Transportation Systems project to provide USFS BLRA managers with new alignments that would address the following site-specific issues at BLRA:

- Recreation impacts in the Indian Peak Wilderness, an area that can be easily accessed from trailheads at BLRA. The proposed trail alignments have the potential to diffuse use away from the Wilderness Area to other recreation areas in BLRA.
- Pedestrian and bicycle traffic in the context of new transportation and infrastructure changes at BLRA that will take place during the summer of 2013. Specifically, new trail alignments will help to reduce the possibility of unattended parking and facilitate pedestrian flow by providing trailhead access from newly constructed parking areas in the BLRA. The trails have the potential to increase visitor safety by keeping visitors off of roadways and on designated pedestrian pathways.

This section of *Chapter 1: Brainard Lake Recreation Area Summary of Data and Findings* provides a summary of the suggested trail alignments for new trails at BLRA. A discussion of methods and suggested trail alignments is included, with a GIS map and text description of each proposed alignment.

Methods

A scoping meeting was held with managers in September 2012 to identify the types and locations of new trails in the BLRA study area. Possible trail alignments were drawn on a paper map and also digitized "on-the-fly" in ArcMap GIS. An associated site visit was conducted at BLRA (see Figure 1-173) with managers during which important locations for trail alignment were identified, possible complications were noted, and important features on the landscape were mapped with a high-accuracy Trimble GeoXT GPS. Drafts of these findings were circulated to key USFS personnel for review, and all revisions were incorporated into the suggested alignments that follow.

Note: All suggestions for new trail alignments are shown in red in figures and a summary of trail design considerations is shown in Table 1-27.

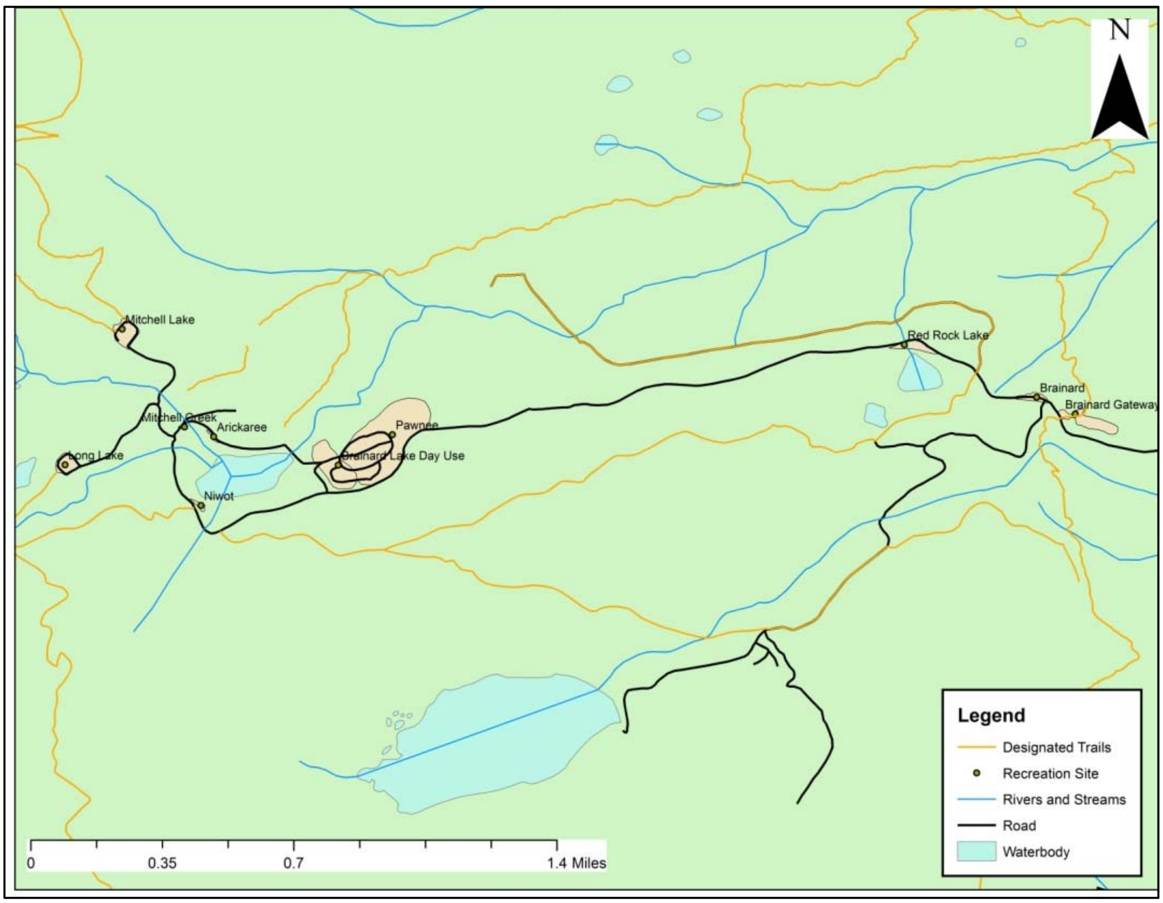


Figure 1-173. General map of the Brainard Lake Recreation Area.

Trail Alignments

Mitchell Creek Picnic Area to Mitchell Lake Trailhead

Suggested Alignment and Considerations (Figure 1-174): Trail should begin on pedestrian-only section of roadway. The new trail can possibly follow alignment of the already present visitor-created trail to Colorado Mountain Club cabin (trail improvement may be needed). Once the trail begins to meet the roadway, the new trail should parallel the road and continue to and through (or possibly around) the Mitchell Lake trailhead parking area.

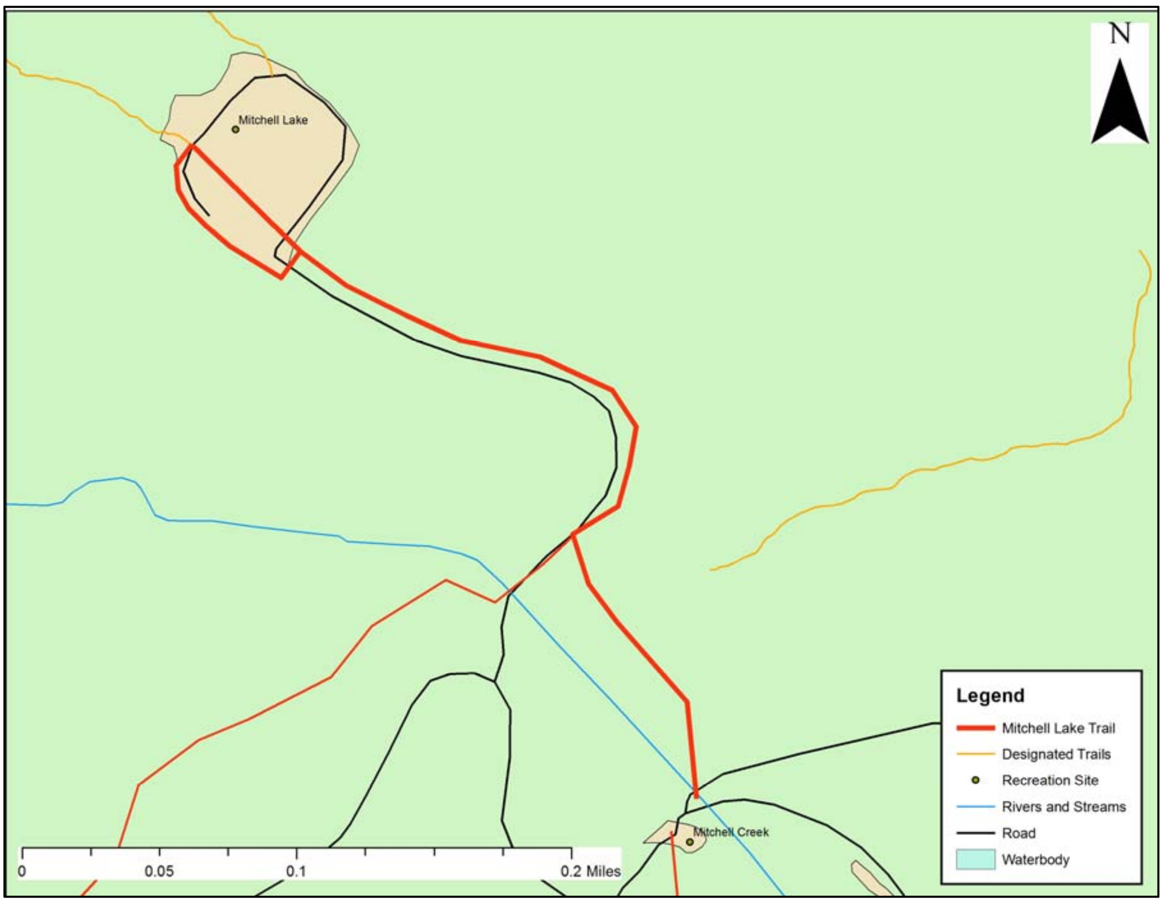


Figure 1-174. Possible trail alignment (in red) from Mitchell Creek Picnic area, past Colorado Mountain Cabin (not shown on map) to Mitchell Lake trailhead parking area.

Mitchell Creek Picnic Area to Long Lake Trailhead

Suggested Alignment and Considerations (Figure 1-175): Trail should begin limited on or across the road template on the pedestrian-only section of road way by the Mitchell Lake Picnic area. Next the trail should follow the trail to the access road to Mitchell Creek Trailhead, cross the road, and turn southwest along the road shoulder and cross Mitchell Creek. The trail should then veer off the road up the ridgeline parallel to the Long Lake Trailhead access road. The trails (proposed and existing) would then meet until the Long Lake parking area and diverge around to provide trail access. The trail should cross the road and continue on the opposite side of the road way to the west of the river. The trail should then follow the most reasonable slope alignment with considerations for soil type to the Long Lake parking area. Signs to warn drivers of pedestrians crossing the road way may need to be placed at road crossings.

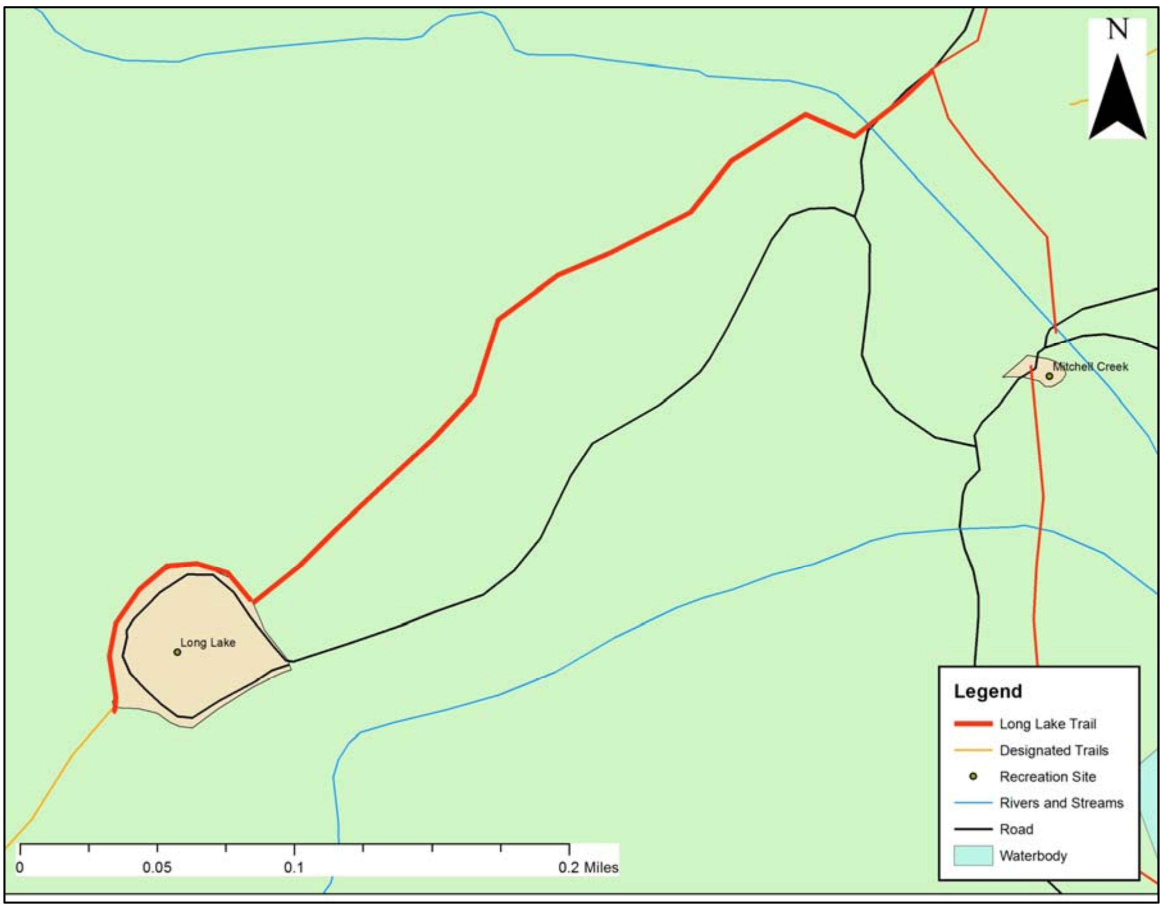


Figure 1-175. Possible trail alignment from Mitchell Creek Picnic area to Long Lake trailhead. New trail alignment to Long Lake is shown as bolded red line, trail alignment for possible Mitchell Creek trailhead parking (see Figure 1-174) is shown as the lighter red line.

Full Access Loop Around Brainard Lake

Suggested Alignment and Considerations (Figure 1-176): For a full access nature trail to be constructed around Brainard Lake, part of the trail should follow the pedestrian-only section of the road. The trail should then cut toward the lake through the Mitchell Creek picnic area. Some of the picnic area was constructed by the CCC and therefore consideration will need to be taken as to how to cut the trail from the road through the picnic area. The trail should then follow from the picnic area through the wooded area (many visitor-created trails cut through this area) to an appropriate creek crossing. The creek crossing location should be chosen based on where it is most feasible to build a full access bridge. The trail should then follow close to the lake as soil conditions and topography allow. A connecting trail should fork from the main all access trail to allow access to the Niwot Cutoff Trail – this fork should by-pass the Niwot picnic area. The Brainard Lake Loop Trail should terminate on the south side of the bridge on the east end of the lake to provide access to the parking lot next to the Pawnee campground. Managers could consider providing an interesting and educational experience for those hiking around the lake.

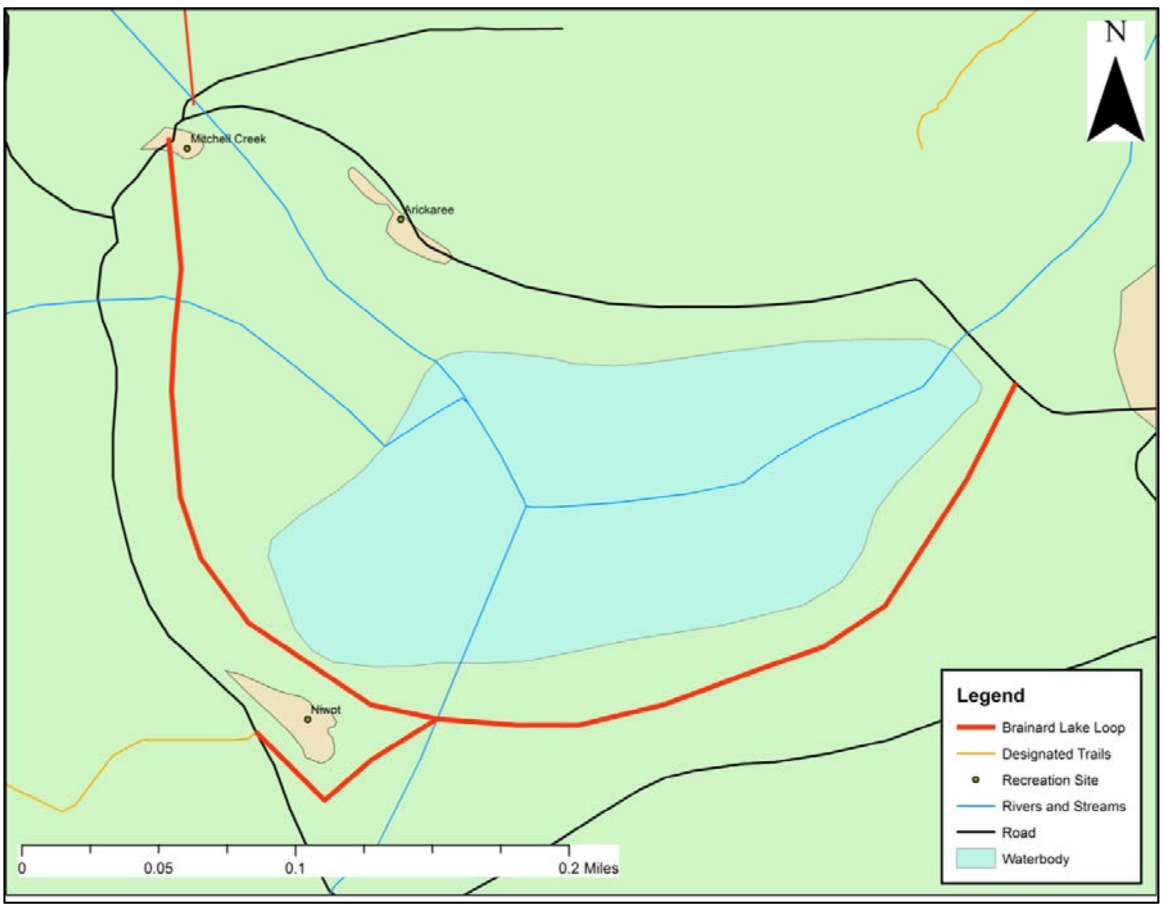


Figure 1-176. Possible trail alignment for all access loop around Brainard Lake (bold red line). The loop will connect from the south side of Mitchell Creek picnic area to the pedestrian-only portion of Brainard Lake Road. The trail will also include a cutoff to the Niwot Cutoff Trail (shown in yellow in southwest corner).

Portal Parking Lot to Brainard Lake (via Waldrop Trail)

Suggested Alignment and Considerations (Figure 1-177 and Figure 1-178): This trail would serve as a means to get visitors from the Brainard Lake Gateway Trailhead Parking Lot to Brainard Lake. As such, the trail should be large capacity, allow for multiple uses such as bikes and strollers, be wide enough for two-way traffic, and contain choke points/bends to slow visitors to maintain the safety of the trail. The trail should follow an already existing alignment from the Portal Parking Lot to the currently existing Waldrop Trail. The trail should follow the Waldrop Trail (trail improvement will be needed on the Waldrop Trail) until the trail begins to head north and the new trail alignment should fork off toward to the Pawnee Campground. The new trail alignment should pass the campground to the north and cut back toward the new parking area where the trail should terminate. All new trail alignments should be far enough away from the road to discourage visitors from cutting the trail and using the road to access Brainard Lake. A short cutoff trail should also be placed from the new trail alignment to the road to allow access to Red Rock Lakes. Pedestrian signs will be needed to warn motorist of a trail crossing to Red Rock Lakes.

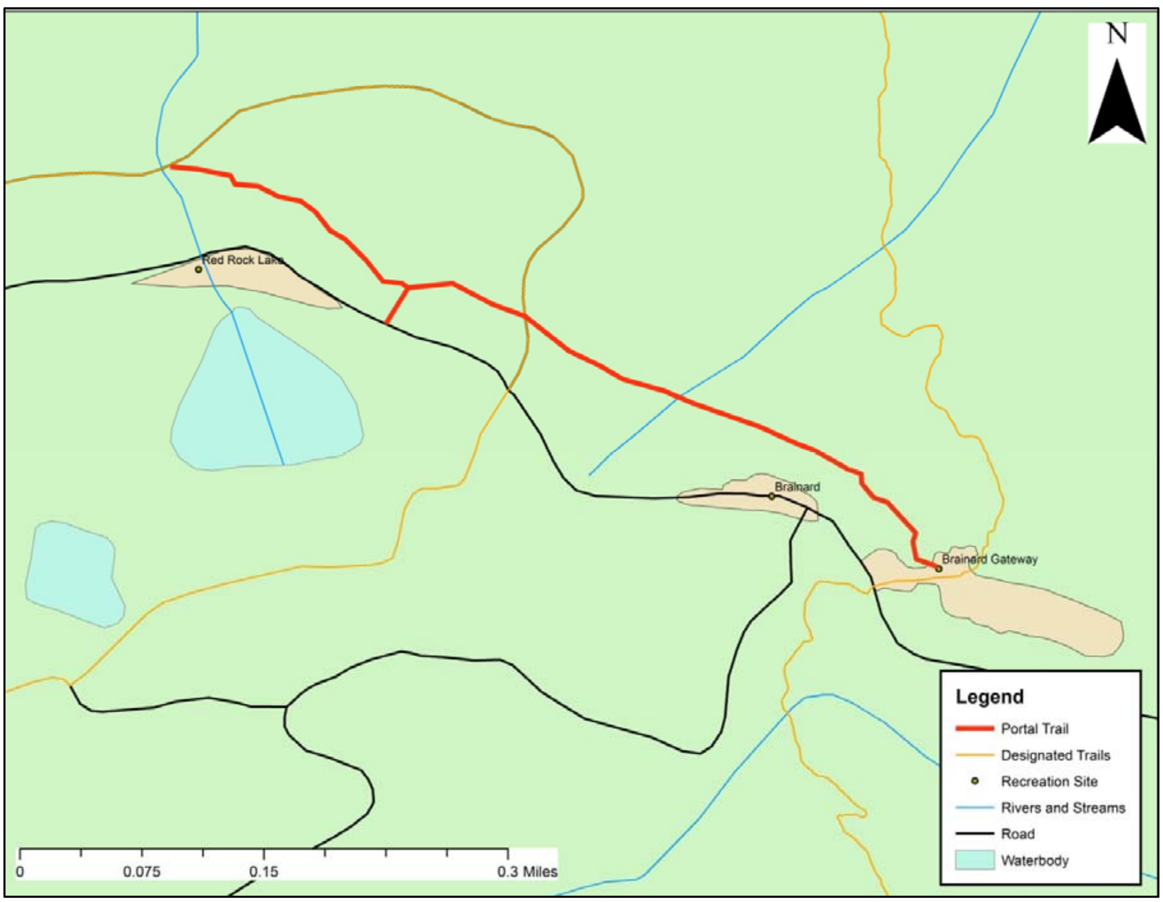


Figure 1-177. Possible trail alignment (shown in bolded red) from portal parking area to Waldrop connection, including cutoff to Red Rock Lake. The new trail alignment will connect to the existing Waldrop trail (shown in brown).

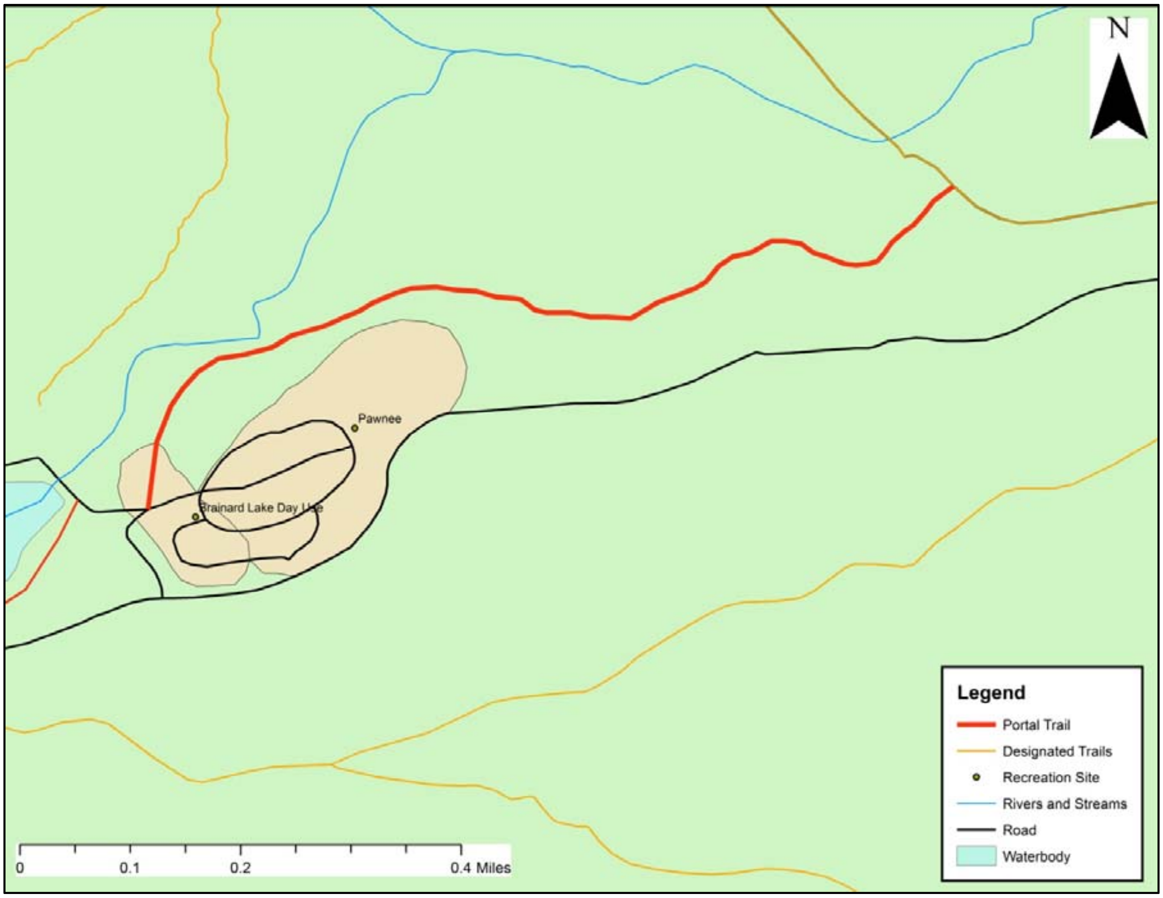


Figure 1-178. Possible trail alignment completing Waldrop trail from portal parking to new day use parking area. New trail alignment (shown by red bolded line) will branch from Waldrop trail (shown in brown).

Trail from Little Raven to Lefthand Park Reservoir

Suggested Alignment and Considerations (Figure 1-179): Currently there is not direct trail route from BLRA to the Lefthand Park Reservoir. The presently available route is hiking the road from the BLRA fee gate. A new trail alignment would provide a shortcut from Little Raven to the Lefthand Park Reservoir. The shortcut is currently placed through areas with the lowest slope percentage. A trail construction survey for the Little Raven trail will need to be completed in order to determine if it is feasible to connect any additional trail connections to or from it.

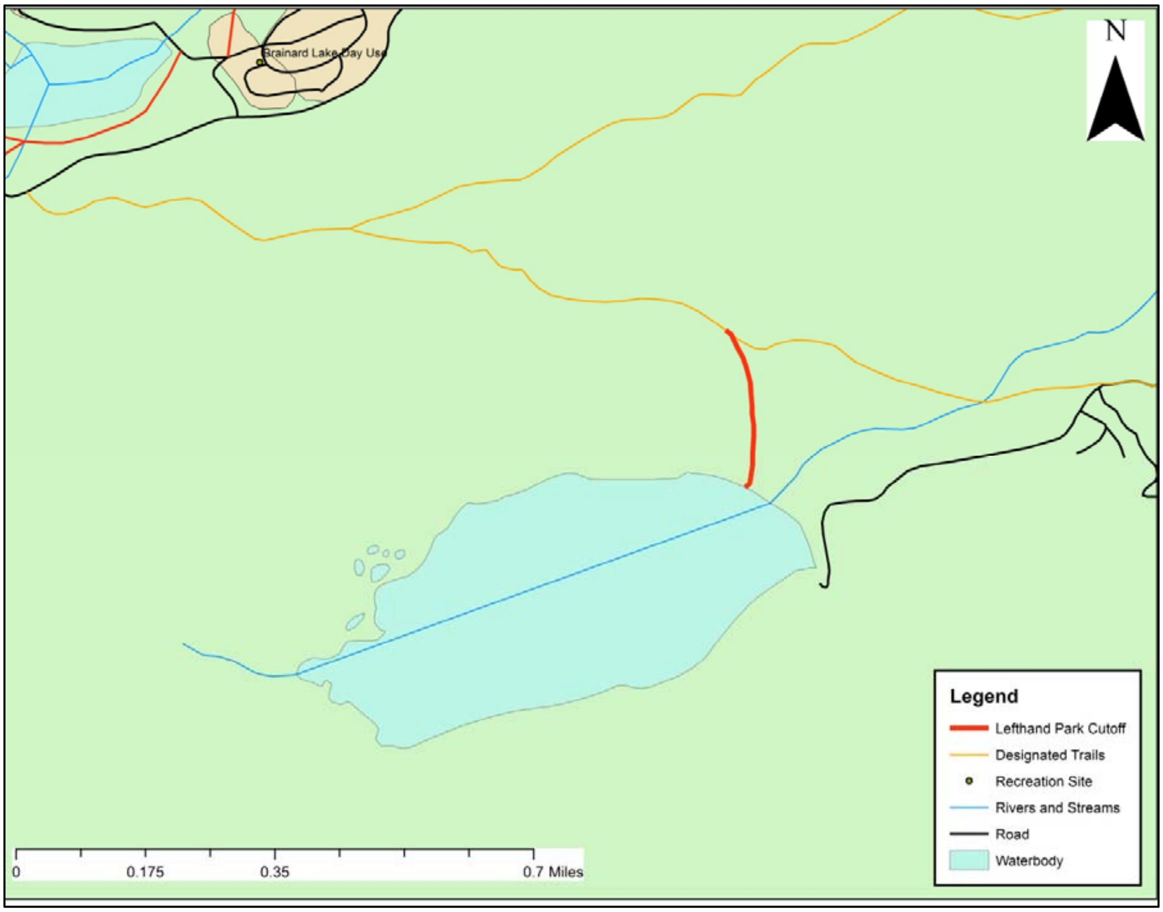


Figure 1-179. Possible trail alignment (shown by bolded red line) connecting Little Raven trail (shown in yellow) to Lefthand Park Reservoir.

Loop Trails Connecting Sourdough and Little Raven

Suggested Alignment and Considerations (Figure 1-180): Managers suggested that providing a loop trail toward the east of the BLRA might divert use away from the wilderness. However, loops connecting the Sourdough and Little Raven trail would most likely require the use of the USFS road to Lefthand Park Reservoir. During the scoping exercise, it seemed as if significant road improvements would be required to make these loops appeal to hikers.

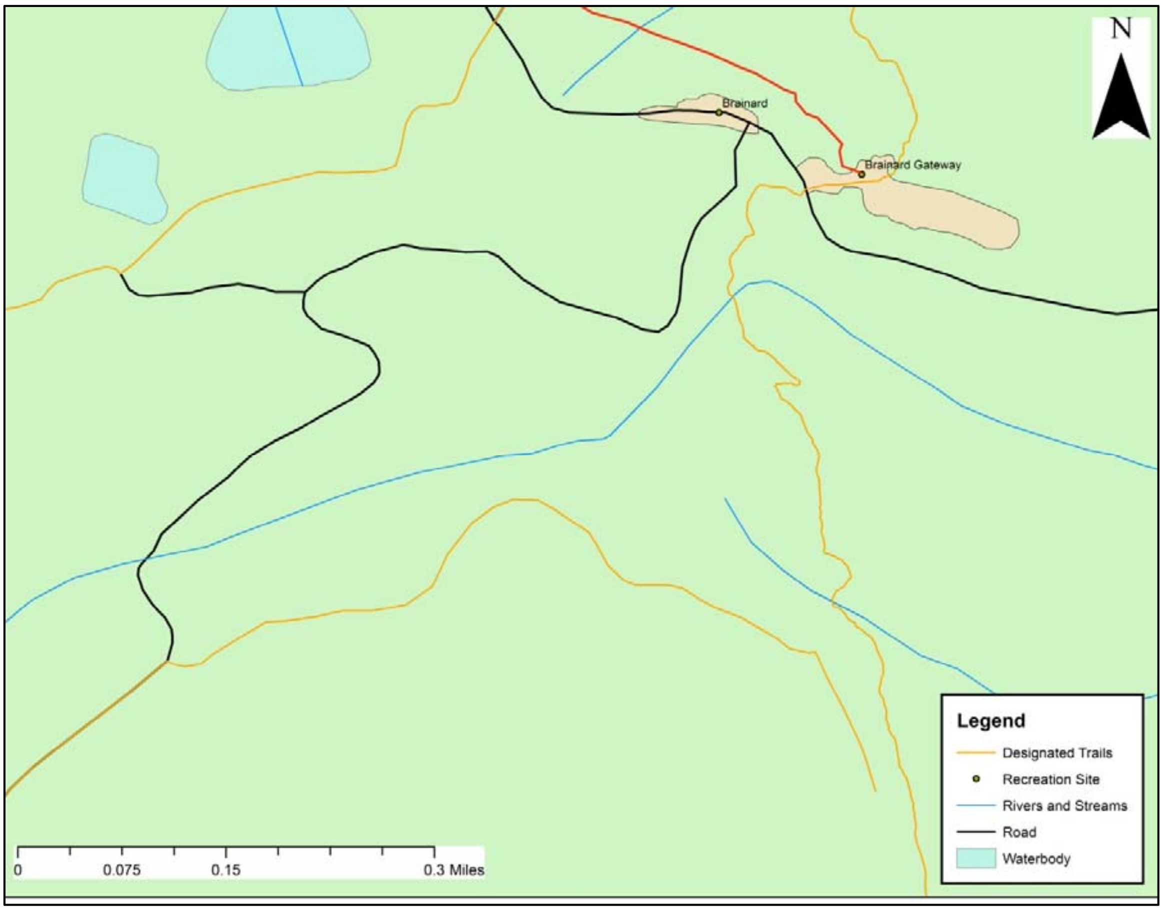


Figure 1-180. Area where new alignments may be considered to create shorter, loop hikes using current designated trails (shown in yellow). Currently no new trail alignments are shown on the map as road improvements would be needed to allow access to this area.

Summary of New Trail Alignments and Considerations

Table 1-27. New trail alignments and trail design considerations.

New Trail Alignment	Associated Figures	Anticipated Use Level	Use Type to Accommodate	Difficulty	Design Considerations
Mitchell Creek Picnic Area to Mitchell Lake Trailhead	Figure 1-174	Medium	Foot Traffic	Moderate	Moderate slope, narrower trail (< 1m), natural trail surface
Mitchell Creek Picnic Area to Long Lake	Figure 1-175	Medium	Foot Traffic	Moderate	Moderate slope, narrower trail (<1 m), natural trail surface
Full Access Loop around Brainard Lake	Figure 1-176	High	Foot traffic, children, seniors, mobility impaired, bicycle	East	ADA Compliance, accommodate two-way traffic
Portal Parking Lot to Brainard Lake (via Waldrop Trail)	Figure 1-177, & Figure 1-178	High	Foot traffic, children, bicycle	Easy	Low slope, hardened surface, wide enough to accommodate multidirectional traffic
Trail from Little Raven to Lefthand Park Reservoir	Figure 1-179	High	Foot traffic, children, bicycle	Easy	Low slope, hardened surface, wide enough to accommodate multidirectional traffic
Loop Trails connecting Sourdough and Little Raven	Figure 1-180	N/A	N/A	N/A	Road improvements would be needed to allow for access to any possible new trail alignments

Consideration of Highway Improvement

In addition to trail improvements and the installation of new trails at BLRA, consideration should be given to improvements on HW 72 to accommodate both bicycles and pedestrians safely. Road improvements, particularly shoulder improvement, may be needed along HW 72 to accommodate cyclists/pedestrians using HW 72 to access the BLRA. Additional signage may also be necessary to ensure the safety of pedestrians and cyclists. Evaluation of the feasibility of such improvements is outside the scope of this particular report. However, the cost of road widening may prove to be prohibitive and we recommend a feasibility study examining the possibility of new signage and shoulder widening.

Chapter 2: Guanella Pass Summary of Data Findings

Guanella Pass Transportation and Visitor Use, Summer 2012

RSG and Colorado State University (CSU) conducted a field study and data collection effort at Guanella Pass during the summer of 2012. The purpose of the study was to collect transportation and visitor use data during the area's peak summer visitation period, from June 23rd through September 3rd. The following data were collected at Guanella Pass during summer 2012:

- Vehicle traffic volumes
- Parking accumulation and turnover rates in the designated parking lots and on the roadside at Guanella Pass
- Visitor use counts on selected trails at Guanella Pass
- GPS-based tracking of visitor use patterns in the study area
- People at one time (PAOT) counts on the summit of Mount Bierstadt

This section of *Chapter 2: Guanella Pass Summary of Data and Findings* provides a summary of the summer 2012 data collection effort at Guanella Pass and results. This section is organized into subsections that describe the data collection methods and statistical results for each of the types of data listed above.

Vehicle Traffic Volumes

Data Collection Method

- Vehicle traffic data were recorded with Automatic Traffic Recorders (ATR's) at six locations on Guanella Pass Road (see Figure 2-1 and Figure 2-2).
- ATR's #1 and #6 in Figure 2-2 were used to count all inbound and outbound traffic on Guanella Pass Road.
- ATR's #2 and #5 were used to count all traffic entering and exiting ARNF and PNF.
- ATR's #3 and #4 were used to count all traffic entering and exiting Guanella Pass.

Figure 2-1. Guanella Pass ATR location.

- The ATR's were configured to record vehicle traffic counts by direction of travel and vehicle class in hourly bins, 24 hours per day from May 25th through September 3rd, 2012.
- Due to the high degree of accuracy and precision of the ATR's used in the study, it was not necessary to calibrate the vehicle traffic count data with direct observation counts.

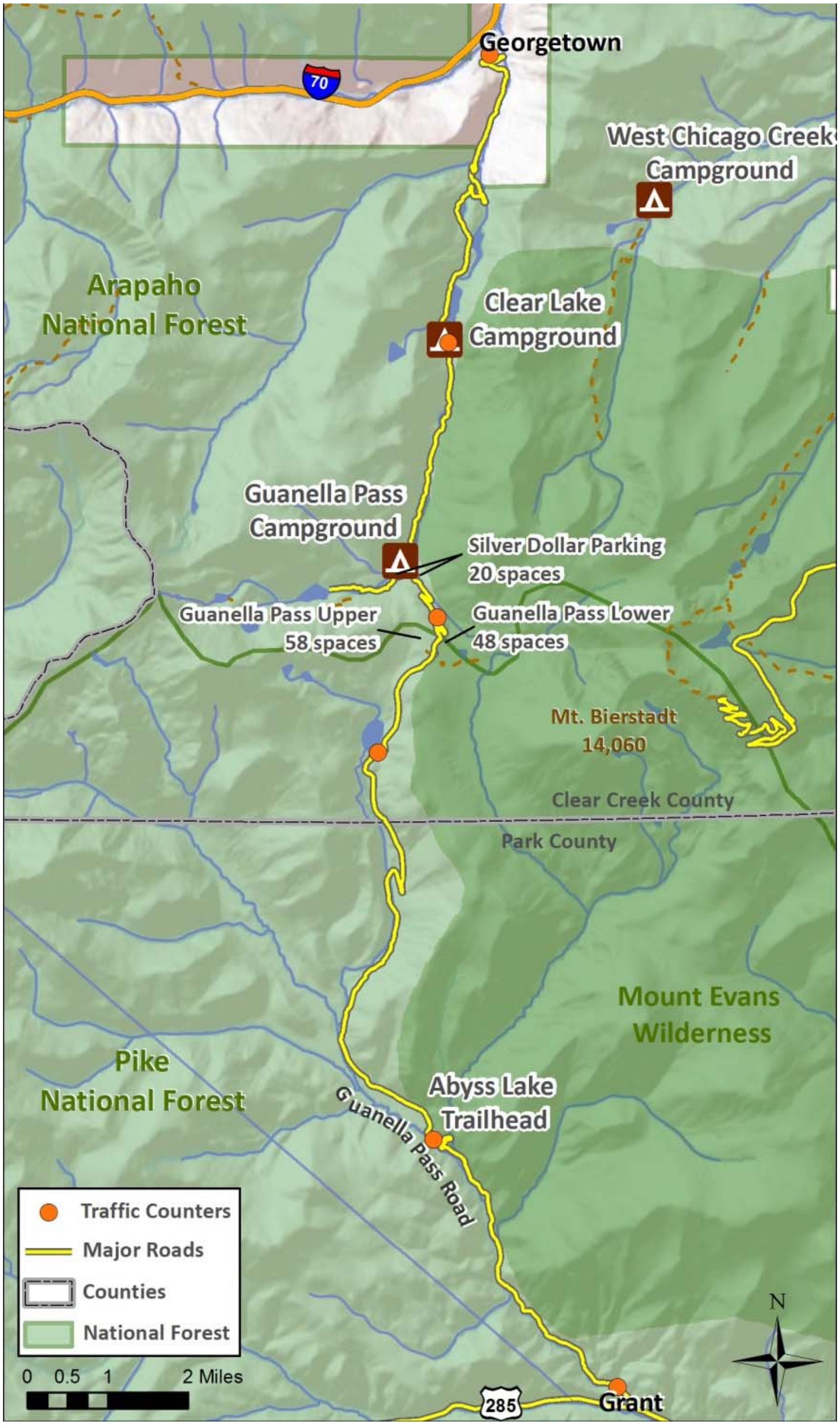


Figure 2-2. Approximate location of ATRs, Guanella Pass summer 2012.

Analysis and Results

Figure 2-3 displays average daily "inbound" (i.e., traveling in the direction of Guanella Pass) traffic volumes on Guanella Pass Road during summer 2012, by counter location and day of week category (i.e., weekday, weekend day, and all days combined). The data in Figure 2-3 suggest, on average, there are roughly twice as many vehicles traveling on Guanella Pass Road on summer weekend days than on summer weekdays. In addition, there is generally about twice as much summer weekend traffic on the "Georgetown side" of Guanella Pass Road than on the "Grant side" of Guanella Pass Road; traffic volumes are more similar on either side of Guanella Pass during summer weekdays, though they are still greater on the "Georgetown side" of Guanella Pass Road.

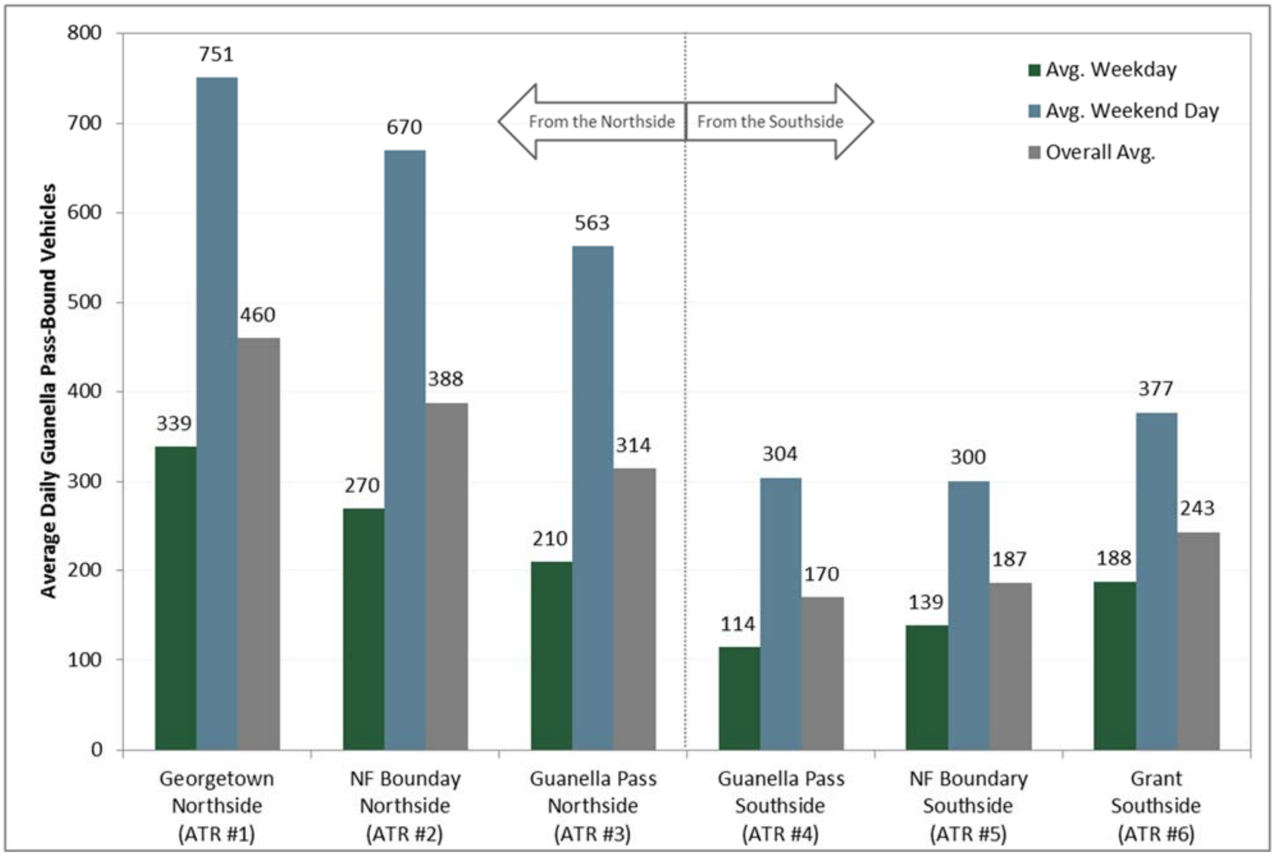


Figure 2-3. Average daily inbound vehicle traffic on Guanella Pass Road, by ATR location and day of week category, summer 2012.

Analysis of the ATR data suggest that approximately three-quarters (75%) of vehicles entering Guanella Pass Road at Georgetown or Grant on summer weekdays travel at least to the national forest boundaries, and nearly two-thirds (60%) travel to Guanella Pass (Table 2-1). On summer weekend days, the vast majority (85%) of vehicles entering Guanella Pass Road at Georgetown or Grant travel at least to the national forest boundaries, and three-quarters (75%) travel to Guanella Pass.

Table 2-1. Percentage of Guanella Pass Road inbound vehicle traffic that travels to the national forest boundaries and Guanella Pass, by day of week category, summer 2012.

	Average on Weekdays	Average on Weekend	Overall Average
Traffic to national forest boundaries	75%	85%	78%
Traffic to Guanella Pass	60%	75%	65%

The majority (66%) of vehicles at Guanella Pass arrive from the north side of the pass, while about one-third (34%) arrive from the south side of the pass (Table 2-2). The percentages of vehicles at Guanella Pass arriving from the north and south side of the pass are similar on weekend days and weekdays. It should be noted, however, that these percentages are approximate, because some visitors passed back and forth over the ATR's located near Guanella Pass (ATR's #3 and #4 in Figure 2-2) while they were looking for a place to park. That being said, the percentages are consistent with the traffic volumes reported by location in Figure 2-3, and therefore appear to be valid estimates of vehicle traffic arrival patterns at Guanella Pass.

Table 2-2. Percentage of vehicles at Guanella Pass that arrive from the north and south, by day of week category, summer 2012.

	Average on Weekdays	Average on Weekend	Overall Average
Arrive from north side of Guanella Pass	66%	65%	66%
Arrive from south side of Guanella Pass	34%	35%	34%

As the summaries of the ATR data suggest, the majority of visitors travel to Guanella Pass from the direction of Georgetown, CO (Figure 2-3 and Table 2-2). Therefore, the daily inbound vehicle traffic volume data recorded at ATR #3 were used to help identify a "design day" for analysis and planning that represents a "typically busy" summer day at Guanella Pass. To do this, the daily inbound vehicle traffic data recorded by ATR #3 were plotted, by date from May 25th, 2012 to September 3rd, 2012, to assess day of week and seasonal traffic patterns (Figure 2-4; NOTE: the red bars highlight days when parking data were collected at Guanella Pass).

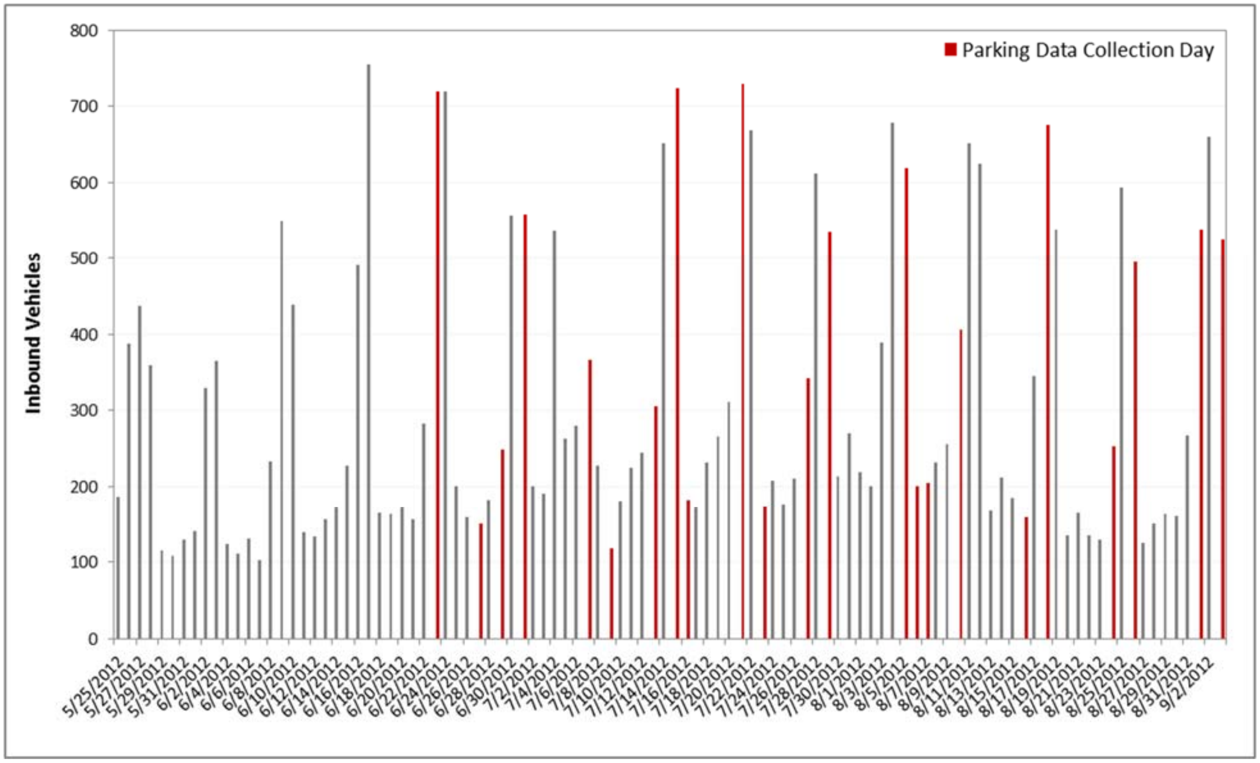


Figure 2-4. Daily inbound vehicle traffic volumes on Guanella Pass Road at ATR #3, by date, summer 2012.

Next, the inbound vehicle traffic volumes recorded by ATR #3 were organized in descending order, from the busiest day (June 17, 2012) to the least busy day (June 7, 2012) of the study period (Figure 2-5). Potential design day levels are depicted with horizontal lines positioned in Figure 2-5 at the 85th, 90th, and 95th percentile days of inbound vehicle traffic during the study period.

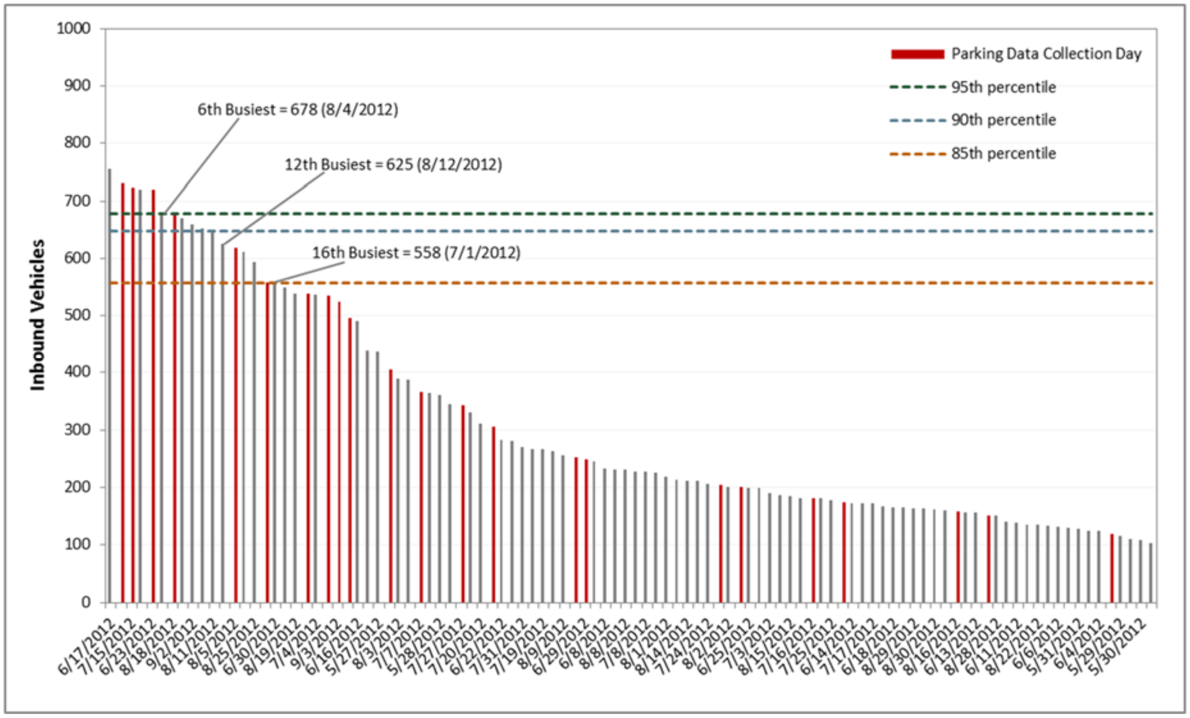


Figure 2-5. Daily inbound vehicle traffic volumes on Guanella Pass Scenic Byway at ATR #3, in descending order, summer 2012.

Commonly, the 85th percentile day is used for "conventional" transportation planning and engineering. If the 85th percentile day were selected as the design day, on average, less than 15% of the days during a "typical summer visitor use season" would exceed what was planned for under the design day. The 85th percentile day is arguably less suitable, however, for transportation planning in parks and recreation areas, because visitor use tends to be temporally concentrated. To further inform the selection of a design day to represent a typically busy summer visitor use day at Guanella Pass, estimates were calculated of the percentage of Guanella Pass summer season visitors that would visit Guanella Pass on days when visitor use, traffic, and parking conditions exceeded design day levels, based on using the 85th, 90th, 95th, and 99th percentile days of vehicle traffic volumes as the design day (Table 2-3). It should be noted that for all four design day levels considered, 100% of the days above the design day level of visitor use were weekend days or holidays.

Table 2-3. Estimated percent of Guanella Pass summer season visitors that would experience visitor use, traffic, and parking conditions in excess of design day conditions.

Day Rank	Potential Design Day	Use Level	% of Visitors	Date
2nd Busiest Day	99th Percentile	1,752	2%	7/21/2012
6th Busiest Day	95th Percentile	1,627	11%	8/4/2012
12th Busiest Day	90th Percentile	1,500	24%	8/12/2012
16th Busiest Day	85th Percentile	1,339	31%	7/1/2012

Using standards developed in consultation with USFS and FHWA to assess the results in Table 2-3, it was concluded that the 85th and 90th percentile days of vehicle traffic volumes would result in too large a proportion of summer season visitors at Guanella Pass to experience conditions beyond those planned for in the feasibility study (31% and 24%, respectively). It was concluded that the 95th percentile day of vehicle traffic would allow for a more acceptable proportion of Guanella Pass summer season visitors (89%) to experience visitor use, traffic, and parking conditions at or below design day levels. While RSG parking data collection did not occur on the 95th percentile day (6th busiest day during the study period), parking data were collected on the 7th busiest day of the study period (8/18/2012). Total daily inbound vehicle traffic volumes for this day differed from that on the 95th percentile day by 2 fewer cars.

Thus, the 7th busiest day of the study period (August 18, 2012) was selected as the Guanella Pass Summer Visitor Use Season Design Day for analysis and planning in this project. As described, this decision was informed and substantiated by the Guanella Pass vehicle traffic volume, group size, and parking data collected by RSG during the 2012 summer visitor use season. The design day is used as a reference point for analyzing most of the transportation and visitor use data collected at Guanella Pass during the 2012 summer visitor use season and reported in this memo.

Arriving (traveling southbound toward Guanella Pass) and departing (traveling northbound toward Georgetown, CO) vehicles recorded by ATR #3 on the design day are displayed in Figure 2-6. The arriving and departing vehicle traffic data in Figure 2-6 suggest there is a very early morning "pulse" of visitor use associated with visitors attempting to climb and descend the summit of Mount Bierstadt before afternoon thunderstorms. Correspondingly, the traffic data in Figure 2-6 suggest that by noon, there are more departing than arriving visitors at Guanella Pass, and by midafternoon, here are many more departing than arriving visitors.

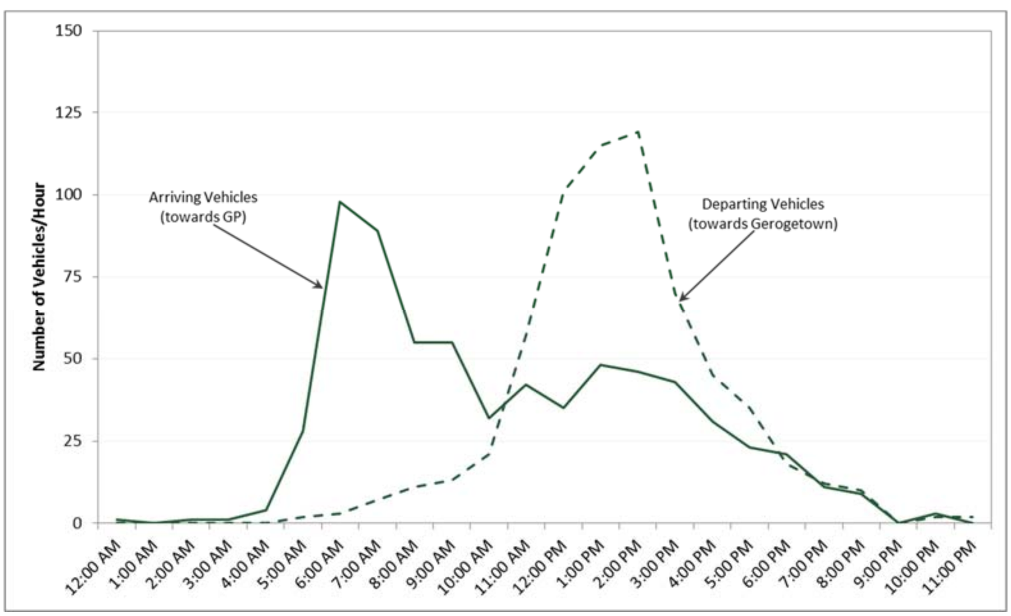


Figure 2-6. Design day vehicle traffic volumes (ATR #3), by hour and direction of travel, Saturday, August 18th, 2012.

The ATR's used in the study record the vehicle speed and Federal Highway Administration (FHWA) class of each vehicle that is detected by the counters. The average speed of vehicles detected by the ATR's on Guanella Pass Road ranged from 24 to 32 mph, depending on ATR location, and the 85th percentile speed[1] (often used for traffic safety studies) ranged from 28 to 37 mph, depending on ATR location (Table 2-4).

Table 2-4. Average and 85th percentile vehicle traffic speeds on Guanella Pass Road, by ATR location, summer 2012.

ATR Location	Average Speed	85th Percentile Speed
Georgetown, CO (ATR #1)	24 mph	28 mph
NF Boundary, North (ATR #2)	31 mph	35 mph
Guanella Pass, North (ATR #3)	32 mph	37 mph
Guanella Pass, South (ATR #4)	31 mph	36 mph
NF Boundary, South (ATR #5)	27 mph	32 mph
Grant, CO (ATR #6)	30 mph	34 mph

Nearly all of the vehicles detected by the ATR's on Guanella Pass Road were classified as passenger vehicles (82% to 94%, depending on ATR location), under the FHWA Scheme F classification (Table 2-5).[2] Very few vehicles were classified as motorcycles (3% or fewer, depending on ATR location), or as heavy trucks or buses (3% to 6%, depending on ATR location). A relatively small number of cases were classified by the ATR's as "unknown" vehicle types.

Table 2-5. FHWA classification of vehicles on Guanella Pass Road, by ATR location, summer 2012.

ATR Location	Motorcycle	Passenger Vehicles	Heavy Truck/Bus	Unknown
Georgetown, CO (ATR #1)	<1%	86%	5%	10%
NF Boundary, North (ATR #2)	<1%	94%	3%	3%
Guanella Pass, North (ATR #3)	3%	91%	5%	2%
Guanella Pass, South (ATR #4)	1%	82%	4%	13%
NF Boundary, South (ATR #5)	<1%	85%	5%	9%
Grant, CO (ATR #6)	<1%	85%	6%	9%

[1] *A Policy on Geometric Design of Highways and Streets, Sixth Edition*. (2011) American Association of State Highway and Transportation Officials (AASHTO): Washington, DC.

[2] *Vehicle Classification Scheme F Report*. (2011) Federal Highway Administration (FHWA): Washington, DC.

Parking Accumulation & Turnover

Data Collection Method

- A license plate recording method (Figure 2-7) was used in the designated parking lots and on the roadside at Guanella Pass to record:
  - An hourly count of parked vehicles, by location (i.e., parking accumulation)
  - The amount of time vehicles were parked, by parking location (i.e., parking turnover)

Figure 2-7. Parking accumulation & turnover data collection at Guanella Pass.

- Parking data collection was conducted from 6:00 AM to 5:00 PM on 13 weekdays and 10 weekend days between June 23rd and September 3rd, 2012. License plates were recorded by subarea of the designated lots and roadside, and by specific parking space in the designated lots (Figure 2-8).

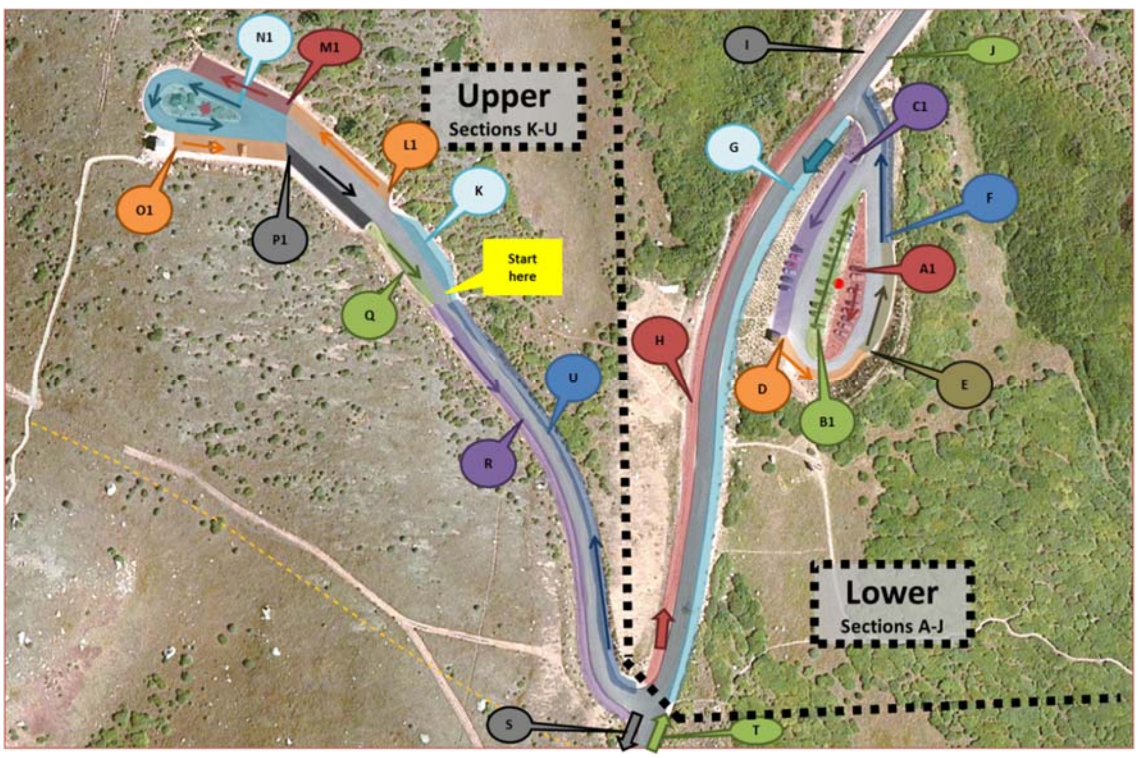


Figure 2-8. Guanella Pass area parking turnover data collection map, designated parking lots and nearby roadside area.

Analysis and Results

Hourly parking accumulation in the designated parking lots and on the roadside at Guanella Pass is displayed in Figure 2-9 through Figure 2-11 for the 7th busiest day of the 2012 summer visitor use season (Saturday, August 18th 2012), which was selected as the "design day" for this study, as described in the preceding section.

As depicted in Figure 2-9, the Lower Lot was already filled beyond its capacity when the first parking count was conducted at 6:00 AM, and the parking lot continued to be filled beyond its capacity until approximately 2:00 PM. Parking accumulation in the Lower Lot reached its peak of 64 vehicles during the 10:00 AM hour.

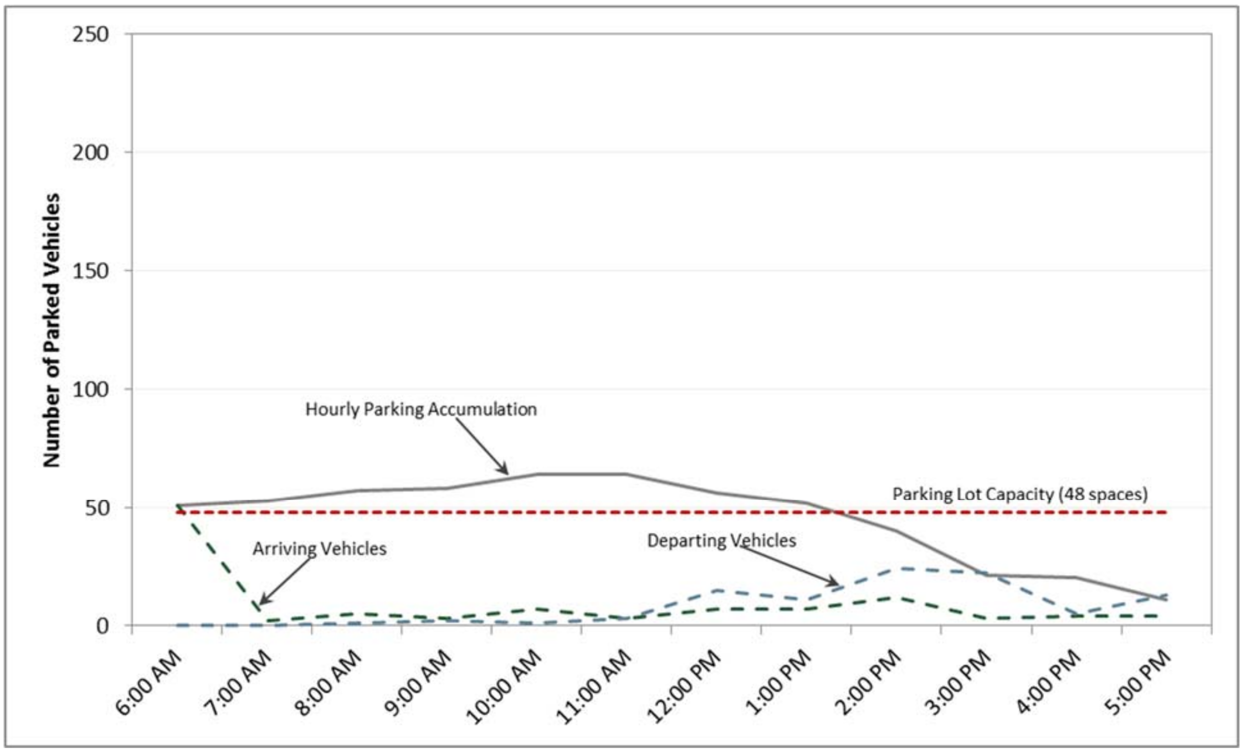


Figure 2-9. Design day parking accumulation at the Guanella Pass Lower Lot, Saturday, August 18th, 2012.

As depicted in Figure 2-10, the Upper Lot was filled to its capacity by 9:00 AM, and was then filled just beyond its capacity until approximately 1:00 PM. Parking accumulation in the Upper Lot reached its peak of 61 vehicles during the 10:00 AM hour, which is the same hour when parking accumulation in the Lower Lot reached its peak.

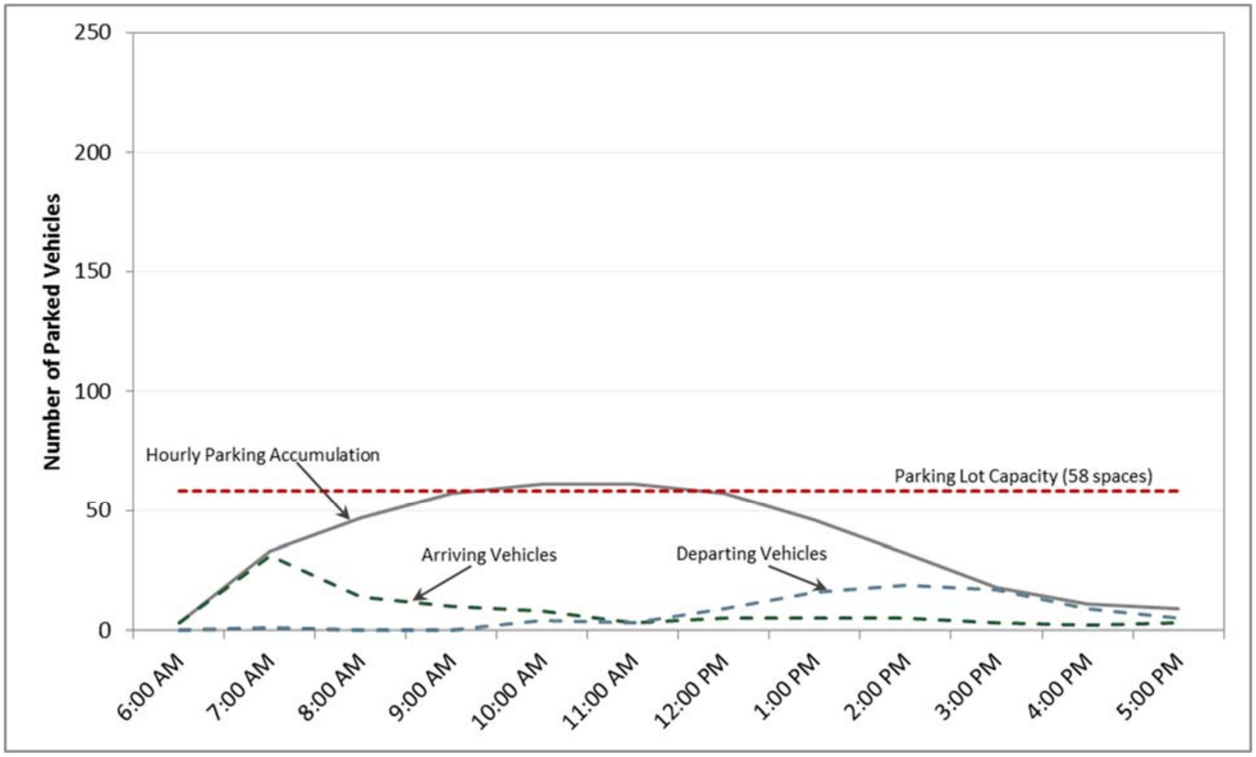


Figure 2-10. Design day parking accumulation at the Guanella Pass Upper Lot, Saturday, August 18th, 2012.

As depicted in Figure 2-11, there were already cars parked in unendorsed spaces on the roadside at Guanella Pass when the first parking count was conducted at 6:00 AM. The number of cars parked in unendorsed spaces on the roadside increased sharply during the early morning hours, as the designated parking lots at Guanella Pass filled beyond capacity. Unendorsed roadside parking at Guanella Pass reached its peak at 231 vehicles during the 11:00 AM hour, which is one hour later than when parking accumulation in the Lower and Upper Lots reached its peak.

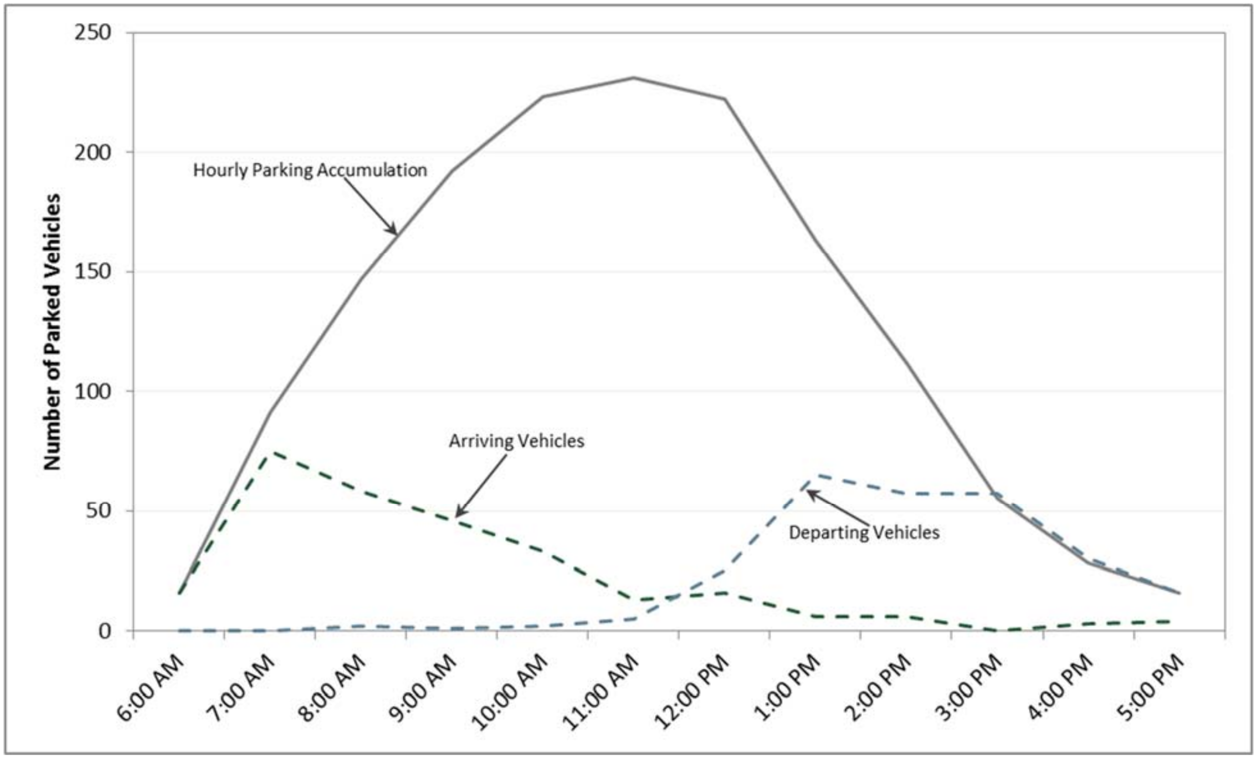


Figure 2-11. Design day parking accumulation on the Guanella Pass roadside, Saturday, August 18th, 2012.

Figure 2-12 displays parking accumulation, by location and overall, for the design day. The data in Figure 2-12 suggest that, by early morning on a "typically busy" summer day at Guanella Pass, the designated lots at Guanella Pass are filled with vehicles beyond their capacities. Correspondingly, the number of cars parked in unendorsed spaces on the roadside at Guanella Pass increases sharply through the morning hours. Overall parking accumulation at Guanella Pass reaches its peak in the late morning, at which time there are nearly twice as many cars parked in unendorsed spaces on the roadside at Guanella Pass (231 vehicles) than in the designated parking lots (125 vehicles).

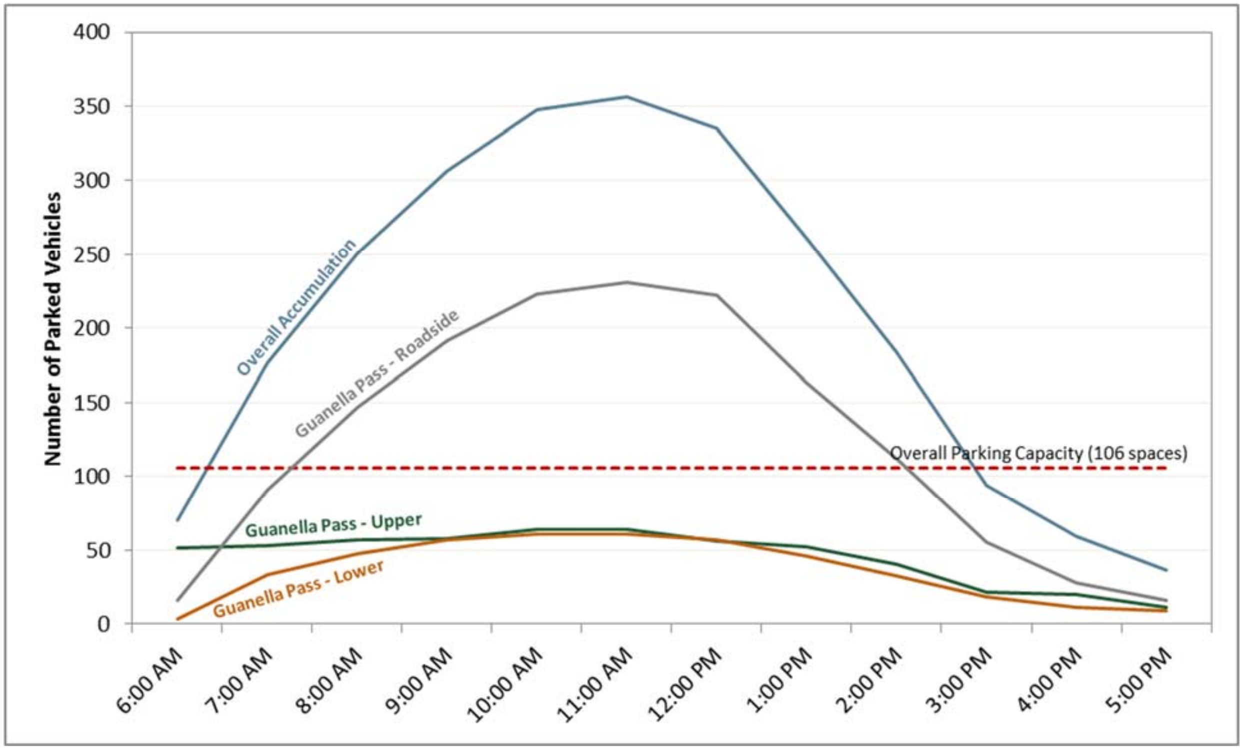


Figure 2-12. Design day parking accumulation at Guanella Pass, by location and overall, Saturday, August 18th, 2012.

Figure 2-13 is a graphical display of Guanella Pass parking accumulation at distinct time periods throughout the morning, afternoon, and evening of the design day. The graphics in Figure 2-13 display the spatial pattern by which visitors use the designated parking lots and unendorsed spaces on the roadside, on a "typically busy" day during the summer visitor use season at Guanella Pass. As depicted in Figure 2-13, on a "typically busy" summer day at Guanella Pass, the Lower Lot and nearby unendorsed spaces on the roadside fill first, followed by the Upper Lot, and then visitors park in unendorsed spaces as far down the side of Guanella Pass Road as necessary. This pattern of parking use is directly related to the fact that most visitors at Guanella Pass (particularly during morning hours) traveled there to hike to the summit of Mount Bierstadt, and therefore try to park as close as they can to the Mount Bierstadt Trailhead, which is located adjacent to the Lower Lot.

6:00 AM: Lower Lot: *51 vehicles, 106% full*
Upper Lot: *3 vehicles, 5% full*
Roadside: *16 vehicles*

8:00 AM: Lower Lot: *57 vehicles, 119% full*
Upper Lot: *47 vehicles, 81% full*
Roadside: *147 vehicles*

Location of parked vehicles

11:00 AM (PEAK)*:* ***Lower Lot****: 64 vehicles, 133% full*
Upper Lot: *61 vehicles, 105% full*
Roadside: *231 vehicles*

2:00 PM: Lower Lot: *40 vehicles, 83% full*
Upper Lot: *32 vehicles, 55% full*
Roadside: *112 vehicles*

5:00 PM: Lower Lot: *11 vehicles, 23% full*
Upper Lot: *9 vehicles, 16% full*
Roadside: *16 vehicles*

Figure 2-13. Design day parking accumulation at Guanella Pass, Saturday, August 18th, 2012.

As noted, the license plate recording method was also used to record turnover rates for vehicles parked in the designated parking lots and on the roadside at Guanella Pass. Data were recorded every hour, therefore, parking turnover rates (i.e., the duration of time vehicles are parked at Guanella Pass) are estimated in hourly bins. On average, vehicles were parked in the Upper and Lower Lots and along the roadside for approximately four to four and a half hours (Table *2-6*, Figure 2-14, and Figure 2-15). In the Lower Lot, cars tended to be parked for longer periods of time on weekdays than on weekend days, while in the Upper Lot, cars tended to be parked for longer durations on weekend days than on weekdays; there were no differences in the duration cars tended to be parked on the roadside by day of week category (Table *2-6*, Figure 2-14, and Figure 2-15). There were also statistically significant differences in parking duration based on the time of day visitors arrived ($t = 39.085$, $p < 0.001$). In particular, visitors who arrived before 10:00 AM (mean = 5.9 hours) parked their vehicles for much longer, on average, than those who arrived after 10:00 AM (mean = 2.5 hours).

Table 2-6. Visitor parking duration at Guanella Pass, by location and day of week category, summer 2012.

	Lower Lot			Upper Lot			Roadside		
Hours Parked	**Weekday (n=197)**	**Weekend (n=190)**	**Overall (n=387)**	**Weekday (n=141)**	**Weekend (n=381)**	**Overall (n=522)**	**Weekday (n=86)**	**Weekend (n=633)**	**Overall (n=719)**
1 - <2	14%	31%	22%	32%	25%	27%	12%	13%	13%
2 - <3	4%	7%	5%	15%	10%	12%	7%	7%	7%
3 - <4	5%	6%	5%	12%	10%	11%	6%	6%	6%
4 - <5	8%	14%	11%	15%	9%	11%	15%	9%	10%
5 - <6	24%	12%	18%	13%	15%	14%	22%	23%	23%
6 - <7	23%	14%	19%	6%	13%	11%	24%	22%	23%
7 - <8	12%	7%	10%	5%	10%	8%	9%	12%	11%
8 - <9	6%	4%	5%	1%	4%	3%	1%	5%	5%
9 - <10	4%	3%	3%	0%	3%	2%	2%	2%	2%
10 - <11	0%	2%	1%	0%	1%	1%	0%	1%	1%
11 - <12	0%	0%	0%	0%	0%	0%	0%	0%	0%
12+	1%	2%	1%	0%	1%	1%	1%	0%	0%
Average	5.0	4.0	4.5	3.1	4.1	3.8	4.7	4.7	4.7
t-test	t = 3.730			t = -4.418			t = -0.200		
p-value	p < 0.001			p < 0.001			p = 0.842		

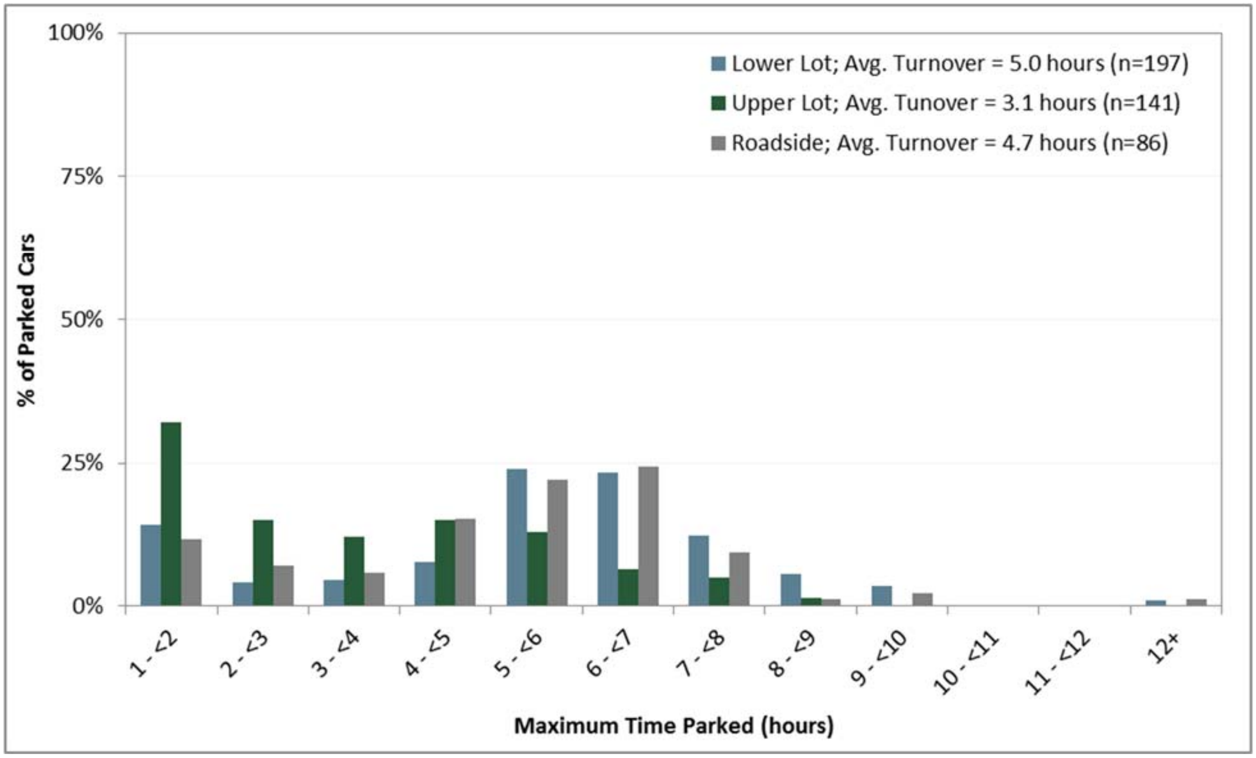


Figure 2-14. Weekday visitor parking duration at Guanella Pass, by location, summer 2012.

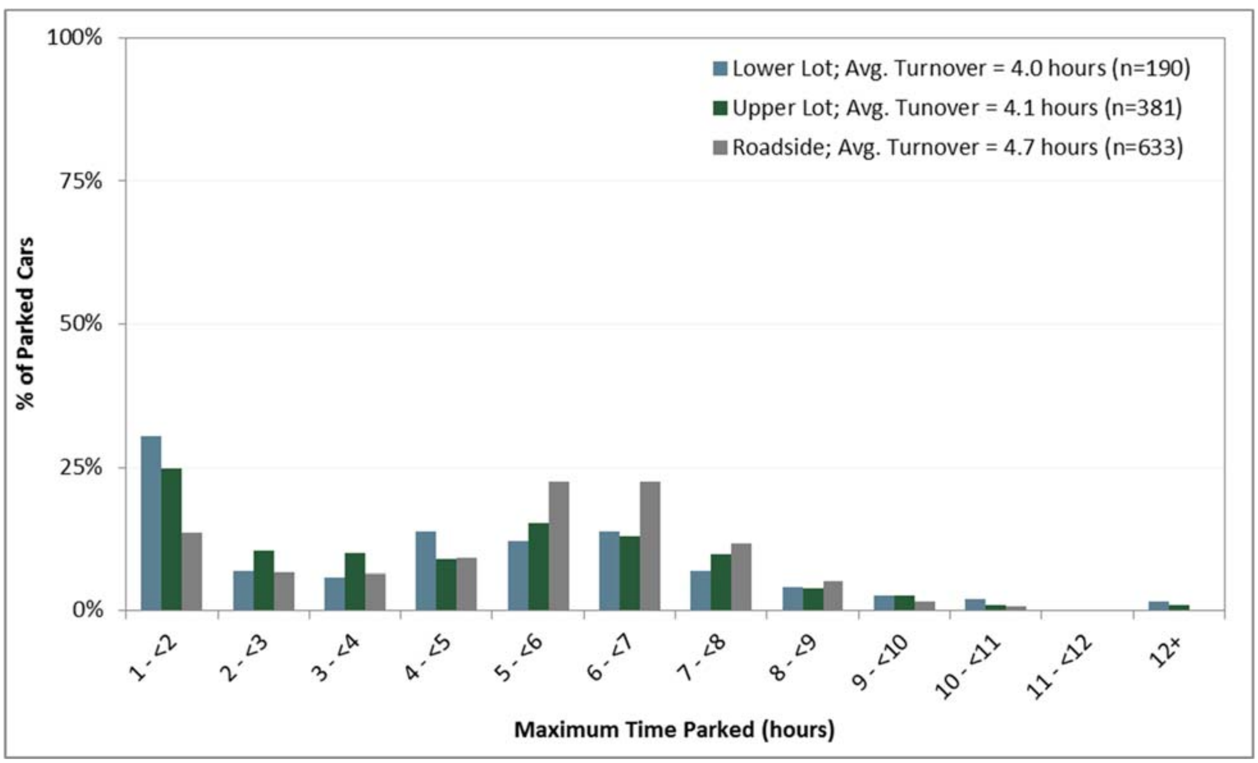


Figure 2-15. Weekend day visitor parking duration at Guanella Pass, by location, summer 2012.

Finally, 86% of all license plates recorded as part of the parking data collection effort were Colorado license plates; this finding suggests the vast majority of visitors to Guanella Pass during the summer visitor use season are residents of the state of Colorado, though some Colorado license plates that were observed may have been on rental cars driven by out-of-state visitors.

Visitor Use Counts

Data Collection Method

- Visitor use counts were recorded with infrared trail counters (Figure 2-16) located on the Mount Bierstadt Trail, Rosalie Trail, and Square Top Lakes Trail (Figure 2-17).
- The infrared trail counters recorded visitor use counts in hourly bins, 24 hours per day during the summer peak season, from June 23rd, 2012 through September 3rd, 2012.
- The locations of the infrared trail counters used to record visitor use data during the study period are depicted in Figure 2-17. The visitor use counting locations were selected in consultation with USFS staff and capture the primary visitor use access points into the ARNF and PNF from Guanella Pass.
- Field staff conducted visitor use counts via direct observation at each of the infrared trail counter locations, for a minimum of 56 hours at each trail counter location. The direct observation counts were used to correct and adjust (i.e., calibrate) the raw infrared trail counter data, as described below.

Figure 2-16. Trail counter setup, Square Top Lakes Trail.

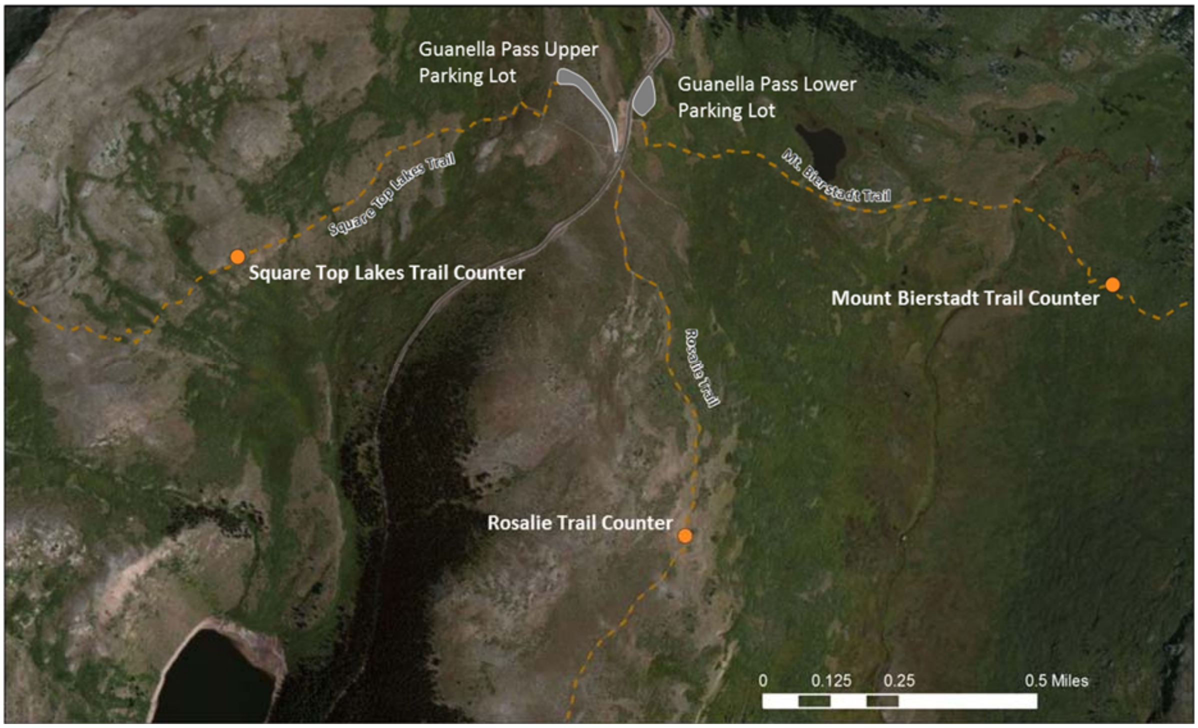


Figure 2-17. Approximate locations of infrared trail counters used to record visitor use counts, Guanella Pass, summer 2012.

Analysis and Results

Regression analyses were conducted with the direct observation counts of visitor use and corresponding infrared trail counter data to estimate correction factors for the infrared trail counter data. Regression results suggest there are strong statistical relationships (R^2 values ranging from 0.65 to 0.99) between the direct observation counts and visitor use counts recorded by the infrared trail counters. Further, the parameter estimates for the regression models were statistically significant in all cases. These results provide a high degree of confidence that applying the correction factors to calibrate the visitor use counts recorded with the infrared trail counters (i.e., multiplying the infrared trail counter data by the corresponding parameter estimates from the regression models) results in very accurate estimates of visitor use on the trails in the Guanella Pass area. The calibrated trail counter data were used for analysis and results.

As expected, the Mount Bierstadt Trail was, by far, the most popular trail within the Guanella Pass area, with an average of 187 visitor arrivals per day on weekdays and 579 visitor arrivals per day on weekend days (Figure 2-18). The Square Top Lakes Trail was the second most popular trail in the Guanella Pass area, but average daily visitor use was only about one-fifth of that on the Mount Bierstadt Trail. In particular, the Square Top Lakes Trail received an average of 41 visitor arrivals per day on weekdays and 96 visitor arrivals per day on weekend days. The Rosalie Trail received much lower visitor use, with an average of 7 visitor arrivals per day on weekdays, and 16 visitor arrivals per day on weekend days. Generally, trails in the study area received more than twice as much visitor use on weekend days than on weekdays.

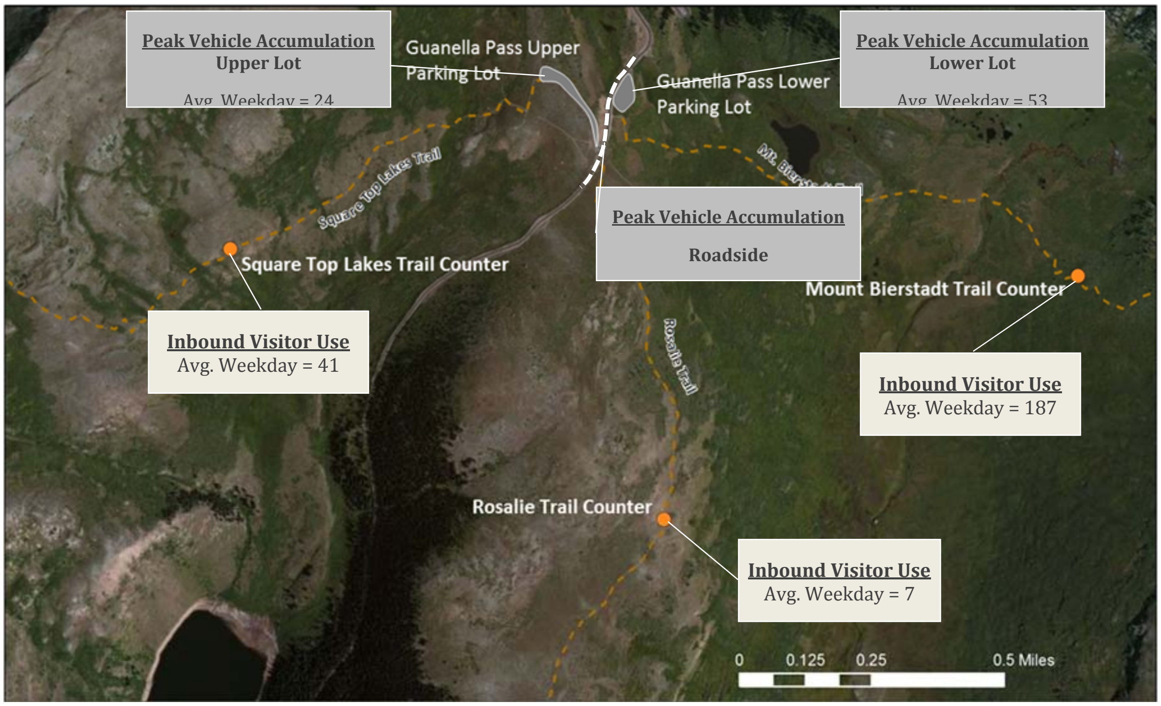


Figure 2-18. Average weekday and weekend day inbound visitor use, by trailhead, and average peak vehicle accumulation, by parking location, Guanella Pass, summer 2012.

Figure 2-19 reports calibrated inbound visitor use counts for the design day (Saturday, August 18th, 2012), by trailhead location. Visitor use on the design day was distributed across the trailhead locations consistently with the seasonal averages reported in Figure 2-19; however, as expected, the design day volumes of visitor use were higher than seasonal averages on all of the trails.

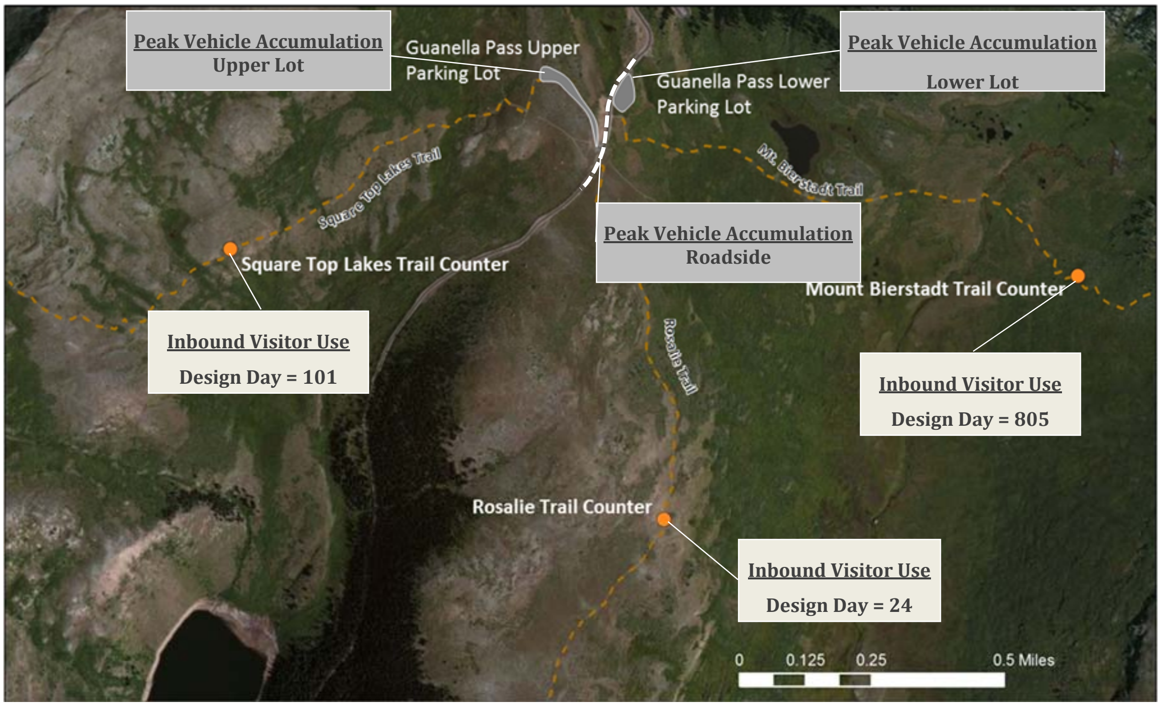


Figure 2-19. Design day inbound visitor use, by trailhead, and peak vehicle accumulation, by parking location, Guanella Pass, Saturday, August 18th, 2012.

Figure 2-20 graphs the design day hourly visitor use (inbound direction), by trailhead. Hourly inbound visitor use on the Mount Bierstadt Trail increases sharply between the 5:00 AM and 7:00 AM hours of the morning, with the peak occurring during the 7:00 AM hour. Visitor arrivals on the Mount Bierstadt Trail drop sharply by 9:00 AM and are near zero from 3:00 PM to the end of the day. There are two peak periods of visitor use on the Square Top Lakes Trail, including a late morning peak during the 10:00 AM hour and an early afternoon peak during the 1:00 PM; in both cases, the peaks of visitor use on the Square Top Lakes Trail are much less pronounced than the early morning peak period of visitor use on the Mount Bierstadt Trail. Visitor use on the Rosalie Trail was very low throughout the day, and no peak periods of visitor use were observed on the trail.

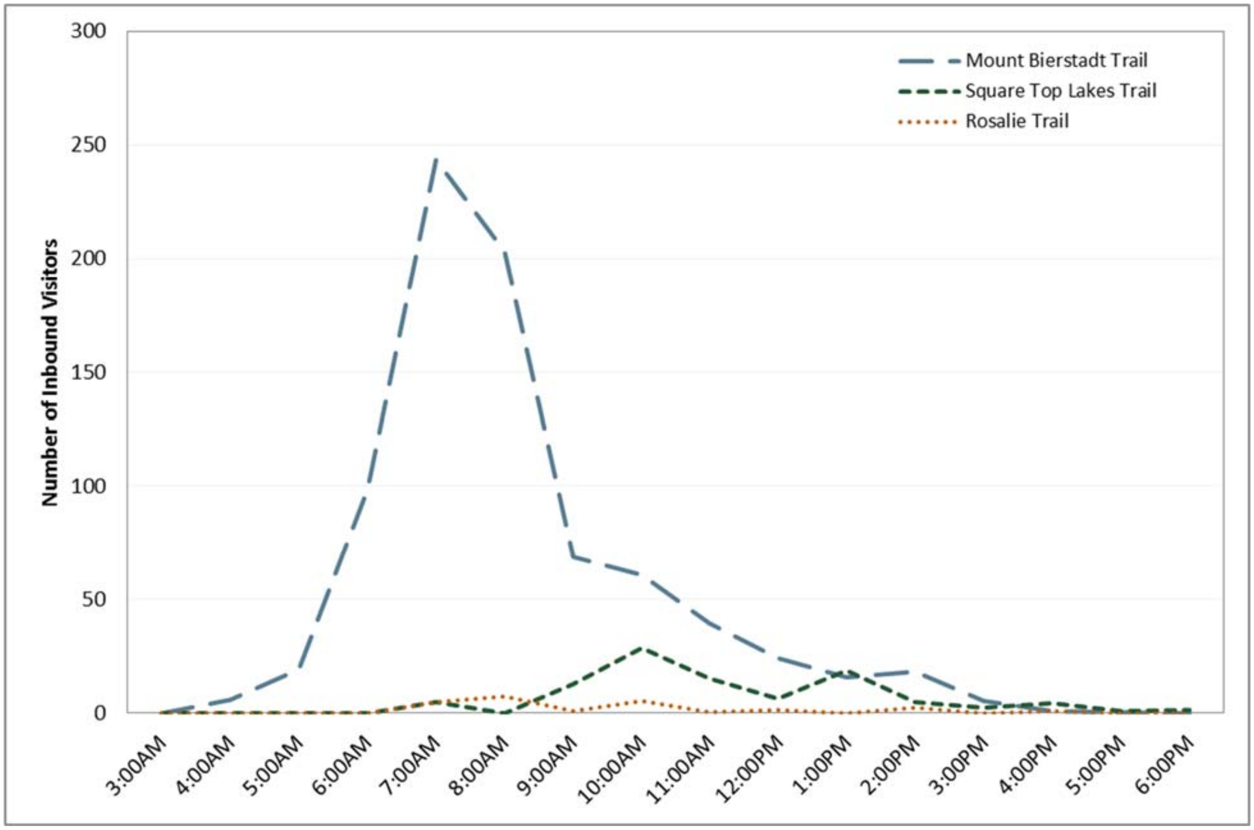


Figure 2-20. Design day hourly inbound visitor use, by trailhead (Saturday, August 18th, 2012).

Monthly visitor use during the study period was roughly the same during July and August, 2012 (Table 2-7). Visitor use data were collected for only the last 10 days of June and only through the Labor Day Weekend in September; consequently, there aren't sufficient data to compare visitor use during June and September to each other or to July and August.

Table 2-7. Monthly inbound visitor use totals, by trailhead, Guanella Pass, summer 2012.

	Bierstadt	Square Top Lakes	Rosalie	Monthly Total
June[2]	3,115	702	114	3,930
July	8,841	1,907	341	11,089
August	8,992	1,506	261	10,758
September[3]	1,867	233	26	2,126
Total	**22,816**	**4,348**	**741**	**27,904**

[1]Missing data due to counter malfunction was filled with weekday/weekend average.

[2]Sampling period includes only June 20th – June 30th, 2012.

[3]Sampling period includes only September 1st – September 3rd.

Visitor Use Tracking

Data Collection Method

Figure 2-21. GPS-based visitor use tracking, Guanella Pass, summer 2012.

- Visitor use patterns were measured using GPS-based tracking (Figure 2-21). GPS units were administered to visitor groups at both the Mount Bierstadt Trailhead and the Square Top Lakes trailhead at the start of their hikes. Visitors were asked to carry the GPS units while recreating in the area, and return the units at the end of their visit to Guanella Pass. Visitors were instructed to use a locked drop box to return their GPS units, if they returned to the trailhead after data collection staff had left the study area for the day.
- GPS units were administered on 10 weekend days, and 12 weekdays from June 23rd, 2012 – September 3rd, 2012
- On each data collection day, GPS units were administered to visitors from 6:00 AM to approximately 1:00 PM, and collected from visitors from 6:00 AM to approximately 2:00 PM.
- Overall, 1,081 visitor groups were contacted on the Mount Bierstadt Trail and 1,051 GPS units were administered to visitor groups hiking the Mount Bierstadt Trail during the 2012 summer visitor use season, resulting in a 97% response rate (Table 2-8). On the Square Top Lakes Trail, 358 visitor groups were contacted and 352 GPS units were administered to visitor groups hiking the Square Top Lakes Trail during the 2012 summer visitor use season, resulting in a 98% response rate (Table 2-8).
- Algorithms were developed to process the GPS tracks and eliminate cases with more than 10-minutes of missing data (primary causes of missing data included poor satellite reception and/or equipment malfunction). For cases with less than 10-minutes of missing data, interpolation was used to estimate location coordinates to populate the data gaps. The reduced, "clean" set of GPS track data were used to analyze and model visitor use patterns in the Guanella Pass area during summer 2012.

Table 2-8. GPS sampling schedule and response rate, Guanella Pass, summer 2012.

		Mount Bierstadt Trail			Square Top Lakes Trail		
Date	**Weekend**	**Count**	**Refusals**	**Response Rate**	**Count**	**Refusals**	**Response Rate**
6/23/2012	Yes	67	3	96%	21	0	100%
6/27/2012	No	28	1	97%	15	0	100%
6/29/2012	No	50	8	86%	20	1	95%
7/1/2012	Yes	58	3	95%	30	0	100%
7/7/2012	Yes	53	1	98%	14	0	100%
7/13/2012	No	47	0	100%	14	0	100%
7/15/2012	Yes	53	2	96%	22	1	96%
7/16/2012	No	49	2	96%	13	0	100%
7/21/2012	Yes	44	0	100%	26	0	100%
7/23/2012	No	47	0	100%	4	0	100%
7/27/2012	No	47	0	100%	11	1	92%
7/29/2012	Yes	47	0	100%	26	0	100%
8/5/2012	Yes	55	0	100%	22	0	100%
8/6/2012	No	33	0	100%	9	2	82%
8/7/2012	No	48	4	92%	16	0	100%
8/10/2012	No	48	4	92%	16	0	100%
8/16/2012	No	31	1	97%	8	0	100%
8/18/2012	Yes	50	0	100%	23	1	96%
8/24/2012	No	47	0	100%	5	0	100%
8/26/2012	Yes	58	0	100%	10	0	100%
9/1/2012	Yes	47	0	100%	17	0	100%
9/3/2012	No	44	1	98%	10	0	100%
Overall		**1,051**	**30**	**97%**	**352**	**6**	**98%**

Analysis and Results

The majority of visitors hiking on both the Mount Bierstadt Trail (73%) and the Square Top Lakes Trail (76%) were in groups of 2-4 people during their visit to Guanella Pass during summer 2012; however, weekday visitors (21%) to the Square Top Lakes Trail were more likely than weekend visitors (13%) to visit Guanella Pass alone. On average, visitor groups hiked both trails in groups of approximately three people.

Table 2-9. Visitor group size, Guanella Pass, summer 2012.

Number of People per Group	Mount Bierstadt Trail Weekday (n=519)	Mount Bierstadt Trail Weekend (n=522)	Mount Bierstadt Trail Overall (n=1,041)	Square Top Lakes Trail Weekday (n=137)	Square Top Lakes Trail Weekend (n=190)	Square Top Lakes Trail Overall (n=327)
1 person	15%	11%	13%	21%	13%	17%
2 people	47%	47%	47%	43%	59%	53%
3-4 people	25%	27%	26%	28%	19%	23%
5 or more people	13%	15%	14%	8%	8%	8%
Chi-square	$\chi2 = 3.937$, $p = 0.268$		n/a	$\chi2 = 9.900$, $p = 0.019$		n/a
Mean	**2.8**	**3.1**	**3.0**	**2.5**	**2.5**	**2.5**

The vast majority of visitor groups traveled to Guanella Pass during summer 2012 in a single vehicle; however, visitor groups hiking on the Mount Bierstadt Trail (11%) were more likely than those hiking on the Square Top Lakes Trail (3%) to travel to Guanella Pass in more than one vehicle (Table 2-10). In addition, visitor groups hiking the Mount Bierstadt Trail on weekends were slightly more likely to travel to Guanella Pass in more than one vehicle than visitor groups who hiked the Mount Bierstadt Trail on weekdays.

Table 2-10. Number of vehicles per group, Guanella Pass, summer 2012.

Number of Vehicles per Group	Mount Bierstadt Trail Weekday (n=519)	Mount Bierstadt Trail Weekend (n=517)	Mount Bierstadt Trail Overall (n=1,036)	Square Top Lakes Trail Weekday (n=137)	Square Top Lakes Trail Weekend (n=188)	Square Top Lakes Trail Overall (n=325)
1 vehicle	92%	87%	89%	98%	96%	97%
2 vehicles	5%	9%	7%	2%	3%	3%
3 vehicles	3%	3%	3%	0%	1%	1%
4 or more vehicles	0%	2%	1%	0%	0%	0%
Chi-square	$\chi2 = 8.342$, $p = 0.039$		n/a	$\chi2 = 1.780$, $p = 0.411$		n/a
Mean	**1.1**	**1.2**	**1.2**	**1.0**	**1.1**	**1.0**

Approximately two-thirds of visitor groups on the Mount Bierstadt Trail (63%) and Square Top Lakes Trail (71%) had a vehicle occupancy rate of 1 to 2 people per vehicle (Table 2-11). Visitor groups who hiked the Square Top Lakes Trail on weekdays had a statistically, but not substantively, higher average vehicle occupancy rate (2.4 people per vehicle) compared to those who hiked the trail on weekends (2.3 people per vehicle).

Table 2-11. Vehicle occupancy rates, Guanella Pass, summer 2012.

Number of People per Vehicle	Mount Bierstadt Trail Weekday (n=506)	Weekend (n=497)	Overall (n=1,003)	Square Top Lakes Trail Weekday (n=136)	Weekend (n=187)	Overall (n=323)
1 person	16%	13%	14%	21%	13%	17%
2 people	49%	50%	49%	44%	61%	54%
3-4 people	29%	31%	30%	28%	19%	23%
5 or more people	7%	6%	6%	7%	6%	6%
Chi-square	$\chi2 = 1.959$, $p = 0.581$		n/a	$\chi2 = 9.650$, $p = 0.022$		n/a
Mean	**2.5**	**2.5**	**2.5**	**2.4**	**2.3**	**2.4**

The vast majority (85%) of visitor groups who hiked on the Mount Bierstadt Trail, regardless of day of week, spent four or more hours on the trail during summer 2012 (Table 2-12). On average, visitor groups who hiked on the Mount Bierstadt Trail spent five and a half hours on the trail. The vast majority (91%) of visitor groups who hiked on the Square Top Lakes Trail, regardless of day of week, spent two or more hours on the trail during summer 2012 (Table 2-12). On average, visitors groups who hiked on the Square Top Lakes Trail spent just under four hours on the trail.

Table 2-12. Hike duration, Guanella Pass, summer 2012.

Travel Time	Mount Bierstadt Trail Weekday (n=519)	Weekend (n=522)	Overall (n=1,041)	Square Top Lakes Trail Weekday (n=137)	Weekend (n=190)	Overall (n=327)
<1 hour	3%	3%	3%	3%	3%	3%
1 hour - <2 hours	2%	3%	3%	5%	6%	6%
2 hours - <3 hours	4%	2%	3%	32%	23%	27%
3 hour - <4 hours	7%	6%	6%	22%	27%	25%
4 hours - <5 hours	21%	19%	20%	18%	18%	18%
5 hours - <6 hours	29%	28%	28%	9%	11%	10%
6 or more hours	34%	40%	37%	11%	11%	11%
Chi-square	$\chi2 = 11.372$, $p = 0.078$		n/a	$\chi2 = 3.630$, $p = 0.727$		n/a
Mean (in minutes)	**328.2**	**347.0**	**144.4**	**224.1**	**232.4**	**144.4**

On average, visitor groups on the Mount Bierstadt Trail hiked just over six miles on the trail during summer 2012 (Table 2-13); weekend visitor groups (mean = 6.3 miles hiked) hiked a statistically, but not substantively, greater distance on the Mount Bierstadt Trail than weekday visitor groups (mean = 6.2 miles hiked). On average, visitor groups on the Square Top Lakes Trail, regardless of day of week, hiked just over four miles on the trail during summer 2012 (Table 2-13).

Table 2-13. Miles hiked, Guanella Pass 2012.

	Mount Bierstadt Trail			Square Top Lakes Trail		
Trip Length	**Weekday** (n=398)	**Weekend** (n=403)	**Overall** (n=801)	**Weekday** (n=101)	**Weekend** (n=139)	**Overall** (n=240)
<1 - <2 miles	4%	5%	5%	4%	8%	6%
2 - <3 miles	1%	2%	1%	7%	8%	8%
3 - <4 miles	5%	3%	4%	24%	22%	23%
4 - <5 miles	2%	2%	2%	39%	37%	38%
5 - <6 miles	4%	4%	4%	11%	9%	10%
6 - <7 miles	75%	70%	73%	12%	12%	12%
7+ miles	9%	14%	11%	4%	4%	4%
Chi-square	$\chi2 = 12.979, p = 0.043$		n/a	$\chi2 = 2.776, p = 0.836$		n/a
Mean	**6.2**	**6.3**	**6.3**	**4.4**	**4.3**	**4.3**

"Heat maps" are included to provide precise information about the spatial characteristics of hiking use on the trails at Guanella Pass (i.e., where visitor use is most concentrated, and where there is less intensive or no visitor use). The heat map in Figure 2-22 depicts the relative intensity of visitor use throughout the trail network and backcountry area at Guanella Pass for visitor groups who were administered a GPS unit at the Mount Bierstadt Trailhead during summer 2012. Generally, information contained in visitor use heat maps can inform transportation planning by identifying locations within a recreation area with high visitor demand that might benefit form improved transportation services and facilities. Moreover, heat maps like this help identify locations to which visitor use could potentially be dispersed (using ITS, trail improvements, etc.) to alleviate congestion in areas that experience excessive traffic, parking congestion, crowding, and/or resource impacts.

The heat map is derived from the GPS track data, with "cooler colors" (i.e., green shades) representing sections of the trail network with relatively low concentrations of visitor use, and "hotter colors" (i.e., yellow and red shades) representing sections of the trail network with relatively high concentrations of visitor use. For example, the "hotter color tones" on the trail to and summit of Mount Bierstadt denote this as the most heavily used hiking route from the Mount Bierstadt Trailhead. The broadly ranging network of "cooler color tones" suggests that there are a number of other hiking routes relatively small numbers of visitors follow from the Mount Bierstadt Trailhead, and depict precisely where those routes are located on the landscape.

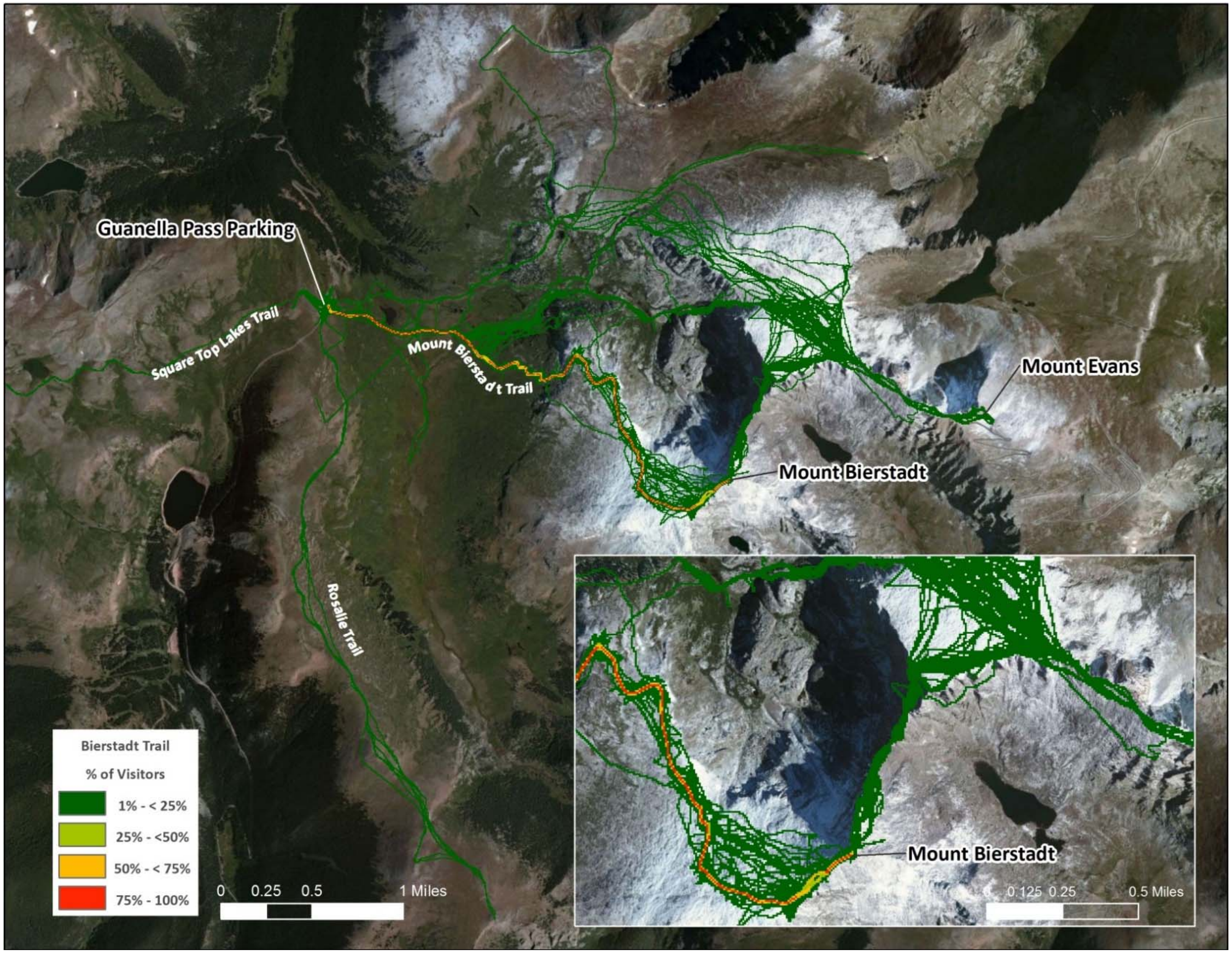


Figure 2-22. Heat map of GPS-based visitor use tracks for visitor groups intercepted at the Mount Bierstadt Trailhead, summer 2012.

The heat map in Figure 2-23 depicts the relative intensity of visitor use throughout the trail network and backcountry area at Guanella Pass for visitor groups who were administered a GPS unit at the Square Top Lakes Trailhead during summer 2012. As noted, the heat map is derived from the GPS track data, with "cooler colors" (i.e., green shades) representing sections of the trail network with relatively low concentrations of visitor use, and "hotter colors" (i.e., yellow and red shades) representing sections of the trail network with relatively high concentrations of visitor use. For example, the "hotter color tones" on the trail to and at the lower Square Top Lake denote this as the most popular route and destination from the Square Top Lakes Trailhead. The GPS track data in Figure 2-23 also suggest the hike to Square Top Mountain, west of Square Top Lakes is a relatively popular route for visitor groups hiking from the Square Top Lakes Trailhead.

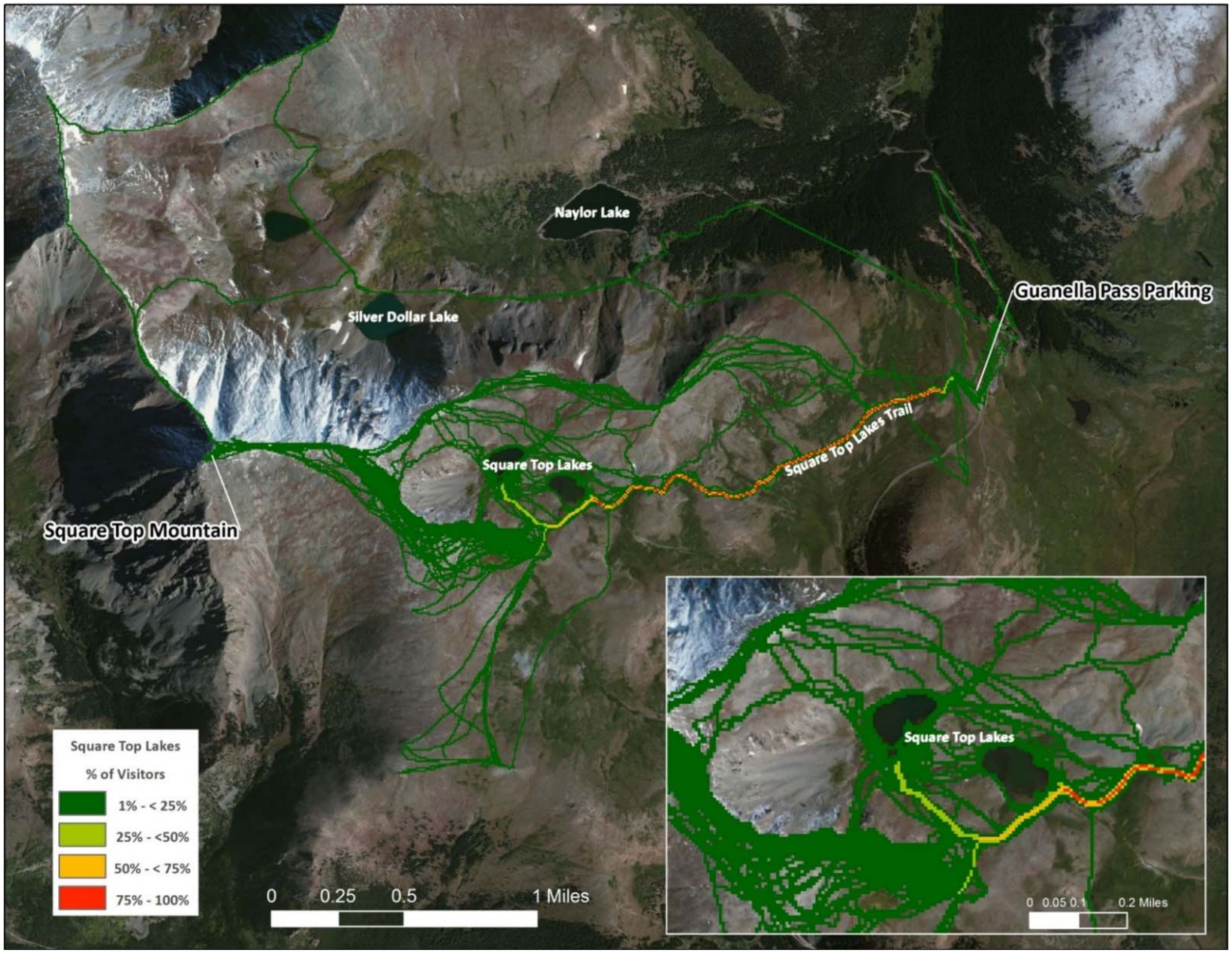


Figure 2-23. Heat map of GPS-based visitor use tracks for visitor groups intercepted at the Square Top Lakes Trailhead, summer 2012.

People At One Time (PAOT) Counts

Data Collection Method

- The number of people at one time (PAOT) on the summit of Mount Bierstadt was measured via direct observation (Figure 2-24)
- Generally, PAOT counts were conducted from approximately 8:30 AM to 11:00 AM, although severe weather conditions on the Mount Bierstadt summit frequently affected the sampling period. In particular, the threat of thunderstorms frequently required field staff to descend from the summit earlier than 11:00 AM.

Figure 2-24. People at one time (PAOT) on the Mount Bierstadt summit, summer 2012.

- The PAOT counts were conducted on five weekdays and seven weekend days between July 1st and September 3rd, 2012. On each sampling day, field staff recorded an "instantaneous count" of the total number of people on the Mount Bierstadt summit every 5 minutes, resulting in 148 weekday and 239 weekend day PAOT observations (Table *2-14*).

Table 2-14. People at one time (PAOT) sampling effort, Mount Bierstadt summit, summer 2012.

Date	Weekend	Number of observations
7/1/2012	Yes	31
7/21/2012	Yes	34
7/29/2012	Yes	34
8/5/2012	Yes	32
8/6/2012	No	34
8/10/2012	No	27
8/16/2012	No	34
8/18/2012	Yes	25
8/24/2012	No	21
8/26/2012	Yes	38
9/1/2012	Yes	45

Date	Weekend	Number of observations
9/3/2012	No	32
Total		**387**

Analysis and Results

On weekdays during summer 2012, there was an average of approximately 17 people on the Mount Bierstadt summit at one time; on weekend days during summer 2012, there was an average of approximately 28 people on the summit at one time. The maximum number of visitors observed at one time on the summit of Mount Bierstadt was approximately 133 visitors, and this occurred on Saturday, August 18th, 2012 (i.e., the design day for this study, selected to represent a "typically busy," but not the busiest summer day at Guanella Pass). Figure 2-25 displays the daily average and daily maximum number of visitors observed at one time on the Mount Bierstadt summit for each PAOT sampling day during summer 2012. As a point of reference, the maximum PAOT on the design day (Saturday, August 18th) results in a density of people on the summit of Mount Bierstadt approximately equivalent to a Pedestrian Level of Service C, which is considered a moderate level of crowding in an urban environment, such as on a city sidewalk.[1]

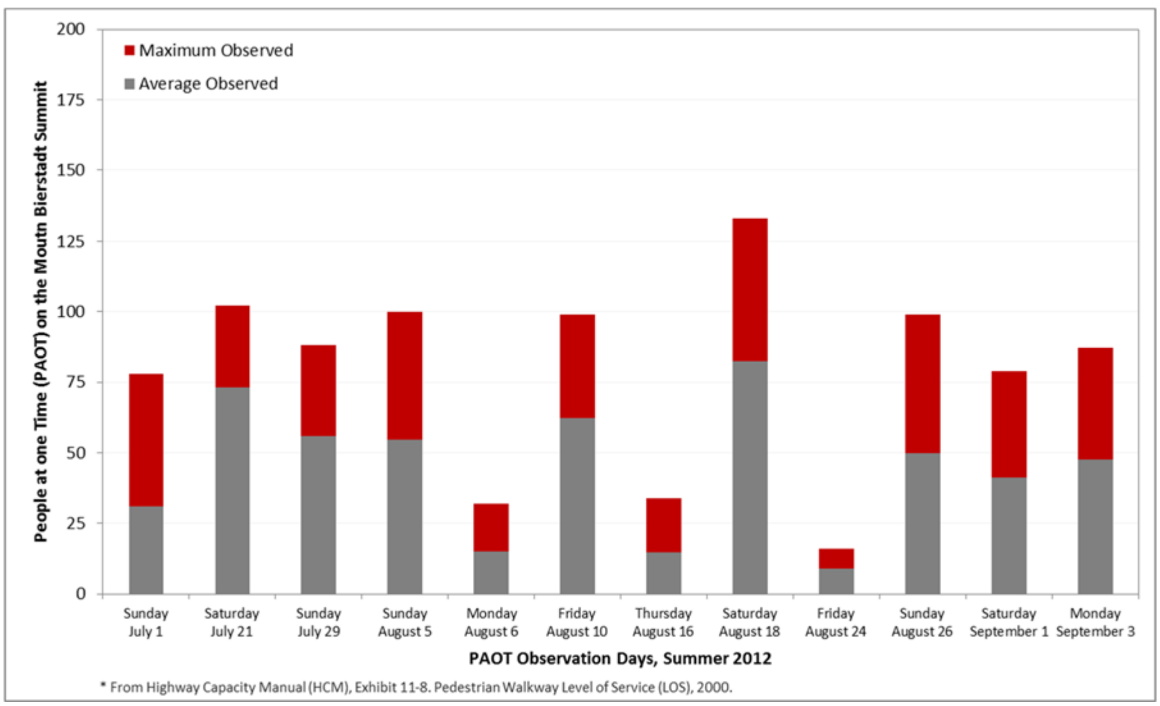


Figure 2-25. Mean and maximum PAOT on the summit of Mount Bierstadt, by sampling day, summer 2012.

[1] Highway Capacity Manual (HCM). (2010) Transportation Research Board of the National Academy of Sciences, Washington, D.C.

Guanella Pass Visitor Survey, Summer 2014

During summer 2014, RSG conducted a visitor survey at Guanella Pass. The purpose of the survey was to collect information that will help the US Forest Service (USFS) improve transportation conditions, and recreation and resource management at Guanella Pass. In particular, the survey instrument was designed to collect the following information from visitors to Guanella Pass:

- Visitors' perceptions, experiences, and expectations, with respect to transportation conditions and services, recreation opportunities, and visitor experience quality at Guanella Pass and on the Mount Bierstadt Trail
- Visitors' opinions about potential changes in operations to modify and improve transportation services and facilities
- Transportation-related issues experienced by visitors

Survey questions had a particular emphasis on traffic congestion and parking shortages at the study site during the summer peak visitation period and potential alternative transportation systems (ATS) strategies to help mitigate and manage these issues. These potential ATS strategies of focus in the survey include shuttle/transit service to Guanella Pass, visitor information and Intelligent Transportation Systems (ITS) to manage demand during peak periods, and on-the-ground parking and traffic management to optimize the use of existing parking and roadway infrastructure. The survey was also designed to measure visitors' perceptions and tolerances for crowding while hiking on the Mount Bierstadt Trail.

This section of *Chapter 2: Guanella Pass Summary of Data and Findings* provides a summary of the summer 2014 survey data collection effort and results. This section is organized into subsections that describe the survey methods and statistical results for the survey of Mount Bierstadt Trail users conducted at GP.

Methods

Survey Instrument

The summer 2014 Guanella Pass visitor survey instrument (Appendix J, K) and methods were developed by RSG, in cooperation with the Federal Highway Administration Central Federal Lands Highway Division (CFL), USFS, and US Department of Transportation Volpe Center. Further, the survey instrument and methods were reviewed and approved by the USFS Office of Regulatory and Management Services and the Office of Management and Budget (OMB).

The summer 2014 Guanella Pass visitor survey instrument is organized into five sections. The first section of the survey instrument, titled "Trip Description," includes questions concerning respondents' group sizes, the presence or absence of children under the age of 16 in respondents' groups, activities engaged in during their visit to Guanella Pass, and other locations visited on Guanella Pass Road.

The second section of the survey instrument, titled "Hike to Mount Bierstadt Summit" includes questions for those visitors who hiked part or all of the way to the summit of Mount Bierstadt on the day they were contacted for the survey. The questions in this section ask about visitors' perceptions of crowding on the trail and on the summit of Mount Bierstadt, and attitudes about potential management actions to prevent crowding, environmental impacts, and safety issues. This section includes a question asking people to evaluate a series of photo simulations depicting varying numbers of people on the summit of Mount Bierstadt. The photo simulations are included in Appendix L.

The third section of the survey instrument, titled "Travel and Parking," includes questions concerning visitors' routes of travel to and from Guanella Pass, the number of vehicles in which visitor groups traveled there, visitors' time of arrival, the location(s) and perceptions about where visitors parked their vehicle(s), and visitors' attitudes about potential actions to manage parking congestion during peak visitation periods.

The fourth section of the survey instrument, titled "Planning Your Trip to Guanella Pass," includes questions about when visitors decided to take a trip to the recreation area, the potential effects of parking conditions at Guanella Pass on their trip planning, and the likelihood they would use various sources for information about parking and crowding conditions at Guanella Pass, if it was available for planning a future trip.

The fifth section of the survey instrument, titled "Background Information," includes questions concerning respondents' gender, age, state or country of residence, level of formal education, ethnicity, and race.

Survey Sampling and Administration

The population to which statistical generalization is intended for the summer 2014 Guanella Pass visitor survey is all visitor groups who walked/hiked at least part of the way on the Mount Bierstadt Trail during the summer 2014 peak visitation period at Guanella Pass. It should be noted, for a subset of questions, the study population is visitors (rather than visitor groups); for example, questions asking about the race, ethnicity, age, and gender of respondents is intended to be generalizable to visitors, not visitor groups. In contrast, results for questions about parking locations, recreation activities, and similar group-oriented questions are intended to be generalizable to visitor groups. Survey results that follow are presented according to the target population for each individual question.

The summer 2014 Guanella Pass visitor survey was administered to visitors at the Mount Bierstadt Trailhead on four weekend days and six weekdays, during summer 2014; the sampling season was selected in consultation with CFL and USFS staff to coincide with the peak summer visitation period at Guanella Pass (Table 2-15). On each sampling day, the visitor survey was administered from 9:00 AM to 5:00 PM to coincide with the peak hours of visitor use on the Mount Bierstadt Trail.

Table 2-15. Summer 2014 Guanella Pass visitor survey sampling effort.

Date	Day of Week	Solicitations	Completes	Refusals	Unusable	Response Rate
7/18/2014	Friday	58	48	10	0	83%
7/20/2014	Sunday	75	58	17	0	77%
7/23/2014	Wednesday	20	19	1	0	95%
7/24/2014	Thursday	49	38	11	0	78%
7/26/2014	Saturday	61	37	24	1	61%
8/1/2014	Friday	23	15	8	0	65%
8/3/2014	Sunday	89	60	29	0	67%
8/6/2014	Wednesday	70	56	14	3	80%
8/7/2014	Thursday	21	19	2	0	90%
8/9/2014	Saturday	86	56	30	0	65%
Total	**-**	**552**	**406**	**146**	**4**	**74%**

Note: “Unusable” are cases where a visitor group agreed to participate but returned an incomplete questionnaire.

At the start of each sampling day, survey administrators were stationed at the Mount Bierstadt Trailhead and intercepted the first visitor group they observed returning to the trailhead at the end of their hike/walk on the trail (Figure 2-26).

Figure 2-26. Survey administration at the Mount Bierstadt Trailhead, summer 2014

The survey administrator asked each intercepted group if they had previously participated in the visitor survey; visitor groups who had not previously participated in the survey were asked to participate in the survey. A randomly selected adult member (18 years of age or older whose birthday was the next in the group to occur) of each visitor group who agreed to participate in the survey was given a copy of the survey instrument and asked to complete it onsite. Visitor groups who were unwilling or unable to participate in the survey were thanked for their consideration. After the survey administrator completed each visitor group contact, she intercepted the next arriving visitor group and repeated the participant screening and recruitment process throughout the sampling period.

Survey Nonresponse

To track visitor survey response rates, survey administrators recorded a survey log entry for each visitor group asked to participate in the summer 2014 Guanella Pass visitor survey (Figure 2-27). Information recorded on the survey log for each contacted group included: 1) current time; 2) visitor group size; 3) the number of vehicles in which the group traveled to Guanella Pass; 4) whether or not the group hiked to the summit of Mount Bierstadt; 5) whether the group accepted or refused to participate in the survey; 6) whether the survey respondent was the driver or a passenger in his/her group’s car(s); 7) the survey ID number for those groups who participated; 8) current weather conditions; and 9) comments concerning the contact, as needed (e.g., if a group previously participated or declined to participate due to a language barrier).

ARNF Visitor Survey Log Page ____of ____

Site: ______________________ **Location:** ____________________________ **Date:** ___________ **Initials:** _____________

Special Event: No / Yes: ____________________________ **Start:** ___________ **End:** ___________

Time	**Group Size**	**# of Veh. per Group**	**Summit / Wilderness**	**Participated?** (*Y* or *N*)	**Driver** (D or P)	**Survey ID #** *If Yes*	**Weather** (*S*, *P*, *O* or *R*)	**Comments** (DB, LB, PP)

Comment Codes: DB – drive-by; LB – unable to recruit due to language barrier; PP – previously participated
Weather: S = Sunny, P = Partly, O = Overcast, R = Raining (or other precipitation)

Figure 2-27. Summer 2014 Guanella Pass visitor survey log form

After removing surveys that were unusable (i.e., had incomplete data and were consequently removed from analysis), the overall response rate to the visitor survey was 74%. The survey log data were used to conduct statistical tests for differences between visitor groups who participated in the survey and those that did not, based on group size, number of vehicles used to travel to Guanella Pass, vehicle occupancy, and whether or not the group hiked to the summit of Mount Bierstadt.

Results of independent samples t-tests of means and chi-square tests suggest groups who participated in the survey do not differ significantly from those that did not participate, in terms of group size (t=-1.346, p=0.179); vehicle occupancy (t=-0.312, p=0.755); and whether or not they hiked to the summit of Mount Bierstadt (χ^2=2.673, p=0.102). There was a statistically significant difference between respondent visitor groups and nonrespondent visitor groups, in terms of the number of vehicles in which the group traveled to Guanella Pass (t=-2.742, p=0.006). However, there was no substantive difference between respondents (mean = 1 vehicle) and nonrespondents (mean = 1 vehicle), in terms of the number of vehicles in which the group traveled to Guanella Pass.

In summary, nonresponse bias tests found no significant differences between respondents and nonrespondents for group size, vehicle occupancy, and summit hikes, and no substantive difference for number of vehicles. Therefore, it is reasonable to conclude the survey data are representative of the target study population.

Survey Data Analysis

Survey data analysis procedures used in this study are based on standard methods for survey research in parks and recreation settings (Vaske, 2008)[4]. Key estimates from the data are descriptive in nature, primarily measures of central tendency (mean) and frequency distributions.

In addition, statistical tests for differences between visitors' survey responses on weekdays and weekend days were conducted. For questions with statistically significant differences in responses between weekday and weekend respondents (p-values ≤ 0.05), results are presented separately for weekday and weekend visitors (groups distinguished with orange and blue bars in figures). When responses do not vary significantly, overall results (rather than separate weekend and weekday results) are presented (overall groups represented with black bar in figures).

Some additional statistical tests for differences in survey responses by various subgroups were performed. For example, responses to questions about parking conditions from visitors who parked in designated parking lots were compared to those from visitors who parked along the roadside at Guanella Pass. Results are reported for subgroups when there are statistically significant differences (groups distinguished with green and yellow bars); otherwise, overall results are presented.

Results for individual survey questions are presented graphically, with summary statements of significant and/or interesting findings reported above each figure. Question language, as it appeared in the questionnaire, is included below each figure.

[4] Vaske, J. (2008). *Survey Research and Analysis: Applications in Parks, Recreation, and Human Dimensions*. State College, PA: Venture Publishing, Inc.

Visitor Survey Results

Trip Description

- The distribution of group sizes varied significantly between weekend day and weekday visitor groups (χ^2=8.508, p=0.037). However, the average group size was three people, regardless of day of week (t=-1.661, p=0.097).
- Solo hikers were more common on weekdays, while larger parties were more common on weekends.
- Groups of two people were the most common, regardless of day of week.
- Most groups of five or more people had fewer than 10 members, whether they were contacted on a weekday or weekend day.
- The largest group surveyed had 22 members and was contacted on a weekend day.

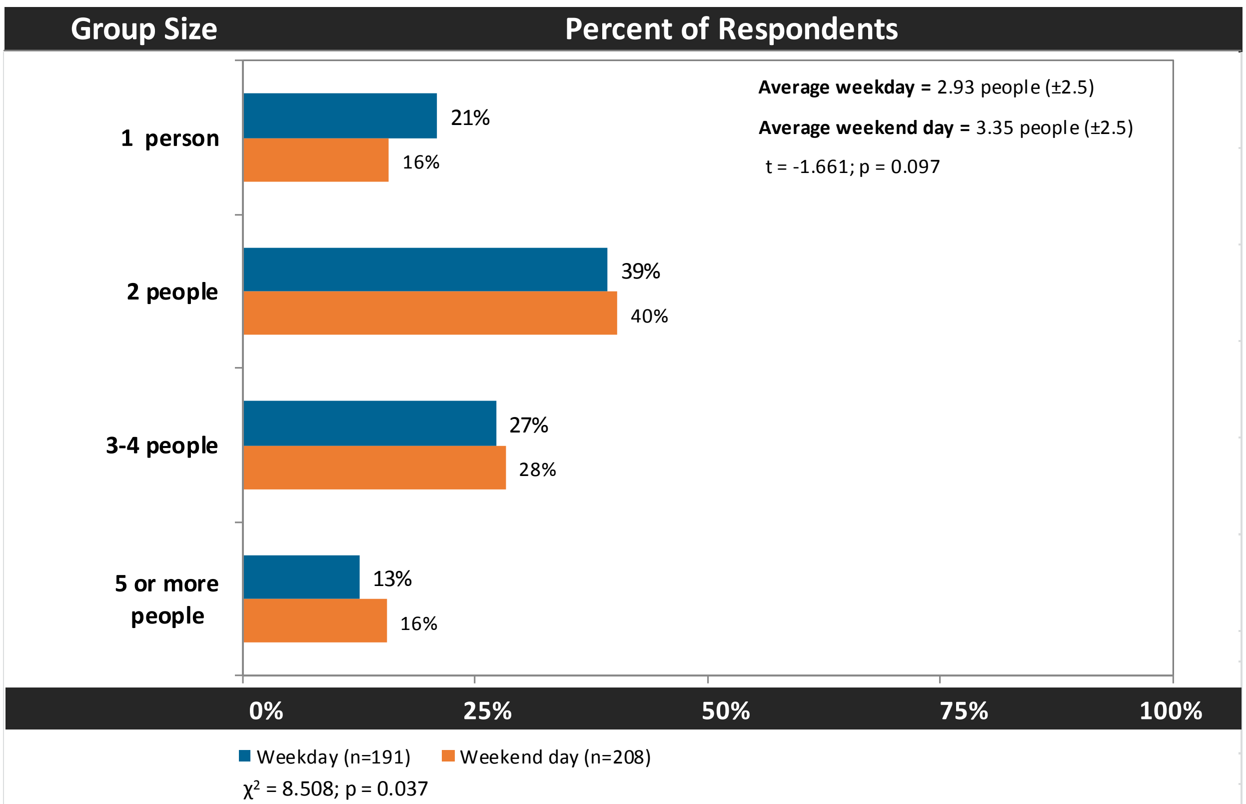


Figure 2-28. Including yourself, how many people are there in your personal group on this trip to Guanella Pass?

- The percentage of groups hiking with children under the age of 16 did not differ significantly between weekend day and weekday visitor groups (χ^2=0.009, p=0.923).
- Regardless of the day of week, less than one-fifth (18%) of visitor groups were hiking with one or more children under the age of 16.

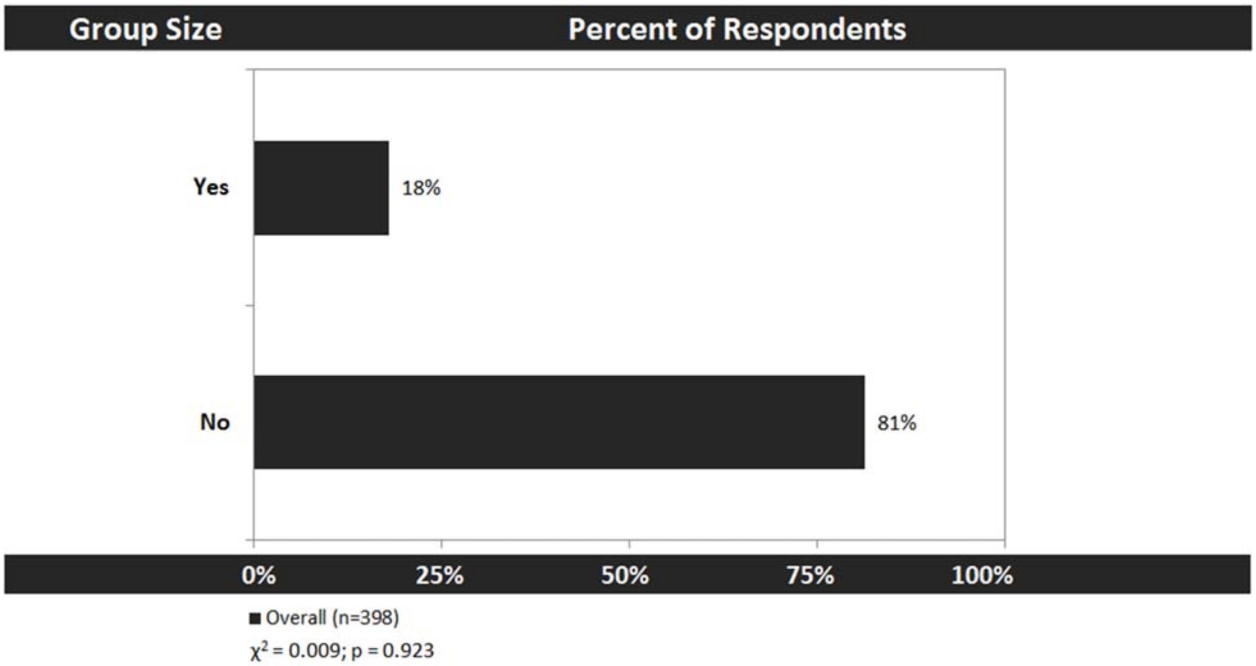


Figure 2-29. Are there any children under the age of 16 in your personal group on this trip to Guanella Pass?

- The number of children in groups with children did not differ significantly between weekdays and weekend days (χ^2=4.615, p=0.202).
- Regardless of the day of week, there was an average of two children in groups with children (t=0.179, p=0.859).
- Of the relatively few groups hiking with children under the age of 16, the vast majority (85%) were with only one or two children.
- Very few groups with children (4%) had five or more children.

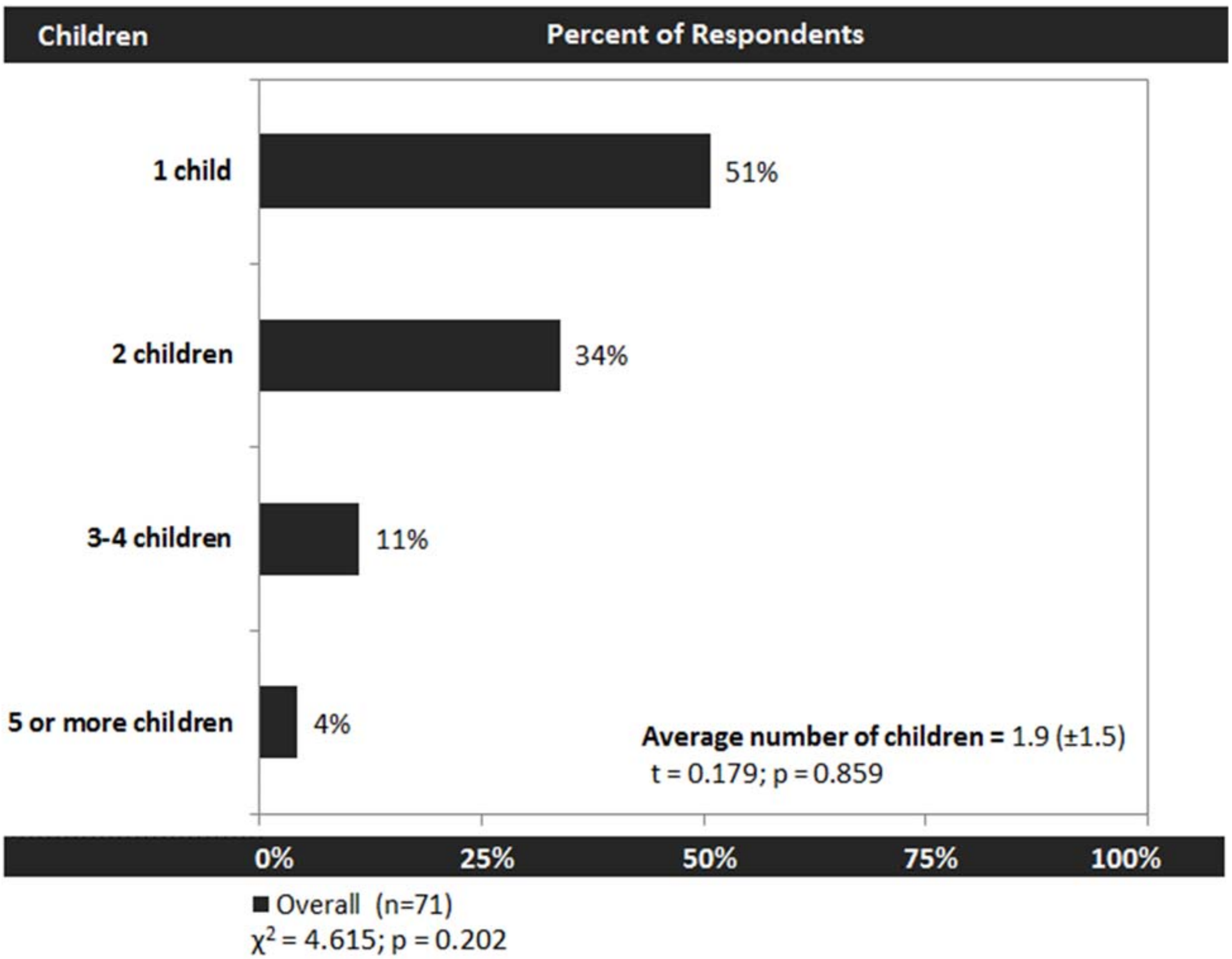


Figure 2-30. For groups with children: how many children under the age of 16 are in your personal group today?

- With the exception of overnight backpacking (χ^2=4.029, p=0.045), the percentage of visitor groups who participated or planned to participate in each of several activities included in the questionnaire did not differ significantly between weekend days and weekdays.
- Visitor groups who were contacted on weekend days were more likely than those contacted on weekdays to have participated or planned to participate in overnight backpacking during their trip to Guanella Pass.
- Nearly all visitor groups, regardless of the day of week, hiked on the Mount Bierstadt Trail. As noted, the survey was administered at the trailhead for Mount Bierstadt Trail. Therefore, sampling systematically excluded Guanella Pass visitor groups/visitors who did not walk at least a short distance on the Mount Bierstadt Trail.
- Scenic driving (21%) and picnicking (14%) were the second and third most common activities among visitor groups, regardless of the day of week.
- A verbatim list (including respondents' typos) of "other" activities reported by respondents is included in Appendix M.

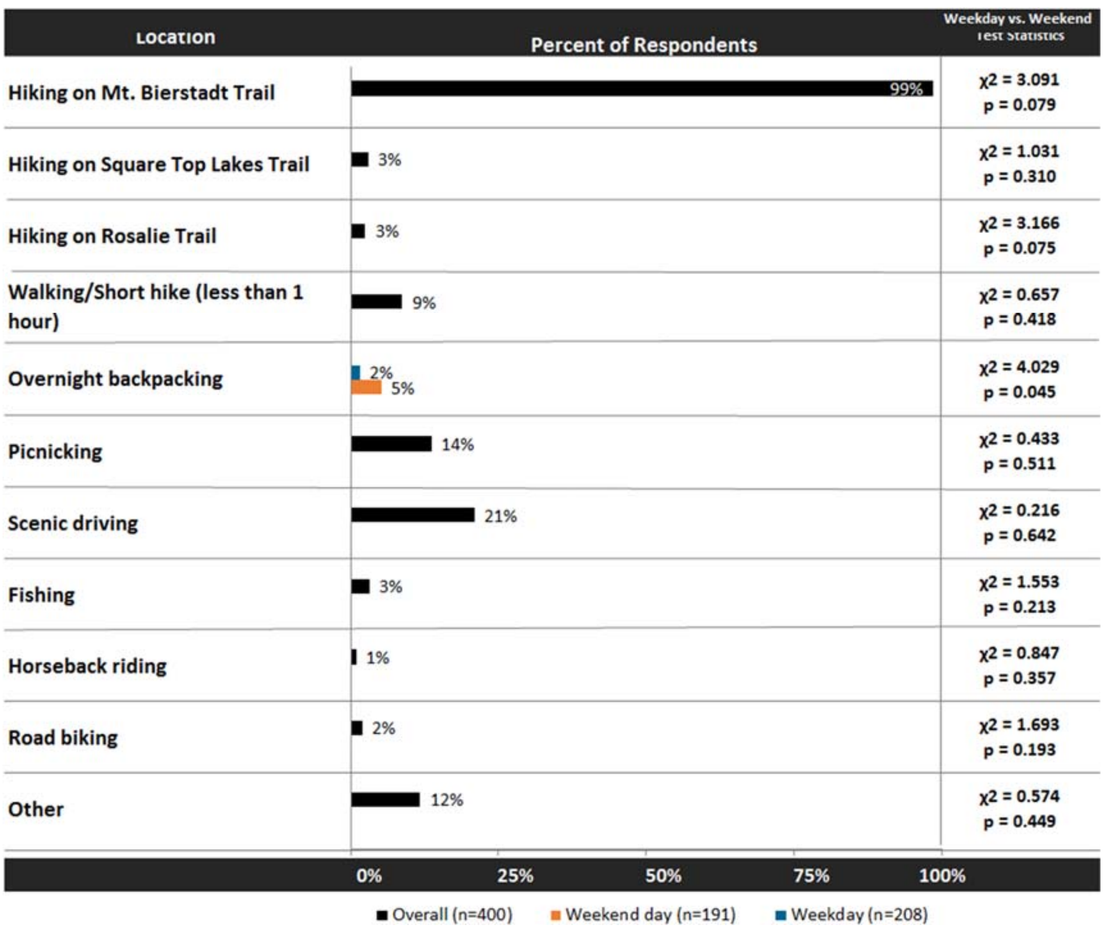


Figure 2-31. Which of the following activities have you done/will you do on this trip to Guanella Pass?

- The primary activities of visitor groups contacted on weekend days did not differ significantly from those contacted on weekdays (χ^2=3.043, p=0.218).
- Hiking on the Mount Bierstadt Trail was the primary activity for the large majority of visitor groups (91%), regardless of the day of week.
- Very few (7%) visitor groups, regardless of the day of the week, reported activities other than hiking on the Mount Bierstadt Trail as their primary activity. Even fewer (2%) reported having no primary activity.

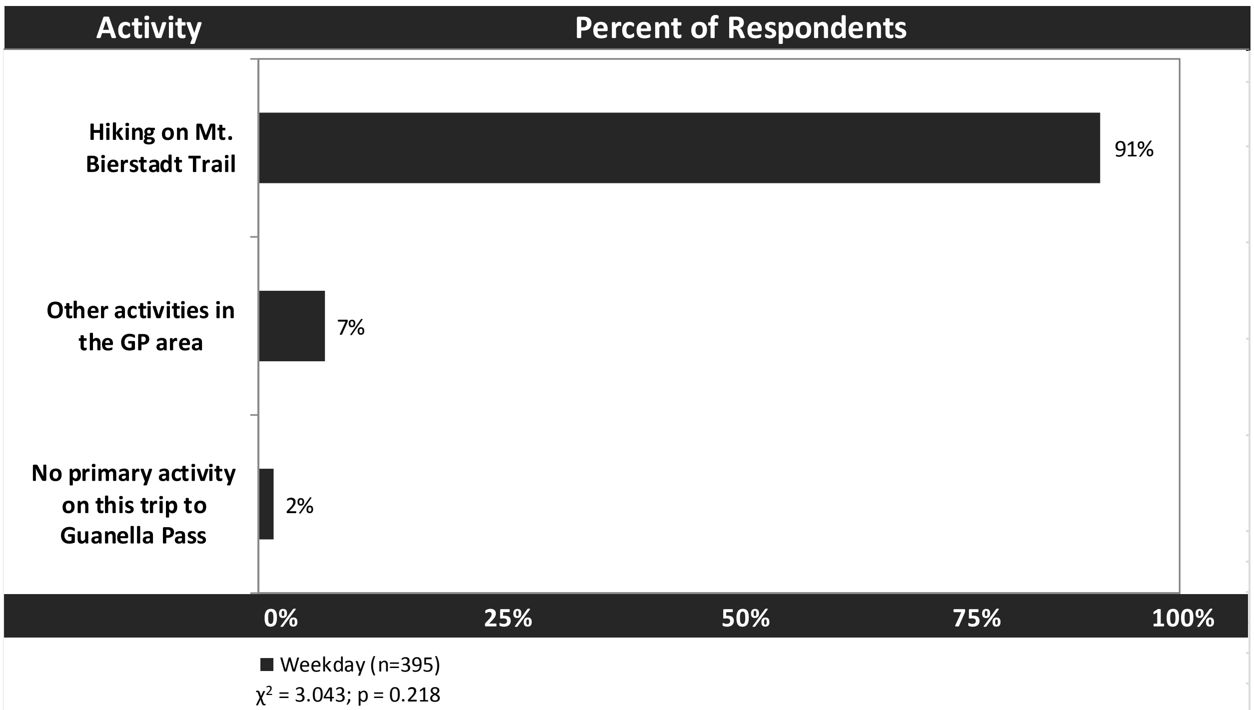


Figure 2-32. What is your primary activity on this trip to Guanella Pass?

- The percentage of visitor groups who visited other locations on Guanella Pass Road did not differ significantly between visitor groups contacted on weekdays and those contacted on weekend days.
- Regardless of the day of week, relatively few groups visited or planned to visit other locations on Guanella Pass Road during their trip, with the most common being the hiking trails at Silver Dollar Lake (7%) and Clear Lake Campground (6%).
- A verbatim list (including respondents' typos) of "other" locations reported by respondents is included in Appendix N.

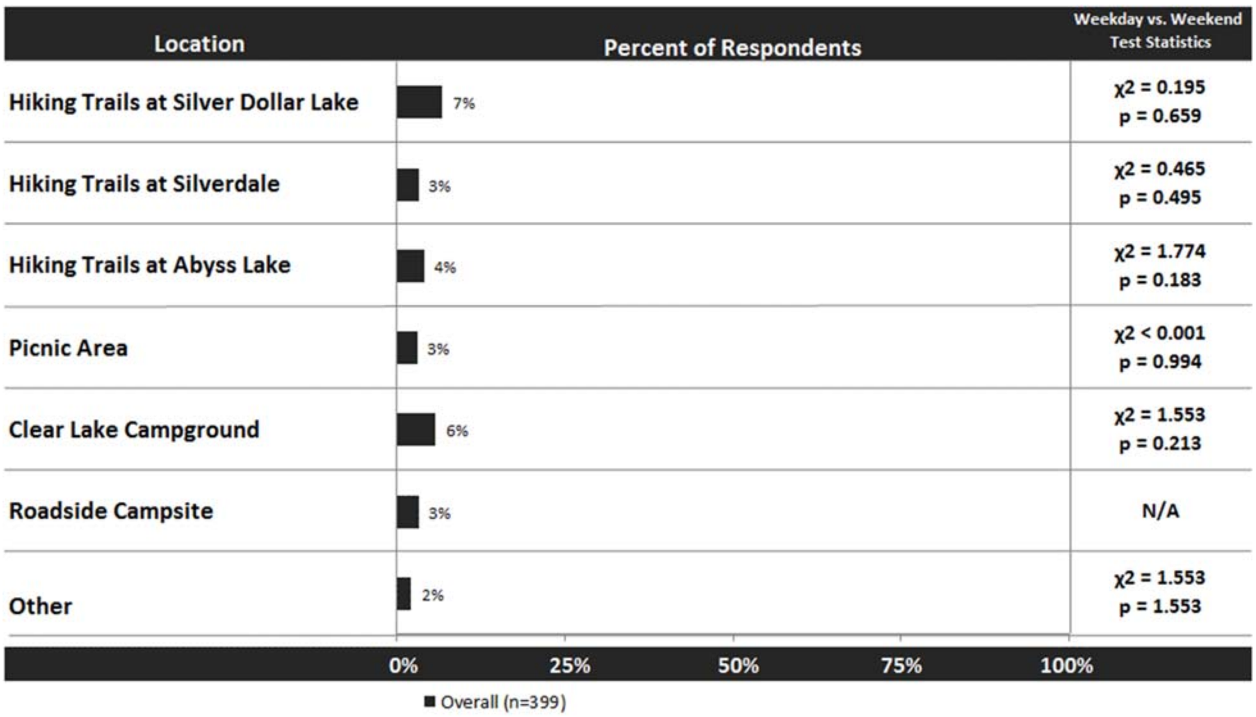


Figure 2-33. Which of the following locations on Guanella Pass Road have you visited/will you visit on this trip to Guanella Pass?

Hike to Mount Bierstadt Summit

- Nearly three-quarters (73%) of visitor groups hiked all the way to the summit of Mount Bierstadt, regardless of the day of the week (χ^2=0.770, p=0.680).

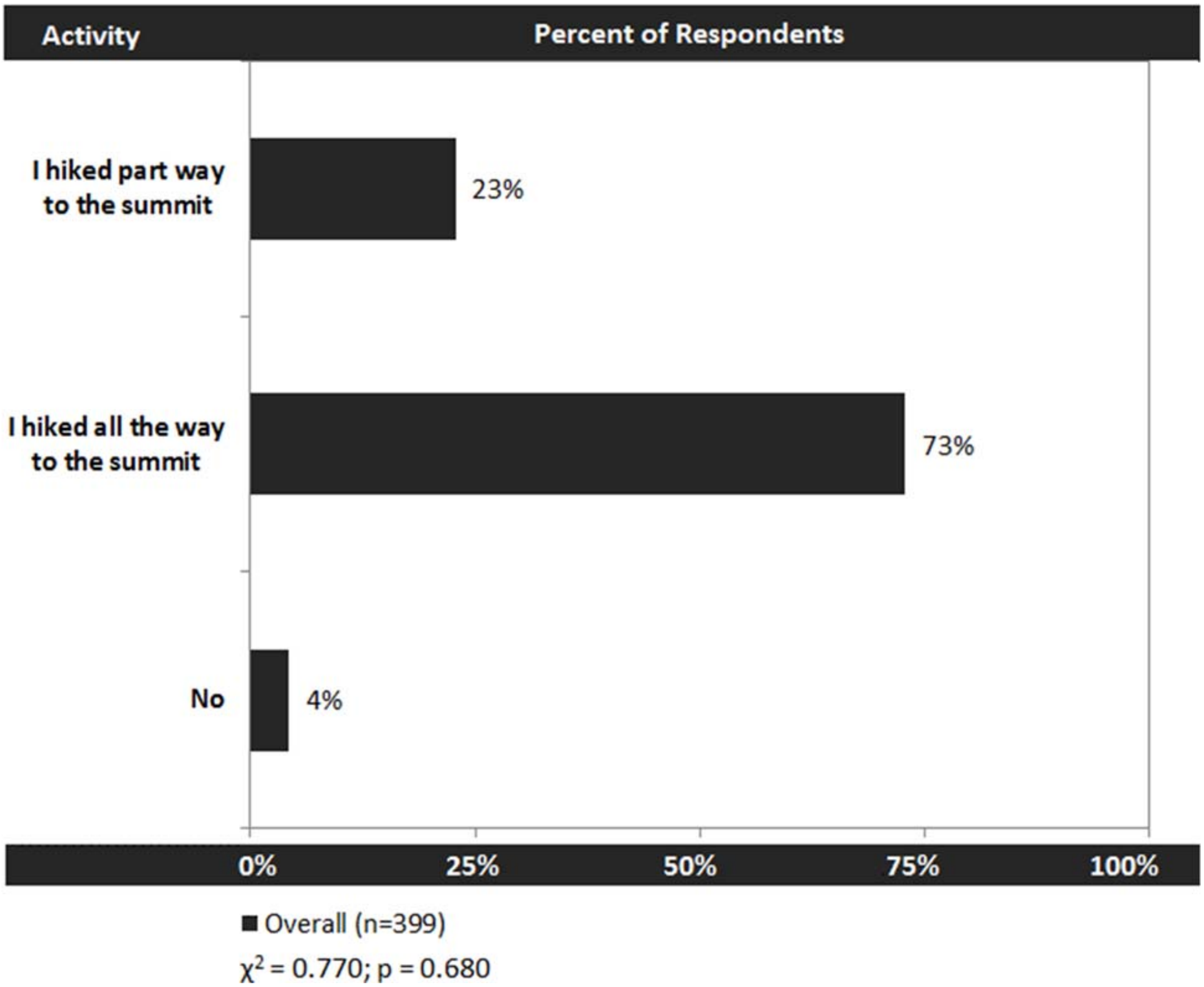


Figure 2-34. Did you hike part or all the way to the summit of Mount Bierstadt today?

- The number of hours hiked on the Mount Bierstadt Trial did not vary significantly between weekday visitor groups and weekend day visitor groups (χ^2=6.550, p=0.256).
- Nearly half of all visitor groups hiked four to five hours on the Mount Bierstadt Trail. On average, visitor groups hiked just under five hours on the trail.

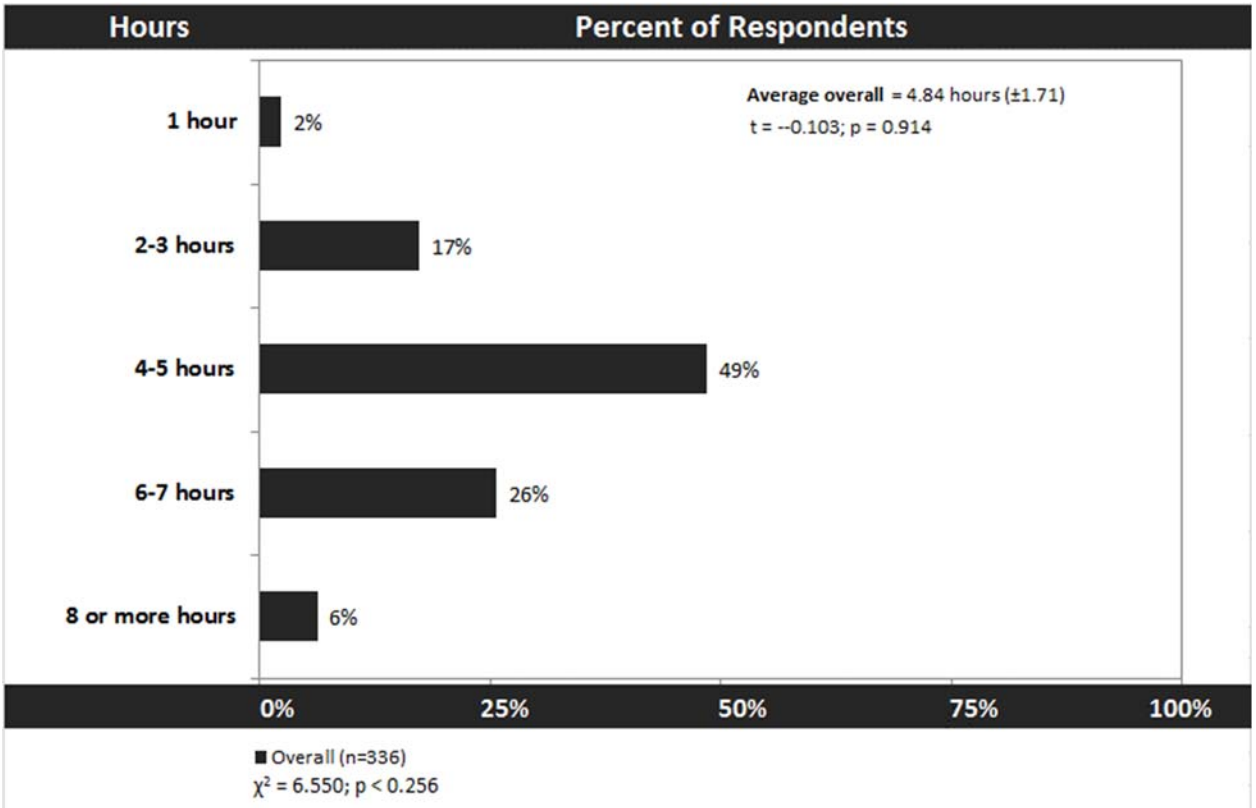


Figure 2-35. Approximately how many hours did you hike on the Mount Bierstadt Trail today?

- The number of hours spent hiking on the Mount Bierstadt Trail varied significantly between visitor groups who hiked to the summit and those who hiked only partway on the trail (χ^2=135.716, p<0.001).
- Groups who went to the summit averaged just over five hours of hiking time, while those who hiked partway averaged about three and a half hours (t=-8.554, p<0.001).
- Nearly half (44%) of visitor groups who hiked only partway on the Mount Bierstadt Trail hiked for two to three hours, while the majority (84%) of visitor groups who hiked to the summit hiked for four to seven hours.

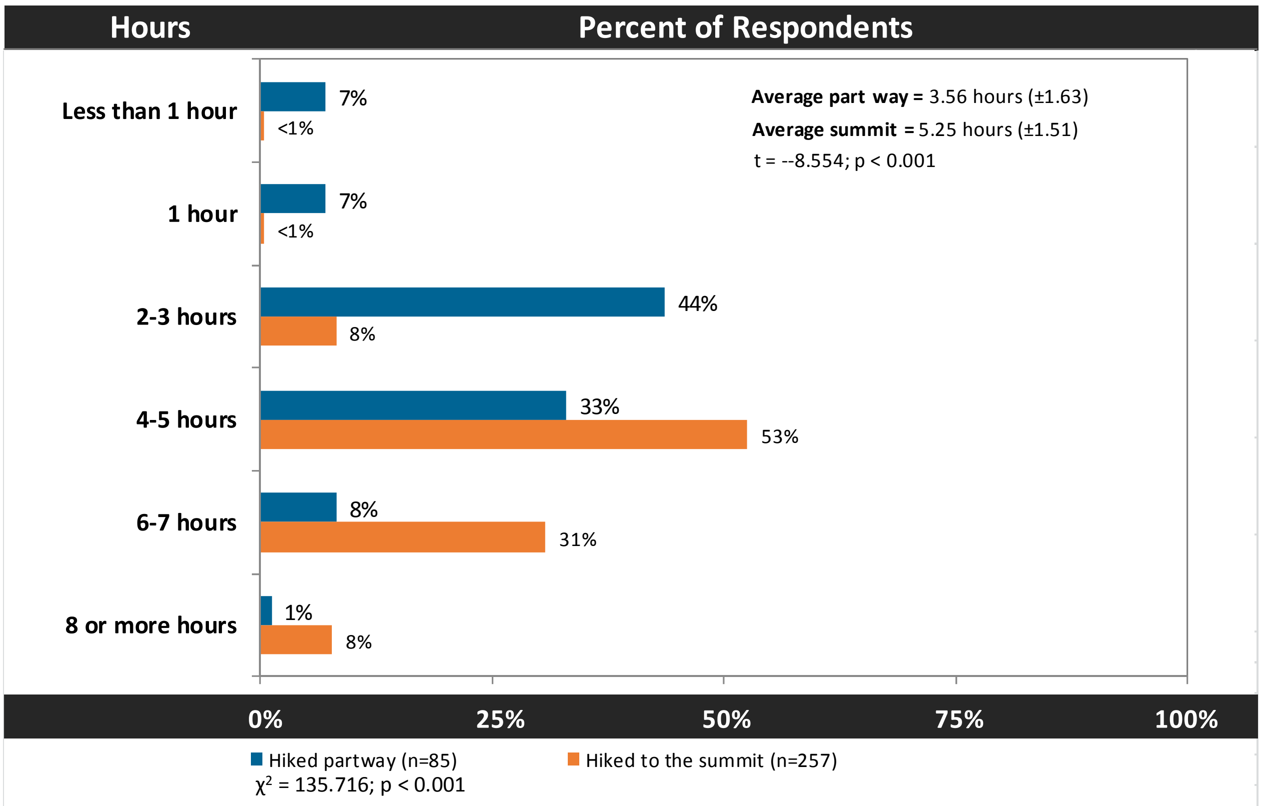


Figure 2-36. Approximately how many hours did you hike on the Mount Bierstadt Trail today?

- Visitors contacted on weekend days were significantly more likely to feel crowded than respondents contacted on weekdays (p<0.001 for all tests).
- More than half (55%) of all visitors on weekend days felt crowded on the trail and more than one-third (36%) felt crowded on the summit of Mount Bierstadt.
- Less than one-third (30%) of visitors on weekend days did not feel crowded at any point during their hike. In contrast, two-thirds (66%) of weekday visitors did not feel crowded at any point during their hike on the Mount Bierstadt Trail.
- However, about one-quarter (26%) of weekday visitors reported feeling crowded on the trail, and almost one-fifth (16%) of weekday visitors felt crowded on the summit.
- The degree of crowding visitors experience on weekend days and weekdays is in sharp contrast to the Wilderness designation of the area.

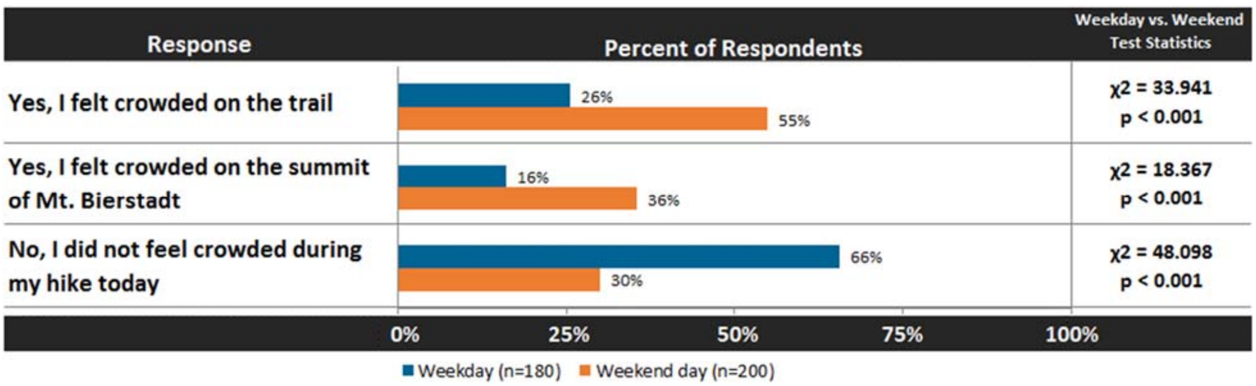


Figure 2-37. Did you feel crowded on the trail and/or the summit during your hike today?

- Regardless of the day of the week, few visitors (10%) felt like crowding increased the risk of injuries to themselves or others on the trail or on the summit of Mount Bierstadt (p>0.05 for all tests).

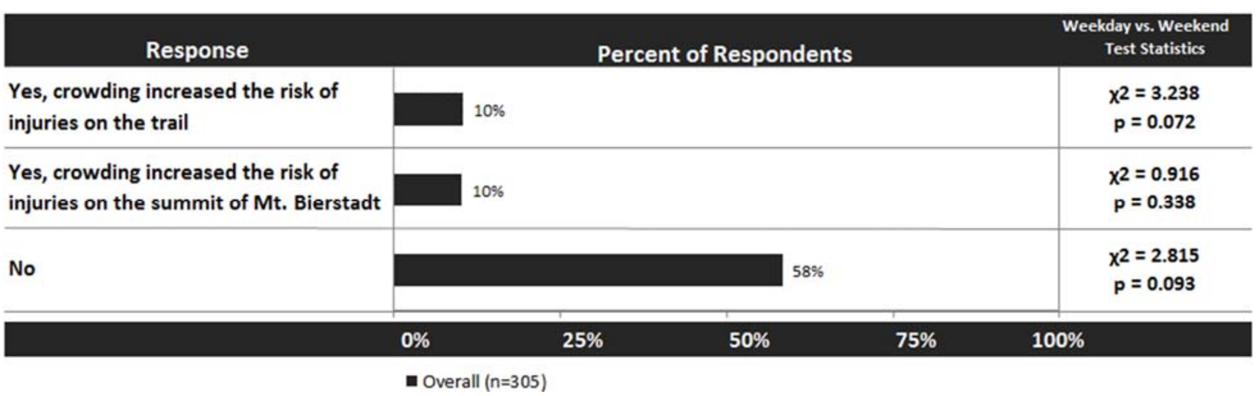


Figure 2-38. Did you feel like crowding increased your risk or other people's risk of being injured at any point during your hike today?

- Visitors contacted on weekend days were significantly more likely than visitors contacted on weekdays to say that other people on the trail made them feel rushed or slowed them down while hiking (χ^2=24.455, p<0.001).
- On weekend days, about one-third (29%) of visitors felt rushed or slowed down by the presence of other people on the trail. Fewer visitors (17%) felt rushed or slowed down by others on weekdays.
- These findings suggest crowding on the Mount Bierstadt Trail causes some visitors to travel off-trail to avoid other hikers, which creates trampling impacts to surrounding vegetation and soils.

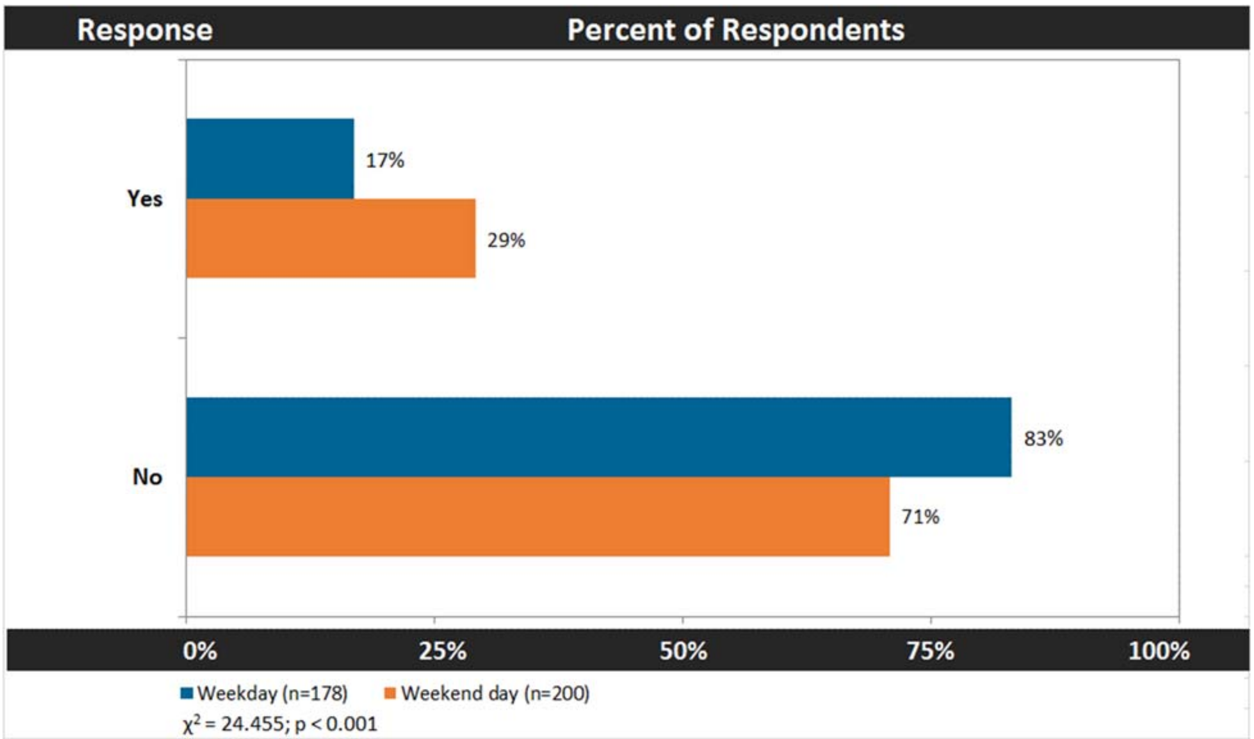


Figure 2-39. Did the presence of other people on the trail make you feel rushed or slow you down at any point during your hike today?

- Respondents were asked to indicate for each of several simulated photos of varying numbers of people on the summit of Mount Bierstadt if they would feel crowding being on the summit with that number of people. Weekday visitors were generally slightly more crowding-sensitive than weekend visitors.
- Few (18% or fewer) visitors thought they would feel crowded with 10 or fewer other people on the summit of Mount Bierstadt.
- About one-third (35% on weekdays and 29% on weekend days) of visitors thought they would feel crowded with 13 other people on the summit at one time.
- Roughly half or more (59% or more on weekdays and 47% or more on weekend days) of visitors thought they would feel crowded with 19 or more other people on the summit.

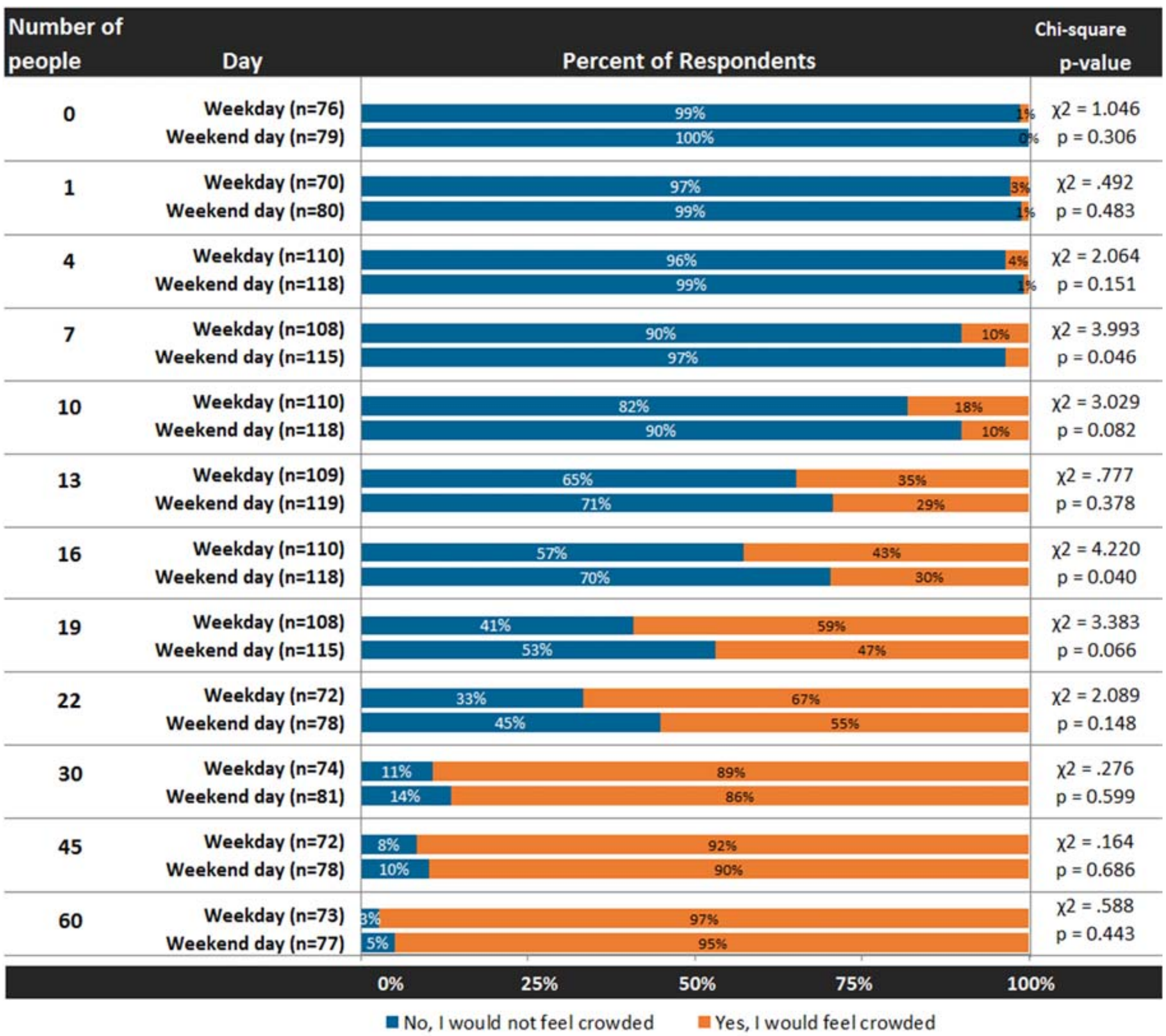


Figure 2-40. For each photograph, please tell us if you would feel crowded if you were on the summit of Mount Bierstadt with the number of people depicted in the photograph.

- Visitors on weekend days and weekdays did not differ significantly in their opinions about whether or not visitor use should be limited on the Mount Bierstadt Trail, regardless of the reason for the use limit ($p>0.05$ for all tests).
- Regardless of the reason, substantive proportions of all visitors believe the number of hikers on the Mount Bierstadt Trail should be limited, even if it limits when they can hike the trail.
- About one-quarter (23%) of all visitors believe the number of hikers on the Mount Bierstadt Trail should be limited to protect the quality of visitors' experiences, even if it limits when they can hike the trail.
- Nearly half (41%) of all visitors believe the number of hikers should be limited to protect visitors' safety, even if it limits when they can hike the trail.
- About half (51%) of visitors believe the number of hikers on the Mount Bierstadt Trail should be limited to reduce environmental impacts, even if it limits when they can hike the trail.

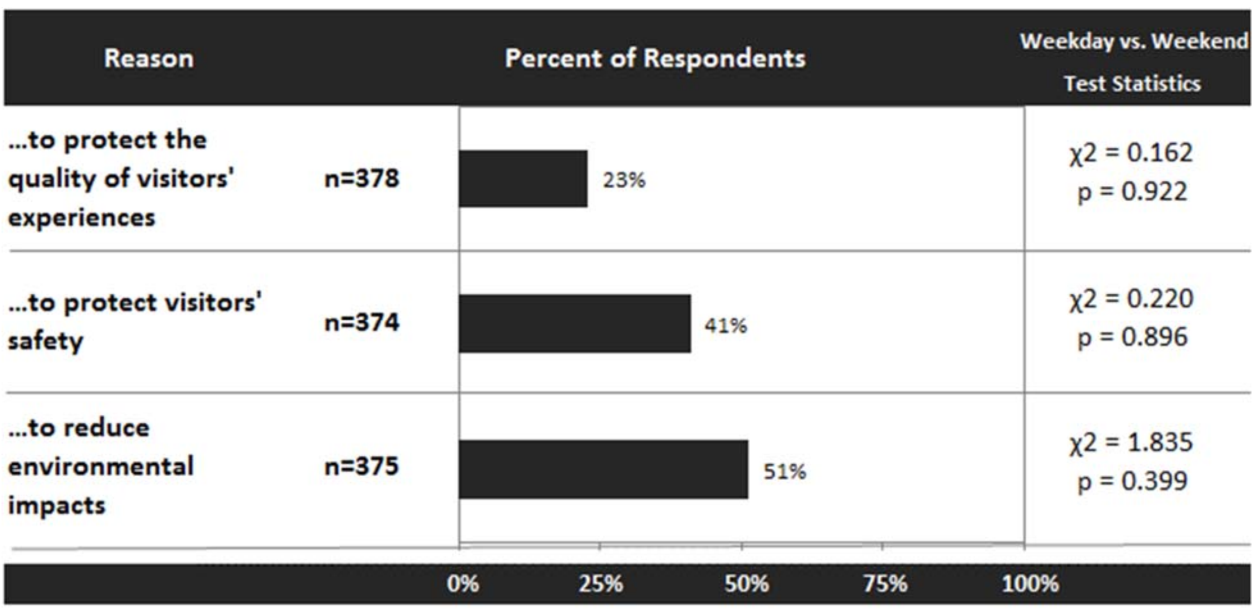


Figure 2-41. Percentage who agree that the number of people allowed to hike on the Mount Bierstadt Trail each day should be limited, even if it limits when they can hike on the trail, if it is needed to a) protect the quality of visitors' experiences; b) protect visitors' safety; c) to reduce environmental impacts.

Travel and Parking

- The travel route of visitor groups did not differ significantly between weekdays and weekend days (χ^2=5.666, p=0.129).
- The vast majority (82%) of visitor groups traveled to and from Guanella Pass via Georgetown.
- Relatively few (11%) visitor groups traveled one-way on Guanella Pass Road (i.e., from Georgetown to Grant, or vice versa) on their trip to Guanella Pass.
- Less than one-fifth (17%) of Guanella Pass visitor groups traveled through Grant at any point during their trip to Guanella Pass.

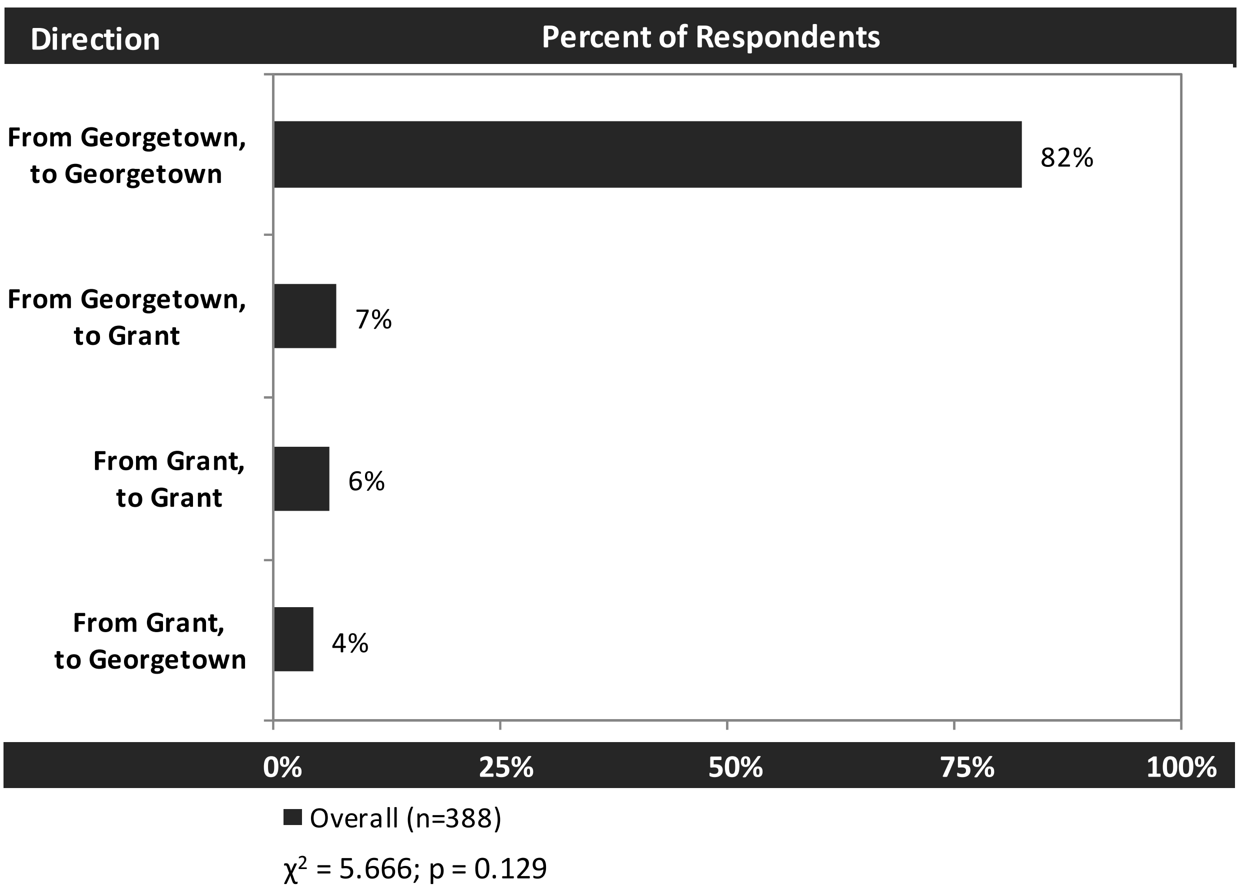


Figure 2-42. Which route did you use to travel to Guanella Pass on this trip?

- Visitor groups' arrival time at Guanella Pass did not vary significantly between weekdays and weekend days (χ^2=6.232, p=0.513).
- Nearly half (42%) of visitor groups arrived at Guanella Pass before 7 AM, and nearly two-thirds (62%) arrived by 8 AM.

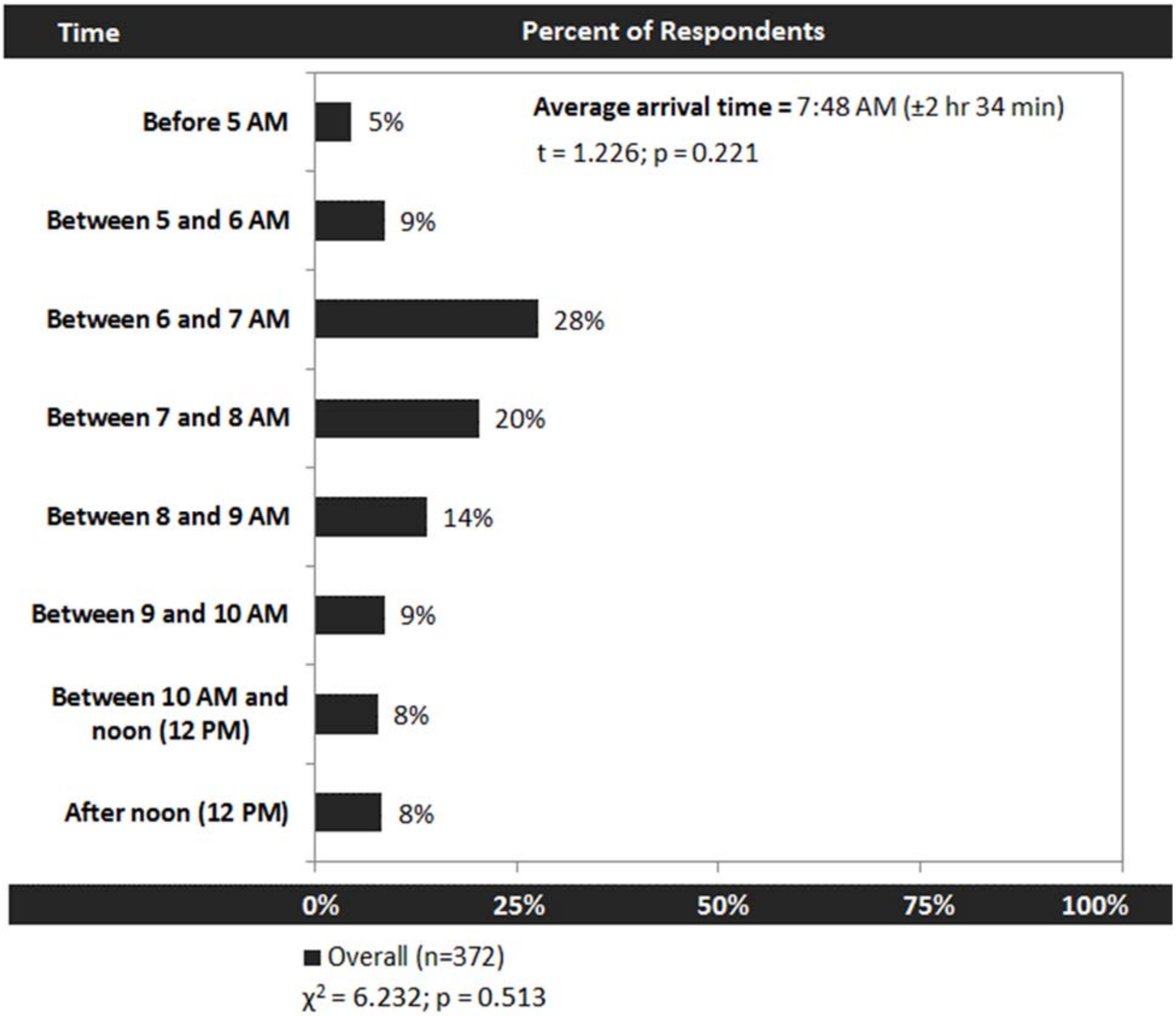


Figure 2-43. At approximately what time did you arrive at Guanella Pass today?

- The vast majority (92%) of all visitor groups arrived at Guanella Pass on the same day they took the survey, regardless of the day of week (χ^2=1.013, p=0.314).

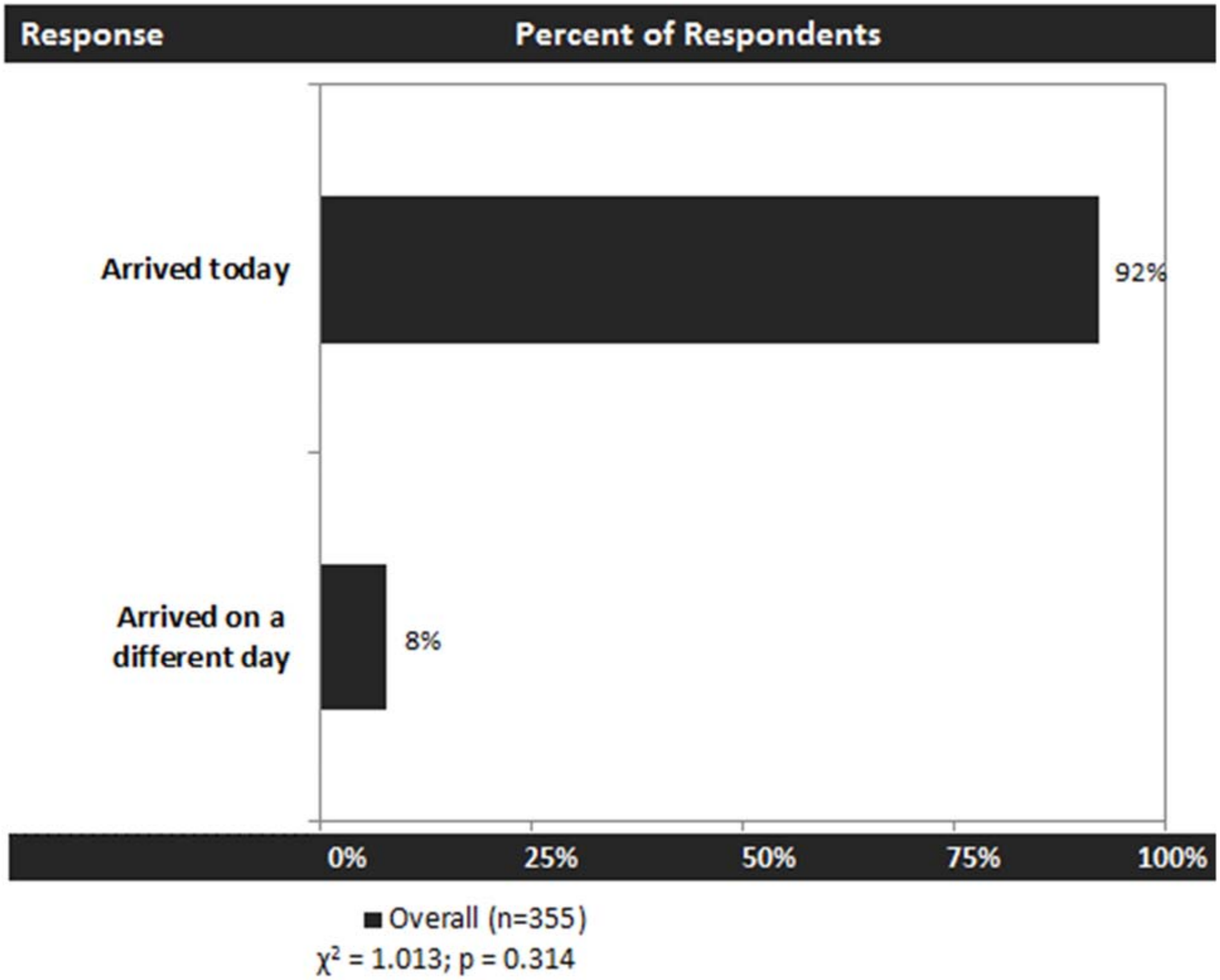


Figure 2-44. Percentage of visitor groups who arrived at Guanella Pass on the same day or different day than when they were contacted for the survey.

- The majority of all visitor groups (86%) traveled to Guanella Pass in a single vehicle, regardless of the day of week (χ^2=0.346, p=0.841).

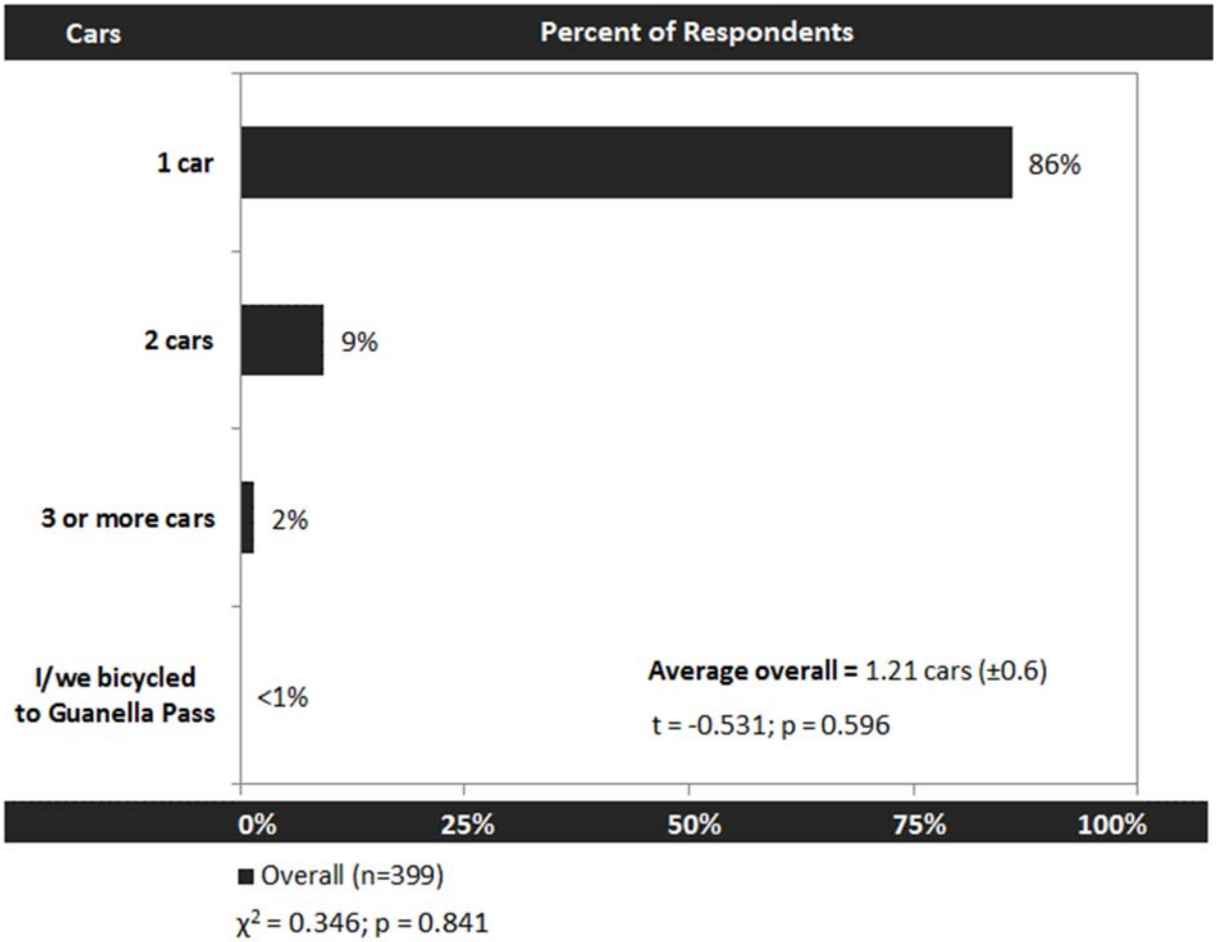


Figure 2-45. In how many vehicles did you/your personal group travel on this trip to Guanella Pass?

- Visitor groups' parking location at Guanella Pass varied significantly between weekdays and weekend days (χ^2=11.904, p=0.008).
- Half (50%) of all weekday visitor groups were able to park in the Mount Bierstadt Trailhead parking lot, whereas only about one-third (39%) of visitor groups were able to park there on weekend days.
- However, about half of all visitor groups, regardless of the day of week, (48% on weekdays and 52% on weekend days) parked along the roadside on Guanella Pass Road.
- Few visitor groups parked in the Square Top Lakes Trailhead parking lot, regardless of the day of week (2% on weekdays and 9% on weekend days).

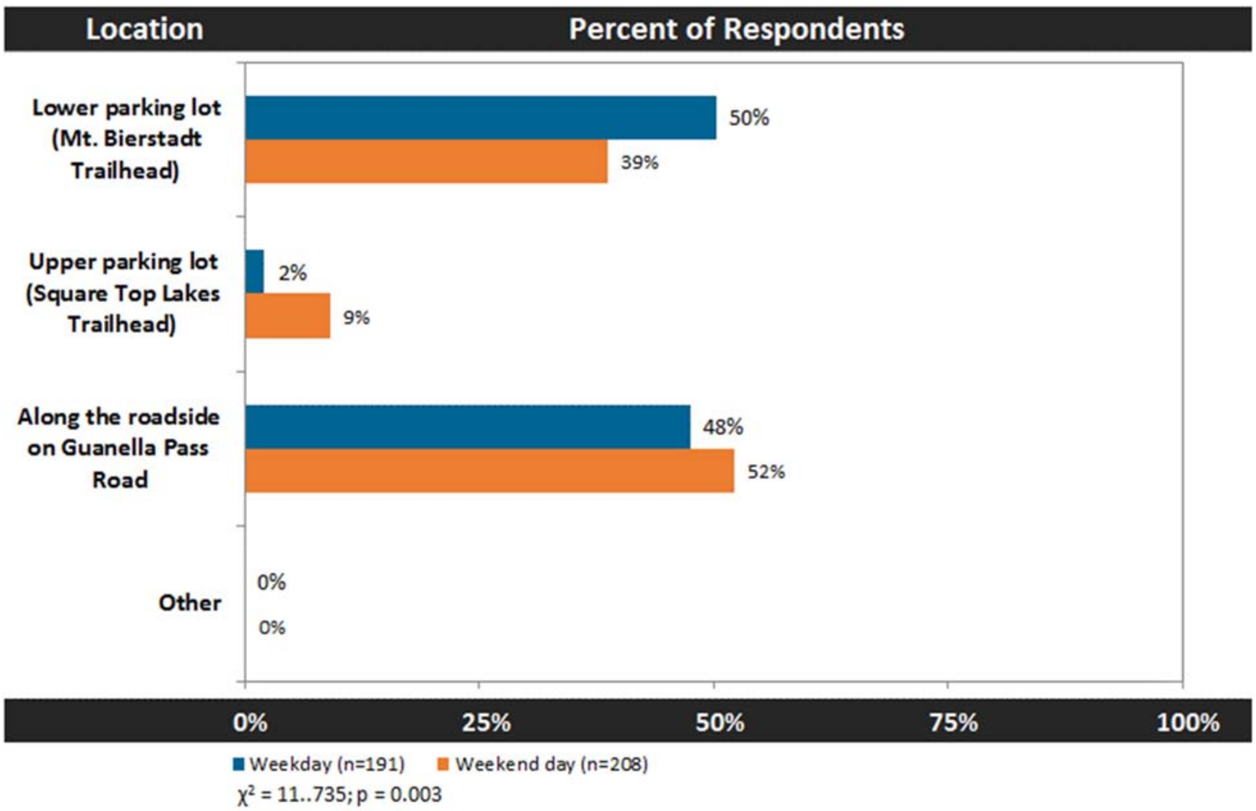


Figure 2-46. Where did you park on this trip to Guanella Pass?

- Visitors on weekend days (28%) were less likely to agree than those on weekdays (43%) that where they parked at Guanella Pass was "uncongested" (χ^2=11.519, p=0.021). In other words, about three-quarters (72%) of visitors on weekend days and more than half (57%) on weekdays thought that where they parked was congested.
- Visitors' perceptions of their parking locations did not vary significantly between weekdays and weekend days on any other factors included in the questionnaire. Visitors generally felt like where they parked was safe (87%), convenient (91%), easy to find (94%), and well-marked (67%).
- However, visitors' perceptions of their parking locations did vary significantly, depending on where they parked at Guanella Pass. These findings are described in detail below.

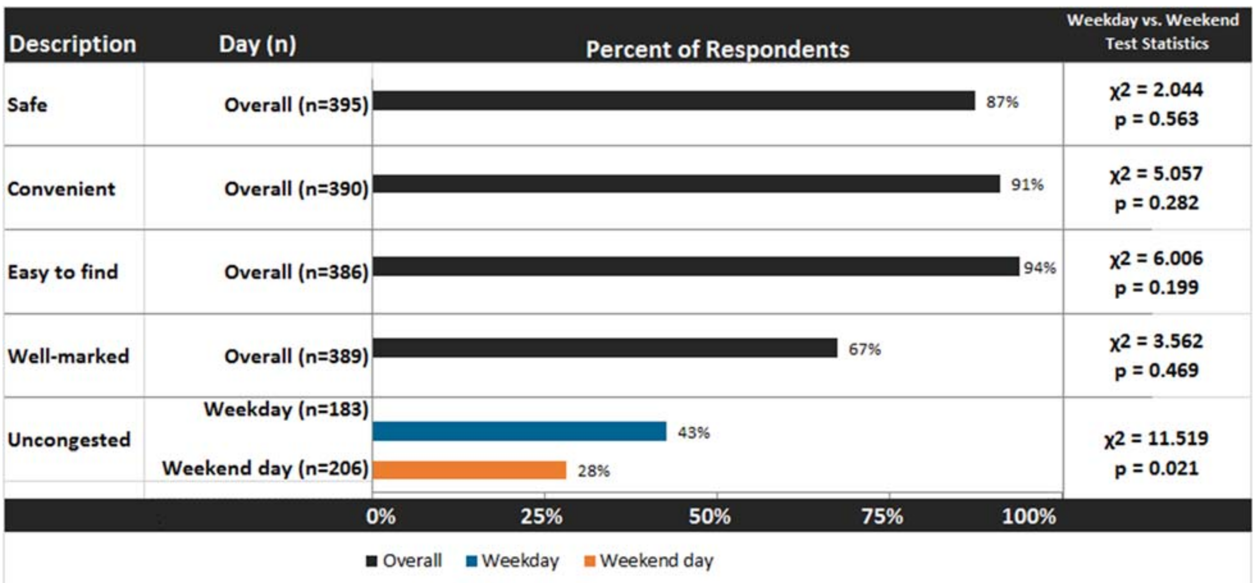


Figure 2-47. Percentage who agree with each of the descriptions of where they parked at Guanella Pass on the day they took the survey.

- Visitors’ perceptions of their parking locations did vary significantly, depending on where they parked at Guanella Pass (p<0.001 for all tests).
- Visitors who parked in parking lots were significantly more likely to think their parking locations were safe, convenient, easy to find, well-marked, and uncongested.
- While very few (2%) visitors who parked in a designated lot thought where they parked was unsafe, nearly one-quarter (23%) of visitors who parked along the roadside thought where they parked was unsafe.
- More than three-quarters (78%) of visitors who parked along the roadside thought where they parked was congested.

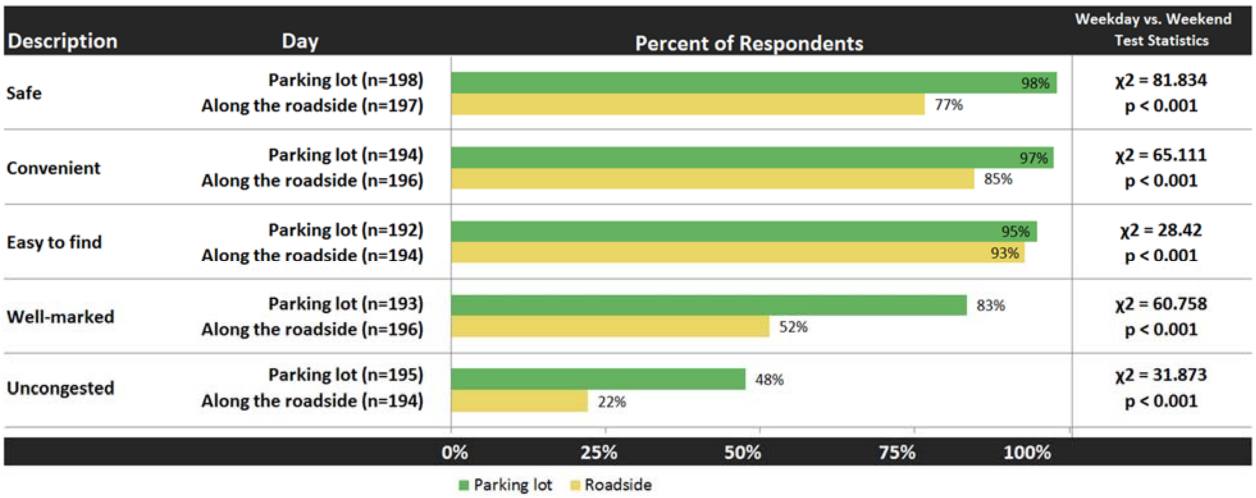


Figure 2-48. Percentage, by parking location, who agree with each of the descriptions of where they parked at Guanella Pass on the day they took the survey.

- Weekday visitors' perceptions of parking congestion at Guanella Pass differed significantly from those of visitors on weekend days (χ^2=28.052, p<0.001; t=-4.868, p<0.001).
- Three-quarters (75%) of visitors on weekend days thought that parking congestion at Guanella Pass was moderate to extreme. Very few (8%) weekend visitors thought there was no parking congestion at all.
- While weekday visitors were less likely than weekend visitors to report that there was parking congestion at Guanella Pass, more than half (58%) thought that parking congestion was moderate to severe.

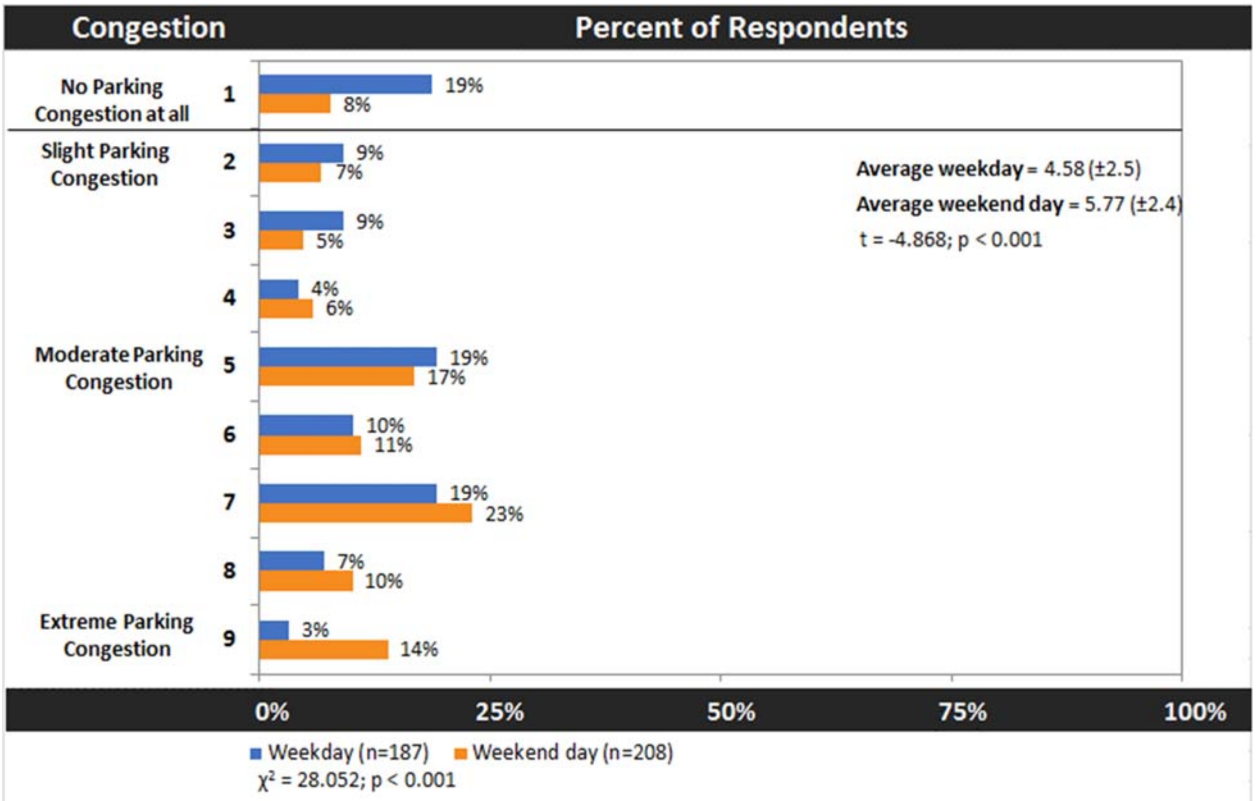


Figure 2-49. How much parking congestion do you think there was when you parked at Guanella Pass on this trip?

- Visitors were asked if they would be likely to park at a designated lot and take a 30 minute or 15 minute shuttle bus ride to Guanella Pass, if it was their only option to visit Guanella Pass in the future because parking lots were full. Visitors' responses to the questions did not vary significantly between weekdays and weekend days for the 30 minute (χ^2=0.018, p=0.892) or 15 minute (χ^2=3.237, p=0.070) shuttle bus ride.
- Close to two-thirds (59%) of visitors said they would probably choose not to visit Guanella Pass if they had to park at a designated lot in town and take a 30 minute shuttle bus ride to Guanella Pass.
- A substantial majority (68%) of visitors said they would be likely to visit Guanella Pass, even if they had to park at a designated lot on Guanella Pass Road and take a 15 minutes shuttle bus ride to GP.
- Responses to these questions did not vary statistically or substantively based on where visitors parked on the day they were contacted for the survey (i.e., in a designated lot or along the roadside at Guanella Pass).

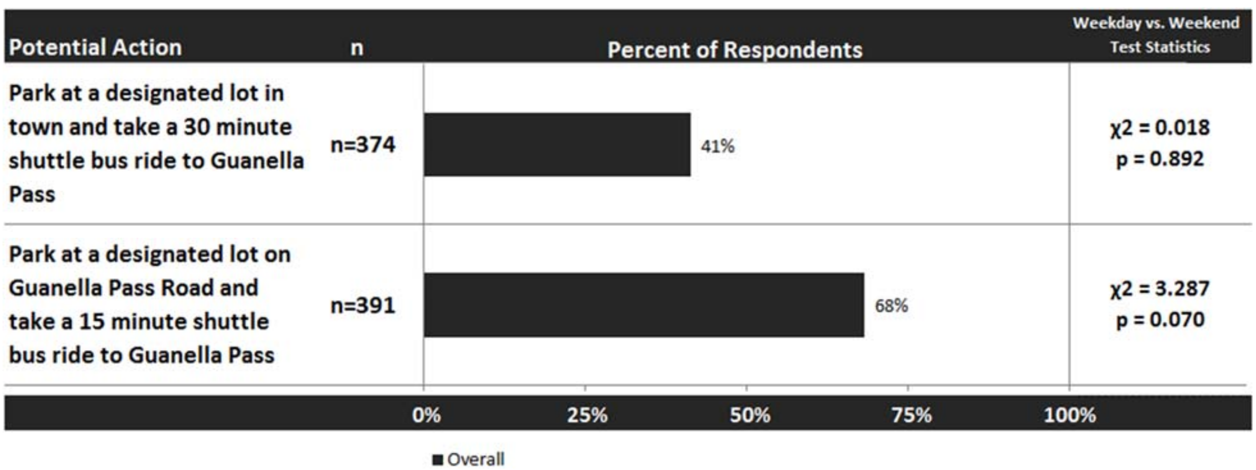


Figure 2-50. Percentage who would be likely to visit Guanella Pass on a future trip, even if this was their only option for visiting because parking lots were full.

- Visitors' attitudes about potential parking management actions at Guanella Pass did not vary significantly between weekdays and weekend days (*p*>0.05 for all tests).
- More than two-thirds (69%) of visitors agreed that when parking lots at Guanella Pass are full, visitors should be allowed to park wherever they can, including on the roadside. The support for this option may be due, in part, to the fact that half of all respondents parked on the roadside at Guanella Pass on the day they were contacted for the survey. In fact, virtually all of those visitors who parked along the roadside (93%) agreed that visitors should continue to be allowed to park along the roadside in the future, when parking lots are full.
- At the same time, half (50%) of visitors also agreed that when parking lots are full at Guanella Pass, visitors should be directed to park at a designated overflow lot on Guanella Pass Road and take a 30 minute shuttle bus ride to Guanella Pass.
- Relatively few (15%) visitors agreed that people should be directed away from Guanella Pass to other recreation areas when parking lots at Guanella Pass are full.

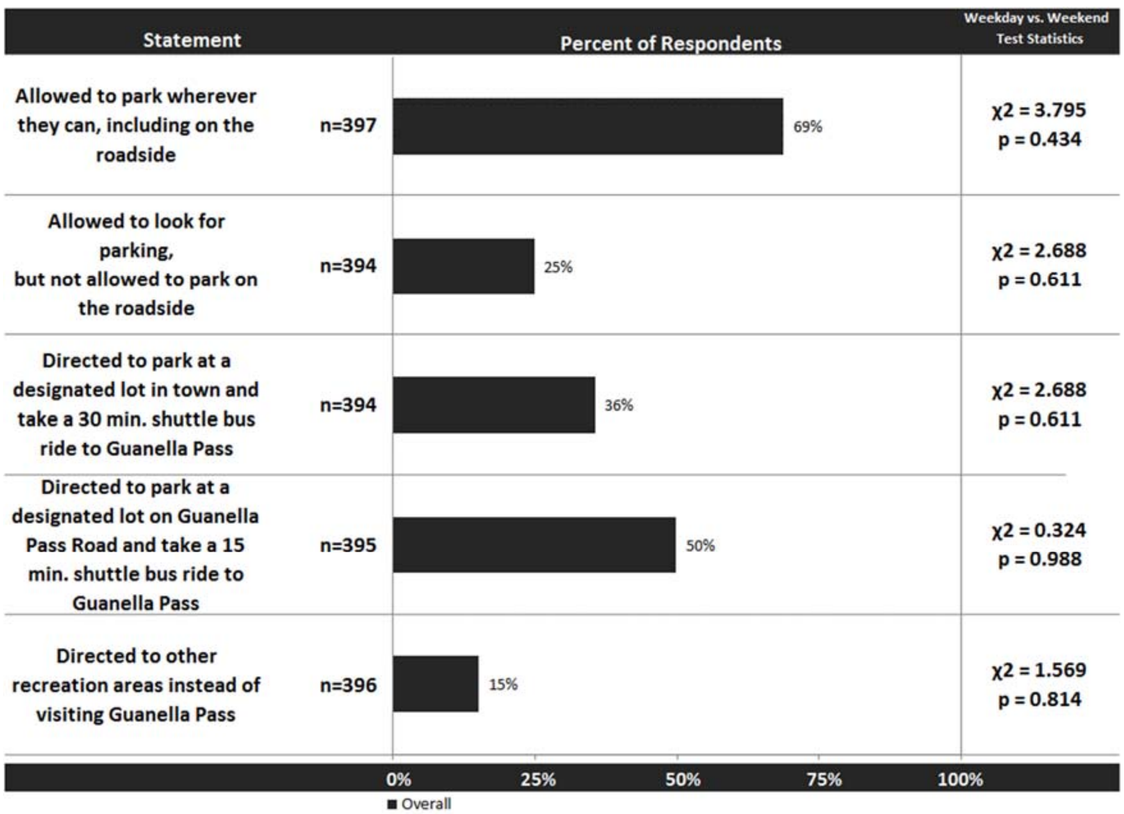


Figure 2-51. Percentage who agree with each of the statements about potential actions when parking lots are full at Guanella Pass.

Planning Your Trip to Guanella Pass

- The time frame in which visitors planned their trips to Guanella Pass did not vary significantly between weekdays and weekend days (χ^2=4.541, p=0.338).
- Regardless of the day of week, nearly three-quarters (71%) of visitors planned their trips to Guanella Pass either the day before they visited or within a week prior to visiting, and more than one-third (36%) planned their visits within the last 24 hours.

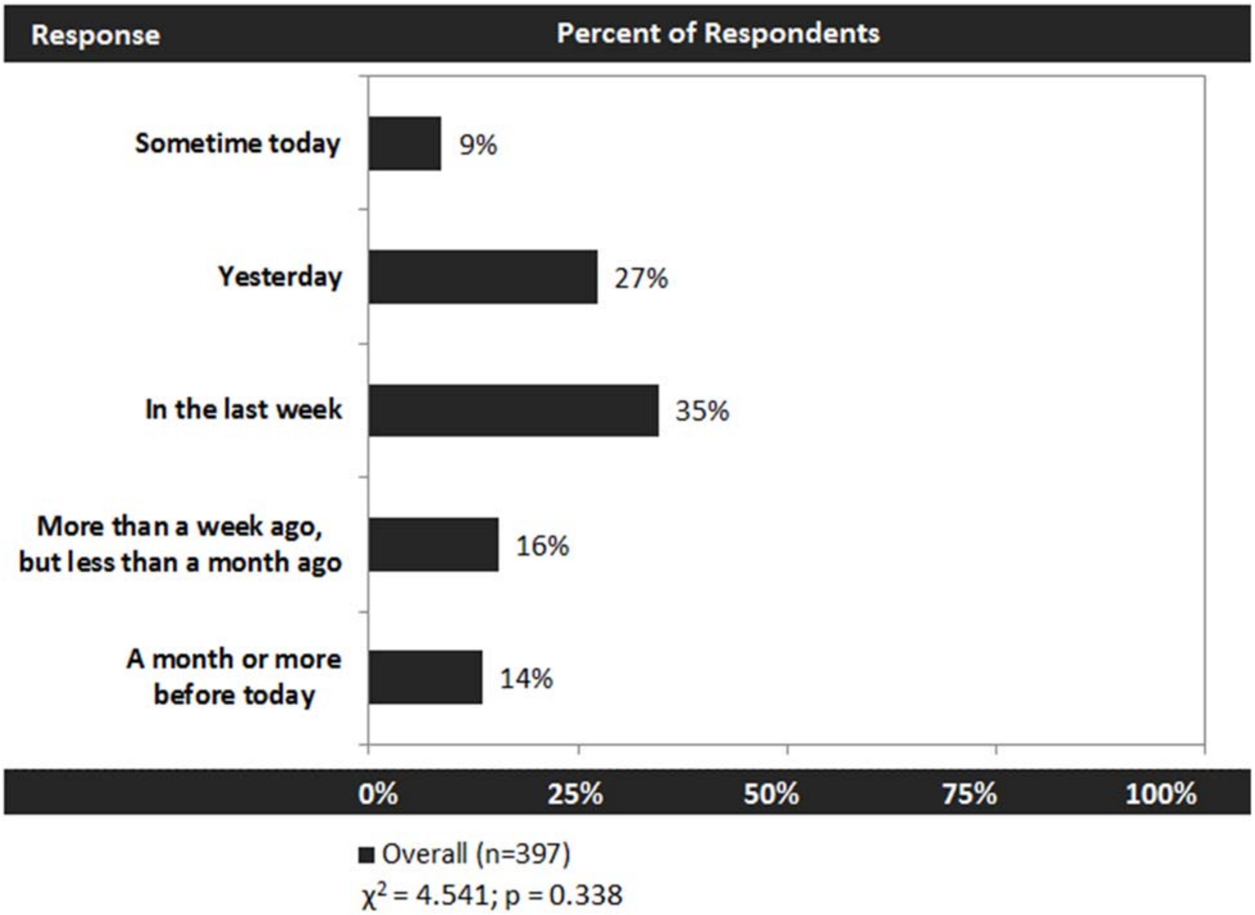


Figure 2-52. How long ago did you decide to take this trip to Guanella Pass?

- Significantly more weekend visitors (39%) than weekday visitors (26%) anticipated that it would be difficult to find parking at Guanella Pass (χ^2=7.618, p=0.006).
- However, the majority of visitors on both weekend days (74%) and weekdays (61%) did not anticipate that it would be difficult to find parking at Guanella Pass when they planned their trip.

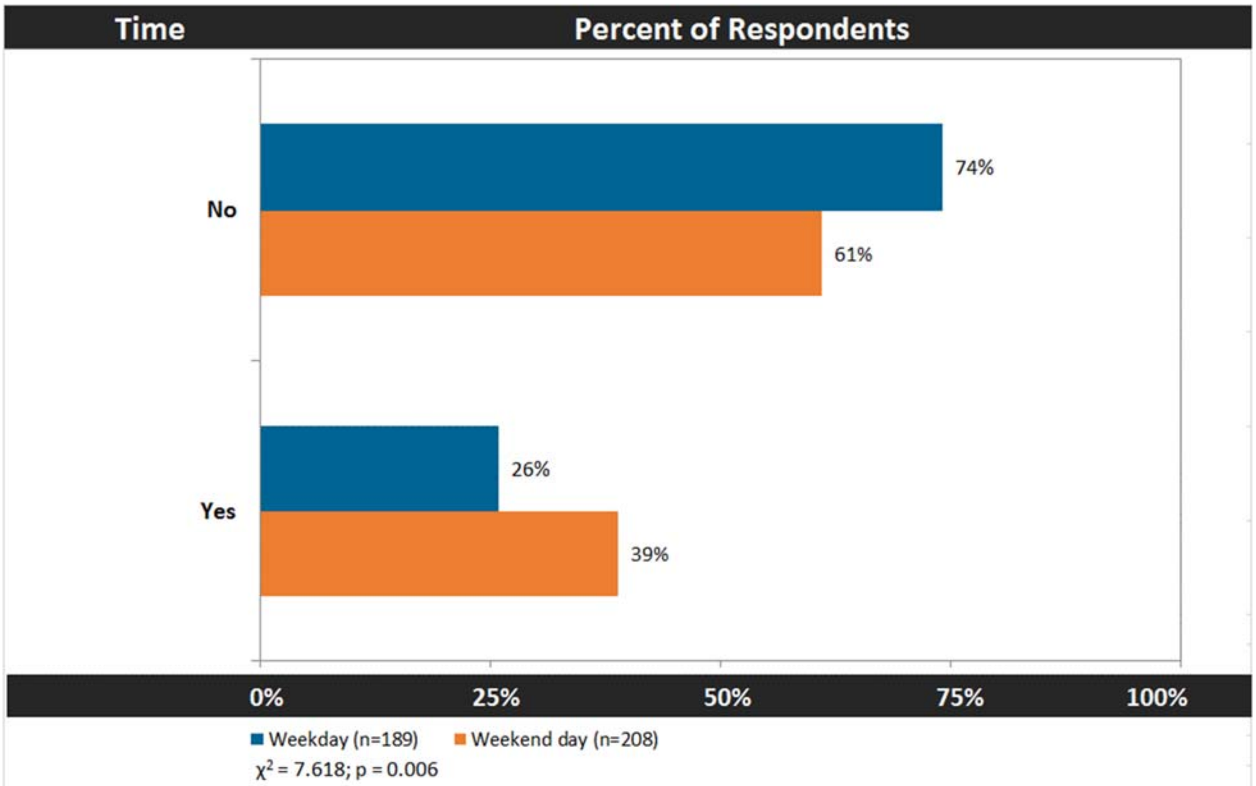


Figure 2-53. When you planned this trip to Guanella Pass, did you think about the possibility that it might be difficult to find parking here?

- For visitors who thought about the possibility that it might be difficult to find parking at Guanella Pass, a follow-up question asked how that affected their trip plans.
- Weekday visitors (47%) were much more likely than weekend day visitors (4%) to plan their visit to Guanella Pass for a day of the week that they thought would be less crowded (χ^2=35.221, p<0.001).
- Weekday and weekend day visitors did not differ significantly in their responses to any of the other statements included in this question.
- Of note, half (50%) of all visitors who thought about the possibility of parking congestion, visited at a time of day they thought would be less crowded, regardless of the day of week.

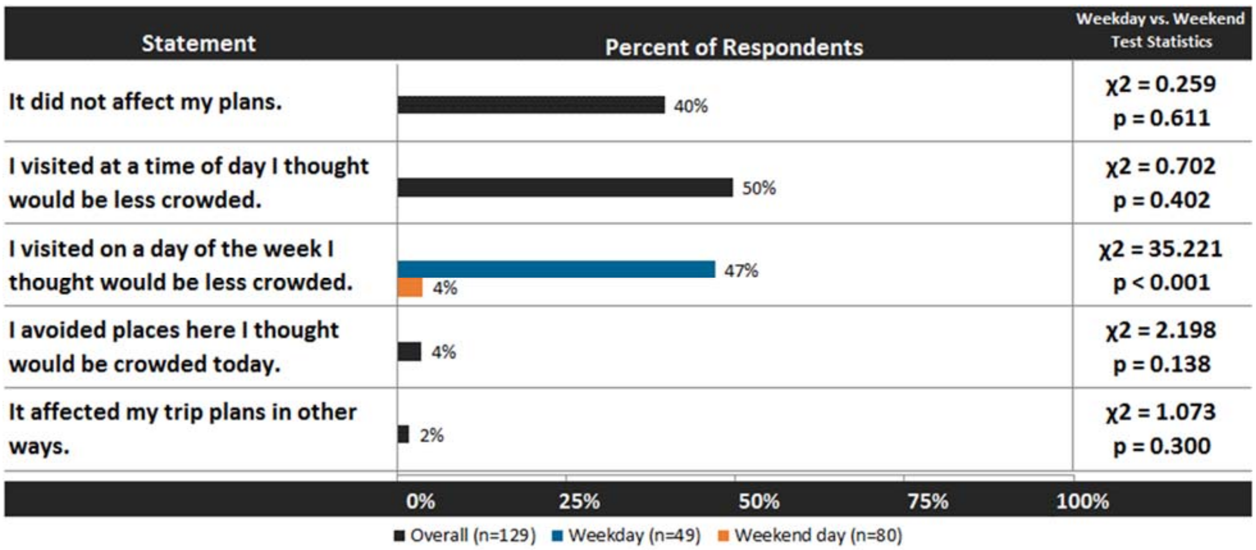


Figure 2-54. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to Guanella Pass, how did it affect your trip plans?

- Visitors were asked how likely they would be to use each of several sources of information about parking and crowding conditions at Guanella Pass, if it was available for planning a future trip to Guanella Pass. Responses to the question did not vary significantly between weekday and weekend day visitor groups.
- The vast majority (88%) of visitors indicated they'd be likely to use a website for information about parking and crowding at Guanella Pass when planning a future trip.
- A smartphone app ranked second among the information sources, with two-thirds (67%) of visitors indicating they'd be likely to use one to plan a future trip to Guanella Pass.
- About one-third of visitors indicated they'd be likely to use social media (35%), text updates on a cellular phone/smartphone (36%), and a tourist information center (34%) for information about parking and crowding at Guanella Pass.
- Fewer visitors thought they'd be likely to use a telephone information line (25% to 28%) or AM radio station (i.e., highway advisory radio; 15%).
- A verbatim list (including respondents' typos) of "other" information sources reported by respondents is included as an appendix item.

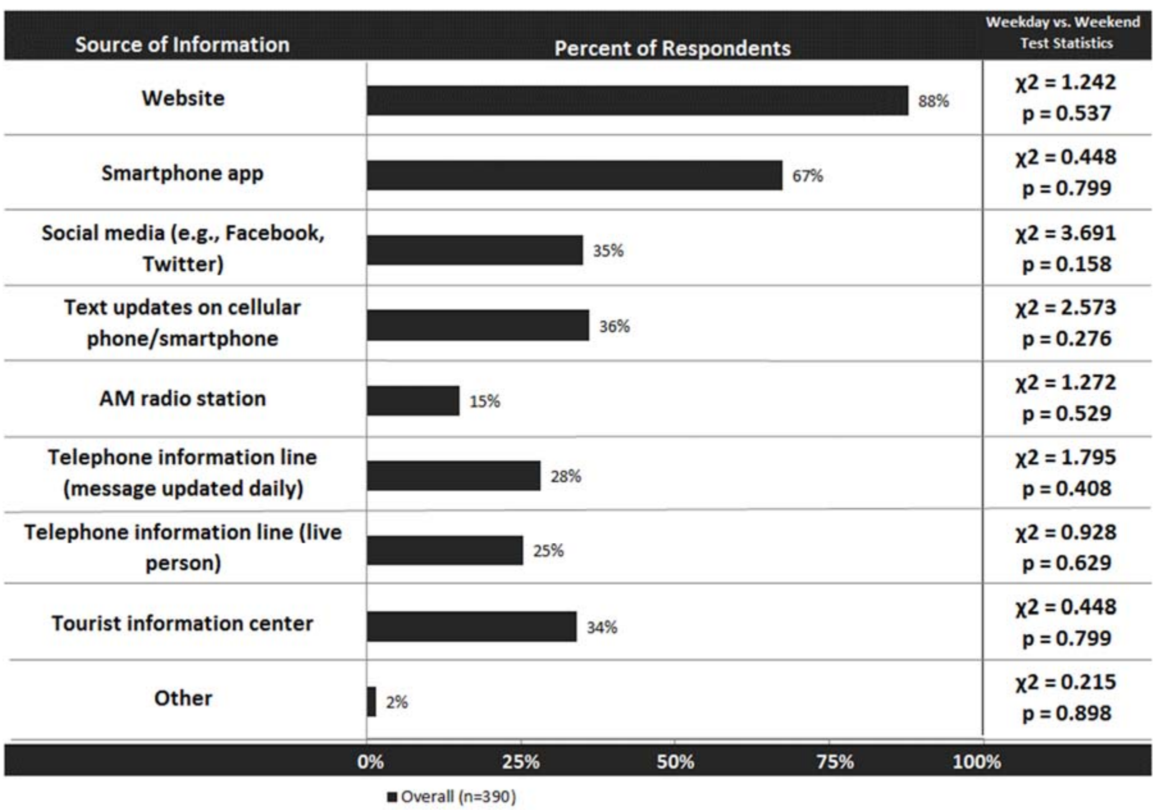


Figure 2-55. Percentage who would be likely to use each of the sources for information about parking and crowding conditions at Guanella Pass, if it was available for planning a future trip to Guanella Pass.

Background Information

- There were no significant differences in the gender of visitors on weekdays and weekend days (χ^2=1.567, p=0.211).
- Nearly two-thirds (66%) of visitors were male; approximately one-third (34%) were female.

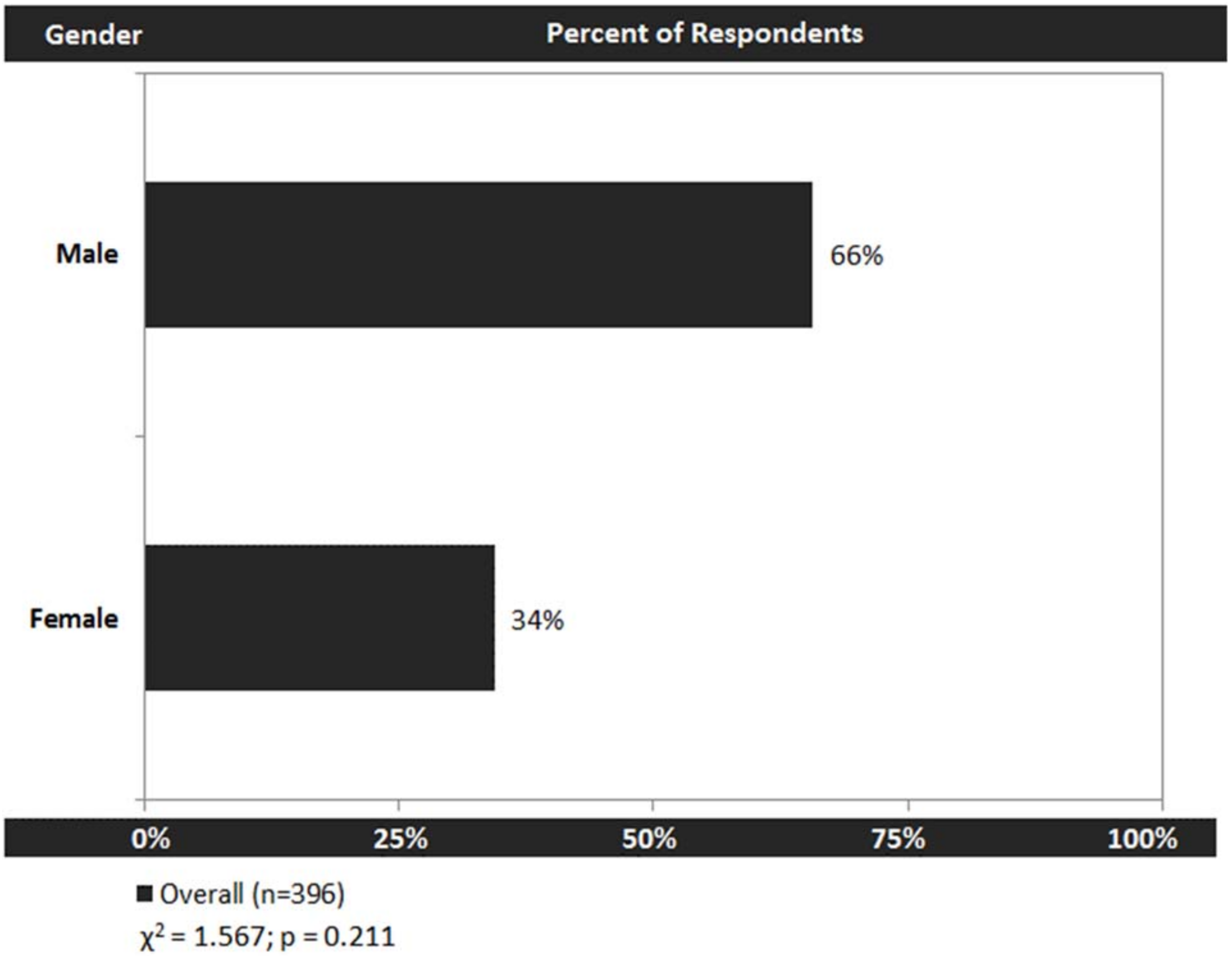


Figure 2-56. What is your gender?

- On average, visitors contacted on weekdays (mean = 40 years of age) were slightly older than those contacted on weekend days (mean = 36 years of age; t=2.778, p=0.006).
- Weekday visitors (41%) were much more likely than weekend day visitors (26%) to be 45 years of age or older (χ^2=12.039, p=0.034).
- About one-third of visitors on weekend days (34%) and weekdays (31%) were between 25 and 34 years of age, and a majority (73% on weekend days and 58% on weekdays) were between 18 and 44 years of age.

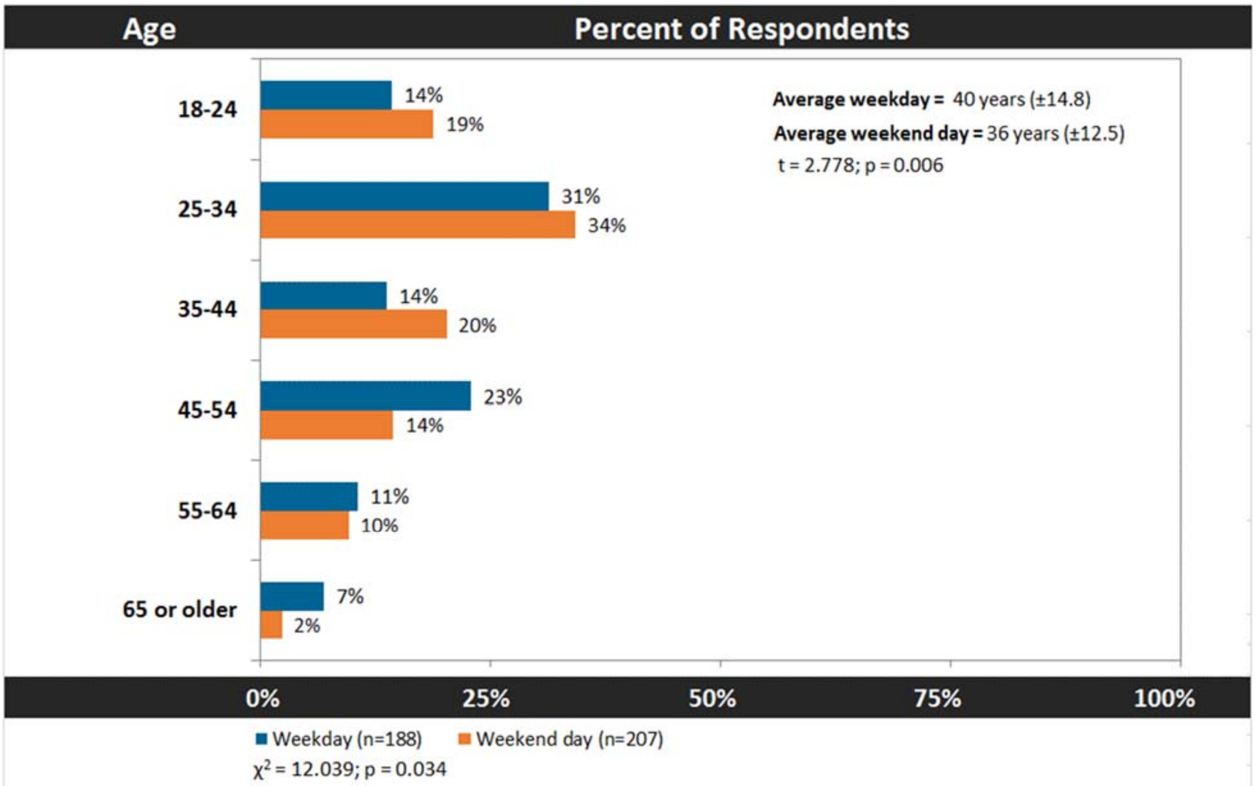


Figure 2-57. In what year were you born?

- Visitors were overwhelming (99%) residents of the United States, regardless of the day of the week when they visited GP (χ^2=3.312, p=0.063).
- A frequency distribution of all countries of residence reported by respondents is included as an appendix item.

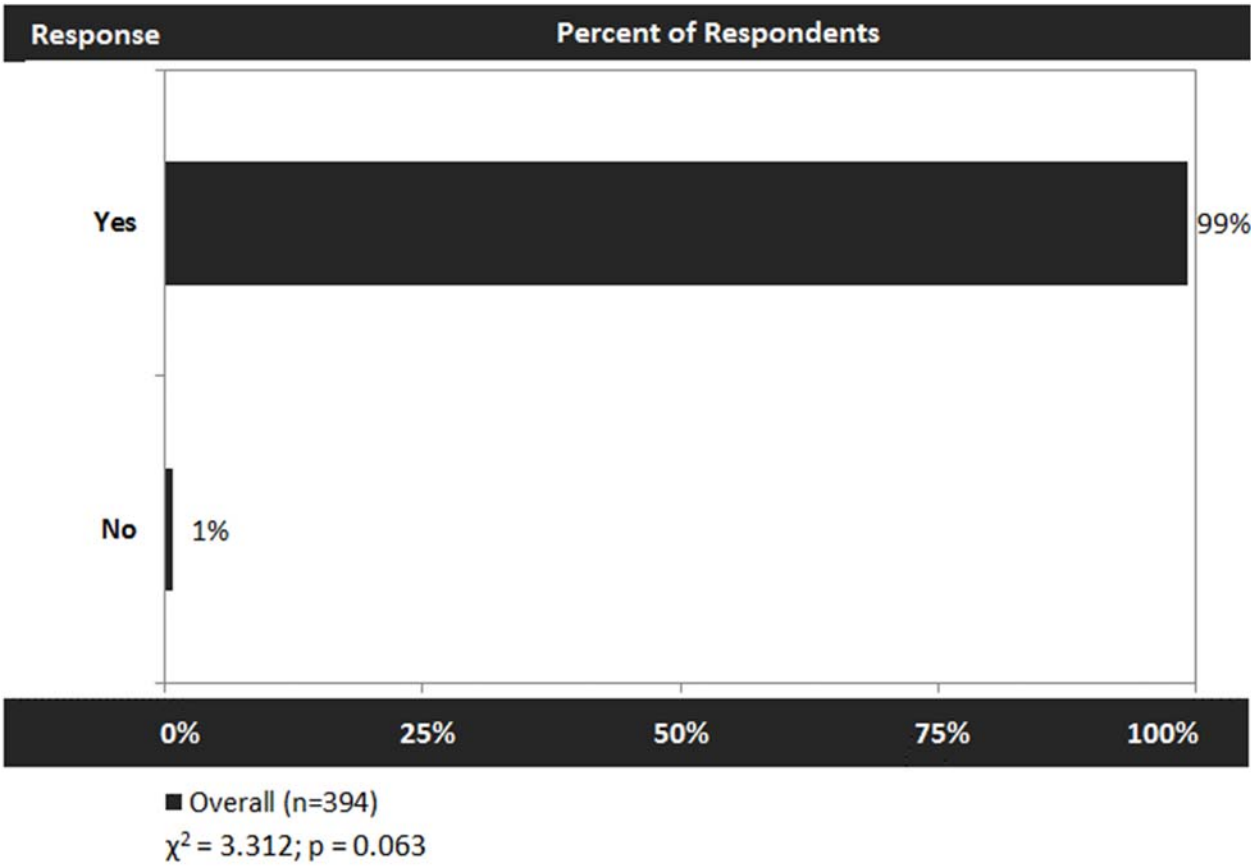


Figure 2-58. Do you live in the United States?

- Visitors' state of residence varied significantly between weekdays and weekend days (χ^2=15.588, p<0.001).
- The vast majority (84%) of visitors on weekend days were residents of Colorado and few (16%) were residents of other states.
- A majority (66%) of weekday visitors were residents of Colorado, but a substantial proportion (34%) were from other states.
- A frequency distribution of all states of residence reported by respondents is included in Appendix Q.

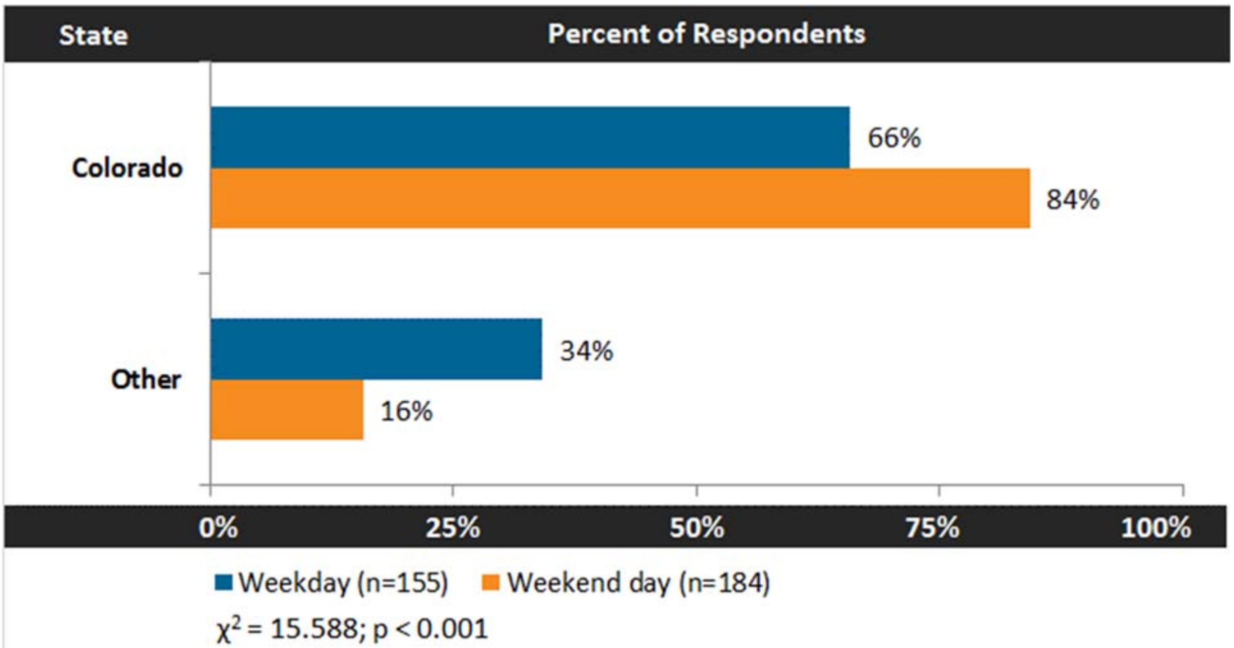


Figure 2-59. If you live in the United States, what state do you live in?

- Among Colorado residents at Guanella Pass, visitors' city of residence did not vary between weekdays and weekend days (χ^2=1.371, p<0.849).
- Among Colorado residents at Guanella Pass, the greatest proportion (70%) lives in the greater Denver area.
- The majority of Colorado respondents live on the Front Range.
- A frequency distribution of all zip codes reported by respondents who are residents of Colorado is included as an appendix item.

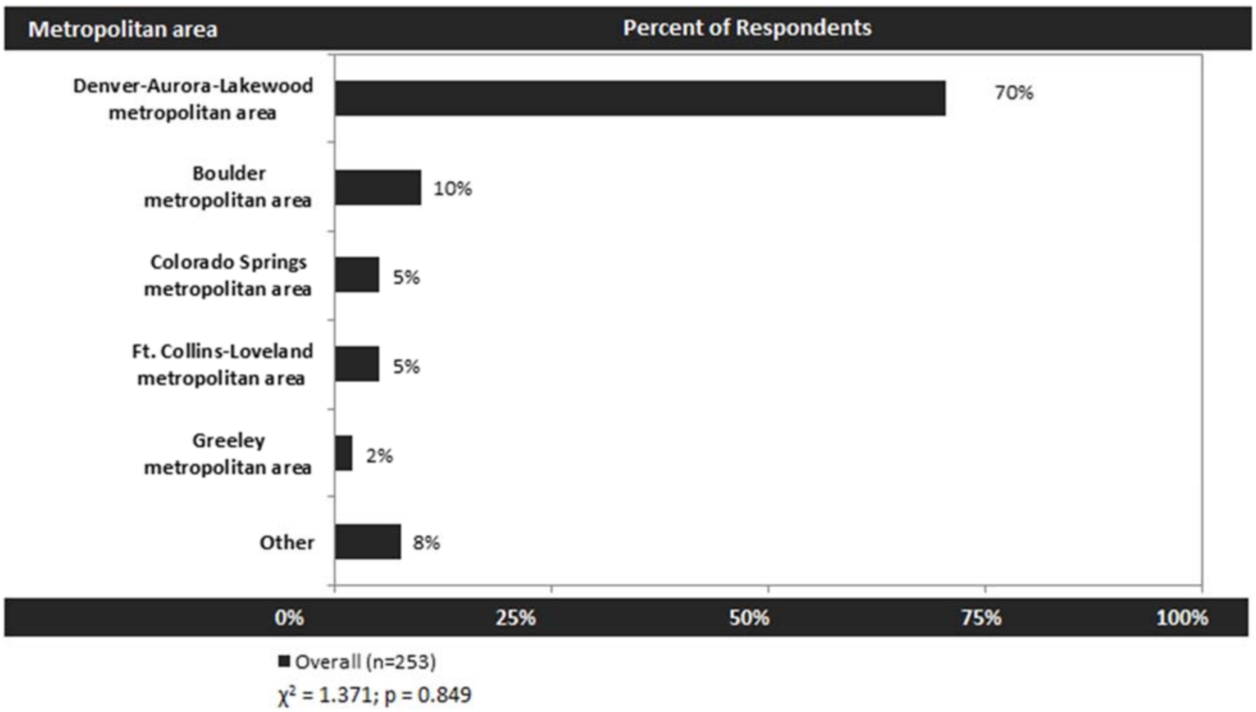


Figure 2-60. If you live in Colorado, what town or city do you live in?

- The education level of visitors did not vary significantly between weekdays and weekend days (χ^2=3.193, p<0.670).
- Regardless of the day of week, the vast majority (82%) of visitors has earned a college, business or trade school degree or higher; this includes about one-third (34%) of visitors who have earned a master's, doctoral, or professional degree.

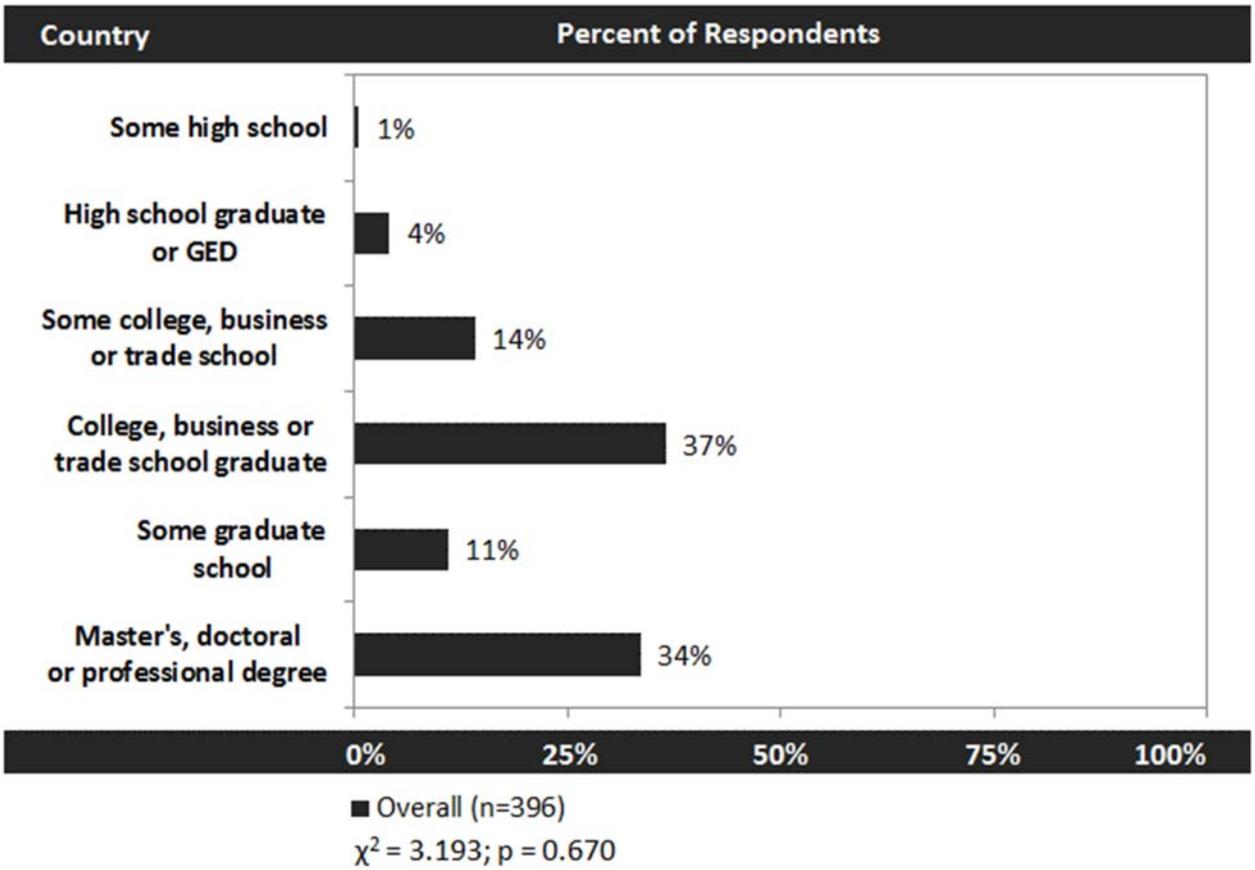


Figure 2-61. What is the highest level of formal education you have completed?

- Very few (5%) visitors reported being Hispanic or Latino, regardless of the day of the week when they visited Guanella Pass (χ^2=1.567, p<0.211).

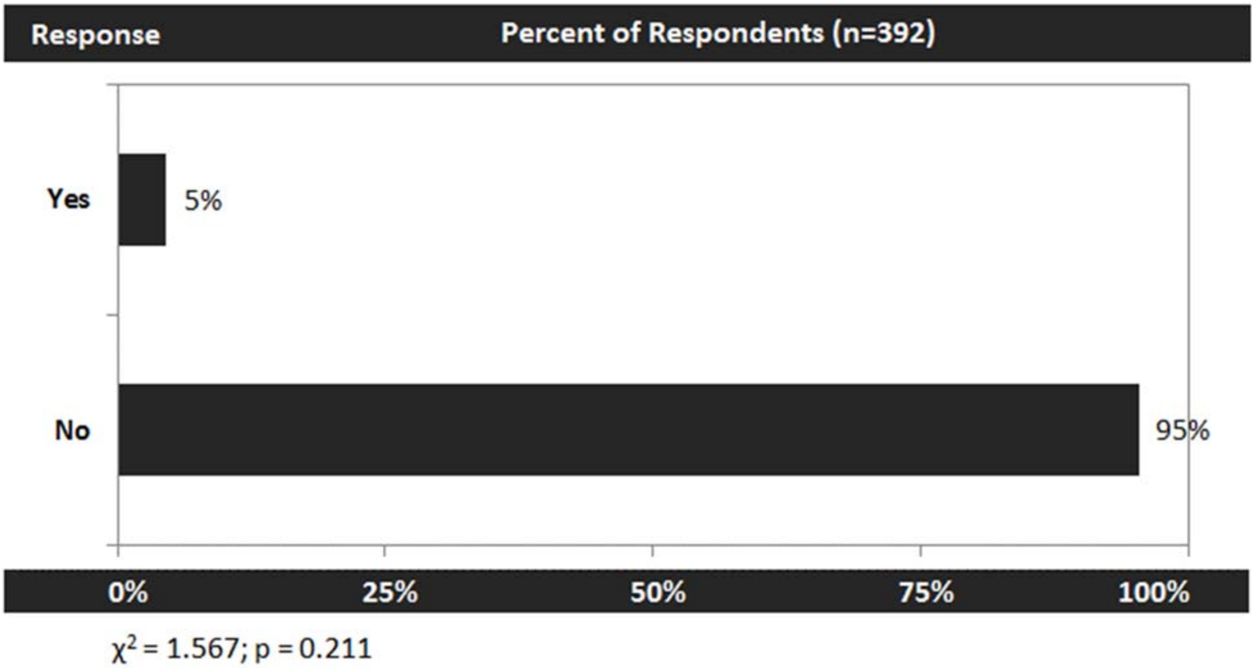


Figure 2-62. Are you Hispanic or Latino?

- Visitors’ self-reported race did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, the vast majority (95%) of visitors reported their race as white.

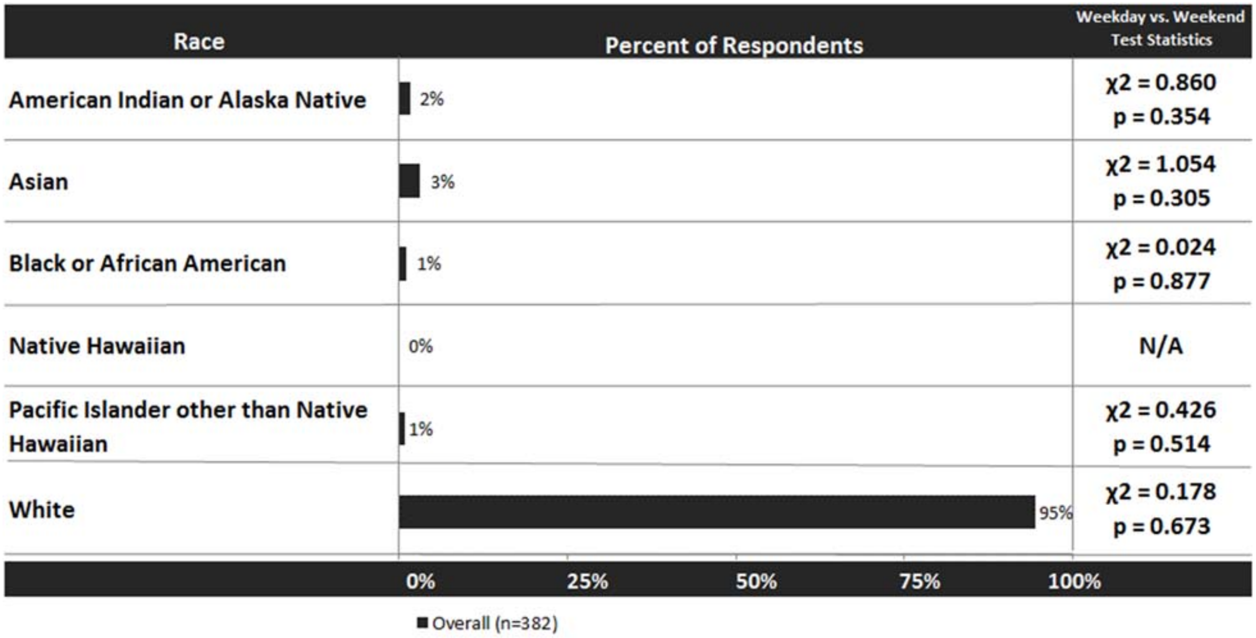


Figure 2-63. What is your race?

Chapter 3: Mount Evans Recreation Area Summary of Data Findings

Mount Evans Recreation Area Transportation and Visitor Use, Summer 2012

During summer 2012, RSG and Colorado State University (CSU) conducted a field study and data collection effort in MERA. The purpose of the study was to collect transportation and visitor use data during the area's peak summer visitation period, from June 23rd through September 3rd. The following data were collected in MERA during summer 2012:

- Vehicle traffic volumes and bicyclist counts
- Parking accumulation and turnover rates in the designated lots and on the nearby roadside at Mount Goliath, Summit Lake, and the Mount Evans summit
- Visitor use counts on selected trails in MERA
- GPS-based tracking of visitor use patterns in the study area
- People at one time (PAOT) counts on the summit of Mount Evans.

This section of *Chapter 3: Mount Evans Recreation Area Summary of Data and Findings* provides a summary of the summer 2012 data collection effort in MERA and results. This section is organized into subsections that describe the data collection methods and statistical results for each of the types of data collected.

Vehicle Traffic Volumes and Bicyclist Counts

Data Collection Method

- Vehicle traffic data were recorded with an Automatic Traffic Recorder (ATR) on the Mount Evans Highway, southeast of the MERA Welcome Station (see Figure 3-1 and Figure 3-2).
- The ATR recorded inbound and outbound vehicle traffic counts in hourly bins, 24 hours per day from May 25th, 2012 through September 3rd, 2012.
- Field staff conducted counts of the number of bicyclists on the Mount Evans Highway via direct observation at the ATR location. The counts of inbound and outbound bicyclists were conducted from 7:00 AM to 3:00 PM on one weekday and one weekend day during the summer 2012 season.

Figure 3-1. ATR location, MERA summer 2012.

- Due to the high degree of accuracy and precision of the ATR's used in the study, it was not necessary to calibrate the vehicle traffic count data with direct observation counts.

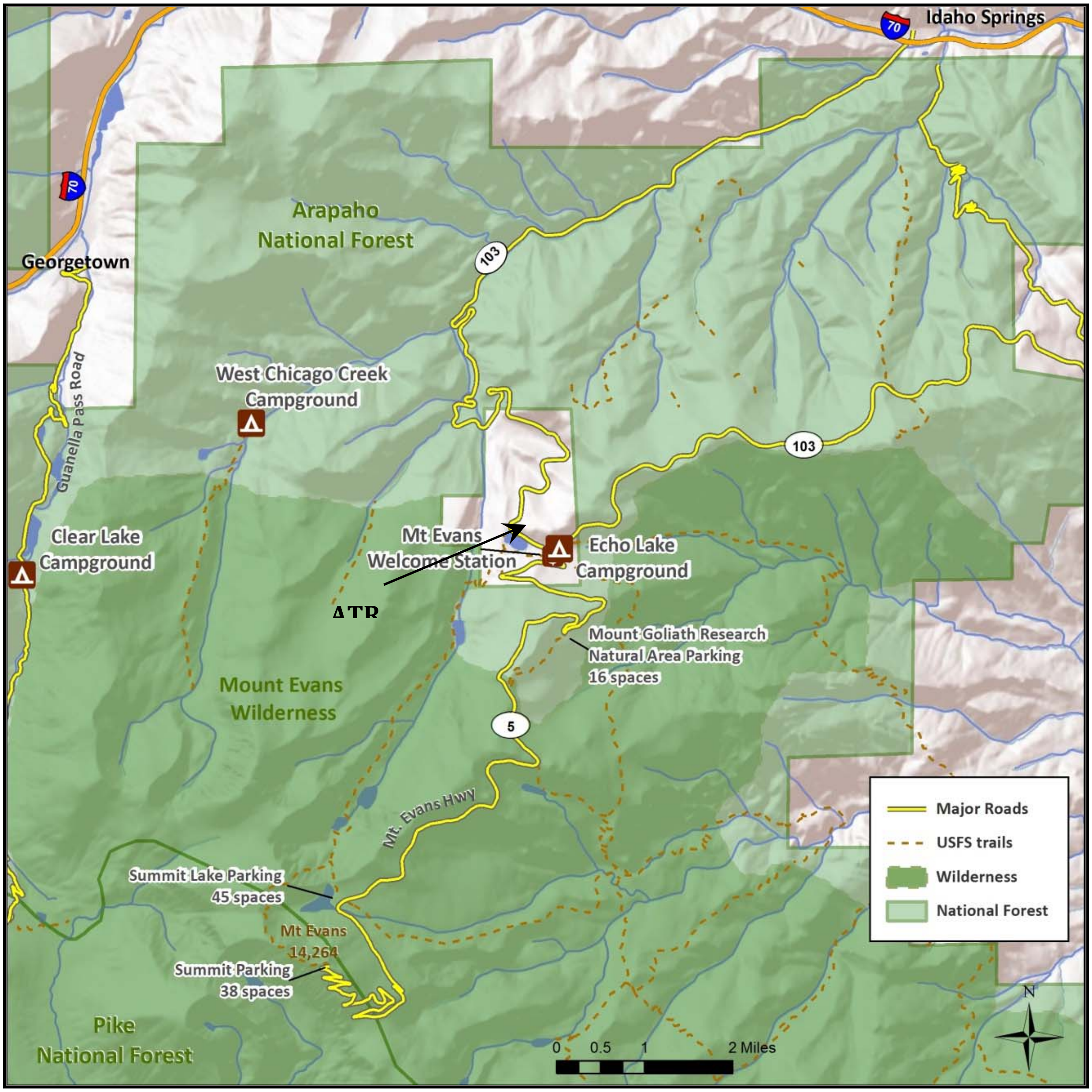


Figure 3-2. Approximate location of ATR, Mount Evans summer 2012.

Analysis and Results

The daily inbound vehicle traffic volumes are reported in Figure 3-3, by date from May 25th, 2012 to September 3rd, 2012; the red bars in the figure highlight days when parking accumulation and turnover data were collected in MERA.

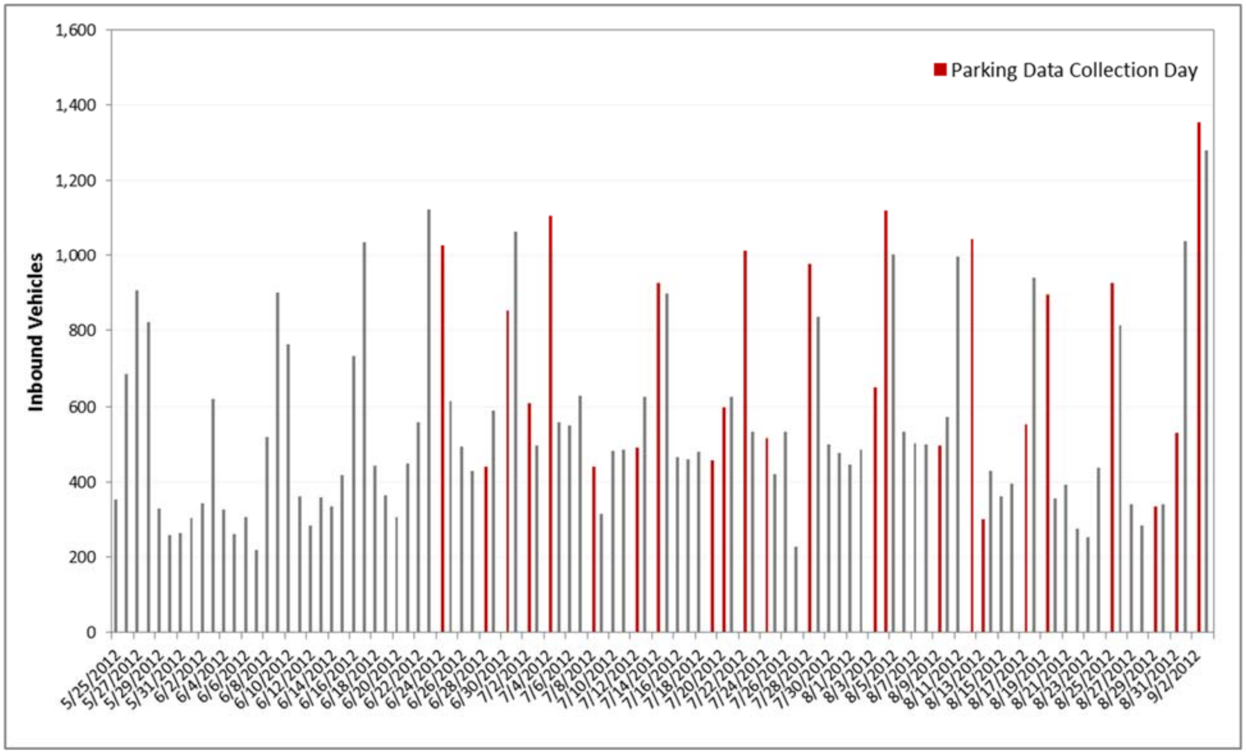


Figure 3-3. Daily inbound vehicle traffic volumes on Mount Evans Highway, by date, summer 2012.

The inbound vehicle traffic volume data were used to help identify a "design day" for analysis and planning that represents a "typically busy" day in MERA during the summer visitor use season. In particular, the inbound vehicle traffic volumes were organized in descending order, from the busiest day (September 2, 2012) to the least busy day (June 7, 2012) of the study period (Figure 3-4). Potential design day levels are depicted with horizontal lines positioned in Figure 3-4 at the 85th, 90th, and 95th percentile days of inbound vehicle traffic during the study period.

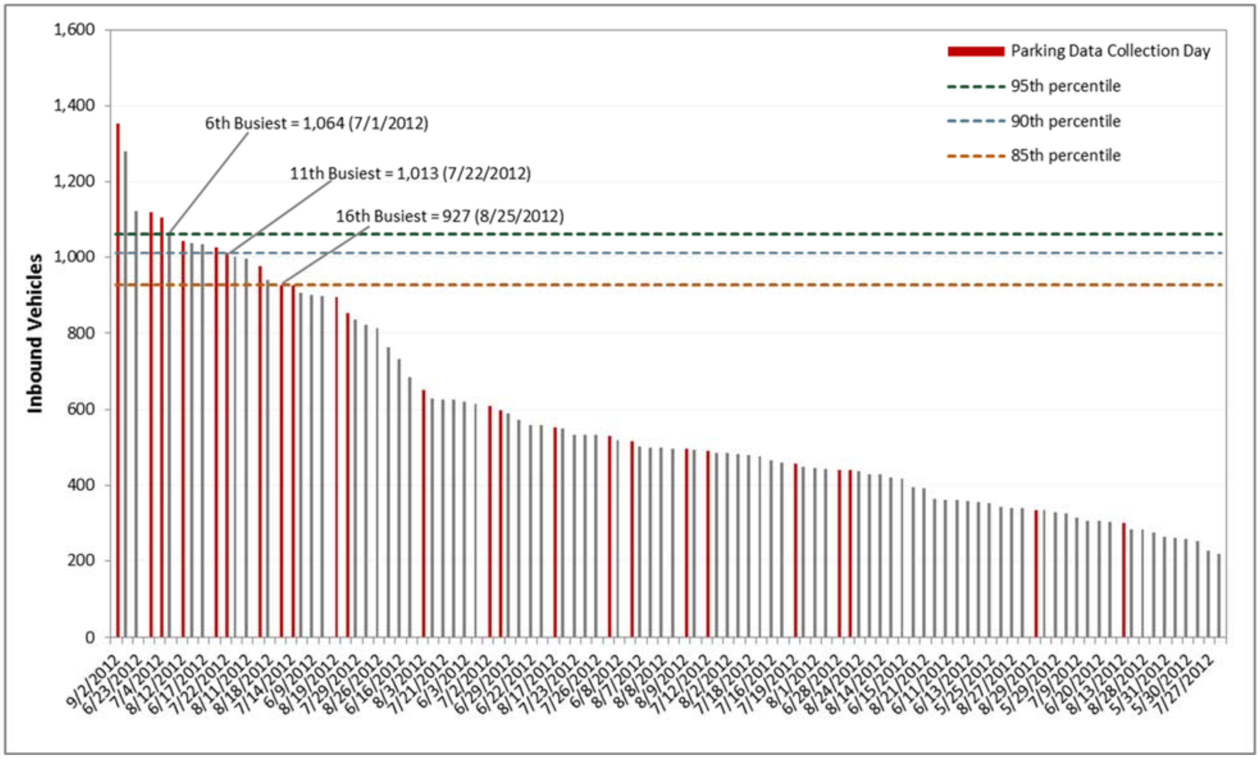


Figure 3-4. Daily inbound vehicle traffic volumes on Mount Evans Highway, in descending order, summer 2012.

Commonly, the 85th percentile day is used for "conventional" transportation planning and engineering. If the 85th percentile day were selected as the design day, on average, less than 15% of the days during a "typical summer visitor use season" would exceed what was planned for under the design day. The 85th percentile day is arguably less suitable, however, for transportation planning in parks and recreation areas, because visitor use tends to be temporally concentrated. To further inform the selection of a design day to represent a typically busy summer visitor use day in MERA, estimates of the percentage of summer season visitors that would visit MERA on days when visitor use, traffic, and parking conditions exceeded design day levels, based on using the 85th, 90th, 95th, and 99th percentile days of vehicle traffic volumes as the design day were calculated (Table 3-1). For all four design day levels considered, 100% of the days above the design day level of visitor use were weekend days or holidays.

Table 3-1. Estimated percent of MERA summer season visitors that would experience visitor use, traffic, and parking conditions in excess of design day conditions.

Day Rank	Potential Design Day	Use Level	% of Visitors	Date
2nd Busiest Day	99th Percentile	3,709	2%	9/3/2012
6th Busiest Day	95th Percentile	3,086	10%	7/1/2012
11th Busiest Day	90th Percentile	2,938	19%	7/22/2012
16th Busiest Day	85th Percentile	2,688	27%	8/25/2012

Using standards developed in consultation with USFS and FHWA to assess the results in Table 3-1, it was concluded that the 85th percentile day of vehicle traffic volumes would result in too large a proportion of summer season visitors to experience conditions beyond those planned for in the feasibility study (27%). It was concluded that the 90th percentile day of vehicle traffic would allow for a more acceptable proportion of Mount Evans summer season visitors (81%) to experience visitor use, traffic, and parking conditions at or below design day levels.

Thus, the 11th busiest day of the study period (July 22nd, 2012) was selected as the MERA Summer Visitor Use Season Design Day for analysis and planning in this project. As described, this decision was informed and substantiated by the Mount Evans vehicle traffic volume, group size, and parking data collected by RSG during the 2012 summer visitor use season. The design day is used as a reference point for analyzing most of the transportation and visitor use data collected at Mount Evans during the 2012 summer visitor use season.

Arriving and departing vehicles on the Mount Evans Highway in MERA on the design day are displayed in Figure 3-5. The arriving and departing vehicle traffic data in Figure 3-5 suggest visitors begin arriving in MERA during the early morning hours; the number of arrivals grows sharply from 6:00 AM through the morning hours, and reaches its peak around noon. The traffic data in Figure 3-5 further suggest that visitors begin departing from MERA in substantive numbers beginning around 11:00 AM, and departures exceed arrivals from approximately 2:00 PM through the end of the day.

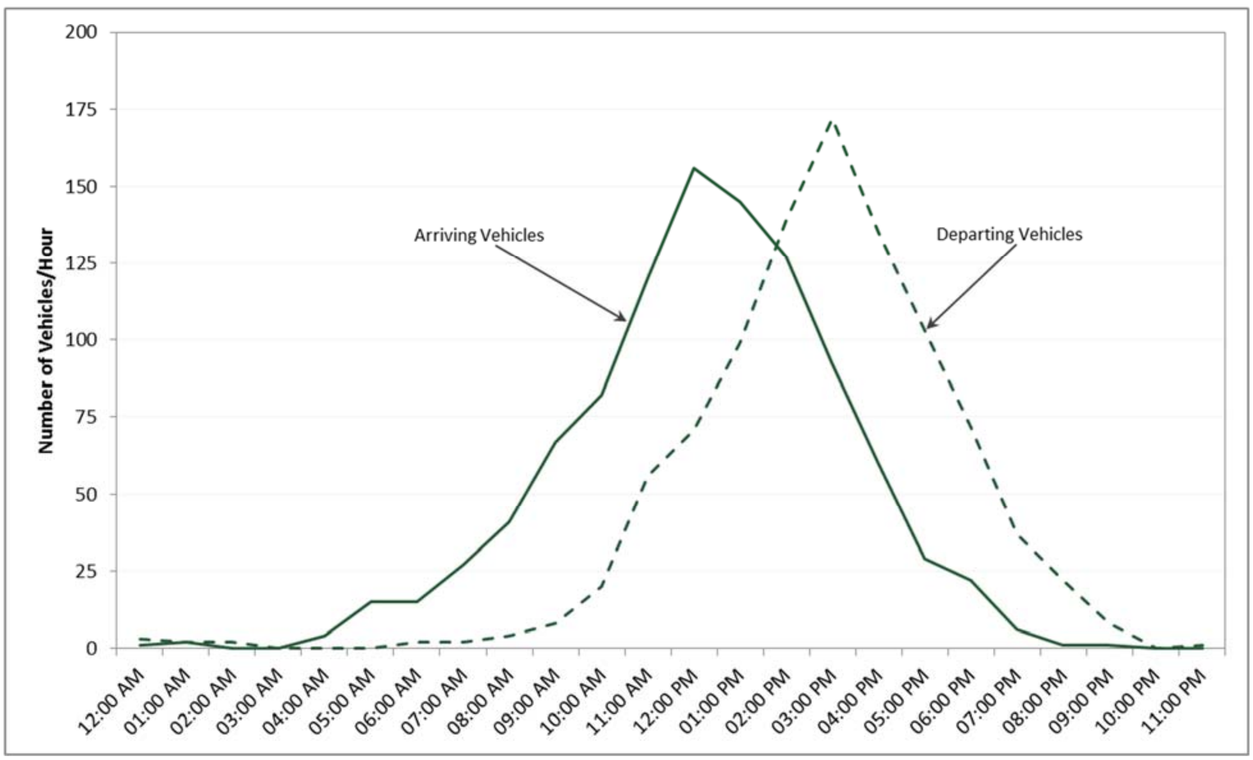


Figure 3-5. Design day vehicle traffic volumes on Mount Evans Highway, by hour and direction of travel, Sunday, July 22nd, 2012.

The ATR used in the study records the vehicle speed and Federal Highway Administration (FHWA) class of each vehicle that is detected by the counter. The average speed observed on the design day was approximately 21 mph on the section of road where the ATR was located, and the 85th percentile speed[5] (often used for traffic safety studies) was 26 mph. Nearly all of the vehicles observed on the design day were classified as passenger vehicles (92%), <1% were classified as motorcycles, 3% were classified as heavy trucks or buses, and 5 % were of unknown classification, under the FHWA Scheme F classification.[6]

Counts of the number of bicyclists entering and exiting MERA between the hours of 7:00 AM and 3:00 PM were conducted at the MERA Welcome Station on one weekend day (Saturday August 4th, 2012) and one weekday (Tuesday July 24th, 2012) during summer 2012 (Figure 3-6). A total of 15 bicycles were observed entering MERA during the weekday count, and 57 bicycles were observed entering MERA during the weekend day count. The weekend count of bicyclists was conducted on a day during which MERA vehicle traffic was similar to, but slightly higher than that on the design day (Figure 3-6). This suggests the weekend count of bicyclists is representative of bicycle use on a "typically busy" day during the summer visitor use season at MERA.

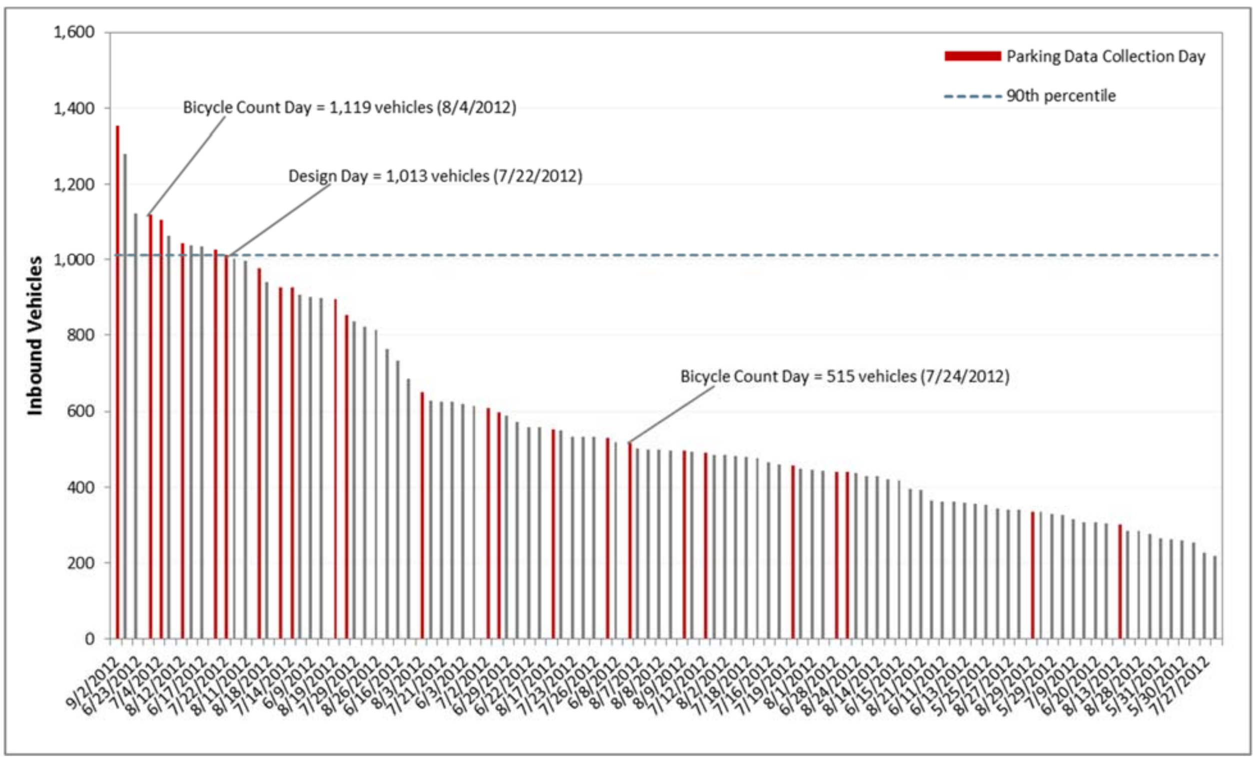


Figure 3-6. Bicycle count days relative to daily inbound vehicle traffic volumes on Mount Evans Highway, in descending order, summer 2012.

[5] *A Policy on Geometric Design of Highways and Streets, Sixth Edition*. (2011) American Association of State Highway and Transportation Officials (AASHTO): Washington, DC.

[6] *Vehicle Classification Scheme F Report*. (2011) Federal Highway Administration (FHWA): Washington, DC.

Arriving and departing bicycles on Saturday August 4th, 2012 are displayed in Figure 3-7. As depicted in Figure 3-7, hourly bicycle arrivals reached a peak of approximately 15 bicycles during the 8:00 AM hour, after which arrivals gradually declined until the 12:00 PM hour, when there was a slight increase in bike arrivals from the previous hour. There were very few bicycle arrivals between 1:00 PM and the end of the data collection period at 3:00 PM.

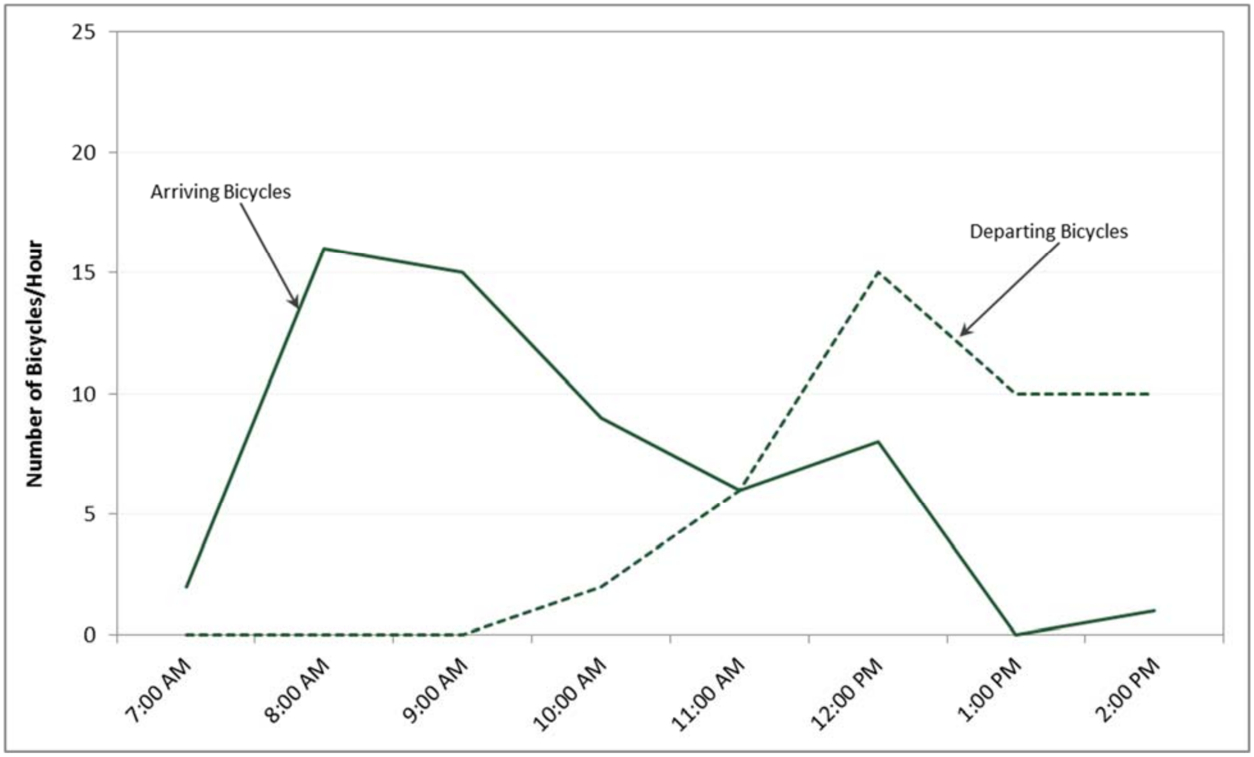


Figure 3-7. Bicycle traffic volumes on Mount Evans Highway, by hour and direction of travel, Saturday, August 4th, 2012.

Parking Accumulation & Turnover

Data Collection Method

- A license plate recording method (Figure 2-72) was used in the designated parking lots and on the nearby roadside at Mount Goliath, Summit Lake, and the Mount Evans summit to record:
    - o An hourly count of parked vehicles, by location (i.e., parking accumulation)
    - o The amount of time vehicles were parked, by parking location (i.e., parking turnover)
- Parking data collection was conducted on 13 weekdays and 11 weekend days between June

Figure 3-8. Parking accumulation & turnover data collection at MERA.

23rd and September 3rd, 2012, from 7:00 AM to 6:00 PM for the Summit Lake and Summit parking areas, and from 7:00 AM to 3:00 PM for the Mount Goliath parking area. License plates were recorded by subarea of the designated lots and roadside, and by specific parking space in the designated lots (Figure 3-9, Figure 3-10, and Figure 3-11).

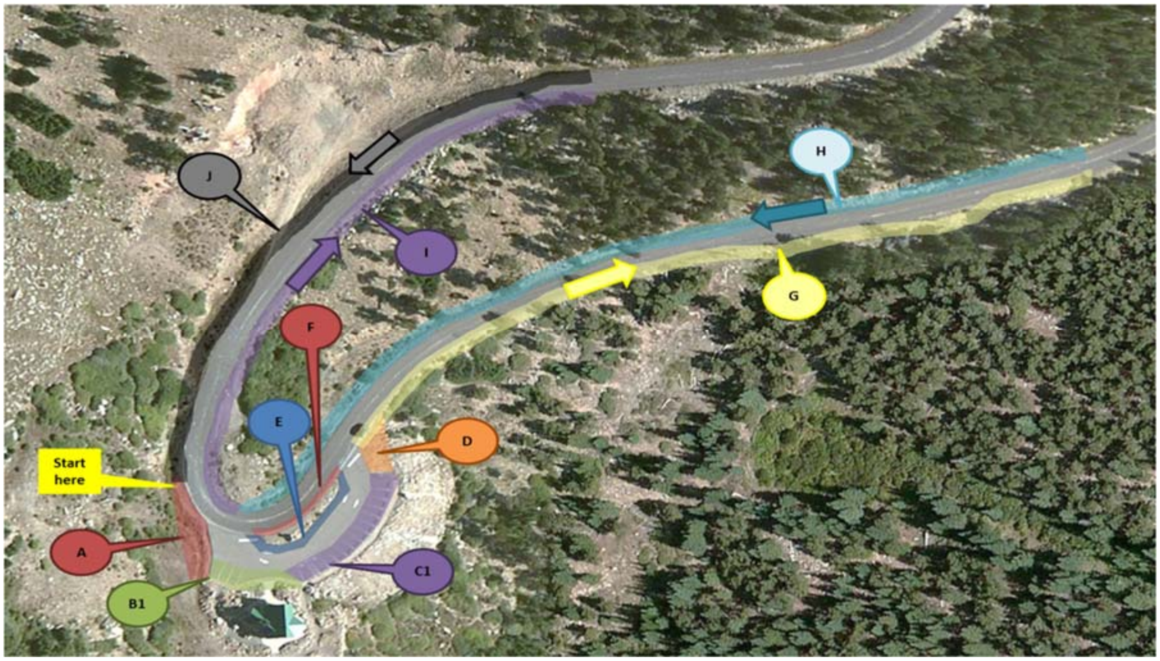


Figure 3-9. Mount Goliath parking accumulation and turnover data collection map.

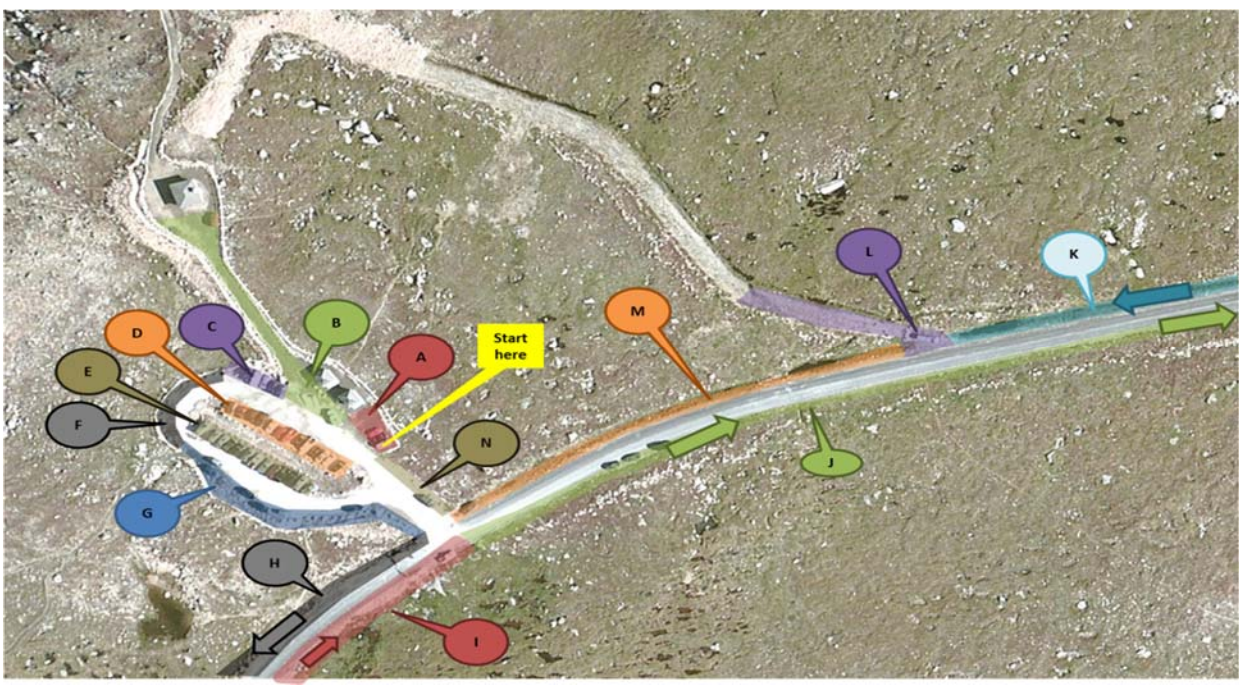


Figure 3-10. Summit Lake parking accumulation and turnover data collection map.

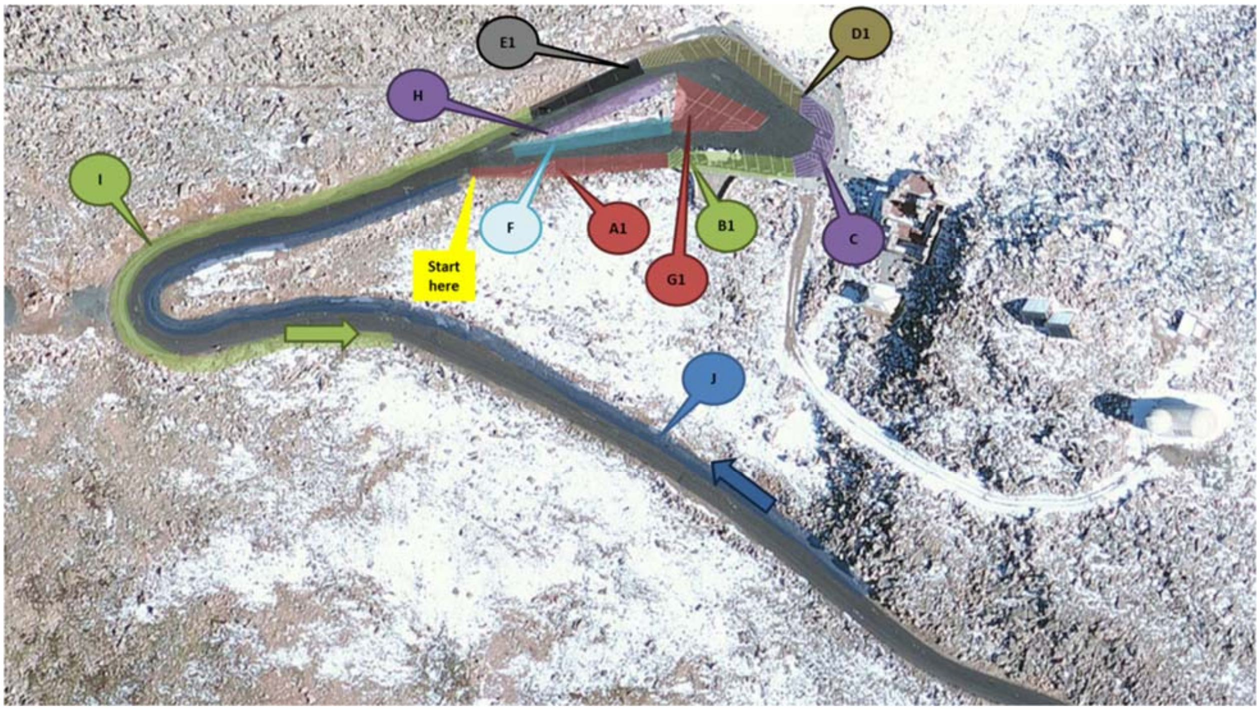


Figure 3-11. Mount Evans Summit parking accumulation and turnover data collection map.

Analysis and Results

Hourly parking accumulation in the designated parking lots and on the roadside at Mount Goliath, Summit Lake, and the Mount Evans summit is displayed in Figure 3-12 through Figure 3-19 for the 11th busiest day of the 2012 summer visitor use season (Sunday, July 22nd, 2012), which was selected as the "design day" for this study, as described in the preceding section.

Figure 3-12 displays parking accumulation at Mount Goliath on the design day, by location (i.e., designated lot versus nearby roadside) and overall. As depicted in Figure 3-12, parking demand was below capacity for most of the day at Mount Goliath, and at its peak during the 1:00 PM hour exceeded capacity by just one vehicle. The results in Figure 3-12 suggest there is adequate parking capacity at Mount Goliath to accommodate demand during "typically busy" days in MERA; however, during the 3-hour period (11:00 AM to 2:00 PM) when the parking lot was near or beyond capacity, some visitors who bypassed Mount Goliath may have wanted to stop there, but did not because there was little or no parking available.

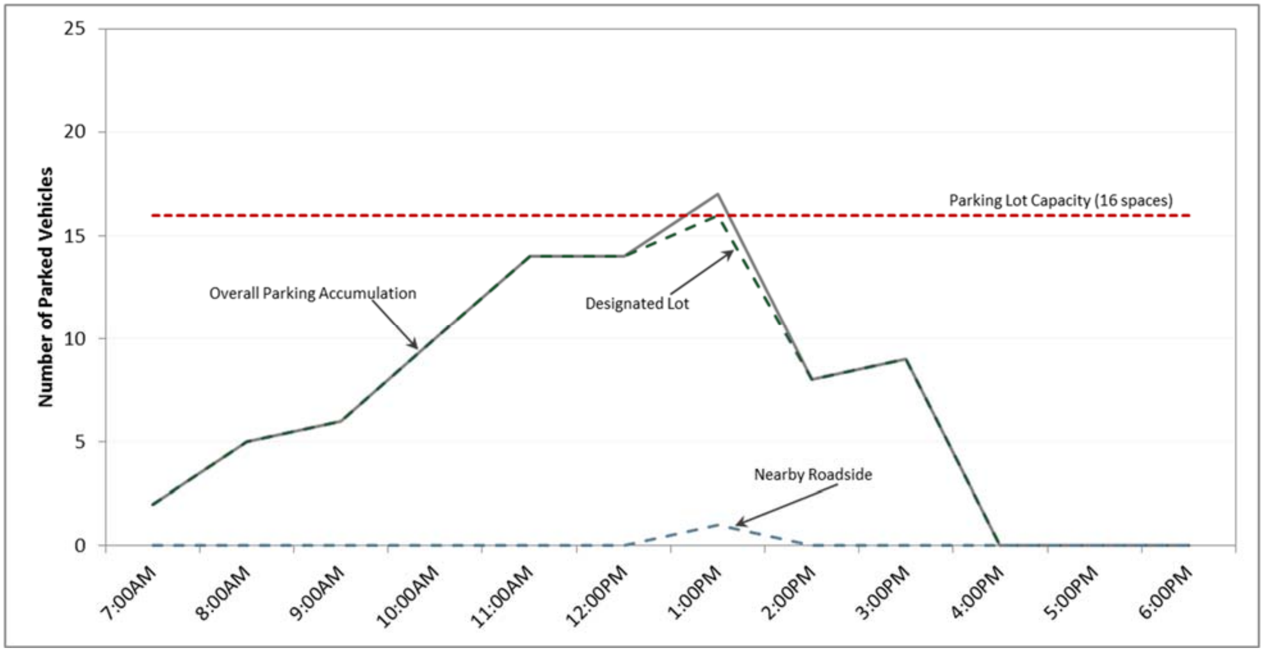
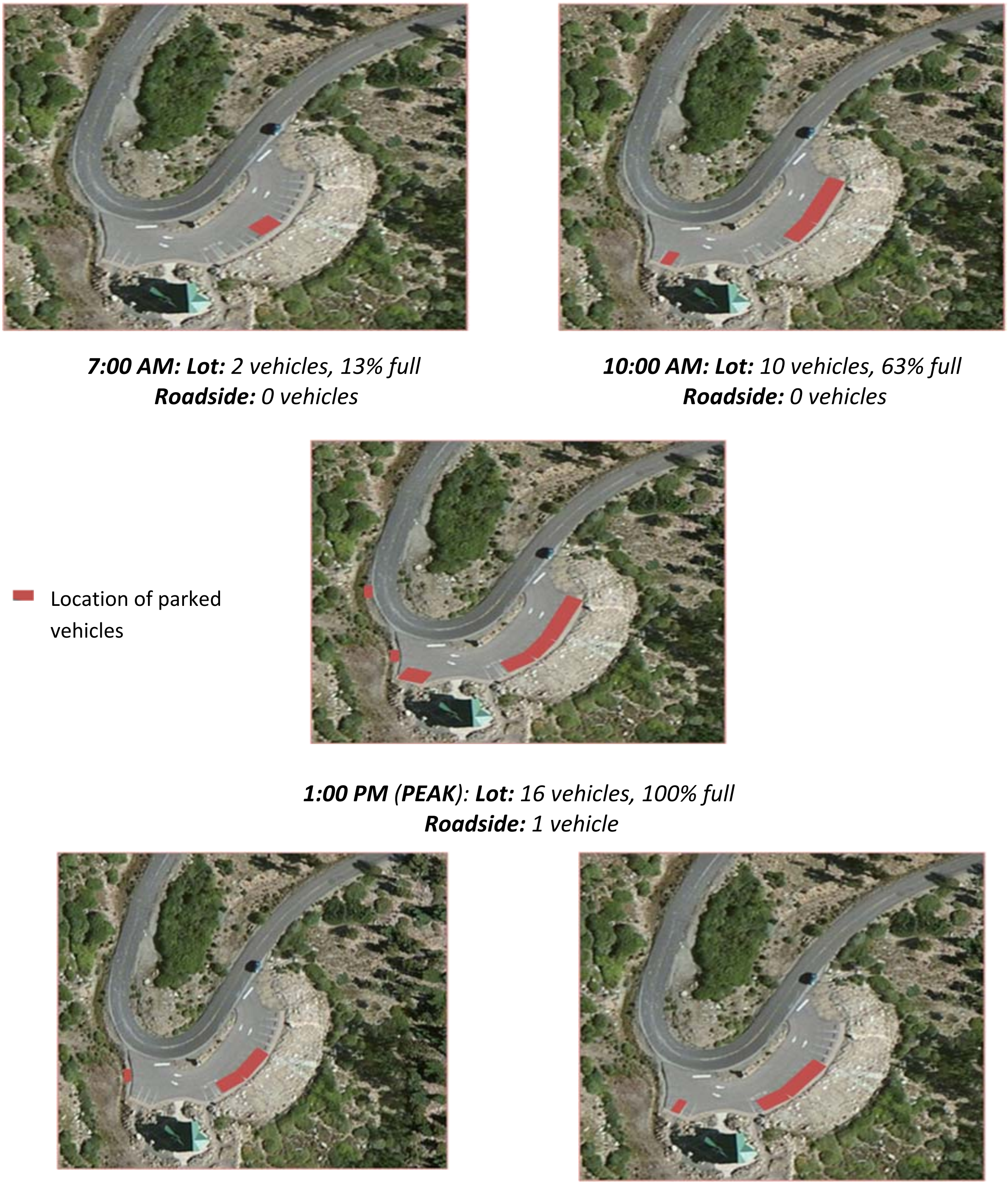


Figure 3-12. Design day parking accumulation at Mount Goliath, Sunday, July 22nd, 2012.

Figure 3-13 is a graphical display of parking accumulation at Mount Goliath at distinct time periods throughout the morning and afternoon of the design day. The graphics in Figure 3-13 display the spatial pattern by which visitors use the designated parking lot and nearby roadside at Mount Goliath, on a “typically busy” day during the summer visitor use season in MERA.



7:00 AM: Lot: *2 vehicles, 13% full*
Roadside: *0 vehicles*

10:00 AM: Lot: *10 vehicles, 63% full*
Roadside: *0 vehicles*

1:00 PM** (**PEAK**): **Lot: *16 vehicles, 100% full*
Roadside: *1 vehicle*

2:00 PM: Lot: *8 vehicles, 50% full*
Roadside: *0 vehicles*

3:00 PM: Lot: *9 vehicles, 56% full*
Roadside: *0 vehicles*

Figure 3-13. Design day parking accumulation at Mount Goliath, Sunday, July 22nd, 2012.

Figure 3-14 displays parking accumulation at Summit Lake on the design day, by location (i.e., designated lot versus nearby roadside) and overall. On the design day, parking accumulation in the designated parking lot reached capacity during the 10:00 AM hour, and remained at or near capacity until approximately 4:00 PM. Parking accumulation in the designated lot reached its peak of 48 vehicles during the 11:00AM hour. Very few visitors parked on the roadside near Summit Lake until the 10:00 AM hour when parking accumulation in the designated lot approached capacity. Parking accumulation on the roadside reached its peak of 17 vehicles during the 11:00 AM hour, and then gradually declined through the afternoon hours. Once parking was available in the designated lot again in the late afternoon/early evening hours, there were no cars parked on the roadside at Summit Lake. Overall, parking accumulation at Summit Lake on the design day increased steadily through the morning hours, reached its peak of 65 vehicles during the 11:00 AM hour, and then gradually declined through the afternoon hours of the day.

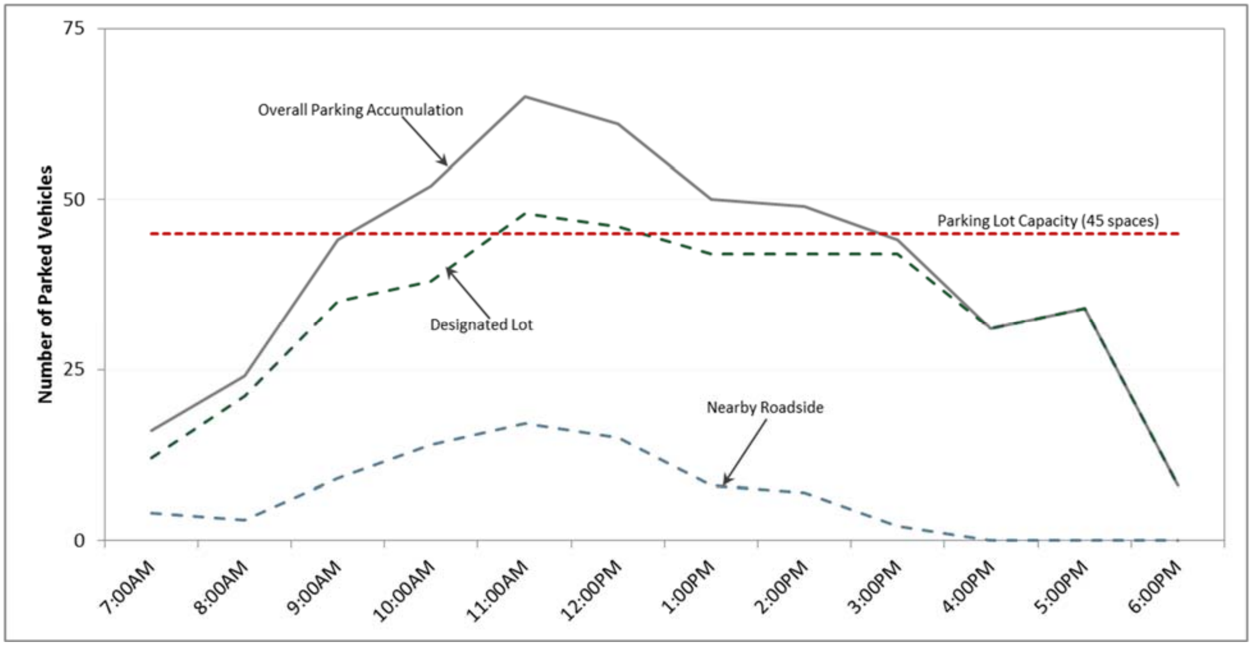


Figure 3-14. Design day parking accumulation at the Summit Lake parking area, Sunday, July 22nd, 2012.

Figure 3-15 is a graphical display of parking accumulation at Summit Lake at distinct time periods throughout the morning, afternoon, and evening of the design day. The graphics in Figure 3-15 display the spatial pattern by which visitors use the designated parking lot and nearby roadside at Summit Lake, on a "typically busy" day during the summer visitor use season in MERA.

7:00 AM: Lot: *12 vehicles, 27% full*
Roadside: *4 vehicles*

9:00 AM: Lot: *35vehicles, 78% full*
Roadside: *9 vehicles*

Location of parked vehicles

11:00 AM (PEAK)**: **Lot: *48 vehicles, 107% full*
Roadside: *17 vehicles*

2:00 PM: Lot: *42 vehicles, 93 % full*
Roadside: *7 vehicles*

6:00 PM: Lot: *8 vehicles, 18% full*
Roadside: *0 vehicles*

Figure 3-15. Design day parking accumulation at Summit Lake, Sunday July 22nd, 2012.

Figure 3-16 displays parking accumulation at the Mount Evans summit on the design day, by location (i.e., designated lot versus nearby roadside) and overall. On the design day, parking accumulation in the designated parking lot reached capacity during the 11:00 AM hour, and exceeded capacity through the afternoon hours, until approximately 4:00 PM. Parking accumulation in the designated lot reached its peak of 45 vehicles during the 12:00 PM hour. Very few visitors parked on the roadside near the Mount Evans summit before 11:00 AM; however, once parking accumulation in the designated lot reached capacity, parking accumulation on the nearby roadside increased steadily through the afternoon hours, reaching its peak of 45 vehicles during the 3:00 PM hour. Parking accumulation in the designated lot and on the nearby roadside declined fairly sharply after 4:00 PM. Overall, parking accumulation at the Mount Evans summit on the design day increased fairly gradually during the early morning hours, then increased sharply during the late morning. Parking accumulation at the Mount Evans summit, overall, continued to increase substantially during the afternoon hours, reached its peak of 90 vehicles (more than twice the capacity of the designated parking lot) at approximately 3:00 PM, and then declined fairly sharply through the late afternoon and early evening hours of the day.

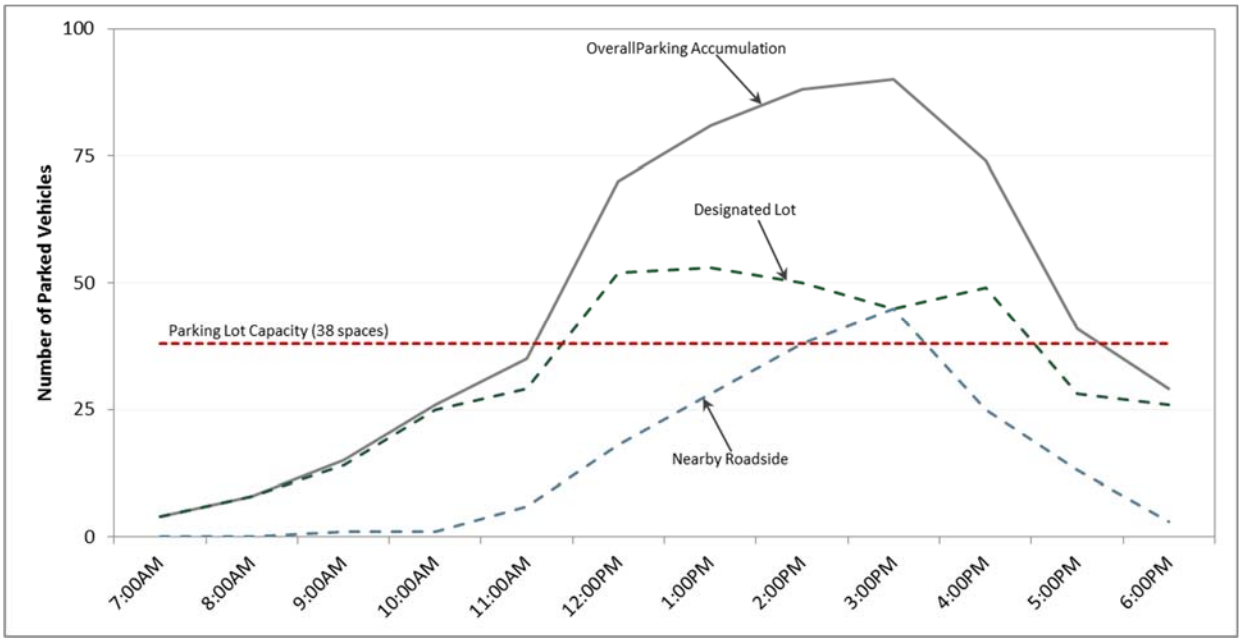
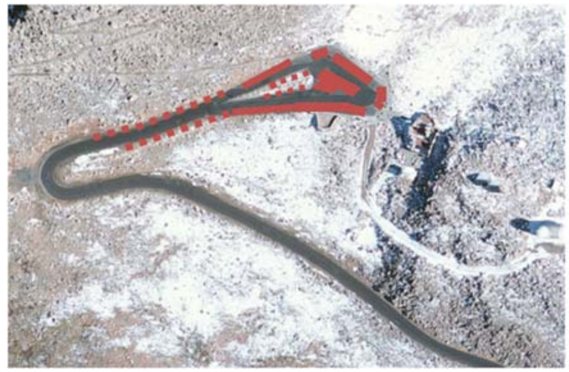


Figure 3-16. Design day parking accumulation at the Mount Evans summit, Sunday, July 22nd, 2012.

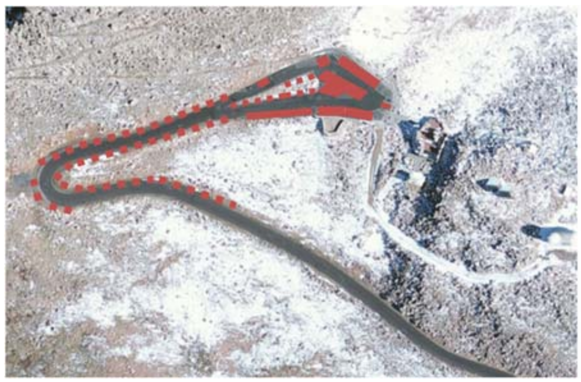
Figure 3-17 is a graphical display of parking accumulation at the Mount Evans summit at distinct time periods throughout the morning, afternoon, and early evening of the design day. The graphics in Figure 3-17 display the spatial pattern by which visitors use the designated lot and nearby roadside at the Mount Evans summit, on a “typically busy” day during the summer visitor use season in MERA.

7:00 AM: Lot: *4 vehicles, 11% full*
Roadside: *0 vehicles*

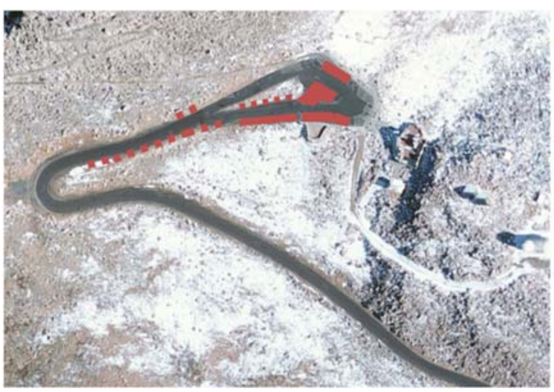


1:00 PM: Lot: *52 vehicles, 139% full*
Roadside: *18 vehicles*

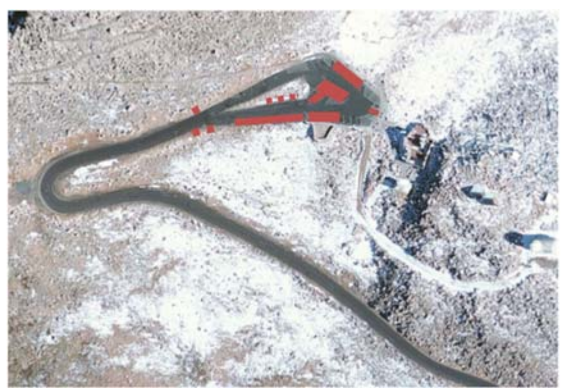
Location of parked vehicles



3:00 PM (PEAK): Lot: *45 vehicles, 118% full*
Roadside: *45 vehicles*



5:00 PM: Lot: *28 vehicles, 74% full*
Roadside: *13 vehicles*



6:00 PM: Lot: *26 vehicles, 68% full*
Roadside: *3 vehicles*

Figure 3-17. Design day parking accumulation at the Mount Evans summit, Sunday, July 22nd, 2012.

Figure 3-19 displays both parking accumulation at each location within in MERA and the sum total of overall parking accumulation for the design day. Parking accumulation increased steadily at all three locations (Mount Goliath, Summit Lake, and the Mount Evans summit) during the morning hours. Parking at Mount Goliath remained steady from late morning through early afternoon, and then declined during the midafternoon hours. Parking accumulation was greatest at Summit Lake during the morning hours, until it reached its peak during the 11:00 AM hour, after which parking accumulation gradually declined there through the remaining hours of the day. Following the 11:00 AM hour when parking accumulation reached its peak at Summit Lake, parking accumulation increased sharply at the Mount Evans summit, and continued to increase to its peak at 3:00 PM. Overall, parking demand on the design day in MERA was well above parking capacity from late morning through late afternoon/early evening. Moreover, parking accumulation appears to have reached an absolute limit of approximately 150 vehicles between the hours of 12:00 PM and 4:00 PM; during this time period, it is likely there were many more cars moving slowly or stopped in traffic on the Mount Evans Highway, waiting for a place to park (Figure 2-82). These findings suggest parking shortages and traffic congestion are severe on "typically busy" days in MERA.

Figure 3-18. "Typically busy" day at the Mount Evans Summit parking area.

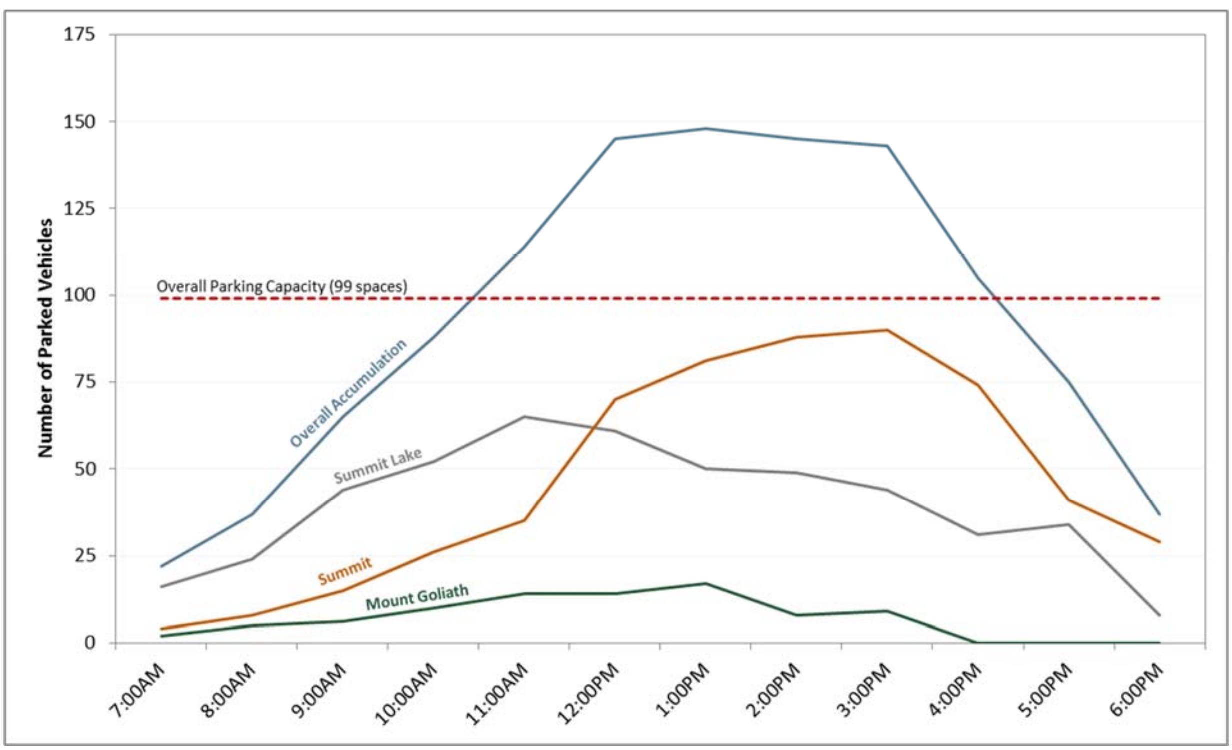


Figure 3-19. Design day parking accumulation in MERA, by location and overall, Sunday, July 22nd, 2012.

The license plate recording method was also used to record turnover rates for vehicles parked at Mount Goliath, Summit Lake, and the Mount Evans summit. Data were recorded every hour, therefore, parking turnover rates (i.e., the duration of time vehicles are parked in the parking lot) are estimated in hourly bins.

On average, vehicles were parked at Mount Goliath for approximately one hour (Table *3-2* and Figure 3-20). There were no significant differences in the average duration of time vehicles parked at Mount Goliath on weekends versus weekdays. However, there were differences in parking duration at Mount Goliath based on the time of day visitors arrived ($t = 9.762$, $p < 0.001$). In particular, visitors who arrived before noon (mean = 1.7 hours) parked their vehicles for longer, on average, than those who arrived after noon (mean = 1.1 hours).

Table 3-2. Visitor parking duration at Mount Goliath, by location and day of week category, summer 2012.

Mount Goliath						
	Designated Lot			Nearby Roadside		
Hours Parked	**Weekday (n=613)**	**Weekend (n=718)**	**Overall (n=1,331)**	**Weekday (n=14)**	**Weekend (n=67)**	**Overall (n=81)**
1 - <2	84%	81%	82%	79%	75%	75%
2 - <3	7%	10%	8%	14%	21%	20%
3 - <4	4%	5%	5%	7%	0%	1%
4 - <5	3%	2%	3%	0%	3%	2%
5 - <6	1%	1%	1%	0%	1%	1%
6 - <7	0%	0%	0%	0%	0%	0%
7 - <8	0%	0%	0%	0%	0%	0%
8 - <9	0%	0%	0%	0%	0%	0%
9 - <10	0%	0%	0%	0%	0%	0%
10 - <11	0%	0%	0%	0%	0%	0%
11 - <12	0%	0%	0%	0%	0%	0%
12+	0%	0%	0%	0%	0%	0%
Average	1.3	1.3	1.3	1.3	1.4	1.3
t-test	t = 0.202			t = -0.330		
p-value	p = 0.840			p = 0.743		

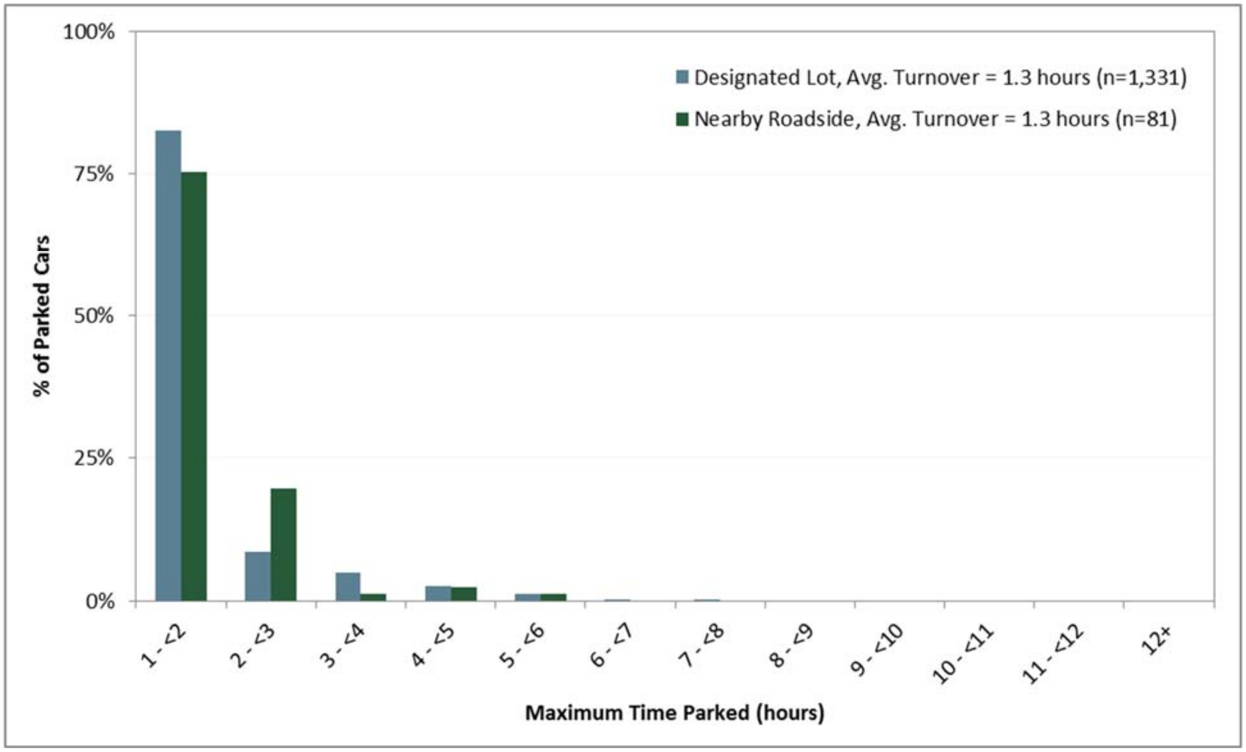


Figure 3-20. Visitor parking duration at Mount Goliath, by location and day of week category, summer 2012.

On average, vehicles were parked at Summit Lake for approximately two hours (Table 3-3 and Figure 3-21). Visitors who parked in the designated lot at Summit Lake on weekends (mean = 1.8 hours) tended to park for slightly longer periods of time than those who parked in the designated lot on weekdays (mean = 1.6 hours). Visitors who parked in the designated lot at Summit Lake tended to park for less time (mean = 1.7 hours) than those who parked on the nearby roadside (mean = 2.4 hours). There were also differences in parking duration based on the time of day visitors arrived ($t = 29.931$, $p < 0.001$). In particular, visitors who arrived before noon (mean = 3.1 hours) parked their vehicles for longer, on average, than those who arrived after noon (mean = 1.2 hours).

Table 3-3. Visitor parking duration at Summit Lake, by location and day of week category, summer 2012.

Summit Lake						
	Designated Lot			Nearby Roadside		
Hours Parked	**Weekday (n=1,361)**	**Weekend (n=1,633)**	**Overall (n=2,994)**	**Weekday (n=116)**	**Weekend (n=565)**	**Overall (n=681)**
1 - <2	77%	72%	74%	63%	58%	59%
2 - <3	7%	8%	8%	8%	6%	7%
3 - <4	5%	4%	4%	9%	9%	9%
4 - <5	5%	5%	5%	11%	10%	10%
5 - <6	3%	5%	4%	3%	7%	7%

Summit Lake

Hours Parked	Designated Lot Weekday (n=1,361)	Designated Lot Weekend (n=1,633)	Designated Lot Overall (n=2,994)	Nearby Roadside Weekday (n=116)	Nearby Roadside Weekend (n=565)	Nearby Roadside Overall (n=681)
6 - <7	1%	3%	2%	1%	4%	4%
7 - <8	1%	2%	1%	0%	2%	2%
8 - <9	0%	0%	0%	1%	2%	1%
9 - <10	0%	0%	0%	0%	0%	0%
10 - <11	0%	0%	0%	0%	0%	0%
11 - <12	0%	0%	0%	0%	0%	0%
12+	0%	0%	0%	5%	0%	1%
Average	1.6	1.8	1.7	2.4	2.4	2.4
t-test	t = -4.591			t = -0.036		
p-value	p < 0.001			p = 0.971		

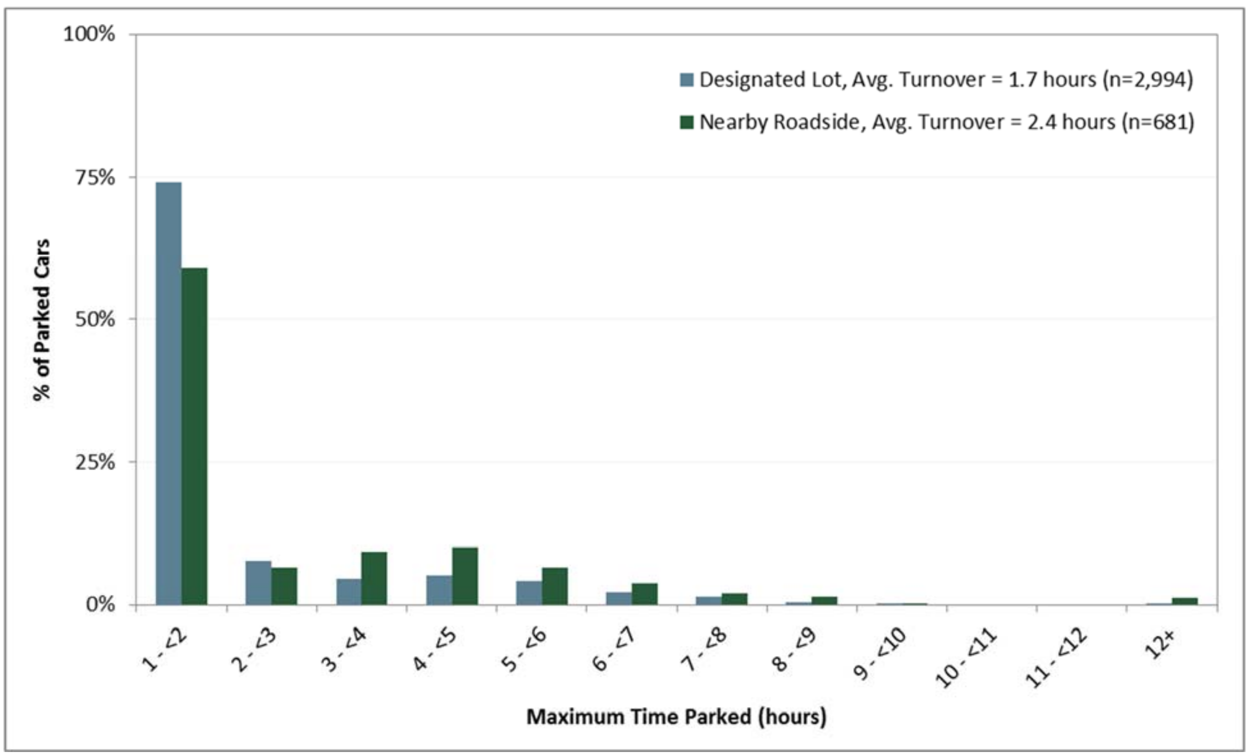


Figure 3-21. Visitor parking duration at Summit Lake, by location and day of week category, summer 2012.

On average, vehicles were parked at the Mount Evans summit for approximately one hour (Table 3-4 and Figure 3-22). There were no significant differences in the average duration of time vehicles parked at the Mount Evans summit on weekends versus weekdays. There were differences in parking duration based on the time of day visitors arrived (t = 5.306, p < 0.001). In particular, visitors who arrived before noon (mean = 1.3 hours) parked their vehicles for longer, on average, than those who arrived after noon (mean = 1.1 hours).

Table 3-4. Visitor parking duration at the Mount Evans summit, by location and day of week category, summer 2012.

	Summit Parking Area					
	Designated Lot			Nearby Roadside		
Hours Parked	**Weekday (n=914)**	**Weekend (n=1,087)**	**Overall (n=2,001)**	**Weekday (n=152)**	**Weekend (n=528)**	**Overall (n=680)**
1 - <2	91%	87%	89%	89%	88%	88%
2 - <3	8%	11%	9%	10%	11%	10%
3 - <4	1%	2%	1%	1%	1%	1%
4 - <5	0%	0%	0%	0%	0%	0%
5 - <6	0%	0%	0%	0%	0%	0%
6 - <7	0%	0%	0%	0%	0%	0%
7 - <8	0%	0%	0%	0%	0%	0%
8 - <9	0%	0%	0%	0%	0%	0%
9 - <10	0%	0%	0%	0%	0%	0%
10 - <11	0%	0%	0%	0%	0%	0%
11 - <12	0%	0%	0%	0%	0%	0%
12+	0%	0%	0%	0%	0%	0%
Average	1.1	1.2	1.1	1.1	1.2	1.1
t-test	t = -1.488			t = -0.568		
p-value	p = 0.137			p = 0.570		

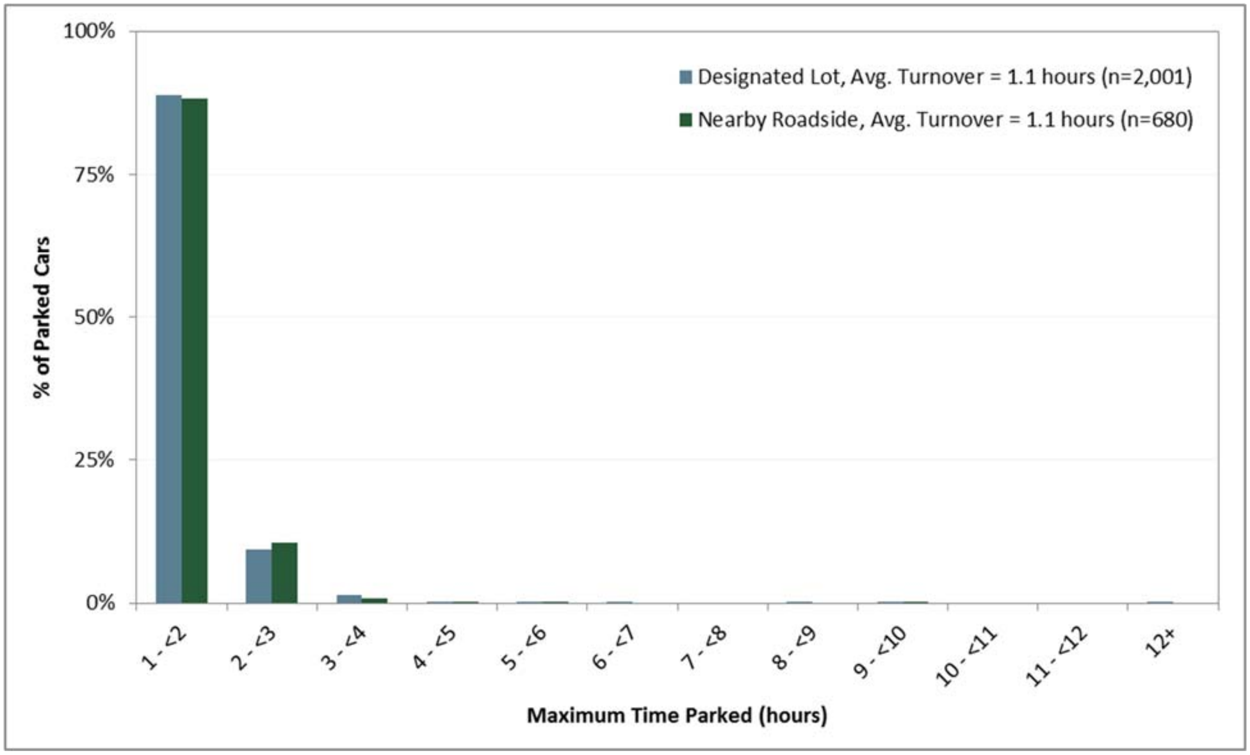


Figure 3-22. Visitor parking duration at the Mount Evans summit, by location and day of week category, summer 2012.

Finally, 75% of all license plates recorded as part of the parking data collection effort were Colorado license plates; this finding suggests the majority of visitors to MERA during the summer visitor use season are residents of the state of Colorado, though some Colorado license plates that were observed may have been on rental cars driven by out-of-state visitors.

Visitor Use Counts

Data Collection Method

- Visitor use counts were recorded with infrared trail counters (Figure 3-23) located on selected trails in MERA.
- The infrared trail counters recorded visitor use counts in hourly bins, 24 hours per day during the summer peak season, from June 23rd, 2012 through September 3rd, 2012.
- The locations of the infrared trail counters used to record visitor use data during the study period are depicted in Figure 3-24. The visitor use counting locations were selected in consultation with USFS staff and capture primary visitor use access points from Mount Goliath, Summit Lake, and the Mount Evans summit.

Figure 3-23. Trail counter setup, Chicago Lakes Overlook Trail.

- Field staff conducted visitor use counts via direct observation at each of the infrared trail counter locations, for a minimum of 14 hours at each trail counter location. The direct observation counts were used to correct and adjust (i.e., calibrate) the raw infrared trail counter data, as described below.

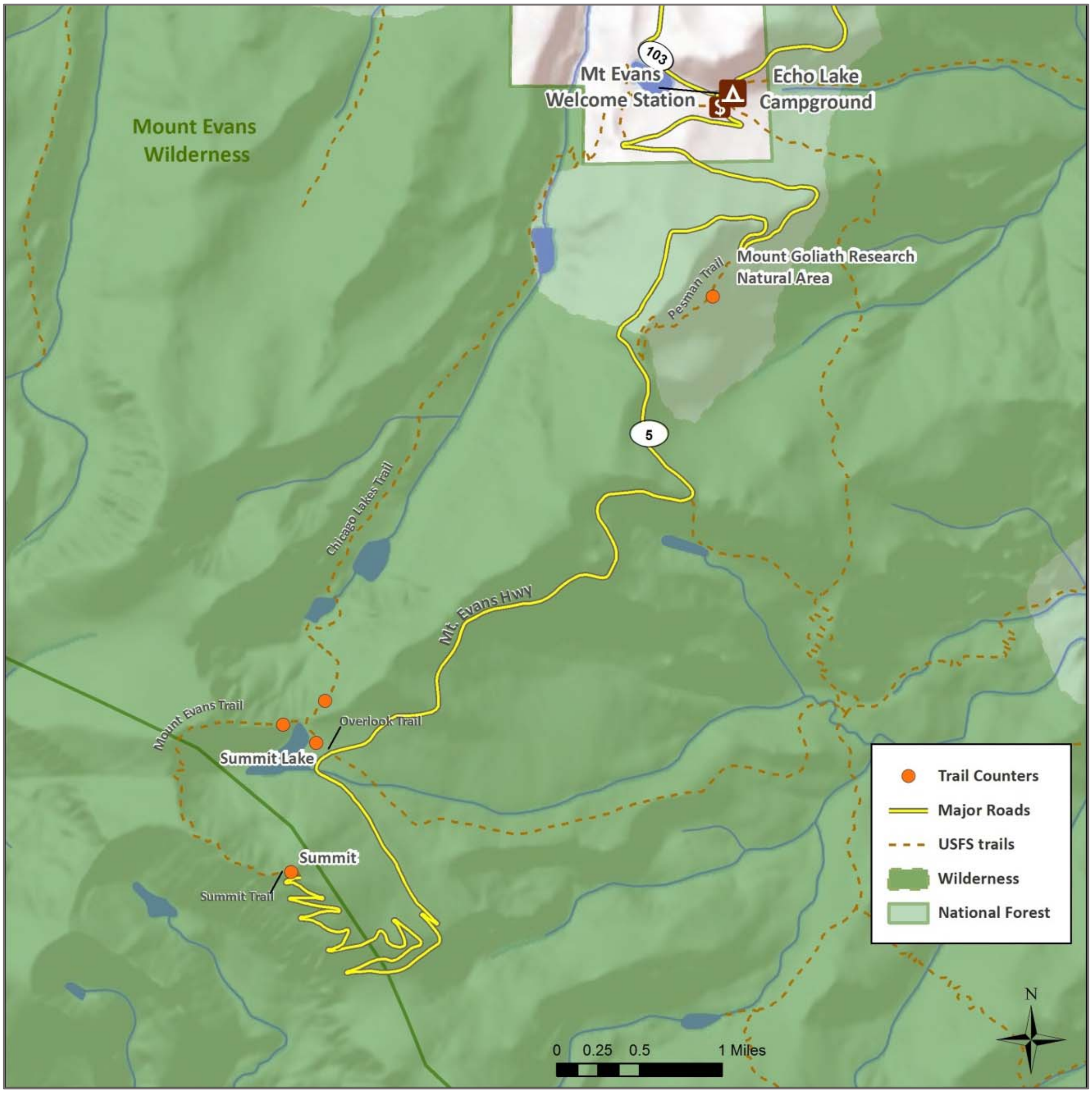


Figure 3-24. Approximate locations of infrared trail counters used to record visitor use counts, MERA, summer 2012.

Analysis and Results

Regression analyses were conducted with the direct observation counts of visitor use and corresponding infrared trail counter data to estimate correction factors for the infrared trail counter data. Regression results suggest there are strong statistical relationships (R^2 values ranging from 0.88 to 0.99) between the direct observation counts and visitor use counts recorded by the infrared trail counters. Further, the parameter estimates for the regression models were statistically significant in all cases. These results provide a high degree of confidence that applying the correction factors to calibrate the visitor use counts recorded with the infrared trail counters (i.e., multiplying the infrared trail counter data by the corresponding parameter estimates from the regression models) results in very accurate estimates of visitor use on the trails in MERA. The calibrated trail counter data were used for analysis and results reported in this memo.

The Summit Trail was the most popular of the study trails in MERA, with an average of 476 visitor arrivals per day on weekdays and 1,018 visitor arrivals per day on weekend days (Figure 3-25). The Chicago Lakes Overlook Trail (Overlook Trail) was also very popular, receiving an average of 237 visitor arrivals per day on weekdays and 561 visitor arrivals per day on weekend days. Visitors were less likely to use the Mount Evans Trail to get to the Mount Evans summit than the Summit Trail; however, the trail received an average of 39 visitor arrivals per day on weekdays and 118 visitor arrivals per day on weekend days. Visitor use was substantially lower on the Chicago Lakes and Pesman Trails, with an average of 9 and 15 visitor arrivals per day on weekdays, respectively, and 24 and 27 visitor arrivals per day on weekend days, respectively. Generally, trails in the study area received about twice as much visitor use on weekend days than on weekdays.

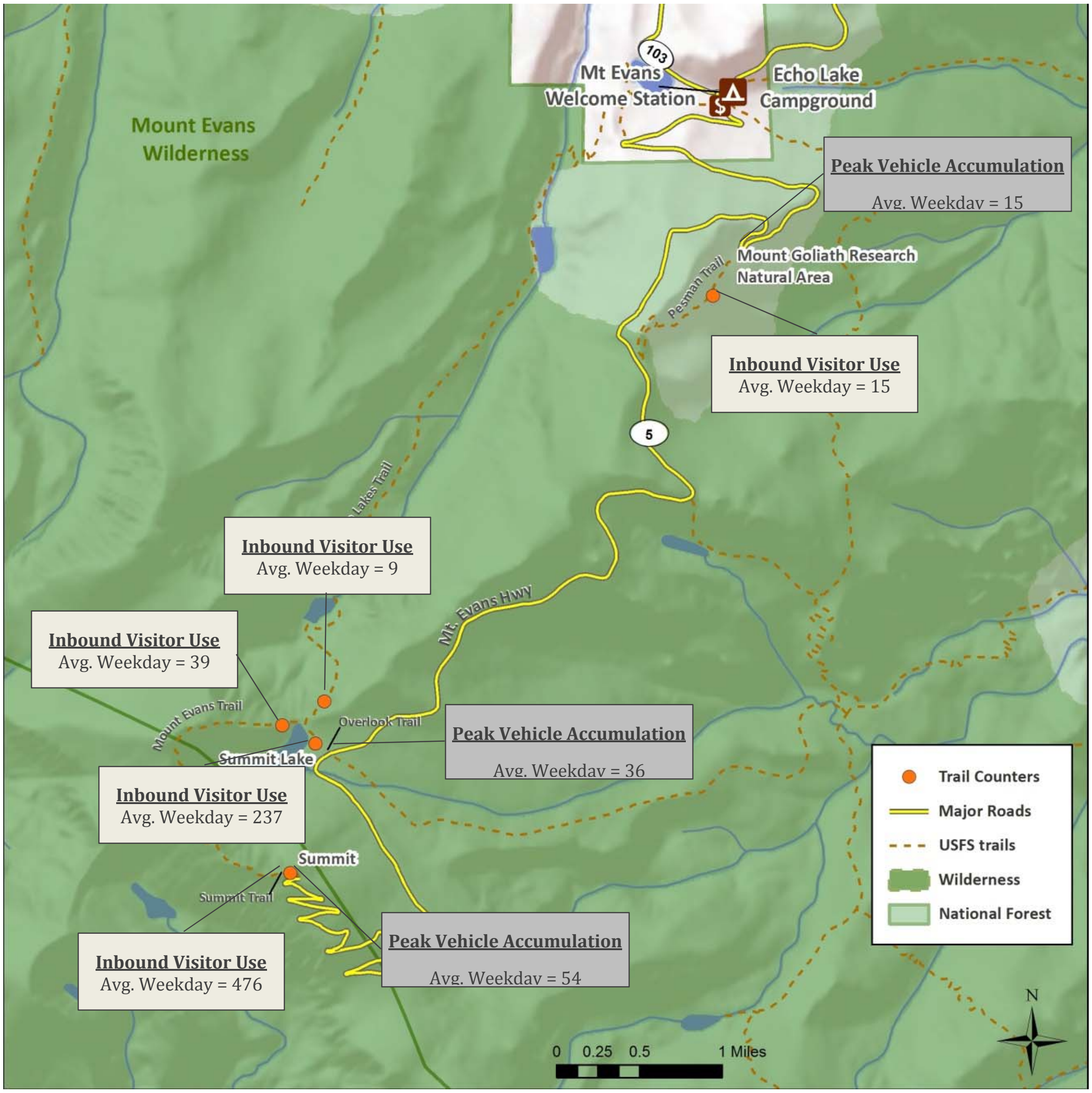


Figure 3-25. Average weekday and weekend day inbound visitor use, by trailhead, and average peak vehicle accumulation, by location in MERA, summer 2012.

Figure 3-26 reports calibrated visitor use counts for the design day (Sunday, July 22nd, 2012), by trailhead location. Visitor use on the design day was distributed across the trailhead locations consistently with the seasonal averages reported in Figure 3-25; however, as expected, the design day volumes of visitor use were higher than seasonal averages on all of the trails, except for the Chicago Lakes and Pesman Trails, where there were particularly high levels of visitor use (relative to visitor use on the design day) on the busiest days.

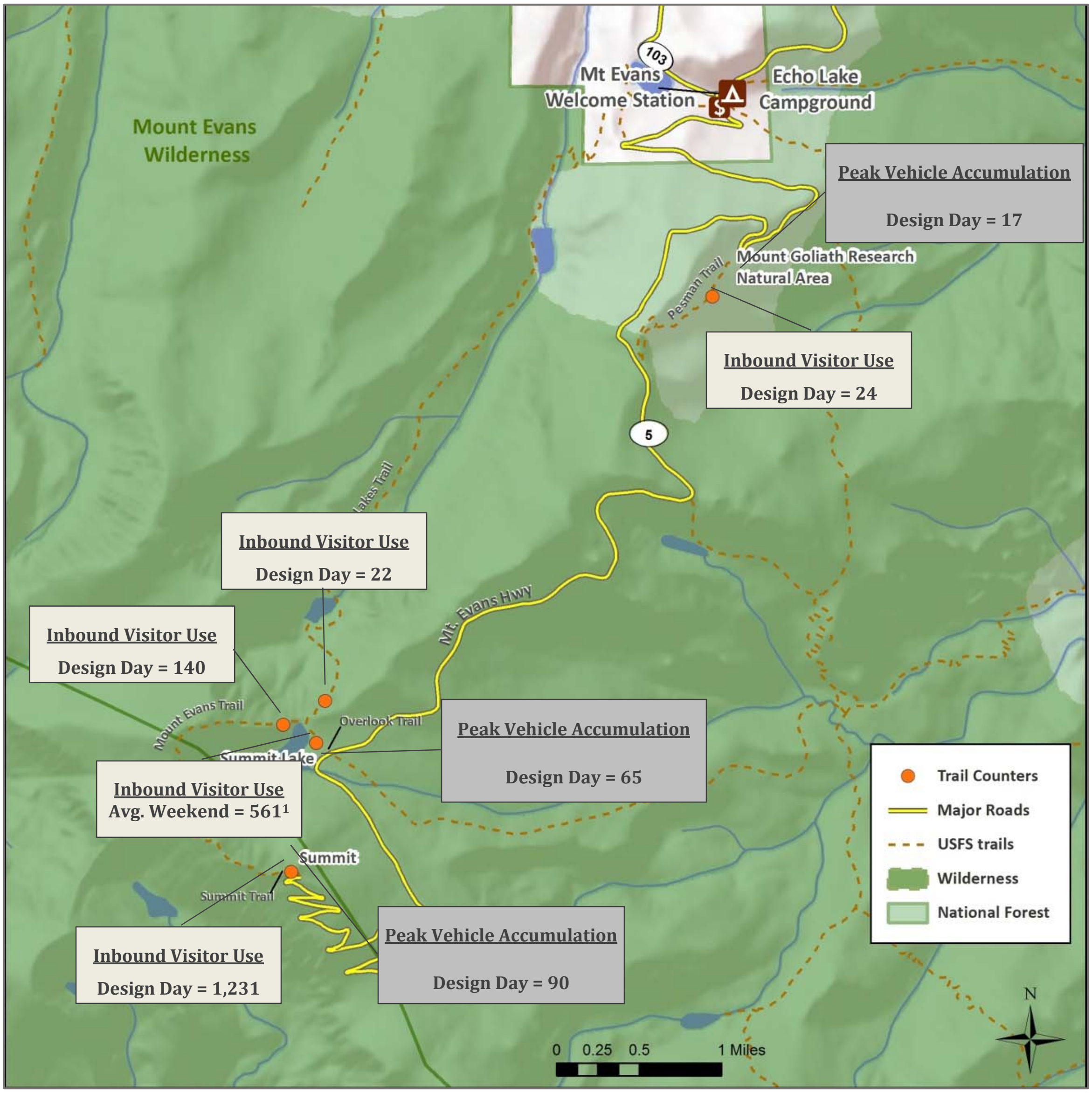


Figure 3-26. Design day inbound visitor use, by trailhead, and peak vehicle accumulation, by location in MERA, Sunday, July 22nd, 2012.

Figure 3-27 graphs the design day hourly visitor use (inbound direction), by trailhead (note, the trail counter on the Overlook Trail malfunctioned on the design day, therefore, average hourly visitor use is reported). The temporal pattern of visitor use throughout the day is generally consistent across the Summit Trail and Overlook Trail, though the Summit Trail sustains a slightly longer peak of inbound visitor use. The Mount Evans Trail has an earlier morning peak in visitor use than the Overlook or Summit Trails, and has little to no visitor use in the afternoon hours. Visitor use on the Chicago Lakes and Pesman Trails is low throughout all hours of the day.

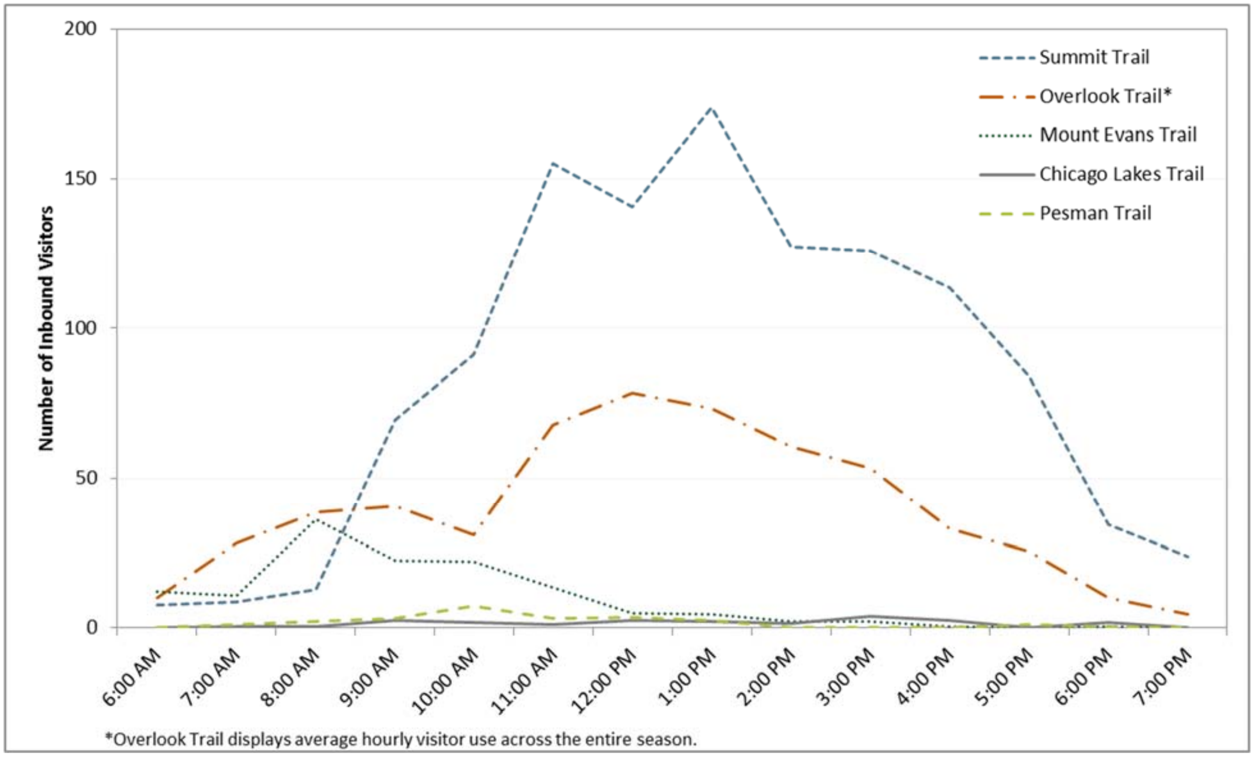


Figure 3-27. Design day hourly inbound use, by trailhead (Sunday, July 22nd, 2012).

Monthly visitor use on the study trails in MERA during summer 2012 was highest in July (Table *3-5*). Visitor use data were collected for only the last 8 days of June and only through the Labor Day Weekend in September; consequently, there aren't sufficient data to compare visitor use during June and September to each other or to July and August.

Table 3-5. Monthly inbound visitor use totals, by trailhead, MERA, summer 2012.[1]

	Summit Trail	**Mount Evans Trail**	**Chicago Lakes Trail**	**Overlook Trail**	**Pesman Trail**	**Monthly Total**
June[2]	6,096	564	157	3,796	320	10,933
July	19,548	1,892	368	10,109	590	32,506
August	18,120	1,760	364	9,395	406	30,044
September[3]	3,856	431	65	1,615	69	6,036
Total	47,619	4,647	954	24,915	1,384	79,520

[1]Missing data due to counter malfunction were replaced with weekday/weekend averages.

[2]June data are only for June 22nd – June 30th, 2012.

[3]September data are only through September 3rd, 2012.

Visitor Use Tracking

Data Collection Method

- Visitor use patterns were measured using GPS-based tracking (Figure 3-28). GPS units were administered to visitor groups at the MERA Welcome Station at the start of their visit to MERA. Visitors were asked to carry the GPS units with them at all times while they were visiting MERA, and to return the GPS units at the end of their visits to MERA. The field technicians attached the GPS devices to visitors' backpacks, jackets, or similar personal items to ensure the GPS units tracked visitors not only while they were in their vehicles, but also when they left their vehicles to visit recreation sites in MERA. Visitors were instructed to use a locked drop box to return their GPS units, if they returned to the MERA Welcome Station after data collection staff had left the study area for the day.

Figure 3-28. GPS-based visitor use tracking, MERA, summer 2012.

- GPS units were administered on 11 weekend days, and 12 weekdays from June 24th, 2012 – September 3rd, 2012.
- On each data collection day, GPS units were administered to visitors from 7:00 AM to approximately 1:00 PM, and collected from visitors from 7:00 AM to approximately 3:00 PM.
- Overall, 2,322 visitor groups were contacted and 2,248 GPS units were administered to visitor groups during the 2012 summer visitor use season in MERA, resulting in a 97% response rate for the GPS tracking study (Table *3-6*).
- Algorithms were developed to process the GPS tracks and eliminate cases with more than 10-minutes of missing data (primary causes of missing data included poor satellite reception and/or equipment malfunction). For cases with less than 10-minutes of missing data, interpolation was used to estimate location coordinates to populate the data gaps. The reduced, "clean" set of GPS track data were used to analyze and model visitor use patterns in MERA during summer 2012.

Table 3-6. GPS sampling schedule and response rate, MERA, summer 2012.

Date	Weekend	Count	Refusals	Response Rate
6/24/2012	Yes	88	5	95%
6/28/2012	No	93	9	91%
6/30/2012	Yes	83	5	94%
7/4/2012	No	86	2	98%
7/8/2012	Yes	122	3	98%
7/12/2012	No	93	9	91%
7/14/2012	Yes	92	3	97%
7/19/2012	No	91	3	97%
7/20/2012	No	99	7	93%
7/22/2012	Yes	102	1	99%
7/24/2012	No	68	2	97%
7/28/2012	Yes	82	1	99%
8/3/2012	No	130	2	98%
8/4/2012	Yes	101	5	95%
8/9/2012	No	99	1	99%
8/12/2012	Yes	113	2	98%
8/13/2012	No	84	2	98%
8/17/2012	No	102	0	100%
8/19/2012	Yes	98	4	96%
8/25/2012	Yes	88	0	100%
8/29/2012	No	99	1	99%
8/31/2012	No	109	5	96%
9/2/2012	Yes	126	2	98%
Overall		**2,248**	**74**	**97%**

Analysis and Results

Over three-quarters (77%) of all summer 2012 MERA visitor groups were groups of 2-4 people (Table 3-7). There were no significant differences in group size between visitor groups who visited on weekends versus weekdays. On average, visitor groups in MERA consisted of approximately three people.

Table 3-7. Visitor group size, MERA, summer 2012.

Number of People per Group	Weekday (n=1,148)	Weekend (n=1,086)	Overall (n=2,234)
1 person	14%	11%	13%
2 people	45%	44%	45%
3-4 people	31%	33%	32%
5 or more people	9%	11%	10%
Chi-square	$\chi2 = 7.321$, $p = 0.062$		n/a
Mean	**2.7**	**2.9**	**2.8**

The vast majority (97%) of visitor groups, regardless of day of week, traveled to MERA during summer 2012 in a single vehicle; very few (3%) traveled to MERA in two or more vehicles (Table 3-8). There were no significant differences in the number of vehicles per group between visitor groups who visited MERA on weekends versus weekdays.

Table 3-8. Number of vehicles per group, MERA, summer 2012.

Number of Vehicles per Group	Weekday (n=1,147)	Weekend (n=1,086)	Overall (n=2,233)
1 vehicle	97%	97%	97%
2 vehicles	2%	2%	2%
3 vehicles	1%	0%	0%
4 or more vehicles	0%	1%	1%
Chi-square	$\chi2 = 2.087$; $p = 0.555$		n/a
Mean	**1.0**	**1.1**	**1.1**

Over half (58%) of MERA visitor groups had a vehicle occupancy rate of 1 to 2 people per vehicle, and about one-third (32%) had a vehicle occupancy rate of 3 to 4 people (Table 3-9); there were no significant differences in vehicle occupancy between visitor groups who visited MERA on weekends versus weekdays. On average, MERA visitor groups had a vehicle occupancy rate of approximately 3 people per vehicle.

Table 3-9. Vehicle occupancy rates, MERA, summer 2012.

Number of People per Group	Weekday (n=1,140)	Weekend (n=1,082)	Overall (n=2,222)
1 person	16%	13%	14%
2 people	45%	43%	44%
3-4 people	31%	34%	32%
5 or more people	8%	10%	9%
Chi-square	$\chi2 = 5.836$; $p = 0.120$		n/a
Mean	**2.6**	**2.7**	**2.7**

Overall, approximately three-quarters (77%) of visitor groups, regardless of day of week, spent two or more hours recreating in MERA during summer 2012 (Table 3-10). One-quarter of MERA visitor groups spent 4 or more hours in MERA, and about one-quarter (24%) spent less than two hours visiting MERA. On average, visitor groups spent just over three hours in MERA during summer 2012. No visitor groups who carried a GPS unit stayed overnight in MERA.

Table 3-10. Length of stay, MERA, summer 2012.

Travel Time	**Weekday** (n=1,148)	**Weekend** (n=1,084)	**Overall** (n=2,237)
<1 hour	2%	1%	2%
1 hour - <2 hours	24%	20%	22%
2 hours - <3 hours	35%	33%	34%
3 hours - <4 hours	18%	17%	18%
4 or more hours	21%	28%	25%
Chi-square	$\chi2 = 15.658$; $p = 0.004$		n/a
Mean (in minutes)	**184.2**	**202.7**	**193.2**

On average, visitor groups traveled approximately 27 miles during their visit to MERA, including vehicle travel on the Mount Evans Highway and pedestrian travel on trails in MERA (Table 3-11). This finding suggests that most visitors drive the length of the Mount Evans Highway from the MERA Welcome Station to the Mount Evans summit, which is approximately 14 miles one-way, and generally don't venture far from the parking lots in MERA. There were no significant differences in distance traveled between visitor groups who visited on weekends versus weekdays.

Table 3-11. Miles traveled during trip, MERA, summer 2012.

Trip Length	**Weekday** (n=855)	**Weekend** (n=730)	**Overall** (n=1,585)
<1 - <10 miles	4%	2%	3%
10 - <15 miles	2%	3%	2%
15 - <20 miles	4%	4%	4%
20 - <25 miles	6%	8%	7%
25 - <30 miles	70%	72%	71%
30 - <35 miles	12%	11%	12%
35+ miles	2%	1%	2%
Chi-square	$\chi2 = 10.706$, $p = 0.098$		n/a
Mean	**27.6**	**27.2**	**27.4**

The GPS track data were summarized graphically in Figure 3-29 using a heat map format that depicts the relative intensity of visitor use throughout the road and trail network in MERA during summer 2012. Generally, information contained in visitor use heat maps like the one in Figure 3-29 can inform transportation planning by identifying locations within a recreation area with high visitor demand that might benefit form improved transportation services and facilities. Moreover, heat maps like this help identify locations to which visitor use could potentially be dispersed (using ITS, trail improvements, etc.) to alleviate congestion in areas that experience excessive traffic, parking congestion, crowding, and/or resource impacts.

The "cooler colors" (i.e., green shades) in the heat map in Figure 3-29 represent sections of the road and trail network in MERA with relatively low concentrations of visitor use, and "hotter colors" (i.e., yellow and red shades) represent sections of the road and trail network with relatively high concentrations of visitor use. For example, the "hotter color tones" on the Mount Evans Highway and at the Mount Evans summit suggest, as expected, visitor use is intensely concentrated in these areas. The notable network of "cooler color tones" on the Summit via Lake Trail and ridges surrounding the summit of Mount Evans suggests that while overall use is not intensively concentrated on these routes, the routes are popular with at least some visitors. In addition, the heat map illustrates the routes that some visitors hike to connect the summits of Mount Evans and Mount Bierstadt in a single day.

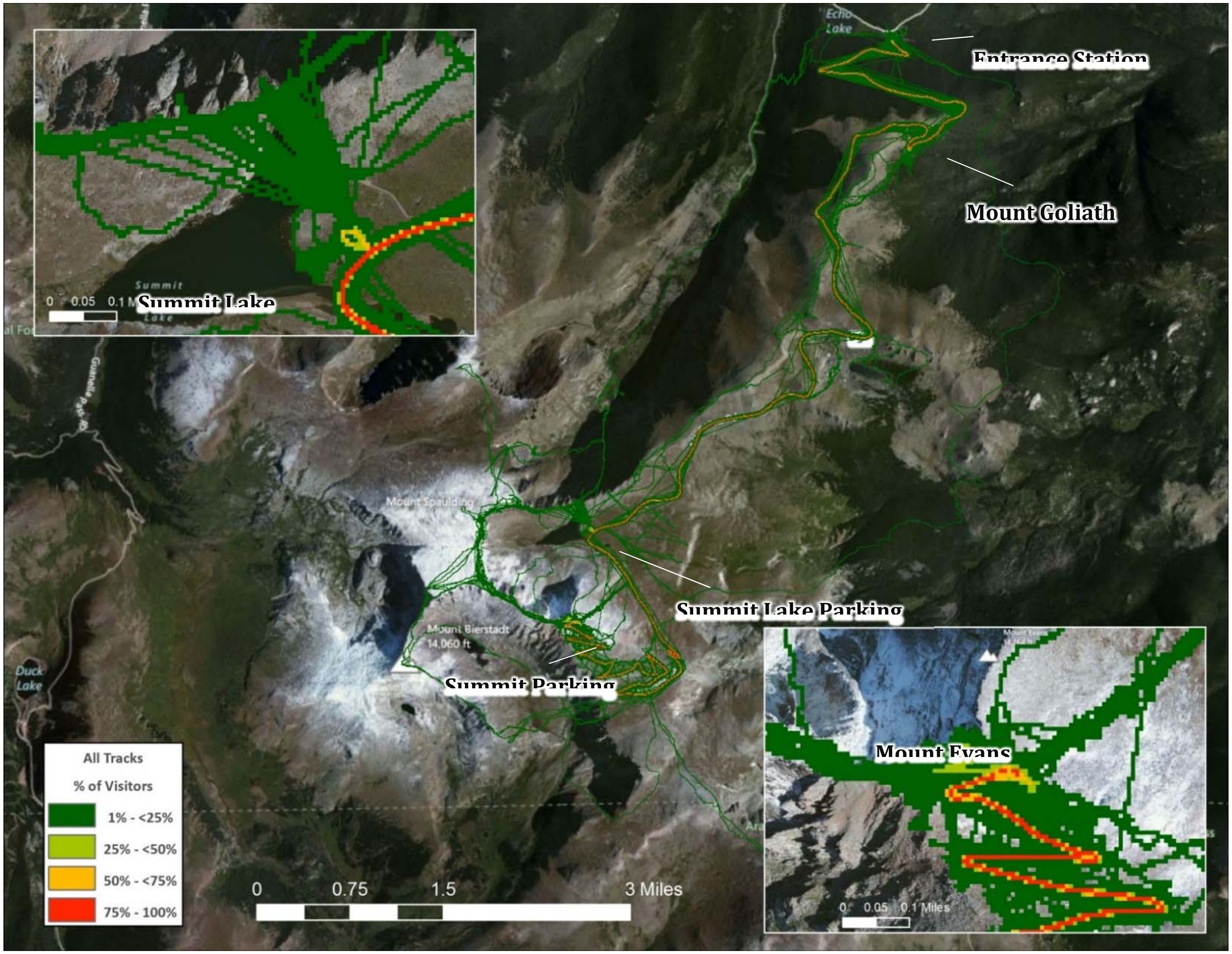


Figure 3-29. Heat map of GPS-based visitor use tracks, MERA, summer 2012.

People At One Time (PAOT) Counts

Data Collection Method

- The number of people at one time (PAOT) on the summit of Mount Evans was measured via direct observation (Figure 2-94).
- Generally, PAOT counts were conducted from approximately 10:00 AM to 3:00 PM, although severe weather conditions on the Mount Evans summit frequently affected the sampling period. In particular, the threat of thunderstorms frequently required field staff to descend from the summit earlier than 3:00 PM.

Figure 3-30. People at one time (PAOT) on the Mount Evans summit, summer 2012.

- The PAOT counts were conducted on two weekdays and eight weekend days between July 8th and September 2nd, 2012. On each sampling day, field staff recorded an "instantaneous count" of the total number of people on the Mount Evans summit every 5 minutes, resulting in 62 weekday and 442 weekend day PAOT observations (Table 3-12).

Table 3-12. People at one time (PAOT) sampling effort, MERA, summer 2012.

Date	Weekend	Number of observations
7/8/2012	Yes	55
7/14/2012	Yes	58
7/20/2012	No	10
7/22/2012	Yes	28
8/4/2012	Yes	56
8/12/2012	Yes	80
8/17/2012	No	52
8/19/2012	Yes	58
8/25/2012	Yes	54
9/2/2012	Yes	53
Total		**504**

Analysis and Results

On weekdays during summer 2012, there was an average of approximately 22 people on the Mount Evans summit at one time; on weekend days during summer 2012, there was an average of approximately 34 people on the summit at one time. The maximum number of people observed at one time on the summit of Mount Evans was approximately 82 people, on Saturday August 4th, 2012. Figure 3-31 displays the daily average and daily maximum number of people observed at one time for each PAOT sampling day during summer 2012. As a point of reference, the maximum PAOT observed on the design day (Sunday, July 22nd, 2012) was 61 people; this results in a density of people on the summit of Mount Evans approximately equivalent to a Pedestrian Level of Service B, which is considered a slight level of crowding in an urban environment, such as on a city sidewalk.[7]

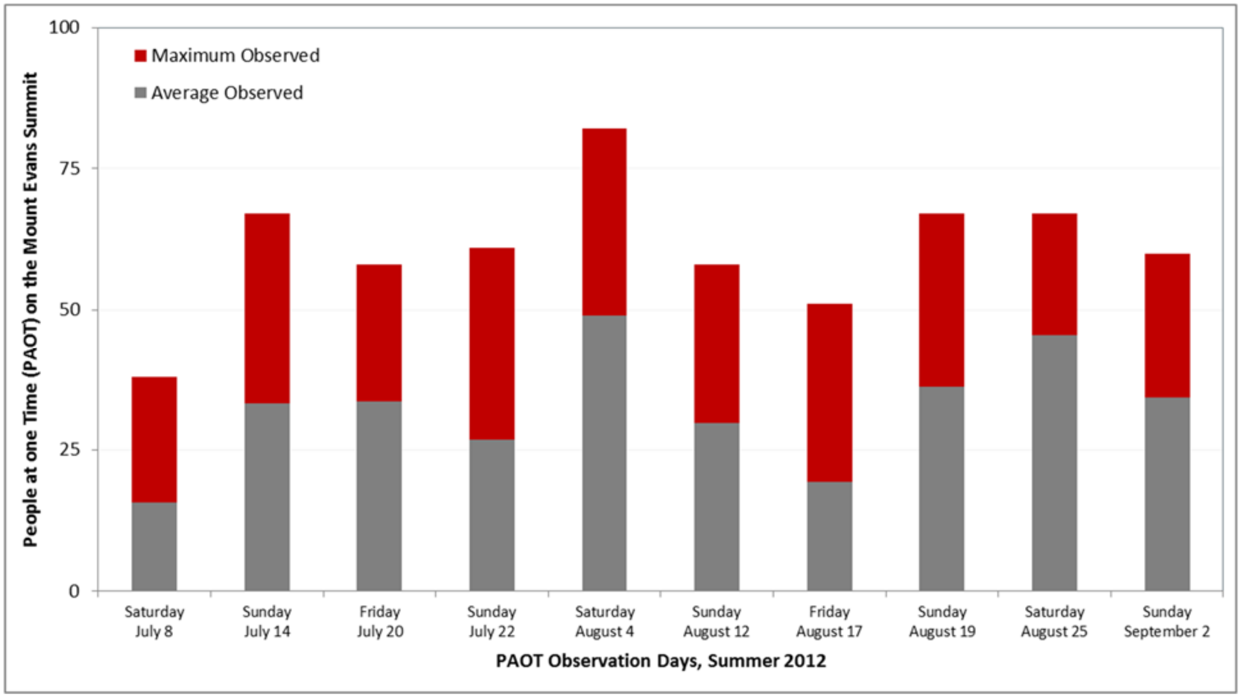


Figure 3-31. Mean and maximum PAOT on the summit of Mount Evans, by sampling day, summer 2012.

Mount Evans Recreation Area Visitor Survey, Summer 2014

During summer 2014, RSG conducted a visitor survey at Mount Evans Recreation Area (MERA). The purpose of the survey was to collect information that will help the US Forest Service (USFS) improve transportation conditions, and recreation and resource management at MERA. In particular, the survey instrument was designed to collect the following information from visitors to Mount Evans Recreation Area:

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[7] Highway Capacity Manual (HCM). (2010) Transportation Research Board of the National Academy of Sciences, Washington, D.C.

- Visitors' perceptions, experiences, and expectations, with respect to transportation conditions and services, recreation opportunities, and visitor experience quality at MERA and on the summit of Mount Evans.
- Visitors' opinions about potential changes in operations to modify and improve transportation services and facilities.
- Transportation-related issues experienced by visitors.

The summer 2014 MERA visitor survey had a particular focus on traffic congestion and parking shortages at the study site during the summer peak visitation period, and potential alternative transportation systems (ATS) strategies to help mitigate and manage these issues. These potential ATS strategies of focus in the survey include shuttle/transit service to MERA; visitor information and Intelligent Transportation Systems (ITS) to manage demand during peak periods; and on-the-ground parking and traffic management to optimize the use of existing parking and roadway infrastructure. The survey was also designed to measure visitors' perceptions and tolerances for crowding on the summit of Mount Evans.

This section of *Chapter 3: Mount Evans Recreation Area Summary of Data and Findings* reports a summary of MERA survey results and methods.

Methods

Survey Instrument

The summer 2014 MERA visitor survey instrument (Appendix S, T) and methods were developed by RSG, in cooperation with the Federal Highway Administration Central Federal Lands Highway Division (CFL), USFS, and US Department of Transportation Volpe Center. Further, the survey instrument and methods were reviewed and approved by the USFS Office of Regulatory and Management Services and the Office of Management and Budget (OMB).

The survey instrument is organized into five sections. The first section of the survey instrument, titled "Trip Description," includes questions concerning respondents' group sizes, the presence or absence of children under the age of 16 in respondents' groups, and locations visited and activities engaged in during their visit MERA.

The second section of the survey instrument, titled "Walk/Hike to Mount Evans Summit" includes questions for those visitors who walked/hiked to the summit of Mount Evans on the day they were contacted for the survey. The questions in this section ask about visitors' perceptions of crowding on the summit of Mount Evans, and attitudes about potential management actions to prevent crowding, environmental impacts, and safety issues. This section includes a question asking people to evaluate a series of photo simulations depicting varying numbers of people on the summit of Mount Evans. The photo simulations are included in Appendix T.

The third section of the survey instrument, titled "Travel and Parking," includes questions concerning visitors' routes of travel to and from MERA, the number of vehicles in which visitor groups traveled there, visitors' time of arrival, visitors' perceptions of traffic congestion at the entrance station and on the Mount Evans Road, the location(s) and perceptions about where visitors parked their vehicle(s), and visitors' attitudes about potential actions to manage parking congestion during peak visitation periods.

The fourth section of the survey instrument, titled "Planning Your Trip to MERA," includes questions about when visitors decided to take a trip to the recreation area, the potential effects of parking conditions at MERA on their trip planning, and the likelihood they would use various sources for information about parking and crowding conditions at MERA, if it was available for planning a future trip.

The fifth section of the survey instrument, titled "Background Information," includes questions concerning respondents' gender, age, state or country of residence, level of formal education, ethnicity, and race.

Survey Sampling and Administration

The population to which statistical generalization is intended for the summer 2014 MERA visitor survey is all visitor groups to MERA during the summer 2014 peak visitation period. It should be noted, for a subset of questions, the study population is visitors (rather than visitor groups); for example, questions asking about the race, ethnicity, age, and gender of respondents is intended to be generalizable to visitors, not visitor groups. In contrast, results for questions about parking locations, recreation activities, and similar group-oriented questions are intended to be generalizable to visitor groups. Survey results are presented in this technical memorandum according to the target population for each individual question.

The summer 2014 MERA visitor survey was administered to visitors as they were exiting MERA at the end of their visit on four weekend days and six weekdays, during summer 2014; the sampling season was selected in consultation with CFL and USFS staff to coincide with the peak summer visitation period at MERA (Table 3-13). On each sampling day, the visitor survey was administered from 10:00 AM to 6:00 PM to coincide with the peak hours of visitor use at MERA.

Table 3-13. Summer 2014 MERA visitor survey sampling effort.

Date	Day of Week	Solicitations	Completes	Refusals	Unusable	Response Rate
7/16/2014	Wednesday	32	17	15	0	53%
7/17/2014	Thursday	78	54	24	0	69%
7/19/2014	Saturday	94	60	34	0	64%
7/25/2014	Friday	68	43	25	0	63%
7/27/2014	Sunday	83	52	31	0	63%
7/28/2014	Monday	58	37	21	0	64%

Date	Day of Week	Solicitations	Completes	Refusals	Unusable	Response Rate
7/31/2014	Thursday	72	46	26	0	64%
8/2/2014	Saturday	99	67	32	0	68%
8/8/2014	Friday	99	55	44	1	56%
8/10/2014	Sunday	46	27	19	0	59%
Total	-	729	458	271	1	63%

Note: "Unusable" are cases where a visitor group agreed to participate but returned an incomplete questionnaire.

On each sampling day, two survey administrators were stationed at a large pullout on Mount Evans Road to intercept visitors while they were driving (Figure 3-32). The survey administrators wore traffic safety vests and installed traffic cones and signs on the roadway to help manage the traffic intercept procedures.

At the start of each sampling day, one survey administrator used hand signals to intercept the first automobile to approach and direct the driver into the pullout. Once the vehicle was safely off the road, the survey administrator approached the automobile and requested the group's participation in the survey. At the same time, a second survey administrator used hand signals to intercept the next automobile to approach and direct the driver into the pullout. Once the vehicle was safely off the road, the second survey administrator approached the automobile and requested the group's participation in the survey.

If an intercepted group had not previously participated in the survey and agreed to participate, a randomly selected adult member (18 years of age or older whose birthday was the next in the group to occur) of the group was given a copy of the survey instrument and asked to complete it onsite. Visitor groups who were unwilling or unable to participate in the survey were thanked for their consideration.

After each visitor group contact, the survey administrator working with the group directed them to safely exit the pullout onto the Mount Evans Road. The survey administrator then returned to the pullout entrance and intercepted the next approaching automobile. The survey administrators repeated this intercept process throughout the day

Figure 3-32. Survey administration at MERA, summer 2014

Survey Nonresponse

To track visitor survey response rates, survey administrators recorded a survey log entry for each visitor group asked to participate in the summer 2014 MERA visitor survey (Figure 3-32). Information recorded on the survey log for each contacted group included: 1) current time; 2) visitor group size; 3) the number of vehicles in which the group traveled to MERA; 4) whether or not the group walked/hiked to the summit of Mount Evans; 5) whether the group accepted or refused to participate in the survey; 6) whether the survey respondent was the driver or a passenger in his/her group's car(s); 7) the survey ID number for those groups who participated; 8) current weather conditions; and 9) comments concerning the contact, as needed (e.g., if a group previously participated or declined to participate due to a language barrier).

ARNF Visitor Survey Log Page ____of ____

Site: ______________________ **Location:** ____________________________ **Date:** ___________ **Initials:** _____________

Special Event: No / Yes: ____________________________ **Start:** __________ **End:** __________

Time	**Group Size**	**# of Veh. per Group**	**Summit / Wilderness**	**Participated?** (*Y* or *N*)	**Driver** (D or P)	**Survey ID #** *If Yes*	**Weather** (*S*, *P*, *O* or *R*)	**Comments** (DB, LB, PP)

Comment Codes: DB – drive-by; LB – unable to recruit due to language barrier; PP – previously participated
Weather: S = Sunny, P = Partly, O = Overcast, R = Raining (or other precipitation)

Figure 3-33. Summer 2014 Mount Evans visitor survey log form

After removing surveys that were unusable (i.e., had incomplete data and were consequently removed from analysis), the overall response rate to the visitor survey was 63%. The survey log data were used to conduct statistical tests for differences between visitor groups who participated in the survey and those that did not, based on group size, number of vehicles used to travel to MERA, vehicle occupancy, and whether or not the group walked/hiked to the summit of Mount Evans.

Results of independent samples t-tests of means and chi-square tests suggest groups who participated in the survey do not differ significantly from those that did not participate, in terms of group size (t=1.896, p=0.058); vehicle occupancy (t=1.829, p=0.068); and whether or not they walked/hiked to the summit of Mount Evans (χ^2=0.095, p=0.758). There was a statistically significant difference between respondent visitor groups and nonrespondent visitor groups, in terms of the number of vehicles in which the group traveled to MERA (t=2.398, p=0.017). However, there was no substantive difference between respondents (mean = 1 vehicle) and nonrespondents (mean = 1 vehicle), in terms of the number of vehicles in which the group traveled to MERA.

In summary, nonresponse bias tests found no significant differences between respondents and nonrespondents for group size, vehicle occupancy, and summit walks/hikes, and no substantive difference for number of vehicles. Therefore, it is reasonable to conclude the survey data are representative of the target study population.

Survey Data Analysis

Survey data analysis procedures used in this study are based on standard methods for survey research in parks and recreation settings (Vaske, 2008)[8]. Key estimates from the data are descriptive in nature, primarily measures of central tendency (mean) and frequency distributions.

In addition, statistical tests for differences between visitors' survey responses on weekdays and weekend days were conducted. For questions with statistically significant differences in responses between weekday and weekend respondents (p-values ≤ 0.05), results are presented separately for weekday and weekend visitors (groups distinguished with orange and blue bars in figures). When responses do not vary significantly, overall results (rather than separate weekend and weekday results) are presented (overall groups represented with black bar in figures).

Results for individual survey questions are presented graphically, with summary statements of significant and/or interesting findings reported above each figure. Question language, as it appeared in the questionnaire, is included below each figure.

[8] Vaske, J. (2008). *Survey Research and Analysis: Applications in Parks, Recreation, and Human Dimensions*. State College, PA: Venture Publishing, Inc.

Visitor Survey Results

Trip Description

- The distribution of group sizes did not vary significantly between weekend day and weekday visitor groups (χ^2=0.362, p=0.948).
- Nearly half (41%) of all visitor groups were groups of two people, and more than three-quarters were groups of two to four people.
- There were few (11%) groups of 5 or more people, and few (13%) visited alone.
- The average group size was 2 people, regardless of the day of week (t=-1.001, p=0.097).

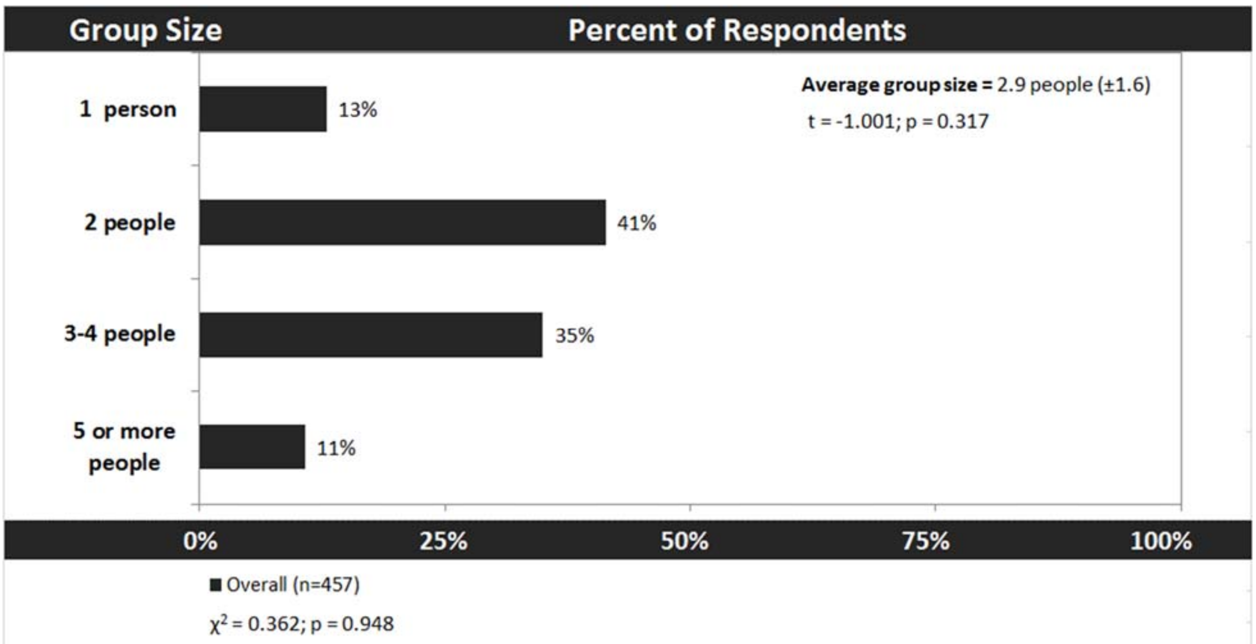

Figure 3-34. Including yourself, how many people are there in your personal group on this trip to MERA?

- The percentage of groups hiking with children under the age of 16 did not differ significantly between weekend day and weekday visitor groups (χ^2=0.062, p=0.804).
- Regardless of the day of week, about one-quarter (23%) of visitor groups were with a child under the age of 16.

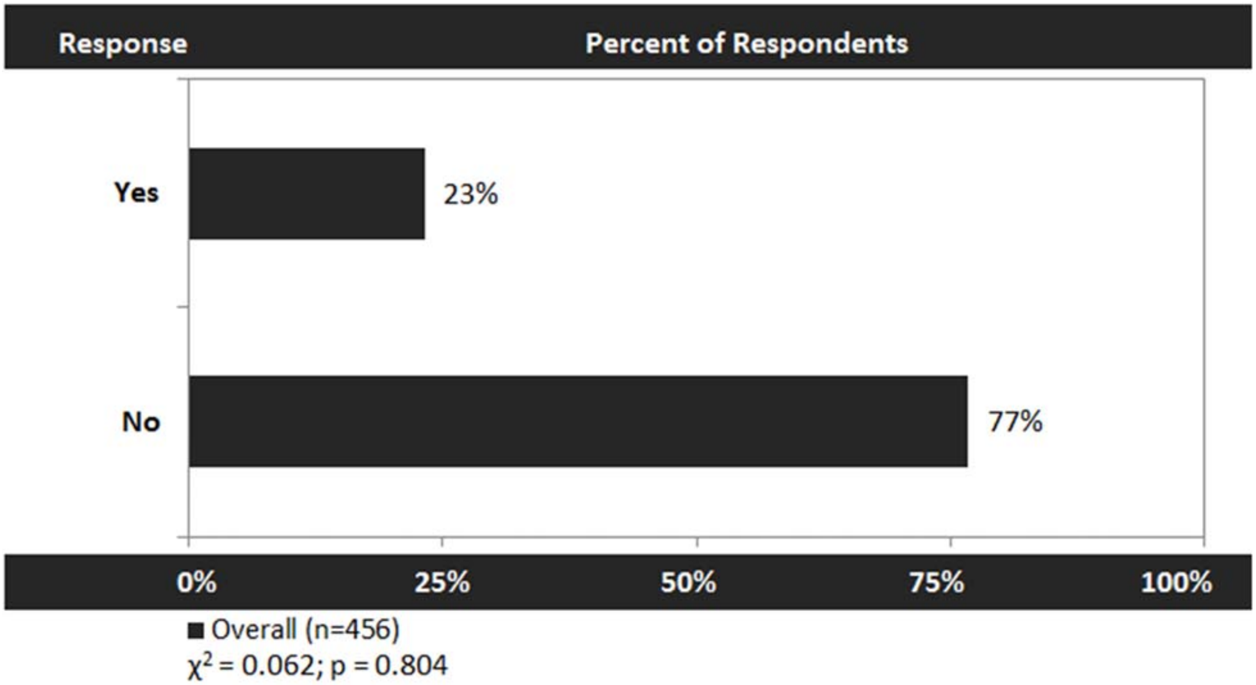

Figure 3-35. Are there any children under the age of 16 in your personal group on this trip to MERA?

- The number of children in groups with children not differ significantly between weekdays and weekend days (χ^2=6.987, p=0.072).
- Regardless of the day of week, there was an average of one child in groups with children (t=-0.617, p=0.539).
- Of the relatively few visitor groups with children under the age of 16, the vast majority (81%) were with only one or two children.
- Very few groups with children (4%) had five or more children.

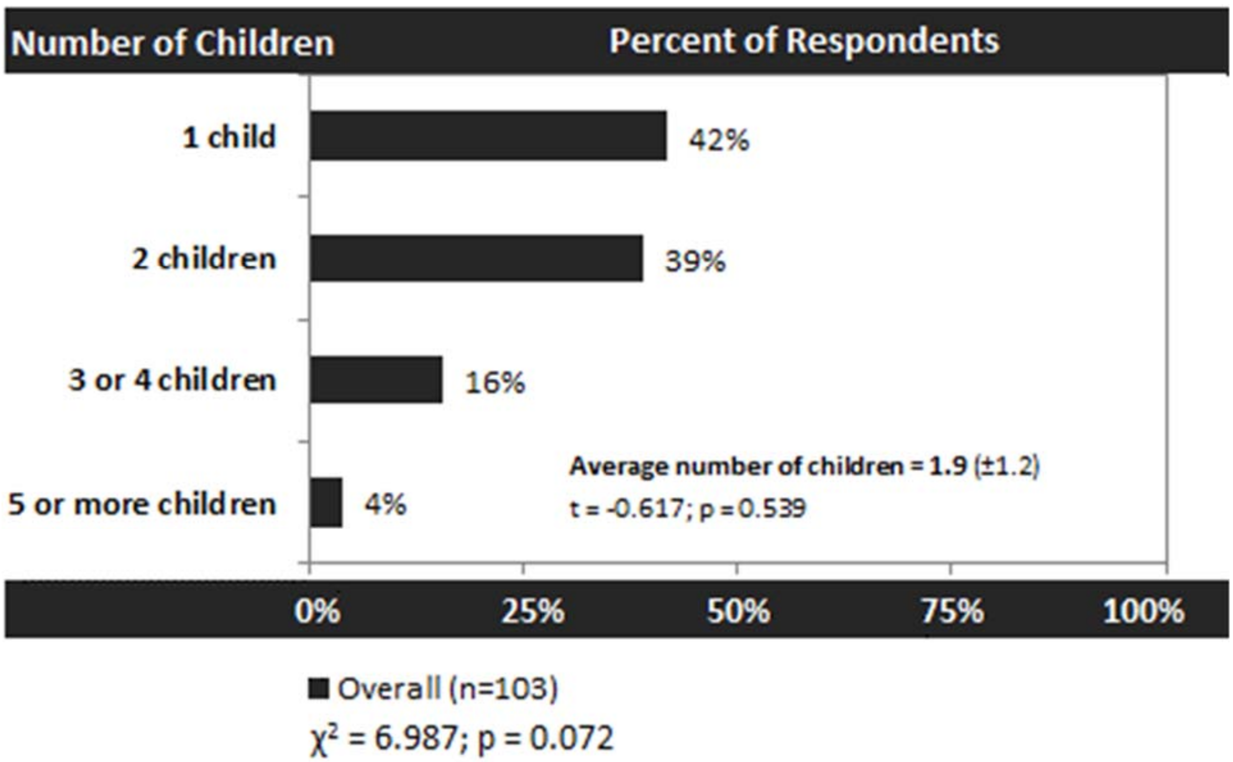

Figure 3-36. For groups with children: how many children under the age of 16 are in your personal group today?

- The percentage of groups who visited each of several locations listed in the questionnaire did not differ significantly between weekend days and weekdays (p>0.05 for all tests).
- Regardless of day of the week, the vast majority (82%) of visitor groups traveled to the summit of Mount Evans, and two-thirds (66%) visited Summit Lake.
- About half (44%) of visitor groups stopped at the Mount Goliath Natural Area.
- Very few (2%) visitor groups reported that they didn't stop at any of the locations listed in the questionnaire (i.e., Mount Evans summit, Summit Lake, Mount Goliath Natural Area).

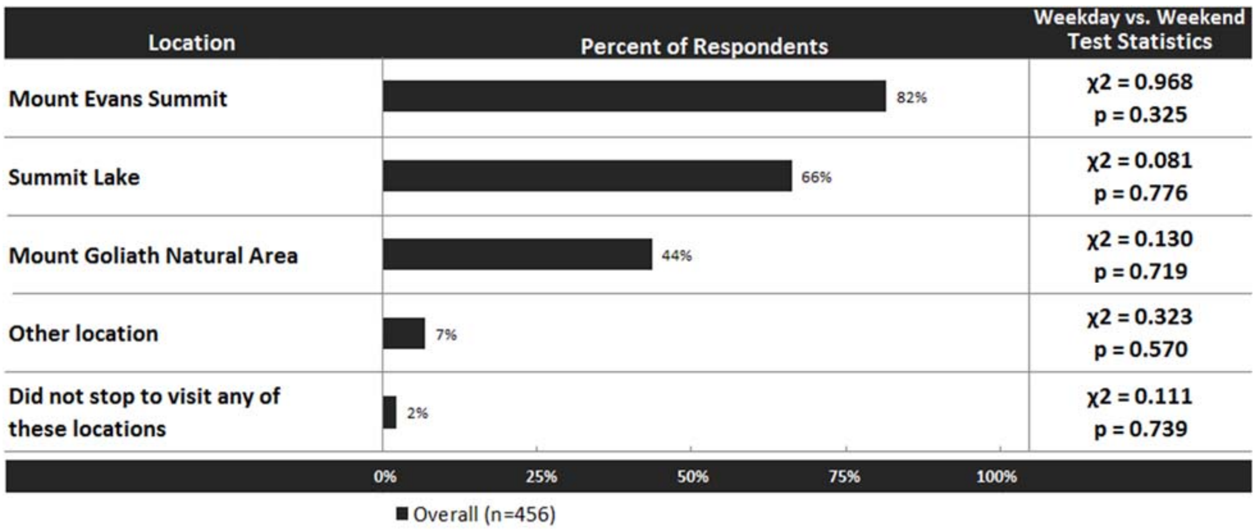

Figure 3-37. Which of the following locations in MERA did you visit today?

- Visitor groups' primary destination did not vary significantly between weekdays and weekend days (χ^2=3.106, p=0.540).
- Mount Evans Summit was the primary destination for the large majority (81%) of visitor groups, regardless of the day of week.
- Few visitor groups indicated that Summit Lake (4%) or Mount Goliath Natural Area (5%) was their primary destination.

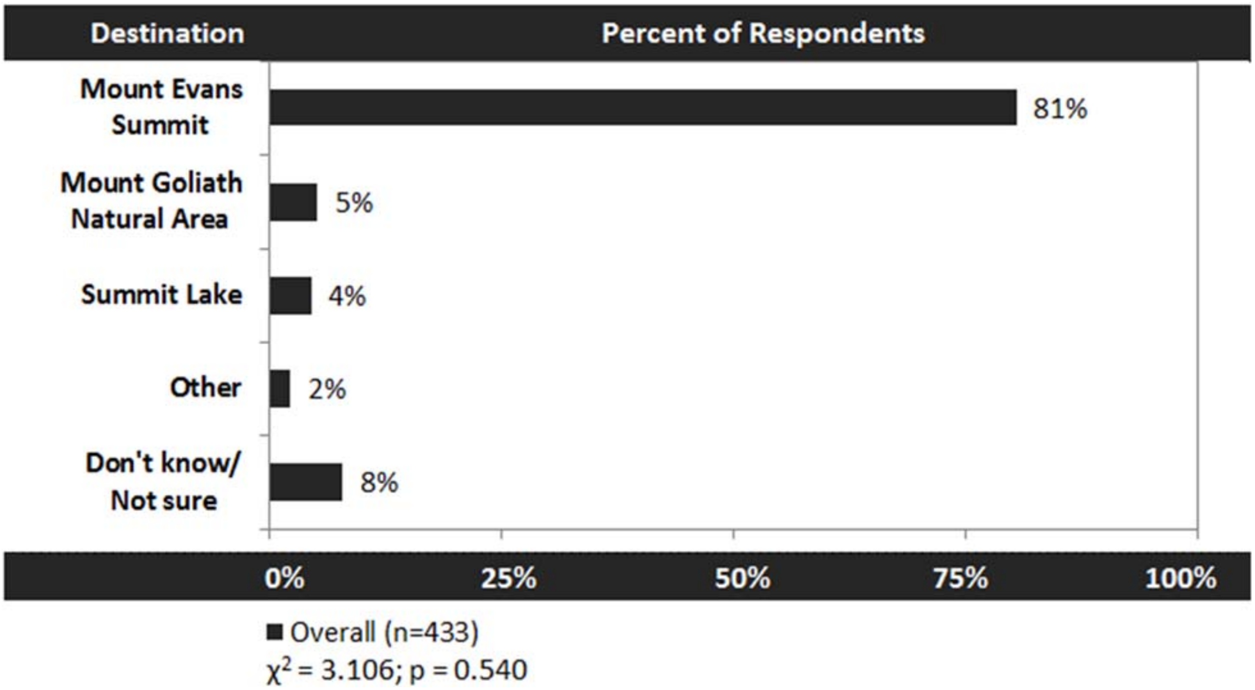

Figure 3-38. Which of the following locations was your primary destination in MERA today?

- With the exception of day hiking (χ^2=9.594, p=0.002), the percentage of visitor groups who participated in each of several activities listed in the questionnaire did not vary significantly between weekdays and weekend days.
- Scenic driving was by far the most popular activity (92%), regardless of the day of week.
- Walking/taking short hikes of less than 1 hour (67%) and wildlife viewing (62%) were the second most common activities, regardless of the day of the week.
- Visitor groups on weekend days were significantly more likely to have gone for a day hike of greater than 1 hour than those on weekdays.
- It should be noted, bicyclists were not intercepted for the survey due to logistical and safety challenges. As a result, the survey results systematically under-represent cyclists.

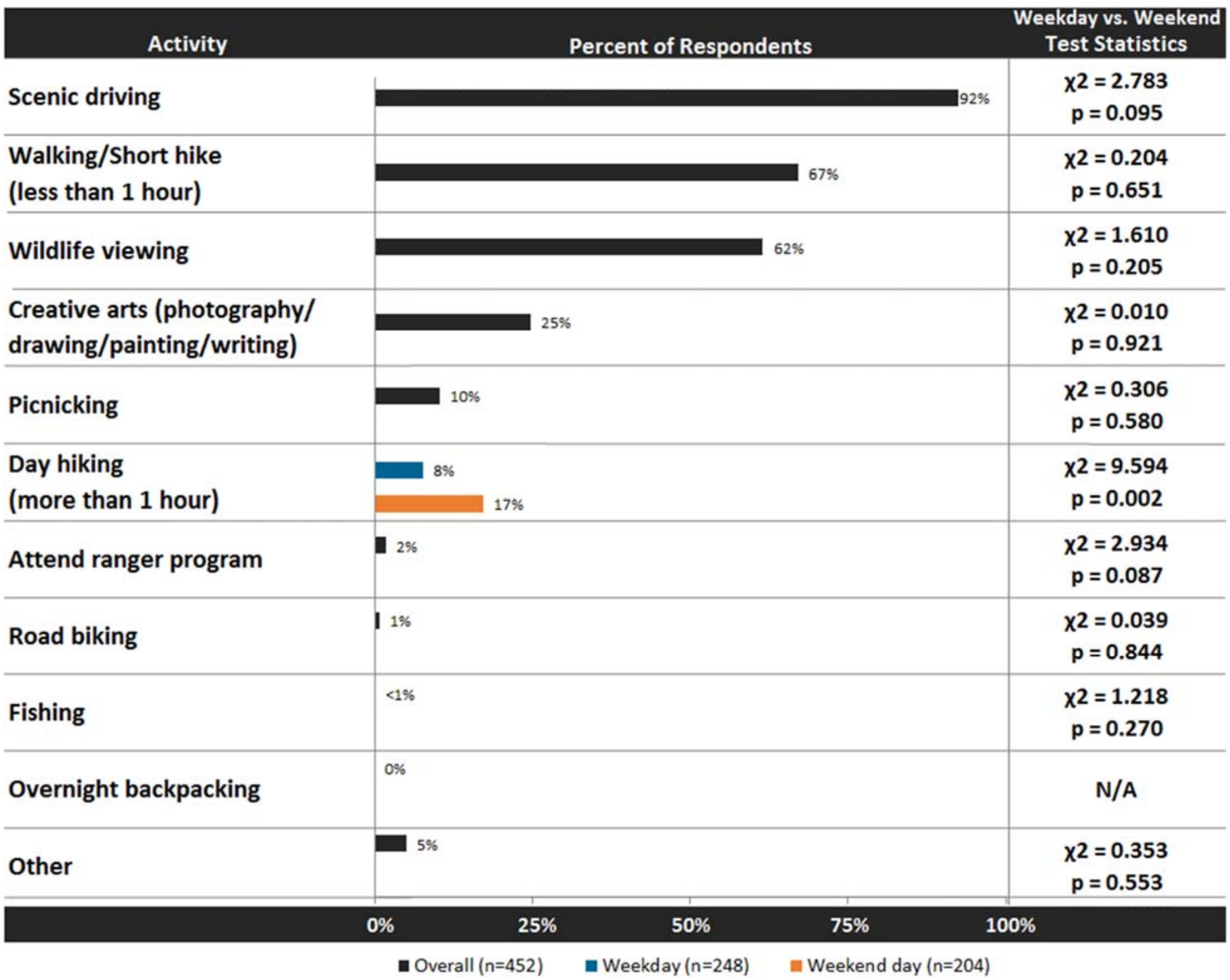

Figure 3-39. Which of the following activities did you do on this trip to MERA?

- The primary activity of visitor groups did not differ significantly between weekdays and weekend days (χ^2=17.542, p=0.093).
- Scenic driving was the primary activity of nearly two-thirds (61%) of all visitor groups.

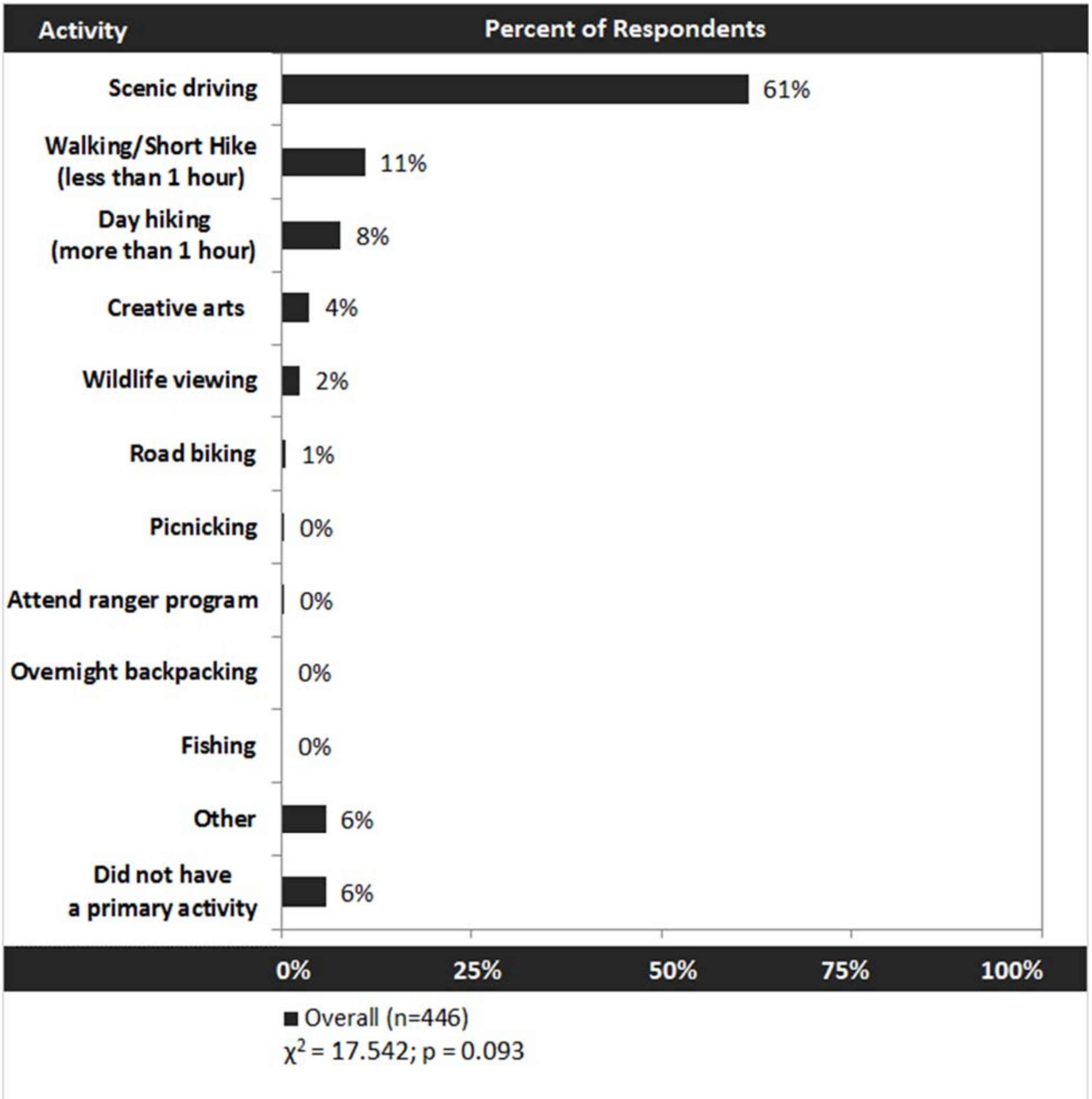

Figure 3-40. Which of the following is your primary activity on this trip to MERA?

Walk/Hike to Mount Evans Summit

- The percentage of visitor groups who hiked to the summit of Mount Evans did not vary significantly between weekday and weekend day visitors (χ^2=6.212, p=0.102).
- A little less than half (46%) of all visitor groups hiked to the summit of Mount Evans.
- Of those visitor groups who hiked to the summit of Mount Evans, the majority hiked from the parking lot just below the summit, rather than hiking from Summit Lake or another location.

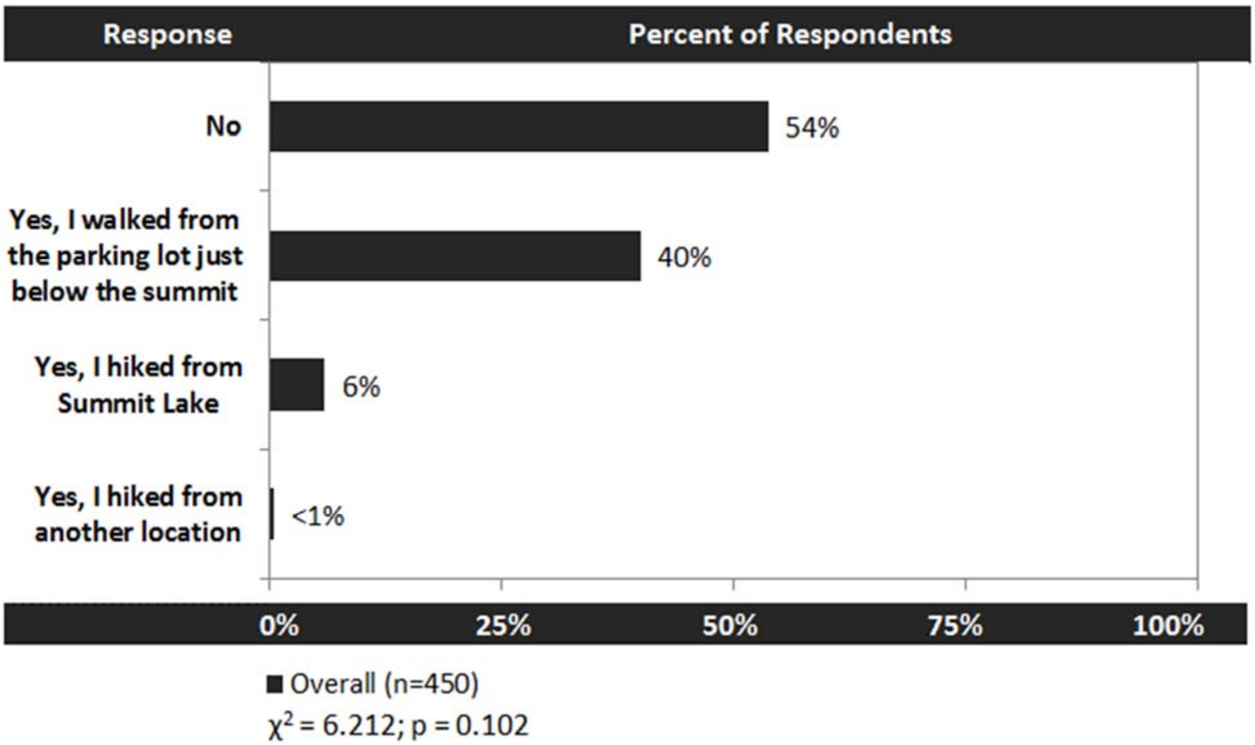

Figure 3-41. Did you walk/hike to the summit of Mount Evans today?

- Visitors contacted on weekend days were significantly more likely to think the summit of Mount Evans was crowded than those contacted on weekdays (χ^2=18.960, p<0.001).
- Nearly half (44%) of all visitors on weekend days thought the summit was crowded.
- In contrast, the vast majority (83%) of weekday visitors thought the summit was not crowded.

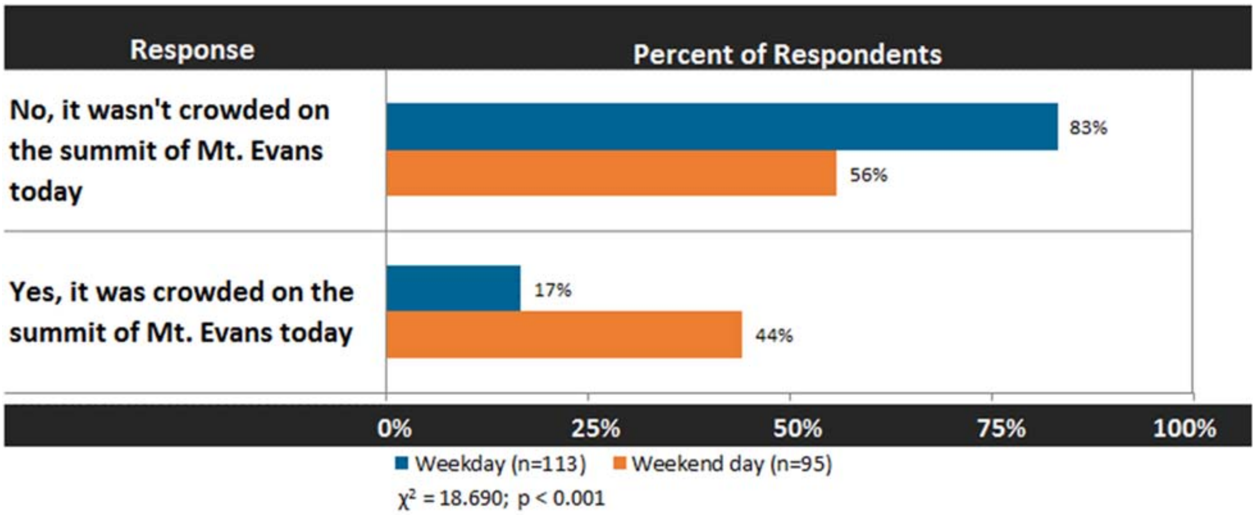

Figure 3-42. Did you think it was crowded on the summit of Mount Evans today?

- Despite the fact that weekend visitors were more likely than weekday visitors to think the summit of Mount Evans was crowded, there was no significant difference between weekday and weekend visitors' perceptions of risk, as a result of crowding, on the summit of Mount Evans (χ^2=0.015, p=0.903).
- A significant majority of all visitors (90%) felt like crowding on the summit of Mount Evans did not increase the risk of injuries to themselves or others.

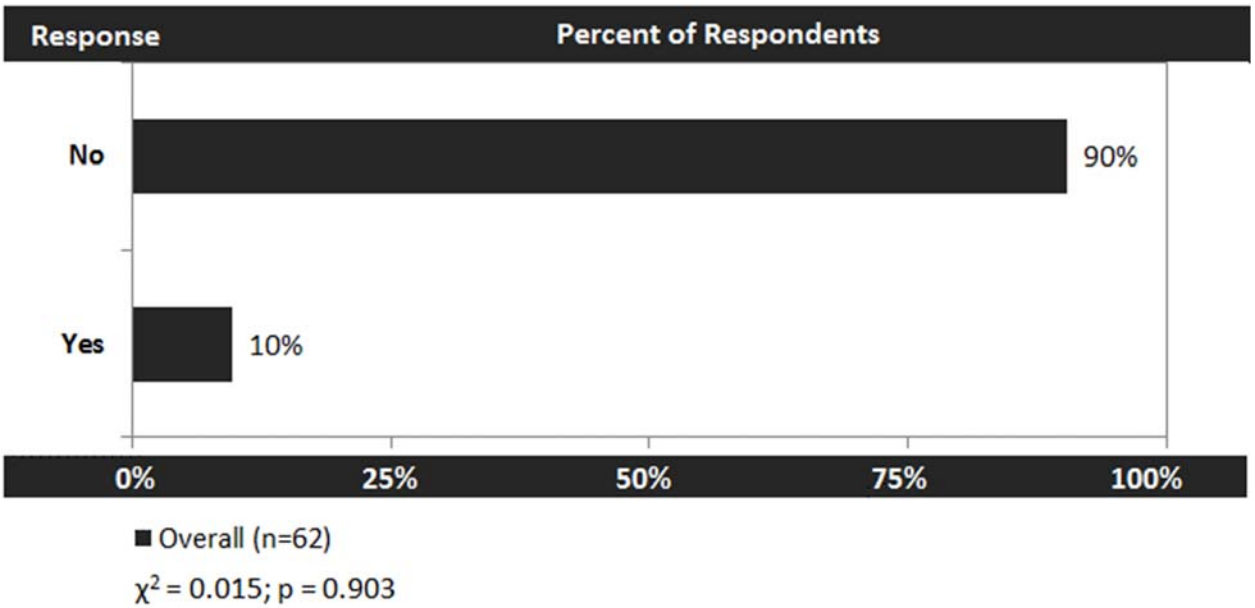

Figure 3-43. Did you feel like crowding on the summit of Mount Evans increased your risk or other people's risk of being injured at any point while you were there today?

- Respondents were asked to indicate for each of several simulated photos of varying numbers of people on the summit of Mount Evans if they would feel crowding being on the summit with that number of people. Weekday visitors were generally slightly more crowding-sensitive than weekend visitors.
- Few (19% or fewer) visitors thought they would feel crowded with 10 or fewer other people on the summit of Mount Evans.
- About one-third or more (43% on weekdays and 29% on weekend days) of visitors thought they would feel crowded with 13 other people on the summit at one time.
- Roughly half or more (70% or more on weekdays and 47% or more on weekend days) of visitors thought they would feel crowded with 19 or more other people on the summit.

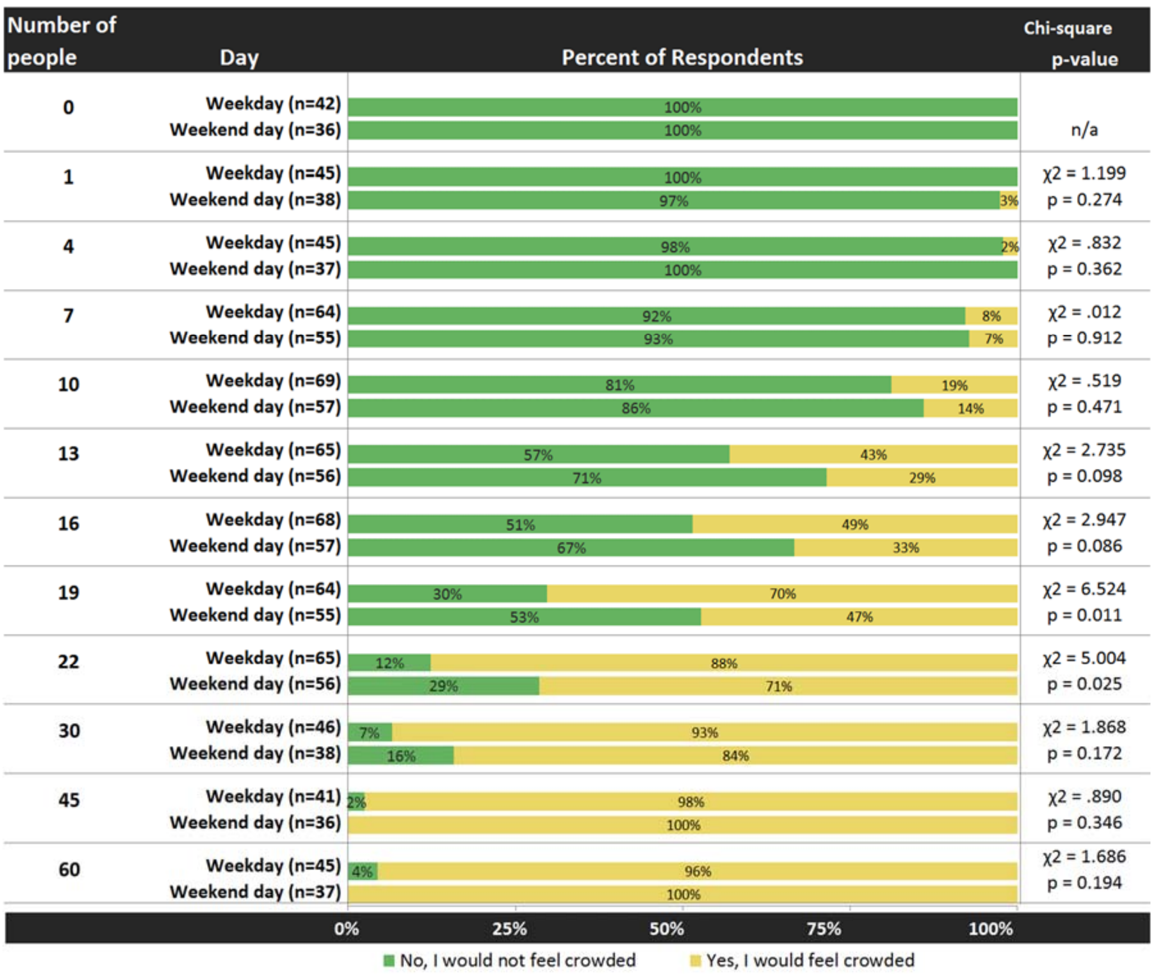

Figure 3-44. For each photograph, please tell us if you would feel crowded if you were on the summit of Mount Evans with the number of people depicted in the photograph.

- Visitors on weekend days and weekdays did not differ significantly in their opinions about whether or not the number of people allowed to visit Mount Evans each day should be limited, regardless of the reason for the use limit ($p>0.05$ for all tests).
- Regardless of the reason, substantive proportions of all visitors believe the number of people allowed to visit Mount Evans each day should be limited, even if it limits when they can hike the trail.
- Just over one-quarter (28%) of all visitors believe the number of people allowed to visit Mount Evans each day should be limited to protect the quality of visitors' experiences, even if it limits when they can hike the trail.
- About half (53%) of all visitors believe the number of people allowed to visit Mount Evans each day should be limited to protect visitors' safety, even if it limits when they can hike the trail.
- More than half (58%) of all visitors believe the number of people allowed to visit Mount Evans each day should be limited to reduce environmental impacts, even if it limits when they can hike the trail.

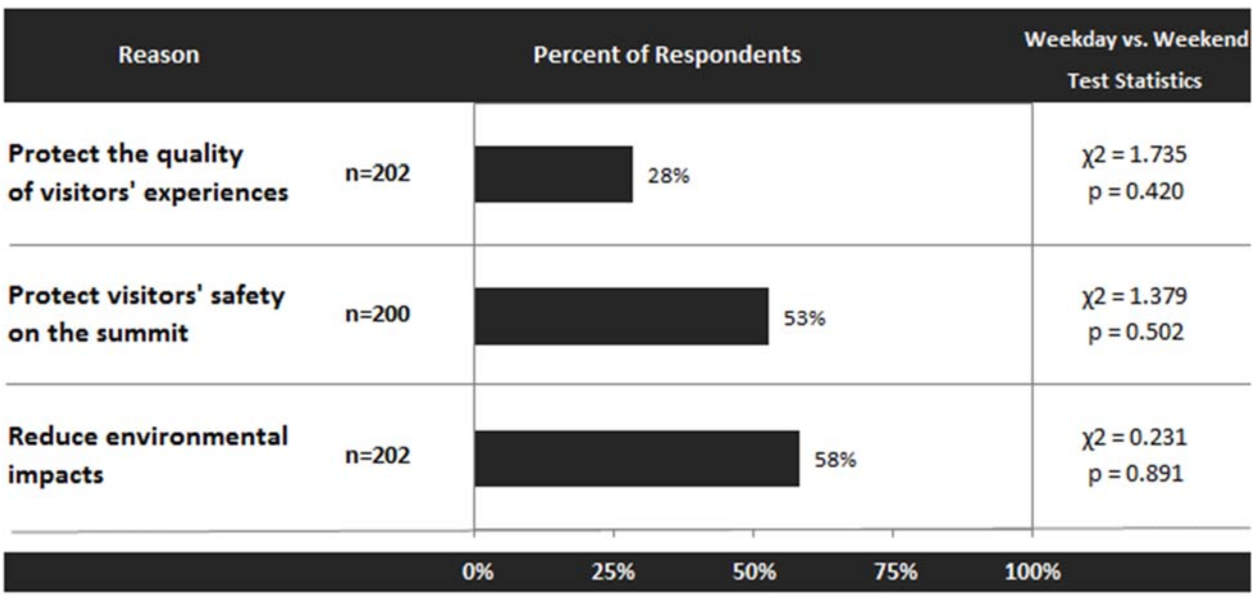

Figure 3-45. Percentage who agree that the number of people allowed to visit Mount Evans each day should be limited, even if it limits when they can visit, if it is needed to a) protect the quality of visitors' experiences; b) protect visitors' safety; c) to reduce environmental impacts.

Travel and Parking

- The travel routes of weekday visitor groups varied significantly from those of groups on weekend days (χ^2=15.855, p=0.001).
- Weekday visitor groups were more likely than groups on weekend days to travel to and from MERA via Idaho Springs, though this was, by far, the most common route for both (73% of weekday visitor groups and 58% of weekend day visitor groups).
- Close to half (42%) of weekend day visitor groups' travel routes included traveling to and/or from MERA via Evergreen, compared to about one-quarter (26%) of weekday visitor groups.

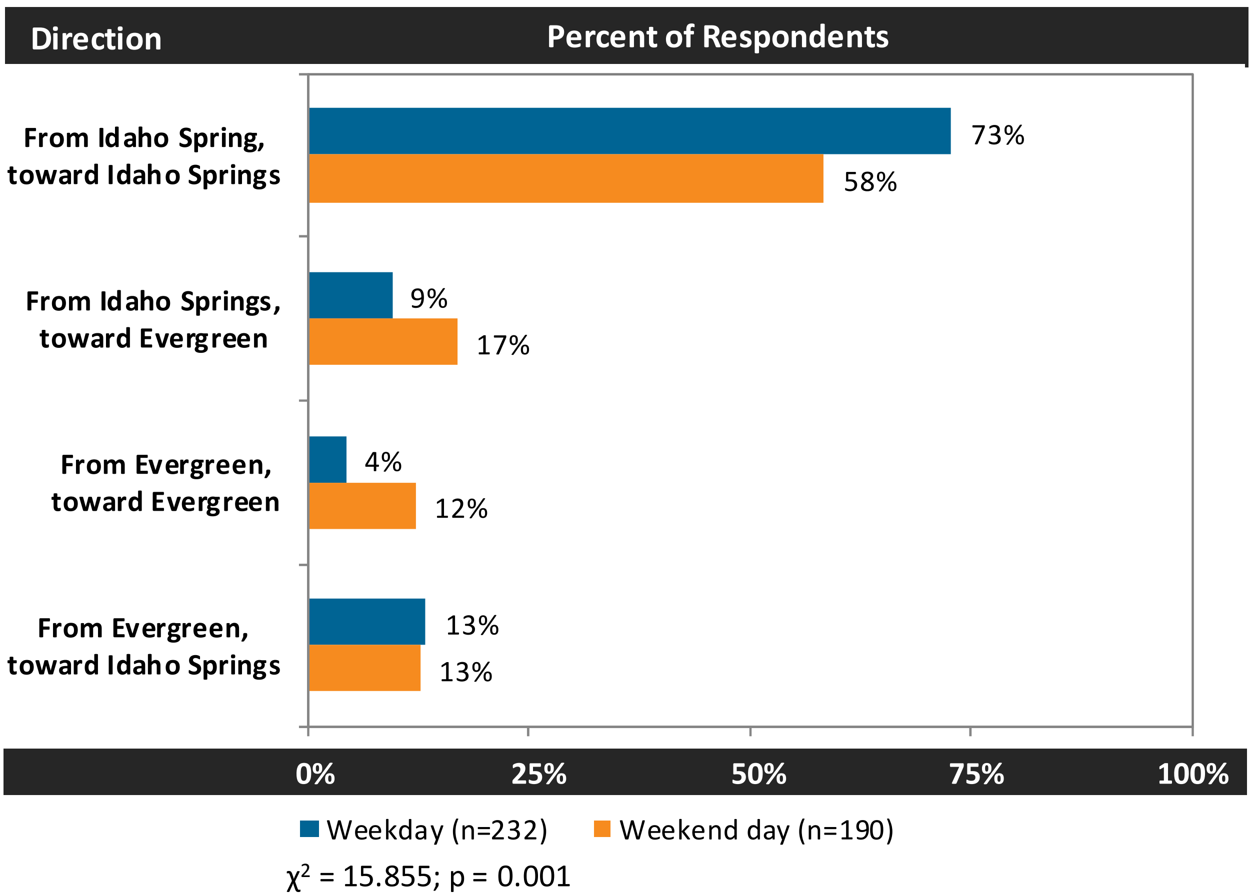

Figure 3-46. Which routes did you use to travel to and from MERA on this trip?

- Visitor groups' arrival times at MERA varied significantly between weekdays and weekend days (χ^2=15.752, p=0.008).
- Weekday visitor groups were significantly more likely to arrive at MERA later than weekend visitors (p=0.001). On average, weekday visitor groups arrived at 11:39 AM, while weekend visitor groups arrived 47 minutes earlier at 10:52 AM.
- The majority of weekend visitor groups arrived before 11 AM (59%), while the majority (57%) of weekday visitor groups arrived after 11 AM.
- On average, weekday visitor groups arrived around 11:30 AM and weekend visitor groups arrived around 11:00 AM.

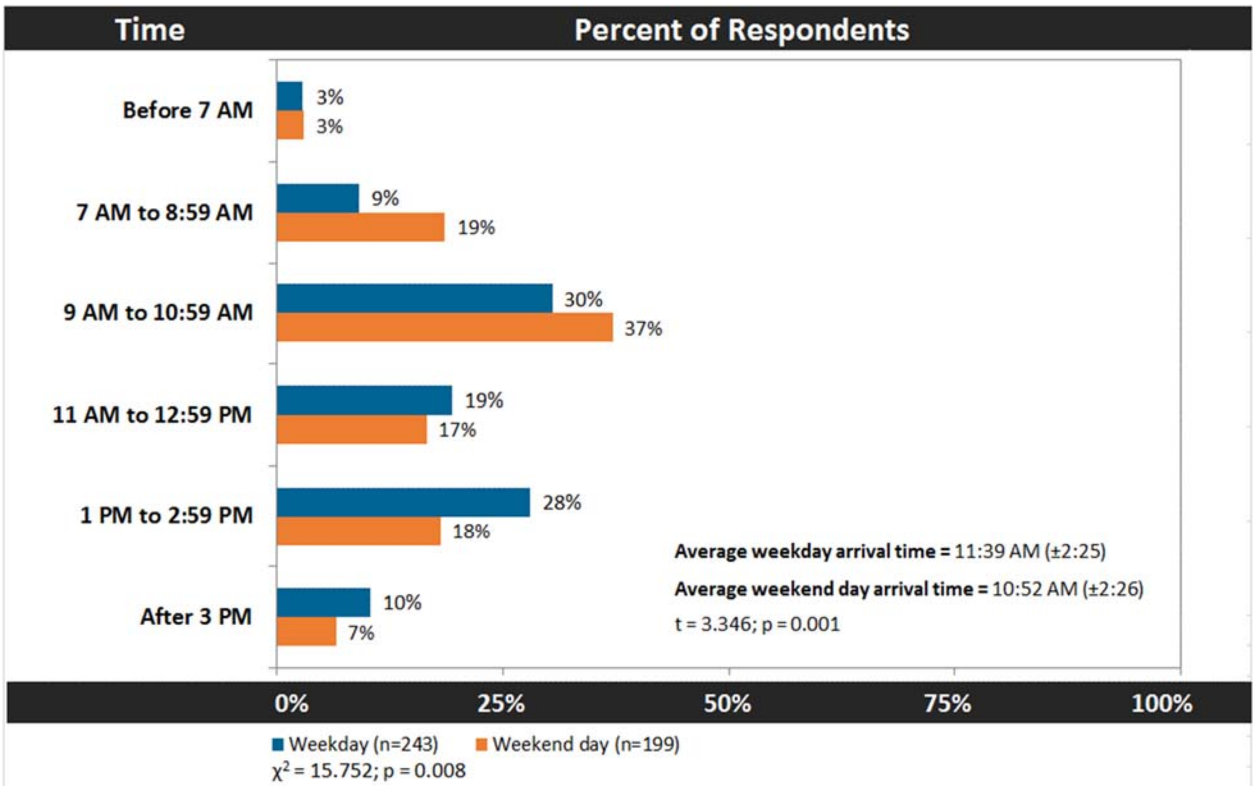

Figure 3-47. At approximately what time did you arrive at MERA today?

- All (100%) visitor groups arrived at MERA on the same day they took the survey, regardless of the day of week (χ^2=1.013, p=0.314).

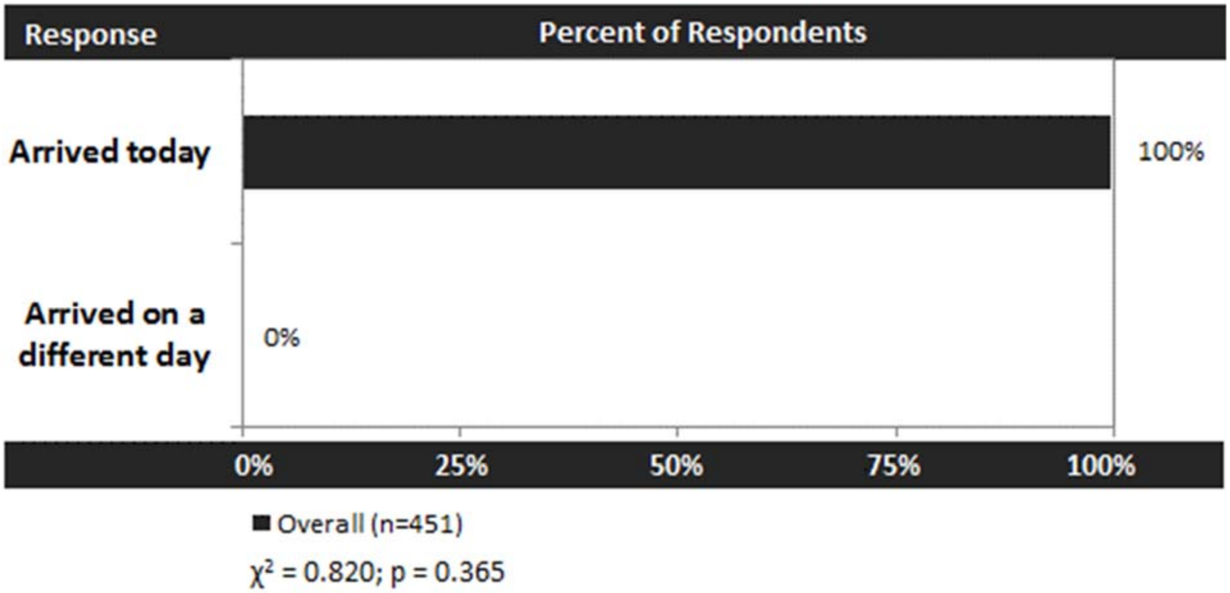

Figure 3-48. Percentage of visitor groups who arrived at MERA on the same day or different day than when they were contacted for the survey.

- Virtually all visitor groups (96%) traveled to MERA in a single vehicle, regardless of the day of week (χ^2=0.302, p=0.861; t=0.129, p=0.897).

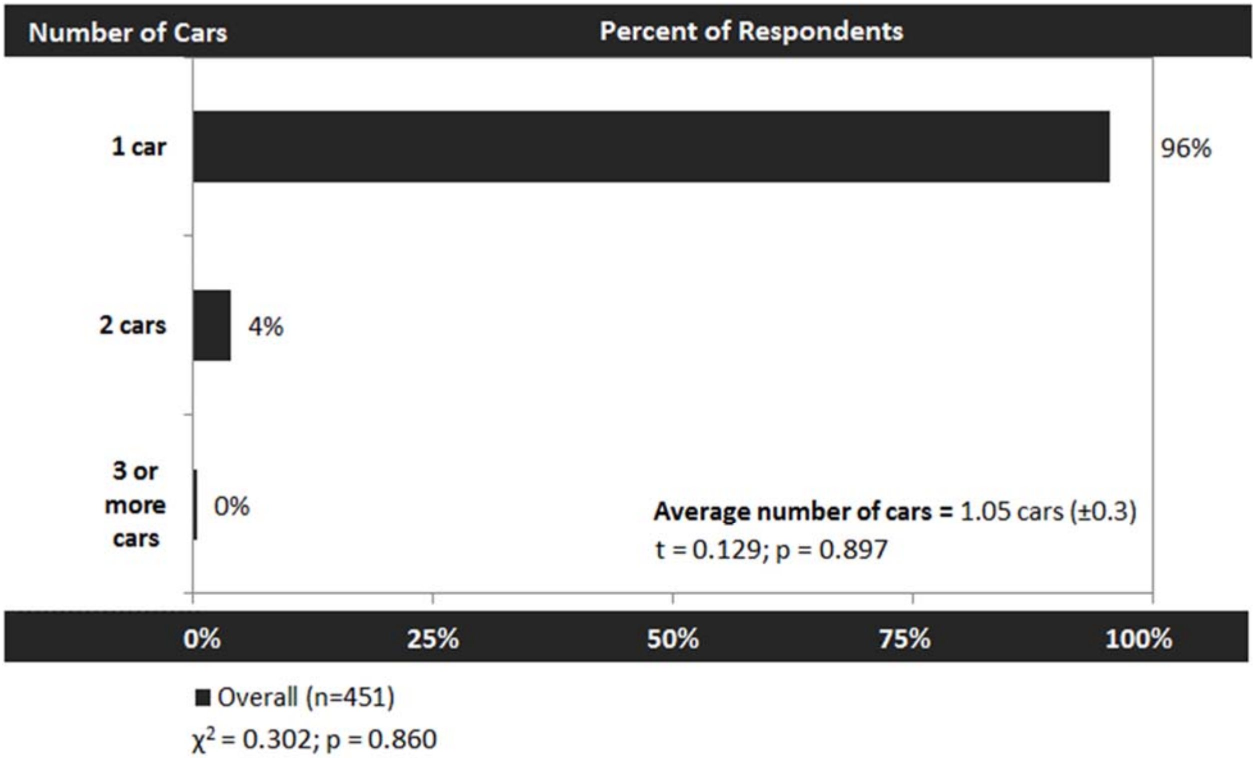

Figure 3-49. In how many vehicles did you/your personal group travel on this trip to MERA?

- The percentage of visitors who experienced traffic congestion at the MERA entrance station varied significantly between weekdays and weekend days (χ^2=15.162, p<0.001).
- On weekend days, about one-quarter (28%) of visitors experienced traffic congestion at the MERA entrance station.
- The vast majority (87%) of visitors on weekdays did not experience traffic congestion at the MERA entrance station.

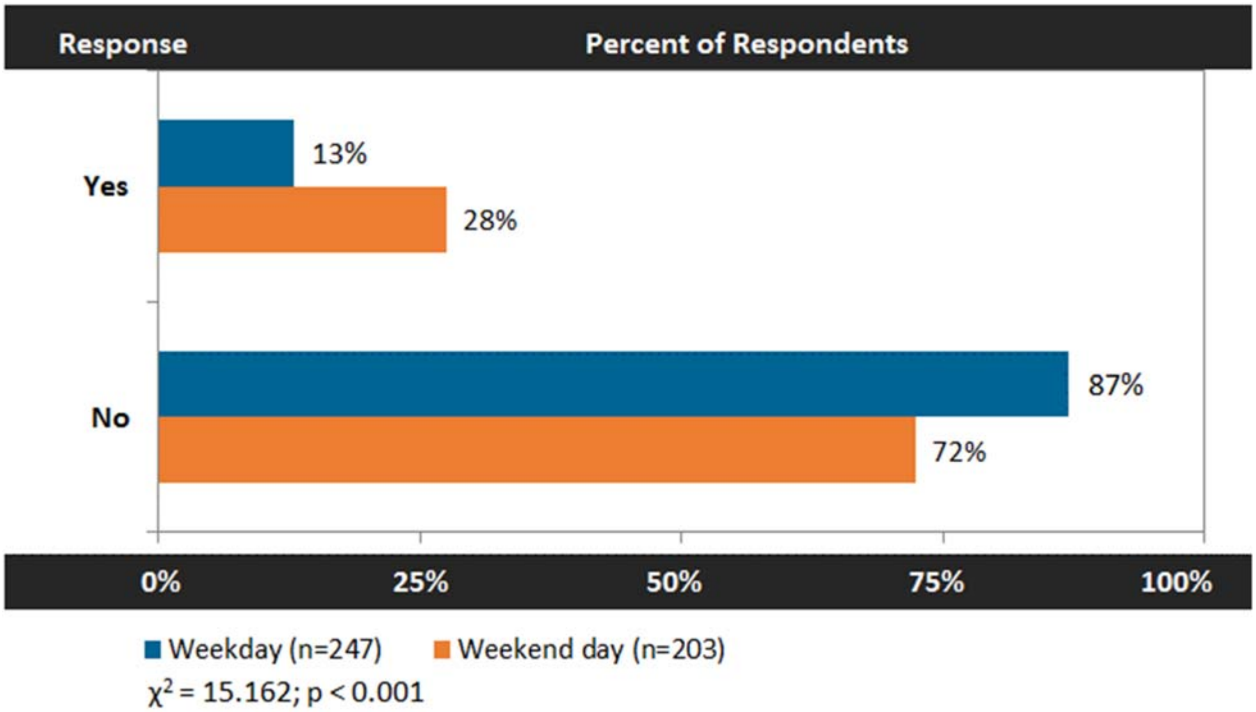

Figure 3-50. Did you experience traffic congestion at the entrance station to enter MERA on this trip?

- The percentage of visitors who experienced traffic congestion on the Mount Evans Road varied significantly between weekdays and weekend days (χ^2=8.862, p=0.003).
- On weekend days, about one-fifth (22%) of visitors experienced traffic congestion while driving on Mount Evans Road.
- The vast majority (89%) of visitors on weekdays did not experience traffic congestion while driving on Mount Evans Road.

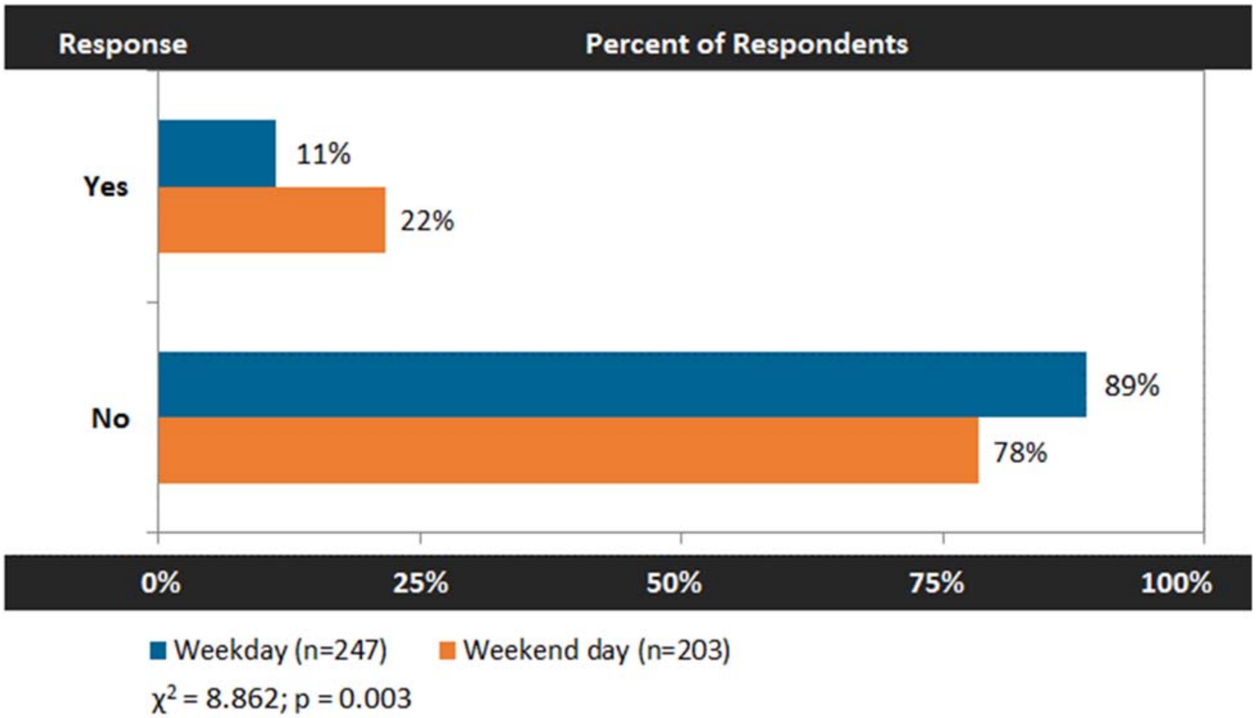

Figure 3-51. Did you experience traffic congestion while driving on the Mount Evans Road?

- The percentage of visitors who felt that the number of cars on the Mount Evans Road made driving conditions unsafe varied significantly (χ^2=14.370, p=0.006), but not substantively, between weekdays (7%) and weekend days (6%).
- Nearly one-third (29%) of visitors on weekends felt that the number of bicycles on the Mount Evans Road made driving conditions unsafe, compared to just 10% of those on weekdays (χ^2=43.956, p=<0.001).
- The vast majority (90%) of all visitors reported that they enjoyed driving on the Mount Evans Road.
- Very few (10%) visitors reported that they would prefer to tour MERA by shuttle bus or van, rather than drive on the Mount Evans road themselves.

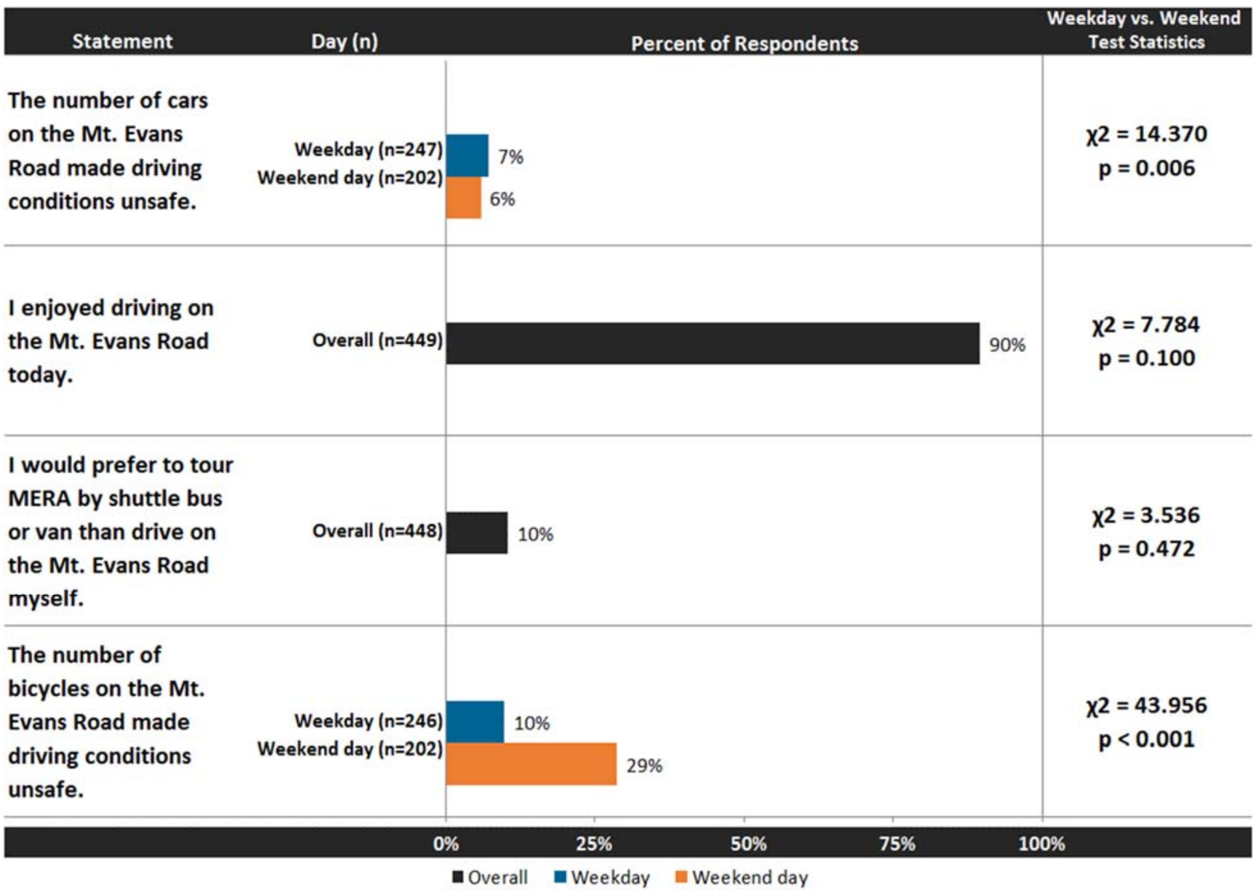

Figure 3-52. Percentage who agree with each of the statements about driving on the Mount Evans Road on the day they took the survey.

- Less than half (44%) of visitors who parked at the Mount Evans summit on weekend days agreed that where they parked there was uncongested, compared to nearly three-quarters (74%) of those on weekdays (χ^2=29.294, p<0.001).
- Weekday visitors who parked at the Mount Evans summit (91%) were more likely than those on weekend days (81%) to report that they parked in a designated lot there (χ^2=6.740, p=0.009).
- However, 40% of all visitors who parked at the Mount Evans summit agreed that where they parked there was not an actual parking space (e.g., on road shoulder).
- The vast majority of all visitors who parked at the Mount Evans summit thought where they parked there was safe (98%) and convenient (96%).

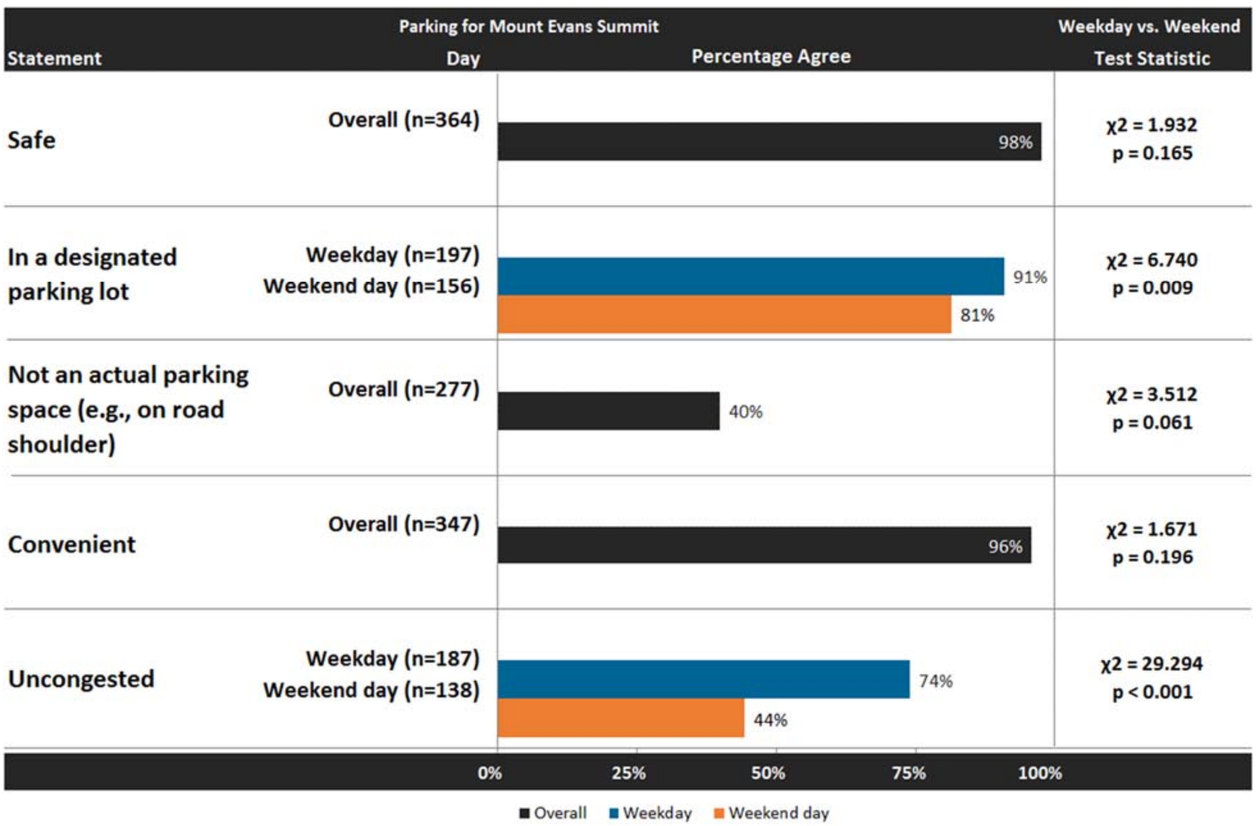

Figure 3-53. Of those visitors who parked at the Mount Evans summit, the percentage who agree with each of the statements about where they parked.

- Weekday visitors who parked at Summit Lake were more likely than those on weekend days to agree that where they parked there was safe (100% versus 96%); in a designated parking lot (97% versus 80%); convenient (99% versus 94%); and uncongested (86% versus 49%).
- About one-quarter (28%) of all visitors who parked at Summit Lake agreed that where they parked there was not an actual parking space (e.g., on road shoulder).

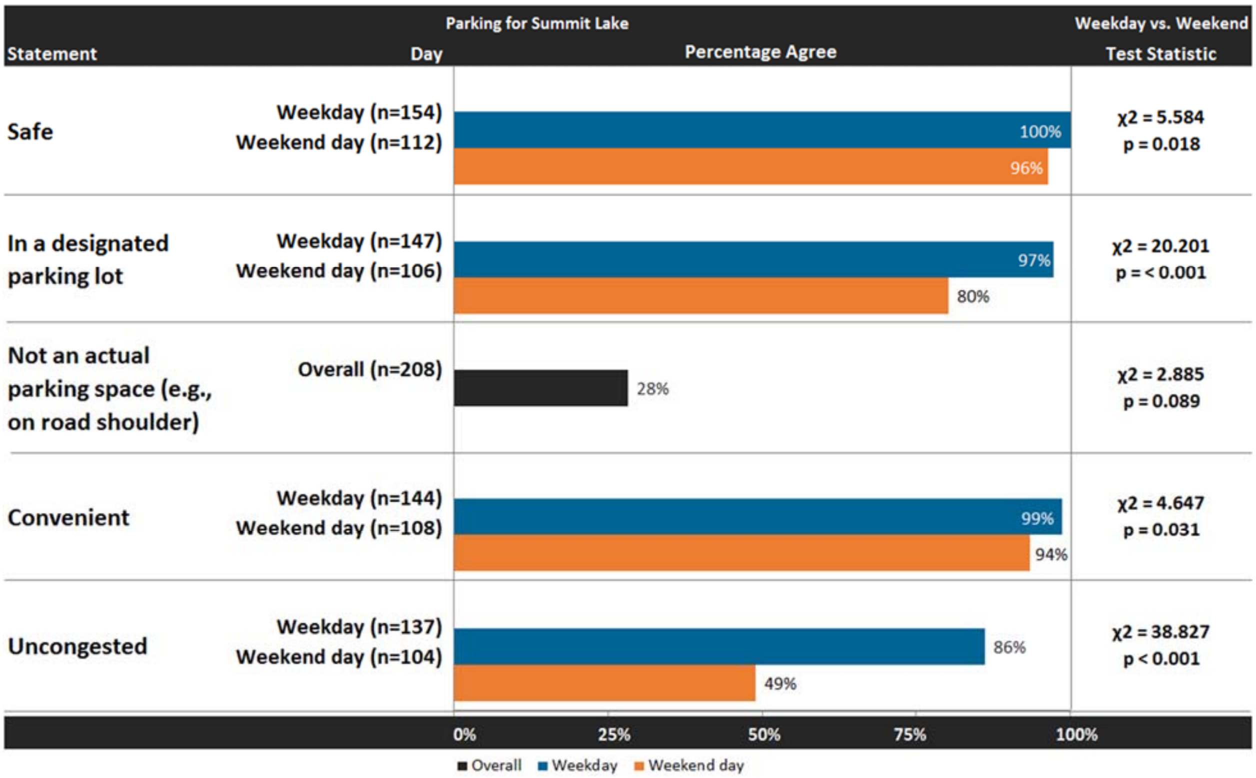

Figure 3-54. Of those visitors who parked at Summit Lake, the percentage who agree with each of the statements about where they parked.

- The vast majority of all visitors who parked at the Mount Goliath Natural Area agreed that where they parked there was safe (99%), in a designated parking lot (96%), and convenient (96%).
- About one-quarter (29%) of all visitors who parked at the Mount Goliath Natural Area agreed that where they parked was not an actual parking space (e.g., on road shoulder).
- Weekday visitors who parked at the Mount Goliath Natural Area were much more likely than those on weekend days to agree that where they parked was uncongested (94% versus 58%).

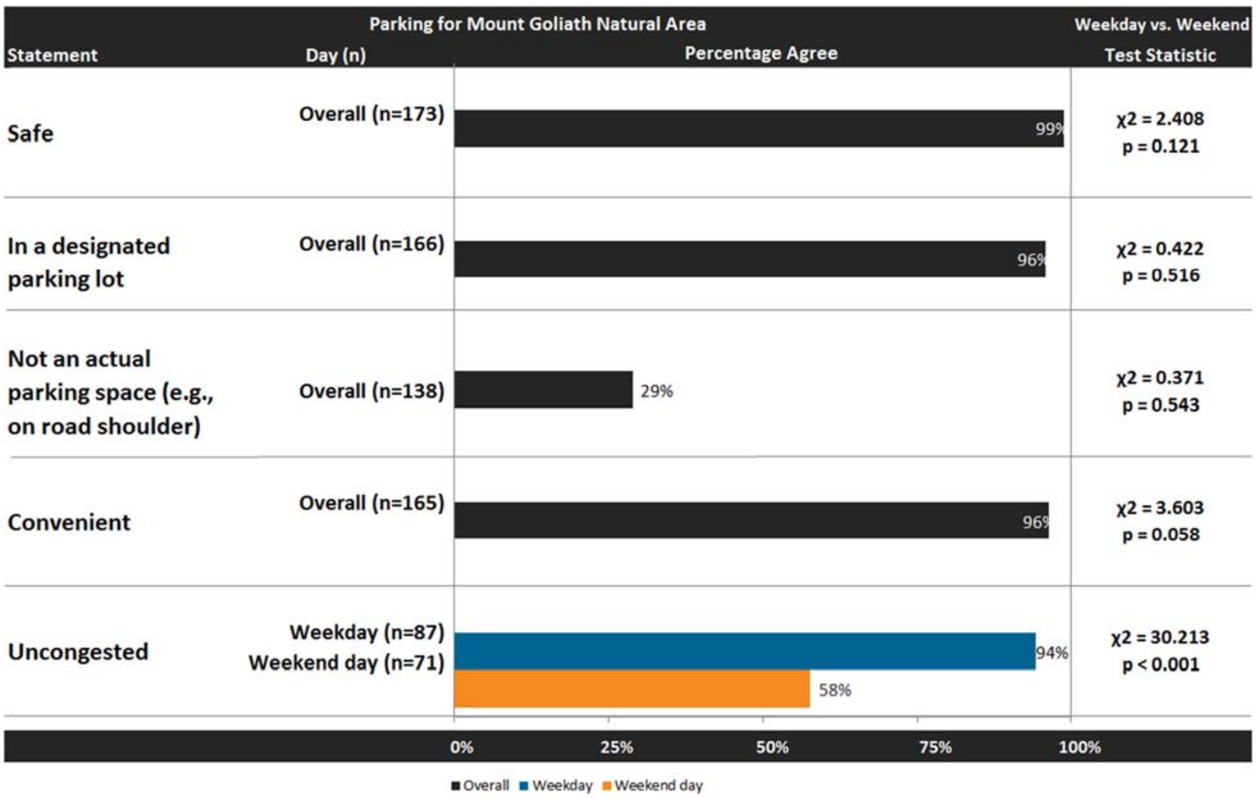

Figure 3-55. Of those visitors who parked at the Mount Goliath Natural Area, the percentage who agree with each of the statements about where they parked.

- Weekday visitors' perceptions of parking congestion at MERA varied significantly from those of visitors on weekend days (χ^2=87.040, p<0.001).
- More than two-thirds (69%) of visitors on weekend days thought that parking congestion at MERA was moderate to extreme that day.
- While perceptions of parking congestion were less negative, more than one-quarter (29%) of weekday visitors thought that parking congestion at MERA was moderate to extreme that day.
- However, nearly one-third (30%) of weekday visitors thought there was no parking congestion at all that day.

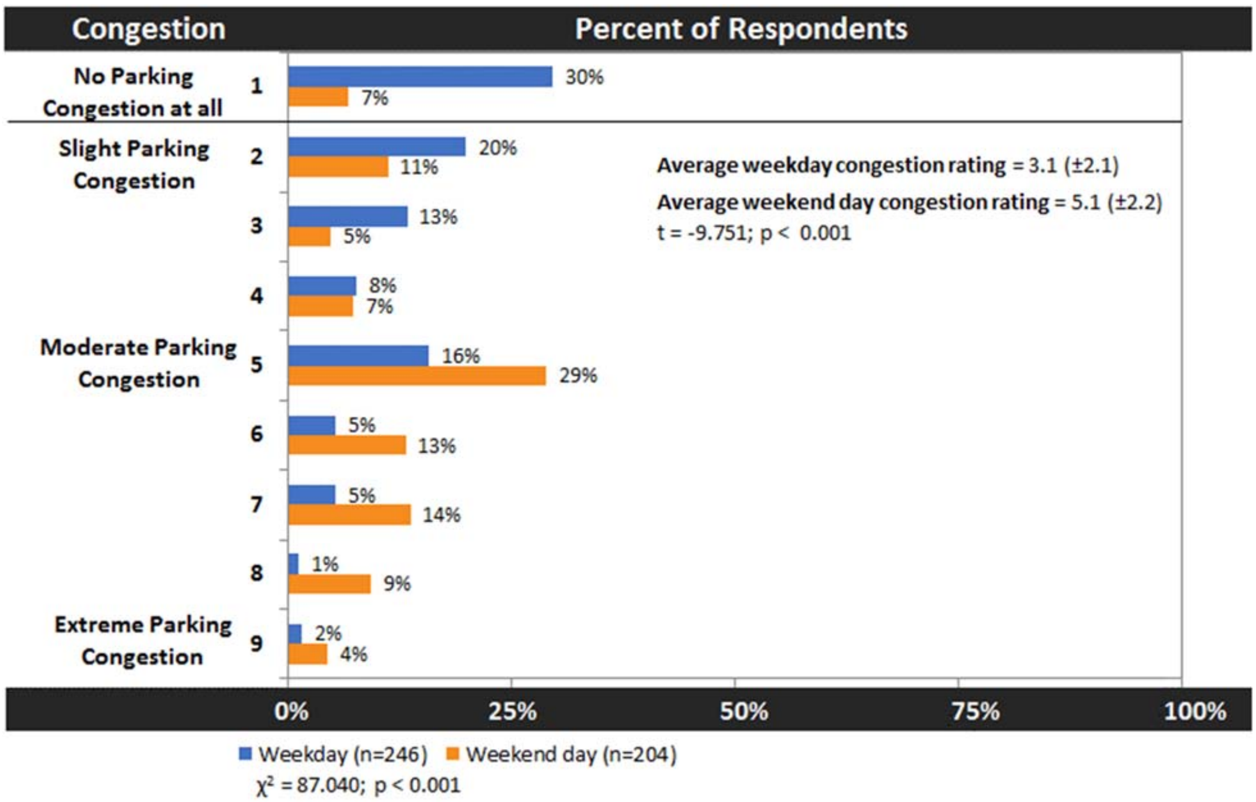

Figure 3-56. How much parking congestion do you think there is in MERA today?

- Half (50%) of weekday visitors, compared to nearly two-thirds of visitors on weekend days, said they would be likely to visit MERA even if they had to park near the MERA entrance station and tour the recreation area by shuttle bus or van (χ^2=4.552, p=0.033).
- A majority (55%) of all visitors said they would be likely to visit MERA, even if they had to park at a designated lot outside of the recreation area, take a 15 minute shuttle bus ride to the MERA entrance station, and tour the recreation area by shuttle bus or van.
- More than three-quarters (77%) of all visitors said they would probably choose not to visit MERA if they had to park at a designated lot outside of the recreation area, take a one hour shuttle bus ride to the MERA entrance station, and tour the recreation area by shuttle bus or van.

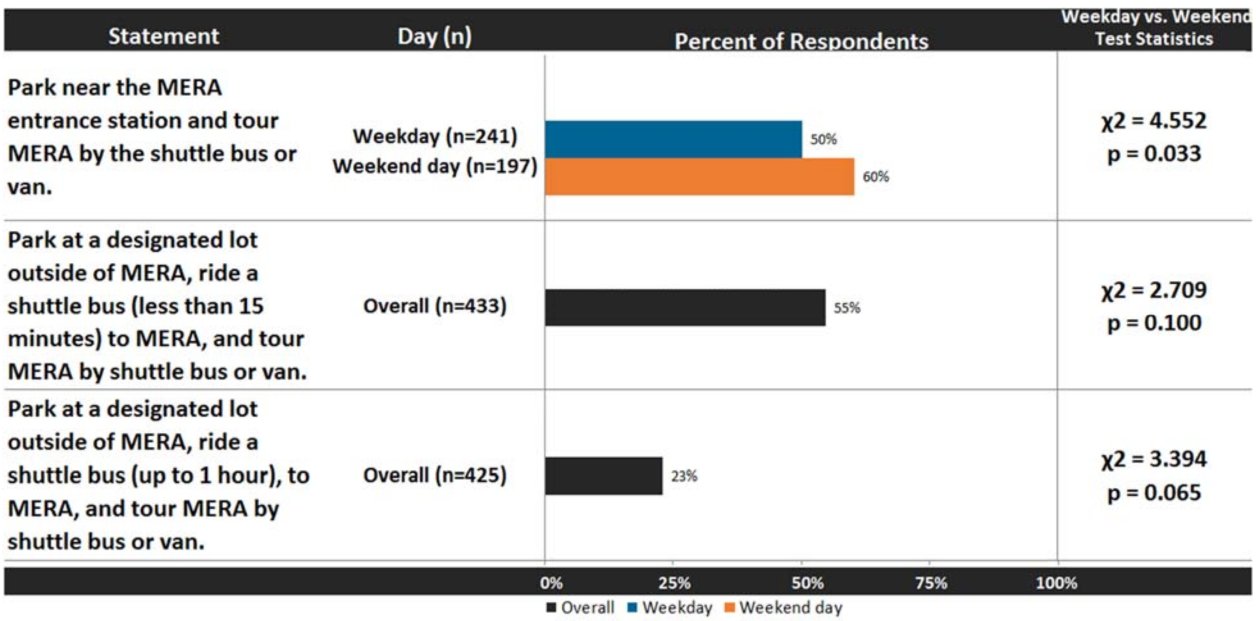

Figure 3-57. Percentage who would be likely to visit MERA on a future trip, even if this was their only option for visiting because parking lots were full.

- Visitors' attitudes about potential parking management actions at MERA generally did not vary significantly between weekdays and weekend days, with the exception that visitors on weekend days (40%) were more likely than those on weekdays (36%) to agree that when parking lots are full, visitors should be allowed to enter MERA and park wherever they can, including on the roadside (χ^2=16.990, p=0.002).
- Nearly half (48%) of all visitors agreed that when parking lots are full, visitors should be stopped at the entrance station until parking spaces open up and only then allowed to enter.
- A majority (56%) of all visitors agreed that when parking lots are full, visitors should be directed to park at a designated lot outside of MERA, ride a shuttle bus for less than 15 minutes, and then tour MERA by shuttle bus or van.
- Less than one-fifth (18%) of all visitors agreed that when parking lots are full, visitors should be directed to other recreation areas instead of visiting MERA that day.

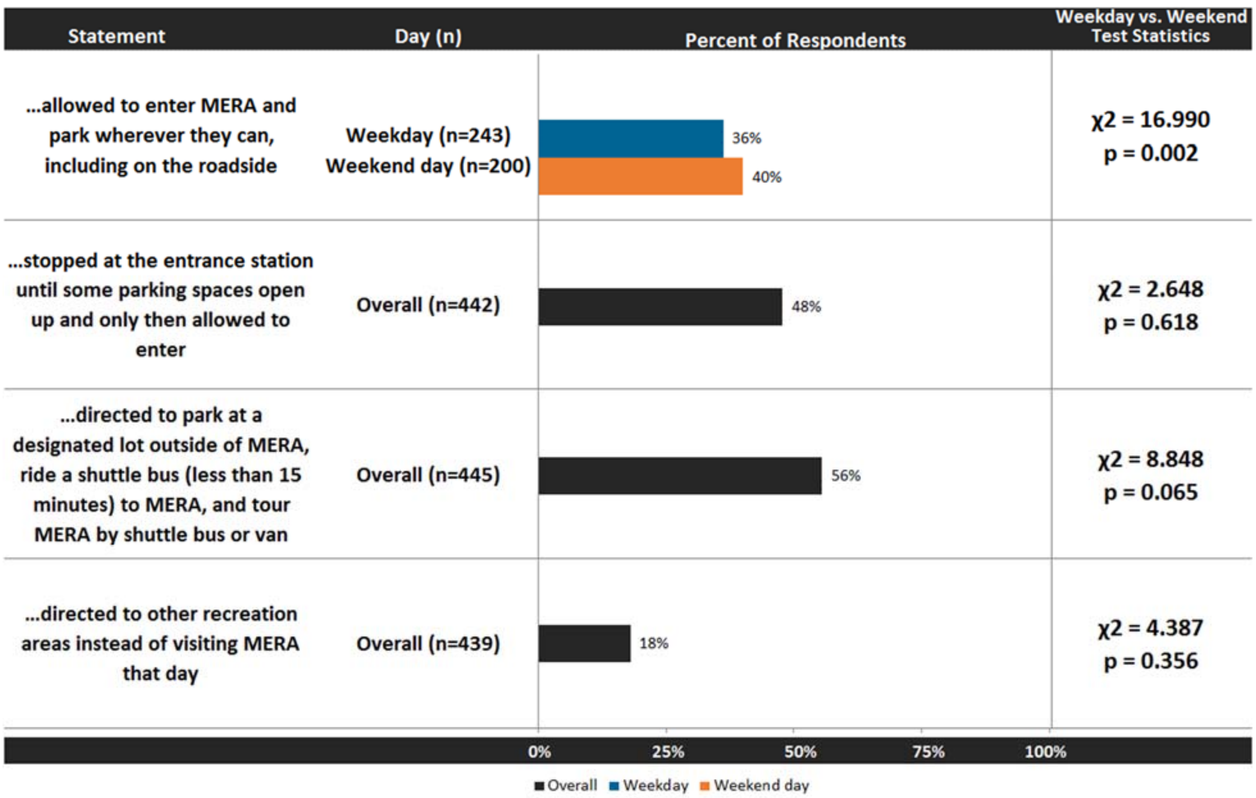

Figure 3-58. Percentage who agree with each of the statements about potential actions when parking lots are full at MERA.

Planning Your Trip to MERA

- The time frame in which visitors planned their trip to MERA did not vary significantly between weekdays and weekend days (χ^2=3.577, p=0.446).
- Regardless of the day of week, approximately half of visitors (53%) planned their trip to MERA within 24 hours of their visit, and three-quarters (75%) planned their trip within a week prior to visiting.

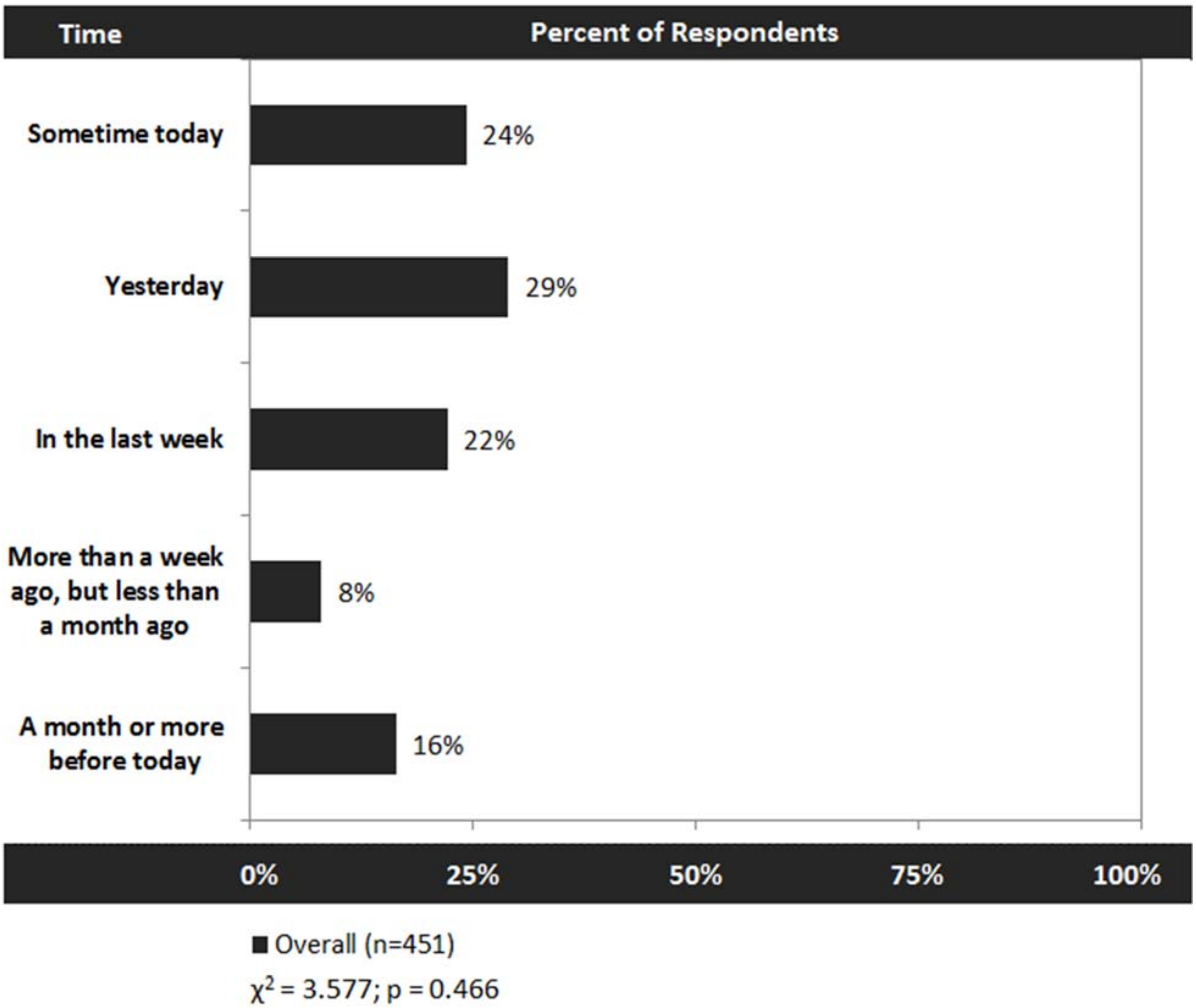

Figure 3-59. How long ago did you decide to take this trip to MERA?

- The vast majority (89%) of all visitors did not anticipate that it would be difficult to find parking at MERA when they planned their trip (χ^2=1.167, p=0.280).

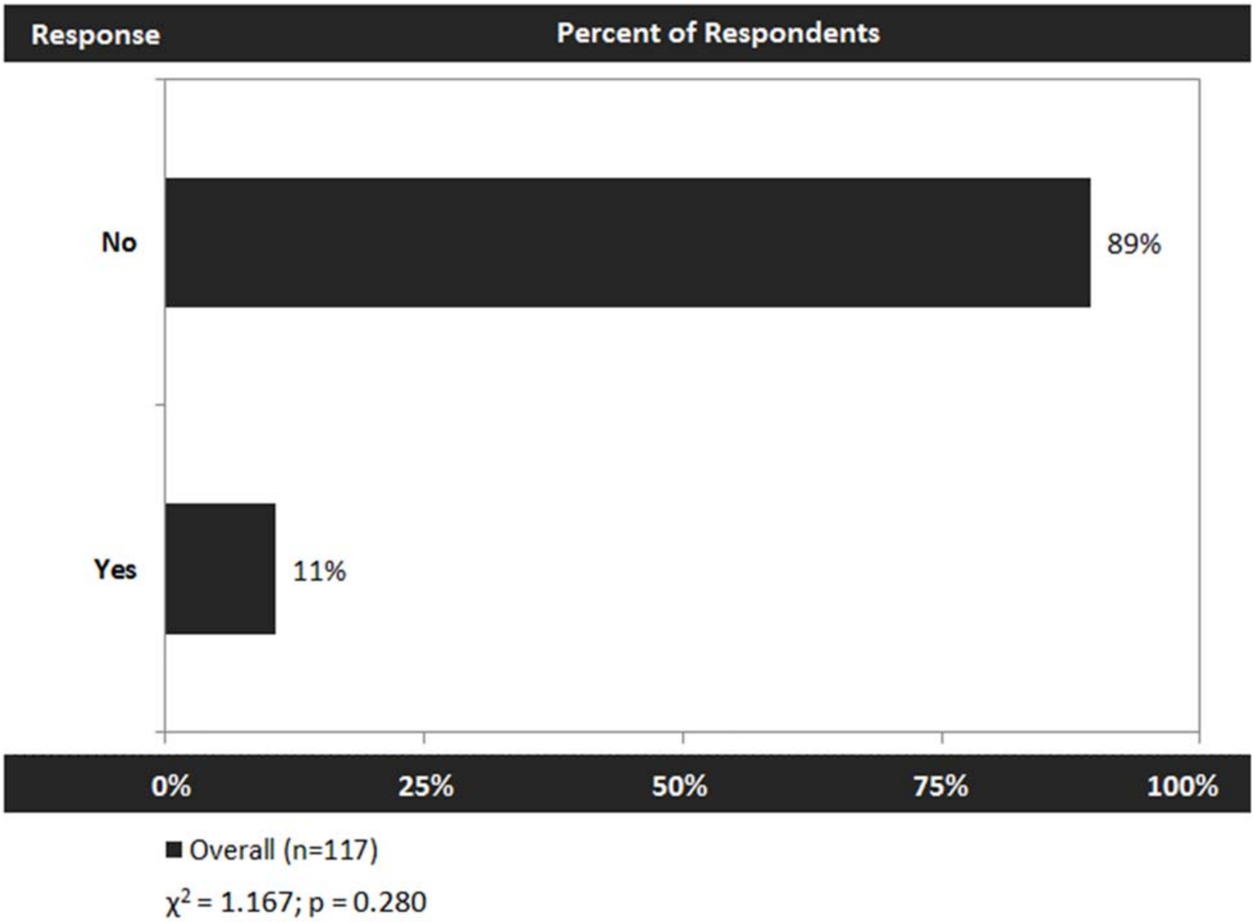

Figure 3-60. When you planned this trip to MERA, did you think about the possibility that it might be difficult to find parking here?

For visitors who thought about the possibility that it might be difficult to find parking at MERA, a follow-up question asked how that affected their trip plans.

- Weekday visitors who anticipated parking congestion (43%) were much more likely than those on weekend days (0%) to plan their visit to MERA for a day of the week that they thought would be less crowded (χ^2=16.211, p<0.001).
- Of note, nearly half (47%) of all visitors who thought about the possibility of parking congestion visited at a time of day they thought would be less crowded.
- Also of note, more than one-third of all visitors who anticipated parking congestion reported that it did not affect their trip plans for visiting MERA.

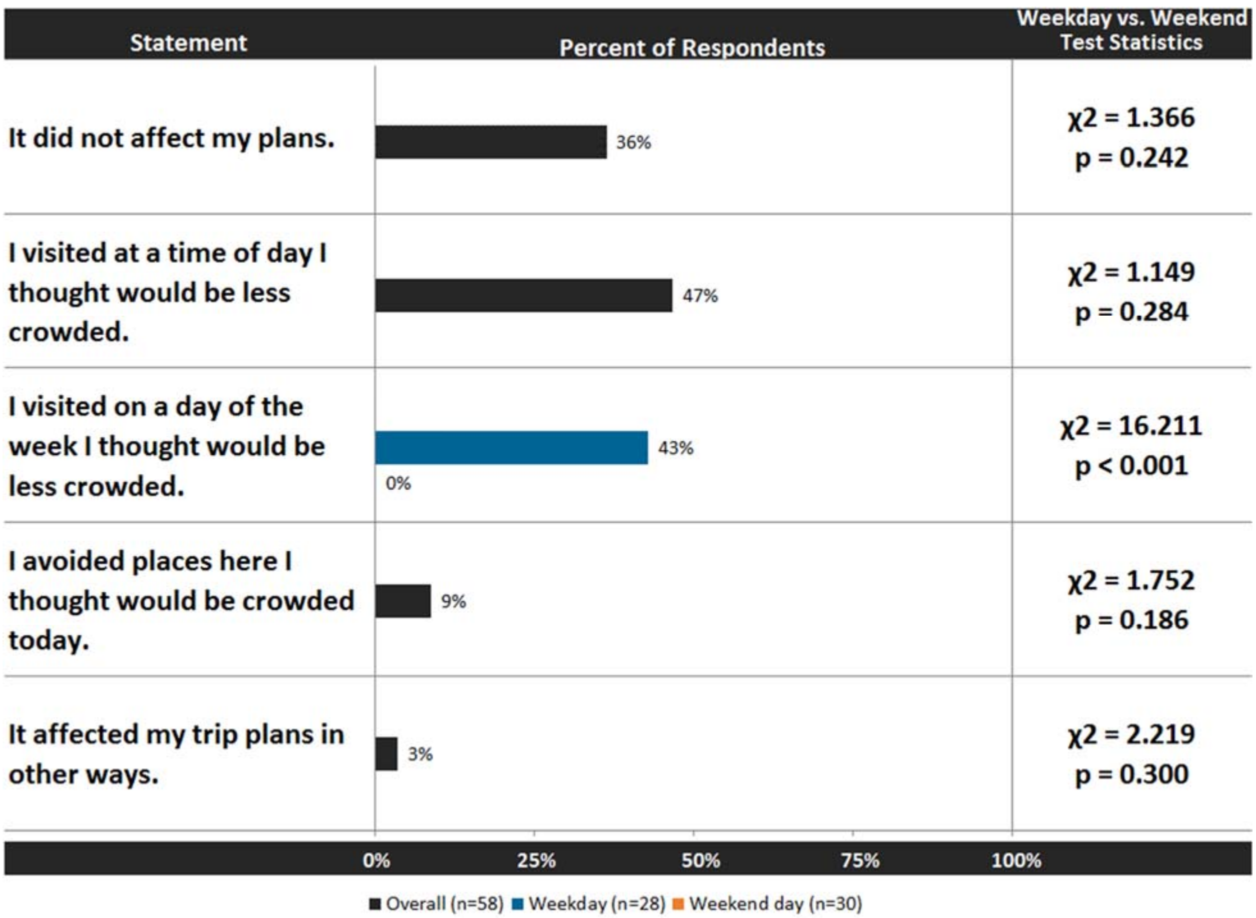

Figure 3-61. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to MERA, how did it affect your trip plans?

- Visitors were asked how likely they would be to use each of several sources of information about parking and crowding conditions at MERA, if it was available for planning a future trip to the recreation area. Responses to the question did not vary significantly between weekday and weekend day visitor groups.
- The vast majority (83%) of visitors indicated they'd be likely to use a website for information about parking and crowding at MERA when planning a future trip.
- About two-thirds of visitors indicated they'd be likely to use a tourist information center (65%) and a smartphone app (64%) for information about parking and crowding at MERA.
- About one-third of visitors indicated they'd be likely to use social media (39%) and text updates on a cellular phone/smartphone (33%) for information about parking and crowding at MERA.
- Fewer visitors thought they'd be likely to use a telephone information line (25% to 26%) or AM radio station (i.e., highway advisory radio; 19%).
- A verbatim list (including respondents' typos) of "other" information sources reported by respondents is included in Appendix V.

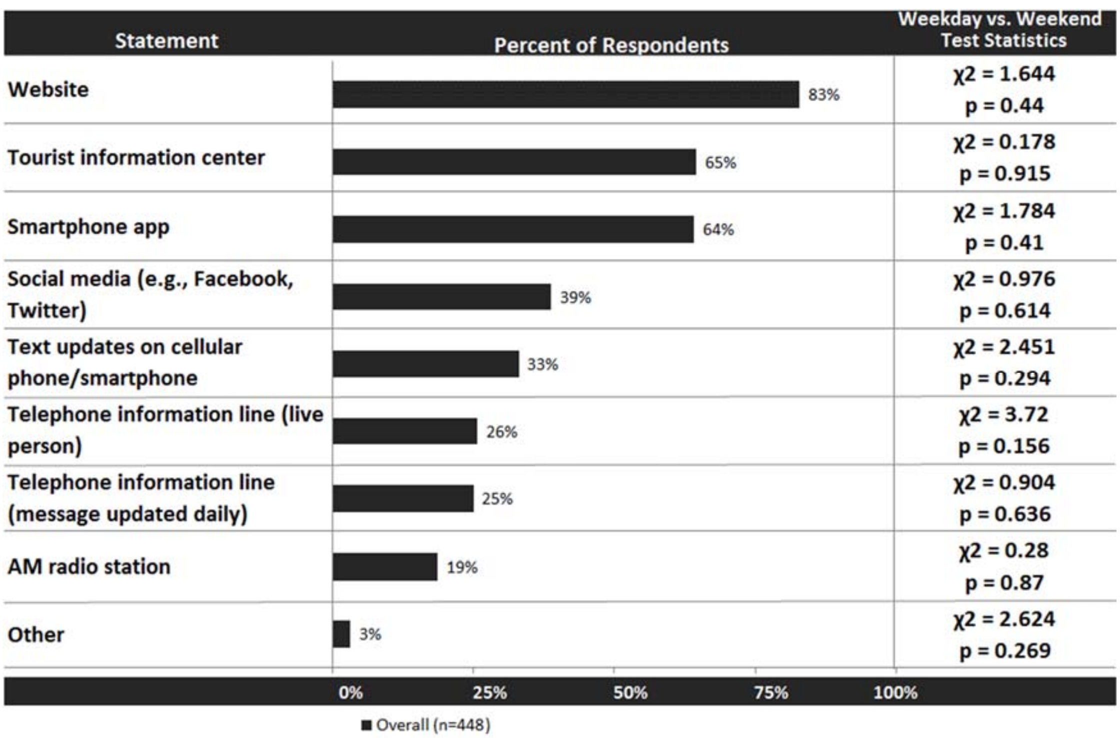

Figure 3-62. Percentage who would be likely to use each of the sources for information about parking and crowding conditions at Mount Evans, if it was available, when planning a future trip to Mount Evans.

Background Information

- There were no significant differences in the gender of visitors on weekdays and weekend days (χ^2=0.005, p=0.942).
- Just over half (54%) of all visitors were male; just under one-half (46%) were female.

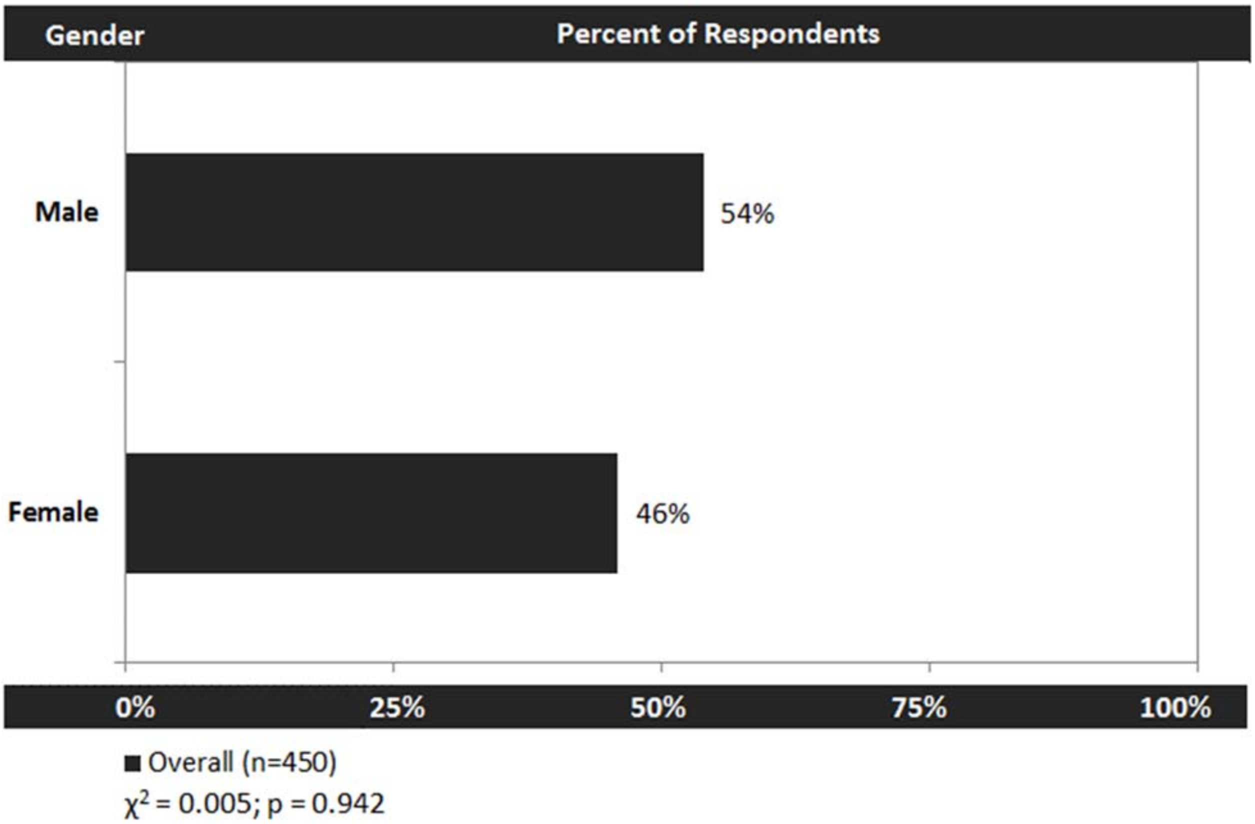

Figure 3-63. What is your gender?

- The age of visitors did not vary significantly between weekdays and weekend days (χ^2=10.424, p=0.064).
- The ages of visitors were fairly evenly distributed, with about one-fifth each between 25 and 34 years of age (23%), 35 and 44 years of age (20%), 45 and 54 years of age (18%), and 55 and 64 years of age (17%).
- Fewer visitors were between 18 and 24 years of age (8%) or 65 years of age and older (14%).
- The average age of all visitors was 45 years of age.

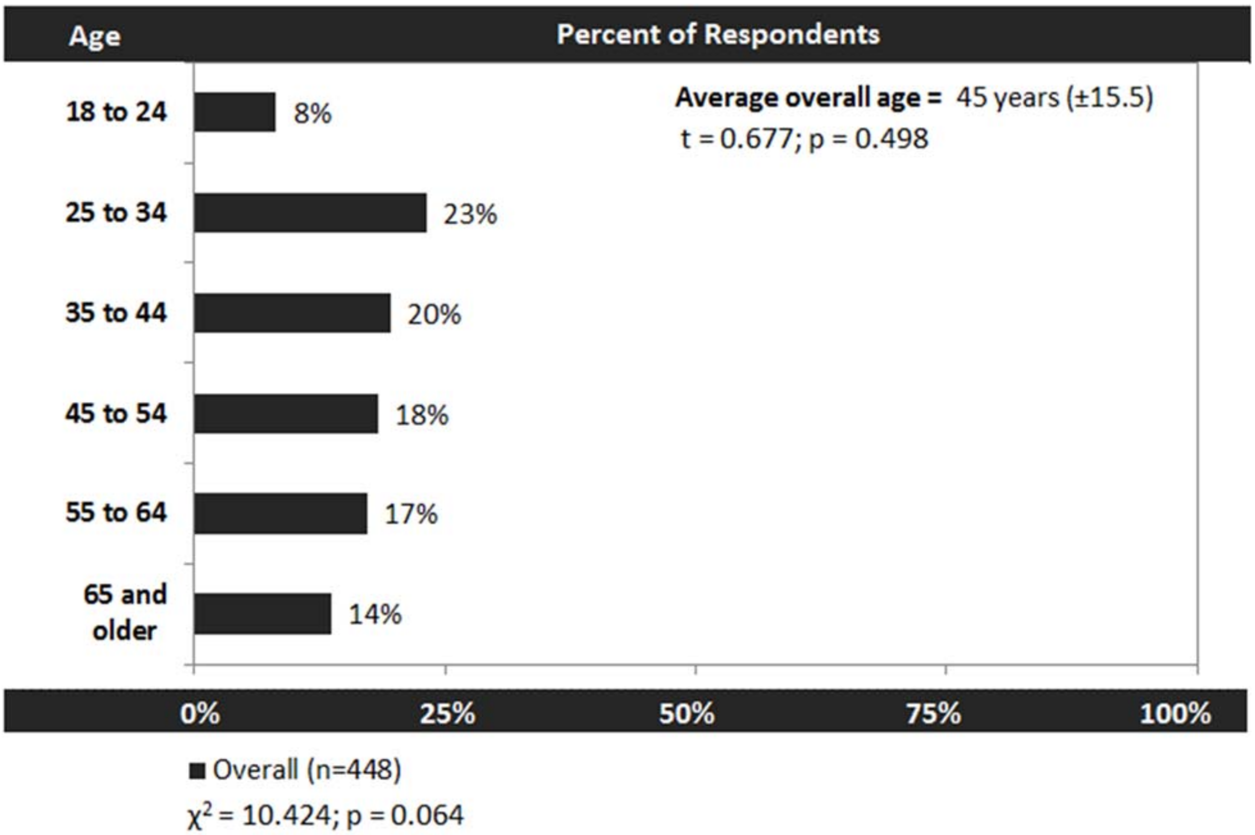

Figure 3-64. In what year were you born?

- The vast majority (97%) of all visitors were residents of the United States (χ^2=3.312, p=0.063).
- A frequency distribution of all countries of residence reported by respondents is included in Appendix W.

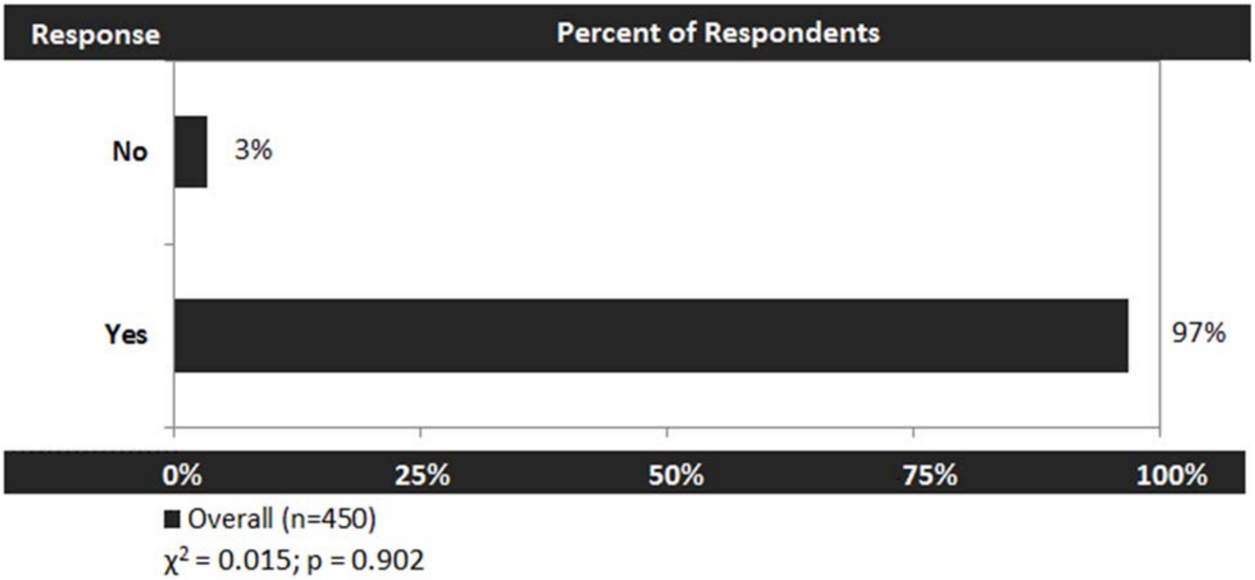

Figure 3-65. Do you live in the United States?

- Visitors' state of residence varied significantly between weekdays and weekend days (χ^2=27.292, p<0.001).
- Nearly two-thirds (63%) of visitors on weekdays were residents of states other than Colorado, and only about one-third (38%) were residents of Colorado.
- In contrast, about two-thirds (64%) of visitors on weekend days were residents of Colorado, and only about one-third (36%) were residents of other states.
- A frequency distribution of all states of residence reported by respondents is included in Appendix X.

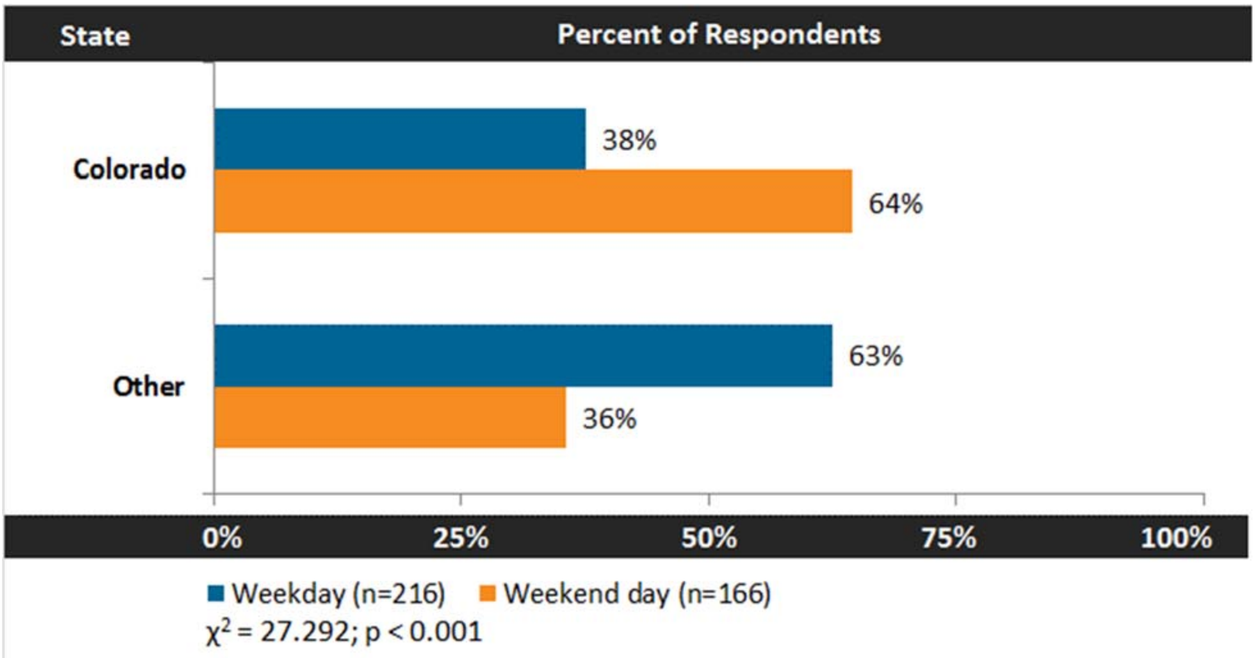

Figure 3-66. If you live in the United States, what state do you live in?

- Among Colorado residents at MERA, visitors' city of residence did not vary significantly between weekdays and weekend days (χ^2=2.690, p<0.611).
- Among Colorado residents at MERA, more than three-quarters (79%) live in the Denver metropolitan area.
- A frequency distribution of all zip codes reported by respondents who are residents of Colorado is included in Appendix Z.

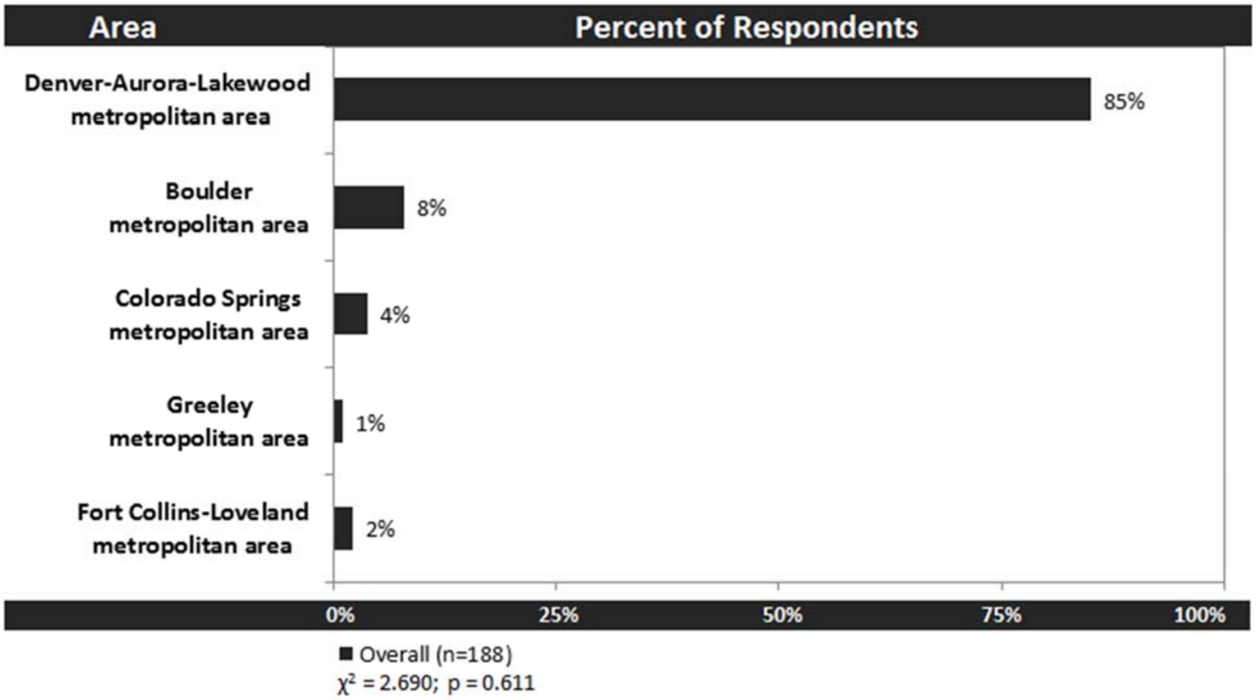

Figure 3-67. If you live in Colorado, what town or city do you live in?

- The education level of visitors did not vary significantly between weekdays and weekend days (χ^2=7.485, p=0.187).
- About three-quarters (74%) of all visitors have earned a college, business, or trade school degree or higher; this includes more than one-quarter (29%) of visitors who have earned a master's, doctoral, or professional degree.

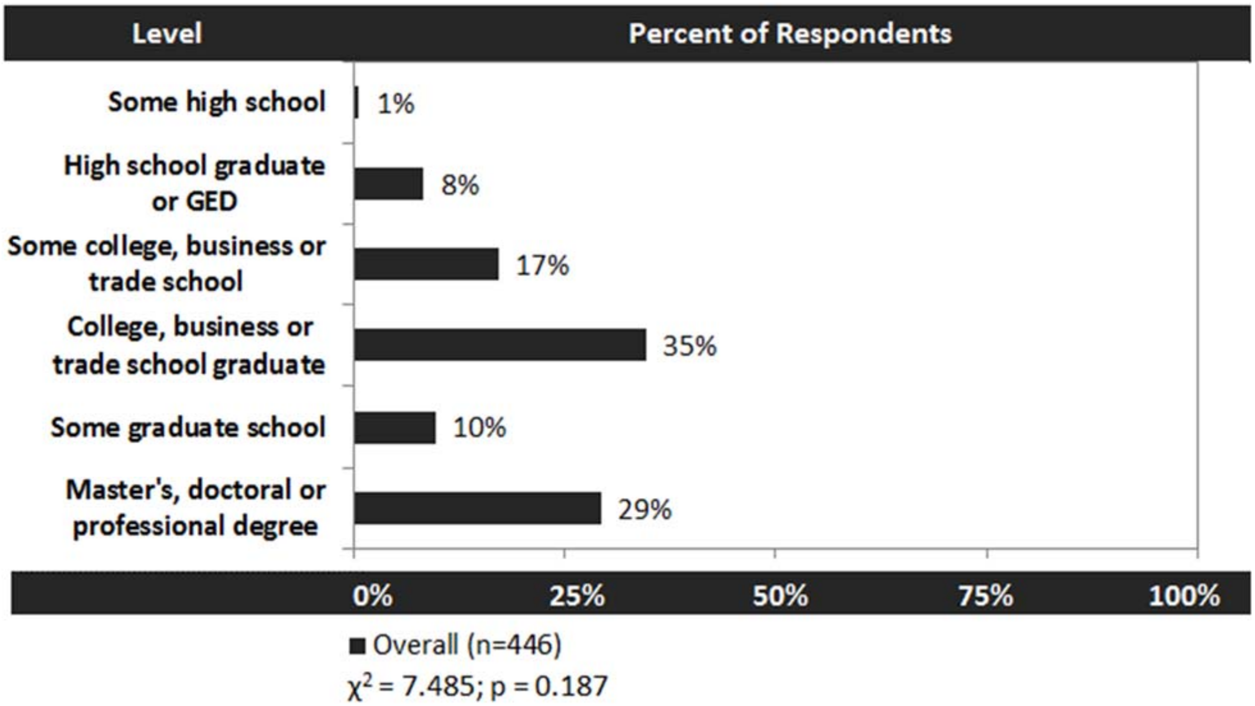

Figure 3-68. What is the highest level of formal education you have completed?

- Very few (5%) visitors reported being Hispanic or Latino (χ^2=1.675, p=0.196).

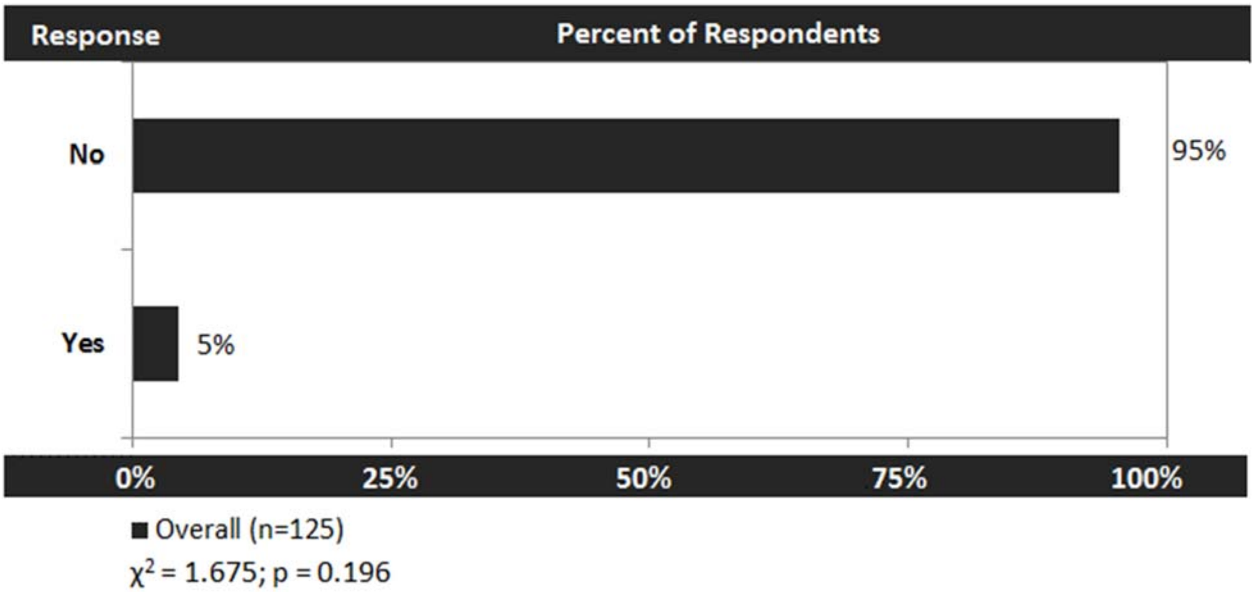

Figure 3-69. Are you Hispanic or Latino?

- Visitors' self-reported race did not vary significantly between weekdays and weekend days (p>0.05 for all tests).
- Regardless of the day of week, the vast majority (94%) of visitors reported their race as white.

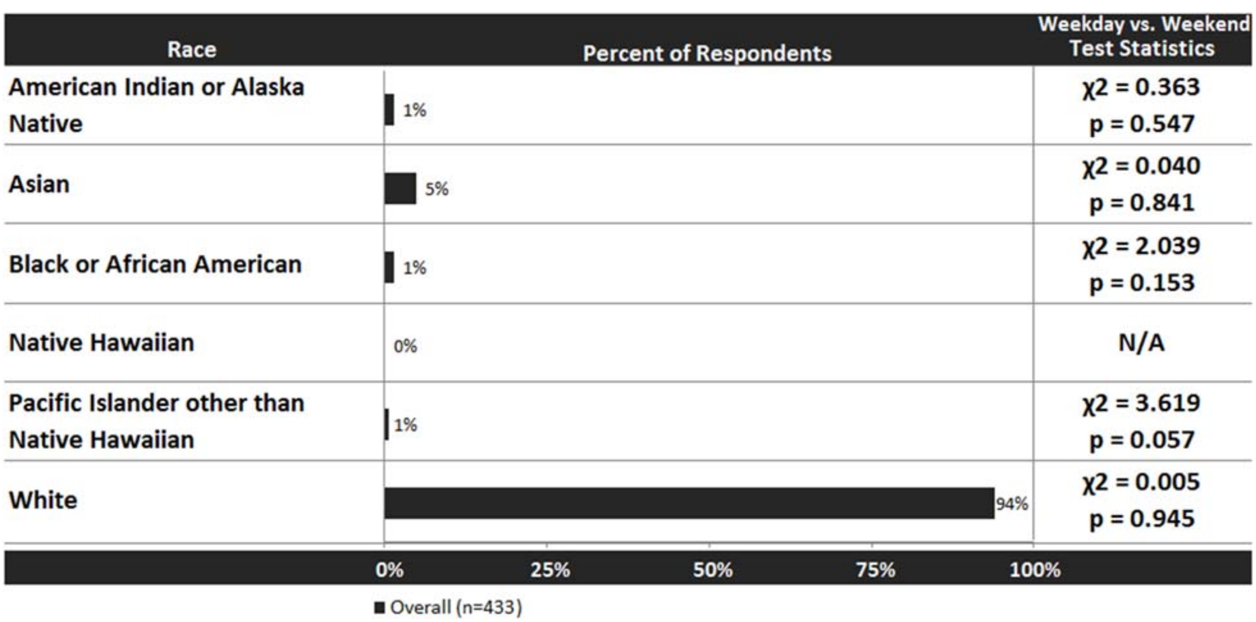

Figure 3-70. What is your race?

Ecological Condition Assessment, Mount Evans Recreation Area and Guanella Pass, Summer 2012

Utah State University (USU), in partnership with RSG, conducted an ecological assessment of resource conditions at MERA and GP to document the current state of resource conditions in the select study areas within both sites. Different assessment techniques were used at the two locations, with a rapid assessment being condition at MERA, and a full assessment being conducted at GP. Data on the following visitor use resource impacts were collected for the assessments during summer 2012:

- Informal trails (MERA and GP)
- Informal spur trails (MERA and GP)
- Visitor-created sites (MERA and GP)
- Areas of dispersed visitor use (GP only)

This section of *Chapter 3: Mount Evans Recreation Area Summary of Data and Findings* provides a summary of the summer 2012 ecological resource assessment at both sites, including a description of methods and statistical results for each site. Tabular results are included in the text in this section, and maps of evaluated trail sections are included in the Appendices (Appendix Z).

Resource Assessment Methods

Monitoring and assessment studies are commonly performed in the field of recreation resource management to help managers of parks and protected areas avoid and mitigate impacts caused by visitor use[9,10]. Such studies provide baseline information from which trends of impact change can be seen over time. Condition assessments can also be used to examine the effect of management actions. A variety of parameters can be studied in monitoring and assessment protocols. Soil and vegetation parameters are commonly used to assess current conditions and can be compared to control sites to determine the amount of change due to recreation use[11,12].

Off-trail use often leads to the occurrence of dispersed visitor-caused impacts such as the formation of informal trails and visitor-created sites. Monitoring and assessment studies allow for the examination of both the severity and extent of dispersed impacts. Soil and vegetation parameters such as soil compaction, vegetation cover, percent of bare ground, and trail width can be used to

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[9] Monz, C., Marion, J. L., Goonan, K., Manning, R. E., Wimpey, J., & Carr, C. 2010. Assessment and Monitoring of Recreation Impacts and Resource Conditions on Mountain Summits: Examples From the Northern Forest, USA. *Mountain Research and Development*, *30*(4), 332-343.

[10] Marion, J.L., Leung, Y., 1997. An assessment of campsite conditions in Great Smoky Mountains National Park. USDI National Park Service Research Resources Management Report.

[11] Hammitt W.E., Cole D.N., 1998. Wildland recreation: ecology and management, second ed. John Wiley, New York.

[12] Cole, D. N., 2004. Impacts of hiking and camping on soils and vegetation: a review. In: Buckeley, R. (Ed.), Environmental Impacts of Ecotourism. CABI, Australia, pp. 41-60

determine the severity of impacts resulting from visitor use[13]. Geographic positioning system (GPS) and geographic information systems (GIS) allow for an examination of the extent of impacts associated with visitor use[10,13]. GPS technology and the use of modified condition class ratings, which were developed for campsite monitoring, provide the means for conducting rapid assessments of resource conditions in the field.

In this study two different, distinct approaches were used; a rapid assessment and a full assessment. The rapid assessment approach, was employed at Mount Evans, mapped trails as linear features, while spurs (informal trails less than 5 meters in length) and all visitor-created sites were mapped as point features. The full assessment approach, employed at Guanella Pass, mapped trails as linear features, spurs as point features, small and medium visitor-created sites as point features with associated measurements, and mapped large areas of dispersed use as polygons.

Rapid Assessment of Resource Conditions at MERA: Submeter accuracy GPS units were used to map the location and intensity of recreation resource impacts related to visitor use, as follows:

- Locations examined included the following in order from highest to lowest priority: Lincoln Lake, Abyss Lake informal trail system, informal trails on the east side of Mount Evans, Summit Lake borrow pit area, Upper Goliath area, Nature Center borrow pit.

- Informal Trails were recorded as linear features. A few (2-3) positions were taken at the start of the trail to assure starting point accuracy. The trail was walked at a normal hiking pace with high accuracy positions recorded at 5s intervals. At the end of the trail a few (2-3) additional positions were taken to assure end point accuracy. Trail width was estimated to the nearest half meter via a categorical system and the informal trail was assigned a condition class rating (Table 3-14).
- Informal Spur Trails, which are informal trails 5 meters or less in length, were recorded as point features. Approximately 15 points were recorded at the location where the spur meets the designated trail. The approximately width of the spur trail was recorded as well as an informal trail condition class rating (Table 3-14).
- Visitor-created sites (locations of continuous disturbance from 10-50 m^2) were located and recorded as point features. The center of the visitor-created site was recorded by collecting 25 to 30 points. A condition class rating was assigned to the site (Table 3-15). All site characteristics were determined using ocular estimations.

Full Assessment at GP: High accuracy GPS units were used to map the location and intensity of recreation resource impacts related to visitor use, as follows:

- Locations examined included the following in order from highest to lowest priority: visitor-related impacts along the designated trail to Mount Bierstadt and the designated trail to Square Top Lakes.

[13] Leung, Y., Newburger, T., Jones, M., Kuhn, B., Woiderski, B., 2010. Developing a monitoring protocol for visitor-created informal trails in Yosemite National Park, USA. Environmental Management, 47, 93-106.

- Informal Trails were recorded as linear features. A few (2-3) positions were taken at the start of the trail to assure starting point accuracy. The trail was walked at a normal hiking pace with high accuracy positions recorded at 5s intervals. At the end of the trail a few (2-3) additional positions were taken to assure end point accuracy. Trail width was estimated to the nearest half meter via a categorical system and the informal trail was assigned a condition class rating (Table 3-14).
- Informal Spur Trails, which are informal trails 5 meters or less in length, were recorded as point features. Approximately 15 points were recorded at the location where the spur meets the designated trail. The approximate width of the spur trail was recorded as well as an informal trail condition class rating (Table 3-14).
- Visitor-created sites were located and recorded as point features. The center of the visitor-created site was recorded by collecting 25 to 30 points. A size category was chosen for the site (small, medium, or large dispersed area). A condition class rating was assigned to the site (Table 3-15). All site characteristics were determined using ocular estimations.
- Areas of dispersed visitor use were recorded as polygon features. The area was scouted to identify natural boundaries and the boundaries of the visitor use. The perimeter of the polygon was recorded by walking at a normal hiking pace following the boundaries of the area of dispersed visitor use. Upon returning to the starting point marked by a flag, a few (2-3) points were recorded at the end of the polygon. A condition class rating was assigned to the site (Table 3-15). All site characteristics were determined using ocular estimations.

In the field, data collection with the highest level of QA/QC possible was maintained. GPS positional error was limited to a maximum of 1-2 meters for point and linear (trail) features. In most cases horizontal position accuracy was submeter. Trimble resource grade Geo XT receivers configured for SBAS correction were utilized and data was postprocessed using Trimble Pathfinder Office software for additional correction.

All data transfer was accomplished via standard GPS/GIS techniques and analysis and data summaries conducted in both the GIS environment (ArcGIS v.10.1) and via SPSS statistical software. Visitor use related resource impacts were reviewed for positional accuracy and mapped with base layers provided by the USFS to USU. Summary statistics for the extent and level of the resource impacts are provided.

Summary of Findings

- Considerable informal (social) trail formation was found in the Guanella Pass study area at both Mount Bierstadt and Square Top Lakes. Numerous segments were found, although the average length and total aggregate length were not considerable (Table 3-16). Alternatively, very little informal trail formation was observed at Mount Evans, with the exception of one informal trail/route.
- Few visitor sites were found in both study areas. Sites were moderately to highly impacted, however (Table *3-17*).

- Several areas of diffuse resource impact were found in the Mount Bierstadt area of moderate impact (condition class 3 and 39% vegetation cover loss). Total aggregate impacted area was considerable (521 m2; Table *3-18*).
- Several "areas of interest" were documented in terms of location and extent across both study areas (Table 3-19)These locations were documented on an opportunistic basis and generally represent areas adjacent to visitor access points, such as locations of unattended parking.
- A significant informal trail/route was documented in the vicinity of Summit Lake to the parking area near the summit of Mount Evans (Table *3-20*).
- All the visitor-created resource impacts as discussed above have been documented and mapped as to the location and spatial extent as illustrated in the maps provided in Appendix Z.

Table 3-14. Unofficial Trail Condition Class Definitions

Condition Class	Definition
Class 1	Trail distinguishable; slight loss of vegetation cover and/or minimal disturbance of organic litter
Class 2	Trail obvious; vegetation cover lost and/or organic litter pulverized in primary use areas
Class 3	Vegetation cover lost and/or organic litter pulverized within the center of the tread, some bare soil exposed
Class 4	Nearly complete or total loss of vegetation cover and organic litter within the tread, bare soil widespread
Class 5	Soil erosion obvious, as indicated by exposed roots and rocks and/or gullying

Table 3-15. Visitor-created Sites and Areas of Dispersed Use Condition Class Definitions

Condition Class	Vegetation Damage	O Horizon Loss	Mineral Soil Exposure	Erosion
1	Very slight <1%	None	None	None
2	Slight <10%	Surface scuffing- some loss evident	Slight <10%	None
3	Moderate 10-50%	Moderate loss evident- 10-50%	Moderate 10-50%	Slight
4	Considerable 51-90%	Considerable 51-90%	Considerable 51-90%	Some
5	Total Loss of cover >90%	Total Loss of OM	Most of site >90%	Considerable

Table 3-16. Characteristics of informal trails and visitor routes throughout the ARNF study area (CC = condition class rating).

Analysis Area	Number of Segments	Total Length (km)	Mean CC	Mean Length (m)	Number of Spur Segments*	Length of Designated or Informal Trail (km)
GP Study Area:						
Square Top Lakes	54	2.9	3	54	17	3.5
Mount Bierstadt	181	3.6	2	20	82	5.9
MERA Study Area:						
Lincoln Lake Bouldering Trail	2	0.7	2	0.4	0	0.7
Mount Evans Summit Shortcut/Route	1	1	4	N/A	17	N/A
Abyss Lake Route	1	0.5	4	N/A	0	N/A

*Spur is any informal trail <5m in length

Table 3-17. Characteristics of visitor-created sites throughout entire study area in ARNF (CC = condition class rating).

Analysis Area	Number of Sites	Total Area (m^2)	Mean CC	Mean Area (m^2)	Mean Veg Loss (%)
GP Study Area:					
Square Top Lakes	1	N/A*	4	N/A*	82
Mount Bierstadt	3	23	2	8	35
MERA Study Area:					
Lincoln Lake Bouldering	2	N/A*	2	N/A*	48
Mount Evans Summit Shortcut/Route	1	N/A*	1	N/A*	82

*visitor-created site areas were not measured during rapid assessment at MERA area

Table 3-18. Characteristics of areas of dispersed visitor use found throughout the GP study area (CC = condition class rating).

Analysis Area	Number of Sites	Total Area (m^2)	Mean CC	Mean Area (m^2)	Mean Veg Loss (%)
Mount Bierstadt	6	521	3	87	39

Table 3-19. Areas of polygons of interest to ARNF managers.

Polygon	Area (m^2)
MERA Area:	
Abyss Lake Parking Area	45
Mount Evans Summit Pull-off	68
Summit Lake Borrow Pit	425
Area of Dispersed use at Upper Goliath Trailhead	163
Nature Center Borrow Pit	139
Lincoln Lake Unattended Parking North	31
Lincoln Lake Unattended Parking South	14
Mount Bierstadt (GP):	
Unattended Parking East	128
Unattended Parking West	197

Table 3-20. Summary of visitor route from Summit Lake to the summit of Mount Evans

Mount Evans Summit Shortcut/Route	Total Length (km)	Mean CC	Mean Length (m)
Cut through tundra	0.7	4	0.3
Cut across rock	0.3	4	0.1

Examples of Observed Ecological Resource Impacts

Figure 3-71. Vegetation and soil disturbance as a consequence of unattended parking to access Lincoln Lake bouldering area in the Mount Evans study area.

Figure 3-72. Alpine vegetation and soil loss in a backcountry location in the Mount Bierstadt study area

Figure 3-73. Informal trail formation in proximity to designated parking area at Mount Bierstadt Trailhead.

Chapter 4: Need Identification by Site

Introduction

Transportation, recreation, and resource management-related needs were identified at BLRA, GP, and MERA through public input, review of previous studies and planning documents, and onsite data collection and analysis. Table 4-1 provides a summary of the identified needs, which are described in more detail in this chapter. The identified needs for each study site begin with a summary of relevant data findings from the 2012 and 2013 data collection efforts, followed by a detailed description of each site needs. In some cases, figures and photos from previous chapters are included in descriptions of need justification for ease of use of this chapter. Refer to the following chapters and sections for detailed descriptions of the data findings that influenced need identification:

- Chapter 1: Brainard Lake Recreation Area Summary of Data Findings
    - Brainard Lake Recreation Area Transportation and Visitor Use, Winter 2011-2012
    - Brainard Lake Recreation Area Transportation and Visitor Use, Summer 2013
    - Brainard Lake Recreation Area Visitor Survey, Summer 2014
    - Brainard Lake Recreation Area Alternative Trail Alignment Analysis, Summer 2012
- Chapter 2: Guanella Pass Summary of Data Findings
    - Guanella Pass Transportation and Visitor Use, Summer 2012
    - Guanella Pass Visitor Survey, Summer 2014
- Chapter 3: Mount Evans Recreation Area Summary of Data Findings
    - Mount Evans Recreation Area Transportation and Visitor Use, Summer 2012
    - Mount Evans Recreation Area Visitor Survey, Summer 2014
    - Ecological Condition Assessment, Mount Evans Recreation Area and Guanella Pass, Summer 2012

Table 4-1. Transportation, recreation, and resource management-related needs, by site.

Common to All Sites	**Site-specific: BLRA**	**Site-specific: GP**	**Site-specific: MERA**
• Peak-period parking shortages. • Lack of advanced trip-planning and traveler information. • Traffic congestion at entrance stations and/or on roads during peak periods. • Intensive Wilderness use and crowding during peak periods.	• Gateway Trailhead Parking Lot is distant from most visitors' destinations. • Small trailhead parking lots limit convenient access to the Indian Peaks Wilderness, but may help prevent unacceptable crowding. • Parking management staff required to prevent unendorsed parking. • Traffic congestion at the Courtesy Station when parking lots are full. • Confusion among visitors who park in the Brainard Lake Day Use Parking Lot about how to get to their destinations. • Lack of safe, enjoyable pedestrian connections among parking lots and visitor destinations. • High visitor use and corresponding potential for crowding and adverse resource impacts in the Indian Peaks Wilderness.	• Unendorsed roadside parking, causing resource impacts and visitor safety risks. • Extreme crowding on the summit of Mount Bierstadt during peak periods. • Off-trail trampling of vegetation and soils in the Mount Evans Wilderness. • Recreation-related traffic congestion in Georgetown, Colorado.	• Unendorsed roadside parking, causing resource impacts and visitor safety risks. • Traffic congestion and gridlock on the road near Summit Lake and the Mount Evans Summit. • Conflict between bicyclists and motor vehicles. • Extreme crowding on the summit of Mount Evans during peak periods. • Traffic congestion at the entrance to MERA during peak periods. • Steep, narrow, scenic yet deteriorating roadway causes driver safety risks.

Brainard Lake Recreation Area

Introduction

Figure 4-1. Long Lake, Brainard Lake Recreation Area.

Brainard Lake Recreation Area is an approximately 3,143 acre land unit on the Boulder Ranger District of the ARNF, bordered by the town of Ward to the east and the Indian Peaks Wilderness (IPW) to the west. Brainard Lake Recreation Area is located within a one to two hour drive from much of the Boulder-Denver metropolitan area and northern Front Range cities, including Longmont, Loveland, Greeley, and Fort Collins.

Brainard Lake Recreation Area is the most heavily visited year-round recreation site in the Boulder Ranger District and one of the most popular recreation sites in the ARNF. While visitor use is highest during the summer, a significant amount of recreational use occurs in the winter. Popular summer activities in BLRA include hiking, picnicking, camping, fishing, mountain biking, viewing scenery, and connecting with nature; during the winter, snowshoeing and cross-country skiing are the most popular activities.

Brainard Lake Road, which provides access from Highway 72 to BLRA, is owned and maintained by Boulder County from its intersection with Highway 72 to the summer entrance gate location (referred to hereafter as the "Courtesy Station"; Figure 4-2). Beyond the summer entrance gate location, Brainard Lake Road is owned by the USFS, but maintained by Boulder County through an agreement between with USFS.

There are a number of developed recreation facilities at BLRA that are accessible to visitors during the summer, including a Courtesy Station where visitors are greeted and provided information about the area, picnic sites, parking lots, restroom facilities, information kiosks, and a boat launch (Figure 4-2). In addition, there is a 47-site campground at BLRA that accommodates tents, campers, trailers, and RV's up to 45 feet in length. Brainard Lake Recreation Area also has a number of trailheads, some of which provide direct access to the IPW.

There are two trailhead parking lots at BLRA that provide direct access to the IPW during the summer; one at the Mitchell Lake Trailhead, and the other at the Long Lake Trailhead (Figure 4-2). The trailhead parking lots have capacities of approximately 30 (Long Lake Trailhead) to 50 (Mitchell Lake Trailhead) automobiles, and both fill early in the morning during the popular summer hiking season. The Niwot Mountain Lot is a relatively short distance east of the Long Lake and Mitchell Lake Trailhead Parking Lots, and also fills relatively early in the morning during the summer hiking season for access to the IPW.

Directly next to Brainard Lake, the USFS recently built (summer 2012) a parking lot of roughly 200 spaces that is open to visitors during the summer; the lot is primarily intended for day use visitors at Brainard Lake, and is located there to help shift some use away from the IPW (Figure 4-2). There is another recently constructed parking lot located just before the Courtesy Station on Brainard Lake Road, approximately two miles east of Brainard Lake and three miles east of the IPW trailheads. The Gateway Trailhead Parking Lot has parking capacity for approximately 150 automobiles, and is open to BLRA visitors year-round. While a parking fee of $10 per vehicle for a three-day pass is collected from BLRA visitors during the summer months, those visitors who park in the Gateway Trailhead Parking Lot do not have to pay the parking fee to enter BLRA. There are no parking fees collected from visitors during the winter.

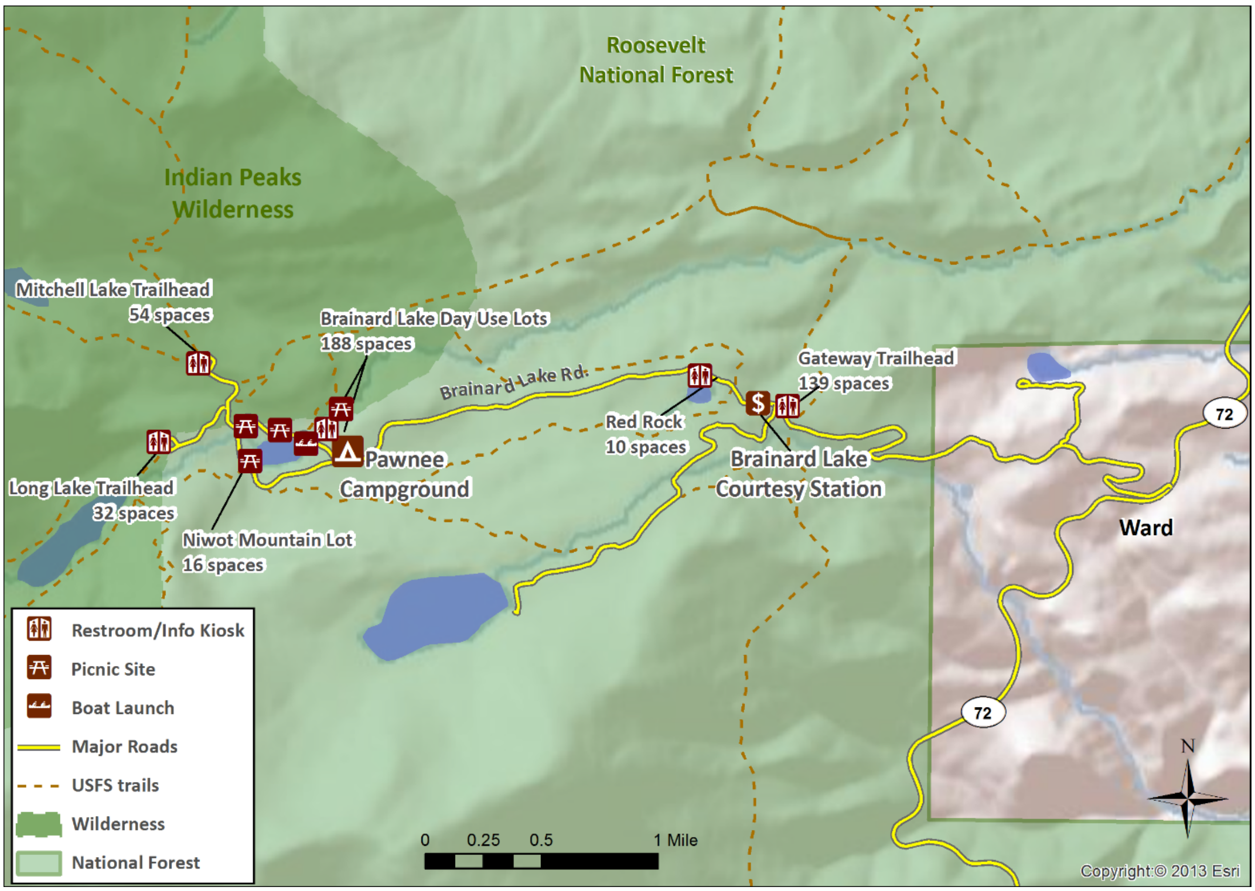

Figure 4-2. Brainard Lake Recreation Area, summer facilities.

During winter months, Brainard Lake Road is plowed from Ward, Colorado, to the BLRA Courtesy Station. While the entrance gate at the Courtesy Station remains closed throughout the winter, visitors can park in the Gateway Trailhead Parking Lot, use the bathrooms and warming hut located there, and access the BLRA trail network.

Visitor use and transportation-related data collected at BLRA during winter 2012 suggest BLRA is popular in the winter for snowshoeing, cross-country and backcountry skiing, and even hiking. However, the area generally does not experience traffic or parking congestion issues during the winter months. For example, results of the winter 2012 study at BLRA suggest that even on "typically busy" weekend days during the winter, the Gateway Trailhead Parking Lot only fills to about half of its capacity (Figure 4-3). Correspondingly, no lines of traffic waiting for a parking space were observed during the winter 2012 study, and visitors were very rarely observed parking on the roadside, rather than in designated parking spaces in the Gateway Trailhead Parking Lot.

The findings from the winter 2012 study at BLRA suggest there aren't significant transportation-related issues at BLRA during the winter months for which alternative transportation solutions are required. In contrast, results of a transportation and visitor use study conducted at BLRA during summer 2013 suggest there are a number of transportation, recreation, and resource management-related issues at BLRA for which alternative transportation solutions are needed, as described below.

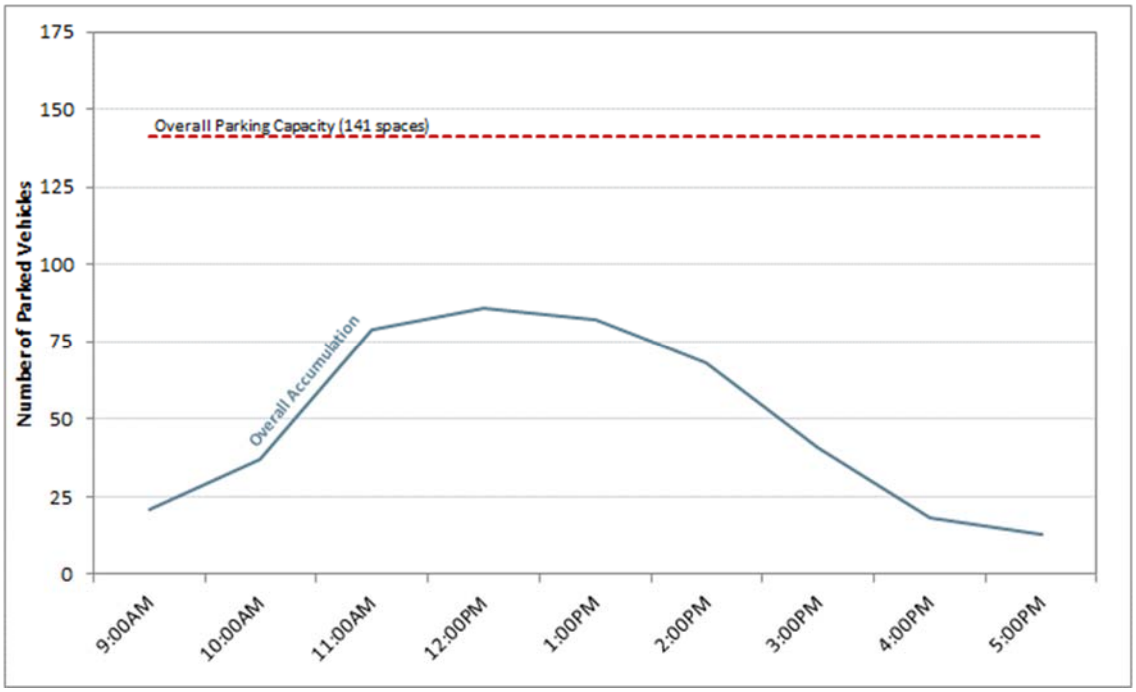

Figure 4-3. Gateway Trailhead parking accumulation, winter 2012.

Parking Demand Exceeds Capacity

During peak periods of the summer visitor use season at BLRA, parking shortages occur at several of the parking lots and are particularly severe at the Long Lake and Mitchell Lake Trailhead Parking Lots. For example, results of the summer 2013 study at BLRA suggest that on typically busy summer days, the Long Lake and Mitchell Lake Trailhead Parking Lots fill to capacity between the hours of 7:00 AM and 8:00 AM, and remain full throughout the day (Figure 4-4). Onsite observations during the summer 2013 study suggest this circumstance is a source of frustration for many BLRA visitors, as a large proportion of them visit BLRA specifically to day hike in the IPW and would prefer to park at or near the IPW trailheads.

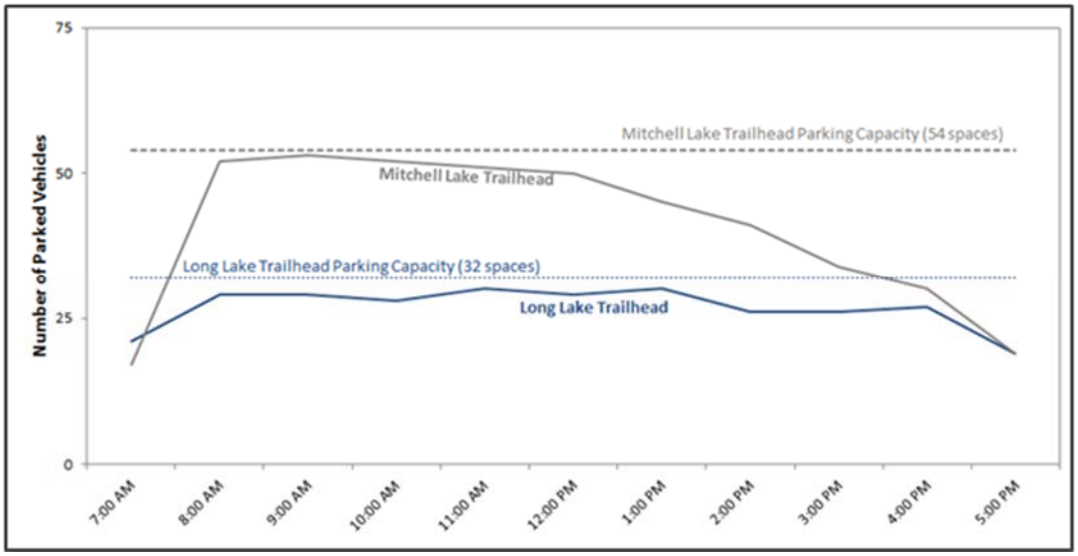

Figure 4-4. IPW trailhead parking accumulation, summer 2013.

The 2013 study results further suggest that the Brainard Lake Day Use Lot fills to capacity on typically busy summer days by 11:00 AM (Figure 4-5). Onsite observations during the summer 2013 study suggest many of the visitors who park in the Day Use Lot are frustrated by the fact that their intended destination is one of the IPW trailheads, yet they have to park a mile away from the trailheads and walk on Brainard Lake Road to get to the trailheads. In addition, as parking in the Day Use Lot approaches capacity, traffic congestion occurs in the lot, and visitors park their personal vehicles in parking spaces that are designated for large vehicles (e.g., RV’s).

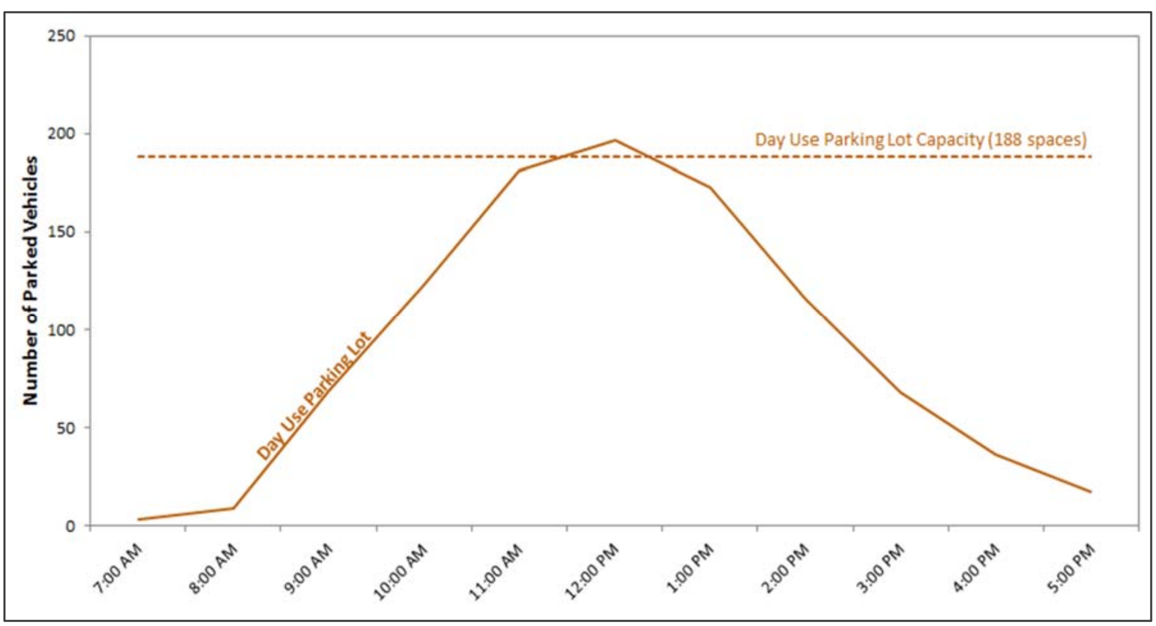

Figure 4-5. Brainard Lake Day Use Parking Lot parking accumulation, summer 2013.

When parking in the Day Use Lot reaches the capacity of the parking lot, visitors are stopped at the Courtesy Station and not allowed to enter BLRA until other visitors leave and parking spaces become available. Thus, during busy periods, lines of traffic form at the Courtesy Station with visitors waiting to enter BLRA.

While the 2013 study results suggest that on typically busy summer days parking shortages are severe at the Long Lake and Mitchell Lake Trailhead Parking Lots, and occur at the Brainard Lake Day Use Lot, the Gateway Trailhead Parking Lot remains mostly empty throughout the entire day (Figure 4-6). The 2013 study results suggest few visitors choose to park in the Gateway Trailhead Parking Lot, even though they can avoid paying the parking fee to enter BLRA by doing so. These findings suggest that, in total, there is sufficient parking capacity at BLRA to meet demand, but that there is a substantial shortage of parking where visitors would like to park and an abundance of parking located where visitors do not choose to park voluntarily.

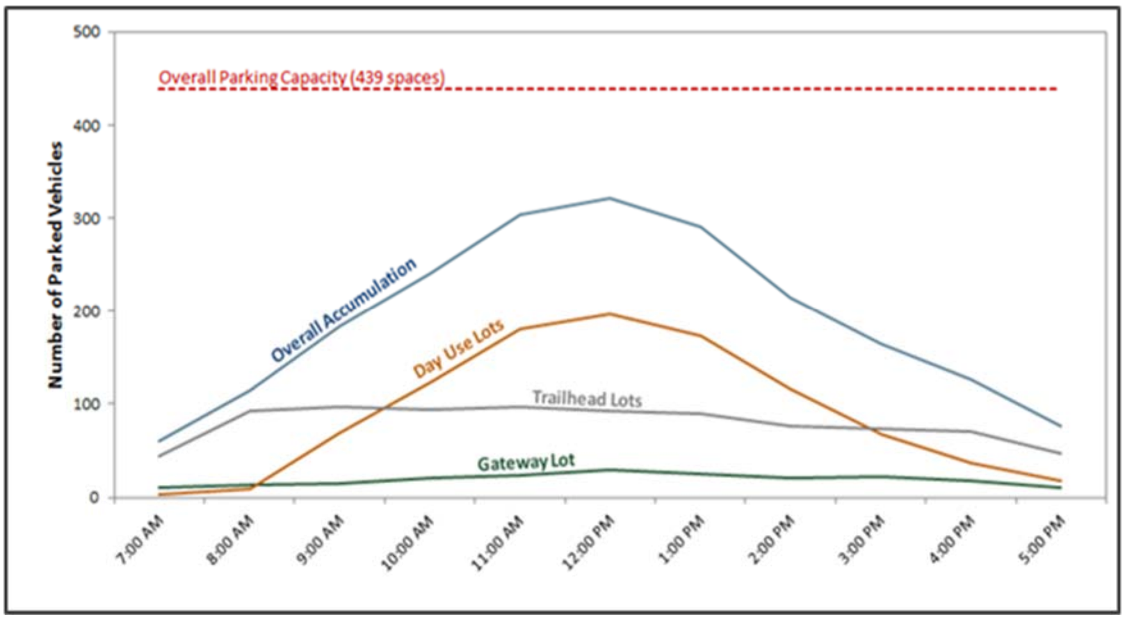

Figure 4-6. Brainard Lake overall parking accumulation, summer 2013.

The parking circumstances noted imply that additional parking is needed at the locations where visitors want to park, and/or improved access (e.g., via shuttle service) is needed from the locations where parking supply is adequate to popular destinations (i.e., the IPW trailheads). Previous studies have assessed the feasibility of using shuttle or transit service to address this need. However, the USFS recognizes that improving access to the IPW trailheads would not be suitable, if it results in unacceptable crowding and/or resource impacts. Thus, strategies to improve access to the IPW trailheads need to be evaluated in terms of their potential impacts on Wilderness resource values in the IPW. Moreover, previous transit feasibility studies at BLRA were conducted prior to reconfiguration of parking lots and parking management there; thus, traffic, parking, and visitor use patterns have changed since the previous studies.

Parking Management

Currently, the USFS has a contract with a concessionaire to manage traffic and parking at BLRA during the peak summer visitor use season (approximately Memorial Day Weekend through Labor Day Weekend; Figure 4-7). The parking management team at BLRA operates daily from 7:00 AM to approximately 2:00 PM, with one staff member stationed at each of the two IPW trailhead parking lots (i.e., the Long Lake and Mitchell Lake Trailhead Parking Lots). The IPW trailhead parking lot monitors use two-way radios to inform a third member of the parking management team and the staff at the Courtesy Station when the trailhead parking lots are full, and when parking spaces become available again after the lots are full. The third member of the parking management team is positioned at various locations in BLRA throughout the day, depending on where parking is available. This "roving" member of the parking management team is responsible for directing visitors to available parking spaces and blocking the roadway to prevent visitors from driving to the IPW trailhead parking lots when they are full. Staff at the Courtesy Station inform arriving visitors of their parking options, based on the information they receive via radio from the three members of the parking management team. As noted, when the IPW trailhead parking lots and the Brainard Lake Day Use Lot are full, staff members at the Courtesy Station stop visitors from entering BLRA until other visitors leave and parking spaces become available. Courtesy Station staff also inform visitors of the option to park in the Gateway Trailhead Lot, instead of waiting at the Courtesy Station for other visitors to leave BLRA. Observations during the summer 2013 study at BLRA suggest that the parking management team is needed to enforce parking lot limits, prohibit roadside parking, and control the flow of visitors into and at BLRA. For example, it was observed during the summer 2013 study at BLRA that when the "roving" member of the parking management team was not present (e.g., after the shift ended or when the staff member had to attend to another duty), visitors would drive past "parking lot full" signs to the full IPW trailhead parking lots and circulate or wait for a parking space to empty. Thus, it is expected that without the parking management team at BLRA, there would be impacts to public safety, forest resources, and the scenery of the area due to parking in undesignated areas and traffic circling through full parking lots searching for places to park.

Figure 4-7. Brainard Lake parking management team, summer 2013.

Roadside Parking

Until recently, visitors were allowed to park on the shoulder of Brainard Lake Road and the access road to the Long Lake and Mitchell Lake Trailhead Parking Lots. This roadside parking caused resource impacts, increased the risk of pedestrian-motor vehicle crashes, and degraded the scenic quality of the area. Recently, the USFS instituted a policy to prohibit roadside parking at BLRA to address the safety, resource management, and visitor experience-related issues noted. The onsite parking management team described above effectively controls the flow of traffic in BLRA to available parking spaces, and is instrumental in implementing the USFS's policy to eliminate roadside parking in BLRA. Additionally, the USFS has installed barriers and signs to prevent roadside parking on Brainard Lake Road and the access road to the Long Lake and Mitchell Lake Trailhead Parking Lots, where it once occurred in large numbers. It is likely that without the parking management team, barriers, and signs in place at BLRA, roadside parking would become a significant issue again. It should be noted that while roadside parking has been effectively eliminated as a form of overflow parking at BLRA, roadside parking does occur sporadically throughout the day on Brainard Lake Road when moose are sighted along the south side of Brainard Lake. When these "moose jams" occur, visitors will often stop their vehicles on the side of the road, impacting forest resources, or in the middle of the road, causing traffic conflicts. Thus, measures are needed to manage this wildlife-viewing behavior.

Wayfinding and Pedestrian Connections

Figure 4-8. Brainard Lake Day Use parking lot, summer 2013.

As noted, when the Long Lake and Mitchell Lake Trailhead Parking Lots are full, visitors are directed to park in the Brainard Lake Day Use Lot. Observations during the summer 2013 study period at BLRA suggest that it is common for visitors who enter the Day Use Parking Lot to be confused about where to park in the lot and where their destinations are, once they have parked (Figure 4-8). For example, many of the visitors who park in the Day Use Lot intend to hike in the IPW, yet it is common for visitors parked in the Day Use Lot to be confused about where the IPW trailheads are located in relation to the lot and what route they should take to access the IPW trailheads. Furthermore, the lot is located approximately one mile from the Long Lake and Mitchell Lake Trailhead, and visitors must walk along the recently closed portion of the Brainard Lake Road or along the open portion of the road on the south side of Brainard Lake. The confusion visitors experience trying to find the correct route to the IPW trailheads, coupled with the fact that they must walk on the road to reach the trailheads, causes visitors to be frustrated. Moreover, the fact that visitors must walk on roads with moving traffic, whether it be on the open portion of Brainard Lake Road or the access road to the Long Lake and Mitchell Lake Trailheads, exposes visitors to the risk of pedestrian-motor vehicle crashes. Wayfinding and access issues are even more pronounced for those visitors who choose to park in the Gateway Trailhead Parking Lot when the other lots at BLRA are full. Specifically, visitors who park in the Gateway Trailhead Parking Lot are often confused about recreation activities originating from the lot and/or how to access Brainard Lake. And, in the case of visitors who park in the Gateway Trailhead Parking Lot and intend to hike in the IPW, these visitors must walk approximately three miles to the IPW trailheads, either on forested trails that are confusing for visitors to use as a form of “transportation” to the IPW trailheads or along a section of Brainard Lake Road with substantial vehicle traffic. Together, these circumstances suggest there aren’t sufficient pedestrian connections to provide visitors with safe, enjoyable, and easy-to-use access among the Gateway Trailhead Parking Lot, Brainard Lake Day Use Lot, Brainard Lake, and the Long Lake and Mitchell Lake Trailheads. Similarly, improvements to wayfinding and directional signage are needed.

Wilderness Use and Visitor Crowding

Figure 4-9. Mitchell Lake Trail, Indian Peaks Wilderness.

The popularity of BLRA is attributable, in part, to the fact that it provides visitors with direct access to the IPW. For example, the IPW can be accessed within one-quarter mile of the Long Lake Trailhead, and within one-half mile of the Mitchell Lake Trailhead (Figure 4-9). Correspondingly, observations during the summer 2013 study at BLRA suggest a large proportion of BLRA visitors are destined for hikes in the IPW. More specifically, trail use count data collected during the summer 2013 study suggest that on typically busy summer days at BLRA, nearly 800 visitors start hikes from the Long Lake and Mitchell Lake Trailheads per day, and close to 200 visitors start hikes at the Niwot Cut-Off Trailhead. Thus, while the USFS is legally mandated by the Wilderness Act of 1964 to manage the IPW for, among other things, opportunities for visitors to experience solitude, there is relatively intensive visitor use in the IPW originating from BLRA during the summer season. That being said, recent changes to parking policies and corresponding onsite parking management are intended to help reduce visitor use pressure on the IPW. In particular, and as noted, parking is now limited to the capacity of the relatively small parking lots at the Mitchell Lake and Long Lake Trailheads, and once these lots are full, visitors must park one mile or more away from the trailheads. Despite this, and as noted, observations during the summer 2013 study suggest a large proportion of BLRA visitors are destined for the IPW and will walk on roads, even with moving traffic, to reach the Long Lake and Mitchell Lake Trailheads. Thus, additional measures may be needed to manage visitor use levels in the IPW according to Wilderness management objectives, including resource protection, solitude, and challenge.

Traffic Congestion at the Entrance to BLRA

Figure 4-10. Brainard Lake Courtesy Station queue, summer 2013.

When the parking lots at the IPW trailheads and the Brainard Lake Day Use Parking Lot are full, staff members at the Courtesy Station stop visitors from entering BLRA until other visitors leave and parking spaces become available. Consequently, during busy periods, lines of traffic form at the entrance to BLRA while visitors wait for parking spaces to become available (Figure 4-10). For example, results of the summer 2013 study at BLRA suggest that, starting around 11:00 AM on typically busy summer days, visitors must be stopped at the entrance to BLRA and wait for a period of time (typically about 10 to 15 minutes) before parking spaces become available again; this occurs for a period of about an hour. On very busy days during the 2013 study period, the line of traffic at the entrance to BLRA reached from the Courtesy Station to beyond the Gateway Trailhead Parking Lot entrance, causing traffic safety hazards resulting from oncoming vehicles approaching BLRA not being able to anticipate traffic is stopped in the roadway ahead of them. These circumstances not only increase the risk of vehicle crashes, but are very frustrating to visitors. Additionally, while visitors waiting in line at the Courtesy Station are informed of the option to park in the Gateway Trailhead Parking Lot, few choose to do so, because the lot is located a relatively long distance from most visitors' destinations. Moreover, some visitors are unable to get from the line of traffic to the Gateway Trailhead Parking Lot, even if they would prefer to park there than wait in line at the Courtesy Station.

Advanced Trip Planning and Traveler Information for BLRA Visitors

Results of previous visitor surveys conducted by the USFS suggest visitors to BLRA receive information about the recreation area primarily through friends and family or through the USFS website1. The information available to BLRA visitors is generally limited to driving directions to BLRA and opportunities for recreation activities at BLRA; correspondingly, visitors have reported in previous visitor surveys that they are only marginally satisfied with the information. Importantly, there is little or no information available to help BLRA visitors make trip-planning decisions based on parking, traffic, and visitor use conditions they are likely to experience at different times of day, days of week, and seasons. Information is needed about the best times to visit BLRA to avoid parking shortages, traffic congestion, and visitor crowding. This information needs to be distributed through multiple outlets (e.g., websites, smartphone apps, regional visitor

[1] Arapaho and Roosevelt National Forests and Pawnee National Grassland Interpretive Strategy (2005).

centers, roadside signs, etc.) to ensure the information is delivered as far in advance of visitors' trips to or arrival at BLRA as possible. This information is needed to help ensure that those who are particularly sensitive to congestion and crowding issues can make informed decisions about when to visit BLRA during off-peak times, and to more generally help shift some visitor use away from peak periods. Similarly, advanced traveler information is needed to inform people as early in their trip as possible when parking lots are full at BLRA and their options.

Guanella Pass

Introduction

Guanella Pass Road is a National Forest Scenic Byway located approximately 40 miles west of the Denver Metropolitan area. The Scenic Byway is 24 miles in length, passes through the ARNF and Pike National Forest (PNF), and connects Georgetown, Colorado, to Grant, Colorado, via the 11,669' Guanella Pass. The section of Guanella Pass Road from Georgetown, Colorado, to the Park County line is owned and maintained by Clear Creek County; from the Park County line to Grant, Colorado, the road is owned and maintained by Park County (Figure 4-12).

Figure 4-11. Mount Bierstadt Trail, Guanella Pass.

Figure 4-12. Guanella Pass facilities.

The Guanella Pass Scenic Byway provides outstanding opportunities for scenic driving, and year-round access to backcountry recreational opportunities. During the summer months, recreational use is particularly concentrated at Guanella Pass (GP). There are two main parking areas at GP, including the Lower Lot with just under 50 parking spaces, and the Upper Lot with just under 60 spaces (Figure 4-12). The parking lots at GP provide trailhead access to the Mount Evans Wilderness to the east and the Square Top Mountain area to the west. Guanella Pass is particularly popular for its relatively easy hiking access to the summit of Mount Bierstadt, one of Colorado's 14,000+ foot peaks (i.e., 14'ers), which is located within the Mount Evans Wilderness.

According to Denver Regional Council of Government's (DRCOG) 2030 Mountains and Plains Transportation Plan, between 1980 and 2005, the population of GP's neighboring communities (Clear Creek and Gilpin Counties) increased 50% from 9,745 to 16,410 residents; the population is projected to increase another 70% by 2030. This population trend, coupled with the burgeoning Colorado Front Range population more generally, suggests that intensive visitor use at GP will continue to occur and is likely to increase. The challenges of intensive summer visitation at GP are exacerbated by the fact that the vast majority (~85%) of visitor use at GP is concentrated on the Mount Bierstadt Trail and during the early-morning to early-afternoon hours of the day. Consequently, there are a number of transportation, recreation, and resource management-related issues at GP, which are described below.

Parking Demand Exceeds Capacity

During peak periods of the summer visitor use season, parking shortages at GP are severe. For example, results of a transportation and visitor use study conducted at GP during summer 2012 suggest that on typically busy summer days, the Lower Lot fills beyond its capacity by 6:00 AM and remains filled beyond its capacity (e.g., with cars parked in unendorsed areas within the lot) through the early afternoon (Figure 4-13). Similarly, the summer 2012 study results suggest the Upper Lot fills to its capacity by 9:00 AM and remains full until early afternoon (Figure 4-14). Consequently, many visitors experience confusion and frustration when they arrive at GP to find all of the designated parking spaces are full, and have no choice but to park in unendorsed spaces on the roadside, as described below, or leave.

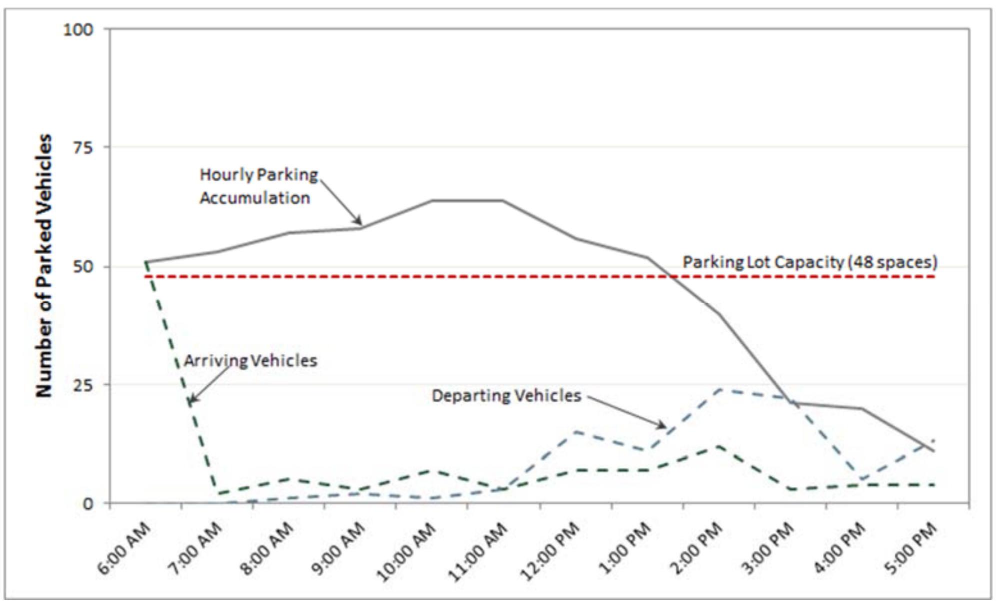

Figure 4-13. Guanella Pass Lower Parking Lot parking accumulation, summer 2012.

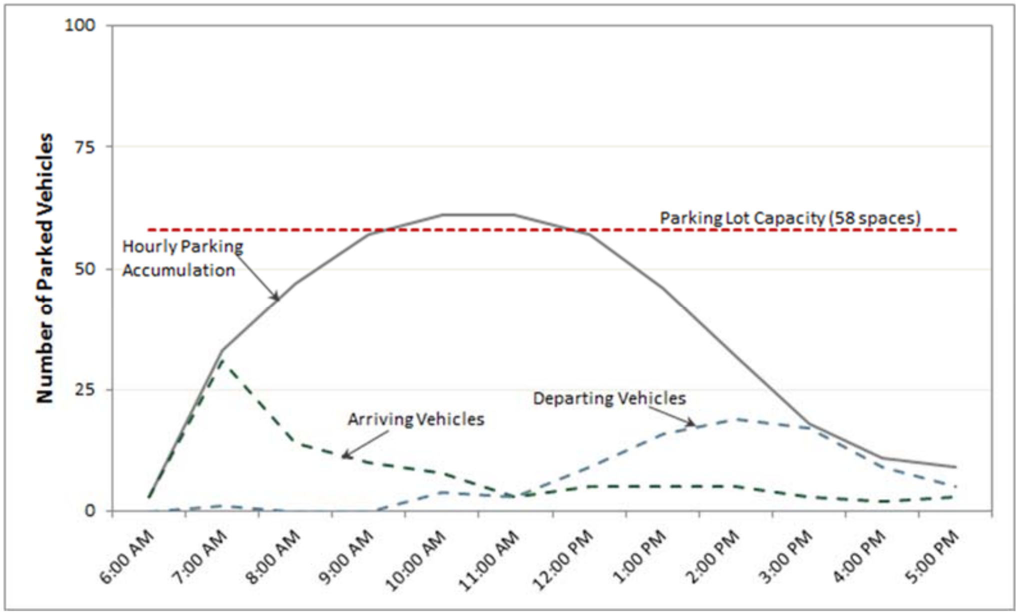

Figure 4-14. Guanella Pass Upper Parking Lot parking accumulation, summer 2012.

Roadside Parking

Results of the summer 2012 study suggest that, by early morning on typically busy summer days at GP, the designated parking lots fill with vehicles beyond their capacities. Correspondingly, the number of cars parked in unendorsed spaces on the roadside at GP increases sharply through the morning hours (Figure 4-15). Overall parking demand at GP reaches its peak in the late morning, at which time there are nearly twice as many cars parked in unendorsed spaces on the roadside at GP (approximately 230 vehicles) than in the designated parking lots (approximately 125 vehicles; Figure 4-16). Visitors who park along the roadside must walk in moving traffic on Guanella Pass Road from their parking spaces to the trailheads at GP, and are consequently exposed to risks of pedestrian-motor vehicle crashes.

Figure 4-15. Guanella Pass roadside parking, summer 2012.

Vehicles parked along the roadside at GP also greatly impact the scenic quality of visitors' auto touring and hiking experiences. Additionally, roadside parking in unendorsed spaces on Guanella Pass Road causes undue impacts to natural resources. In particular, results of a resource condition assessment conducted at GP during summer 2012 suggest there are over 3,500 square feet of trampled soils and vegetation along the roadside, largely due to impacts from unendorsed roadside parking.

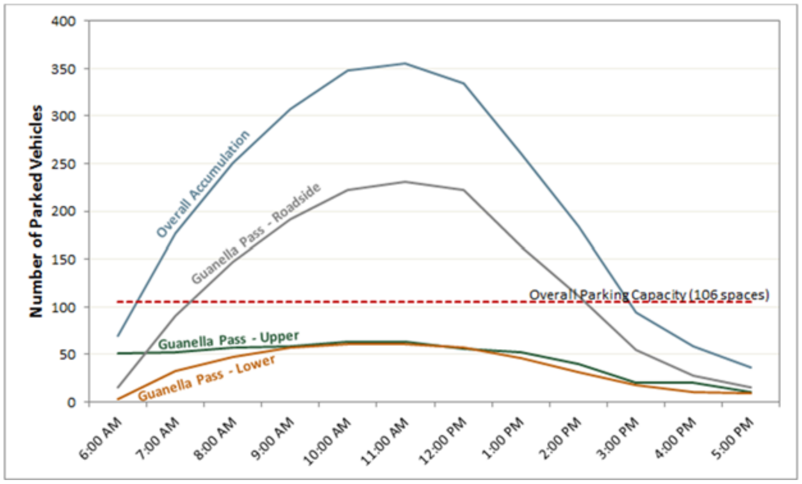

Figure 4-16. Guanella Pass overall parking accumulation, summer 2012.

Wilderness Use and Visitor Use Crowding

Figure 4-17. Summit of Mount Bierstadt, summer 2012.

As noted, the vast majority of visitors to GP hike the Mount Bierstadt Trail to the summit of Mount Bierstadt. Correspondingly, visitor use at GP is heavily concentrated in the Mount Evans Wilderness, through which the Mount Bierstadt Trail travels. For example, results of the summer 2012 study at GP suggest that on typically busy summer days at GP, more than 800 people hike on the Mount Bierstadt Trail per day. Moreover, most visitors hike the Mount Bierstadt Trail during the morning hours to avoid being on the mountain summit during afternoon thunderstorms. Consequently, intensive visitor densities and crowding occur on the Mount Bierstadt Trail and summit of Mount Bierstadt (Figure 4-17). For example, the 2012 study results suggest that during peak hours of typically busy summer days, there are as many as 130 people on the summit of Mount Bierstadt at one time. This results in a density of people on the mountain summit that is characterized in capacity planning guidelines (i.e., the Transportation Research Board's Highway Capacity Manual) as moderately crowded for an urban environment, such as a city sidewalk. Thus, while the USFS is legally mandated by the Wilderness Act of 1964 to manage the Mount Evans Wilderness for, among other things, opportunities for visitors to experience solitude, there is intensive visitor use and crowding on the Mount Bierstadt Trail and summit. Consequently, measures are needed to manage visitor use levels at Guanella Pass according to Wilderness management objectives and corresponding user capacities, for example, by instituting a day use permit system for access to the Mount Bierstadt Trail.

Recreation-Related Traffic Impacts in Georgetown, Colorado

Vehicle traffic volumes on Guanella Pass Road are relatively high, particularly during the summer months, and are concentrated on the Georgetown side of GP. For example, results of a 1995 traffic study on Guanella Pass Road suggest that during the summer, an average of 650 vehicles per day travel on the section of Guanella Pass Road located just south of Georgetown. Further, results of traffic counts conducted on Guanella Pass Road as part of the summer 2012 study suggest that nearly two-thirds (65%) of the vehicles on Guanella Pass Road travel to GP. This suggests that a substantial proportion of the traffic on Guanella Pass Road is recreation-related travel, and in particular, attributable to people destined for hiking trips on the Mount Bierstadt Trail. Consequently, the town of Georgetown, Colorado, experiences relatively intensive recreation-related traffic volumes through its small, historic downtown. Moreover, the 1995 traffic study on Guanella Pass Road included projections that traffic volumes would be approximately 50% to 80% higher in 2025 than they were in 1995. Correspondingly, recreation-related traffic impacts to the roads and character of Georgetown, Colorado, are anticipated to become more pronounced over the next decade. Thus, alternative transportation solutions for access to GP and the Mount Bierstadt Trailhead may be warranted to help reduce the number of vehicles traveling through the downtown streets of Georgetown, en route to GP.

Advanced Trip Planning and Traveler Information for GP Visitors

Results of previous visitor surveys conducted by the USFS suggest visitors to GP receive information about the recreation area primarily through friends and family or through the USFS website[2]. The information available to GP visitors is generally limited to driving directions to GP and opportunities for recreation activities at GP; correspondingly, visitors have reported in previous visitor surveys that they are only marginally satisfied with the information. Importantly, there is little or no information available to help GP visitors make trip-planning decisions based on parking, traffic, and visitor use conditions they are likely to experience at different times of day, days of week, and seasons. Information is needed about the best times to visit GP to avoid parking shortages, traffic congestion, and visitor crowding. This information needs to be distributed through multiple outlets (e.g., websites, smartphone apps, regional visitor centers, roadside signs, etc.) to ensure the information is delivered as far in advance of visitors trip to or arrival at GP as possible. This information is needed to help ensure that those who are particularly sensitive to congestion and crowding issues can make informed decisions about when to visit GP during off-peak times, and to more generally help shift some visitor use away from peak periods. Similarly, advanced traveler information is needed to inform people as early in their trip as possible when parking lots are full at GP and about their alternative parking and recreation options.

[2] Arapaho and Roosevelt National Forests and Pawnee National Grassland Interpretive Strategy (2005).

Mount Evans Recreation Area

Figure 4-18. Mount Evans Recreation Area.

Mount Evans Recreation Area (MERA) is located approximately 70 miles southwest of the Denver Metropolitan area, and 28 miles southwest of Idaho Springs, Colorado. Primary access to MERA is from I-70 via the Idaho Springs exit and Colorado Highway 103 to the intersection of Colorado Highway 5/Mount Evans Highway. The MERA Welcome Station is situated at the base of the Mount Evans Highway, which travels from the MERA Welcome Station 14 miles to the summit of Mount Evans. The Mount Evans Highway is a state highway, and the Colorado Department of Transportation (CDOT), who has a right of way from the USFS for the road, is responsible for maintaining the road. The summit of Mount Evans is 14,264 feet in elevation, making the Mount Evans Highway the highest-elevation paved road in North America. The entire route from Idaho Springs to the summit of Mount Evans is designated as the Mount Evans Scenic and Historic Byway.

The Mount Evans Highway is within both the ARNF and PNF, and is bordered on either side by the Mount Evans Wilderness Area (Figure 4-19). The Mount Evans Highway is open seasonally, roughly between Memorial Day and the first weekend in October, depending on weather and road conditions, although the road beyond Summit Lake is closed on the Tuesday after Labor Day. Visitor use in MERA is concentrated within three main recreation areas along the Mount Evans Highway, including: 1) Mount Goliath Research Natural Area; 2) Summit Lake Park, National Natural Landmark; and 3) Mount Evans summit area. The Mount Goliath Research Natural Area has a 16-space paved parking lot; Summit Lake Park has a 45-space dirt parking area; and the Mount Evans summit area has just under 40 paved parking spaces.

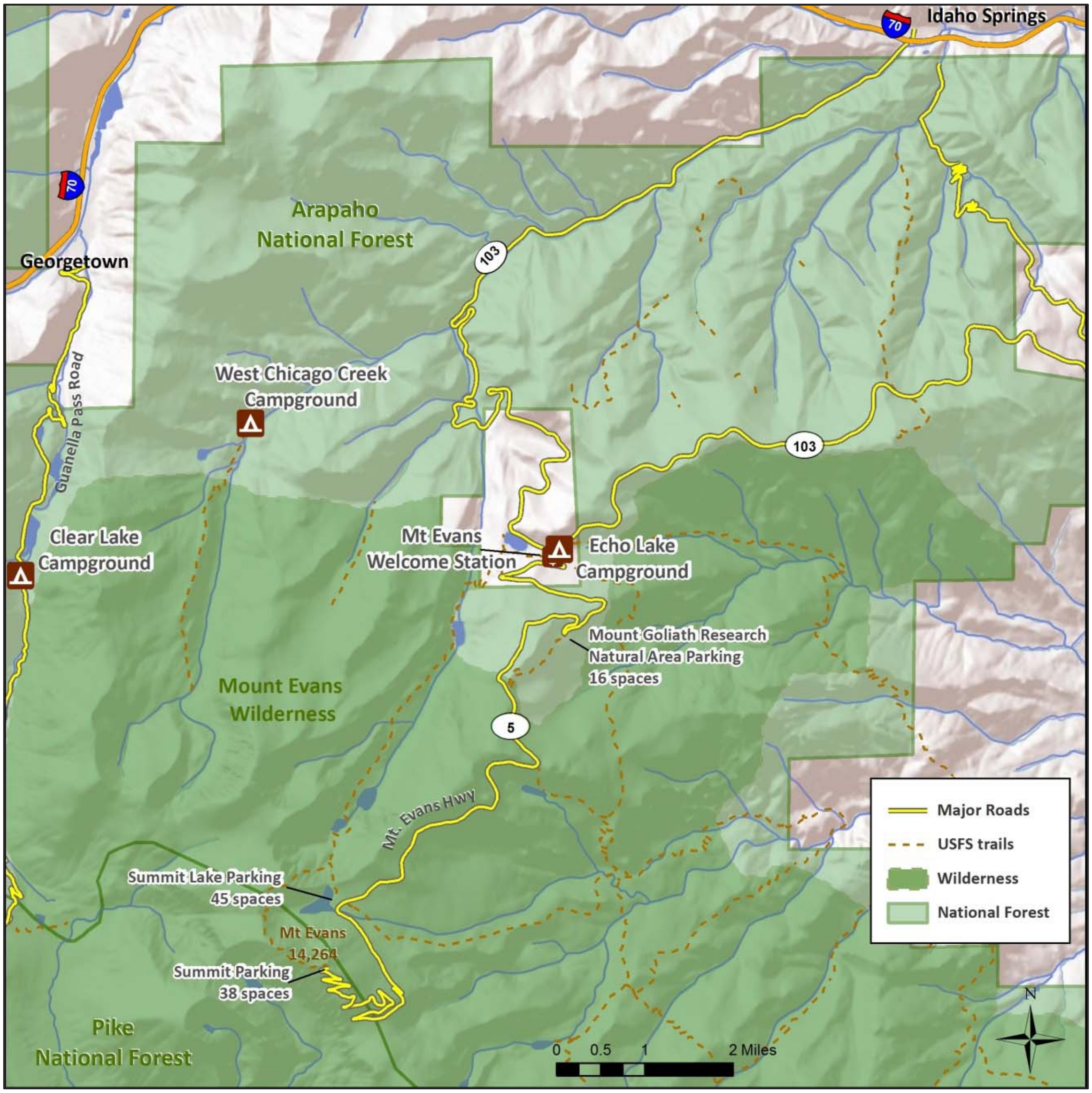

Figure 4-19. Mount Evans Recreation Area facilities.

Visitation to MERA has been relatively steady, or slightly increasing since the early 2000s, and presently averages around 120,000 visitors per year. As noted, visitor use at MERA occurs within a relatively short use season (approximately a 4-month period), and tends to be heavily concentrated along the Mount Evans Highway itself, and at the Summit Lake Park and Mount Evans summit areas. Intensive and narrowly concentrated visitation at MERA is the cause of a number of transportation, recreation, and resource management-related issues, which are described below.

Parking Demand Exceeds Capacity

During peak periods of the visitor use season at MERA, parking shortages at Summit Lake Park (Figure 4-20) and the Mount Evans Summit (Figure 4-21) area are severe. At Mount Goliath, the parking lot reaches, but does not exceed capacity. For example, results of the transportation and visitor use study conducted at MERA during summer 2012 suggest that on typically busy summer days, parking demand substantially exceeds parking capacity at MERA from late morning through late afternoon/early evening with numerous vehicles parked in unendorsed spaces along the roadside (Figure 4-22). The study results further suggest that during the peak hours on typically busy summer days, the number of parked cars at MERA reaches an "absolute limit" (i.e., not even room for unendorsed roadside parking) of over 50% above parking capacity; this implies that during the peak hours of summer days at MERA there is complete gridlock on upper sections of the Mount Evans Highway, with many cars moving slowly or stopped in traffic on the road, waiting for a place to park. These circumstances cause visitor frustration and traffic safety issues on the steep, narrow roadway.

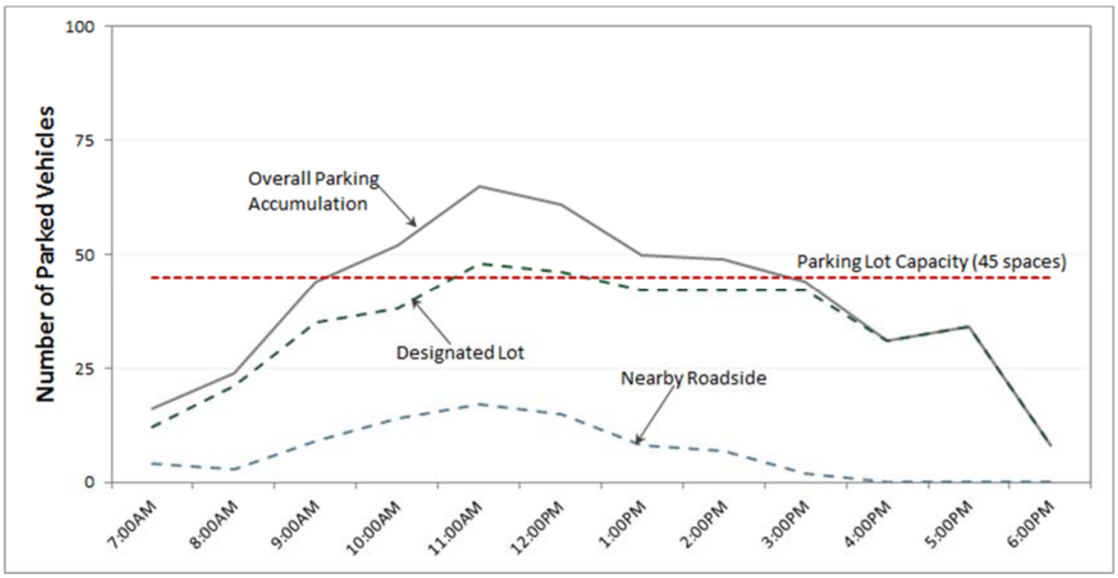

Figure 4-20. Summit Lake parking accumulation, summer 2012.

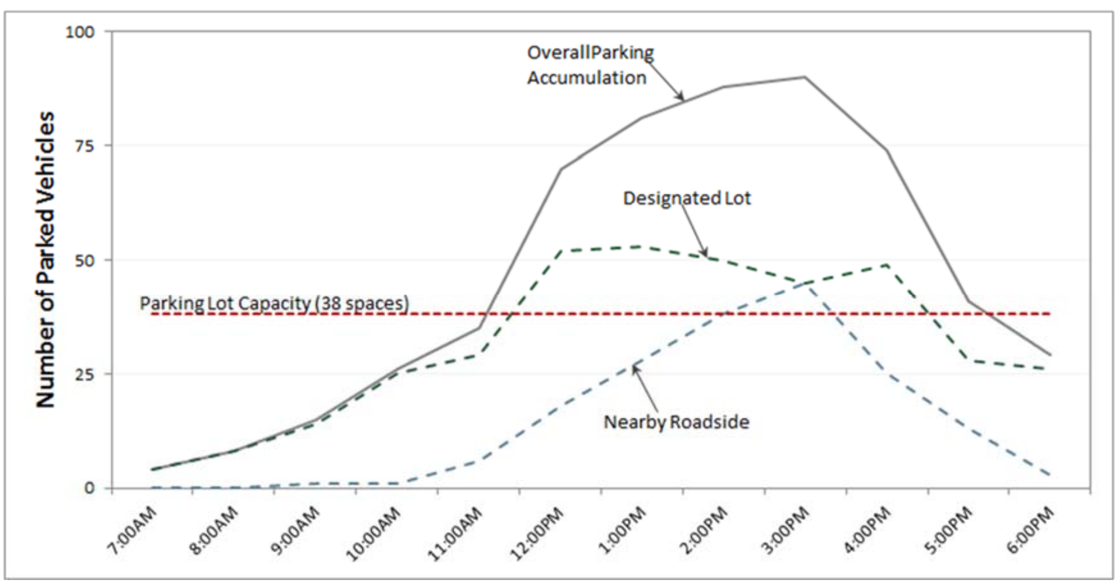

Figure 4-21. Summit area parking accumulation, summer 2012.

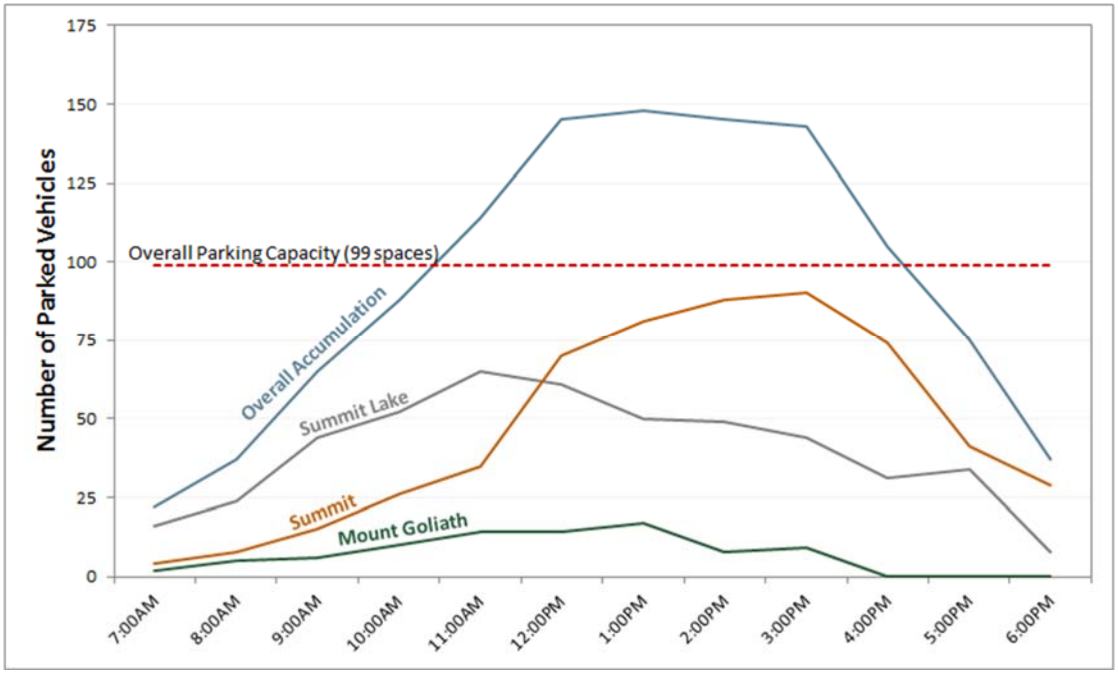

Figure 4-22. Mount Evans overall parking accumulation, summer 2012.

Roadside Parking

Figure 4-23. Mount Evans summit, summer 2012.

As noted, on typically busy summer days at MERA, the designated parking lots at Summit Lake Park and the Mount Evans summit area fill to capacity by mid- to late morning, and remain full until early to late afternoon. When the designated lots are full at these locations, visitors park in nearby undesignated locations along the roadside (Figure 4-24). For example, results of the summer 2012 study at MERA suggest that during the peak hours of typically busy summer days at the Mount Evans summit area, there are as many or more cars parked in undesignated roadside locations as in designated spaces in the parking lot. Visitors who park along the roadside must walk relatively long distances at high altitude in or near moving traffic on the narrow, winding road, which exposes them to risks of pedestrian-vehicle crashes. Vehicles parked along the roadside at Summit Lake Park and the Mount Evans summit area also greatly impact the quality of visitors' scenic driving and hiking experiences. Additionally, roadside parking in undesignated spaces causes undue impacts to natural resources and impairs proper drainage along the highway. In particular, results of the resource condition assessment conducted at MERA during summer 2012 suggest there are nearly 1,700 square feet of trampled soils and vegetation at MERA attributable to impacts from unendorsed parking. These issues are exacerbated by the fact that some visitors park along or in the roadway to view and photograph wildlife. Thus, alternative transportation strategies are needed to minimize or eliminate roadside parking at MERA.

Bicycle-Motor Vehicle Traffic Conflicts on the Mount Evans Highway

Results of the summer 2012 study at MERA suggest that on typically busy summer days, more than 50 cyclists climb the Mount Evans Highway to the summit. Climbing the Mount Evans Highway to the summit of Mount Evans is popular with cyclists, despite the fact that the narrow, winding roadway has virtually no shoulder and very poor sight lines (Figure 4-25). Vehicles must cross the center line into oncoming traffic to pass bicycles, and when headed downhill, bicyclists are often in the center of the lane. These circumstances expose cyclists and motorists to significant traffic safety hazards.

Figure 4-24. Bicycle and vehicle traffic on Mount Evans Highway, summer 2012.

Wilderness Use and Visitor Use Crowding

While the Mount Evans Highway itself is not located within congressionally designated Wilderness, it is surrounded on both sides by the Mount Evans Wilderness. Correspondingly, most of the trails in MERA are located in congressionally designated Wilderness. For example, the summit of Mount Evans, which is only a quarter-mile from a designated parking lot, is located within the boundaries of the Mount Evans Wilderness. Consequently, high visitor densities and crowding occur on the Mount Evans summit and at other popular destinations in the Mount Evans Wilderness (Figure 4-26). For example, results of the summer 2012 study at MERA

Figure 4-25. Mount Evans summit, summer 2012.

suggest that during peak hours of typically busy summer days, there are as many as 60 people on the summit of Mount Evans at one time. This results in a density of people on the summit of Mount Evans that is characterized in capacity planning guidelines (i.e., the Transportation Research Board's Highway Capacity Manual) as slightly crowded for an urban environment, such as a city sidewalk. Thus, while the USFS is legally mandated by the Wilderness Act of 1964 to manage the Mount Evans Wilderness for, among other things, opportunities for visitors to experience solitude, there is relatively intensive visitor use and crowding at popular Wilderness destinations in MERA. Consequently, measures are needed to manage visitor use levels at MERA according to Wilderness management objectives and corresponding user capacities, for example, by limiting access to the extent of designated parking capacities at the Mount Evans summit area and/or other trailheads along the Mount Evans Highway.

Traffic Congestion at the Entrance to MERA

Results of the summer 2012 study conducted at MERA suggest that, on typically busy summer days, more than 1,000 vehicles enter MERA per day. In addition, the study results suggest during the peak hour of busy summer days, more than 150 vehicles pass through the Welcome Station; this equates to close to three vehicles passing through the Welcome Station per minute during busy periods. Correspondingly, long lines of traffic form at the Welcome Station on typically busy summer days, and during particularly busy periods, traffic backs up onto Colorado Highway 103 (Figure 4-27). Traffic congestion at the Welcome Station causes visitor frustration at the onset of visitors' experiences at MERA, and when traffic backs up onto Highway 103, it creates traffic safety hazards for MERA visitors and other highway travelers.

Figure 4-26. Mount Evans Welcome Station queue, summer 2012.

Deteriorating Roadway Conditions and Driver Safety on the Mount Evans Highway

Figure 4-27. Mount Evans Highway road damage, summer 2012.

The Colorado Department of Transportation (CDOT) maintains the Mount Evans Highway, including plowing the roadway in late spring/early summer to open MERA for the recreational visitor use season. The Mount Evans Highway is in deteriorating condition due to its exposure to harsh climatic conditions; for example, sections of the roadbed are situated on perma-frost and consequently have substantial and ongoing frost-heave damage (Figure 4-28). Similarly, road shoulders have sloughed off along sections of the Mount Evans Highway, and the steep terrain makes repairs and reinforcement to these sections of road infeasible. Correspondingly, CDOT has expressed ongoing concerns about the costs and feasibility of maintaining the roadway for recreational vehicle access in the long term. Moreover, the deteriorating condition of the Mount Evans Highway, coupled with outstanding scenic views from the roadway are sources of concern among visitors, CDOT, and the USFS about visitors' safety while driving to the summit of Mount Evans.

Advanced Trip Planning and Traveler Information for MERA Visitors

Results of previous visitor surveys conducted by the USFS suggest visitors to MERA receive information about the recreation area primarily through friends and family or through the USFS website[3]. The information available to MERA visitors is generally limited to driving directions to MERA and opportunities for recreation activities at MERA; correspondingly, visitors have reported in previous visitor surveys that they are only marginally satisfied with the information. Importantly, there is little or no information available to help MERA visitors make trip-planning decisions based on parking, traffic, and visitor use conditions they are likely to experience at different times of day, days of week, and seasons. Information is needed about the best times to visit MERA to avoid parking shortages, traffic congestion, and visitor crowding. This information needs to be distributed through multiple outlets (e.g., websites, smartphone apps, regional visitor centers, roadside signs, etc.) to ensure the information is delivered as far in advance of visitors trip to or arrival at MERA as possible. This information is needed to help ensure that those who are particularly sensitive to congestion and crowding issues can make informed decisions about when to visit MERA during off-peak times, and to more generally help shift some visitor use away from peak periods. Similarly, advanced traveler information is needed to inform people as early in their trip as possible when parking lots are full at MERA and about their alternative parking and recreation options.

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[3] Arapaho and Roosevelt National Forests and Pawnee National Grassland Interpretive Strategy (2005).

Chapter 5: Alternative Components by Site

Introduction

Chapter 5: Alternative Components by Site presents descriptions of identified potential alternative transportation and visitor use management components to provide the USFS with the tools needed to address transportation, recreation, and resource management-related needs at BLRA, GP, and MERA. Within the section for each site, alternative transportation and visitor use management components are organized into transit and nontransit components. While each component is presented as a "stand alone" option presently, individual components were ultimately bundled to maximize their efficiency and effectiveness in final recommendations.

Alternative components are presented for each site, organized into transit-related components and non-transit-related components. Alternative components for Brainard Lake Recreation Area are presented first, followed by components for Guanella Pass and Mount Evans Recreation Area.

Brainard Lake Recreation Area Alternative Components

Potential Transit Components

It is anticipated the following transit service components could help reduce peak-period parking demand and shortages in BLRA, improve visitor access from the Gateway Trailhead Parking Lot to the Mitchell Lake and Long Lake Trailheads, and manage visitor access to the IPW according to crowding-related capacities.

Shuttle Service from Nederland, Colorado, to the Gateway Trailhead Parking Lot

Shuttle buses would operate between the Regional Transportation District (RTD) park-and-ride lot in Nederland, Colorado, and the Gateway Trailhead Parking Lot at BLRA, with en route shuttle stops at designated lodging establishments (e.g., hotels) and in Ward, Colorado. Existing facilities would be used for shuttle bus loading/unloading areas at the RTD park-and-ride lot in Nederland, Colorado, and in the Gateway Trailhead Parking Lot, and loading/unloading areas would be designated at en route shuttle stops, as needed. Shuttle service would operate on weekends and holidays from mid-June through Labor Day, and be coordinated with shuttle service between Boulder, Colorado, and Nederland, Colorado. Shuttle service would be operated according to ridership demand and crowding-related capacities for the IPW.

Shuttle Service Within BLRA

Shuttle buses would operate between the Gateway Trailhead Parking Lot and the Mitchell Lake and Long Lake Trailhead Parking Lots, with en route shuttle stops at the Brainard Lake Day Use Parking Lot and Red Rock Lake. Existing facilities would be used for shuttle bus loading/unloading areas in the Gateway Trailhead Parking Lot and Brainard Lake Day Use Parking Lot, and loading/unloading areas would be designated in the trailhead parking lots and at Red Rock Lake. Shuttle service would operate on weekends and holidays from mid-June through Labor Day. Shuttle service would be operated according to ridership demand and crowding-related capacities for the IPW.

Potential Non-transit Components

Site Design Improvements

Potential site design improvements include those that alter parking capacities in BLRA to simultaneously maximize public access and protect Wilderness resource values in the IPW. Improved bicycle and/or pedestrian connections could provide visitors with safe, enjoyable, and easy-to-use access among the Gateway Trailhead Parking Lot, Brainard Lake Day Use Parking Lot, Brainard Lake, and the Mitchell Lake and Long Lake Trailheads. In addition, trail system improvements could help shift some visitor use away from the IPW to areas east of Brainard Lake, which is consistent with management objectives for BLRA (see *Chapter 1: Brainard Lake Recreation Area Summary of Data and Findings* for discussion of proposed trail alignments). Thus, the following components will be evaluated in this study to assess the potential of each to improve transportation, recreation, and resource management in BLRA.

Hiking, bicycling, and pedestrian access

- **Accessible loop trail around Brainard Lake:** A universally accessible nature trail would be constructed around Brainard Lake, providing access for pedestrians, bicyclists, and visitors with mobility impairments. The trail would enhance recreational opportunities in BLRA and potentially shift some visitor use away from the IPW.

- **Loop trail connecting the Sourdough and Little Raven Trails:** New trail alignments would be developed to connect the Sourdough and Little Raven Trails. The new trail alignments would create opportunities for loop hikes from the Gateway Trailhead Parking Lot and potentially shift some visitor use away from the IPW.

- **Trail connecting the Little Raven Trail to Left Hand Park Reservoir:** A new trail alignment would be developed to connect the Little Raven Trail to Left Hand Park Reservoir. The new trail alignment would provide off-road pedestrian and bicycle access to Left Hand Park Reservoir and potentially shift some visitor use away from the IPW.

- **Bicycle and pedestrian path from the Gateway Trailhead Parking Lot to Brainard Lake via the Waldrop Trail:** A new bicycle and pedestrian path would be developed from the Gateway Trailhead Parking Lot to Brainard Lake. The path would follow the existing alignment from the Gateway Trailhead Parking Lot to the Waldrop Trail and continue along the existing Waldrop Trail alignment until it begins to head north. A new trail alignment would be developed from where the Waldrop Trail begins to head north to the Pawnee Campground and Brainard Lake Day Use Parking Lot. The bicycle and pedestrian path would provide off-road pedestrian and bicycle access from the Gateway Trailhead Parking Lot to Brainard Lake.

- **Trail connecting Brainard Lake Day Use Parking Lot to IPW trailheads:** A new trail alignment would be developed to provide pedestrian access from the Brainard Lake Day Use Parking Lot to the Mitchell Lake and Long Lake Trailheads. The new trail alignment would follow the pedestrian-only section of Brainard Lake Road on the north side of Brainard Lake to the Mitchell Creek Picnic Area. From the Mitchell Creek Picnic Area, the new trail alignment would follow the most reasonable course to the Mitchell Lake and Long Lake Trailheads, based on consideration of slopes, soils, distance, and road crossings.

Parking areas

- **Expand the size of parking lots at the IPW trailheads:** New parking spaces would be added to the existing paved parking lots at the Mitchell Lake and/or Long Lake Trailheads to increase parking capacity and help address parking shortages that occur during peak periods of visitor use. Parking lots would be sized according to parking demand and crowding-related capacities for the IPW.

- **Reduce the size of parking lots at the IPW trailheads:** The size of the existing parking lots at the Mitchell Lake and/or Long Lake Trailheads, and the number of designated parking spaces there, would be reduced to manage visitor access according to crowding-related capacities for the IPW.

- **Expand the size of the Brainard Lake Day Use Parking Lot:** New parking spaces would be added to the Brainard Lake Day Use Parking Lot to increase parking capacity and help address parking shortages that occur during peak periods of visitor use. The parking lot would be sized according to parking demand and crowding-related capacities for the IPW.

- **Reduce the size of the Brainard Lake Day Use Parking Lot:** The size of the existing Brainard Lake Day Use Parking Lot, and the number of designated parking spaces there, would be reduced to manage visitor access according to crowding-related capacities for the IPW.

- **Reconfigure and re-stripe existing parking facilities to optimize parking efficiency at the IPW trailheads:** Parking areas at the Mitchell Lake and Long Lake Trailheads would be reconfigured and re-striped to maximize efficient use of the existing paved footprint. This would potentially improve traffic circulation in the trailhead parking lots and help address parking shortages that occur during peak periods of visitor use. Parking lots would be configured according to parking demand and crowding-related capacities for the IPW.

ITS and Visitor Information

Intelligent Transportation System (ITS) technologies are commonly employed in public lands recreation areas to convey real-time and historical travel, parking, and weather information. The following ITS and visitor information components could be used to provide information about the best times to visit BLRA to avoid parking shortages, traffic congestion, and visitor crowding, which would potentially help shift some visitor use away from peak periods. Similarly, the below ITS and visitor information components could be used to inform people as early in their trip as possible when parking lots are full at BLRA and of their options. In addition, visitor information components could be used to improve wayfinding in BLRA and reduce visitor confusion.

- **Variable Message Signs (VMS):** Variable message signs would be placed in approved highway locations en route to BLRA (e.g., I-70, Peak-to-Peak Highway). Messages displayed on the VMS could be used to inform visitors of parking and visitor use conditions at BLRA and potentially persuade some people to visit BLRA during off-peak periods. This component could be coupled with one or more transit components to display information about shuttle service and park-and-ride options. Similarly, this component could be used in conjunction with a permit system and quota to inform people about their options for accessing BLRA and the IPW.

- **Highway Advisory Radio (HAR):** It would be possible to use VMS units with integrated Highway Advisory Radio (HAR) systems that travelers could listen to on an AM frequency. The HAR systems would allow for more detailed information to be conveyed than the VMS would alone. In this case, the VMS would display a message instructing visitors to "tune in" to a specific AM station for BLRA information.

- **CDOT 511, ARNF Website, Social Media, and Apps:** Website information and smart phone apps would be targeted at reaching visitors before they begin their trip to BLRA. Messages and related content would be designed to provide visitors with information about the advantages of visiting BLRA during off-peak periods and to set expectations about peak period conditions. In addition, links to websites and information about other outdoor recreation and tourist destinations in the vicinity of BLRA would be provided to inform visitors of options to consider as alternatives to visiting BLRA during peak periods.

- **Improved Onsite Wayfinding:** Improved wayfinding signage at key locations in BLRA would help reduce visitor confusion about how to get to and from parking lots and/or shuttle stops to their destinations in BLRA.

Parking Management

Implementation of the following parking management components would help address impacts to public safety, forest resources, the scenery of the area, and the quality of visitors' experiences due to parking in undesignated areas and traffic circling through full parking lots searching for places to park.

- **Dedicated traffic and parking management team:** A dedicated traffic and parking management team would continue to be deployed at BLRA during the peak summer visitor use season (mid-June through Labor Day). The team would operate daily during the peak summer season from early morning to midafternoon, with one staff member stationed at each of the two IPW trailhead parking lots (i.e., the Mitchell Lake and Long Lake Trailhead Parking Lots). The IPW trailhead parking lot monitors would use two-way radios to inform a third member of the parking management team and the staff at the Courtesy Station when the trailhead parking lots are full, and when parking spaces become available again after the lots are full. The third member of the parking management team would be positioned at various locations in BLRA throughout the day, depending on where parking is available. This "roving" member of the parking management team would be responsible for directing visitors to available parking spaces and blocking the roadway to prevent visitors from driving to the IPW trailhead parking lots when they are full. Staff at the Courtesy Station would inform arriving visitors of their parking options, based on the information they receive via radio from the three members of the parking management team and parking management policies.

- **Traffic queuing at Courtesy Station when parking lots are full:** When the IPW trailhead parking lots and the Brainard Lake Day Use Parking Lot are full, staff members at the Courtesy Station would stop visitors from entering BLRA. Visitors would be given the option to park in the Gateway Trailhead Parking Lot or wait in their vehicles at the Courtesy Station until other visitors leave and parking spaces become available in BLRA.

- **Mandatory parking at Gateway Trailhead Parking Lot when other lots are full:** When the IPW trailhead parking lots and the Brainard Lake Day Use Parking Lot are full, staff members at the Courtesy Station would stop visitors from entering BLRA. Visitors would be required to park in the Gateway Trailhead Parking Lot and would not be allowed to wait in their vehicles at the Courtesy Station for parking spaces to become available in BLRA. Visitors would be allowed to enter BLRA again, after the peak hours of the day when a substantive number of parking spaces are available in BLRA.

- **Mandatory parking in offsite lot when all BLRA lots are full:** When all parking lots at BLRA are full, including the Gateway Trailhead Parking Lot, staff members at the Courtesy Station would stop visitors from entering BLRA. Visitors would be required to park in an offsite lot (e.g., in Nederland, Colorado) for access to BLRA. This option would be combined with transit service from the offsite parking lot to BLRA.

- **Paid parking:** Visitors who wish to park in the IPW trailhead parking lots and/or the Brainard Lake Day Use Parking Lot would be required to pay a parking fee that would be in addition to the amenity fee to enter BLRA. Visitors would be required to pay the fee at the Courtesy Station or an automated machine at the parking lots and display a parking permit in their vehicles.

- **Signs and/or barriers to prevent unendorsed roadside parking:** Existing barriers and signs would be retained to prevent roadside parking on Brainard Lake Road and the access road to the Mitchell Lake and Long Lake Trailhead Parking Lots, where it once occurred in large numbers. In addition, roadside barriers would be installed on Brainard Lake Road south of Brainard Lake to prevent roadside parking from occurring when moose are sighted in the area.

- **Designated parking for wildlife viewing:** Designated parking would be developed on Brainard Lake Road south of Brainard Lake to provide a place for visitors to park and view wildlife when moose are sighted in the area.

Visitor Use Management

Visitor use management strategies would help to shift visitor use away from the most congested locations, days, and times of day at BLRA. The following visitor use management strategies range from those that attempt to *persuade* visitors to change their behaviors to those that *require* visitors to change their behavior.

- **Differential amenity fees for peak and nonpeak periods:** To encourage visitation during off-peak periods, the BLRA amenity fee would be increased during peak seasons, days, and/or hours of the day, and/or reduced during off-peak periods. Increased peak-period fees would generate additional revenue and serve as a potentially effective way to dis-incentivize visitation during peak periods. However, fee increases may be unpopular with the public and potentially raises issues of equitable access to BLRA. In either case, the effectiveness and acceptability of a variable amenity fee structure would require that it be clearly explained so that visitors are aware of and understand their options.

- **Day use permit system and quota for Indian Peaks Wilderness trailheads:** A permit system and quota would be implemented to limit the number of day use visitors allowed to hike in the IPW per day. Under such a system, visitors would be required to obtain and display a permit for a specific date and time period during which they would be allowed to hike in the IPW. An online permit system could be used to allow visitors to obtain their permits in advance of their trip to BLRA, or permits could be obtained at one or more locations in BLRA (e.g., Gateway Trailhead Parking Lot, Courtesy Station) when visitors arrive. The number and distribution of day use hiking permits would be based on crowding-related capacities for the IPW and operational capacity of BLRA (i.e., parking capacities, shuttle service capacities if applicable, etc.).

- **Temporary closures when parking lots are full:** During particularly busy periods at BLRA visitors would be directed to other recreation and tourism destinations in the area, rather than being allowed to visit BLRA.

Guanella Pass Alternative Components

Potential Transit Components

It is anticipated the hiker shuttle service components described below could help reduce peak-period parking demand and shortages at GP, and manage visitor access to the Mount Bierstadt Trail and summit according to crowding-related capacities for the Mount Evans Wilderness. The transit-based interpretive tour components described in this subsection could help shift some use away from GP to less crowded and congested attractions along the Guanella Pass Scenic Byway.

Hiker Shuttle Service from Georgetown, Colorado, to GP

Shuttle buses would operate between a designated park-and-ride lot in Georgetown, Colorado, and GP, with en route shuttle stops at the Clear Lake and Guanella Pass Campgrounds, and the Silver Dollar parking area. Existing facilities would be used for shuttle bus loading/unloading areas at the designated park-and-ride lot in Georgetown, Colorado, to the extent possible, and loading/unloading areas would be designated at en route shuttle stops and GP. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. Hours of operation would correspond with peak hours of visitor use/hiking on the Mount Bierstadt Trail, and include contingency operating plans for managing surges in ridership demand at GP in the event of thunderstorms. More generally, shuttle service would be operated according to ridership demand and crowding-related capacities for the Mount Evans Wilderness.

Hiker Shuttle Service from Guanella Pass Road to GP

Shuttle buses would operate between a designated park-and-ride lot on Guanella Pass Road, and GP, with en route shuttle stops at key visitor destinations on Guanella Pass Road (e.g., the Clear Lake and Guanella Pass Campgrounds and the Silver Dollar parking area, if en route). Loading/unloading areas would be designated at the designated park-and-ride lot, en route shuttle stops, and GP. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. Hours of operation would correspond with peak hours of visitor use/hiking on the Mount Bierstadt Trail, and include contingency operating plans for managing surges in ridership demand at GP in the event of thunderstorms. More generally, shuttle service would be operated according to ridership demand and crowding-related capacities for the Mount Evans Wilderness.

Interpretive Tour from Georgetown, Colorado, Via Van or Shuttle Bus on Guanella Pass Road

A shuttle bus would operate along Guanella Pass Road at regular intervals on weekends and holidays from Memorial Day weekend through Labor Day. The tour would include interpretation about the natural and cultural resources of the forest and surrounding areas, delivered by the bus driver or via a recording. The tour would originate at a designated park-and-ride lot in Georgetown, Colorado, and it would include several stops along Guanella Pass Road, including Silverdale day use area, Clear Lake, Upper Cabin Creek Reservoir Trailhead, Silver Dollar Lake, and the Guanella Pass parking lot. New facilities or designations for loading/unloading areas would be developed at all stops, and each stop would include an opportunity for passengers to unload and briefly explore the area. Tour frequency and hours of operation would be based upon demand. The tour would operate as a round-trip service, with potential for a hop-on/hop-off service if there is sufficient demand. This service could be operated by a concessionaire, with a tour fee charged to passengers.

Interpretive Tour from Denver, Colorado, Via Van or Shuttle Bus on Guanella Pass Road

A shuttle bus would operate along Guanella Pass Road at regular intervals on weekends and holidays from Memorial Day weekend through Labor Day. The tour would include interpretation about the natural and cultural resources of the forest and surrounding areas, delivered by the bus driver or via a recording. The tour would originate at a central location in Denver, Colorado, that is accessible by transit and also provides parking. The tour would include several stops along Guanella Pass Road, including Silverdale day use area, Clear Lake, Upper Cabin Creek Reservoir trailhead, Silver Dollar Lake, and the Guanella Pass parking lot. New facilities or designations for loading/unloading areas would be developed at all stops, and each stop would include an opportunity for passengers to unload and briefly explore the area. The tour would operate as a round-trip service, with one trip per day on weekends and holidays. Due to the length of the tour, there would not be potential for hop-on/hop-off service. This service could be operated by a concessionaire, with a tour fee charged to passengers.

Potential Non-transit Components

Site Design Improvements

Potential site design improvements include those that alter the parking capacity at GP to simultaneously maximize public access and protect Wilderness resource values in the adjacent Mount Evans Wilderness, as follows.

Parking areas

- **Expand the size of parking lots at GP:** New parking spaces would be added to the existing paved parking lots at GP to increase parking capacity and help address parking shortages that occur during peak periods of visitor use. Parking lots would be sized according to parking demand and crowding-related capacities for the Mount Evans Wilderness.

- **Reduce the size of parking lots at GP:** The size of the existing parking lots and number of designated parking spaces at GP would be reduced to manage visitor access according to crowding-related capacities for the Mount Evans Wilderness.

- **Widen road shoulders for designated roadside parking at GP:** Guanella Pass Road would be widened at GP and striping would be used to designate roadside parking spaces to increase parking capacity and help address parking shortages that occur during peak periods of visitor use. The number of roadside parking spaces would be designated according to parking demand and crowding-related capacities for the Mount Evans Wilderness.

ITS and Visitor Information

As noted, ITS technologies are commonly employed in public lands recreation areas to convey real-time and historical travel, parking, and weather information. The following ITS and visitor information components could be used to help shift some visitor use away from peak periods at GP.

- **Variable Message Signs (VMS):** Variable message signs would be placed in approved highway locations en route to GP (e.g., I-70, Guanella Pass Road near Georgetown, Colorado, and Grant, Colorado). Messages displayed on the VMS could be used to inform visitors of parking and visitor use conditions at GP and potentially persuade some people to visit GP during off-peak periods. This component could be coupled with one or more transit components to display information about shuttle service and park-and-ride options. Similarly, this component could be used in conjunction with a permit system and quota to inform people about their options for accessing GP and the Mount Bierstadt Trail.

- **Highway Advisory Radio (HAR):** It would be possible to use VMS units with integrated Highway Advisory Radio (HAR) systems that travelers could listen to on an AM frequency. The HAR systems would allow for more detailed information to be conveyed than the VMS would alone. In this case, the VMS would display a message instructing visitors to "tune in" to a specific AM station for GP information.

- **CDOT 511, ARNF Website, Social Media, and Apps:** Website information and smart phone apps would be targeted at reaching visitors before they begin their trip to GP. Messages and related content would be designed to provide visitors with information about the advantages of visiting GP during off-peak periods and to set expectations about peak period conditions. In addition, links to websites and information about other outdoor recreation and tourist destinations in the vicinity of GP would be provided to inform visitors of options to consider as alternatives to visiting GP during peak periods.

Parking Management

Implementation of the following parking management components would help address impacts to public safety, forest resources, the scenery of the area, and the quality of visitors' experiences due to parking in undesignated areas and traffic circling through full parking lots searching for places to park.

- **Dedicated traffic and parking management team:** A dedicated traffic and parking management team would be deployed at GP on weekend days during the peak summer visitor use season (approximately Memorial Day Weekend through Labor Day). The parking management team would operate from early morning to midafternoon, with two or three staff members stationed near the parking lot entrances at GP on Guanella Pass Road. The parking management team staff would be responsible for directing visitors to available parking spaces in the designated parking lots and directing traffic on Guanella Pass Road when the parking lots are full. If roadside parking on Guanella Pass Road is prohibited, the parking management team staff would be responsible for enforcing this parking policy by directing visitors to other destinations, and informing them of options to return during less congested times and/or days.

- **Mandatory parking in offsite lot when all GP lots are full:** When all parking lots at GP are full, visitors would be required to park in an offsite lot (e.g., in Georgetown, Colorado) for access to GP. This option would be combined with transit service from the offsite parking lot to GP. In addition, it is likely this option would require a dedicated traffic and parking management team at GP to enforce this parking policy.

- **Paid parking at GP:** Visitors who wish to park in the GP parking lots would be required to pay a parking fee using an automated machine at the parking lots and display a parking permit in their vehicles.

- **Signs and/or barriers to prevent unendorsed roadside parking:** Roadside barriers and/or signs would be installed on both sides of Guanella Pass Road at GP to prevent roadside parking from occurring when the parking lots at GP are full. It is likely this option would require a dedicated traffic and parking management team at GP to enforce this parking policy.

Visitor Use Management

Visitor use management strategies would help to shift visitor use away from the most congested days and/or times of day at GP and on the Mount Bierstadt Trail. The following visitor use management strategies range from those that attempt to *persuade* visitors to change their behaviors to those that *require* visitors to change their behavior.

- **Amenity fee for visitor access during peak periods:** To encourage visitation during off-peak periods, an amenity fee would be charged for visitor access at GP during peak seasons, days, and/or hours of the day. Peak-period fees would generate additional revenue and serve as a potentially effective way to dis-incentivize visitation during peak periods. However, fee increases may be unpopular with the public and potentially raises issues of equitable access to GP. In either case, the effectiveness and acceptability of an amenity fee at GP would require that it be clearly explained so that visitors are aware of and understand their options.

- **Day use permit system and quota for Mount Bierstadt Trail/Mount Evans Wilderness:** A permit system and quota would be implemented to limit the number of day use visitors allowed to hike the Mount Bierstadt Trail per day. Under such a system, visitors would be required to obtain and display a permit for a specific date and time period during which they would be allowed to hike the Mount Bierstadt Trail. An online permit system could be used to allow visitors to obtain their permits in advance of their trip to GP, or permits could be obtained at the GP parking lot when visitors arrive there. The number and distribution of day use hiking permits would be based on crowding-related capacities for the Mount Bierstadt Trail/Mount Evans Wilderness and operational capacity of GP (i.e., parking capacities, shuttle service capacities if applicable, etc.).

Mount Evans Recreation Area Alternative Components

Potential Transit Components

It is anticipated the shuttle service components described below could help reduce peak-period parking demand and shortages at MERA, and manage visitor access to the Mount Evans Wilderness according to crowding-related capacities. The transit-based interpretive tour components described in this subsection could help shift some use away from peak periods to less crowded and congested times of day and/or days of the week. Tour vans on the Mount Evans Highway would also provide an opportunity for visitors to travel the route without the challenges or potential safety risks of driving their own vehicles on the narrow, winding roads. This may be a particularly important option if road conditions deteriorate and maintenance/repairs become financially and/or operationally infeasible.

Shuttle Service from Idaho Springs, Colorado, to MERA

Shuttle buses would operate between a designated park-and-ride lot in Idaho Springs, Colorado, and the summit of Mount Evans, with en route shuttle stops at Echo Lake, Echo Lake Campground, Mount Goliath Natural Area, and Summit Lake. A transfer from full-size shuttle buses to smaller buses or vans would occur in the vicinity of the MERA Welcome Station for travel on the Mount Evans Highway between the Welcome Station and the summit of Mount Evans. Existing facilities would be used for shuttle bus loading/unloading areas at the designated park-and-ride lot in Idaho Springs, Colorado, to the extent possible; loading/unloading areas would be designated at en route shuttle stops and the summit of Mount Evans; and a vehicle transfer area would be designated in the vicinity of the Welcome Station. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. Hours of operation would correspond with peak hours of visitor use at MERA, and include contingency operating plans for managing surges in ridership demand in the event of thunderstorms. More generally, shuttle service would be operated according to ridership demand and crowding-related capacities for the Mount Evans Wilderness.

Shuttle Service from Echo Lake to MERA

Shuttle buses would operate between a designated park-and-ride lot at Echo Lake, and the summit of Mount Evans, with en route shuttle stops at Echo Lake Campground, Mount Goliath Natural Area, and Summit Lake. Loading/unloading areas would be designated at Echo Lake, en route shuttle stops, and the summit of Mount Evans. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. Hours of operation would correspond with peak hours of visitor use at MERA, and include contingency operating plans for managing surges in ridership demand in the event of thunderstorms. More generally, shuttle service would be operated according to ridership demand and crowding-related capacities for the Mount Evans Wilderness.

Shuttle Service from a New Offsite Lot to MERA

Shuttle buses would operate between a newly constructed park-and-ride lot in the vicinity of MERA, and the summit of Mount Evans, with en route shuttle stops at Echo Lake Campground, Mount Goliath Natural Area, and Summit Lake. A park-and-ride lot would be constructed in the vicinity of MERA, and include a designated loading/unloading area for shuttle service. In addition, loading/unloading areas would be designated at en route shuttle stops and the summit of Mount

Evans. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. Hours of operation would correspond with peak hours of visitor use at MERA, and include contingency operating plans for managing surges in ridership demand in the event of thunderstorms. More generally, shuttle service would be operated according to ridership demand and crowding-related capacities for the Mount Evans Wilderness.

Interpretive Tour from Idaho Springs, Colorado, Via Van or Shuttle Bus to MERA

A shuttle bus would operate along Mount Evans Highway at regular intervals on weekends and holidays (or daily if there is sufficient demand) from Memorial Day weekend through Labor Day. The tour would include interpretation about the forest, history of the area, scenic vistas, and recreational opportunities, delivered by the bus driver or via a recording. The tour would originate at a designated park-and-ride lot in Idaho Springs, Colorado, and it would include several stops, including Echo Lake, Mount Goliath Natural Area, Summit Lake, and the summit of Mount Evans. New facilities or designations for loading/unloading areas would be developed at all stops, and each stop would include an opportunity for passengers to unload and briefly explore the area. Tour frequency and hours of operation would be based upon demand and crowding-related capacities for the Mount Evans Wilderness. The tour would operate as a round-trip service, with potential for a hop-on/hop-off service if there is sufficient demand. This service could be operated by a concessionaire, with a tour fee charged to passengers.

Interpretive Tour from Denver, Colorado, Via Van or Shuttle Bus to MERA

A shuttle bus would operate along Mount Evans Road at regular intervals on weekends and holidays from Memorial Day weekend through Labor Day. The tour would include interpretation about the forest, history of the area, scenic vistas, and recreational opportunities, delivered by the bus driver or via a recording. The tour would originate at a central location in Denver that is accessible by transit and also provides parking. The tour would include several stops, including Echo Lake, Mount Goliath Natural Area, Summit Lake, and the summit of Mount Evans. New facilities or designations for loading/unloading areas would be developed at all stops, and each stop would include an opportunity for passengers to unload and briefly explore the area. The tour would operate as a round-trip service, with one trip per day on weekends and holidays. Due to the length of the tour, there would not be potential for hop-on/hop-off service. This service could be operated by a concessionaire, with a tour fee charged to passengers.

Potential Non-transit Components

Site Design Improvements

Potential site design improvements include those that alter the parking capacity in MERA to simultaneously maximize public access and protect Wilderness resource values in the adjacent Mount Evans Wilderness. In addition, site design improvements include those to the roadway to help reduce conflicts between bicycles and motor vehicles. Thus, the following components will be evaluated in this study to assess the potential of each to improve transportation, recreation, and resource management in MERA.

Parking areas

- **Expand the size of parking lots in MERA:** New parking spaces would be added to the existing parking lots at Mount Goliath Natural Area, Summit Lake, and/or summit of Mount Evans to increase parking capacity and help address parking shortages that occur during peak periods of visitor use. Parking lots would be sized according to parking demand and crowding-related capacities for the Mount Evans Wilderness.

- **Reduce the size of parking lots in MERA:** The size of the existing parking lots and number of designated parking spaces at Mount Goliath Natural Area, Summit Lake, and/or summit of Mount Evans would be reduced to manage visitor access according to crowding-related capacities for the Mount Evans Wilderness.

- **Widen road shoulders for designated roadside parking in MERA:** Mount Evans Highway would be widened at Mount Goliath Natural Area, Summit Lake, and/or summit of Mount Evans, and striping would be used to designate roadside parking spaces to increase parking capacity and help address parking shortages that occur during peak periods of visitor use. The number of roadside parking spaces would be designated according to parking demand and crowding-related capacities for the Mount Evans Wilderness.

Bicycle access

- **Pullouts:** Paved pullouts would be constructed at key locations along the Mount Evans Highway between the Welcome Station and summit of Mount Evans. The pullouts would be sized for bicycles and provide opportunities for cyclists to pull off of the road to allow motor vehicle traffic to pass. The number and location of pullouts would be based on safety considerations, landscape suitability, and financial and operational feasibility.

- **Striping to designate bike lane:** Mount Evans Highway would be widened between the Welcome Station and summit of Mount Evans, and striping would be used to designate a bicycle lane. The bicycle lane would help to reduce conflicts between bicycles and motor vehicles, and corresponding safety risks.

ITS and Visitor Information

As noted, ITS technologies are commonly employed in public lands recreation areas to convey real-time and historical travel, parking, and weather information. The following ITS and visitor information components could be used to help shift some visitor use away from peak periods and locations in MERA.

- **Variable Message Signs (VMS):** Variable message signs would be placed in approved highway locations en route to MERA (e.g., I-70, Rte. 103 near Idaho Springs, Colorado, and Evergreen, Colorado). Messages displayed on the VMS could be used to inform visitors of parking and visitor use conditions in MERA and potentially persuade some people to visit MERA during off-peak periods. This component could be coupled with one or more transit components to display information about shuttle service and park-and-ride options.

Similarly, this component could be used in conjunction with a permit system and quota to inform people about their options for accessing MERA.

- **Highway Advisory Radio (HAR):** It would be possible to use VMS units with integrated Highway Advisory Radio (HAR) systems that travelers could listen to on an AM frequency. The HAR systems would allow for more detailed information to be conveyed than the VMS would alone. In this case, the VMS would display a message instructing visitors to "tune in" to a specific AM station for MERA information.

- **CDOT 511, ARNF Website, Social Media, and Apps:** Website information and smart phone apps would be targeted at reaching visitors before they begin their trip to MERA. Messages and related content would be designed to provide visitors with information about the advantages of visiting MERA during off-peak periods and to set expectations about peak period conditions. In addition, links to websites and information about other outdoor recreation and tourist destinations in the vicinity of MERA would be provided to inform visitors of options to consider as alternatives to visiting MERA during peak periods.

Parking Management

Implementation of the following parking management components would help address impacts to public safety, forest resources, the scenery of the area, and the quality of visitors' experiences due to parking in undesignated areas and traffic circling through full parking lots searching for places to park.

- **Dedicated traffic and parking management team:** A dedicated traffic and parking management team would be deployed in MERA on weekend days during the peak summer visitor use season (approximately Memorial Day Weekend through Labor Day). The parking management team's hours of operation would correspond with peak hours of visitor use in MERA, with one staff member stationed at each of the designated parking lots (i.e., at Mount Goliath Natural Area, Summit Lake, and the summit of Mount Evans). The parking lot monitors would use two-way radios to inform a fourth member of the parking management team and the staff at the Welcome Station when the parking lots are full, and when parking spaces become available again after the lots are full. The fourth member of the parking management team would be positioned at various locations in MERA throughout the day, depending on where parking is available. This "roving" member of the parking management team would be responsible for directing visitors to available parking spaces and blocking the roadway to prevent visitors from driving to visitor destinations where parking lots are full. Staff at the Welcome Station would inform arriving visitors of their parking options, based on the information they receive via radio from the four members of the parking management team and parking management policies.

- **Traffic queuing at Welcome Station when parking lots are full:** When parking lots in MERA are full, staff members at the Welcome Station would stop visitors from entering MERA. Visitors would be required to wait in their vehicles at the Welcome Station until other visitors leave and parking spaces become available in MERA.

- **Mandatory parking in offsite lot when lots in MERA are full:** When parking lots in MERA are full, staff members at the Welcome Station would stop visitors from entering MERA. Visitors would be required to park in an offsite lot (e.g., in Idaho Springs, Colorado or at Echo Lake) for access to MERA. This option would be combined with transit service from the offsite parking lot to MERA.

- **Parking reservation fee:** Visitors who wish to park in MERA during peak periods would be required to make an advanced parking reservation and pay a parking fee.

- **Signs and/or barriers to prevent unendorsed roadside parking:** Roadside barriers and/or signs would be installed on Mount Evans Highway at Mount Goliath Natural Area, Summit Lake, and/or summit of Mount Evans to prevent roadside parking from occurring when the parking lots are full. It is likely this option would require a dedicated traffic and parking management team in MERA to enforce this parking policy.

Traffic Management

The following traffic management strategies would help minimize traffic congestion at the Welcome Station and/or on Mount Evans Highway, potentially reduce parking shortages, and improve visitor safety in MERA.

- **Extend express lane at the Welcome Station:** The Mount Evans Highway would be widened between Route 103 and the Welcome Station, and the express lane would be extended to help reduce peak-period traffic congestion there. The express lane would be used for annual pass holders, employees, and emergency vehicles. In addition, if one or more transit components are implemented, the express lane would be used for shuttle bus access.

- **Queue bypass lane at the Welcome Station:** A queue bypass lane would be constructed at the Welcome Station for administrative and emergency vehicle access to MERA without delays due to traffic congestion during peak periods. The queue bypass lane could be controlled with a gate that is activated with a swipe-card administered to eligible employees and emergency vehicle operators. In addition, if one or more transit components are implemented, the queue bypass lane would be used for shuttle bus access.

- **Stacked kiosks at the Welcome Station:** An additional kiosk would be added to each lane at the Welcome Station to increase capacity and reduce traffic congestion that occurs there during peak periods.

- **Traffic lane closures:** Selected sections of the Mount Evans Highway between the Welcome Station and summit of Mount Evans would be temporarily or permanently closed to vehicle traffic. The traffic lane closures would occur in locations where continued roadway maintenance and repairs are financially and/or operationally infeasible. Traffic signals would be installed at each closure location to manage the flow of traffic through the one-way sections of the road.

- **Designate Mount Evans Highway as a toll road:** The Mount Evans Highway between the Welcome Station and summit of Mount Evans would be designated as a toll road, and visitors would be required to pay a toll to travel on the road. The toll could be charged for bicycle and motor vehicle access, restricted to just motor vehicles, or vary depending on mode of travel. The toll program would be implemented by Colorado Department of Transportation (CDOT), and could be administered by the US Forest Service or via a contractor.

- **Carpool/High Occupancy Vehicle (HOV) program:** An offsite park-and-ride lot would be designated in Idaho Springs, Colorado, Echo Lake, or another location in the vicinity of MERA, from which visitors could carpool to MERA. To encourage carpooling from the park-and-ride lot, a reduced amenity fee would be charged for visitors who travel to MERA in high occupancy vehicles (e.g., 3 or more passengers per vehicle).

Visitor Use Management

Visitor use management strategies would help to shift visitor use away from the most congested days and/or times of day in MERA. The following visitor use management strategies range from those that attempt to *persuade* visitors to change their behaviors to those that *require* visitors to change their behavior.

- **Differential amenity fees for peak and nonpeak periods:** To encourage visitation during off-peak periods, amenity fees for MERA would be increased during peak seasons, days, and/or hours of the day, and/or reduced during off-peak periods. Increased peak-period fees would generate additional revenue and serve as a potentially effective way to dis-incentivize visitation during peak periods. However, fee increases may be unpopular with the public and potentially raises issues of equitable access to MERA. In either case, the effectiveness and acceptability of a variable amenity fee structure would require that it be clearly explained so that visitors are aware of and understand their options.

- **Day use permit system for MERA:** A permit system and quota would be implemented to limit the number of day use visitors in MERA per day. Under such a system, visitors would be required to obtain and display a permit for a specific date and time period during which they would be allowed to enter MERA. An online permit system could be used to allow visitors to obtain their permits in advance of their trip to MERA, or permits could be obtained at the Welcome Station when visitors arrive. The number and distribution of day use permits would be based on crowding-related capacities for the Mount Evans Wilderness and operational capacity of MERA (i.e., parking capacities, shuttle service capacities if applicable, etc.).

- **Designated dates and/or times for bicycle access:** Specific days of the week and/or times of day would be designated for bicycle access on the Mount Evans Highway between the Welcome Station and the summit of Mount Evans. Cyclists would be allowed access only during these designated periods; motor vehicle access could be limited or prohibited during periods of designated bicycle access to reduce conflicts between bicycles and motor vehicles.

Visitor Access in the Event of Long-term Road Closure

As noted in *Chapter 4: Need Identification by Site*, CDOT has expressed ongoing concerns about the costs and feasibility of maintaining Mount Evans Highway for recreational vehicle access in the long term. Correspondingly, the following components are included in this study as options for providing access to MERA, in the event of a long-term road closure on the Mount Evans Highway between the Welcome Station and the summit of Mount Evans.

- **Cog railroad to the Mount Evans summit:** A cog rail would be constructed to provide access to the summit of Mount Evans. The railroad would operate in place of an auto road to the summit. The railroad could be open year-round or during the summer only, depending upon demand and a financially feasible business model. Service frequency and hours of operation would be based upon demand and crowding-related capacities for the Mount Evans Wilderness. This service could be run by a concession and charge passengers a fee.

- **Aerial tram to the Mount Evans summit:** An aerial tram would be constructed to provide access to the summit of Mount Evans. The aerial tram would operate in place of an auto road to the summit. The tram could be open year-round or during the summer only, depending upon demand and a financially feasible business model. Service frequency and hours of operation would be based upon demand and crowding-related capacities for the Mount Evans Wilderness. This service could be run by a concession and charge passengers a fee.

- **Hiking access only to MERA and Mount Evans summit:** One or more trail routes would be developed to provide visitors with hiking access to Mount Goliath Natural Area, Summit Lake, and the summit of Mount Evans. The hiking routes would provide visitor access to MERA in place of an auto road to the summit. The trails could be open year-round or during the summer only, depending upon demand, visitor safety, and financial and operational feasibility.

Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis, by Site

Introduction

Integrated user capacity and transit demand analyses were conducted for each of the three study sites with the purpose of 1) establishing maximum levels of visitor use that can be accommodated without exceeding user capacities, and 2) developing alternative transportation solutions according to those user capacity parameters. User capacities were operationalized differently at each site, with capacity considerations and goals driven by site-specific factors including guidance from existing management plans, Wilderness designations, and findings from this study. Table 6-1 provides a summary of the integrated user capacity and transit demand analysis, by site. The remainder of this chapter provides detailed information about the user capacity considerations and integrated user capacity and transit demand analyses for each site.

Table 6-1. Summary of Capacity Analyses by Site

	BLRA	GP	MERA
Basis for User Capacity Analysis	• 2005 BLRA Management Plan: Manage user capacity according to availability of designated parking	• Overflow parking on roadside and visitor use impacts in Wilderness	• Popularity of and congestion-related impacts to scenic auto touring experiences • Relatively low Wilderness use and impacts
Design Day Visitation[4]	737 vehicles / 1,843 visitors	963 vehicles / 2,408 visitors	1,013 vehicles / 2,735 visitors
Estimated User Capacity	943 vehicles / 2,357 visitors	Mount Bierstadt Trail: 400 hikers Physical Parking: 553 vehicles / 1,383 visitors	620 vehicles / 1,674 visitors
User Capacities Exceeded?	No	Yes	Yes
Visitor Use Management and Transit-related Strategies to Management User Capacity	• Onsite parking management team • Overflow parking in Gateway Trailhead Parking Lot, instead of queuing at Courtesy Station • Shuttle service between Gateway Trailhead Parking Lot and BLRA Day Use Lot	• Wilderness use permit system and quota, including onsite enforcement • Offsite overflow parking and shuttle service for Wilderness use permit holders and other GP visitors	• Day use reservation/permit system and quota OR • Offsite overflow parking and shuttle service

[4] Reported design day vehicles are based on actual vehicle counts on the design day. Reported design day visitors were calculated using an average vehicle occupancy rate calculated from reports of group size collected during field data collection in 2013.

BLRA Integrated User Capacity and Transit Demand Analyses

BLRA User Capacity Considerations

In the 2005 BLRA Management Plan[5], the USFS established a theoretical user capacity for BLRA. Among other associated factors, the plan states the following:

> "Given the direction of the Forest Plan, the Assessment of Existing Recreation Sites and Opportunities, and the specific information provided in the Assessment of Capacity document for BLRA, the following recommendations for user capacity and distribution are proposed to meet the objectives:
>
> - Assess and manage capacity according to location, distribution, season, and daily use patterns of available parking spaces.
>
> - Restrict all parking to designated parking spaces in the entire BLRA (p.33-34)."

Therefore, user capacity for BLRA was operationalized in this study as the maximum number of visitors that can be accommodated, per day, without exceeding designated parking capacities at BLRA, including the Gateway Trailhead Parking Lot.

Data collected during the winter 2012 and summer 2013 data collection efforts were used to evaluate parking demand and user capacity at BLRA[6]. Specifically, vehicle traffic counts from Automated Traffic Recorders (ATRs) and parking accumulation and turnover rates were collected during two data collection periods 1) during winter 2011 – 2012 to understand winter recreational use and demand at BLRA, and 2) during summer 2013 to understand peak recreational use and demand at BLRA. These data were used to estimate user capacity at BLRA according to the availability of designated parking, which is the definition of BLRA user capacity set forth by the USFS.

BLRA Winter Season User Capacity Analysis

During the winter 2011-2012 data collection period, parking accumulation and turnover data were collected at the Gateway Trailhead Parking Lot (located just outside the BLRA Courtesy Station). The Gateway Trailhead Parking Lot serves as the only designated parking area open in the winter months for visitors to BLRA. An hourly count of parked vehicles and the amount of time vehicles were parked were recorded on weekdays and weekend days from January to April 2012 by parking lot location. A design day[7], selected to represent "typically busy" winter days, was identified to

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[5] USDA Forest Service Boulder Ranger District, Rocky Mountain Region, Roosevelt National Forest. (2005). Brainard Lake Recreation Area Management Plan. Available: http://www.fs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb5228436.pdf

[6] BLRA data collection methods and results are reported in detail in *Chapter 1: Brainard Lake Recreation Area Summary of Data Findings.*

[7] The "design day" is selected to represent a typically busy winter recreation day at BLRA. See *Chapter 1: Brainard Lake Recreation Area Summary of Data and Findings* for a detailed description of design day selection for the BLRA winter recreation season traffic and parking analyses.

evaluate hourly and daily parking demand at the Gateway Trailhead Parking Lot during the winter season. Parking data results suggest that peak parking accumulation on typically busy winter days reaches just over 60% of the capacity of the Gateway Trailhead Parking Lot (Figure 6-1). These data suggest that the Gateway Trailhead Parking Lot is large enough to accommodate visitor demand for parking during the winter visitor use season at BLRA, and therefore, user capacity as defined in the 2005 BLRA Management Plan is not exceeded during the winter visitor use season. Correspondingly, no further capacity analyses or transportation demand analyses were conducted for winter use at BLRA.

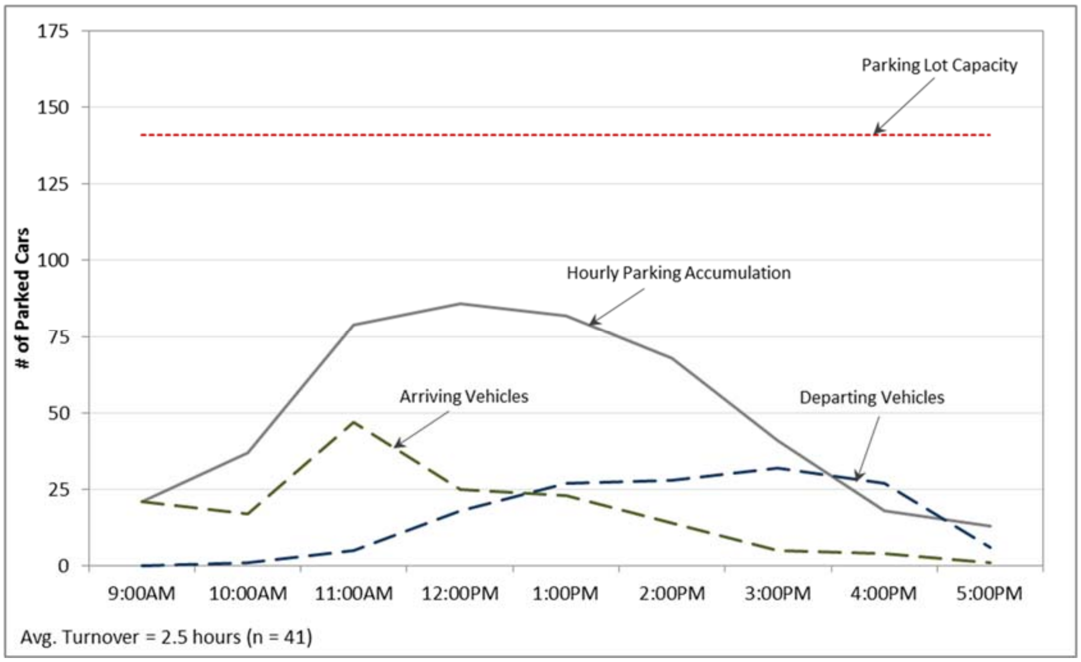

Figure 6-1. Design day parking accumulation at the Gateway Trailhead Parking Lot, Saturday, January 28, 2012.

BLRA Summer Season User Capacity Analysis

User capacity analysis for BLRA summer season was centered on estimating whether or not hourly and/or daily parking demand on typically busy summer days exceeds BLRA's designated parking capacity. Inbound and outbound vehicle traffic data from two Automated Traffic Recorders (ATRs; Figure 6-2) were used to estimate the following parameters:

- The total hourly number of vehicles that arrive at BLRA (ATR1).
- Of the total hourly number of vehicles that arrive, the number of vehicles that are able to park "inside" BLRA (i.e., in designated parking areas reached after passing through the Courtesy Station; ATR2).
- The number of vehicles that cannot park inside BLRA because parking lots inside BLRA are full (i.e., "unmet parking demand" for parking inside BLRA).

The user capacity determination is based on whether the number of vehicles that travel to BLRA and can not park "inside" BLRA can be accommodated in the Gateway Trailhead Parking Lot or whether that number exceeds the designated capacity of the Gateway Trailhead Parking Lot, using the following sequence of calculations.

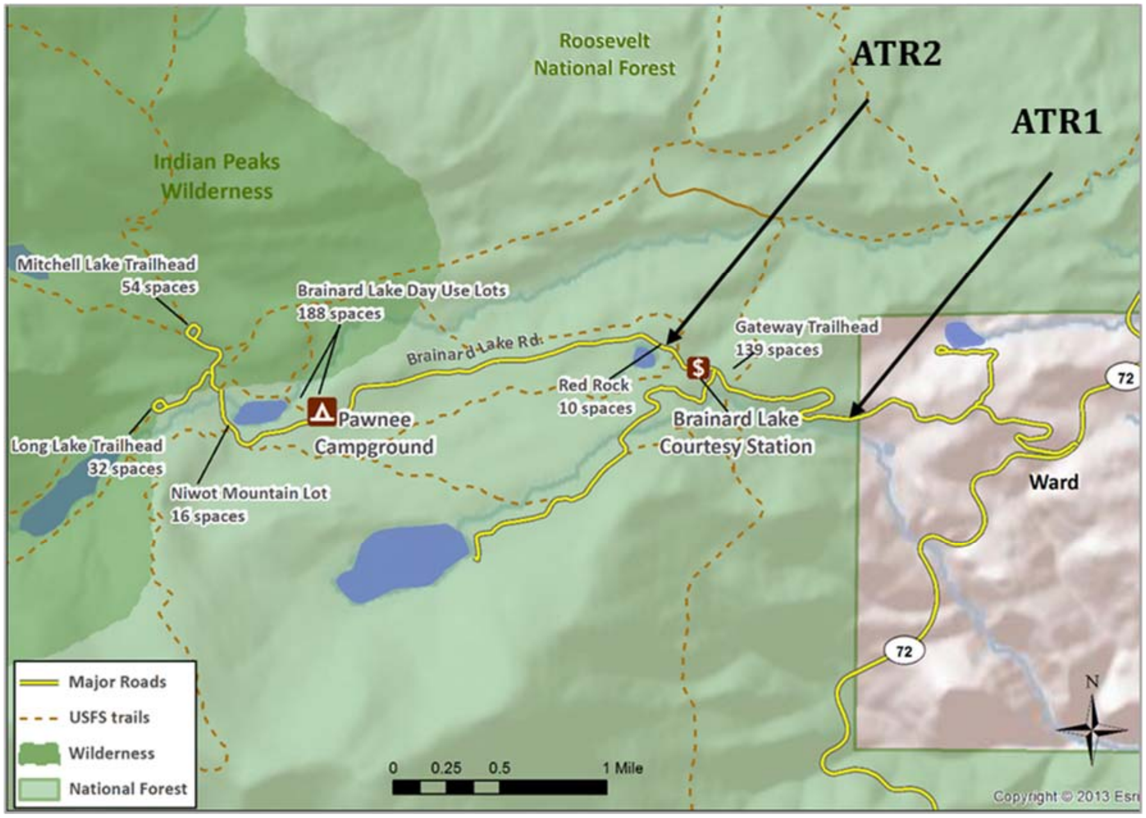

Figure 6-2. Approximate locations of ATRs on Brainard Lake Road, summer 2013.

1. Equation 1 was used to estimate hourly parking demand for the Gateway Trailhead Parking Lot (Table 6-2), assuming that all visitors unable to park "inside" BLRA would be required to park at the Gateway Trailhead Parking Lot (rather than wait in line at the Courtesy Station).

Equation 1: $\mathbf{GPL_{DEMAND} = PHA + (ATR1_{IN} – ATR2_{IN}) - (ATR1_{OUT} – ATR2_{OUT})}$

Where:

GPL_{DEMAND} = Total hourly parking demand in the Gateway Trailhead Parking Lot (GPL)
PHA = Previous hour's parking accumulation in the GPL (assumed to be 0 at midnight)
$ATR1_{IN}$ = Hourly inbound vehicle traffic at ATR1 (outside Courtesy Station)
$ATR2_{IN}$ = Hourly inbound vehicle traffic at ATR2 (inside Courtesy Station)
$ATR1_{OUT}$ = Hourly outbound vehicle traffic at ATR1 (outside Courtesy Station)
$ATR2_{OUT}$ = Hourly outbound vehicle traffic at ATR2 (inside Courtesy Station)

Table 6-2. Estimated Hourly Parking Demand in the Gateway Trailhead Parking Lot on typically busy Peak Season Summer Days (Assuming all BLRA Overflow Parking is Directed There)

Hour	Hourly Parking Demand (GPL_{DEMAND})
12:00 AM	1
1:00 AM	1
2:00 AM	1
3:00 AM	1
4:00 AM	2
5:00 AM	2
6:00 AM	8
7:00 AM	8
8:00 AM	25
9:00 AM	29
10:00 AM	36
11:00 AM	51
12:00 PM	36
1:00 PM	40
2:00 PM	22
3:00 PM	16
4:00 PM	0
5:00 PM	0
6:00 PM	0
7:00 PM	0
8:00 PM	0
9:00 PM	0
10:00 PM	0
11:00 PM	0

2. Equation 2 was used to compare estimates from Equation 1 of hourly parking demand for the Gateway Trailhead Parking Lot (GPL_{DEMAND}) to the designated parking capacity of the Gateway Trailhead Parking Lot.

Equation 2: If **($GPL_{DEMAND} > GPL_{CAPACITY}$)**, User Capacity Exceeded. Else, Not Exceeded.
Where:

GPL_{DEMAND} = Total hourly parking demand in the GPL
$GPL_{CAPACITY}$ = Designated parking capacity of the GPL (139 parking spaces)

Results of the user capacity analysis suggest that parking demand on typically busy peak season days does not exceed the designated parking capacity at BLRA. In other words, BLRA user capacity as defined by the USFS in the 2005 BLRA Management Plan is not exceeded on typically busy summer days.

However, to make full use of the designated parking capacity at BLRA, and in particular the Gateway Trailhead Parking Lot, visitors must be directed to park in the Gateway Trailhead Parking Lot, and need safe and convenient access from the Gateway Trailhead Parking Lot to their recreation destinations in BLRA. Transit demand analyses were conducted for two transit scenarios that would provide circulator shuttle service between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot, while at the same time not resulting in levels of visitation that exceed BLRA's user capacity. It should be noted, that the proposed circulator shuttle service would only run between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot, and not to the IPW trailheads so as not to inadvertently "over-deliver" visitors to those trailheads and cause visitor crowding in the IPW.

BLRA Transit Demand Analysis with User Capacity Management

Transit Demand: Circulator Shuttle from Gateway Trailhead Parking Lot to BLRA Day Use Lot

Ridership demand on typically busy summer days for circulator shuttle service from the Gateway Trailhead Parking Lot to the BLRA Day Use Lot was calculated using the following sequence of equations:

3. Equation 3 was used to estimate the hourly unmet demand for parking "inside" BLRA Table 6-3).

Equation 3: $\mathbf{UPD_{IN} = (ATR1_{IN} - ATR2_{IN}) - GPL_{V}}$

Where:

UPD_{IN} = Hourly unmet parking demand (vehicles) for parking areas "inside" BLRA
$ATR1_{IN}$ = Hourly inbound vehicle traffic at ATR1 (outside Courtesy Station)
$ATR2_{IN}$ = Hourly inbound vehicle traffic at ATR2 (inside Courtesy Station)
GPL_{V} = Observed hourly inbound vehicle traffic that voluntarily parks at GPL

Table 6-3. Estimated Hourly Unmet Parking Demand "Inside" BLRA on typically busy Peak Season Summer Days

Hour	Hourly Unmet Parking Demand (UPD_{IN})
12:00 AM	1
1:00 AM	0
2:00 AM	0
3:00 AM	0
4:00 AM	1
5:00 AM	0
6:00 AM	6
7:00 AM	0
8:00 AM	15
9:00 AM	1
10:00 AM	11
11:00 AM	26
12:00 PM	11
1:00 PM	23
2:00 PM	0
3:00 PM	5
4:00 PM	0
5:00 PM	2
6:00 PM	0
7:00 PM	0
8:00 PM	0
9:00 PM	1
10:00 PM	0
11:00 PM	1
Total	**103**

4. Equation 4 was used to convert the hourly unmet demand for parking "inside" BLRA from vehicles to visitors using the average vehicle occupancy rate for BLRA (Table 6-4).

Equation 4: $UD_{VISITORS} = UPD_{IN} * VehOccup$

Where:

$UD_{VISITORS}$ = Hourly unmet parking demand (visitors) for parking "inside" BLRA
UPD_{IN} = Hourly unmet parking demand (vehicles) for parking areas "inside" BLRA
VehOccup = Vehicle occupancy rate, as observed in summer 2013

Table 6-4. Estimated Hourly Unmet Parking Demand (Vehicles and Visitors) "Inside" BLRA on typically busy Peak Season Summer Days

Hour	Hourly Unmet Parking Demand – Vehicles (UPD_{IN})	Hourly Unmet Parking Demand – Visitors ($UPD_{VISITORS}$)
12:00 AM	1	3
1:00 AM	0	0
2:00 AM	0	0
3:00 AM	0	0
4:00 AM	1	3
5:00 AM	0	0
6:00 AM	6	15
7:00 AM	0	0
8:00 AM	15	38
9:00 AM	1	1
10:00 AM	11	27
11:00 AM	26	65
12:00 PM	11	27
1:00 PM	23	58
2:00 PM	0	0
3:00 PM	5	13
4:00 PM	0	0
5:00 PM	2	5
6:00 PM	0	0
7:00 PM	0	0
8:00 PM	0	0
9:00 PM	1	3
10:00 PM	0	0
11:00 PM	1	3
Total	**103**	**257**

5. Results from the 2014 BLRA visitor survey suggest 76% of BLRA visitors would be likely to visit BLRA on a future trip, even if they had to park in the Gateway Trailhead Parking Lot and take a 10-minute shuttle bus ride to the recreation destination. This percentage was applied in Equation 5 to the hourly visitor demand for parking in the Gateway Trailhead Parking Lot as a scale factor to determine the estimated ridership demand for shuttle service from the Gateway Trailhead Parking Lot to BLRA (Table 6-5).

Equation 5: $\mathbf{Ridership_{GPL} = Percent_{RIDE} * UD_{VISITORS}}$

Where:

$Ridership_{GPL}$ = Hourly ridership demand for shuttle service between Gateway Trailhead Parking Lot and BLRA Day Use Lot
$Percent_{RIDE}$ = Proportion of visitors who would opt to use the shuttle service
$UD_{VISITORS}$ = Hourly unmet parking demand (visitors) for parking "inside" BLRA

Results from Equation 5 suggest that on typically busy summer days, approximately 195 visitors who could not otherwise park "inside" BLRA would opt to use shuttle service from the Gateway Trailhead Parking Lot to the BLRA Day Use Lot (Table 6-5).

Ridership Demand: Shuttle Service from Nederland, Colorado, to Gateway Trailhead Parking Lot

Ridership demand on typically busy summer days for shuttle service from Nederland, Colorado, to the Gateway Trailhead Parking Lot, run in conjunction with the Gateway Trailhead Parking Lot to BLRA Day Use Lot circulator shuttle, was calculated using the following sequence of equations:

6. Equation 6 was used to estimate the hourly number of inbound BLRA visitors.

Equation 6: $\mathbf{ATR1_{IN\_VISITORS} = ATR1_{IN} * VehOccup}$

Where:

$ATR1_{IN\_VISITORS}$ = Hourly number of inbound BLRA visitors
$ATR1_{IN}$ = Hourly inbound vehicle traffic at ATR1
VehOccup = Average vehicle occupancy rate, as observed in summer 2013

7. Results from the 2014 visitor survey were used in Equation 7 to estimate the number of inbound BLRA visitors who travel to and from BLRA via Nederland, Colorado.

Equation 7: $\mathbf{Ned_{IN\_VISITORS} = ATR1_{IN\_VISITORS} * Travel_{NED}}$

Where:

$Ned_{IN\_VISITORS}$ = Hourly number of inbound BLRA visitors who travel to and from BLRA via Nederland, Colorado
$ATR1_{IN\_VISITORS}$ = Hourly number of inbound BLRA visitors
$Travel_{NED}$ = Proportion of BLRA visitors who reported in the 2014 visitor survey that they traveled to and from BLRA via Nederland

8. Results of the 2014 visitor survey were used in Equation 8 to estimate the proportion of BLRA visitors who travel to and from BLRA via Nederland that would choose to voluntarily park in Nederland, Colorado, and ride shuttle service between there and the Gateway Trailhead Parking Lot to visit BLRA:

Equation 8: $\mathbf{Ridership_{NED} = Percent_{RIDE} * Ned_{IN\_VISITORS}}$

Where:

$Ridership_{NED}$ = Hourly ridership demand for voluntary shuttle service between Nederland, Colorado, and Gateway Trailhead Parking Lot
$Percent_{RIDE}$ = Proportion of visitors who would opt to use the shuttle service
$Ned_{IN\_VISITORS}$ = Hourly number of inbound BLRA visitors who travel to and from BLRA via Nederland, Colorado

Results of Equation 8 suggest that on typically busy summer days, only about 13 visitors would voluntarily choose to park in Nederland, Colorado, and ride shuttle service between there and the

Gateway Trailhead Parking Lot to visit BLRA (Table 6-5). This result suggests there would not be sufficient ridership demand (a minimum of 100 riders per day) for voluntary shuttle service between Nederland, Colorado, and BLRA to be financially feasible.

Table 6-5. Ridership Demand Estimates for BLRA Alternative Transportation Options

Hour	***Staging at Gateway Trailhead Parking Lot Ridership Demand[a]***	***Staging in Nederland, Colorado Ridership Demand[b]***
12:00 AM	2	0
1:00 AM	0	0
2:00 AM	0	0
3:00 AM	0	0
4:00 AM	2	0
5:00 AM	0	0
6:00 AM	11	1
7:00 AM	0	1
8:00 AM	29	1
9:00 AM	1	1
10:00 AM	20	2
11:00 AM	49	1
12:00 PM	20	1
1:00 PM	44	1
2:00 PM	0	1
3:00 PM	10	1
4:00 PM	0	0
5:00 PM	4	0
6:00 PM	0	0
7:00 PM	0	0
8:00 PM	0	0
9:00 PM	2	0
10:00 PM	0	0
11:00 PM	2	0
Total	195	13

[a] Transit Ridership Estimate Gateway Circulator**:** Transit from Gateway Trailhead Parking Lot to Day Use Lot coupled with parking restrictions in which it is assumed that 76% of visitors who cannot park in BLRA because parking lots are full would take transit and the other 24% choose to go somewhere other than BLRA.

[b] Transit Ridership Demand Estimate Nederland Shuttle: Voluntary transit from Nederland, Colorado, to Gateway Trailhead Parking Lot (this would only operate when coupled with the Gateway circulator and BLRA parking restrictions). Assumes 2% of all visitors who currently drive through Nederland on route to and from BLRA would choose to use the voluntary transit service from Nederland to the Gateway Trailhead Parking Lot.

Summary of Findings: BLRA Integrated User Capacity and Transit Demand Analyses

Results of the user capacity analysis suggest that visitor use does not exceed the designated parking capacity for BLRA on typically busy days during the winter or summer season. In other words, user capacity, as defined by the USFS in the BLRA Management Plan is not exceeded on typically busy days during the winter or summer season.

Related, the vast majority of IPW visitors accessing the IPW via BLRA (85%) reported in the 2014 summer season visitor survey that they do not feel crowded during their hike. Ninety percent of IPW visitors reported that the presence of other people on the trail did not make them feel rushed and/or did not cause them to slow down at any point during their hike. These findings suggest that current visitor use levels, even on typically busy peak season days, do not cause unacceptable visitor crowding in the IPW.

However, BLRA still faces user capacity management challenges because *many visitors do not voluntarily park in the Gateway Trailhead Parking Lot as a means for accessing BLRA*. To make full use of the designated parking capacity at BLRA, and in particular the Gateway Trailhead Parking Lot, an onsite parking management team is necessary to enforce designated parking requirements within BLRA and to direct all overflow parking to the Gateway Trailhead Parking Lot. An onsite parking management team has been functioning to eliminate unendorsed roadside parking since 2015. A continued emphasis should be made to direct overflow traffic to the Gateway Trailhead Parking Lot.

In addition, visitors parking in the Gateway Trailhead Parking Lot with the intent of accessing BLRA and/or the IPW do not have a safe and convenient way to access their destinations "inside BLRA." Visitors parking in the Gateway Trailhead Parking Lot must walk two or more miles in traffic on Brainard Lake Road and/or on what is currently a partially developed network of connector trails to access BLRA and IPW recreation sites. A circulator shuttle between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot[8] would provide a safe and convenient way to help manage visitor use according to the USFS's designated user capacity for BLRA. It is estimated there would be viable ridership demand for this service, approximately 195 daily riders.

[8] *Chapter 7: Transit Feasibility Analyses and Recommendations by Site* provides a detailed description of the estimated ridership demand for the referenced circulator shuttle service.

GP Integrated User Capacity and Transit Demand Analyses

GP User Capacity Considerations

Parking accumulation and turnover data collected during summer 2012 suggest that by early morning on typically busy peak season days at GP, the designated lots at GP are filled with vehicles beyond their capacities. Correspondingly, the number of cars parking in unendorsed spaces on the roadside at GP increases sharply through the morning hours. Overall parking accumulation at GP reaches its peak in the late morning, at which time there are nearly twice as many cars parked in unendorsed spaces on the roadside at GP than in the designated parking lots.

Results from the 2012 visitor use data collection and 2014 visitor survey indicate that Wilderness values are compromised in the Mount Evans Wilderness; specifically, on typically busy summer days:

- On a typically busy peak season day approximately 800 people per day hike the Mount Bierstadt Trail, which accounts for about 80% of all hiking use that occurs in the GP area.
- Peak visitor densities on the summit of Mount Bierstadt are equivalent to a moderate level of crowding for pedestrian facilities in an urban environment, such as a city sidewalk.[9]
- The majority of weekend hikers (70%), and about one-third of weekday hikers (34%) on the Mount Bierstadt Trail feel crowded during their hike.

These findings suggest the physical (i.e., designated parking) and Wilderness resource capacities of the GP area are exceeded. Two approaches were taken to analyze and estimate capacity at GP, including: 1) a conventional approach based only on the parking capacity at GP; and 2) a resource-based approach that integrates Wilderness resource and parking capacities together. The first approach, based on the physical capacity of parking lots is designed to accommodate demand, and correspondingly accommodates current levels of visitation that have been documented in this study to cause unacceptable levels of crowing and impact to Wilderness values on the Mount Bierstadt Trail and summit. The second approach establishes a Wilderness resource capacity, based on a threshold for the number of people-at-one-time (PAOT) on the summit of Mount Bierstadt, and optimizes parking and transit within the parameters of the Wilderness resource capacity. In this study, the term "Wilderness resource" is understood as a collective term for the intended resources and values that comprise Wilderness, and are derived from the Wilderness Act, including naturalness, opportunities for solitude, and wildness.[10] **Both approaches are presented in this**

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[9] On typically busy peak season days, visitor density at-one-time on the summit of Mount Bierstadt is equivalent to a Pedestrian Level of Service C rating according to the Highway Capacity Manual of Transportation Research Board of the National Academy of Sciences.
[10] Dawson, C. P., & Hendee, J. C. (2014). Wilderness management: Stewardship and protection of resources and values. Fulcrum Publishing: Golden, CO.

section, but only the Wilderness resource capacity-based approach provides a sustainable solution for managing transportation and visitor use at GP.

GP User Capacity Analysis: Physical Capacity

During the 2012 data collection, ATR3 and ATR4 (Figure 6-3) were located to cordon GP arrivals and departures from the north and south. Data collected at these two ATR's were used in this analysis to estimate the timing (hours of the day) and amount by which parking capacity at GP is exceeded on typically busy summer weekend days, using the following sequence of calculations.

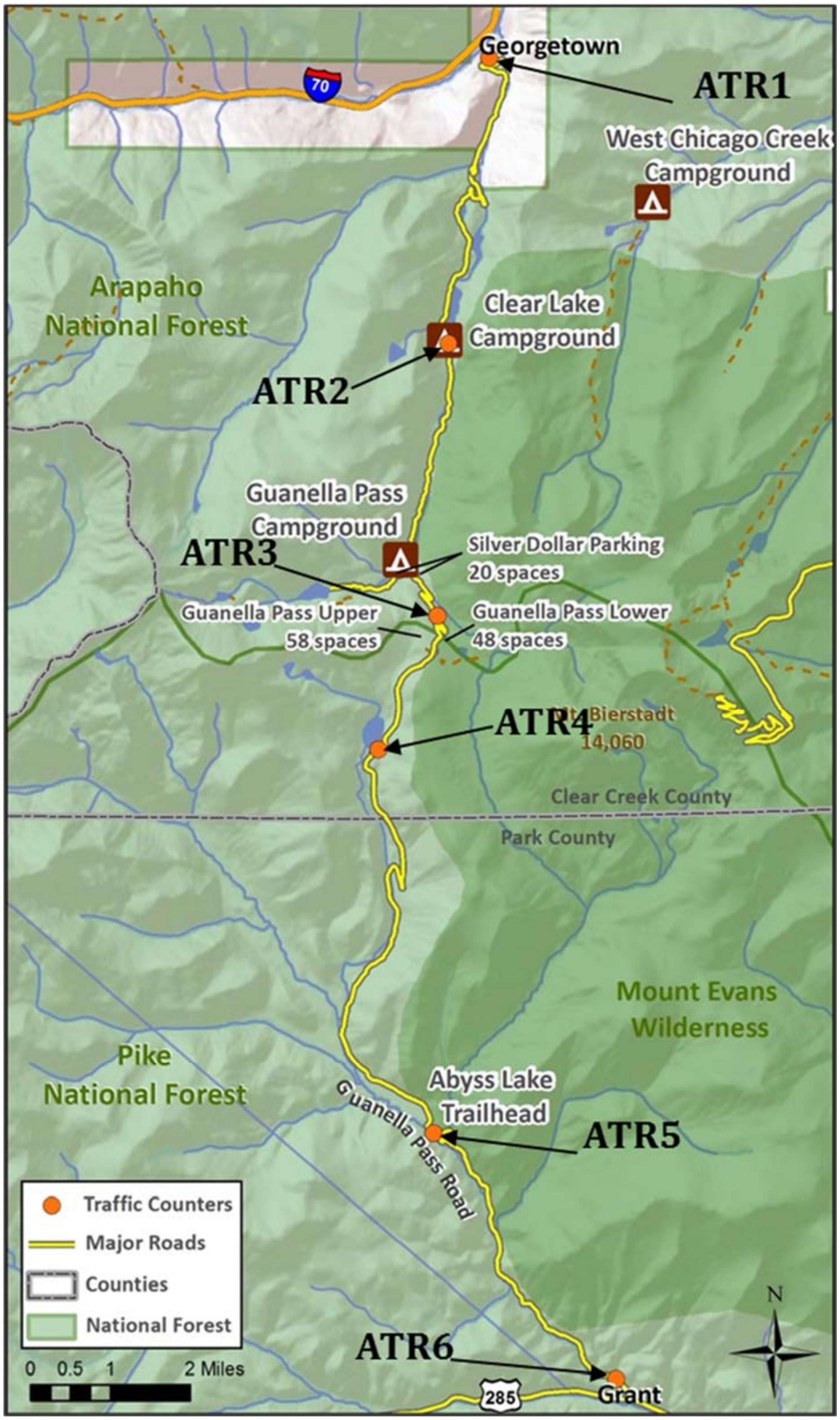

Figure 6-3. Approximate location of all ATR's, Guanella Pass summer 2012. Only data from ATR3 and ATR4 were used in the GP parking capacity analysis.

1. Equation 1 was used to estimate hourly parking demand at GP (Table 6-6).

Equation 1: $\mathbf{GP_{ACCUM} = PHA + ((ATR3_{IN} + ATR4_{IN}) - (ATR3_{OUT} - ATR4_{OUT}))}$

Where:

GP_{ACCUM} = Hourly parking accumulation at GP
PHA = Previous hour's parking accumulation at GP (assumed to be 0 at midnight)
$ATR3_{IN}$ = Hourly inbound vehicle traffic at ATR3
$ATR4_{IN}$ = Hourly inbound vehicle traffic at ATR4
$ATR3_{OUT}$ = Hourly outbound vehicle traffic at ATR3
$ATR4_{OUT}$ = Hourly outbound vehicle traffic at ATR4

Table 6-6. Estimated Hourly Parking Accumulation at GP on typically busy Peak Season Summer Days

Hour	Hourly Parking Accumulation (GP_{ACCUM})
12:00 AM	1
1:00 AM	1
2:00 AM	2
3:00 AM	4
4:00 AM	12
5:00 AM	42
6:00 AM	149
7:00 AM	244
8:00 AM	296
9:00 AM	345
10:00 AM	351
11:00 AM	342
12:00 PM	283
1:00 PM	210
2:00 PM	116
3:00 PM	72
4:00 PM	42
5:00 PM	25
6:00 PM	18
7:00 PM	12
8:00 PM	4
9:00 PM	4
10:00 PM	5
11:00 PM	5

2. Equation 2 was used to compare GP_{ACCUM} to the total number of designated parking spaces at GP.

Equation 2: If $\mathbf{(GP_{ACCUM} > GP_{CAPACITY})}$, Parking Capacity Exceeded. Else, Not Exceeded.
Where:

GP_{ACCUM} = Hourly parking accumulation at GP
$GP_{CAPACITY}$ = Designated parking capacity at GP (106 parking spaces)

Results of the physical capacity analysis suggest that parking demand substantially exceeds the designated parking capacity at GP on typically busy peak season days. The total number of designated parking spaces at GP is 106 spaces, and for many hours of the day, the calculated hourly parking accumulation exceeds 106, indicating that parking capacity is exceeded. Transit service from an overflow parking area in Georgetown, Colorado, or elsewhere along GP Road could be operated, in conjunction with a ban on roadside parking along GP Road, to accommodate current visitor demand while eliminating unsafe and unsustainable roadside parking at GP. Transit demand analysis was conducted to estimate hourly ridership demand for two transit service options.

GP Transit Demand Analysis with Visitor Use Managed According to Physical Capacity

Hourly unmet parking demand at GP and corresponding ridership estimates for transit service from offsite overflow parking were estimated using the following sequence of equations.

3. Equation 3 was used to estimate the hourly number of available/unoccupied parking spaces at GP.

Equation 3: $\mathbf{Parking_{OPEN} = GP_{CAPACITY} - (PHA - VT_{OUT})}$
Where:

$Parking_{OPEN}$ = Hourly number of parking spaces open at GP
$GP_{CAPACITY}$ = Designated parking capacity of GP (106 parking spaces)
PHA = Previous hour's parking accumulation at GP (assumed to be 0 at midnight)
VT_{OUT} = Estimate of hourly outbound vehicle traffic at GP

4. Equation 4 was used to estimate hourly unmet parking demand as a function of the hourly number of unoccupied parking spaces and inbound vehicle arrivals at GP:

Equation 4: $\mathbf{UPD = |Parking_{OPEN} - ATR_{IN}|}$
Where:

UPD = Hourly unmet parking demand at GP
$Parking_{OPEN}$ = Hourly number of parking spaces open at GP
ATR_{IN} = Hourly inbound vehicle traffic at ATR3 and ATR4

5. Equation 5 was used to convert the hourly unmet demand for designated parking in GP from vehicles to visitors using the average vehicle occupancy rate for GP (Table 6-7).

Equation 5: $\mathbf{UD_{VISITORS} = UPD * VehOccup}$

Where:

$UD_{VISITORS}$ = Hourly unmet visitor demand for designated parking at GP
UPD = Hourly unmet vehicle demand for designated parking at GP
VehOccup = Vehicle occupancy rate, as observed in summer 2012

Table 6-7. Estimated Hourly Available Parking Spaces and Unmet Parking Demand (Vehicles and Visitors) on typically busy Summer Days

Hour	Hourly Open Parking Spaces ($Parking_{OPEN}$)	Hourly Unmet Parking Demand – Vehicles (UPD)	Hourly Unmet Parking Demand – Visitors ($UD_{VISITORS}$)
12:00 AM	106	0	0
1:00 AM	105	0	0
2:00 AM	105	0	0
3:00 AM	104	0	0
4:00 AM	102	0	0
5:00 AM	97	0	0
6:00 AM	71	43	108
7:00 AM	7	98	245
8:00 AM	6	59	148
9:00 AM	8	64	159
10:00 AM	12	32	81
11:00 AM	25	50	124
12:00 PM	40	31	77
1:00 PM	60	28	69
2:00 PM	82	0	0
3:00 PM	101	0	0
4:00 PM	109	0	0
5:00 PM	124	0	0
6:00 PM	115	0	0
7:00 PM	112	0	0
8:00 PM	112	0	0
9:00 PM	102	0	0
10:00 PM	105	0	0
11:00 PM	103	0	0
Total	.	404	1,011

6. Results from the 2014 BLRA visitor survey suggest 68% of GP visitors would be likely to visit GP on a future trip, even if they had to park in an overflow lot elsewhere on GP Road and ride shuttle buses from there to GP. Approximately 41% said they would be likely to do this if the overflow lot was in Georgetown, Colorado. These percentages were applied in Equation 6 to the hourly unmet visitor demand for parking at GP as a scale factor to determine the estimated ridership demand for shuttle service from an offsite overflow lot.

Equation 6: $\mathbf{Ridership_{GP} = Percent_{RIDE} * UD_{VISITORS}}$

Where:

$Ridership_{GP}$ = Estimated hourly ridership demand for shuttle service from GP Road
$Percent_{RIDE}$ = Estimated proportion of visitors who would ride this transit service option (from survey)
$UD_{VISITORS}$ = Hourly unmet visitor demand for parking at GP

Results of Equation 6 suggest that on a typically busy peak season days approximately 687 visitors[11], who could not otherwise park in a designated parking space at GP, would opt to take transit service from an overflow lot elsewhere on GP Road, while 414 visitors would do this if the overflow parking lot was in Georgetown, Colorado (Table 6-8).

[11]The analysis generates "high end" estimates of potential ridership demand at GP, because the ATR data used in the analysis include vehicle arrivals for visitors driving through GP, but not parking. These "drive-by" visitors would likely not park at an overflow lot and ride a shuttle bus to GP.

Table 6-8. Ridership Demand Estimates for GP Transit Options with Visitor Use Managed According to Physical Capacity

Hour	***Staging on GP Road Ridership Demand***[a]	***Staging in Georgetown, Colorado Ridership Demand***[b]
12:00 AM	0	0
1:00 AM	0	0
2:00 AM	0	0
3:00 AM	0	0
4:00 AM	0	0
5:00 AM	0	0
6:00 AM	73	44
7:00 AM	166	100
8:00 AM	101	61
9:00 AM	108	65
10:00 AM	55	33
11:00 AM	84	51
12:00 PM	52	31
1:00 PM	47	28
2:00 PM	0	0
3:00 PM	0	0
4:00 PM	0	0
5:00 PM	0	0
6:00 PM	0	0
7:00 PM	0	0
8:00 PM	0	0
9:00 PM	0	0
10:00 PM	0	0
11:00 PM	0	0
Total	687	414

[a] Transit Ridership Estimate GP Road Shuttle**:** Transit originating on Guanella Pass Road (new lot) coupled with parking restrictions in which we assume 68% of visitors who would otherwise park in undesignated roadside parking (because designated lots are full) take transit and the other 32% choose to go somewhere other than GP.

[b] Transit Ridership Estimate for Georgetown Shuttle**:** Transit staging area in Georgetown (expand/adapt existing parking lots) coupled with parking restrictions in which we assume 41% of visitors who would otherwise park in undesignated roadside parking (because designated lots are full) take transit and the other 59% choose to go somewhere other than GP.

GP User Capacity Analysis: Wilderness Resource-Based Analysis

Crowding Threshold for the Mount Bierstadt Summit

The basis for the Wilderness capacity analysis is visitors' perceptions of and thresholds for crowding on the Mount Bierstadt summit. Crowding impacts are in direct conflict with Wilderness experience values outlined in the Wilderness Act of 1964. For example, the Wilderness Act indicates that in addition to other qualities, a Wilderness area must offer, "outstanding opportunities for solitude and primitive and unconfined type of recreation." Furthermore, crowding avoidance behaviors cause resource damage (e.g., vegetation and soil trampling, social trailing, etc.) as spread out over a landscape to get away from other visitors. Respondents to the 2014 survey of Mount Bierstadt Trail hikers were asked to indicate for each of several simulated photos of varying numbers of people on the summit of Mount Bierstadt if they would feel crowding being on the summit with that number of people (Figure 6-4).

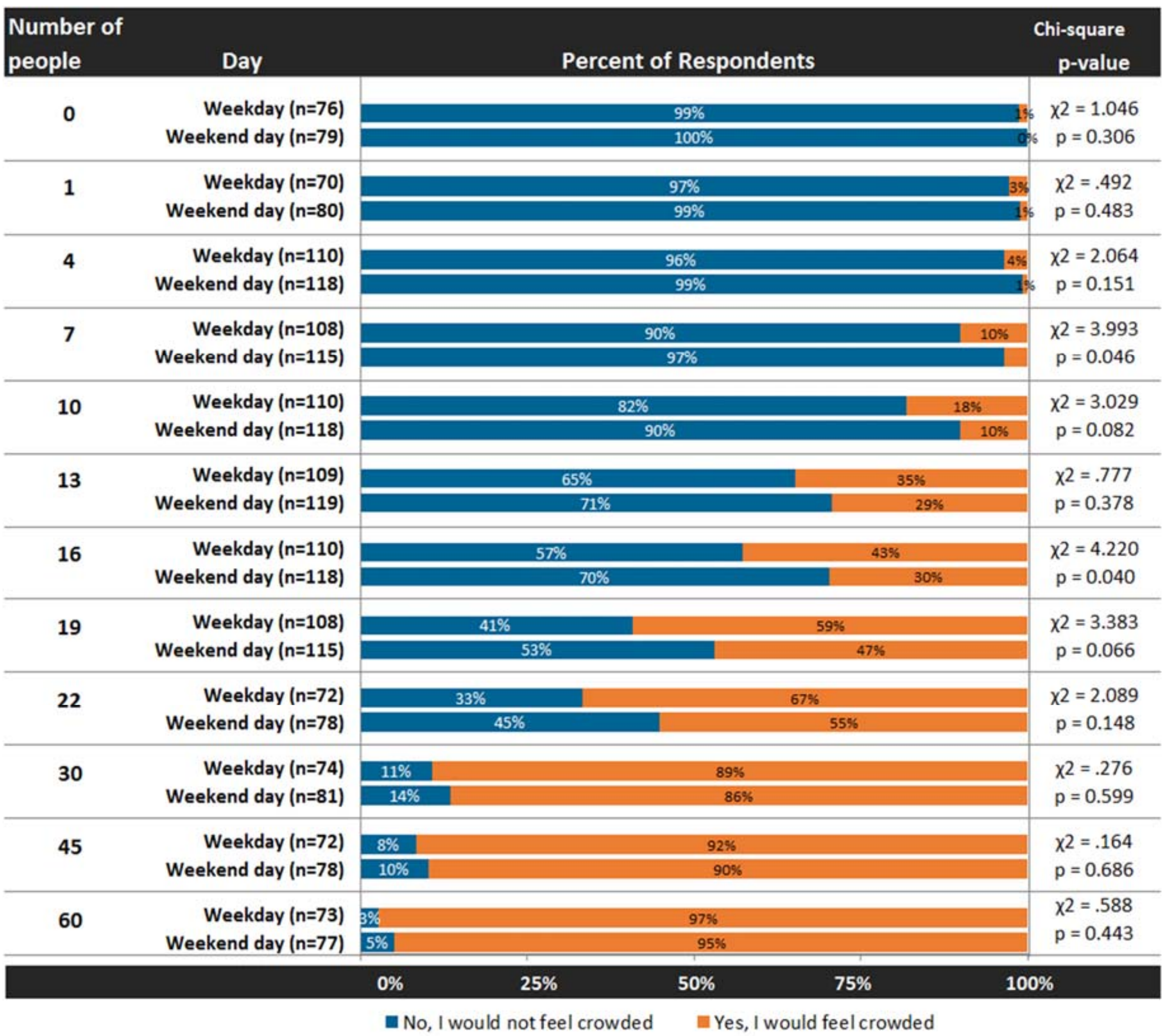

Figure 6-4. For each photograph, please tell us if you would feel crowded if you were on the summit of Mount Bierstadt with the number of people depicted in the photograph.

The results in Figure 6-4 were used to identify an empirically-based crowding threshold that serves to balance the popularity and accessibility of the area with concerns for the quality of Wilderness resources and experiences. An overly restrictive threshold would not be pragmatic, given the popularity and accessibility of GP. Meanwhile, an overly relaxed threshold would be inconsistent with the Wilderness designation of the area and related USFS management goals. Based on these factors, the following visitor-based crowding threshold was adopted for the Wilderness Capacity analysis:

No more than 15% of visitors who hike to the summit of Mount Bierstadt on a given day would see more than 22 people-at-one-time in their viewscape on the summit of Mount Bierstadt.

Figure 6-5. Simulated photo of 22 people-at-one-time on the summit of Mount Bierstadt.

Wilderness Use and Capacity Model

A Wilderness use and capacity model was developed using visitor use data collected during the 2012 data collection period, including:

- GPS tracks of visitor hikes on the Mount Bierstadt Trail. Variables derived from this data include the proportion of hikers who make it to the summit, hiking times from the trailhead to the summit, time spent on the summit, and hiking times returning from the summit to the trailhead.

- Hourly and daily visitor use counts recorded via infrared trail counter on the Mount Bierstadt Trail.

Simulations were conducted with the Wilderness use and capacity model to:

- Estimate crowding-related conditions on the Mount Bierstadt summit on typically busy summer weekend days.
- Estimate the maximum number of people that can hike the Mount Bierstadt Trail per day without exceeding the crowding threshold for the Mount Bierstadt summit used in this analysis.

Simulation results suggest that:

- On typically busy summer days, approximately 800 visitors hike the Mount Bierstadt Trail and approximately 60% of visitors who hike to the summit see more than 22 PAOT. This exceeds the Wilderness capacity of GP, based on the crowding threshold for the Mount Bierstadt summit used in this analysis.
- A maximum of 400 people can be accommodated to hike the Mount Bierstadt Trail per day without exceeding the crowding threshold for the Mount Bierstadt summit used in this analysis.

The Wilderness use and capacity model results suggest a Wilderness use permit system with a quota of no more than 400 hikers per day is required to manage use on the Mount Bierstadt Trail. The following section describes analyses conducted to estimate parking and transit demand that would result from instituting a Wilderness use permit system with a quota of 400 hikers per day on the Mount Bierstadt Trail.

GP Parking and Transit Demand Analysis with Wilderness Permit Quota

The Wilderness use and capacity model was used to estimate parking demand that would result from instituting a Wilderness use permit system with a quota of 400 hikers per day on the Mount Bierstadt Trail. Parking demand was estimated based on:

1. A total of 400 hikers per day on the Mount Bierstadt Trail, with hourly arrivals based on the pattern of arrivals observed via the infrared trail counter installed on the trail during the 2012 data collection period.
2. Estimates from the hourly parking accumulation data collected in 2012 of the hourly number of vehicles that park at GP for reasons other than hiking on the Mount Bierstadt Trail.
3. Parking durations, based on hiking times from the GPS track data for Mount Bierstadt hikers and parking turnover data collected in 2012 for other GP visitors.
4. Designating 15 (out of 106 total) parking spaces for people who park at GP for reasons other than hiking on the Mount Bierstadt Trail, and allocating all remaining parking spaces to Mount Bierstadt Trail permit holders.

Results of this analysis are summarized in Table 6-9 and report the estimated number of Mount Bierstadt Trail permit holders and other GP visitors who would be unable to park in designated parking spaces at GP.

Table 6-9. Unmet Parking Demand at GP with Wilderness Permit Quota

Hour	*Unmet Parking Demand Mount Bierstadt Permit Holders* [a]	*Unmet Parking Demand Other GP Visitors* [b]
12:00 AM	0	0
1:00 AM	0	0
2:00 AM	0	0
3:00 AM	0	0
4:00 AM	0	0
5:00 AM	0	0
6:00 AM	0	21
7:00 AM	0	43
8:00 AM	30	0
9:00 AM	28	82
10:00 AM	21	58
11:00 AM	9	5
12:00 PM	1	36
1:00 PM	0	18
2:00 PM	0	24
3:00 PM	0	1
4:00 PM	0	1
5:00 PM	0	2
6:00 PM	0	0
7:00 PM	0	0
8:00 PM	0	0
9:00 PM	0	0
10:00 PM	0	0
11:00 PM	0	0
Total	90	290

[a] Hourly estimate of unmet demand for designated parking among permit-holding Mount Bierstadt Trail users when 91 of 106 designated GP parking spaces are reserved for permit-holding Mount Bierstadt Trail users, and Mount Bierstadt Trail use is limited to 400 users per day. Number of permit holders determined using average vehicle occupancy rate.
[b] Hourly estimate of unmet demand for designated parking among visitors to GP that do not intend to hike the Mount Bierstadt Trail when 15 of 106 designated GP parking spaces are reserved for visitors to GP that do not intend to hike the Mount Bierstadt Trail. Number of other GP visitors determined using average vehicle occupancy rate.

The findings in Table 6-9 suggest that only about 300 people would be able to hike the Mount Bierstadt Trail per day, if unendorsed roadside parking at GP is eliminated and overflow parking and transit service is not provided. Yet, the Wilderness capacity analysis suggests as many as 400 people could hike the trail per day without exceeding the crowding threshold for the Mount Bierstadt summit. Overflow parking (in Georgetown, Colorado, or at another location along GP Road) and transit service could be provided to maximize the allocation of Wilderness use permits to ensure up to 400 people have access to hike the trail per day. It is uncertain whether people who wish to visit GP for reasons other than hiking the Mount Bierstadt Trail would be willing to park at an overflow lot and ride transit to GP, or if they would choose to go somewhere else. Thus, the lower-bound estimate of ridership demand is equal to the first column of unmet parking demand in

Table 6-9, and the upper-bound estimate is equal to the sum of the two columns of unmet parking demand estimates in Table 6-9.

Summary of Findings: GP Integrated User Capacity and Transit Demand Analyses

Results from the physical capacity and wilderness capacity analyses support substantially different recommendations for transportation and visitor use management at GP, and corresponding outcomes related to Wilderness resource values and Forest Goals (Table 6-10). **Only the Wilderness resource capacity-based approach provides a sustainable solution for managing transportation and visitor use at GP**.

Table 6-10. Summary of Findings and Outcomes for Physical and Wilderness Capacity Analyses

	Physical Capacity Analysis	Wilderness Capacity Analysis
Mount Bierstadt Trail Peak Use	800+ people per day	400 people per day
Wilderness Resource Conditions	Approximately 60% of hikers encounter more than 22 people per view or more on the summit of Mount Bierstadt	No more than 15% of hikers encounter more than 22 people per view on the summit of Mount Bierstadt
Visitor Use Management	No systematic visitor use management	Wilderness use permit quota system
Transit Service Recommendations[12]	Transit service; ridership demand of 400 to 700 people/day	Transit service; ridership demand of 100 to 400 people/day
Alignment with Forest Goals	Does not align with forest goals for resource protection and Wilderness values. May eliminate unendorsed roadside parking	Aligns with multiple goals (resource protection, Wilderness values, eliminating unendorsed roadside parking)

[12] *Chapter 7: Transit Feasibility Analyses and Recommendations by Site* provides a detailed description of the estimated ridership demand for the referenced transit service.

MERA Integrated User Capacity and Transit Demand Analysis

MERA User Capacity Considerations

Parking accumulation and turnover data collected during the summer of 2012 suggest parking demand on typically busy peak season days in MERA is far above parking capacity from late morning through late afternoon/early evening. Between the hours of 12:00 PM and 4:00 PM on typically busy peak season days, there is gridlock in parking lots and on the road itself as visitors wait for a place to park at Summit Lake and the Mount Evans summit. Traffic data collected during the 2012 season also indicate long lines of traffic form at the Welcome Station on typically busy summer days, and during particularly busy periods, traffic backs up onto Colorado Highway 103.

Parking and traffic conditions on typically busy summer days in MERA conflict with the paramount experience in MERA: scenic driving. Findings from the 2014 visitor survey in MERA indicate:

- The vast majority of visitor groups to Mount Evans (91%) engage in scenic driving, and 61% of visitor groups report that scenic driving is their primary activity on their trip to MERA.
- The majority of weekend (93%) and weekday (70%) visitors reported that they experienced parking congestion during their visit to MERA.
- More than two-thirds (69%) of weekend visitor groups and about one-third (29%) of weekday visitor groups thought that parking congestion in MERA was moderate to extreme.
- Forty-percent of MERA visitors that parked at the summit of Mount Evans reported that they did not park in an actual parking space.

In contrast to the findings regarding scenic driving, survey results suggest crowding-related impacts to Wilderness values on the Mount Evans summit are less problematic:

- Very few visitors reported walking/taking a short hike (11%), day hiking (8%), or overnight backpacking (0%) as their primary activity during their visit to MERA.
- Less than half (46%) of MERA visitors hiked to the "true summit" of Mount Evans (and this is likely over-reported, due to confusion among respondents about the difference between the Mount Evans parking lot and the "true summit").
- Regardless of the day of the week, a minority (17% on weekdays and 44% on weekend days) of those MERA visitors who hiked to the "true summit" felt crowded when they were there.

Based on the study findings, the user capacity analysis for MERA focuses on the physical capacity of designated parking areas in MERA to address the impacts of parking shortages and traffic congestion on scenic driving experiences and safety.

MERA User Capacity Analysis

Inbound and outbound vehicle counts from one Automated Traffic Recorder (ATR; Figure 6-6) deployed during the summer 2012 data collection period were used as the basis for the MERA capacity analysis, using the following sequence of calculations.

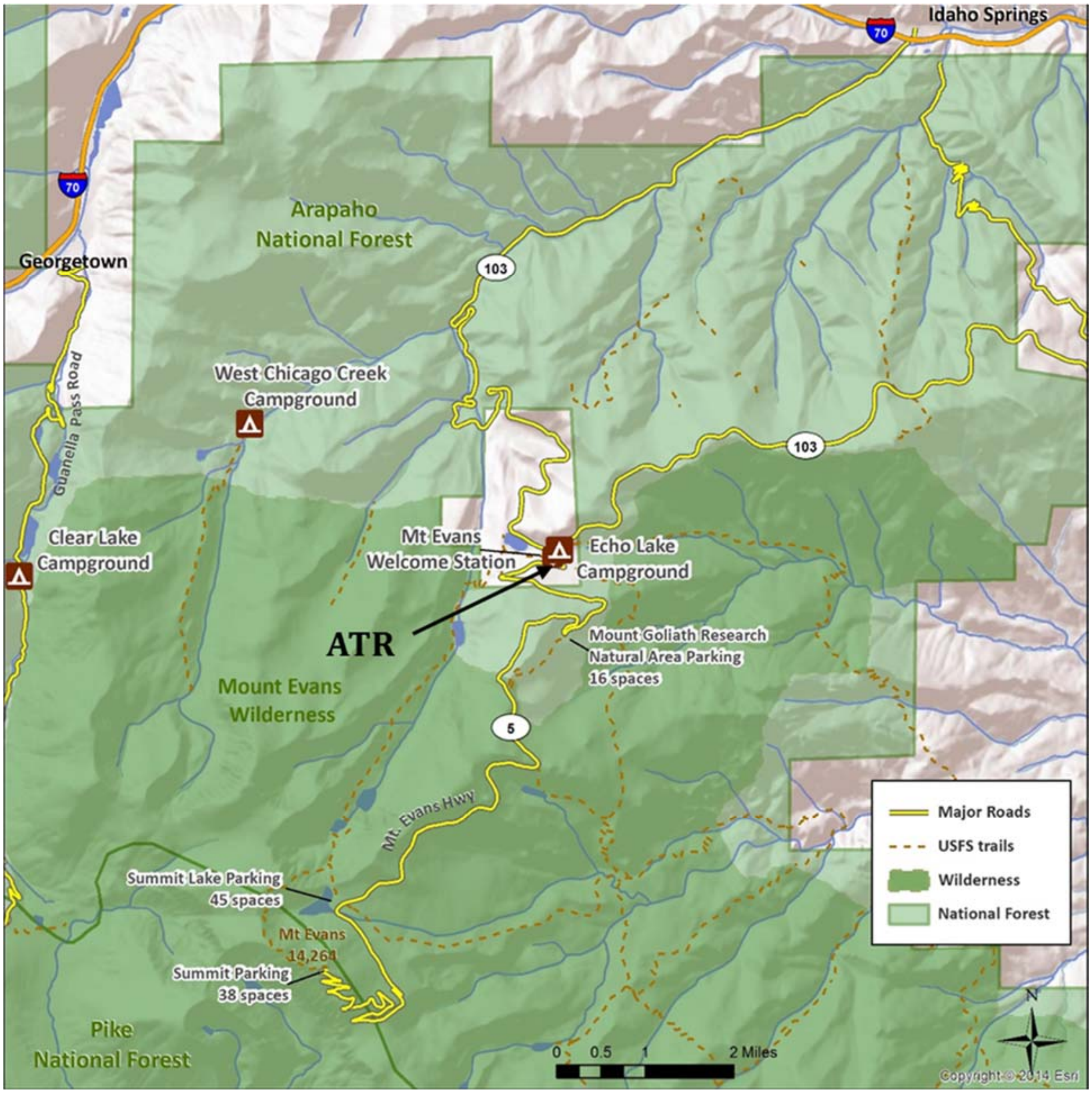

Figure 6-6. Approximate location of ATR, Mount Evans summer 2012.

1. Equation 1 was used to estimate the hourly net vehicle accumulation in MERA.

Equation 1: $\mathbf{NVA_{ACCUM} = PHA + (ATR_{IN} - ATR_{OUT})}$

Where:

NVA_{ACCUM} = Hourly net vehicle accumulation in MERA
PHA = Previous hour's net vehicle accumulation in MERA (assumed to be 0 at midnight)
ATR_{IN} = Hourly inbound vehicle traffic at ATR
ATR_{OUT} = Hourly outbound vehicle traffic at ATR

2. Equation 2 was used to scale hourly net vehicle accumulation estimates from Equation 1 to an estimate of the number of vehicles parked or attempting to park (i.e., parking demand; Table 6-11), rather than just touring the road without plans to park. The scale factor used in Equation 2 ($Percent_{PARK}$) was developed based on the parking accumulation and traffic data collected in 2012.

Equation 2: $\mathbf{P_{DEMAND} = NVA_{ACCUM} * Percent_{PARK}}$

Where:

P_{DEMAND} = Estimated hourly parking demand in MERA
NVA_{ACCUM} = Hourly net vehicle accumulation in MERA
$Percent_{PARK}$ = Scale factor to convert hourly net vehicle accumulation to estimated parking demand

Table 6-11. Estimated Hourly Net Vehicle Accumulation and Parking Demand in MERA on typically busy Peak Season Summer Days

Hour	Hourly Parking Accumulation (NVA_{ACCUM})	Hourly Parking Demand (P_{DEMAND})
12:00 AM	-2	0
1:00 AM	-2	0
2:00 AM	-4	0
3:00 AM	-4	0
4:00 AM	0	0
5:00 AM	15	10
6:00 AM	28	20
7:00 AM	53	37
8:00 AM	90	63
9:00 AM	149	104
10:00 AM	211	148
11:00 AM	275	192
12:00 PM	360	252
1:00 PM	406	284
2:00 PM	394	275
3:00 PM	314	220
4:00 PM	239	167
5:00 PM	165	115
6:00 PM	115	80
7:00 PM	84	59
8:00 PM	63	44
9:00 PM	56	39
10:00 PM	56	39
11:00 PM	55	38

3. Equation 3 was used to compare the estimated hourly park demand from Equation 2 to the physical capacity of designated parking areas in MERA.

Equation 3: If **($P_{DEMAND} > MERA_{CAPACITY}$)**, User Capacity Exceeded. Else, Not Exceeded.
Where:

P_{DEMAND} = Estimated hourly parking demand in MERA
$MERA_{CAPACITY}$ = Designated parking capacity of MERA (99 spaces)

Results of the user capacity analysis suggest that visitor use exceeds MERA's capacity on typically busy peak season days. Options for addressing this include redirecting visitors to other recreation destinations in "real-time" using VMS and/or onsite staff, via a reservation/permit system with a daily quota, or directing visitors to an overflow parking lot with transit service to MERA. Transit demand analysis was conducted to estimate hourly ridership demand for two transit service options from overflow parking locations.

MERA Transit Demand Analysis with User Capacity Management

Hourly unmet parking demand at MERA on typically busy peak season days, based on the physical site capacity of the designated parking areas, and corresponding ridership estimates for transit service from offsite overflow parking were estimated using the following sequence of equations. Additionally, the analysis assumes that unendorsed roadside parking at MERA is eliminated.

4. Equation 4 was used to estimate the hourly number of available/unoccupied parking spaces at MERA.

Equation 4: $\textbf{Parking}_{\textbf{OPEN}} = \textbf{MERA}_{\textbf{CAPACITY}} - (\textbf{PHA} - \textbf{VT}_{\textbf{OUT}})$

Where:

$Parking_{OPEN}$ = Hourly number of parking spaces open in MERA
$MERA_{CAPACITY}$ = Designated parking capacity of MERA (99 spaces)
PHA = Previous hour's total parking accumulation in MERA (assumed to be 0 at midnight)
VT_{OUT} = Estimate of hourly outbound vehicle traffic at MERA

5. Equation 5 was used to estimate hourly unmet parking demand as a function of the hourly number of unoccupied parking spaces and inbound vehicle arrivals, scaled to account for only those vehicles entering MERA with intentions of parking.

Equation 5: $\textbf{UPD} = |\textbf{Parking}_{\textbf{OPEN}} - (\textbf{ATR}_{\textbf{IN}} * \textbf{Percent}_{\textbf{PARK}})|$

Where:

UPD = Hourly unmet parking demand
$Parking_{OPEN}$ = Hourly number of parking spaces open in MERA
ATR_{IN} = Hourly inbound vehicle traffic at ATR
$Percent_{PARK}$ = Scale factor to convert hourly inbound vehicles to estimated parking demand

Equation 6 was used to convert the hourly unmet demand for parking in MERA from vehicles to visitors using the average vehicle occupancy rate for MERA (Table 6-12).

Equation 6: $\textbf{UD}_{\textbf{VISITORS}} = \textbf{UPD} * \textbf{VehOccup}$

Where:

$UD_{VISITORS}$ = Hourly unmet visitor demand for parking in MERA
UPD = Hourly unmet vehicle parking demand
VehOccup = Vehicle occupancy rate, as observed in summer 2012

Table 6-12. Estimated Hourly Available Parking Spaces and Unmet Parking Demand (Vehicles and Visitors) on typically busy Peak Season Summer Days

Hour	Hourly Open Parking Spaces ($Parking_{OPEN}$)	Hourly Unmet Parking Demand – Vehicles (UPD)	Hourly Unmet Parking Demand – Visitors ($UD_{VISITORS}$)
12:00 AM	99	0	0
1:00 AM	99	0	0
2:00 AM	99	0	0
3:00 AM	99	0	0
4:00 AM	99	0	0
5:00 AM	99	0	0
6:00 AM	90	0	0
7:00 AM	81	0	0
8:00 AM	65	0	0
9:00 AM	42	5	14
10:00 AM	13	44	119
11:00 AM	26	58	156
12:00 PM	26	84	225
1:00 PM	27	74	200
2:00 PM	34	55	148
3:00 PM	43	21	57
4:00 PM	43	0	0
5:00 PM	43	0	0
6:00 PM	56	0	0
7:00 PM	59	0	0
8:00 PM	67	0	0
9:00 PM	70	0	0
10:00 PM	69	0	0
11:00 PM	70	0	0
Total	.	341	919

6. Results from the 2014 MERA visitor survey suggest 60% of MERA visitors would be likely to visit MERA on a future trip, even if they had to park in an overflow lot near the MERA Welcome Station and tour MERA in vans. In contrast, only 23% of visitors said they would be likely to do this if overflow parking was located in Idaho Springs, Colorado. These percentages were applied in Equation 7 to the hourly unmet visitor demand estimates from Equation 6 to estimate hourly ridership demand for shuttle service from an offsite overflow lot.

Equation 7: $\mathbf{Ridership_{MERA} = Percent_{RIDE} * UD_{VISITORS}}$

Where:

$Ridership_{MERA}$ = Estimated hourly ridership demand
$Percent_{RIDE}$ = Estimated proportion of visitors who would opt to ride the transit service
$UD_{VISITORS}$ = Hourly unmet visitor demand for parking in MERA

Results of Equation 7 suggest that on typically busy peak season days, approximately 552 visitors who could not otherwise park in designated parking spaces at MERA, would opt to use transit service from an overflow parking lot near the MERA Welcome Station. Alternatively, approximately only 211 visitors would do this if the overflow parking lot was in Idaho Springs (Table 6-13).

Table 6-13. Ridership Demand Estimates for MERA Alternative Transportation Options

Hour	***Staging Near Welcome Station Ridership Demand*[a]**	***Staging in Idaho Springs Ridership Demand*[b]**
12:00 AM	0	0
1:00 AM	0	0
2:00 AM	0	0
3:00 AM	0	0
4:00 AM	0	0
5:00 AM	0	0
6:00 AM	0	0
7:00 AM	0	0
8:00 AM	0	0
9:00 AM	8	3
10:00 AM	71	27
11:00 AM	93	36
12:00 PM	135	52
1:00 PM	120	46
2:00 PM	89	34
3:00 PM	34	13
4:00 PM	0	0
5:00 PM	0	0
6:00 PM	0	0
7:00 PM	0	0
8:00 PM	0	0
9:00 PM	0	0
10:00 PM	0	0
11:00 PM	0	0
Total	552	211

[a] Transit Ridership Estimate for Welcome Station Shuttle Service**:** Service from (newly designated or constructed) lot near Welcome Station into MERA, coupled with parking restrictions in which it is assumed 60% of visitors who would otherwise park in undesignated roadside parking (because designated lots are full) take transit and the other 40% choose to go somewhere other than MERA.

[b] Transit Ridership Estimate for Idaho Springs Shuttle Service**:** Service from Idaho Springs, Colorado, to Welcome Station and from Welcome Station into MERA, coupled with parking restrictions in which it is assumed 23% of visitors who would otherwise park in undesignated roadside parking (because designated lots are full) take transit and the other 77% choose to go somewhere other than MERA.

Summary of Findings: MERA Integrated User Capacity and Transit Demand Analysis

The direction for the MERA user capacity analysis was derived from a data-driven exploration of transportation and visitor use issues at MERA. Survey results suggest that scenic driving is the paramount visitor use at MERA, and that visitors to the "true summit" generally do not feel crowded under current use conditions. Additionally, parking accumulation and traffic data indicate that on typically busy peak season days, MERA parking demand far exceeds capacity and gridlock occurs in parking lots and on the road. The physical capacity analysis identified unmet demand for parking at MERA. A transit demand analysis was performed to determine the potential for transit to satisfy the excess demand for parking. Two alternative transportation scenarios were explored, and may serve as potential solutions for accommodating the excess demand within the existing parking capacity[13]. If alternative transportation to MERA is implemented, continued monitoring of visitor use and perceptions of crowding on the "true summit" of MERA should be implemented to ensure that the visitor experience is not altered by the addition of alternative transportation to MERA.

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[13] *Chapter 7: Transit Feasibility Analyses and Recommendations by Site* provides a detailed description of the estimated ridership demand for the referenced alternative transportation scenarios.

Chapter 7: Transit Feasibility Analyses and Recommendations by Site

Note: The content included in this chapter was originally contributed by the U.S. Department of Transportation John A. Volpe National Transportation Systems Center, report #DOT-VNTSC-FHWA-16-04, in the form of a technical memorandum issued to FWHA CFLHD as an interim deliverable.

Introduction

Chapter 7: Transit Feasibility Analyses and Recommendations by Site describes a range of potential transit components at each study site that could be implemented to address identified transportation needs. For each transit scenario, a description of the component, ridership estimates, scheduling and operational parameters, vehicle needs, and cost estimates are provided. As demonstrated in the preceding *Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis, by Site*, transit components may be helpful in meeting unmet demand for vehicle access to the study sites. To further explore the feasibility of transit options at each study site, this transit feasibility study was performed to greater detail for potential transit implementation at BLRA, GP, and MERA.

Potential transit alternatives, representing a range of costs, potential impacts, and implementation timeframes were developed in consultation with the USFS, and included, among other things, input from local stakeholders and public meeting attendees. Using initial screening from the evaluation criteria (a process described in *Chapter 8: Alternative Component Analyses, Methodology and Results* to follow), the transit components that were most likely to meet the study's goals and address USFS's needs were identified and evaluated. Upon further analysis, some of the evaluated transit components proved to have a combination of high costs and minimal benefits, such that these were deemed unfeasible for implementation. These "unfeasible" transit components are identified in this chapter, but detailed evaluation is only included for the transit scenarios deemed to be "feasible." It should be noted that all costs presented in this chapter are estimates based on assumptions and industry averages. Actual costs, based on the selected vehicle and local fuel and shuttle operator costs, should be determined as part of site-specific implementation plans.

Methods

The cost estimates for all alternative transportation scenarios are a combination of the following:

1. Transit-supportive infrastructure costs
2. Vehicle purchase or lease cost
3. Start-up costs
4. Operation costs (annual)
5. Maintenance costs (annual)

Operations and maintenance costs are calculated annually based on fuel costs, vehicle maintenance (related to road and operating conditions), driver salaries, and other fixed-per-mile or -hour expenses. The other costs may either be one-time costs at transit initiation or costs that may be spread over a few years, depending on transit system design. If the USFS elects to do a short-term pilot or lease of vehicles, the upfront infrastructure costs will be less in the short term but may eventually be greater in the long term. Both lease and purchase estimates are included for all scenarios.[14] One-time costs include:

[14] The project team was not tasked with evaluating the ownership, leasing, or contracting options available to the USFS for this shuttle service, so this report does not specify what entity would lease or own the vehicles.

- Transit-supportive infrastructure like bus shelters and benches and
- Start-up costs like vehicle procurement, training, and initial marketing, which is higher in the first year of operations when visitors have no knowledge of the service. Start-up costs are estimated as $20,000 in Year 1.[15]

These one-time costs are shown as aggregated over the life of the purchase, which in most cases is 12 years (the average lifecycle of the proposed transit vehicles). These are simplified because vehicles, transit-supportive infrastructure, staff oversight efforts, and signage may have different lifecycles and replacement needs.

The cost estimates also include a cost per passenger, which includes the following components:

- Annual capital cost, which equals the total capital cost (vehicle purchase or lease, bus shelters, benches, start-up costs) divided by the life of the vehicles and infrastructure (20- and 28-passenger vehicles are calculated with a 12-year lifecycle and 15-passenger vehicles with a 7-year lifecycle) plus…
- Annual operations and maintenance cost, which includes fuel, driver salaries, and annual maintenance, divided by…
- The total number of passengers per season, which is the average number of daily passengers multiplied by the number of service days per year.

BLRA Transit Feasibility Analysis

The BLRA is located approximately 55 miles northwest of downtown Denver and 25 miles northwest of Boulder, Colorado. Brainard Lake Road runs from the Peak-to-Peak Highway (Colorado 72) 4.8 miles to Brainard Lake and around the lake until it forks with one fork leading to a parking lot at Long Lake Trailhead and the other leading to a parking lot at Mitchell Lake Trailhead. Both of these trailheads access the Indian Peaks Wilderness (IPW). A Courtesy Station (where the parking concessionaire collects a fee) and the Gateway Trailhead Parking Lot are located on Brainard Lake Road 2.6 miles from the Peak-to-Peak Highway. A campground and the Day Use Parking Lot are located on Brainard Lake Road as it approaches the lake. Brainard Lake Road is closed at the Courtesy Station from mid-October to mid-June, but visitors park at the Gateway Trailhead Parking Lot during the off-season and hike or cross-country ski in BLRA. The USFS estimates over 100,000 people visit BLRA annually, with the majority of use concentrated between June and October.

In the past, summer visitation volumes led to several undesirable transportation-related safety and natural resource concerns. The USFS recently addressed these concerns by re-engineering and expanding the Day Use Parking Lot, closing a portion of the loop road around the lake, prohibiting

[15] Volpe Center. 2011. Bus Lifecycle Cost Model for Federal Land Management Agencies. User's Guide. Accessed 23 April 2015: http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling

roadside parking, and by hiring a concessionaire to actively manage and enforce parking restrictions. Nonetheless a few more minor issues exist today:

- Traffic congestion, idling, and queuing at the Courtesy Station, which has natural resource impacts and can impede access to the Gateway Trailhead Parking Lot (as noted in *Chapter 4: Need Identification by Site*).
- Visitors walking along the road, and therefore conflicting with motor vehicles, between the Gateway Trailhead Parking Lot and the lake and trailheads.

Relevant Constraints and Needs

Currently, the USFS believes that the current number of visitors accessing the IPW is appropriate. However, the agency also feels that any increase in the number of visitors to the IPW would have negative impacts on visitor's wilderness experience as well as impacts to natural resources, such as erosion and off-trail impacts to the IPW's fragile above tree-line ecosystems. Therefore, a central constraint for the transit system is that it should not result in a net increase of visitors to the IPW.

Proposed Transit Scenarios

Through meetings with USFS staff, stakeholders, and the public, the following transit scenarios were developed. Evaluation of the scenarios by project partners (FHWA CFLHD, RSG, and the USDOT John A. Volpe Center). This group then determined that the first three scenarios were impractical due to their costs and because they would result in an increase of visitors to the IPW; however, these scenarios were evaluated nonetheless because of stakeholder interest expressed before the implementation of recent parking lot and management improvements. Of the presented scenarios, the fourth scenario has been deemed the most practical and would complement these improvements. All of the scenarios assume the current fee collection and parking management operations will continue into the future. Figure 7-1 illustrates all four BLRA scenarios and Table 7-1 lists the stops served by each scenario.

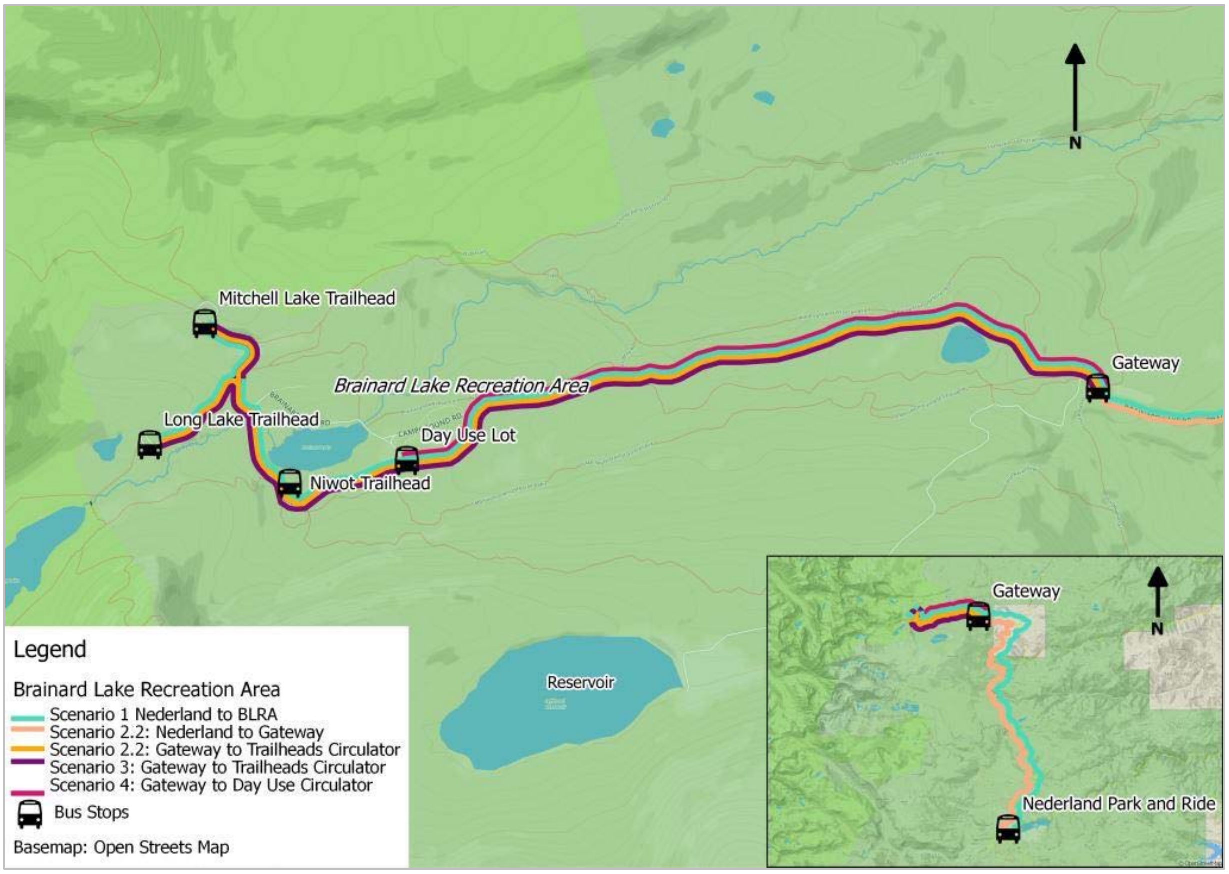

Figure 7-1. BLRA Scenarios

Table 7-1. Stops Served by Each Scenario

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Nederland	Yes	Yes		
Gateway Trailhead Parking Lot	Yes	Yes	Yes	Yes
Day Use Lot	Yes	Yes	Yes	Yes
Niwot Mountain TH		Yes	Yes	
Long Lake TH	Yes	Yes	Yes	
Mitchell Lake TH	Yes	Yes	Yes	

1. **Shuttle Service from Nederland to Gateway Trailhead Parking Lot, Day Use Lot, and IPW Trailhead Lots** Shuttle buses would operate between the RTD park-and-ride lot in Nederland, Colorado, and BLRA with en route shuttle stops in BLRA at the Gateway Trailhead Parking Lot, Day Use Lot, Long Lake Trailhead, and Mitchell Lake Trailhead. Existing facilities would be used for shuttle bus loading/unloading areas at the RTD park-and-ride lot in Nederland to the extent possible, and loading/unloading areas would be designated at the en route shuttle stops in BLRA. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. This decision to restrict service to weekends and holidays was driven by BLRA visitation patterns; the BLRA receives on average twice the number of visitors on weekend days than on weekdays during the summer. The hours of operation correspond with

peak hours of visitor use in the IPW. The frequency of shuttle service would be operated according to ridership demand and parking capacities.

2. **Shuttle Service from Nederland to Gateway Trailhead Parking Lot with Circulator from Gateway Trailhead Parking Lot to Day Use Lot and IPW Trailheads**
   This scenario is composed of two separate shuttle services, requiring visitor transfers in order to access the IPW trailheads. The first shuttle service would operate between the RTD park-and-ride lot in Nederland and the Gateway Trailhead Parking Lot at BLRA. The second shuttle service would operate within the BLRA with en route shuttle stops at the Gateway Trailhead Parking Lot, Day Use Lot, Niwot Mountain Lot, Long Lake Trailhead, and Mitchell Lake Trailhead. Existing facilities would be used for shuttle bus loading/unloading areas at the park-and-ride lot in Nederland to the extent possible, and loading/unloading areas would be designated at the en route shuttle stops in BLRA. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. The hours of operation correspond with peak hours of visitor use/hiking in the IPW. The frequency of shuttle service would be operated according to ridership demand.
3. **Circulator from Gateway Trailhead Parking Lot to Day Use Lot and Indian Peaks Wilderness Trailheads**
   For this scenario, shuttle buses would operate within the BLRA with en route shuttle stops at the Gateway Trailhead Parking Lot, Day Use Lot, Niwot Mountain Lot, Long Lake Trailhead, and Mitchell Lake Trailhead. Loading/unloading areas would be designated at the en route shuttle stops in BLRA. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. The hours of operation correspond with peak hours of visitor use/hiking in the IPW. The frequency of shuttle service would be operated according to ridership demand and parking capacities.
4. **Circulator from Gateway Trailhead Parking Lot to Day Use Lot**
   For this scenario, shuttle buses would operate within the BLRA with stops at the Gateway Trailhead Parking Lot and the Day Use Lot. Loading/unloading areas would be designated at these two stops. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day. The hours of operation correspond with peak hours of visitor use/hiking in the area. The frequency of shuttle service would be operated according to ridership demand, parking capacities, and congestion and queuing at the Courtesy Station.

Table 7-2 provides a summary of the operations and costs of each of the scenarios and the following sections contain details for each scenario. Note that costs to own are averaged over seven years and do not include start-up costs for marketing or signage, which is estimated to be around $20,000 for each scenario. Scenario 4 is the most cost efficient and would likely improve the congestion and safety concerns at the Courtesy Station more effectively or at least as effectively as any of the other scenarios.

Table 7-2. BLRA Scenarios Operations and Costs Summary

	Scenario 1	Scenario 2, Component 1	Scenario 3	Scenario 4
Travel Time (Round-trip)	98 minutes	52 minutes	53 minutes	20 minutes
Distance (Round-trip)	35.8 miles	28.6 miles	7.2 miles	4.4 miles
Hours of Operation	7am to 7pm	7am to 7pm	7am to 6pm	7am to 6pm
Frequency of Service	20 minutes	30 minutes	20 minutes	20 minutes
Vehicles Required	5	2	3	1
Days in Service	35	35	35	35
Passengers/Day	208	13	195	195
Cost to Own/Year	$136,408	$58,032	$66,604	$25,981
Cost to Own/Year/Rider	$18.74	$127.54	$9.76	$3.81
Cost to Lease/Year	$126,744	$51,422	$67,810	$26,967
Cost to Lease/Year/Rider	$17.41	$113.02	$9.94	$3.95

Scenario 1: Shuttle Service from Nederland to Gateway Trailhead Parking Lot, Day Use Lot, and IPW Trailhead Lots

This section describes capital and operational elements of transit service from Nederland to BLRA. This includes the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs.

Route

The route would start and end at Nederland, making an out-and-back drive to BLRA and the IPW Trailhead Lots with a stop in both directions at the Gateway Trailhead Parking Lot and Day Use Parking Lot. Table 7-3 presents the mileage and driving times between stops for this scenario.

Table 7-3. Mileage and Driving Time between Stops for BLRA Scenario 1

Route Segment	Mileage	Driving Time
Nederland to Gateway Trailhead Parking Lot	14.3 miles	24 minutes
Gateway Trailhead Parking Lot to Day Use Lot	2.2 miles	6 minutes
Day Use Lot to Long Lake Trailhead	1.1 miles	5 minutes
Long Lake Trailhead to Mitchell Lake Trailhead	0.7 miles	3 minutes
Mitchell Lake Trailhead to Day Use Lot	1.0 miles	5 minutes
Day Use Lot to Gateway Trailhead Parking Lot	2.2 miles	6 minutes
Gateway Trailhead Parking Lot to Nederland	14.3 miles	24 minutes
Round-Trip Totals	35.8 miles	73 minutes (driving) 98 minutes (with stops)[16]

[16] The total time for each route includes 5 minutes loading and unloading in Nederland and 3 minute stops at all other stops.

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was first estimated based on current traffic volumes and results from the visitor survey[17]. The transit ridership estimate assumes that two percent of all visitors who currently drive through Nederland on route to and from BLRA would choose to use the optional transit service from Nederland to the Gateway Trailhead Parking Lot. According to visitors that responded to the survey, 76% of visitors would elect to take a short transit ride from the Gateway Trailhead Parking Lot to BLRA hiking destinations, *if this were their only option to visit BLRA* because parking lots were full. (The assumption is that the remaining 24% of visitors would not visit BLRA during times that these parking conditions exist.) The estimate is also coupled with the continuance of parking restrictions and management. Hourly traffic volumes on a 92nd percentile design day (737 vehicles per day) at an average vehicle occupancy rate of 2.5 people per vehicle were used to translate percentages to ridership volumes.

The resulting estimate is 208 passengers per day (13 passengers from Nederland to BLRA and 195 passengers from the Gateway Trailhead Parking Lot to the other stops). Most passengers would arrive between 10 a.m. and 1 p.m., and the greatest volume of visitors would be between 11 a.m. and 12 p.m. and between 1 p.m. and 2 p.m.

Service Hours and Frequency

Service hours and frequency are based on ridership demand, passenger safety, and feasibility. Traffic volumes and parking lot counts from the parking and transportation studies done in BLRA during the summer 2013 season show that parking demand begins to exceed capacity at Long and Mitchell Lake Trailhead Lots starting around 8 a.m. However, the Day Use Lot does not fill up until 11 a.m., which is when the demand for the transit service is anticipated to be greatest. To ease the crowding in advance of exceeding capacity (for visitors who would prefer to take a shuttle rather than driving to or within BLRA), transit service should began at 7:00 a.m.

Headways are used to describe the average amount of time between vehicles traveling the same transit route; headways indicate the scheduled frequency of transit service. A system with maximum headways of 20 minutes was designed to balance convenience and visitor safety with financial and operational feasibility.[18] The system would operate every 20 minutes from 7 a.m. through 7 p.m. (with the last shuttle leaving Nederland at 5:20 p.m.). See Table 7-4 for a summary schedule of shuttle service for Scenario 1, as well as the vehicle assigned to each trip.

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[17] Traffic volume and survey data for BLRA are reported in *Chapter 1: Brainard Lake Recreation Area Summary of Data Findings.*

[18] The 20-minute figure is based on previous transit surveys conducted at Marsh-Billings Rockefeller NHP and Muir Woods National Monument. Also, a Center for Urban Transportation Research (University of South Florida) study suggests a maximum wait time of 30 minutes is acceptable for urban transit systems, and the study team estimates that a slightly shorter headway seems appropriate in the recreation context (CUTR study available at http://www.nctr.usf.edu/pdf/77720.pdf)

This service schedule would consist of 32 round trips daily and 5 shuttle buses. There would be an average of 7 passengers per trip throughout the day. During peak periods (11 a.m. to 1 p.m.), average ridership would be higher, perhaps up to 12 passengers per trip.

Table 7-4. Schedule of Shuttle Runs for BLRA Scenario 1

Departure (Staging)	Arrival (THs)	Arrival (Staging)	Vehicle #
7:00 AM	7:50 AM	8:40 AM	1
7:20 AM	8:10 AM	9:00 AM	2
7:40 AM	8:30 AM	9:20 AM	3
8:00 AM	8:50 AM	9:40 AM	4
8:20 AM	9:10 AM	10:00 AM	5
8:40 AM	9:30 AM	10:20 AM	1
9:00 AM	9:50 AM	10:40 AM	2
9:20 AM	10:10 AM	11:00 AM	3
9:40 AM	10:30 AM	11:20 AM	4
10:00 AM	10:50 AM	11:40 AM	5
10:20 AM	11:10 AM	12:00 PM	1
10:40 AM	11:30 AM	12:20 PM	2
11:00 AM	11:50 AM	12:40 PM	3
11:20 AM	12:10 PM	1:00 PM	4
11:40 AM	12:30 PM	1:20 PM	5
12:00 PM	12:50 PM	1:40 PM	1
12:20 PM	1:10 PM	2:00 PM	2
12:40 PM	1:30 PM	2:20 PM	3
1:00 PM	1:50 PM	2:40 PM	4
1:20 PM	2:10 PM	3:00 PM	5
1:40 PM	2:30 PM	3:20 PM	1
2:00 PM	2:50 PM	3:40 PM	2
2:20 PM	3:10 PM	4:00 PM	3
2:40 PM	3:30 PM	4:20 PM	4
3:00 PM	3:50 PM	4:40 PM	5
3:20 PM	4:10 PM	5:00 PM	1
3:40 PM	4:30 PM	5:20 PM	2
4:00 PM	4:50 PM	5:40 PM	3
4:20 PM	5:10 PM	6:00 PM	4
4:40 PM	5:30 PM	6:20 PM	5
5:00 PM	5:50 PM	6:40 PM	1
5:20 PM	6:10 PM	7:00 PM	2

Bolded runs would not pick up visitors in Nederland such that the last "new" transit visitors arrive via the 4:40 PM shuttle.

Vehicle Selection

Ridership demand estimates show that demand for the shuttle would average seven passengers per trip with a peak of 10 to 12 in the late morning to early afternoon. In considering passenger safety and convenience, a 20 minute headway (see Service Hours and Frequency) was chosen, and with three trips per hour, transit service can meet demand with 12-passenger light-duty shuttle buses. Using smaller vehicles will save some on upfront capital costs, have less of an impact on the roadway, would not require drivers to hold a CDL, and allow for increased vehicle maneuverability and storage options.

GSA AutoChoice lists several options for light-duty shuttle buses that would meet the needs for BLRA transit service. Since the shuttle service would be a fixed-route system, the vehicle must be "readily accessible to and usable by individuals with disabilities, including individuals who use wheelchairs"[19] (Figure 7-2). Such a vehicle, such as a Goshen Coach Pacer II, which includes a wheelchair lift, will cost about $70,000. Since five of these vehicles are necessary for Scenario 1, the total cost to purchase these vehicles would be $350,000.

Figure 7-2. Exterior (left) and interior (right) of a Goshen Coach Pacer II[20]

Staging

Two options for staging transit in Nederland were considered. In both cases, lots are owned by other public agencies and USFS would need to enter into a use agreement with owners. The locations in Table 7-5 were considered as *preliminary* options for staging. To date, contact has not been made with the owners of these lots nor has an assessment of the current status of each lot during peak summer weekend days been completed.

Table 7-5. Preliminary Options for BLRA Scenario 1 Staging

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[19] Subpart D. Acquisition of Accessible Vehicles By Public Entities; Sec. 37.71 Purchase or lease of new non-rail vehicles by public entities operating fixed route systems. http://www.fta.dot.gov/12876_3906.html
[20] Source: tescobus.com

Location	Capacity	Notes
RTD Park-N-Ride Lot	79 lined spots	Located close to downtown; Park-N-Ride serves buses to/from Boulder and beyond
Nederland Middle-Senior High School	46 lined spots	1.2 miles outside of town; also serves Hessie Trailhead Shuttle on summer weekends

Operations and Maintenance Assumptions[21]

The following cost assumptions in Table 7-6 allow for the calculation of seasonal operations and maintenance costs. All costs are from the Volpe Bus Lifecycle Cost Model and updated to 2015.

Table 7-6. Assumptions Driving Costs in BLRA Scenario 1

Transit Element	Cost Assumption
Driver hourly wage	$30
Fuel cost per gallon	$3.50
Maintenance cost per mile (based on condition of Peak-to-Peak Highway and Brainard Lake Rd.)	$0.60
Fueling station and maintenance facility	$0.00 (Assume USFS uses existing stations/facility and does not construct new ones exclusively for transit)

Cost Estimates

This scenario assumes that the transit-supportive infrastructure costs, which include bus shelters and benches, would be negligible since much of this infrastructure already exists at the proposed staging areas and stops. Other general start-up costs include marketing, installation of signage, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1 and should be added to the purchase and leasing cost estimates below.

Table 7-7 and Table 7-8 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases five full-size vans. These vehicles can be shared with other sites or used offsite during the remainder of the year when not in use at BLRA. These tables also show an annual maintenance cost, which assumes a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-7. Capital Cost for Vehicle Purchase in BLRA Scenario 1

Vehicle	Quantity	Cost per Unit	Total
Light-Duty Shuttle Bus	5	$70,000	$350,000

[21] All cost references cited in Bus Lifecycle Cost Model (http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling).

Table 7-8. Total and Per-Passenger Costs with Vehicle Purchase in BLRA Scenario 1

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$78,938	$10.84
Year One Capital Costs	$350,000	$48.08
Costs Per Season (2-7, cumulative)	$525,919	$10.32
Total	$954,856	$18.74

The USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for full-size passenger vans. GSA offers a short-term lease in which the federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[22] GSA short-term lease rates for vehicles of this size are $3,092 per month, with an estimate cost per season of $12,368 each. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These costs include fuel and drivers only, at a total cost of $64,904 per year for all five vehicles. Table 7-9 shows the total costs and per-passenger costs with a lease option.

Table 7-9. Total and Per-Passenger Costs with Vehicle Lease Per Year in BLRA Scenario 1

Full-size Passenger Vans	Quantity	Cost per Month	Cost per Season	Total Capital	Total O&M (Fuel & Driver)	Total Costs	Total Per Passenger
One Season[23]	5	$3,092	$12,368	$61,840	$64,904	$126,744	$17.41

The total cost per passenger is similar between the purchase and lease options, with the lease being slightly less expensive.

Due to the relatively low number of passengers using this transit service (208 passengers represent less than eight percent of the approximately 1,843 visitors on a 92nd percentile day), the length of the service in terms of miles and minutes, and the high level of service needed for passenger safety and convenience, the cost per passenger is relatively high in both the purchase- and lease-scenarios. Implementation of this transit scenario would need capital investment from the USFS (or another funding source) for vehicles and infrastructure. This scenario would likely need a subsidy to cover the per-passenger operating cost or charge high fees to passengers.

[22] GSA also has leasing options that commit the leaser to a 7 year or 100,000 mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance.

[23] The season refers to the three months of transit service described for all scenarios (Memorial Day through Labor Day).

Scenario 2: Shuttle Service from Nederland to Gateway Trailhead Parking Lot with Circulator from Gateway Trailhead Parking Lot to Day Use Lot and IPW Trailheads

This section describes capital and operational elements of transit service from Nederland to BLRA and is divided into two components: the first component is a shuttle service between Nederland and the Gateway Trailhead Parking Lot (presented below) and the second is a circulator between the Gateway Trailhead Parking Lot to the Day Use Lot and IPW Trailheads (presented in Scenario 3). This section presents the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs for component 1 (with the assumption that component 2, described in Scenario 3, would also be implemented).

Component 1: Shuttle Service from Nederland to Gateway Trailhead Parking Lot

Route

The route would start and end at Nederland (the Nederland Park-n-Ride is used as the staging area for the analysis below), making an out-and-back drive to the Gateway Trailhead Parking Lot at BLRA. Table 7-10 presents the mileage and driving times between stops for this scenario.

Table 7-10. Mileage and Driving Time between Stops for BLRA Scenario 1

Route Segment	Mileage	Driving Time
Nederland to Gateway Trailhead Parking Lot	14.3 miles	24 minutes
Gateway Trailhead Parking Lot to Nederland	14.3 miles	24 minutes
Round-Trip Totals	28.6 miles	48 minutes (driving) 52 minutes (with stops)[24]

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was estimated based on current traffic volumes and results from the visitor survey[25]. Accordingly, the ridership estimate assumes that two percent of all visitors who currently drive through Nederland on route to and from BLRA would choose to use the optional transit service from Nederland to the Gateway Trailhead Parking Lot. To translate this percentage to ridership volumes, hourly traffic volumes on a 92nd percentile design day (737 vehicles per day) at an average vehicle occupancy rate of 2.5 people per vehicle were used. **The resulting estimate is 13 passengers per day**.

[24] The total time for each route includes a 4 minute stop at the Gateway Trailhead Parking Lot.
[25] Traffic volume and survey data for BLRA are reported in *Chapter 1: Brainard Lake Recreation Area Summary of Data Findings.*

Service Hours and Frequency

As is described for Scenario 1, service hours and frequency are based on ridership demand and feasibility. Accordingly, transit service should begin at 7:00 a.m.

A system with maximum headways of 30 minutes was designed to balance convenience and visitor safety with financial and operational feasibility. The system would therefore operate every 30 minutes from 7 a.m. through 7 p.m. (with the last shuttle leaving Nederland at 6 p.m.). See Table 7-11 for a summary schedule of shuttle service for component 1, as well as the vehicle assigned to each trip. This service schedule would call for 23 round trips daily and 5 shuttle buses.

Table 7-11. Schedule of Shuttle Runs for BLRA Scenario 2, Component 1

Departure (Staging)	Arrival (THs)	Arrival (Staging)	Vehicle #
7:00 AM	7:30 AM	8:00 AM	1
7:30 AM	8:00 AM	8:30 AM	2
8:00 AM	8:30 AM	9:00 AM	1
8:30 AM	9:00 AM	9:30 AM	2
9:00 AM	9:30 AM	10:00 AM	1
9:30 AM	10:00 AM	10:30 AM	2
10:00 AM	10:30 AM	11:00 AM	1
10:30 AM	11:00 AM	11:30 AM	2
11:00 AM	11:30 AM	12:00 PM	1
11:30 AM	12:00 PM	12:30 PM	2
12:00 PM	12:30 PM	1:00 PM	1
12:30 PM	1:00 PM	1:30 PM	2
1:00 PM	1:30 PM	2:00 PM	1
1:30 PM	2:00 PM	2:30 PM	2
2:00 PM	2:30 PM	3:00 PM	1
2:30 PM	3:00 PM	3:30 PM	2
3:00 PM	3:30 PM	4:00 PM	1
3:30 PM	4:00 PM	4:30 PM	2
4:00 PM	4:30 PM	5:00 PM	1
4:30 PM	5:00 PM	5:30 PM	2
5:00 PM	5:30 PM	6:00 PM	1
5:30 PM	6:00 PM	6:30 PM	2
6:00 PM	6:30 PM	7:00 PM	1

Bolded runs would not pick up visitors in Nederland such that the last “new” transit visitors arrive via the 4:40 PM shuttle.

Vehicle Selection

The same light-duty shuttle bus used for Scenario 1 should be used for Scenario 2. Since this vehicle would likely cost around $70,000, two vehicles would cost $140,000.

Staging

Staging for BLRA Scenario 2, Component 1 in Nederland is the same as BLRA Scenario 1.

Operations and Maintenance Assumptions[26]

The operations and maintenance assumptions for this scenario is the same as in BLRA Scenario 1.

Cost Estimates

The cost estimates for BLRA Scenario 2, Component 1 are a combination of the following costs:

1. Transit-supportive infrastructure costs
2. Vehicle purchase or lease
3. Start-up costs
4. Operation costs (annual)
5. Maintenance costs (annual)

This scenario assumes that the transit-supportive infrastructure costs, which include bus shelters and benches, would be negligible since much of this infrastructure already exists at the proposed staging areas and stop. Other general start-up costs include marketing, installation of signage, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1 and should be added to the purchase and leasing cost estimates below.

Table 7-12 and Table 7-13 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases five full-size vans. These vehicles can be shared with other sites or used offsite during the remainder of the year when not in use at BLRA. These tables also calculate an annual maintenance cost, which assumes a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-12. Capital Cost for Vehicle Purchase in BLRA Scenario 2, Component 1

Vehicle	Quantity	Cost per Unit	Total
Light-Duty Shuttle Bus	2	$70,000	$140,000

Table 7-13. Total and Per-Passenger Costs with Vehicle Purchase in BLRA Scenario 2, Component 1

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$34,744	$76.36
Year One Capital Costs	$140,000	$307.69
Costs Per Season (2-7, cumulative)	$231,479	$72.68
Total	$406,223	$127.54

As is the case with Scenario 1, USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for full-size passenger vans. GSA offers a short-term lease in which the

[26] All cost references cited in Bus Lifecycle Cost Model (http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling).

federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[27] GSA short-term lease rates for vehicles of this size are $3,092 per month, with an estimate cost per season of $12,368 each. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These costs include fuel and drivers only, at a total cost of $26,686 per year for both vans. Table 7-14 shows the total costs and per-passenger costs with a lease option.

Table 7-14. Total and Per-Passenger Costs with Vehicle Lease Per Year in BLRA Scenario 2, Component 1

Full-size Passenger Vans	Quantity	Cost per Month	Cost per Season	Total Capital	Total O&M (Fuel & Driver)	Total Costs	Total Per Passenger
One Season	2	$3,092	$12,368	$24,736	$26,686	$51,422	$113.02

The total cost per passenger is similar between the purchase and lease options, with the lease being slightly less expensive.

Due to the very low number of passengers using this transit service (13 passengers represent less than one percent of the approximately 1,843 visitors on a 92nd percentile day), the length of the service in terms of miles and minutes, and the level of service needed for passenger convenience, the cost per passenger is extremely high in both the purchase- and lease-scenarios. Implementation of component 1 of this transit scenario would need capital investment from the USFS (or another funding source) for vehicles and infrastructure. Component 1 of this scenario would likely need a large subsidy to cover the per-passenger operating cost or charge high fees to passengers and is therefore not recommended for implementation. Analyzing component 2 together with this component is therefore not necessary, so the following transit scenario should only be considered as a standalone scenario.

Scenario 3: Circulator from Gateway Trailhead Parking Lot to Day Use Lot and IPW Trailhead Lots

This section describes capital and operational elements of circulator transit service in BLRA. This section includes the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs for this transit scenario.

Route

The route would start and end at the Gateway Trailhead Parking Lot, making a circular drive to the IPW Trailhead Lots with stops at the Day Use Lot and Niwot Mountain Lot to and from the Trailhead Lots (Long Lake and Mitchell Lake). Table 7-15 presents the mileage and driving times between stops for this scenario.

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[27] GSA also has leasing options that commit the leaser to a 7 year or 100,000 mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance.

Table 7-15. Mileage and Driving Time between Stops for BLRA Scenario 3

Route Segment	Mileage	Driving Time
Gateway Trailhead Parking Lot to Day Use Lot	2.2 miles	6 minutes
Day Use Lot to Niwot Mountain Lot	0.5 miles	2 minutes
Niwot Mountain Lot to Long Lake Trailhead Lot	0.7 miles	3 minutes
Long Lake Trailhead to Mitchell Lake Trailhead Lot	0.7 miles	3 minutes
Mitchell Lake Trailhead Lot to Niwot Mountain Lot	0.7 miles	3 minutes
Niwot Mountain Lot to Day Use Lot	0.5 miles	2 minutes
Day Use Lot to Gateway Trailhead Parking Lot	2.2 miles	6 minutes
Round-Trip Totals	7.2 miles	25 minutes (driving) 53 minutes (with stops)[28]

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was estimated based on current traffic volumes and results from the visitor survey[29]. The transit ridership estimate assumes two percent of all visitors who currently drive through Nederland on route to and from BLRA would choose to use the optional transit service from Nederland to the Gateway Trailhead Parking Lot. According to visitors that responded to the survey, 76% of visitors would elect to take a short transit ride from the Gateway Trailhead Parking Lot to BLRA hiking destinations, *if this were their only option to visit BLRA* because parking lots were full. (The assumption is that the remaining 24% of visitors would not visit BLRA during times that these parking conditions exist.) The estimate is also coupled with the continuance of parking restrictions and management. To translate these percentages to ridership volumes, hourly traffic volumes on a 92nd percentile design day (737 vehicles per day) at an average vehicle occupancy rate of 2.5 people per vehicle were used.

The resulting estimate is 195 passengers per day. Most passengers would arrive between 10 a.m. and 1 p.m., and the greatest volume of visitors would be between 11 a.m. and 12 p.m. and between 1 p.m. and 2 p.m.

Service Hours and Frequency

Service hours and frequency are based on ridership demand, passenger safety, and feasibility. Traffic volumes and parking lot counts conducted in BLRA during the summer 2013 field season show that parking demand begins to exceed capacity at Long and Mitchell Lake Trailhead Lots starting around 8 a.m. However, the Day Use Lot does not fill up until 11 a.m., which is when the demand for the transit service would likely be greatest. For feasibility of transit operations, transit service should begin at 7:00 a.m.

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[28] The total time for each route includes 4 minutes at each stop.

[29] Traffic volume and survey data for BLRA are reported in *Chapter 1: Brainard Lake Recreation Area Summary of Data Findings.*

A system with maximum headways of 20 minutes was designed to balance convenience and visitor safety with financial and operational feasibility.[30] The system would operate every 20 minutes from 7:00 a.m. through 6:00 p.m. (with the last shuttle leaving the Gateway Trailhead Parking Lot at 5:00 p.m.). See), the average would be higher.

Table 7-16 for a summary schedule of shuttle service for Scenario 1, as well as the vehicle assigned to each trip.

This service schedule would call for 31 round trips daily and three shuttle buses. There would be an average of seven passengers per trip throughout the day, but during peak periods (11 a.m. to 1 p.m.), the average would be higher.

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[30] The 20-minute figure is based on previous transit surveys conducted at Marsh-Billings Rockefeller NHP and Muir Woods National Monument. Also, a Center for Urban Transportation Research (University of South Florida) study suggests a maximum wait time of 30 minutes is acceptable for urban transit systems, and the study team estimates that a slightly shorter headway seems appropriate in the recreation context (CUTR study available at http://www.nctr.usf.edu/pdf/77720.pdf)

Table 7-16. Schedule of Shuttle Runs for BLRA Scenario 3

Departure (Staging)	Arrival (THs)	Arrival (Staging)	Vehicle #
7:00 AM	7:30 AM	8:00 AM	1
7:20 AM	7:50 AM	8:20 AM	2
7:40 AM	8:30 AM	8:40 AM	3
8:00 AM	8:30 AM	9:00 AM	1
8:20 AM	8:50 AM	9:20 AM	2
8:40 AM	9:10 AM	9:40 AM	3
9:00 AM	9:30 AM	10:00 AM	1
9:20 AM	9:50 AM	10:20 AM	2
9:40 AM	10:10 AM	10:40 AM	3
10:00 AM	10:30 AM	11:00 AM	1
10:20 AM	10:50 AM	11:20 AM	2
10:40 AM	11:10 AM	11:40 AM	3
11:00 AM	11:30 AM	12:00 PM	1
11:20 AM	11:50 AM	12:20 PM	2
11:40 AM	12:10 PM	12:40 PM	3
12:00 PM	12:30 PM	1:00 PM	1
12:20 PM	12:50 PM	1:20 PM	2
12:40 PM	1:10 PM	1:40 PM	3
1:00 PM	1:30 PM	2:00 PM	1
1:20 PM	1:50 PM	2:20 PM	2
1:40 PM	2:10 PM	2:40 PM	3
2:00 PM	2:30 PM	3:00 PM	1
2:20 PM	2:50 PM	3:20 PM	2
2:40 PM	3:10 PM	3:40 PM	3
3:00 PM	3:30 PM	4:00 PM	1
3:20 PM	3:50 PM	4:20 PM	2
3:40 PM	4:10 PM	4:40 PM	3
4:00 PM	4:30 PM	5:00 PM	1
4:20 PM	4:50 PM	5:20 PM	2
4:40 PM	5:10 PM	5:40 PM	3
5:00 PM	5:30 PM	6:00 PM	1

Vehicle Selection

The same light-duty shuttle bus used for Scenario 1 should be used for this scenario. Since this vehicle would likely cost around $70,000, three vehicles would cost of $210,000.

Operations and Maintenance Assumptions

The operations and maintenance assumptions for this scenario is the same as in Scenario 1.

Cost Estimates

The cost estimates for BLRA Scenario 2, Component 2/Scenario 3 are a combination of the following costs:

1. Transit-supportive infrastructure costs
2. Vehicle purchase or lease
3. Start-up costs
4. Operation costs (annual)
5. Maintenance costs (annual)

This scenario assumes that the transit-supportive infrastructure costs, which include bus shelters and benches, would be negligible since much of this infrastructure already exists at the proposed staging areas and stops. Other general start-up costs include marketing, installation of signage, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1.

Table 7-17 and Table 7-18 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases five full-size vans. These vehicles can be shared with other sites or used offsite during the remainder of the year when not in use at BLRA. These tables also calculate an annual maintenance cost, which assumes a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-17. Capital Cost for Vehicle Purchase in BLRA Scenario 2, Component 2/Scenario 3

Vehicle	Quantity	Cost per Unit	Total
Light-Duty Shuttle Bus	3	$70,000	$210,000

Table 7-18. Total and Per-Passenger Costs with Vehicle Purchase in BLRA Scenario 2, Component 2/ Scenario 3

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$33,440	$4.90
Year One Capital Costs	$210,000	$30.77
Costs Per Season (2-7, cumulative)	$222,791	$4.66
Total	$466,230	$9.76

USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for full-size passenger vans. GSA offers a short-term lease in which the federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[31] GSA short-term lease rates for vehicles of this size are $3,092 per month, with an estimate cost per season of $12,368 each. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These costs include fuel and drivers only, at a cost of $64,904 per year. Table 7-19 shows the total costs and per-passenger costs with a lease option.

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[31] GSA also has leasing options that commit the leaser to a 7 year or 100,000-mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance.

Table 7-19. Total and Per-Passenger Costs with Vehicle Lease in BLRA Scenario 2, Component 2/Scenario 3

Full-size Passenger Vans	Quantity	Cost per Month	Cost per Season	Total Capital	Total O&M (Fuel & Driver)	Total Costs	Total Per Passenger
One Season	3	$3,092	$12,368	$37,104	$30,706	$67,810	$9.94

The total cost per passenger is similar between the purchase and lease options, with the lease being slightly more expensive.

Considering the number of passengers using this service (195 passengers, which represents about 11% of the approximately 1,843 visitors on a 92nd percentile day), the length of the service in terms of miles and minutes, and the level of service needed for passenger safety and convenience, the cost per passenger is relatively reasonable, especially for the purchase option. Implementation of this transit scenario would need capital investment from the USFS (or another funding source) for vehicles and infrastructure. This scenario would likely need a subsidy to cover the per-passenger operating cost or charge high fees to passengers.

Scenario 4: Circulator from Gateway Trailhead Parking Lot to Day Use Lot

This section describes capital and operational elements of circulator transit service in BLRA from the Gateway Trailhead Parking Lot to the Day Use Lot. This section includes the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs.

Route

The route would start and end at the Gateway Trailhead Parking Lot, making an out-and-back drive to the Day Use Lot.

Table 7-20 presents the mileage and driving times between the stops for this scenario.

Table 7-20. Mileage and Driving Time between Stops for BLRA Scenario 4

Route Segment	Mileage	Driving Time
Gateway Trailhead Parking Lot to Day Use Lot	2.2 miles	6 minutes
Day Use Lot to Gateway Trailhead Parking Lot	2.2 miles	6 minutes
Round-Trip Totals	4.4 miles	12 minutes (driving) 20 minutes (with stops)[32]

[32] The total time for each route includes 4 minutes at each stop.

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was estimated based on current traffic volumes and results from the visitor survey[33]. The estimate is coupled with the continuance of parking restrictions and management which, based on survey results, it is assumed that 76% of visitors who cannot park in BLRA because lots are full would take transit and the other 24% choose to go somewhere other than BLRA. To translate this percentage to ridership volumes, hourly traffic volumes on a 92nd percentile design day (737 vehicles per day) at an average vehicle occupancy rate of 2.5 people per vehicle were used.

The resulting estimate is 195 passengers per day. Most passengers would arrive between 10 a.m. and 1 p.m., and the greatest volume of visitors would be between 11a.m. and noon and between 1 p.m. and 2 p.m.

Service Hours and Frequency

Service hours and frequency is based on ridership demand, passenger safety, and feasibility. Traffic volumes and parking lot counts in conducted in BLRA during the summer 2013 field season show that parking demand begins to exceed capacity at Long and Mitchell Lake Trailhead Lots starting around 8 a.m. However, the Day Use Lot does not fill up until 11 a.m., which is when the demand for the transit service would likely be greatest. For feasibility of transit operations, transit service should begin at 7:00 a.m.

A system with maximum headways of 20 minutes was designed to balance convenience and visitor safety with financial and operational feasibility.[34] The system would operate every 20 minutes from 7 a.m. through 6 p.m. (with the last shuttle leaving the Gateway Trailhead Parking Lot at 5:00 p.m.). See Table 7-21 for a summary schedule of shuttle service for Scenario 1, as well as the vehicle assigned to each trip.

This service schedule would call for 33 round trips daily and one shuttle bus. There would be an average of seven passengers per trip throughout the day, but during peak periods (11 a.m. to 1 p.m.), the average would be higher.

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[33] Traffic volume and survey data for BLRA are reported in *Chapter 1: Brainard Lake Recreation Area Summary of Data Findings.*

[34] The 20-minute figure is based on previous transit surveys conducted at Marsh-Billings Rockefeller NHP and Muir Woods National Monument. Also, a Center for Urban Transportation Research (University of South Florida) study suggests a maximum wait time of 30 minutes is acceptable for urban transit systems, and the study team estimates that a slightly shorter headway seems appropriate in the recreation context (CUTR study available at http://www.nctr.usf.edu/pdf/77720.pdf)

Table 7-21. Schedule of Shuttle Runs for BLRA Scenario 4

Departure (Gateway)	Arrival (Day Use)	Arrival (Gateway)
7:00 AM	7:10 AM	7:20 AM
7:20 AM	7:30 AM	7:40 AM
7:40 AM	7:50 AM	8:00 AM
8:00 AM	8:10 AM	8:20 AM
8:20 AM	8:30 AM	8:40 AM
8:40 AM	8:50 AM	9:00 AM
9:00 AM	9:10 AM	9:20 AM
9:20 AM	9:30 AM	9:40 AM
9:40 AM	9:50 AM	10:00 AM
10:00 AM	10:10 AM	10:20 AM
10:20 AM	10:30 AM	10:40 AM
10:40 AM	10:50 AM	11:00 AM
11:00 AM	11:10 AM	11:20 AM
11:20 AM	11:30 AM	11:40 AM
11:40 AM	11:50 AM	12:00 PM
12:00 PM	12:10 PM	12:20 PM
12:20 PM	12:30 PM	12:40 PM
12:40 PM	12:50 PM	1:00 PM
1:00 PM	1:10 PM	1:20 PM
1:20 PM	1:30 PM	1:40 PM
1:40 PM	1:50 PM	2:00 PM
2:00 PM	2:10 PM	2:20 PM
2:20 PM	2:30 PM	2:40 PM
2:40 PM	2:50 PM	3:00 PM
3:00 PM	3:10 PM	3:20 PM
3:20 PM	3:30 PM	3:40 PM
3:40 PM	3:50 PM	4:00 PM
4:00 PM	4:10 PM	4:20 PM
4:20 PM	4:30 PM	4:40 PM
4:40 PM	4:50 PM	5:00 PM
5:00 PM	5:10 PM	5:20 PM
5:20 PM	5:30 PM	5:40 PM
5:40 PM	5:50 PM	6:00 PM

Bolded runs would not pick up visitors at Gateway Trailhead Parking Lot such that the last "new" transit visitors arrived via the 5:20 PM shuttle.

Vehicle Selection

The same light-duty shuttle bus used for Scenario 1 should be used for this scenario. This vehicle would likely cost around $70,000. In case this vehicle breaks down, it may be wise for the USFS to purchase or lease a second vehicle to have on hand. Otherwise, service would have to be suspended if a shuttle breaks down. This possibility may be acceptable to the USFS since then visitors would simply have to walk the relatively short distance instead. Accordingly, only one vehicle is used in the cost estimates below.

Operations and Maintenance Assumptions[35]

The operations and maintenance assumptions for this scenario is the same as in Scenario 1.

Cost Estimates

The cost estimates for BLRA Scenario 4 are a combination of the following costs:

1. Vehicle purchase or lease
2. Transit-supportive infrastructure costs
3. Start-up costs
4. Operation costs (annual)
5. Maintenance costs (annual)

This scenario assumes that the transit-supportive infrastructure costs, which include bus shelters and benches, would be negligible since much of this infrastructure already exists at the proposed staging areas and stops. Other general start-up costs include marketing, installation of signage, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1.

Table 7-22 and Table 7-23 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases the full-size van. This vehicle can be shared with other sites or used offsite during the remainder of the year when not in use at BLRA. These tables also calculate an annual maintenance cost, which assumes a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-22. Capital Cost for Vehicle Purchase in BLRA Scenario 4

Vehicle	Quantity	Cost per Unit	Total
Light-Duty Shuttle Bus	1	$70,000	$70,000

Table 7-23. Total and Per-Passenger Costs with Vehicle Purchase in BLRA Scenario 4

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$14,599	$2.14
Year One Capital Costs	$70,000	$10.26
Costs Per Season (2-7, cumulative)	$97,267	$2.04
Total	$181,866	$3.81

USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for full-size passenger vans. GSA offers a short-term lease in which the federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[36] GSA short-term lease rates for vehicles of

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[35] All cost references cited in Bus Lifecycle Cost Model (http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling).
[36] GSA also has leasing options that commit the leaser to a 7 year or 100,000-mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to

this size are $3,092 per month, with an estimate cost per season of $12,368 each. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These costs include fuel and drivers only, at a cost of $14,599 per year. Table 7-24 shows the total costs and per-passenger costs with a lease option.

Table 7-24. Total and Per-Passenger Costs with Vehicle Lease in BLRA Scenario 4

Full-size Passenger Vans	Quantity	Cost per Month	Cost per Season	Total Capital	Total O&M (Fuel & Driver)	Total Costs	Total Per Passenger
One Season	3	$3,092	$12,368	$12,368	$14,599	$26,967	$3.95

The total cost per passenger is similar between the purchase and lease options, with the lease being slightly more expensive.

Considering the number of passengers using this service (195 passengers, which represents about 11% of the approximately 1,843 visitors on a 92nd percentile day), the length of the service in terms of miles and minutes, and the level of service needed for passenger safety and convenience, the cost per passenger is quite reasonable, especially for the purchase option. Implementation of this transit scenario would need capital investment from the USFS (or another funding source) for vehicles and infrastructure. This scenario would likely need a subsidy to cover the per-passenger operating cost or charge high fees to passengers.

GP Transit Feasibility Analysis

Guanella Pass Road is a National Forest Scenic Byway located approximately 40 miles west of the Denver metropolitan area. The Road is 24 miles in length and connects Georgetown, Colorado, with Grant, Colorado, via the 11,669' Guanella Pass. The Guanella Pass Scenic Byway is within both the ARNF and the Pike National Forest (PNF). The primary transportation challenges at GP result from parking congestion at the Mount Bierstadt Trailhead. Guanella Pass is popular among hikers for its relatively easy hiking access to the summit of Mount Bierstadt, which is one of Colorado's 14,000+ foot peaks. Mount Bierstadt is located within the Mount Evans Wilderness.

Guanella Pass has two main parking lots – the Lower Lot has 48 spaces and the Upper Lot has 58 spaces. Most visitors drive from the north (Georgetown) along Guanella Pass Road to access the trailhead, arriving early in the morning on summer days to complete their hike before afternoon thunderstorms arrive. These lots fill to capacity between 6 a.m. and 9 a.m. and remain full until early afternoon. Visitors frequently arrive at the Pass and find all designated spaces full, leaving them with no choice but to park in unendorsed spaces on the roadside or leave. The problem is so severe that nearly twice as many cars are parked in unendorsed spaces (230 vehicles) as in the designated lots (125 vehicles).[37]

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work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance.

[37] *Chapter 4: Need Identification by Site*, Guanella Pass, Figures 13 and 14

The heavy, concentrated visitation leads to several transportation challenges. As summarized in *Chapter 4: Need Identification by Site*, these include:

- Unendorsed roadside parking, causing resource impacts and visitor safety risks.
- Extreme crowding on the summit of Mount Bierstadt during peak periods.
- Off-trail trampling of vegetation and soils in the Mount Evans Wilderness.
- Recreation-related traffic congestion in Georgetown, Colorado.

Relevant Constraints and Needs

GP's primary challenge that may be addressed through transit is the unendorsed roadside parking near the Mount Bierstadt Trailhead. Since Mount Bierstadt is within a Wilderness area where concentrated visitor use is not appropriate, transit service must be sensitive to visitor volume. As stated in *Chapter 4: Need Identification by Site*, measures to manage visitor use levels at Guanella Pass according to wilderness management objectives and corresponding user capacities are needed; transportation and management strategies will be necessary to manage these use levels.

The following constraints at Guanella Pass were recognized as affecting the types and feasibility of transit systems and how to design transit that would best address the site's challenges:

1. **Unique time constraints of visitor activity**. Nearly all congestion at the trailhead lots is from hiker vehicles that are parked for an average of 4 to 5 hours on weekends, with use concentrated between 6 a.m. and 3 p.m. Also, nearly all hikers are participating in the same activity (hiking to the summit of Mount Bierstadt). Transit would need to concentrate on this user group while accommodating variation and uncertainty in hiker schedules.
2. **Peak hours and storms.** The peak hours of use at GP are concentrated to avoid summer afternoon thunderstorms. Transit headways and other operational parameters would need to balance visitor safety during storm events, demand for transit, and crowd control.
3. **Short season**. The busiest hiking season is from Memorial Day through Labor Day. Since congestion and safety risks are greatest on weekends and holidays, the operating season for transit would be only 35 days.
4. **Coupling with parking enforcement needed**. Through the visitor survey, the majority of visitors (68%) would be willing to take a short (15-minute) shuttle "if this was their only option for visiting because parking lots were full." A smaller percentage (41%) would be willing to take a 30-minute shuttle from Georgetown.[38] Therefore, there would need to be some parking enforcement or another method to control unendorsed parking to compel visitors to use transit. Absent such enforcement, ridership would be too low for feasible

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[38] Survey data for GP are reported in *Chapter 2: Guanella Pass Summary of Data Findings.*

operation. Additionally, charging a fee for the shuttle (even as low as $1 per person) may have a significant impact on ridership, even with such enforcement in place.[39]

5. **Staging**. The hiker shuttle would attract up to 275 vehicles at one time during peak use periods, which would be a significant constraint for staging and parking. The staging area would only be used 35 days per year, which could allow for greater flexibility in using existing lots or could add considerable expense to acquire or construct parking that would have limited use.

Proposed Transit Scenarios

Through meetings with USFS staff, stakeholders, and the public, the following transit scenarios were developed to address parking congestion and resource management needs at Guanella Pass. Each of these scenarios assumes that, and is dependent upon, the USFS enforcing parking in designated parking lots only along the highway. Figure 7-3 provides an illustration of Guanella Pass scenarios.

[39]The visitor survey did not ask about price sensitivity. However, transit ridership demand and its relationship to transit fare is well-documented. Studies show that increasing fares are associated with decreased ridership and that fare-free systems may result in increased ridership: http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_95c12.pdf, http://trid.trb.org/view.aspx?id=405875, and http://www.wsdot.wa.gov/research/reports/fullreports/277.1.pdf.

Figure 7-3. Guanella Pass Scenarios

1. **Hiker Shuttle from Georgetown to Guanella Pass**
   Shuttle buses would operate between a designated park-and-ride lot in Georgetown, Colorado, and Guanella Pass, with en route shuttle stops by request at the Clear Lake Campground, Guanella Pass Campground, and the Silver Dollar Lake parking area. Hours of operation would correspond with peak hiking hours on the Mount Bierstadt trail and include contingency operating plans for visitor safety in the event of thunderstorms. Shuttle service would operate according to hiker demand coupled with parking enforcement at the Upper and Lower Lots at Guanella Pass and along Guanella Pass Road.
2. **Hiker Shuttle Service from New Lot on Guanella Pass Road to Guanella Pass**
   Shuttle buses would operate between a designated park-and-ride lot on Guanella Pass Road (near the Pass), and Guanella Pass, with en route shuttle stops by request at the Clear Lake Campground, Guanella Pass Campground, and the Silver Dollar Lake parking area. Hours of operation would correspond with peak hiking hours on the Mount Bierstadt trail and include contingency operating plans for visitor safety in the event of thunderstorms. Shuttle service would operate according to hiker demand coupled with parking enforcement at the Upper and Lower Lots at Guanella Pass and along Guanella Pass Road.
3. **Mandatory Hiker Shuttle Service from Georgetown to Guanella Pass (With Permit System)**
   USFS would institute a wilderness permit system that permitted only 400 hikers per day on weekends and 200 hikers per day on weekdays. All hikers would be required to take a shuttle to Guanella Pass Trailhead, thus decreasing the need for staffing and enforcement at the trailhead. Shuttle buses would operate between a designated park-and-ride lot in Georgetown, Colorado, and Guanella Pass. Hours of operation would correspond with peak hiking hours on the Mount Bierstadt trail and include contingency operating plans for visitor safety in the event of thunderstorms.

Cost estimates were also considered and developed for the following scenarios. They were dismissed because it is believed that the costs would exceed the potential benefits.

4. ***Voluntary* Hiker Shuttle Service from Guanella Pass Road to Guanella Pass**.
   This shuttle service would be similar to Scenario 2 above but it would not be linked to parking restrictions or enforcement. Instead, all hikers using the shuttle would do so on a voluntary basis. It was assumed that up to five percent of hikers would choose to use the shuttle. With such low ridership (approximately 81 visitors, or five percent of 1,627 visitors on the 95th percentile design day[40]), the costs of instituting a shuttle service would not outweigh the congestion relief benefits. Also, per-passenger costs would be prohibitive.
5. **Hiker Shuttle Service Coupled With Wilderness Permit System**
   This transit scenario envisions that a wilderness permit system is in effect that sets a limit to the number of people that can hike Mount Bierstadt per day. The number of permits is limited such that no more than 15% of visitors who hike to the summit would see more than 22 people-at-one-time. The total volume of hikers that would receive permits is very close to total number

[40] Traffic volume and design day selection for GP are reported in *Chapter 2: Guanella Pass Summary of Data Findings.*

of designated parking spaces at the Upper and Lower Lots (multiplied by vehicle occupancy). The cost, capacity, and safety risks (from waiting for shuttle pick-up during weather events) to run shuttles to serve a small number of "overflow" hikers exceeds the benefits. It was decided instead to limit the permit system to the number of vehicles that will fit in designated spaces at the lot.

Table 7-25 provides a summary of the operations and costs of Guanella Pass scenarios 1-3 and the following sections contain details for each scenario. Note that costs to own are averaged over twelve years, which is the life of the vehicle (if purchased). Scenario 2 is the most cost-effective scenario and would relieve congestion at the GP parking lots, but it would require displacing parking to elsewhere on Guanella Pass Road.

Table 7-25. GP Scenarios Operations and Costs Summary

	Scenario 1	Scenario 2	Scenario 3
Travel Time (Round-trip)	84 minutes	36 minutes	66 minutes
Distance (Round-trip)	32 miles	10 miles	22 miles
Hours of Operation	6 a.m. to 7 p.m.	6 a.m. to 7:30 p.m.	6 a.m. to 5 p.m.
Frequency of Service	20-30 minutes	10-20 minutes	15-30 minutes
Vehicles Required	5	5	5
Passengers/Day	414	687	400 (weekends), 200 (weekdays)
Cost to Own/Year	$166,309	$123,955	$234,271
Cost to Own/Year/Rider	$11.48	$5.16	$8.37
Cost to Lease/Year*	$130,315-$144,900	$52,516	$181,790
Cost to Lease/Year/Rider*	$8.99-$10.00	$4.36-$5.17	$6.49

*Cost range reflects addition of transit-supportive infrastructure (bus shelters, benches, etc.) aggregated over 12 years.

Scenario 1: Hiker Shuttle from Georgetown to Guanella Pass

This section describes the process of planning for the capital and operational elements of transit service from Georgetown to Guanella Pass. This includes the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs.

Route

The route would start and end at Georgetown, making an out-and-back drive to Guanella Pass. The shuttle would cater to hikers, who have relatively set schedules and destinations. The survey data indicates that the majority of hikers exclusively visit the Mount Bierstadt trail; therefore, we anticipate that most hikers would not be interested in other destinations along Guanella Pass Road, but the shuttle could make stops by request only at the Clear Lake Campground, Guanella Pass Campground, and the Silver Dollar Lake parking area. For example, if a group of hikers were camping at one of the campgrounds, they could make an advance reservation for shuttle pick up. Because stops at these locations would be infrequent and brief, they are not included in the time estimate totals in Table 7-26.

Most shuttles would carry passengers in one direction only (from Georgetown to the Pass in the morning and from the Pass to Georgetown in the afternoon), and some of the midday shuttles may carry passengers in both directions.

Table 7-26. Mileage and Driving Time between Stops for GP Scenario 1

Route Segment	Mileage	Driving Time
Georgetown Staging Area to Clear Lake Campground	11 miles	24 minutes
Clear Lake Campground to Guanella Pass Campground/Silver Dollar Lake Parking	3 miles	7 minutes
Guanella Pass Campground to Guanella Pass Trailhead	2 miles	6 minutes
Round-Trip Totals	32 miles	74 minutes (driving) 84 minutes (with stops)[41]

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was estimated based on current traffic volumes and results from the visitor survey[42].

According to the visitors that responded to the survey, 41% of visitors would elect to take transit from Georgetown (up to 30 minutes) *if this were their only option to visit GP* because parking conditions prevented them from driving their private vehicles. (The assumption is that the remaining 59% of visitors would not visit GP during times that these parking conditions exist.) The estimate is also coupled with the addition of parking restrictions and management. To translate to ridership volumes, hourly traffic volumes on a 95th percentile design day coupled with available parking and likely duration of stay to arrive at a number of visitors *per hour* that would otherwise have to park in undesignated roadside parking if they were to enter GP in their private vehicle were used.

The resulting estimate is 414 passengers per day. Most passengers would arrive between 6 a.m. and 9 a.m., with departures spaced more regularly throughout the early afternoon and tapering off by late afternoon/evening.

Service Hours and Frequency

Service hours and frequency are based on ridership demand, passenger safety, and feasibility. Traffic volumes and parking lot counts show that parking demand begins to exceed capacity in the Lower Lot starting around 6 a.m. and in the Upper Lot by 9 a.m. Therefore, transit service would begin at 6 a.m.

Using the distribution of departing vehicles, which peaks between 12 p.m. and 3 p.m., and visitor hiking times on the Mount Bierstadt Trail, the hourly desired departure times relative to hourly parking demand based on arrival times were estimated. The resulting volumes show that the

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[41] The total time for each route includes 5 minutes loading (either at Georgetown or at Guanella Pass) and 5 minutes unloading.

[42] Traffic volume and survey data for GP are reported in *Chapter 2: Guanella Pass Summary of Data Findings.*

greatest demand for transit (to GP) would occur between 6 a.m. and 10 a.m. and the greatest demand for transit (from GP) would be from 12 p.m. to 3 p.m. However, there would be demand for return trips until 7 p.m. Therefore, the last shuttle would leave GP at approximately 6:15 p.m.

A system with maximum headways of 30 minutes was designed to balance convenience and visitor safety with financial and operational feasibility. When possible and during the highest demand periods, shuttles will operate with 15-20 minute headways.[43] Scheduled departures from Georgetown would better allow hikers to plan for and adapt to 30 minute headways, especially during early morning hours. See Table 7-27 for a summary schedule of shuttle service for GP Scenario 1, as well as the vehicle assigned to each trip. The schedule allows for some flexibility for a vehicle to be available for extra trips in case of an emergency.

Table 7-27: Schedule of Shuttle Runs for GP Scenario 1

Departure (Staging)	Arrival (Pass)	Arrival (Staging)	Vehicle #
6:00 AM	6:42 AM	7:24 AM	1
6:30 AM	7:12 AM	7:54 AM	2
7:00 AM	7:42 AM	8:24 AM	3
7:20 AM	8:02 AM	8:44 AM	4
7:40 AM	8:22 AM	9:04 AM	5
8:00 AM	8:42 AM	9:24 AM	1
8:20 AM	9:02 AM	9:44 AM	2
8:40 AM	9:22 AM	10:04 AM	3
9:00 AM	9:42 AM	10:24 AM	4
9:30 AM	10:12 AM	10:54 AM	5
10:00 AM	10:42 AM	11:24 AM	1
10:20 AM	11:02 AM	11:44 AM	2
10:40 AM	11:22 AM	12:04 PM	3
11:00 AM	11:42 AM	12:24 PM	4
11:20 AM	12:02 PM	12:44 PM	5
11:40 AM	12:22 PM	1:04 PM	1
12:00 PM	12:42 PM	1:24 PM	2
12:20 PM	1:02 PM	1:44 PM	3
12:40 PM	1:22 PM	2:04 PM	4
1:00 PM	1:42 PM	2:24 PM	5
1:20 PM	2:02 PM	2:44 PM	1
1:40 PM	2:22 PM	3:04 PM	2

[43] The 20-minute figure is based on previous transit surveys conducted at Marsh-Billings Rockefeller NHP and Muir Woods National Monument. Also, a Center for Urban Transportation Research (University of South Florida) study suggests a maximum wait time of 30 minutes is acceptable for urban transit systems, and the study team estimates that a slightly shorter headway seems appropriate in the recreation context (CUTR study available at http://www.nctr.usf.edu/pdf/77720.pdf)

Departure (Staging)	Arrival (Pass)	Arrival (Staging)	Vehicle #
2:00 PM	2:42 PM	3:24 PM	3
2:20 PM	3:02 PM	3:44 PM	4
2:40 PM	3:22 PM	4:04 PM	5
3:00 PM	3:42 PM	4:24 PM	1
3:20 PM	4:02 PM	4:44 PM	2
3:40 PM	4:22 PM	5:04 PM	3
4:00 PM	4:42 PM	5:24 PM	4
4:30 PM	5:12 PM	5:54 PM	5
5:00 PM	5:42 PM	6:24 PM	1
5:30 PM	6:12 PM	6:54 PM	2

This service schedule would call for 34 round trips daily and 5 shuttle buses. There would be an average of 21 passengers per trip *to* GP and an average of 15 passengers per trip *from* GP.

Vehicle Selection

Ridership demand estimates show that demand for the shuttle would fluctuate between 24 and 86 passengers per hour *to* GP. Due to the high average passengers per trip in the morning (see Service Hours and Frequency), the 28 passenger vehicles were selected.

One potential option (used for cost estimate purposes) is the light-duty StarTrans Senator HD (2014; Figure 7-4). The StarTrans Senator HD base model can be modified with options to improve performance on steep grade roadways. With these options and a wheelchair lift, the vehicle will cost approximately $100,000, with a total vehicle cost of $500,000 for five vehicles.

Figure 7-4. StarTrans HD44

[44] http://www.goshencoach.com

Staging

Several options for staging transit in Georgetown were considered. Georgetown offers the benefit of proximity to Interstate 70 and more developed parking lots. However, lots are owned by multiple owners (not USFS) and USFS would need to either purchase and develop a lot (or lots) or enter into a use agreement with its owner. The legal and financial implications for either option could vary considerably.

The staging area would need to hold approximately 130 vehicles. The nature of transit riders coming in the morning and leaving in the afternoon, combined with the average length of stay, means that sharing parking spaces between early and late hikers would not be feasible.

The locations in Table *7-28* were considered as *preliminary* options for staging. Likely more than one of these would have to be utilized to arrive at sufficient capacity. To date, the owners of these lots have not been contacted nor have assessments of the current status of each lot during peak summer days been completed.

Table 7-28. Preliminary Options for GP Scenario 1 Staging

Location	Capacity	Notes
Gateway Visitor Center	TBD	May be full on weekends
County government annex lot	TBD	Potential to use gravel overflow lot
Town hall lot	TBD	Unlined parking, both parallel and standard stalls
Gravel lot near reservoir	TBD	Need to check on status

Operations and Maintenance Assumptions[45]

The following cost assumptions in Table 7-29 allowed for the calculation of seasonal operations and maintenance costs. All costs are from the Volpe Bus Lifecycle Cost Model and updated to 2015.

Table 7-29. Assumptions Driving Costs in GP Scenario 1

Transit Element	Cost Assumption
Driver hourly wage	$30
Fuel cost per gallon	$3.50
Maintenance cost per mile (based on good condition of Guanella Pass Road)	$1.00
Fueling station and maintenance facility	$0.00 (Assume USFS uses existing stations/facility and does not construct new ones exclusively for transit)

Cost Estimates

The transit-supportive infrastructure includes bus shelters at Georgetown (2) and the Mount Bierstadt Trailhead (3). Additionally, benches are needed at each stop. The total cost for shelters

[45] All cost references cited in Bus Lifecycle Cost Model (http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling).

and benches is $160,000.[46] Other general start-up costs include marketing, installation, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1.

Table 7-30 and Table 7-31 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases five 28-passenger shuttles. These can be shared with other sites or used offsite during the remainder of the year when not in use at GP. These tables also calculate an annual maintenance cost, which assume a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-30. Capital Cost for Vehicle Purchase in GP Scenario 1

Vehicle	Quantity	Cost per Unit	Total
28-passenger shuttle bus	5	$100,000	$500,000

Table 7-31. Total and Per-Passenger Costs with Vehicle Purchase in GP Scenario 1

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$93,060	$6.42
Year One Capital Costs	$680,000	$46.93
Costs Per Season (2-12, cumulative)	$1,227,650	$7.70
Total	$2,000,710	$11.51

USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for 16-25 passenger vehicles. GSA offers a short-term lease in which the federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[47] GSA short-term lease rates for vehicles of this size are $4,357 per month, with an estimate cost per season of $13,071. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These costs include fuel and drivers only, at a cost of $64,960 per year. Table 7-32 shows the total costs and per-passenger costs with a lease option.

[46] Bench and bus shelter costs: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=2
[47] GSA also has leasing options that commit the leaser to a 7 year or 100,000 mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance.
GSA does not offer rates for 28 passenger vehicles. The cost estimate assumes that a similar schedule, service frequency, and operating costs would hold true for 25 passenger vehicles. However, the transit operator would need to make some adjustments, which may affect schedule and costs, to accommodate transit demand during a few peak periods.

Table 7-32. Total and Per-Passenger Costs with Vehicle Lease in GP Scenario 1

25-passenger vehicles	Quantity	Cost per Month	Cost per Season	Total Capital[48]	Capital Per Passenger	Total O&M (Fuel & Driver)	Total Per Passenger
One Season	5	$4,357	$13,071	$65,355	$5.27	$64,960	$8.99

The total cost per passenger is less for leasing than purchasing a vehicle. In both cases, capital costs account for approximately half of the total cost.

With a relatively large number of passengers using this transit service (414 passengers) and a long transit route, there are more vehicles required which raises the cost per passenger. Capital investment from the USFS (or another funding source) for vehicles and infrastructure could help reduce the cost per passenger.

Scenario 2: Hiker Shuttle from New Lot on Guanella Pass Road to Guanella Pass

This section describes the process of planning for the capital and operational elements of transit service from a staging area on Guanella Pass Road to Guanella Pass. This includes the route description, ridership demand, service frequency, capital elements, and costs.

Route

The route would start and end at the new staging lot, making an out-and-back drive to GP. The shuttle would also cater to hikers, with the same arrival and departure patterns described in Scenario 1. Similar to Scenario 1, there would be no planned stops other than GP, but hikers could make a reservation or request for pick-up and drop-off at a campground (depending on where the staging area is located). Because additional stops would be rare, they are not included in the time estimates listed in Table 7-33.[49] Similarly, shuttles would be mostly full only in one direction.

The staging area is not yet determined (see Staging), but for planning purposes, a staging lot near the Clear Lake parking area is used for distance and time estimates.

[48] Capital costs should also include $180,000 for benches, shelters, and start-up costs. These will remain the same regardless of lease or purchase of vehicles. For calculation purposes, they are not included in Table 33. If this cost were aggregated over 12 seasons and added to the lease capital cost, the capital cost per passenger would be $5.55 and the total cost (capital, operations, and maintenance) would be $10.03.

[49] It is possible that after transit service is established, there may be increased demand from hikers staying at one of the campgrounds. This may result in slight schedule adjustments but should not significantly alter the overall levels of service or cost estimates included in this analysis for planning purposes. Overall, USFS and the transit provider would need to adjust transit service based on demand after one or two seasons.

Table 7-33. Mileage and Driving Time between Stops for GP Scenario 2

Route Segment	Mileage	Driving Time
Clear Lake Staging Area to Trailhead	5 miles	13 minutes
Round-Trip Totals	10 miles	26 minutes (driving)
		36 minutes (with stops)[50]

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was estimated based on current traffic volumes and results from the visitor survey[51].

According to the visitors that responded to the survey, 68% of visitors (see *Chapter 2: Guanella Pass Summary of Data and Findings* for visitor survey results) would elect to take transit from a lot near the trailhead (up to 15 minutes) *if this were their only option to visit GP* because parking conditions prevented them from driving their private vehicles. (The assumption is that the remaining 32% of visitors would not visit GP during times that these parking conditions exist.) The estimate is also coupled with the addition of parking restrictions and management. To translate to ridership volumes, hourly traffic volumes on a 95th percentile design day coupled with available parking and likely duration of stay to arrive at a number of visitors *per hour* that would otherwise have to park in undesignated roadside parking if they were to enter GP in their private vehicle were used.

The resulting estimate is 687 passengers per day. Most passengers would arrive between 6 a.m. and 9 a.m., with departures spaced more regularly throughout the early afternoon and tapering off by late afternoon/evening.

Service Hours and Frequency

Service hours and frequency is based on ridership demand, passenger safety, and feasibility. As with GP Scenario 1, parking demand begins to exceed capacity in the Lower Lot starting around 6 a.m. and in the Upper Lot by 9 a.m. Therefore, transit service will begin at 9 a.m. The demand for return service to the staging area (calculated based on data from departing vehicles and visitor survey data on length of hike) is the same as GP Scenario 1 (peak demand to GP is from 6 a.m. to 9 a.m. and peak demand from GP is from 12 p.m. to 3 p.m., with service extending until 7 p.m.).

A system with maximum headways of 20 minutes was designed, although headways are as frequent as 10 minutes during the morning peak. (See Service Hours and Frequency in GP Scenario 1 for more information on headways). See Table 7-34 for a summary schedule of shuttle service for GP Scenario 2, as well as the vehicle assigned to each trip. The schedule allows significant flexibility for the fifth vehicle to be available for extra trips in case of an emergency.

This service schedule would call for 49 round trips daily and 5 shuttle buses. The fifth shuttle bus is only needed during peak hours (approximately 7 a.m. through 2 p.m.) but it may help with

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[50] The total time for each route includes 5 minutes loading (either at staging area or at Guanella Pass) and 5 minutes unloading.

[51] Traffic volume and survey data for GP are reported in *Chapter 2: Guanella Pass Summary of Data Findings.*

emergency runs if needed. There would be an average of 14 passengers per trip, although most trips between 6 a.m. and 9 a.m. would operate at or near capacity.

Table 7-34. Schedule of Shuttle Runs for GP Scenario 2

Departure (Staging)	Arrival (Pass)	Arrival (Staging)	Vehicle #
6:00 AM	6:18 AM	6:36 AM	1
6:20 AM	6:38 AM	6:56 AM	2
6:40 AM	6:58 AM	7:16 AM	3
7:00 AM	7:18 AM	7:36 AM	1
7:10 AM	7:28 AM	7:46 AM	2
7:20 AM	7:38 AM	7:56 AM	4
7:30 AM	7:48 AM	8:06 AM	5
7:40 AM	7:58 AM	8:16 AM	3
7:50 AM	8:08 AM	8:26 AM	1
8:00 AM	8:18 AM	8:36 AM	2
8:15 AM	8:33 AM	8:51 AM	4
8:30 AM	8:48 AM	9:06 AM	5
8:45 AM	9:03 AM	9:21 AM	3
9:00 AM	9:18 AM	9:36 AM	1
9:15 AM	9:33 AM	9:51 AM	2
9:30 AM	9:48 AM	10:06 AM	3
9:45 AM	10:03 AM	10:21 AM	4
10:00 AM	10:18 AM	10:36 AM	5
10:20 AM	10:38 AM	10:56 AM	1
10:40 AM	10:58 AM	11:16 AM	2
11:00 AM	11:18 AM	11:36 AM	3
11:20 AM	11:38 AM	11:56 AM	4
11:40 AM	11:58 AM	12:16 PM	5
12:00 PM	12:18 PM	12:36 PM	1
12:15 PM	12:33 PM	12:51 PM	2
12:30 PM	12:48 PM	1:06 PM	3
12:45 PM	1:03 PM	1:21 PM	4
1:00 PM	1:18 PM	1:36 PM	5
1:15 PM	1:33 PM	1:51 PM	1
1:30 PM	1:48 PM	2:06 PM	2
1:45 PM	2:03 PM	2:21 PM	3
2:00 PM	2:18 PM	2:36 PM	4
2:15 PM	2:33 PM	2:51 PM	1
2:30 PM	2:48 PM	3:06 PM	2
2:45 PM	3:03 PM	3:21 PM	3
3:00 PM	3:18 PM	3:36 PM	4

Departure (Staging)	Arrival (Pass)	Arrival (Staging)	Vehicle #
3:15 PM	3:33 PM	3:51 PM	1
3:30 PM	3:48 PM	4:06 PM	2
3:45 PM	4:03 PM	4:21 PM	3
4:00 PM	4:18 PM	4:36 PM	4
4:20 PM	4:38 PM	4:56 PM	1
4:40 PM	4:58 PM	5:16 PM	2
5:00 PM	5:18 PM	5:36 PM	3
5:20 PM	5:38 PM	5:56 PM	4
5:40 PM	5:58 PM	6:16 PM	1
6:00 PM	6:18 PM	6:36 PM	2
6:20 PM	6:38 PM	6:56 PM	3
6:40 PM	6:58 PM	7:16 PM	4
7:00 PM	7:18 PM	7:36 PM	1

Vehicle Selection

Ridership demand estimates show that demand for the shuttle would fluctuate between 50 and 170 passengers per hour *to* the Pass. Due to the high number of passengers per trip during peak hours (6 a.m. to 9 a.m. and 12 p.m. to 3 p.m.), 28 passenger vehicles were selected. The vehicle would be the same as in Scenario 1.

Staging

Several options for staging transit on Guanella Pass Road were considered. Many sites are constrained by steep slopes, sensitive habitat, and/or existing recreational use. Much of the land is owned by USFS, which would make it easier to develop a lot (or lots).

The staging area would need to hold between 250 and 275 vehicles. The nature of transit riders coming in the morning and leaving in the afternoon, combined with the average length of stay, means that sharing of parking spaces for early and late hikers is not feasible. This represents an area of approximately 2 acres devoted to parking and loading. *Locating and acquiring use of such a site near Guanella Pass Road represents a significant constraint in transit planning.*

Locations in Table 7-35 were considered as *preliminary* options for staging. These are meant to help the Forest Service examine feasibility of developing permanent or temporary staging areas at these locations. Costs of developing or expanding lots are not calculated.

Table 7-35: Preliminary Options for GP Scenario 2 Staging

Location	Ownership	Notes
Ski area near Duck Lake	USFS	Plans to develop into campground
Clear Lake Recreation Area	USFS	The 30 spaces currently at Clear Lake frequently fill with anglers
Xcel Energy Amenity Areas	USFS (but under agreement for use by Xcel Energy)	Limited capacity, further from Trailhead
Campgrounds	USFS	Would need to add significant amounts of parking

Operations and Maintenance Assumptions[52]

All operations and maintenance assumptions are the same as GP Scenario 1.

Cost Estimates

The transit-supportive infrastructure includes bus shelters at the staging area (3) and the Mount Bierstadt Trailhead (4). Additionally, benches are needed at each stop. The total cost for shelters and benches is $220,000.[53] Other general start-up costs include marketing, installation, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1.

Table 7-36 and Table 7-37 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases five 28-passenger shuttles. These can be shared with other sites or used offsite during the remainder of the year when not in use at GP. These tables also calculate an annual maintenance cost, which assume a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-36. Capital Cost for Vehicle Purchase in GP Scenario 2

Vehicle	Quantity	Cost per Unit	Total
28-passenger shuttle bus	5	$100,000	$500,000

Table 7-37. Total and Per-Passenger Costs with Vehicle Purchase in GP Scenario 2

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$53,020	$2.21
Year One Capital Costs	$740,000	$30.78
Costs Per Season (2-12, cumulative)	$699,441	$2.64
Total	$1,492,461	$5.17

USFS may also elect to lease vehicles, especially for a pilot test. The least options and prices are the same as those described in GP Scenario 1. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These

52 All cost references cited in Bus Lifecycle Cost Model (http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling).
53 Bench and bus shelter costs: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=2

costs include fuel and drivers only, at a cost of $39,445 per year. Table 7-38 shows the total costs and per-passenger costs with a lease option.

Table 7-38. Total and Per-Passenger Costs with Vehicle Lease in GP Scenario 1

25-passenger vehicles	Quantity	Cost per Month	Cost per Season	Total Capital[54]	Capital Per Passenger	Total O&M (Fuel & Driver)	Total Per Passenger
One Season	5	$4,357	$13,071	$65,355	$2.72	$39,445	$4.36

The total cost per passenger is less for leasing than for purchasing a vehicle.

GP Scenario 2 has a very low per-passenger cost, due to the high number of passengers and the low mileage and time of the transit route. However, these costs would likely be augmented significantly by costs to build a staging area that could accommodate up to 275 vehicles.

Scenario 3: Mandatory Hiker Shuttle from Georgetown to Guanella Pass

This section describes the process of planning for the capital and operational elements of transit service from Georgetown to Guanella Pass, as part of a mandatory transit system for hikers on Mount Bierstadt. The section includes the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs.

Route

The route would start and end at Georgetown, making an out-and-back drive to Guanella Pass. The shuttle would be the only transportation option for hikers to access the Mount Bierstadt trailhead. Hikers would park at designated lots in Georgetown and would not make any additional stops along Guanella Pass Road except for at the trailhead. Most shuttles would carry passengers in one direction only (from Georgetown to the Pass in the morning and from the Pass to Georgetown in the afternoon), and some of the midday shuttles would carry passengers in both directions. See route description and mileage.

Table 7-39 for route description and mileage.

[54] Capital costs should also include $240,000 for benches, shelters, and start-up costs. These will remain the same regardless of lease or purchase of vehicles. For calculation purposes, they are not included in Table 7-38. If this cost were aggregated over 12 seasons and added to the lease capital cost, the capital cost per passenger would be $3.54 and the total cost (capital, operations, and maintenance) would be $5.19.

Table 7-39. Mileage and Driving Time between Stops for GP Scenario 3

Route Segment	Mileage	Driving Time
Georgetown Staging Area to Guanella Pass Trailhead	11 miles	28 minutes
Round-Trip Totals	22 miles	56 minutes (driving) 76 minutes (with stops)[55]

Ridership Demand

As opposed to using visitation and ridership demands calculated through visitor surveys and traffic counts, Scenario 3 relies on a high-level estimate of "sustainable" weekend and weekend daily hiker volumes on Mount Bierstadt Trail. These estimates are based on visitor survey data using photo simulations in which the survey asks visitors to respond if they "would feel crowded if you were on the summit of Mount Bierstadt with the number of people depicted" in a series of simulated photos. Based on these responses, the USFS determined that an appropriate weekend use level could be the point at which 50% of visitors think that there are too many people on the summit. This level corresponded to 400 hikers per day. Since the current weekday use level is 200 hikers per day, the USFS proposed holding that number constant so as not to shift visitation increases to weekdays. **The resulting visitation levels are 400 hikers on weekend days and 200 hikers on weekdays.**

Service Hours and Frequency

Service hours and frequency are based on ridership demand, passenger safety, and feasibility. Since all hikers will be required to take the shuttle, USFS can more easily set hours of transit that are based on the most popular times for hiking. The proposed operating hours are 6 a.m. to 5 p.m. These hours correspond with peak hiking hours and allow hikers up to 11 hours to complete their hike.

The transit vehicles would run approximately every 15 minutes from 6 a.m. through 2 p.m., which corresponds with anticipated peak levels of use both to the trailhead and from the trailhead (based on visitor survey and traffic count data). Headways then taper off to 30-minute frequency from 2 p.m. through 5 p.m. Exact headways could be adjusted to accommodate hiker demand and visitor safety. See Table 7-40 for a summary schedule of shuttle service for GP Scenario 3, as well as the vehicle assigned to each trip. The schedule allows for some flexibility for a vehicle to be available for extra trips in case of an emergency. For weekdays, transit service would operate at approximately 30 minute frequencies throughout the day. The USFS and/or transit operator could determine if higher or lower levels of service would be desirable based on hiker's willingness to schedule their arrivals and safety of hikers upon finishing the hike.

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[55] The total time for each route includes 5 minutes loading (either at Georgetown or at Guanella Pass) and 5 minutes unloading.

Table 7-40. Schedule of Shuttle Runs for GP Scenario 3

Departure (Staging)	Arrival (Pass)	Arrival (Staging)	Vehicle #
6:00 AM*	6:38 AM	7:06 AM	1
6:15 AM	6:53 AM	7:21 AM	2
6:30 AM*	7:08 AM	7:36 AM	3
6:45 AM	7:23 AM	7:51 AM	4
7:00 AM*	7:38 AM	8:06 AM	5
7:15 AM	7:53 AM	8:21 AM	1
7:30 AM*	8:08 AM	8:36 AM	2
7:45 AM	8:23 AM	8:51 AM	3
8:00 AM*	8:38 AM	9:06 AM	4
8:15 AM	8:53 AM	9:21 AM	5
8:30 AM*	9:08 AM	9:36 AM	1
8:45 AM	9:23 AM	9:51 AM	2
9:00 AM*	9:38 AM	10:06 AM	3
9:15 AM	9:53 AM	10:21 AM	4
9:30 AM*	10:08 AM	10:36 AM	5
9:45 AM	10:23 AM	10:51 AM	1
10:00 AM*	10:38 AM	11:06 AM	2
10:30 AM	11:08 AM	11:36 AM	3
11:00 AM*	11:38 AM	12:06 PM	4
11:15 AM	11:57 AM	12:39 PM	5
11:30 AM*	12:12 PM	12:54 PM	1
11:45 AM	12:27 PM	1:09 PM	2
12:00 PM*	12:42 PM	1:24 PM	3
12:15 PM	12:57 PM	1:39 PM	4
12:30 PM*	1:12 PM	1:54 PM	5
12:45 PM	1:27 PM	2:09 PM	1
1:00 PM*	1:42 PM	2:24 PM	2
1:15 PM	1:57 PM	2:39 PM	3
1:30 PM*	2:12 PM	2:54 PM	4
1:45 PM	2:27 PM	3:09 PM	5
2:00 PM*	2:42 PM	3:24 PM	1
2:30 PM*	3:12 PM	3:54 PM	2
3:00 PM*	3:42 PM	4:24 PM	3
3:30 PM*	4:12 PM	4:54 PM	4
4:00 PM*	4:42 PM	5:24 PM	5
4:30 PM*	5:12 PM	5:54 PM	1

Runs marked with an asterisk (*) would also run on weekdays. The weekend service schedule would call for 36 round trips daily and 5 shuttle buses. There would be an average of 24 passengers per trip *to* GP and an average of 21 passengers per trip *from* GP on weekends. Weekday shuttles would have 21 round trips, require 3 vehicles, and have an average of 11 passengers per trip.

Vehicle Selection

Ridership demand estimates show that demand for the shuttle would fluctuate between 55 and 120 passengers per hour *to* GP on weekends (or 30 to 60 passengers per hour on weekdays). Due to the high ridership levels and concentration of use (see Service Hours and Frequency), 28 passenger vehicles were selected.

One potential option (used for cost estimate purposes) is the light-duty StarTrans Senator HD (2014; Figure 7-4). The StarTrans Senator HD base model can be modified with options to improve performance on steep grade roadways. With these options and a wheelchair lift, the vehicle will cost approximately $100,000, with a total vehicle cost of $500,000 for five vehicles.

Staging

Staging considerations for Scenario 3 are similar to those in Scenario 1. However, USFS would need to identify vehicle parking for weekdays as well as weekends (approximately 80 vehicles on weekdays and 160 vehicles on weekends). As with Scenario 1, hiking patterns and a long average length of stay means that sharing parking spaces between early and late hikers would not be feasible. See Table *7-28* for staging options in Georgetown.

Operations and Maintenance Assumptions[56]

The following cost assumptions in Table 7-41 allowed for the calculation of seasonal operations and maintenance costs. All costs are from the Volpe Bus Lifecycle Cost Model and updated to 2015.

Table 7-41. Assumptions Driving Costs in GP Scenario 3

Transit Element	Cost Assumption
Driver hourly wage	$30
Fuel cost per gallon	$3.50
Maintenance cost per mile (based on good condition of Guanella Pass Road)	$1.00
Fueling station and maintenance facility	$0.00 (Assume USFS uses existing stations/facility and does not construct new ones exclusively for transit)

Cost Estimates

The transit-supportive infrastructure includes bus shelters at Georgetown (2) and the Mount Bierstadt Trailhead (3). Additionally, benches are needed at each stop. The total cost for shelters

[56] All cost references cited in Bus Lifecycle Cost Model (http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling).

and benches is $160,000.[57] Other general start-up costs include marketing, installation, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1.

Table 7-42 and Table 7-43 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases five 28-passenger shuttles. These shuttles can be shared with other sites or used offsite during the remainder of the year when not in use at GP. These tables also calculate an annual maintenance cost, which assumes a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-42. Capital Cost for Vehicle Purchase in GP Scenario 1

Vehicle	Quantity	Cost per Unit	Total
28-passenger shuttle bus	5	$100,000	$500,000

Table 7-43. Total and Per-Passenger Costs with Vehicle Purchase in GP Scenario 1

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$150,525	$5.38
Year One Capital Costs	$680,000	$24.29
Costs Per Season (2-12, cumulative)	$1,985,730	$6.45
Total	$2,816,255	$8.38

USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for 16-25 passenger vehicles. GSA offers a short-term lease in which the federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[58] GSA short-term lease rates for vehicles of this size are $4,357 per month, with an estimate cost per season of $13,071. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These costs include fuel and drivers only, at a cost of $116,435 per year. Table 7-44 shows the total costs and per-passenger costs with a lease option.

Table 7-44. Total and Per-Passenger Costs with Vehicle Lease in GP Scenario 3

25-passenger vehicles	Quantity	Cost per Month	Cost per Season	Total Capital	Capital Per Passenger	Total O&M (Fuel & Driver)	Total Per Passenger
One Season	5	$4,357	$13,071	$65,355	$5.27	$116,435	$6.49

[57] Bench and bus shelter costs: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=2

[58] GSA also has leasing options that commit the leaser to a 7 year or 100,000-mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance. **GSA does not offer rates for 28 passenger vehicles**. The cost estimate assumes that a similar schedule, service frequency, and operating costs would hold true for 25 passenger vehicles. However, the transit operator would need to make some adjustments, which may affect schedule and costs, to accommodate transit demand during a few peak periods.

The total cost per passenger is less expensive for the lease option. In both cases, capital costs account for approximately one-third of the total cost.

Relative to Scenario 1, which is similar in route and service frequency, the operations costs are higher in Scenario 3 due to the weekday service addition. However, the cost per passenger is less in Scenario 3 since there are many more visitors using the transit service.

MERA Transit Feasibility Analysis

The MERA is located approximately 70 miles southwest of the Denver metropolitan area and 28 miles southwest of Idaho Springs, Colorado. MERA is within both the ARNF and the Pike National Forest (PNF). The Mount Evans Highway runs 14 miles from a USFS Welcome Station to the summit of Mount Evans. At 14,264 feet, the Mount Evans Highway is the highest-elevation paved road in North America. Mount Evans Highway is open from approximately Memorial Day through early October, with the Summit closing after Labor Day. Approximately 120,000 visitors recreate in MERA annually, concentrated between May and October, and visitation is further concentrated at the Summit Lake Park and the Mount Evans summit parking lot.

The heavy, concentrated visitation leads to several transportation challenges. As summarized in *Chapter 4: Need Identification by Site*, these include:

- Unendorsed roadside parking, causing resource impacts and visitor safety risks.
- Traffic congestion near Summit Lake and the Mount Evans summit.
- Conflicts between bicyclists and motor vehicles.
- Extreme crowding on the summit during peak periods.
- Traffic congestion at the entrance to MERA during peak periods.
- Steep, narrow, scenic yet deteriorating roadway causes driver safety risks.

Relevant Constraints and Needs

MERA's primary challenge that may be addressed through transit is the significant traffic congestion along Mount Evans Highway and at parking lots at Mount Goliath Natural Area, Summit Lake, and the Mount Evans Summit. Additionally, roadway conditions are deteriorating, primarily due to sloughing along stretches of the highway. Congestion results in frequent parking in undesignated spaces or along roadsides, impacts to roadside vegetation, and significant risks to visitor safety. It was envisioned that transit components may be effective in replacing vehicles on Mount Evans Highway with transit shuttles, thus allowing similar visitation levels with significant reductions in traffic volumes and parking demand. Reducing traffic volumes would have the added benefit of reducing the risk to visitors of driving on the degraded roadway and reducing the net impact of vehicles on the already-poor road.

The following constraints at Mount Evans were recognized to affect if and what types of transit systems would be feasible and how to design transit that would best address the site's challenges:

1. **Vehicle length**. The maximum vehicle length on Mount Evans Highway is 30 feet due to the sharp curves and steep grade of the road. Transit capacity would be limited to vehicles of this length with a maximum of 28 passengers per vehicle.
2. **Short season**. Mount Evans Road is typically closed from after Labor Day through before Memorial Day. Since congestion and safety risks are greatest on weekends and holidays, the operating season for transit would be only 35 days.
3. **Limited staging**. By nature of its location, Mount Evans has limited nearby spaces to stage transit (or construct a new parking lot to hold the vehicles of transit passengers, as well as a loading/unloading area and necessary passenger facilities). Idaho Springs similarly lacks a large, unified staging area but may have more capacity in dispersed lots.
4. **Peak hours and storms.** The peak hours of use at MERA also correspond with summer thunderstorms. Transit headways and other operational parameters would need to balance visitor safety during storm events, demand for transit, and crowd control.
5. **Coupling with parking enforcement needed**. Most visitors (90%) responding to the survey would prefer to drive their personal vehicle in MERA, but some percentage of visitors responded that they would be willing to take a shuttle to visit MERA "if this was their only option for visiting because parking lots were full."[59] Therefore, there would need to be some parking enforcement or another method to control visitor entry based on total traffic volume on Mount Evans Highway in place to compel visitors to use transit. Absent such enforcement, ridership would be too low to be feasible to operate. Additionally, charging a fee for the shuttle (even as low as $1 per person) may have a significant impact on ridership, even with such enforcement in place.

Proposed Transit Scenarios

Through meetings with USFS staff, stakeholders, and the public, the following transit scenarios were developed to address parking congestion and resource management needs at MERA. Each of these scenarios assumes that, and is dependent upon, the USFS enforcing parking in designated parking lots only along the highway.

1. **Shuttle Service from Idaho Springs to MERA**
   Shuttle buses would operate between a designated park-and-ride lot in Idaho Springs, Colorado, and the summit of Mount Evans, with en route shuttle stops at Echo Lake, Echo Lake Campground, Mount Goliath Natural Area, and Summit Lake. Hours of operation would correspond with peak hours of visitor use at MERA and include contingency operating plans for managing surges in ridership demand in the event of thunderstorms. Shuttle service would operate according to ridership demand coupled with parking enforcement along Mount Evans Highway.
2. **Shuttle Service from New Staging Area Near Welcome Station to MERA**

[59] Technical Memo 3.8, Figure 21 (page 25) and Figure 26 (page 30)

Shuttle buses would operate between a newly constructed park-and-ride lot in the vicinity of the MERA Welcome Station and the summit of Mount Evans with en route shuttle stops at Echo Lake Campground, Mount Goliath Natural Area, and Summit Lake. Hours of operation would correspond with peak hours of visitor use at MERA and include contingency operating plans for managing surges in ridership demand in the event of thunderstorms. Shuttle service would be operated according to ridership demand coupled with parking enforcement along Mount Evans Highway.

Figure 7-5 illustrates these Mount Evans Scenarios. Table 7-45 provides a summary of the operations and costs of each of the scenarios and the following sections contain details for each scenario. Note that costs to own are averaged over twelve years. MERA Scenario 2 is the more cost efficient option on a per-passenger basis, but the total ownership and lease costs are similar between the two scenarios.

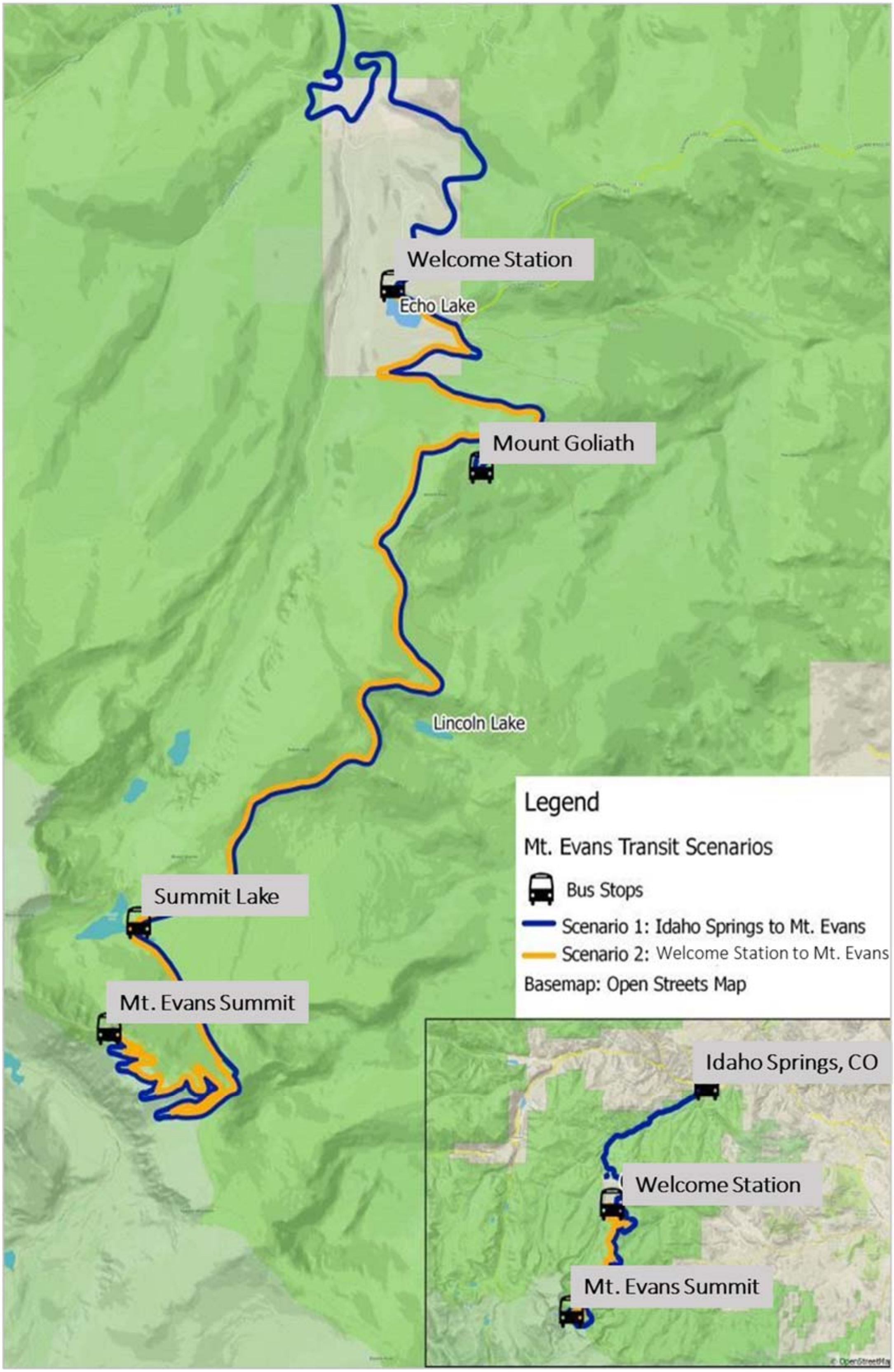

Figure 7-5. Mount Evans Scenarios

Table 7-45. MERA Scenarios Operations and Costs Summary

	Scenario 1	Scenario 2
Travel Time (Round-trip)	160 minutes	108 minutes
Distance (Round-trip)	55 miles	30 miles
Hours of Operation	10am to 7pm	10am to 8pm
Frequency of Service	20 minutes	12-15 minutes
Vehicles Required	9	10
Passengers/Day	211	552
Cost to Own/Year	$245,954	$269,888
Cost to Own/Year/Rider	$33.30	$13.82
Cost to Lease/Year	$111,012	$112,432
Cost to Lease/Year/Rider	$29.19-$31.38	$11.91-$12.68

Scenario 1: Shuttle Service from Idaho Springs to MERA

This section describes the process of planning for the capital and operational elements of transit service from Idaho Springs to MERA. This includes the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs.

Route

The route would start and end at Idaho Springs, making an out-and-back drive to the Mount Evans Summit and stopping in both directions at the Welcome Station, Mount Goliath Natural Area, and Summit Lake. Table 7-46 presents the mileage and driving times between stops for this scenario.

Table 7-46. Mileage and Driving Time between Stops for MERA Scenario 1

Route Segment	Mileage	Driving Time
Idaho Springs Staging Area to Welcome Station	13 miles	21 minutes
Welcome Station to Mount Goliath	3 miles	8 minutes
Mount Goliath to Summit Lake	6.2 miles	15 minutes
Summit Lake to Mount Evans Summit	5.4 miles	15 minutes
Round-Trip Totals	55 miles	118 minutes (driving)
		160 minutes (with stops)[60]

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was estimated based on current traffic volumes and results from the visitor survey[61].

[60] The total time for each route includes 5 minutes loading and unloading in Idaho Springs, 3 minute stops at Summit Lake and Mount Goliath in both directions, a 5 minute stop at Welcome Station in both directions, a 10 minute stop at Mount Evans Summit, and 59 minutes run time each way.

[61] Traffic volume and survey data for MERA are reported in *Chapter 3: Mount Evans Recreation Area Summary of Data Findings.*

According to the visitors that responded to the survey, 23% of visitors (see *Chapter 3: Mount Evans Recreation Area Summary of Data and Findings* for visitor survey results) would elect to take transit from up to one hour away from MERA if parking conditions prevented them from driving their private vehicles to MERA. (The assumption is that the remaining 77% of visitors would not visit MERA during times that these parking conditions exist.) To translate to ridership volumes, the hourly traffic volumes on a 90th percentile design day (approximately 1,000 vehicles per day) coupled with available parking and likely duration of stay to arrive at a number of visitors *per hour* that would otherwise have to park in undesignated roadside parking if they were to enter MERA in their private vehicle were used.

The resulting estimate is 211 passengers per day. Most passengers would arrive between 10 a.m. and 2 p.m., and the greatest volume of visitors would be between 12 p.m. and 1 p.m.

Service Hours and Frequency

Service hours and frequency is based on ridership demand, passenger safety, and feasibility.

Traffic volumes and parking lot counts show that parking demand begins to exceed capacity in some lots starting around 9 a.m. However, the need for additional capacity at 9 a.m. is very low and picks up significantly at 10 a.m. For feasibility of transit operations, transit service should begin at 10:00 a.m.

Baseline parking accumulation data (reported in detail in *Chapter 3: Mount Evans Recreation Area Summary of Data and Findings*) show the distribution of lengths of stay among visitor groups to MERA. Using these data, the hourly desired departure times relative to hourly parking demand were estimated based on arrival times. The resulting volumes show that the greatest demand for transit (in both directions) would occur between 12 p.m. and 5 p.m., but transit demand would remain steady through 7 p.m.

A system with maximum headways of 20 minutes was designed to balance convenience and visitor safety with financial and operational feasibility.[62] The system would operate every 20 minutes from 10 a.m. through 8:00 p.m. (with the last shuttle leaving the Mount Evans Summit parking lot at 6:40 p.m.). Table 7-47 provides a summary schedule of shuttle service for Scenario 1, as well as the vehicle assigned to each trip.

This service schedule would call for 23 round trips daily and 9 shuttle buses. There would be an average of 9 passengers per trip throughout the day, but during peak periods (12 – 5 PM), the average would be much higher.

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[62] The 20 minute figure is based on previous transit surveys conducted at Marsh-Billings Rockefeller NHP and Muir Woods National Monument. Also, a Center for Urban Transportation Research (University of South Florida) study suggests a maximum wait time of 30 minutes is acceptable for urban transit systems, and the study team estimates that a slightly shorter headway seems appropriate in the recreation context (CUTR study available at http://www.nctr.usf.edu/pdf/77720.pdf)

Table 7-47. Schedule of Shuttle Runs for MERA Scenario 1

Departure (Staging)	Arrival (Summit)	Arrival (Staging)	Vehicle #
10:00 AM	11:20 AM	12:40 PM	1
10:20 AM	11:40 AM	1:00 PM	2
10:40 AM	12:00 PM	1:20 PM	3
11:00 AM	12:20 PM	1:40 PM	4
11:20 AM	12:40 PM	2:00 PM	5
11:40 AM	1:00 PM	2:20 PM	6
12:00 PM	1:20 PM	2:40 PM	7
12:20 PM	1:40 PM	3:00 PM	8
12:40 PM	2:00 PM	3:20 PM	9
1:00 PM	2:20 PM	3:40 PM	1
1:20 PM	2:40 PM	4:00 PM	2
1:40 PM	3:00 PM	4:20 PM	3
2:00 PM	3:20 PM	4:40 PM	4
2:20 PM	3:40 PM	5:00 PM	5
2:40 PM	4:00 PM	5:20 PM	6
3:00 PM	4:20 PM	5:40 PM	7
3:20 PM	4:40 PM	6:00 PM	8
3:40 PM	5:00 PM	6:20 PM	9
4:00 PM	5:20 PM	6:40 PM	1
4:20 PM	5:40 PM	7:00 PM	2
4:40 PM	6:00 PM	7:20 PM	3
5:00 PM	6:20 PM	7:40 PM	4
5:20 PM	6:40 PM	8:00 PM	5

Bolded runs would not pick up visitors in Idaho Springs such that the last “new” transit visitors arrive via the 3:40 PM shuttle.

Vehicle Selection

MERA is limited to 30-foot vehicles, and ridership demand estimates show that demand for the shuttle would fluctuate between 13 and 52 passengers per hour. In considering passenger safety and convenience, a 20 minute headway (see Service Hours and Frequency) was instituted, and with three trips per hour, transit service can meet demand with 20 passenger vehicles (rather than 28 passenger vehicles). Using smaller vehicles will save some money on upfront capital costs, have less of an impact on the roadway, and allow for slightly more flexibility in vehicle maneuvering and storage.

GSA AutoChoice lists several options for 20-passenger, light-duty shuttle buses that would meet the needs for MERA transit service. Table 7-48 shows vehicle options and prices. A 20-passenger vehicle will likely cost around $90,000, with a total vehicle cost of $810,000 for nine vehicles.

Table 7-48. MERA Scenario 1 Potential Vehicles

Vehicle Model	Year	All-Wheel Drive	Price
Champbus Challenger Ford F550	2014	No	$86,895
StarTrans Senator HD Ford	2014	Available as option	$88,711
Goshen Coach GCII FD (Figure 7-6)	2014	Yes	$99,504

Figure 7-6. Champbus Challenger Ford F550[63]

Staging

Several options for staging transit in Idaho Springs were considered. Idaho Springs offers the benefit of proximity to Interstate 70 and more developed parking lots. However, parking lots are owned by multiple owners (not USFS) and USFS would need to either purchase and develop a lot (or lots) or enter into a use agreement with its owner. The legal and financial implications for either option could vary considerably.

The locations in Table 7-49 were considered as *preliminary* options for staging. To date, the owners of these lots have not been contacted nor have assessments of the current status of each lot during peak summer days been completed.

Table 7-49. Preliminary Options for MERA Scenario 1 Staging

Location	Capacity	Notes
Idaho Springs High School or school offices	60 lined spots, 45 lined spots in upper lot	
USFS Visitor Center	TBD	Usually fills on weekends; potential to expand lot with sale of adjacent property
Fairgrounds/rodeo along I-70	TBD	Currently used as storage for CDOT and may not be consistently available during summer weekends

[63]http://www.rohrerbus.com/bus-sales/choose-your-vehicle/commercial-buses/16-25-passenger-buses/champion-challenger/

Operations and Maintenance Assumptions[64]

The following cost assumptions in Table 7-50 allow for the calculation of seasonal operations and maintenance costs. All costs are from the Volpe Bus Lifecycle Cost Model and updated to 2015.

Table 7-50. Assumptions Driving Costs in MERA Scenario 1

Transit Element	Cost Assumption
Driver hourly wage	$30
Fuel cost per gallon	$3.50
Maintenance cost per mile (based on poor condition of Mount Evans Highway)	$1.50
Fueling station and maintenance facility	$0.00 (Assume USFS uses existing stations/facility and does not construct new ones exclusively for transit)

Cost Estimates

The transit-supportive infrastructure includes bus shelters at Idaho Springs (1), the Welcome Station (2), Summit Lake (1) and the Mount Evans Summit (2). No shelter is included at Mount Goliath because there is already a Nature Center. Additionally, benches are needed at each stop. The total cost for shelters and benches is $194,000.[65] Other general start-up costs include marketing, installation, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1.

Table 7-51 and Table 7-52 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases nine 20-passenger shuttles. These can be shared with other sites or used offsite during the remainder of the year when not in use at MERA. These tables also calculate an annual maintenance cost, which assume a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-51. Capital Cost for Vehicle Purchase in MERA Scenario 1

Vehicle	Quantity	Cost per Unit	Total
20-passenger shuttle bus	9	$90,000	$810,000

Table 7-52. Total and Per-Passenger Costs with Vehicle Purchase in MERA Scenario 1

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$135,812	$18.39
Year One Capital Costs	$1,024,000	$138.66
Costs Per Season (2-12, cumulative)	$1,791,643	$20.22
Total	$2,951,455	$33.30

USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for

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[64] All cost references cited in Bus Lifecycle Cost Model (http://www.volpe.dot.gov/transportation-planning/public-lands/department-interior-bus-and-ferry-lifecycle-cost-modeling).
[65] Bench and bus shelter costs: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=2

16-25 passenger vehicles. GSA offers a short-term lease in which the federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[66] GSA short-term lease rates for vehicles of this size are $4,357 per month, with an estimate cost per season of $13,071. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost is calculated separately. These costs include fuel and drivers only, at a cost of $97,941 per year. Table 7-53 shows the total costs and per-passenger costs with a lease option.

Table 7-53. Total and Per-Passenger Costs with Vehicle Lease in MERA Scenario 1

25-passenger vehicles	Quantity	Cost per Month	Cost per Season	Total Capital[67]	Capital Per Passenger	Total O&M (Fuel & Driver)	Total Per Passenger
One Season	9	$4,357	$13,071	$117,639	$15.93	$97,941	$29.19

The total cost per passenger is similar between the purchase and lease options, with the lease being slightly less expensive. In both cases, capital costs account for approximately half of the total cost.

Due to the relatively low number of passengers using this transit service (211 passengers represent less than 8 percent of the approximately 2,700 visitors on a 90th percentile day), the length of the service in terms of miles and minutes, and the high level of service needed for passenger safety and convenience, the cost per passenger is very high in both the purchase- and lease-scenarios. Implementation of this transit scenario would need capital investment from the USFS (or another funding source) for vehicles and infrastructure. This scenario would likely need a subsidy to cover the per-passenger operating cost or charge very high fees to passengers.

Scenario 2: Shuttle Service from Welcome Station to MERA

This section describes the process of planning for the capital and operational elements of transit service from the Welcome Station to MERA. This includes the route description, ridership demand, service frequency, capital elements (such as staging and vehicle selection), and costs.

Route

The route would start and end at Idaho Springs, making an out-and-back drive to the Mount Evans Summit and stopping in both directions at the Welcome Station, Mount Goliath Natural Area, and Summit Lake. Table 7-54 presents the mileage and driving times between stops for this scenario.

[66] GSA also has leasing options that commit the leaser to a 7 year or 100,000-mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance.

[67] Cost estimates should also include $194,000 for bus shelters, benches, and start-up costs for year one. These are calculated separately. However, if they were included in the least costs and aggregated over twelve years, the capital per passenger cost would be $18.12 in year one and the total per passenger cost would be $31.38.

Table 7-54. Mileage and Driving Time between Stops for MERA Scenario 2

Route Segment	Mileage	Driving Time
Welcome Station to Mount Goliath	3 miles	8 minutes
Mount Goliath to Summit Lake	6.2 miles	15 minutes
Summit Lake to Mount Evans Summit	5.4 miles	15 minutes
Round-Trip Totals	30 miles	76 minutes (driving) 108 minutes (with stops)[68]

Ridership Demand

To plan for appropriate service levels and capital investment, the demand for transit was estimated based on current traffic volumes and results from the visitor survey[69].

According to the visitors that responded to the survey, 60% of visitors (see *Chapter 3: Mount Evans Recreation Area Summary of Data and Findings* for visitor survey results) would be willing to take transit that originated near the MERA entrance station if parking conditions prevented them from driving their private vehicles to MERA. (The assumption is that the remaining 40% of visitors would not visit MERA during times that these parking conditions exist.) To translate to ridership volumes, hourly traffic volumes on a 90th percentile design day coupled with available parking and likely duration of stay to arrive at a number of visitors *per hour* that would otherwise have to park in undesignated roadside parking if they were to enter MERA in their private vehicle were used.

The resulting estimate is 552 passengers per day. Most passengers would arrive between 10 a.m. and 2 p.m., and the greatest volume of visitors would be between 12 p.m. and 1 p.m.

Service Hours and Frequency

Service hours and frequency is based on ridership demand, passenger safety, and feasibility. Traffic volumes and parking lot counts show that parking demand begins to exceed capacity in some lots starting around 9 a.m. However, the need for additional capacity at 9 a.m. is very low and picks up significantly at 10 a.m. For feasibility of transit operations, transit service should begin at 10:00 a.m.

Using the distribution of lengths of stay among visitor groups to MERA, the hourly desired departure times were estimated relative to hourly parking demand based on arrival times. The resulting volumes show that the greatest demand for transit (in both directions) would occur between 12 p.m. and 5 p.m., but transit demand would remain steady through 7:30 p.m.

A system with maximum headways of 20 minutes was designed to balance convenience and visitor safety with financial and operational feasibility.[70] However, due to high volumes of passenger

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[68] The total time for each route includes 5 minutes loading and unloading at the Welcome Station, 3 minute stops at Summit Lake and Mount Goliath in both directions, a 10 minute stop at Mount Evans Summit, and 38 minutes run time each way.
[69] Traffic volume and survey data for MERA are reported in *Chapter 3: Mount Evans Recreation Area Summary of Data Findings.*
[70] The 20 minute figure is based on previous transit surveys conducted at Marsh-Billings Rockefeller NHP and Muir Woods National Monument. Also, a Center for Urban Transportation Research (University of South Florida) study

demand throughout the day, but especially from 12 p.m. to 5 p.m., the maximum headways for Scenario 2 would be 15 minutes. From 12 p.m. to 4 p.m., shuttles would operate approximately every 12 minutes. The system would operate from 10 a.m. through 8:00 p.m. (with the last shuttle leaving the Mount Evans Summit parking lot around 7:00 p.m.). See Table 7-55 for a summary schedule of shuttle service for Scenario 2, as well as the vehicle assigned to each trip.

This service schedule would call for 37 round trips daily and 10 shuttle buses. There would be an average of 15 passengers per trip throughout the day, but during peak periods (12 – 4 PM), the average would be much higher and several shuttles would likely operate at capacity.

Table 7-55. Schedule of Shuttle Runs for MERA Scenario 2

Departure (Staging)	Arrival (Summit)	Arrival (Staging)	Vehicle #
10:00 AM	10:54 AM	11:48 AM	1
10:15 AM	11:09 AM	12:03 PM	2
10:30 AM	11:24 AM	12:18 PM	3
10:45 AM	11:39 AM	12:33 PM	4
11:00 AM	11:54 AM	12:48 PM	5
11:15 AM	12:09 PM	1:03 PM	6
11:30 AM	12:24 PM	1:18 PM	7
11:45 AM	12:39 PM	1:33 PM	8
12:00 PM	12:54 PM	1:48 PM	1
12:12 PM	1:06 PM	2:00 PM	2
12:24 PM	1:18 PM	2:12 PM	3
12:36 PM	1:30 PM	2:24 PM	4
12:48 PM	1:42 PM	2:36 PM	5
1:00 PM	1:54 PM	2:48 PM	6
1:12 PM	2:06 PM	3:00 PM	7
1:24 PM	2:18 PM	3:12 PM	8
1:36 PM	2:30 PM	3:24 PM	9
1:48 PM	2:42 PM	3:36 PM	10
2:00 PM	2:54 PM	3:48 PM	1
2:12 PM	3:06 PM	4:00 PM	2
2:24 PM	3:18 PM	4:12 PM	3
2:36 PM	3:30 PM	4:24 PM	4
2:48 PM	3:42 PM	4:36 PM	5
3:00 PM	3:54 PM	4:48 PM	6
3:12 PM	4:06 PM	5:00 PM	7
3:24 PM	4:18 PM	5:12 PM	8

suggests a maximum wait time of 30 minutes is acceptable for urban transit systems, and the study team estimates that a slightly shorter headway seems appropriate in the recreation context (CUTR study available at http://www.nctr.usf.edu/pdf/77720.pdf)

Departure (Staging)	Arrival (Summit)	Arrival (Staging)	Vehicle #
3:36 PM	4:30 PM	5:24 PM	9
3:48 PM	4:42 PM	5:36 PM	10
4:00 PM	4:54 PM	5:48 PM	1
4:15 PM	5:09 PM	6:03 PM	2
4:30 PM	5:24 PM	6:18 PM	3
4:45 PM	5:39 PM	6:33 PM	4
5:00 PM	5:54 PM	6:48 PM	5
5:15 PM	6:09 PM	7:03 PM	6
5:30 PM	6:24 PM	7:18 PM	7
5:45 PM	6:39 PM	7:33 PM	8
6:00 PM	6:54 PM	7:48 PM	9

Bolded runs would not pick up visitors at the Welcome Station such that the last "new" transit visitors arrive via the 4:15 PM shuttle.

Vehicle Selection

MERA is limited to 30-foot vehicles, and ridership demand estimates show that demand for the shuttle would fluctuate between 34 and 135 passengers per hour, with an average hourly demand of 92 passengers per hour). With a high hourly demand, a 28-passenger vehicle is the most appropriate in Scenario 2. The hourly demand necessitates at least 15-minute headways, with 12 minute headways (5 trips per hour) between 12 p.m. and 4 p.m. Twenty-eight passenger vehicles are the largest capacity vehicles that can safely operate with the 30-foot length limit on Mount Evans Highway.

Most 28-passenger vehicles on GSA AutoChoice exceed 30 feet in length. One potential option (used for cost estimate purposes) is the light-duty StarTrans Senator HD (2014) (see). The StarTrans Senator HD base model can be modified with options to improve performance on steep grade roadways. With these options and a wheelchair lift, the vehicle will cost approximately $100,000, with a total vehicle cost of $1,000,000 for ten vehicles.

Staging

Several options for staging transit near the Welcome Station were considered. Staging would need to accommodate at least 120 vehicles, which translates to 36,000 square feet for parking or approximately 0.75 acres. This represents a significant challenge and potential impact to this transit scenario.

Two options for staging for Scenario 2 are the development of a property adjacent to Echo Lake Lodge and Campground or the use of the old Echo Lake Ski Area (5.5 miles east of the lodge on Colorado 103). To date, owners of these properties have not been contacted about the feasibility, costs, or constraints involved in using these as transit staging areas 35 days per year.

Operations and Maintenance Assumptions

The operations and maintenance assumptions for this scenario are the same as MERA Scenario 1.

Cost Estimates

The cost estimates for MERA Scenario 2 are a combination of the following costs:

1. Transit-supportive infrastructure costs
2. Vehicle purchase or lease
3. Start-up costs
4. Operation costs (annual)
5. Maintenance costs (annual)

The transit-supportive infrastructure includes bus shelters at the Welcome Station (2), Summit Lake (1) and the Mount Evans Summit (2). No shelter is included at Mount Goliath because there is already a Nature Center. Additionally, benches are needed at each stop. The total cost for shelters and benches is $161,000.[71] Other general start-up costs include marketing, installation, initial promotion, staff training, etc. These costs are anticipated to be $20,000 in Year 1.

Table 7-56 and Table 7-57 show the combined cost estimate for a vehicle purchase option. This assumes that USFS or another party purchases ten 28-passenger shuttles. These can be shared with other sites or used offsite during the remainder of the year when not in use at MERA. These tables also calculate an annual maintenance cost, which assume a three percent increase per year to account for inflation and fluctuation in driver, maintenance, and fuel costs.

Table 7-56. Capital Cost for Vehicle Purchase in MERA Scenario 2

Vehicle	Quantity	Cost per Unit	Total
28-passenger shuttle	10	$100,000	$1,000,000

Table 7-57. Total and Per-Passenger Costs with Vehicle Purchase in MERA Scenario 2

Costs	Total	Per Passenger
Annual O&M Costs (Season 1)	$133,205	$6.89
Year One Capital Costs	$1,181,000	$61.13
Costs Per Season (2-12, cumulative)	$1,757,244	$7.58
Total	$3,238,654	$13.82

USFS may also elect to lease vehicles, which may be an attractive option to test the viability of transit service with less upfront capital investment. GSA AutoChoice presents pricing options for 16-25 passenger vehicles. GSA offers a short-term lease in which the federal agency pays a monthly lease fee to use the vehicles for a few months at a time.[72] GSA short-term lease rates for vehicles of this size are $4,357 per month, with an estimate cost per season of $13,071. Because lease rates include maintenance costs but not fuel or driver costs, the annual operations and maintenance cost

[71] Bench and bus shelter costs: http://www.pedbikesafe.org/PEDSAFE/countermeasures_detail.cfm?CM_NUM=2

[72] GSA also has leasing options that commit the leaser to a 7 year or 100,000-mile lease, which would be less attractive to the USFS if they were testing transit on a pilot basis. If USFS pursues transit, they are encouraged to work with their regional GSA office for more detailed pricing options. Rates vary by region, but they are unlikely to *exceed* the rates presented here. Short-term lease rates include mileage and preventative maintenance.

is calculated separately. These costs include fuel and drivers only, at a cost of $99,361 per year. Table 7-58 shows the total costs and per-passenger costs with a lease option.

Table 7-58. Total and Per-Passenger Costs with Vehicle Lease in MERA Scenario 2

25-passenger vehicles	Quantity	Cost per Month	Cost per Season	Total Capital[73]	Capital Per Passenger	Total O&M (Fuel & Driver)	Total Per Passenger
One Season	10	$4,357	$13,071	$130,710	$6.77	$99,361	$11.91

The total cost per passenger is similar between the purchase and lease options, with the lease being slightly less expensive. In both cases, capital costs account for approximately half of the total cost.

Relative to MERA Scenario 1, there is a larger number of passengers using this transit service (552 passengers represents 20% of the approximately 2,700 visitors on a 90th percentile day). Also, Scenario 2 has a shorter total length of the service in terms of miles and minutes, which results in a cost per passenger that is much lower than Scenario 1 in both the purchase- and lease-scenarios. A cost of $11 to $14 per passenger may significantly reduce demand, and the USFS should consider options to subsidize this cost. Capital investment from the USFS (or another funding source) for vehicles and infrastructure could also help reduce the cost per passenger.

Synthesis

The most cost-effective, defined as cost per rider, and likely transit scenarios are BLRA Scenario 4, GP Scenario 3, and MERA Scenario 2. Though GP Scenario 3 is more expensive than GP Scenario 2, GP Scenario 3 is more likely since it would help alleviate crowding on Mount Bierstadt, the trail, and in the wilderness area. While MERA Scenario 2 is slightly more expensive than MERA Scenario 1, MERA Scenario 2 would serve more passengers. This scenario is likely if the road degrades to a point where it would be closed to private vehicles due to safety concerns. Table 7-59 summarizes the operations and costs of the ARNF's most feasible scenarios in each of the three sites.

[73] Cost estimates should also include $181,000 for bus shelters, benches, and start-up costs for year one. These are calculated separately. However, if they were included in the least costs and aggregated over twelve years, the capital per passenger cost would be $7.54 in year one and the total per passenger cost would be $12.68.

Table 7-59. Operations and Costs Summary of Feasible Scenarios

	BLRA Scenario 4	GP Scenario 3	MERA Scenario 2
Travel Time (Round-trip)	20 minutes	66 minutes	108 minutes
Distance (Round-trip)	4.4 miles	22 miles	30 miles
Hours of Operation	7am to 6pm	6 a.m. to 5 p.m.	10am to 8pm
Frequency of Service	20 minutes	15-30 minutes	12-15 minutes
Vehicles Required	1	5	10
Passengers/Day	195	400 (weekends), 200 (weekdays)	552
Cost to Own/Year	$25,981	$234,271	$269,888
Cost to Own/Year/Rider	$3.81	$8.37	$13.82
Cost to Lease/Year	$26,967	$181,790	$112,432
Cost to Lease/Year/Rider	$3.95	$6.49	$11.91-$12.68

If the USFS would like to pursue any or all of these transit scenarios, the next steps include getting line officer and Forest leadership team support; developing an implementation plan that identifies partners and funding sources (such as the Federal Lands Access Program) and estimates site-specific capital and O&M costs and capacities of necessary staging areas; putting agreements into place; implementing the system as well as accompanying transportation components (such as permit systems, etc.).

Chapter 8: ALTERNATIVE COMPONENT ANALYSIS, METHODOLOGY, AND RESULTS

Introduction

This chapter describes the evaluation criteria, method of analysis, and results of analysis used to evaluate the full range of potential alternative transportation and visitor use management components for each site identified in *Chapter 5*: *Alternative Components by Site.* While some issues identified are site specific, many are common to all sites, and as such, criteria were developed to evaluate the components consistently across all sites. The evaluation criteria and method of analysis were applied to each component individually and to some packaged components. Following the description of methods, results of the analysis of the components for each site are reported for both standalone and packaged components. The evaluation process provides a mechanism for narrowing the field of alternative components to short-term and long-term solutions for transportation and visitor use management that align with forest and project goals. Recommendations stemming from this evaluation, and those analyses reported in Chapters 6 and 7 are reported in *Chapter 9: Study Recommendations by Site*.

Method for Alternative Component Evaluation

Evaluation Criteria

The alternative components analysis process is intended to evaluate components or "building blocks." Components were evaluated both as standalone solutions and as packaged solutions. Packaging of solutions was done to maximize component efficiency and effectiveness for solving transportation and visitor use needs. The evaluation process was structured in two phases: 1) a high-level "fatal flaw" analysis for standalone components, and 2) a more detailed technical analysis of standalone components and packaged combinations. Accordingly, the team developed two different sets of evaluation criteria for use in fatal flaw and technical analyses, 1) requirement criteria and, 2) technical criteria.

Requirement Criteria

Requirement criteria were used in the first phase of analysis (i.e., "fatal flaw" analysis) for standalone components. These criteria were used to evaluate the most critical aspects of each component to determine whether they met the project's goals and are viable for implementation by addressing the following questions:

- Does the component have the potential to meet the project's purpose and need?
- Is the component consistent with the Forest Goals? (Defined as objectives in *Chapter 4: Need Identification by Site.*)
- Is the component politically feasible?

The project *purpose and need* criterion was established to clearly define and use data to substantiate the issues observed at the study sites. By establishing a purpose and need criterion, it subjects components to a basic level analysis to determine whether implementation of the component would address the data-informed need for improvements at each of the sites.

Forest Goals and objectives established by the ARNF were adopted as the goals and objectives for this alternative transportation study. By including subthemes such as contributing to the protection of forest resources; improving the safety, efficiency, and sustainability of the forest transportation system; and preserving the quality of the visitor experience this criterion evaluates whether or not alternative components are consistent with high-level USFS programmatic functions.

Political Feasibility is the most subjective of the requirement criteria. Understanding that management direction and public opinion could change in the long term, the tenets of this criterion support technical feasibility, financial feasibility, and political palatability under current management direction and public use.

An example of the requirements criteria cross tabulated for the screening analysis with the components for the Guanella Pass site are shown in Table 8-1.

Table 8-1. Evaluation Criteria

Component			**Requirement Criteria**			
Site	**#**	**Component Name**	Does the component have the potential to meet the project's purpose and need?	Is the component consistent with the Forest Goals?	Is the component currently politically feasible?	**Meets Reqs?**
Guanella Pass		**Transit**				
	1	Hiker shuttle from Georgetown to GP				
	2	Hiker shuttle from Guanella Pass Rd to GP				
	3	Interpretive tour from Georgetown on GP Rd.				
	4	Interpretive tour from Denver on GP Rd.				
		Site design improvements				
	5	Expand size of parking lots at GP				
	6	Reduce size of parking lots at GP				
	7	Widen road shoulders for roadside parking				
		ITS & Visitor Information				
	8	Variable Message signs				
	9	Highway advisory radio				
	10	CDOT 511, ARNF Website, Social Media, Apps				
		Parking management				
	11	Dedicated traffic & parking management team				
	12	Mandatory parking offsite when parking lots full				
	13	Paid parking				
	14	Signs/barriers to prevent roadside parking				
		Visitor Use Management				
	15	Amenity fee during peak periods				
	16	Day use permit system and quota for Wilderness				

Points were not awarded for requirement criteria; rather, subjective yes/no assessments were made regarding each component met the criteria. If a component did not meet these criteria, it was not considered further as a standalone component. Components that did meet the requirement criteria were eligible for further standalone evaluation based on technical criteria in the second screening phase. Components that had the potential to meet the requirement criteria if packaged with other components were carried forward to the component packaging phase to be combined with others in the final screening evaluation.

Technical Criteria

Technical evaluation criteria were developed for use in the second screening phase. These criteria were developed to address a more detailed evaluation of Forest Goals, specific to the three sites, and issues related to project implementation. Forest resource protection, visitor experience quality, and transportation safety and operations criteria were included as a basis to evaluate alternative components relative to Forest Goals, while cost effectiveness, displacement and implementation feasibility criteria were developed to evaluate implementation issues. Although each of the six technical criteria developed encompassed multiple issues, for the ease of scoring and summary purposes, they were consolidated into general categories. The technical criteria are summarized in Table 8-2.

Table 8-2. Technical Criteria

Criteria	Response Range	Elements to Consider
Protection of Forest Resources	4 - 0 *	Does the component maintain use below the Wilderness threshold?
		To what extent does the component location or geographic scope of component benefits correspond to areas with Wilderness capacity needs?
		Potential noise or air quality impact
		Potential visual impact
		Potential impact to wildlife
		Potential impact to other natural resources (vegetation, soil, water)
Visitor Experience	0 - 4	To what extent does the component provide benefits to visitors' experience of the paramount use?
Transportation Safety & Operations	0 - 4	To what extent does the component improve safety?
		To what extent does the component location or geographic scope of component benefits correspond to areas with transportation capacity needs?
Cost Effectiveness	< $100,000 (4) $100,000 - $250,000 (3) $250,001 - 500,000 (2) $500,001 - $1,000,000 (1) > $1,000,000 (0)	Total capital cost
		O&M costs: operations and maintenance, vehicle replacement, liability and insurance, administration, utilities
		Are matching funds available?
Displacement of Existing Users	4 - 0 *	To what extent does the component benefit the paramount user group to the detriment of others?
		Potential social impact to adjacent communities
		Potential economic impact to adjacent communities

Criteria	Response Range	Elements to Consider
Implementation Feasibility	0 - 4	To what extent do the USFS or other willing partners have the organizational capacity to oversee implementation?
		Are necessary permits (or other administrative hurdles) not needed, obtained, in the process of being obtained, or will be obtainable within a reasonable time period?
		NEPA class of action?
		To what extent is the component publicly acceptable?

* "Reverse" scoring: less impact yields a higher score

The *Protection of Forest Resources* criterion addresses resource and wilderness protection, inclusive of wilderness capacity, noise and air quality, visual impact, wildlife impact, and other natural resources (soil, vegetation, etc.). Given the range of resources and possible impacts under this criterion, the scoring was intended to address order of magnitude concerns for overall resource protection.

The *Visitor Experience* criterion provides a basis to evaluate alternative components based on perceived visitor benefits in experiencing the "paramount use" at each site. Paramount use was defined as the primary experience(s) for which the USFS manages the site (e.g., Wilderness recreation on the Mount Bierstadt Trail and summit, and in the Indian Peaks Wilderness; scenic auto touring at MERA; developed recreation in the day use area of BLRA).

The *Transportation Safety and Operations* criterion was included to evaluate the degree to which the components improved overall safety of the site. In addition, the geographic scope of the component's ability to address transportation capacity needs was considered in this scoring.

The *Cost Effectiveness* criterion was included to consider estimated total capital cost, lifecycle cost, and whether or not matching funding sources may be available for implementation. At this stage of analysis order of magnitude cost were evaluated at a planning feasibly level.

The *Displacement (of existing users)* criterion was included to evaluate potential social and economic impacts to adjacent communities, and the extent that the component provided benefits to specific user groups at the detriment of others.

The *Implementation Feasibility* criterion was included to consider the organizational capacity of the Forest Service or other partners to oversee implementation. In addition, the complexity of necessary National Environmental Policy Act (NEPA) evaluation and permit requirements was considered. Lastly, public acceptability was estimated based on input gathered during public outreach and visitor surveys conducted at each site.

Screening Analysis

The component screening analysis was structured in four phases:

1. Fatal flaw analysis (i.e., analysis using Evaluation Criteria)
2. Technical analysis (i.e., analysis using Technical Criteria)
3. Packaging
4. Technical analysis of packages (i.e. analysis using Technical Criteria)

The screening analysis attempts to apply both technical and nontechnical criteria to a set of solutions to identify which solution or set of solutions best meets the purpose and need identified as part of this study. The multiphase analysis sequentially evaluates components identified at each of the three recreation sites. The methodology and scoring rubric used for the series of phases in the analysis are described in the following sections.

Fatal Flaw Analysis

The fatal flaw analysis is intended to screen out components that do not address the project purpose and need, are inconsistent with Forest Goals, or are not politically feasible as standalone components. The requirement criteria lend themselves to yes/no answers requiring documentation on how the component did or did not meet the criteria. Those components that garnered a “yes” to each of the requirement criteria advanced to the technical criteria screening, and those components that garnered a “no” did not advance further. Components must receive “yes” answers to all three criteria in order to advance to the technical screening phase. However, some components that failed the requirement criteria were determined to be beneficial when packaged with other components. These “packaged only” components bypassed the standalone technical criteria screening phase and proceeded directly to the packaging phase. The sections below elaborate on the logic used to assign “yes,” “no,” and “package only” scores to individual components. Example components from each of the three sites are used to provide examples of score application.

A “Yes” score was assigned to components that fully met the criterion under evaluation. For example at GP, the component “Reduce size of parking lots at GP” received a “Yes” score for meeting the requirement “Is the component consistent with USFS goals” because the stated goals for the administering forest unit include resource protection and reduction of resource impacts. Reducing the size of a parking facility in the fragile tundra environment of GP is an action consistent with these specified USFS goals.

A “Package Only” score was assigned to components that had the potential to meet the requirement criterion if packaged together with other components, but that did not fully meet the requirement criterion on their own. For example the component “Shuttle between Gateway Trailhead Parking Lot and Day Use Lot” at BLRA received a “Package Only” score for meeting the requirement “Is the component consistent with Forest goals” because on its own, a shuttle system could have variable impacts that may or may not meet USFS goals. Instituting a hiker shuttle between parking areas at BLRA has the potential to greatly increase or decrease the number of visitors to BLRA trailheads depending on the shuttle size and frequency of service. Furthermore, implementing a shuttle as a standalone measure may or may not reduce the number of cars arrived at BLRA parking areas that may already be full. Only when coupled with visitor use management and/or parking management does the shuttle have the potential to reduce resource impacts (a stated forest goal).

A “No” score was assigned to components that did not meet the criterion under evaluation. For example, the component “Expand size of parking lots at MERA” received a “No” score for meeting the requirement “Is the component consistent with forest goals” because the stated goals for the administering forest unit are related to resource protection and reducing impacts; increasing the size of an existing parking lot would increase (rather than decrease) the resource impact.

Individual scores were applied to the components for each site. The individual scores for each component were evaluated for consistency between score applications. Discrepancies in score applications were identified and rectified through an iterative process among FHWA CFLHD, USDOT John A. Volpe Center, and RSG project team members. Where discrepancies existed among assigned scores, the score that a majority of team members originally selected was assigned to the component. In the few cases where applied scores seemed to be in opposition (a combination of "Yes" and "No" scores for the same component), the logic behind score application was discussed, and agreement was reached.

Technical Analysis

Standalone components that met the requirement criteria were scored in a technical analysis, using technical criteria described in previous sections of this report. Components received a score with point values ranging from zero to four for each of the six criteria, with a zero score representing the least beneficial. Maximum score for this analysis yielded 24 points. Most of these technical criteria evaluated the positive impacts of components, meaning the higher the potential for improvement, the higher the score. However, both "Forest Resources" and "Displacement" criteria evaluate the negative impacts of such transportation interventions. Therefore, these two criteria were scored using reverse scoring, meaning the lower the potential for negative impact, the higher the score. Probing questions were developed for each technical criterion to provide scorers with uniform guidance for evaluating the component's improvement potential. While the numeric scoring methodology was developed to normalize the evaluation process, the nature of the scores was based on professional human judgment and is, by nature, subjective. Reasoning for score applications is provided on a case by case basis in the Results section.

A score of four was assigned if the component fully met the technical criterion under consideration. For example, the BLRA component "Dedicated traffic and parking management team" received a score of four for the technical criteria "Transportation Safety and Operations" because it maximized the potential to improve on the two probing questions for the criteria: 1) To what extent does the component improve safety? and 2) To what extent does the component location or geographic scope of component benefits correspond to areas with transportation capacity needs? At BLRA, roadside parking and traffic congestion in the designated parking areas near the Indian Peaks Wilderness access points and other BLRA recreation areas are two of the top transportation capacity needs at the site. In comparison to previously unregulated state of traffic and parking at BLRA, implementing the traffic and parking management during the summer of 2013 through employing a dedicated onsite team greatly improved onsite safety and address the geographic scope of the problem. Therefore, this component received a top score for Transportation Safety and Operations.

A score of three was assigned to a component if the component generally met the technical criterion, but also contained an aspect that did not fully meet the criterion. For example, the GP component "Dedicated traffic and parking management team" received a score of three for the technical criterion "Visitor Experience." This score was assigned after consideration of the probing question for the criterion: To what extent does the component provide benefits to visitors' experience of the paramount use? For the purposes of this study, Mount Bierstadt trail users were considered to be the paramount use and user group at GP. The presence of a dedicated traffic and parking management team would likely reduce the confusion associated with traffic and parking at the Mount Bierstadt trailhead. This improvement of the overall visitor experience for the paramount user group meets some of the "Visitor Experience" requirements; however, it does not directly improve the on-trail hiking experience by itself. Recognizing the limits of this component to directly influence the trail hiking experience led to its assignment of a positive score, rather than a top score.

A score of two was assigned if the component partially met the criterion, but did not fully meet the criterion. For example, the MERA component "Signs/barriers to prevent roadside parking" received a score of 2 for the technical criterion "Forest Resources." The Forest Resources technical criterion was evaluated by considered whether the component maintained use below the Wilderness threshold, to what extent the component benefits correspond with Wilderness capacity needs, and potential environmental impacts such as visual impacts, noise impacts, and/or impacts to wildlife. Using signs/barriers to prevent roadside parking is not as effective as other methods of parking management, therefore this component may not completely maintain use below Wilderness thresholds. Additionally, installing man-made barriers would likely have some environmental impacts to the site. For these reasons, the signs/barriers component at MERA received a two for "Forest Resources" during technical criteria screening.

A score of one was assigned if the component only met a few aspects of the technical criterion under evaluation. For example, the GP component "Reduce size of parking lots at GP" received a score of one for the technical criterion "Transportation Safety and Operations." The existing parking lots at GP are already filled to over capacity during peak demand at the site. Reducing the size of existing parking lots would not inherently increase the safety of the current traffic and parking situation at GP as it may result in additional congestion or increased unendorsed parking.

Finally, in this application of Phase 2 screening, zero scores were not assigned to any components. In order for a component to pass the Phase 1 Screening, the component had to have some utility, in and of itself, to receive three "Yes" scores for the requirements criteria. Therefore, assigning a score of zero was unlikely in this application of the Technical Criteria scoring rubric given the previous evaluation in Phase 1.

Packaging

Though many components scored well as standalone solutions, most were determined to have increased overall benefit and higher implementation feasibility when packaged with other components. Component packaging attempts to identify the optimal mix of components to address the needs identified at each site, while looking for manageable solutions that can be implemented in short- and long-term timeframes. The resultant packages carried forward into the final screening phase included components that passed the requirement criteria as well as those that were identified as "packaged only."

Due to the complexity of potentially implementing a transit components, additional analysis was conducted to evaluate feasibility of the transit components at each of the three sites. Transit feasibility analysis is discussed further in *Chapter 7: Transit Feasibility Analyses and Recommendations by Site* and *Chapter 9: Study Recommendations by Site.*

Component packaging was guided primarily by the needs identified for each site (see *Chapter 4: Needs Identification by Site*). For each identified need area, standalone and package only components were grouped together to provide both transit and nontransit packaged solutions. Transit package components are those that include some form of transit/shuttle service within and/or to the study site. Nontransit package components are those that do not include any form of transit or shuttle service, but influence the flow of traffic through or to the site, such as intelligent transportation systems, parking management teams, and/or visitor use management strategies.

Packages were created to provide a range of solutions including indirect and/or optional management actions to direct and/or mandatory management strategies. For example, a package using an indirect management strategy may include actions that seek to passively manage vehicle flow such a signs indicating the parking lot is full. Conversely, an example of a package employing a direct management strategy may recommend the physical prevention of visitor arrivals at a parking area through closing the area to additional use when full. In both cases, the goal of the strategy is to reduce parking lot congestion; however, the strategy achievement in the later example is accomplished through direct enforcement whereas the sign example indirectly communicates to visitors that they should turn around because parking is limited.

Packaged solutions were organized to progress from simple to more complex, increasing in efficacy of the actions as packages increase in the extent to which they direct, rather than simply attempt to persuade, visitors' behaviors. The increasing complexity is reflected in the numerical list of packages, with lower numbered packages representing simple solutions and higher number packages representing more complex solutions. Figure 8-1 provides a schematic of the logic used to package components together.

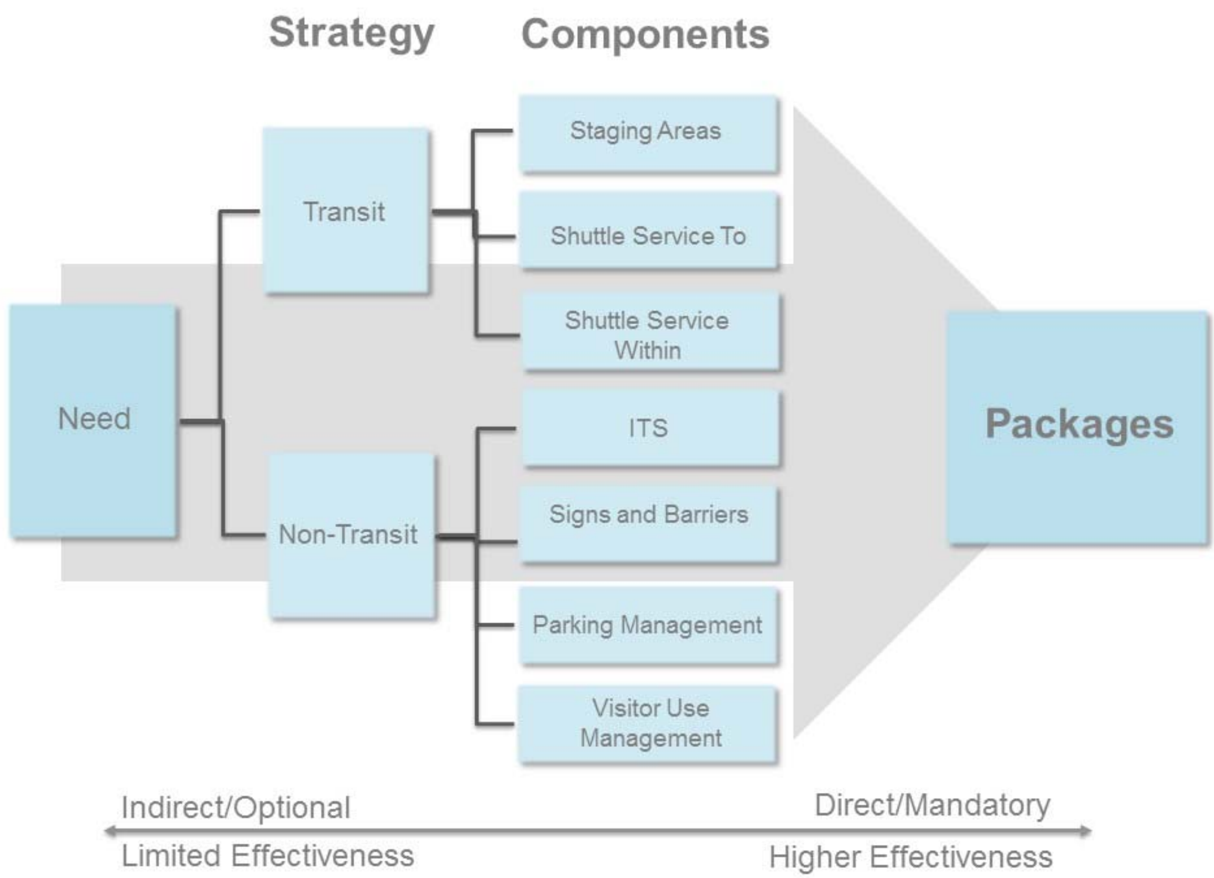

Figure 8-1. Component Packaging Logic

Technical Analysis of Packages

The final step in the screening process is the technical evaluation of packaged components. The same technical criteria scoring rubric applied in Phase 2 Screening was used to evaluate packages in Phase 4. The numerical score for each package provides a relative ranking for understanding both the anticipated onsite effectiveness of each package combined with administrative feasibility. For example, the technical criteria “Forest Resources,” “Visitor Experience,” and “Transportation Safety and Operations” provide an indication of the onsite improvement potential if the package were to be implemented. The remaining three technical criteria “Cost Effectiveness,” “Displacement of Existing Users,” and “Implementation Feasibility” provide an indication of the feasibility of the USFS to implement the package. Therefore, the combination of the six technical criteria together in the unweighted, summed score provides a mechanism for understanding proposed solutions in context. Analysis of package scores is reflected in recommendations for short- and long-term recommendations in *Chapter 9: Study Recommendations by Site*.

Brainard Lake Recreation Area Results

Phase 1: Evaluation Criteria and Requirement Criteria Screening

Twenty-eight components were evaluated for fulfillment of the Phase 1 Screening requirement criteria. The majority of the components met the requirement criteria, with seventeen of the twenty-eight proposed components moving forward as standalone components. Three components moved on as “Package Only” components for subsequent evaluation in Phases 3 and 4 of the screening process. Eight components were dropped from further consideration. Of the dropped components, four were site design improvements that did not meet any of the Phase 1 requirement criteria. The “Meets Reqs?” column of Table 8-3 contains the final requirement criteria evaluation for each BLRA component.

Table 8-3. Requirement Criteria Scores for Brainard Lake Recreation Area

Component			Requirement Criteria			
Site	**#**	**Component Name**	Does the component have the potential to meet the project's purpose and need?	Is the component consistent with the Forest Goals?	Is the component currently politically feasible?	**Meets Reqs?**
Brainard Lake Recreation Area		**Transit**				
	17	Shuttle from Nederland to Gateway Trailhead	P	P	Y	P
	18a	Shuttle from Gateway to Day Use to IPW TH’s	P	N	Y	N
	18b	Shuttle between Gateway Trailhead Parking Lot and Day Use Lot	P	P	Y	P
		Site design improvements				
	19	Accessible loop trail around BL	Y	Y	Y	
	20	Loop trail: Sourdough and Little Raven	Y	Y	Y	
	21	Trail: Little Raven to Left Hand Park Reservoir	Y	Y	Y	
	22	Mixed use path: Gateway Trailhead Parking Lot to BL via Waldrop	Y	Y	Y	
	23	Trail: BL Day Use Parking Lot to BL via Waldrop	Y	Y	Y	
	24	Expand the size of parking lots at IPW trailheads	N	N	N	N
	25	Reduce the size of parking lots at IPW trailheads	N	N	N	N
	26	Expand the size of BL Day Use Parking Lot	N	N	N	N
	27	Reduce the size of BL Day Use Parking Lot	N	N	N	N
	28	Reconfigure/optimize existing IPW trailhead lots	Y	Y	Y	
		ITS & Visitor Information				
	29	Variable message signs	Y	Y	Y	
	30	Highway Advisory Radio	Y	Y	Y	
	31	CDOT 511, ARNF Website, Social Media Apps	Y	Y	Y	
	32	Improved Onsite Wayfinding	Y	Y	Y	
		Parking Management				
	33	Dedicated traffic and parking management team	Y	Y	Y	
	34a	Traffic queuing at Courtesy Station when lots full	N	N	Y	N
	34b	Traffic queuing at Gateway Trailhead Parking Lot when lots full	Y	Y	Y	
	35	Mandatory parking at Gateway Trailhead Parking Lot when lots full	P	Y	Y	P

Component			Requirement Criteria			
Site	#	Component Name	Does the component have the potential to meet the project's purpose and need?	Is the component consistent with the Forest Goals?	Is the component currently politically feasible?	Meets Reqs?
	36	Mandatory parking offsite when all BLRA lots full	P	P	N	N
	37	Paid parking	Y	Y	Y	
	38	Signs/barriers to prevent roadside parking	Y	Y	Y	
	39	Designated parking for wildlife viewing	Y	Y	Y	
		Visitor Use Management				
	40	Differential amenity fees for peak and nonpeak	Y	Y	Y	
	41	Day use permits and quota for IPW trailheads	Y	Y	Y	
	42	Temporary closures when parking lots are full	Y	Y	N	N

Phase 2: Technical Evaluation Criteria and Screening

The seventeen standalone components identified through Phase 1 screening were assigned individual scores representative of the components' improvement potential in six technical areas. The total score represents the likelihood of improvement if the component were implemented. Technical criteria scores for the seventeen BLRA components ranged from 12 to 20 (Table 8-4). Components with higher scores tended to receive scores of 3 and 4 across multiple technical criteria. Discussions with managers during the May 2015 onsite meetings provided valuable information regarding the "Implementation Feasibility" technical criteria for each BLRA component. Managers discussed, in detail, which components they already intended to implement based on the BLRA Management Plan. This knowledge, led to higher "Implementation Feasibility" scores for some components. Scores for "Displacement of Existing Users" also tended to influence component scoring.

Table 8-4. Technical Criteria Scores for Brainard Lake Recreation Area

Component				Technical Criteria						
Site	#	Component Name	Meets Reqs?	Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	Total (max = 24)
Brainard Lake Recreation Area		**Transit**								
	17	Shuttle from Nederland to Gateway Trailhead	P							
	18a	Shuttle from Gateway to Day Use to IPW TH's	N							
	18b	Shuttle between Gateway Trailhead Parking Lot and Day Use Lot	P							
		Site design improvements								
	19	Accessible loop trail around BL		3	2	2	3	4	2	**16**
	20	Loop trail: Sourdough and Little Raven		2	2	1	2	4	2	**13**
	21	Trail: Little Raven to Left Hand Park Reservoir		3	2	1	3	4	3	**16**
	22	Mixed use path: Gateway Trailhead Parking Lot to BL via Waldrop		3	4	3	3	4	3	**20**
	23	Trail: BL Day Use Parking Lot to BL via Waldrop		3	4	3	3	4	3	**20**

Component			Meets Reqs?	Technical Criteria						
Site	#	Component Name		Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	Total (max = 24)
	24	Expand the size of parking lots at IPW trailheads	N							
	25	Reduce the size of parking lots at IPW trailheads	N							
	26	Expand the size of BL Day Use Parking Lot	N							
	27	Reduce the size of BL Day Use Parking Lot	N							
	28	Reconfigure/optimize existing IPW trailhead lots		2	3	2	2	2	1	**12**
		ITS & Visitor Information								
	29	Variable message signs		3	2	3	4	4	3	**19**
	30	Highway Advisory Radio		3	2	2	3	2	3	**15**
	31	CDOT 511, ARNF Website, Social Media Apps		3	2	2	4	3	3	**17**
	32	Improved Onsite Wayfinding		2	2	2	4	4	3	**17**
		Parking Management								
	33	Dedicated traffic and parking management team		3	3	4	3	2	4	**19**
	34a	Traffic queuing at Courtesy Station when lots full	N							
	34b	Traffic queuing at Gateway Trailhead Parking Lot when lots full		3	2	3	4	3	4	**19**
	35	Mandatory parking at Gateway Trailhead Parking Lot when lots full	P							
	36	Mandatory parking offsite when all BLRA lots full	N							
	37	Paid parking		4	2	3	3	1	1	**14**
	38	Signs/barriers to prevent roadside parking		2	2	2	4	4	3	**17**
	39	Designated parking for wildlife viewing		2	1	3	3	4	3	**16**
		Visitor Use Management								
	40	Differential amenity fees for peak and nonpeak		3	2	1	2	2	2	**12**
	41	Day use permits and quota for IPW trailheads		4	4	4	3	1	2	**18**
	42	Temporary closures when parking lots are full	N							

Phase 3: Component Packaging

While many of the BLRA components scored well as standalone solutions, most had increased overall benefit and higher implementation feasibility when packaged with other components (See Table 8-5 for list of components eligible for packaging).

Table 8-5. Brainard Lake Recreation Area Components Eligible for Packaging

Site	#	Component Name	Requirement Criteria Score
Brainard Lake Recreation	17	Shuttle from Nederland to Gateway Trailhead	P
	18b	Shuttle between Gateway Trailhead Parking Lot and Day Use Lot	P
	19	Accessible loop trail around BLRA	Y
	20	Loop trail: Sourdough and Little Raven	Y

Site	#	Component Name	Requirement Criteria Score
	21	Trail: Little Raven to Left Hand Park Reservoir	Y
	22	Mixed use path: Gateway Trailhead Parking Lot to BL via Waldrop	Y
	23	Trail: BL Day Use Parking Lot to IPW trailheads	Y
	28	Reconfigure / optimize existing IPW trailhead lots	Y
	29	Variable message signs	Y
	30	Highway advisory radio	Y
	31	CDOT 511, ARNF Website, Social Media Apps	Y
	32	Improved onsite wayfinding	Y
	33	Dedicated traffic & parking management team	Y
	34b	Traffic queuing at Gateway Trailhead Parking Lot when lots full	Y
	35	Mandatory parking at Gateway Trailhead Parking Lot when lots full	P
	37	Paid parking	Y
	38	Signs/barriers to prevent roadside parking	Y
	39	Designated parking for wildlife viewing	Y
	40	Differential amenity fees for peak and nonpeak	Y
	41	Day use permits and quota for IPW trailheads	Y
Note: Components that did not pass the requirement criteria have been removed (24, 25, 26, 27, 34, 36, 42)			

For BLRA, two over-arching need areas were identified around which to develop packages: parking demand management and Wilderness use management. Package development began with the creation of transit and nontransit options to address parking demand at BLRA. Subsequently, transit and nontransit parking demand management packages were coupled with other components to produce packages addressing parking demand and Wilderness use management issues. Nine packages were created as potential solutions for the two needs at BLRA. Three packages relate specifically to addressing parking demand management, and the remaining six packages address both parking demand and Wilderness use management (Table 8-6). Additionally, five of the components eligible for packaging were not added to specific packages, but rather included as “add-ons” to the existing proposed packages. For example, component 28 (reconfigure / optimize existing IPW trailhead lots) could be added to any of the proposed packages to help with parking efficiency and traffic circulation at the IPW trailhead lots.

Table 8-6. Brainard Lake Recreation Area Packages

Component			Technical Criteria	
Site	Need		Package	Component #’s Included
Brainard	Parking Demand Management	1	Mandatory queuing and/or parking at Gateway Trailhead Parking Lot when lots are full, ITS, onsite signs/barriers, onsite parking management team, and access trails[1] (nontransit)	34b, 35, 29, 30, 31, 38, 33, 22, 23

Component			Technical Criteria	
Site	Need		Package	Component #'s Included
		2	Mandatory queuing and/or parking at Gateway Trailhead Parking Lot when lots are full with shuttle to Day Use Lot, ITS, onsite signs/barriers, onsite parking management team, and access trails[1] (transit)	34b, 35, 18b, 29, 30, 31, 38, 33, 22, 23
		3	Mandatory queuing and/or parking at Gateway Trailhead Parking Lot when lots are full with shuttle to Day Use Lot, optional offsite parking in Nederland, Colorado, with shuttle to Gateway Trailhead Parking Lot, ITS, onsite signs/barriers, onsite parking management team, and access trails[1] (transit)	34b, 35, 18b, 17, 29, 30, 31, 38, 33, 22, 23
	Parking Demand & Wilderness Use Management	4	Development of additional onsite recreational trails[2], and Package 1 parking management (nontransit)	19, 20, and/or 21, and Package 1
		5	Development of additional onsite recreational trails[2], and Package 2 parking management (transit)	19, 20, and/or 21, and Package 2
		6	Development of additional onsite recreational trails[2], and Package 3 parking management (transit)	19, 20, and/or 21, and Package 3
		7	Management with Wilderness quota, development of additional onsite recreational trails[2], and Package 1 parking management (nontransit)	41 & 19, 20, and/or 21, and Package 1
		8	Management with Wilderness quota, development of additional onsite recreational trails[2], and Package 2 parking management (transit)	41 & 19, 20, and/or 21, and Package 2
		9	Management with Wilderness quota, development of additional onsite recreational trails[2], and Package 3 parking management (transit)	41 & 19, 20, and/or 21, and Package 3
Note	Component 28 could be added to any of the above packages to help with parking efficiency and traffic circulation at the IPW trailhead lots Components 37 and/or 40 could be added to any of the above packages to help with parking demand management Component 39 could be added to any of the above packages to help manage "moose jams" Component 32 could be added to any of the above packages to improve visitor wayfinding onsite			
	[1] Access trails refer to trails constructed to improve the flow of pedestrian traffic between various parking lot options within BLRA, specifically including a mixed use path between Gateway Trailhead Parking Lot to Brainard Lake via Waldrop (#22) and a trail between the Day Use Lot to Brainard Lake via Waldrop (#23) [2] Recreational trails refer to trails constructed to provide BLRA visitors with additional recreational access to sites outside of the IPW, specifically referring to options such as an accessible loop trail around Brainard Lake (#19), a trail from Sourdough to Little Raven (#20), and a trail from Little Raven to Left Hand Reservoir (#21)			

Phase 4: Package Scoring

BLRA package scoring identified three packages with high scores of 18 (relative to the scores of the other BLRA packages; Table 8-6). These packages addressed both parking and visitor use management needs, with driving factors being cost and safety. The May 2015 onsite meetings with BLRA managers confirmed that the USFS has implemented parking management solutions such as employing an onsite team to prevent roadside parking in the IPW trailhead parking lots. These meetings also confirmed the desire for increased pedestrian safety between parking areas and recreation access points. Additionally, the meetings provided insight on the implementation feasibility for certain components; these conversations are reflected in the scoring. For example, Packages 4 and 5 received scores of 4 for the “Implementation Feasibility” technical criterion because USFS managers indicated future plans to construct additional access and recreational trails in BLRA.

Table 8-7. Technical Criteria Package Scores for Brainard Lake Recreation Area

Packages			Technical Criteria						
Site	**#**	**Package Description**	Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	**Total (max = 24)**
Brainard Lake Recreation Area	1	Mandatory queuing and/or parking at Gateway Trailhead Parking Lot when lots are full, ITS, onsite signs/barriers, onsite parking management team, and access trails[1] (nontransit)	2	2	3	3	2	4	**16**
	2	Mandatory queuing and/or parking at Gateway Trailhead Parking Lot when lots are full with shuttle to Day Use Lot, ITS, onsite signs/barriers, onsite parking management team, and access trails[1] (transit)	2	2	4	2	3	4	**17**
	3	Mandatory queuing and/or parking at Gateway Trailhead Parking Lot when lots are full with shuttle to Day Use Lot, optional offsite parking in Nederland, Colorado, with shuttle to Gateway Trailhead Parking Lot, ITS, onsite signs/barriers, onsite parking management team, and access trails[1] (transit)	2	2	4	0	3	1	**12**
	4	Development of additional onsite recreational trails[2], and Package 1 parking management (nontransit)	2	3	3	3	3	4	**18**
	5	Development of additional onsite recreational trails[2], and Package 2 parking management (transit)	3	3	4	1	3	4	**18**
	6	Development of additional onsite recreational trails[2], and Package 3 parking management (transit)	3	3	4	0	3	2	**15**
	7	Management with Wilderness quota, development of additional onsite recreational trails[2], and Package 1 parking management (nontransit)	4	4	3	3	1	3	**18**
	8	Management with Wilderness quota, development of additional onsite recreational trails[2], and Package 2 parking management (transit)	4	4	4	1	1	3	**17**
	9	Management with Wilderness quota, development of additional onsite recreational trails[2], and Package 3 parking management (transit)	4	4	4	0	1	2	**15**

Guanella Pass Results

Phase 1: Evaluation Criteria and Requirement Criteria Screening

Nine of the seventeen evaluated GP components met all of the criteria and moved on to Phase 2 Screening as standalone components. Six components moved on as "Package Only" components for later evaluation in Phases 3 and 4. Two site design improvement components were dropped from further consideration for not being consistent with USFS goals or politically feasible. The "Meets Reqs?" column of Table 8-8 contains the final requirement criteria evaluation for each GP component.

Table 8-8. Requirement Criteria Scores for Guanella Pass

Component			Requirement Criteria			
Site	**#**	**Component Name**	Does the component have the potential to meet the project's purpose and need?	Is the component consistent with the Forest Goals?	Is the component currently politically feasible?	**Meets Reqs?**
Guanella Pass		**Transit**				
	1	Hiker shuttle from Georgetown to GP	P	P	Y	P
	2	Hiker shuttle from Guanella Pass Rd to GP	P	P	Y	P
	3	Interpretive tour from Georgetown on GP Rd.	P	P	Y	P
	4	Interpretive tour from Denver on GP Rd.	P	P	Y	P
		Site design improvements				
	5	Expand size of parking lots at GP	Y	N	N	N
	6	Reduce size of parking lots at GP	Y	Y	Y	
	7	Widen road shoulders for roadside parking	Y	N	N	N
		ITS & Visitor Information				
	8	Variable Message signs	Y	Y	Y	
	9	Highway advisory radio	Y	Y	Y	
	10	CDOT 511, ARNF Website, Social Media, Apps	Y	Y	Y	
		Parking management				
	11	Dedicated traffic and parking management team	Y	Y	Y	
	12a	Mandatory parking offsite when parking lots full	Y	P	Y	P
	12b	Mandatory parking offsite for the Mount Bierstadt trail	Y	Y	P	P
	13	Paid parking	Y	Y	Y	
	14	Signs/barriers to prevent roadside parking	Y	Y	Y	
		Visitor Use Management				
	15	Amenity fee during peak periods	Y	Y	Y	
	16	Day use permit system and quota for Wilderness	Y	Y	Y	

Phase 2: Technical Evaluation Criteria and Screening

The scores for each component were summed across the technical criteria to generate a total score representing the likelihood of improvement if the component were implemented. Technical criteria scores for the nine GP components scored in Phase 2 range from 10 to 19 (Table 8-9).

Table 8-9. Technical Criteria Scores for Guanella Pass

Component			Meets Reqs?	Technical Criteria						
Site	#	Component Name		Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	**Total (max = 24)**
Guanella Pass		**Transit**								
	1	Hiker shuttle from Georgetown to GP	P							
	2	Hiker shuttle from Guanella Pass Rd to GP	P							
	3	Interpretive tour from Georgetown on GP Rd.	P							
	4	Interpretive tour from Denver on GP Rd.	P							
		Site design improvements								
	5	Expand size of parking lots at GP	N							
	6	Reduce size of parking lots at GP		3	1	1	2	1	2	**10**
	7	Widen road shoulders for roadside parking	N							
		ITS & Visitor Information								
	8	Variable Message signs		3	3	4	2	2	3	**19**
	9	Highway advisory radio		3	2	2	3	2	3	**15**
	10	CDOT 511, ARNF Website, Social Media, Apps		3	2	2	4	3	3	**17**
		Parking management								
	11	Dedicated traffic & parking management team		3	3	4	2	2	3	**17**
	12a	Mandatory parking offsite when parking lots full	P							
	12b	Mandatory parking offsite for the Mount Bierstadt trail	P							
	13	Paid parking		3	3	2	1	1	1	**11**
	14	Signs/barriers to prevent roadside parking		3	2	3	3	2	2	**15**
		Visitor Use Management								
	15	Amenity fee during peak periods		2	2	2	3	1	1	**11**
	16	Day use permit system and quota for Wilderness		4	3	3	3	2	1	**16**

Phase 3: Component Packaging

Two over-arching need areas were identified from the specific needs identified in *Chapter 4: Need Identification by Site* to serve as the basis for developing packages: roadside parking and reduction of visitor-use-related impacts in designated Wilderness areas. Package development began with the creation of transit and nontransit options to address roadside parking at GP from package-eligible components (Table 8-10).

Table 8-10. Guanella Pass Components Eligible for Packaging

Site	#	Component Name	Requirement Criteria Score
Gua nella	1	Hiker shuttle from Georgetown to GP	P
	2	Hiker shuttle from Guanella Pass Rd to GP	P

Site	#	Component Name	Requirement Criteria Score
	3	Interpretive tour from Georgetown on GP Rd.	P
	4	Interpretive tour from Denver on GP Rd.	P
	6	Reduce size of parking lots at GP	Y
	8	Variable Message signs	Y
	9	Highway advisory radio	Y
	10	CDOT 511, ARNF Website, Social Media, Apps	Y
	11	Dedicated traffic & parking management team	Y
	12a	Mandatory parking offsite when parking lots full	P
	12b	Mandatory parking offsite for the Mount Bierstadt trail	P
	13	Paid parking	Y
	14	Signs/barriers to prevent roadside parking	Y
	15	Amenity fee during peak periods	Y
	16	Day use permit system and quota for Wilderness	Y
Note: Components that did not pass the requirement criteria have been removed (#5 and 7)			

Subsequently, transit and nontransit roadside management packages were coupled with other components to produce packages addressing roadside parking and visitor-use management issues. Developed packages included transit-only components, non-transit-only components, or a combination of both transit and nontransit components. Fourteen packages were created as potential solutions for the two needs (referenced above) at GP. Six packages relate specifically to addressing roadside parking, and the subsequent eight packages address roadside parking and visitor use management (Table 8-11).

Table 8-11. Guanella Pass Packages

Component			Technical Criteria	
Site	Need		Package	Component #'s Included
Guanella Pass	Roadside Parking	1	ITS and onsite signs/barriers (nontransit)	8, 9, 10, 14
		2	ITS, onsite signs/barriers, and onsite parking management team (nontransit)	8, 9, 10, 11, 14
		3	Mandatory offsite overflow parking when lots are full, transit service from offsite parking, ITS, and onsite signs/barriers (transit)	1 or 2, 8, 9, 10, 12a, 14
		4	Mandatory offsite overflow parking when lots are full, transit service from offsite parking, ITS, onsite signs/barriers, and onsite parking management team (transit)	1 or 2, 8, 9, 10, 11, 12a
		5	Mandatory offsite parking for all visitors to Mount Bierstadt trail, transit service from offsite parking, ITS, and onsite signs/barriers (transit)	1 or 2, 8, 9, 10, 12b, 14

Component			Technical Criteria	
Site	Need		Package	Component #'s Included
		6	Mandatory offsite parking for all visitors to Mount Bierstadt trail, transit service from offsite parking, ITS, onsite signs/barriers, and onsite parking management team (transit)	1 or 2, 8, 9, 10, 11, 12b, 14
	Roadside Parking & Wilderness Impacts	7	Management with Wilderness quota and Package 1 (nontransit)	Package 1, & 16
		8	Management with Wilderness quota and Package 2 (nontransit)	Package 2, & 16
		9	Reduced onsite parking, management with Wilderness quota, and Package 1 (nontransit)	Package 1, & 6, 16
		10	Reduced onsite parking, management with Wilderness quota, and Package 2 (nontransit)	Package 2, & 6, 16
		11	Management with Wilderness quota and Package 3 (transit)	Package 3, & 16
		12	Management with Wilderness quota and Package 4 (transit)	Package 4, & 16
		13	Management with Wilderness quota and Package 5 (transit)	Package 5, & 16
		14	Management with Wilderness quota and Package 6 (transit)	Package 6, & 16
Note: Components 13 and/or 15 could be added to any of the above packages to help with parking management				

Phase 4: Package Scoring

Overall, the GP package scoring process did not identify clear front runners for potential implementation. Generally, packages with higher scores tended to be those that were less expensive, increase safety at the site, and include a Wilderness quota. However, the point differential between the lowest and highest scoring packages was only a 4 point difference (low score of 13, high score 17). Scores for "Cost Effectiveness," "Displacement," and "Implementation Feasibility" varied the most between packages, whereas the scores for the other technical criteria did not vary as much between packages. While the four-step process did not identify a clear, top-choice solution, the process provides utility in identifying the tradeoffs, strengths, and weaknesses of the components and packages for GP.

Table 8-12. Technical Criteria Package Scores for Guanella Pass

Packages			Technical Criteria						
Site	**#**	**Package Description**	Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	**Total (max = 24)**
Guanella Pass	1	ITS and onsite signs/barriers (nontransit)	2	2	2	4	3	4	**17**
	2	ITS, onsite signs/barriers, and onsite parking management team to enforce endorsed parking only (nontransit)	2	2	2	2	2	3	**13**
	3	Mandatory offsite overflow parking when lots are full, transit service from offsite parking, ITS, and onsite signs/barriers (transit)	2	3	3	0	3	2	**13**
	4	Mandatory offsite overflow parking when lots are full, transit service from offsite parking, ITS, onsite signs/barriers, and onsite parking management team (transit)	3	3	3	0	2	2	**13**
	5	Mandatory offsite parking for all visitors to Mount Bierstadt trail, transit service from offsite parking, ITS, and onsite signs/barriers (transit)	3	3	4	0	3	3	**16**
	6	Mandatory offsite parking for all visitors to Mount Bierstadt trail, transit service from offsite parking, ITS, onsite signs/ barriers, and onsite parking management team (transit)	3	3	4	0	3	2	**15**
	7	Management with Wilderness quota and Package 1 (nontransit)	2	4	2	4	1	4	**17**
	8	Management with Wilderness quota and Package 2 (nontransit)	3	4	3	2	1	3	**16**
	9	Reduced onsite parking, management with Wilderness quota, and Package 1 (nontransit)	2	4	2	3	1	1	**13**
	10	Reduced onsite parking, management with Wilderness quota, and Package 2 (nontransit)	3	4	3	2	1	1	**14**
	11	Management with Wilderness quota and Package 3 (transit)	4	4	3	0	1	3	**15**
	12	Management with Wilderness quota and Package 4 (transit)	4	4	4	0	1	3	**16**
	13	Management with Wilderness quota and Package 5 (transit)	4	4	4	0	1	2	**15**
	14	Management with Wilderness quota and Package 6 (transit)	4	4	4	0	1	2	**15**

Mount Evans Recreation Area Results

Phase 1: Evaluation Criteria and Requirement Criteria Screening

Thirty components were evaluated for fulfillment of the three requirement criteria in Phase 1. Approximately one-third of the components met all three requirement criteria, with eleven of the thirty proposed components moving on to Phase 2 screening as standalone components. Six moved on as "Package Only" components and will be re-evaluated in Phases 3 and 4 of the screening process. Notably, all proposed transit components were considered to be viable as "Package Only" components because they did not fully meet Forest goals or project needs with standalone implementation. Thirteen components were dropped from further consideration, including all of the components related to site design improvements and visitor access for long-term road closure. The "Meets Reqs?" column of Table 8-13 contains the final requirement criteria evaluation for each MERA component.

Table 8-13. Requirement Criteria Scores for Mount Evans Recreation Area

Component			Requirement Criteria			
Site	**#**	**Component Name**	Does the component have the potential to meet the project's purpose and need?	Is the component consistent with the Forest Goals?	Is the component currently politically feasible?	**Meets Reqs?**
Mount Evans Recreation Area		**Transit**				
	43	Shuttle Service from Idaho Springs to MERA	P	P	Y	P
	44	Shuttle from Echo Lake to MERA	P	P	Y	P
	45	Shuttle from new offsite to MERA	P	P	Y	P
	46	Interpretive tour from Idaho Springs to MERA	P	P	Y	P
	47	Interpretive tour from Denver to MERA	P	P	Y	P
		Site Design Improvements				
	48	Expand size of parking lots in MERA	P	N	N	N
	49	Reduce size of parking lots in MERA	N	N	N	N
	50	Widen road shoulders for roadside parking	N	N	N	N
	51	Paved pullouts	Y	Y	N	N
	52	Striped bike lanes on Mount Evans Hwy.	Y	Y	N	N
		ITS & Visitor Information				
	53	Variable message signs	Y	Y	Y	
	54	Highway advisory radio	Y	Y	Y	
	55	CDOT 511, ARNF Website, Social Media Apps	Y	Y	Y	
		Parking Management				
	56	Dedicated traffic and parking management team	Y	Y	Y	
	57	Traffic queuing at Welcome Station when lots full	N	N	Y	N
	58	Mandatory parking offsite when all MERA lots full	P	Y	Y	P
	59	Parking reservation fee	Y	Y	Y	
	60	Signs/barriers to prevent roadside parking	Y	Y	Y	
		Traffic Management				

Component			Requirement Criteria			
Site	#	Component Name	Does the component have the potential to meet the project's purpose and need?	Is the component consistent with the Forest Goals?	Is the component currently politically feasible?	Meets Reqs?
	61	Extend express lane at Welcome Station	Y	N	Y	N
	62	Queue bypass lane at Welcome Station	Y	N	Y	N
	63	Stacked kiosks at Welcome Station	Y	N	Y	N
	64	Traffic lane closures	N	N	N	N
	65	Designate Mount Evans Hwy. a toll road	Y	Y	Y	
	66	Carpool/HOV program	Y	Y	Y	
		Visitor Use Management				
	67	Differential amenity fees for peak and nonpeak	Y	Y	Y	
	68	Day use permits and quota for MERA	Y	Y	Y	
	69	Designated dates/times for bike access	Y	Y	Y	
		Visitor Access for Long-Term Road Closure				
	70	Cog Railroad to summit	P	P	N	N
	71	Aerial tram to summit	P	P	N	N
	72	Hiking access only to MERA and summit	N	N	N	N

Phase 2: Technical Evaluation Criteria and Screening

The eleven standalone components identified through Phase 1 screening were assigned individual scores representative of the component's improvement potential in six technical areas. The total score represents the likelihood of improvement if the component were implemented. Technical criteria scores for the eleven MERA components ranged from 12 to 19 (Table 8-14). Components with lower technical criteria scores tended to receive lower scores for "Transportation & Safety," "Displacement of Visitors," and "Implementation Feasibility." The two higher scoring components tended to receive higher marks for "Cost Effectiveness," "Displacement of Existing Users," and "Implementation Feasibility."

Table 8-14. Technical Criteria Scores for Mount Evans Recreation Area

Component			Meets Reqs?	Technical Criteria						
Site	#	Component Name		Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	Total (max = 24)
Mount Evans Recreation Area		**Transit**								
	43	Shuttle from Idaho Springs to MERA	P							
	44	Shuttle from Echo Lake to MERA	P							
	45	Shuttle from new offsite lot to MERA	P							
	46	Interpretive tour from Idaho Springs to MERA	P							
	47	Interpretive tour from Denver to MERA	P							
		Site Design Improvements								
	48	Expand size of parking lots in MERA	N							

Component			Meets Reqs?	Technical Criteria						
Site	#	Component Name		Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	**Total (max = 24)**
	49	Reduce size of parking lots in MERA	N							
	50	Widen road shoulders for roadside parking	N							
	51	Paved pullouts	N							
	52	Striped bike lands on Mount Evans Hwy.	N							
		ITS & Visitor Information								
	53	Variable message signs		3	2	3	4	4	3	**19**
	54	Highway Advisory Radio		2	2	2	3	2	3	**14**
	55	CDOT 511, ARNF Website, Social Media Apps		3	2	2	4	3	3	**17**
		Parking Management								
	56	Dedicated traffic and parking management team		3	3	4	3	2	2	**17**
	57	Traffic queuing at Welcome Station when lots full	N							
	58	Mandatory parking offsite when all MERA lots full	P							
	59	Parking reservation fee		4	3	3	2	1	1	**14**
	60	Signs/barriers to prevent roadside parking		2	2	2	4	4	3	**17**
		Traffic Management								
	61	Extend express lane at Welcome Station	N							
	62	Queue bypass lane at Welcome Station	N							
	63	Stacked kiosks at Welcome Station	N							
	64	Traffic lane closures	N							
	65	Designate Mount Evans Hwy. a toll road		2	2	1	3	2	2	**12**
	66	Carpool/HOV program		3	1	1	4	2	2	**13**
		Visitor Use Management								
	67	Differential amenity fees for peak and nonpeak		3	2	1	2	2	2	**12**
	68	Day use permits and quota for MERA		4	4	4	3	1	2	**18**
	69	Designated dates/times for bike access		2	4	4	3	3	3	**19**
		Visitor Access for Long-Term Road Closures								
	70	Cog Railroad to summit	N							
	71	Aerial tram to summit	N							
	72	Hiking access only to MERA and summit	N							

Phase 3: Component Packaging

The process of packaging components at MERA played an important role in providing a range of alternative solutions for the identified site needs. During the Phase 1 screening process, only eleven of thirty possible components were determined to meet all requirement criteria. Therefore, less than half of the proposed components were evaluated at the technical level in Phase 2. The process of packaging components together reintroduced six additional components for consideration as part of packaged solutions. Therefore at Mount Evans, Phase 3 played a critical role in allowing a diverse range of solutions to be considered (See Table 8-15 for eligible components). Component packaging was guided by the needs identified for MERA.

Table 8-15. Mount Evans Recreation Area Components Eligible for Packaging

Site	#	Component Name	Requirement Criteria Score
Mount Evans Recreation Area	43	Shuttle from Idaho Springs to MERA	P
	44	Shuttle from Echo Lake to MERA	P
	45	Shuttle from new offsite lot to MERA	P
	46	Interpretive tour from Idaho Springs to MERA	P
	47	Interpretive tour from Denver to MERA	P
	53	Variable message signs	Y
	54	Highway advisory radio	Y
	55	CDOT 511, ARNF Website, Social Media Apps	Y
	56	Dedicated traffic & parking management team	Y
	58	Mandatory parking offsite when all MERA lots full	P
	59	Parking reservation fee	Y
	60	Signs/barriers to prevent roadside parking	Y
	65	Designate Mount Evans Hwy a toll road	Y
	66	Carpool / HOV program	Y
	67	Differential amenity fees for peak and nonpeak	Y
	68	Day use permits and quota for MERA	Y
	69	Designated dates / times for bike access	Y
Note Components that did not pass the requirement criteria have been removed (48, 49, 50, 51, 52, 70, 71, 72)			

Similar to the identified needs for GP and BLRA, two primary needs were also identified for MERA related to parking and visitor use management. Package development began with the creation of nontransit and transit packages to address roadside parking needs at MERA. Next, visitor use management needs were considered (in the context of the existing roadside parking management packages), and day use quota components were added (as appropriate) to the existing packages. Ultimately, nine packages were developed, providing a range of potential solutions including transit and nontransit options, direct and indirect management strategies, and limited effectiveness to increased effectiveness of actions (Table 8-16).

Table 8-16. Mount Evans Recreation Area Packages

Component			Technical Criteria	
Site	Need		Package	Component #'s Included
Mount Evans Recreation Area	Roadside Parking	1	ITS and onsite signs/barriers (nontransit)	53, 54, 55, 60
		2	Mandatory offsite overflow parking with transit service from Idaho Springs and shuttle service in MERA, ITS, signs/barriers, and onsite parking management team (transit)	58, 43, 53, 54, 55, 60, 56
		3	Mandatory offsite overflow parking with transit service from Echo Lake and shuttle service in MERA, ITS, signs/barriers, and onsite parking management team (transit)	58, 44, 53, 54, 55, 60, 56
		4	Mandatory offsite overflow parking in new offsite lot near Welcome Station with shuttle service in MERA, ITS, signs/barriers, and onsite parking management team (transit)	58, 45, 53, 54, 55, 60, 56
	Roadside Parking & Visitor Use Management	5	Management with MERA day use quota and Package 1 (nontransit)	68 & Package 1
		6	Management with MERA day use quota, onsite parking management team, and Package 1 (nontransit)	68, 56, & Package 1
		7	Management with MERA day use quota and Package 2 (transit)	68 & Package 2
		8	Management with MERA day use quota and Package 3 (transit)	68 & Package 3
		9	Management with MERA day use quota and Package 4 (transit)	68 & Package 4
Note	Components 59 and/or 67 could be added to any of the above packages to help with parking demand management Components 65 and/or 66 could be added to any of the above packages to help with parking shortages and traffic congestion Component 69 could be added to any of above packages to help with traffic congestion and roadway safety			

Phase 4: Package Scoring

The package scoring process revealed two packages with high improvement potential (relative to the other MERA packages) if implemented. Packages 5 and 6 scored the highest, with scores of 18 and 19 respectively (Table 8-17). These packages scored highly for being cost-effective solutions that address both the parking and visitor use management needs of MERA. Other packages, including those involving shuttle service to the site or within the site, received lower scores due to high implementation costs and low implementation feasibility. Conversations with MERA managers during the May 2015 site visits confirmed the low implementation potential for transit service at MERA due to high costs and concern about the viability of the road to Mount Evans, and revealed the jurisdictional complexity unique to MERA among the three ARNF sites.

Table 8-17. Technical Criteria Package Scores for Mount Evans Recreation Area

Packages			Technical Criteria						
Site	**#**	**Package Description**	Forest Resources	Visitor Experience	Transportation Safety and Operations	Cost Effectiveness	Displacement of Existing Users	Implementation Feasibility	**Total (max = 24)**
Mount Evans Recreation Area	1	ITS and onsite signs/barriers (nontransit)	2	1	1	4	4	4	**16**
	2	Mandatory offsite overflow parking with transit service from Idaho Springs and shuttle service in MERA, ITS, signs/barriers, and onsite parking management team (transit)	3	0	2	0	3	1	**9**
	3	Mandatory offsite overflow parking with transit service from Echo Lake and shuttle service in MERA, ITS, signs/barriers, and onsite parking management team (transit)	3	1	2	0	3	0	**9**
	4	Mandatory offsite overflow parking in new offsite lot near Welcome Station with shuttle service in MERA, ITS, signs/barriers, and onsite parking management team (transit)	3	2	2	0	3	1	**11**
	5	Management with MERA day use quota and Package 1 parking management (nontransit)	3	4	3	4	1	3	**18**
	6	Management with MERA day use quota, onsite parking management team, and Package 1 parking management (nontransit)	4	4	4	3	1	3	**19**
	7	Management with MERA day use quota and Package 2 parking management (transit)	4	4	4	0	1	2	**15**
	8	Management with MERA day use quota and Package 3 parking management (transit)	4	4	4	0	1	2	**15**
	9	Management with MERA day use quota and Package 4 parking management (transit)	4	4	4	0	1	2	**15**

Synthesis

The evaluation of components, both individually and in packages, according to requirement and technical criteria is intended to provide a systematic way to compare the range of potential solutions available to meet the needs of GP, BLRA, and MERA. The application of the four-part screening process identified a few key areas for USFS managers to consider when evaluating the suggested packaged solutions:

- Across the three sites, the highest scoring packaged components generally represent cost-effective and easy to implement solutions that may only provide short-term solutions for the identified needs rather than long-term solutions. For example, at each of the locations the simplest solutions to address roadside parking with signs and barriers, ITS, and a parking management team often scored high due to driving factors such as implementation feasibility and low cost and not because the package presents a long-term solution to the problem of excess demand for parking at the site.
- The incorporation of transit service to and from a site as a transportation and/or visitor use management solution tended to keep transit oriented package scores low due to the extended, long-term operational costs of providing shuttle service. Often, packages including a transit option received a “0” score for the “Cost Effectiveness” criterion because the estimated cost of the transit alone (derived from analysis in *Chapter 7: Transit Feasibility Analyses and Recommendations by Site* exceeded $1,000,000, which was the break point for the scale. The assignment of a “0” score was rare for other technical criteria considered. This exercise demonstrated cost to be a driving factor, particularly related to the feasibility of transit-based solutions.
- Many of the components scored well individually; however, the packages of components provide a range of comprehensive solutions for addressing site needs. The four-step screening process effectively eliminated components that were not feasible early on, providing a limited range of options for consideration in packaging. The result led to the creation of a smaller number of more realistic packages for consideration by USFS managers.

Chapter 9: Study Recommendations by Site

Introduction

Results of the user capacity, transit demand, transit feasibility, and alternative components analyses and input from meetings with the public and forest managers were used to inform recommendations for addressing identified visitor use and transportation needs. Recommendations were made according to the needs identified at each site and the maximum levels of visitor use that can be accommodated at each study site without unacceptable impacts to forest resources, Wilderness values, and recreation experiences identified through the user capacity analyses at each site.

The purpose of this chapter is to report the short-term and long-term recommendations, by study site, for effectively addressing transportation and visitor use management needs. Management recommendations at each site are organized into phases, described below, according to implementation feasibility and anticipated financial constraints and/or needs. Strategies for adaptive management are also discussed, as appropriate, for each study site after phased recommendations.

- Phase 1 recommendations are short-term management interventions that generally address pressing needs, are less expensive to implement (than other proposed recommendations), and likely do not require NEPA compliance (and/or other time-intensive administrative processes) to be completed before implementation. Phase 1 recommendations also include acknowledgement of current practices that are anticipated to continue to meet transportation and visitor use needs.

- Phase 2 recommendations are midterm management interventions that address identified needs that are important, but not as pressing as, those needs addressed in Phase 1. Phase 2 recommendations may require more planning and/or financial resources than those in Phase 1; inclusion in Phase 2 provides additional time for these realistic components of implementation. These recommendations should be considered for implementation as soon as feasible, given budgetary and administrative constraints.

- Phase 3 recommendations are long-term management interventions that require significant planning and financial support to fully implement. These recommendations address identified needs, but likely cannot be implemented without the support of stakeholders. Implementation of these recommendations is just as important as the implementation of Phase 1 and 2 recommendations; however, this phasing acknowledges the efforts needed to implement solutions on this scale.

Rough order of magnitude (ROM) costs for phased recommendations are provided (Table 9-1, Table 9-2, and Table 9-3). The included ROM costs are adapted from Class C cost estimates for other similar projects and provide only a rough estimate of cost; detailed cost estimates should be prepared prior to implementation.

The following subsections present transportation and visitor use management recommendations, by site, and included the following information:

1. Overview of site-specific needs derived from study data and analysis.
2. Narrative summary of recommendations, with an overview of components and phasing.
3. Tabular summary of recommendations and phasing, including rough order of magnitude cost estimates (i.e., Implementation Plan).
4. Detailed descriptions of recommended components and phasing.

Brainard Lake Recreation Area Recommendations

Overview of BLRA Needs[74]

The following transportation, recreation, and resource management-related needs were identified at BLRA through considering public input, reviewing previous studies and planning documents, and collecting and analyzing new baseline data:

- The Gateway Trailhead Parking Lot is distant from most visitors' destinations.
- Small trailhead parking lots limit convenient access to Indian Peaks Wilderness (IPW), but may help prevent unacceptable crowding.
- Parking management staff are required to prevent unendorsed roadside parking.
- Traffic congestion occurs at the Courtesy Station when parking lots inside BLRA are full.
- Confusion exists among visitors who park in the Brainard Day Use Parking Lot about how to access BLRA visitor destinations and/or the IPW.
- Currently, there is a lack of safe, convenient pedestrian connections among parking lots and visitor destinations.
- Historically, high visitor use and corresponding potential for crowding and adverse resource impacts exist in the IPW.

BLRA Recommendations

BLRA recommendations are organized into three implementation phases. They provide short, mid, and long-term approaches to managing transportation and visitor use according to BLRA's designated parking capacity and corresponding user capacity specified in the 2005 BLRA Management Plan. The recommendations are summarized in Table 9-1 and described in more detail in the following subsections.

[74] See Chapter 4: Need Identification by Site for a more detailed description of need identification for BLRA.

- Phase 1 addresses the need to more effectively utilize the Gateway Trailhead Parking Lot to manage BLRA parking demand and user capacity; visitor use and user capacity monitoring is also recommended.
- Phase 2 focuses on providing a safe connection from the BLRA Day Use Lot to the IPW trailheads, while also developing other trail-based recreation opportunities to help disperse use away from the IPW.
- Phase 3 provides a long-term solution to increasing the safety and convenience of access between the Gateway Trailhead Parking Lot and BLRA destinations through the provision of shuttle service from the parking area into BLRA.

An adaptive strategy for management consideration is included after presentation of the phased recommendations. This strategy should be considered if substantial changes to visitor use of BLRA occur over the next five to ten years.

Table 9-1. Implementation Plan for Transportation and Visitor Use Management, BLRA

Recommended Alternatives by Implementation Phase		**Rough Order of Magnitude (ROM) Costs****	
		Capital Costs	**Operations & Maintenance**
Phase 1			
1.	Implement visitor use monitoring for adaptive management*	$8,000	$20,000
	Automated Traffic Recorders	*($5,000)*	*($3,000)*
	Trail Counters	*($3,000)*	*($3,000)*
	Annual Interim Reports and Five-Year Evaluation for Trends	-	*($14,000)*
2.	Continue presence of onsite traffic and parking management team	-	$41,000
3.	Require mandatory queuing and/or parking at Gateway Trailhead Parking Lot when other lots are full and prohibit queuing at Courtesy Station	$1,000	*Included in 2*
4.	Install onsite signs and barriers to deter and prevent unendorsed roadside parking	$6,000	-
5.	Deploy variable message signs to communicate traffic and parking conditions	$120,000	$3,000
6.	Complete trail connection between the Gateway Trailhead Parking Lot and Brainard Lake via the Waldrop Trail	$221,000	-
7.	Install improved onsite wayfinding signage in parking areas	$3,000	-
8.	Provide pre-trip information through ARNF website, smartphone apps, and info centers*	$210,000	$54,000
	Update and Maintenance of ARNF Website	-	*($14,000)*
	Creation and Distribution of Information at Information Centers	*($10,000)*	-
	Development and Maintenance of Smartphone Application for ARNF	*($200,000)*	*($40,000)*
	Phase 1 ROM Cost**	**$569,000**	**$118,000**
Phase 2			
9.	Construct access trail to improve the flow of pedestrian traffic between parking areas	$206,000	-
10.	Construct recreation trails to increase visitor opportunities and enhance enjoyment	$300,000	-
	Phase 2 ROM Cost**	**$506,000**	**$0**
Phase 3			
11.	Operate a circulator shuttle from Gateway Trailhead Parking Lot to Day Use Lot	$70,000	$15,000
	Phase 3 ROM Cost**	**$70,000**	**$15,000**
Adaptive Management			
12.	Implement day use permit system and quota for Indian Peaks Wilderness	N/A	N/A

*Recommendations with multiple line items included in cost have been broken out for context. **ROM costs are adapted from Class C cost estimates for other similar projects and provide only a rough estimate of cost; detailed cost estimates should be prepared prior to implementation.

Phase 1: Short-Term Visitor Use, Parking, and Traffic Management Components

1. ***Implement visitor use monitoring for adaptive management***

   In accordance with the 2005 Brainard Lake Management Plan, a long-term plan for visitor use monitoring should be implemented to gauge the impact of visitor use on social and resource conditions at BLRA and in the IPW. The capacity analysis suggests that at current visitor use levels (when all available parking options are used by visitors), capacity is not exceeded. Similarly, visitor survey results show that crowding is not an issue for visitors to BLRA. These conclusions about resource conditions are derived from baseline measurements of visitor use under current management strategies. Through the implementation of a long-term visitor use management plan, managers will be able to identify trends in visitor use that can be used to understand if resource conditions are likely to be impacted.

   To implement a long-term monitoring plan, Automated Traffic Recorders (ATRs) and trail counters should be deployed in the same locations as they were deployed during the baseline data collection. This includes two ATRs on Brainard Lake Road and three trail counters at the following trails: Beaver Creek Trail, Mitchell Lake Trail, and Lake Isabelle Trail (Figure 9-1). Interim reports should be issued on an annual basis, with an in-depth evaluation every five years to identify trends and determine if adaptive strategies for visitor use management should be considered (as described in the section *Adaptive Strategy for Long-Term Management* to follow).

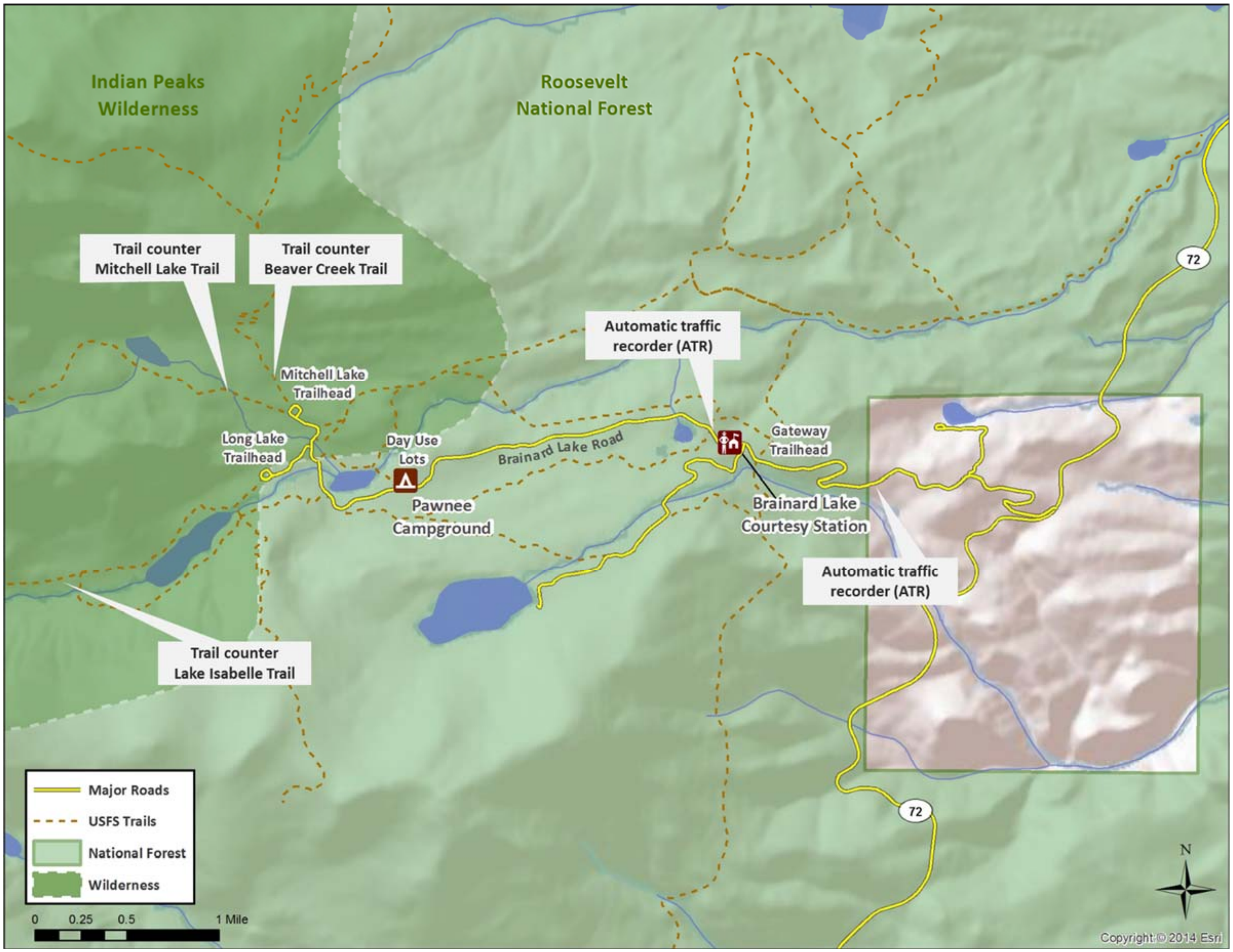

Figure 9-1. Phase 1 Recommendation: ATRs and trail counters for visitor use monitoring at BLRA (Recommendation 1).

2. Continue presence of onsite traffic and parking management team

The onsite traffic and parking management team currently in use during the peak season (mid-June through Labor Day) at BLRA should be continued (Figure 9-3). The team would continue to operate daily during the peak season from early morning to midafternoon. The team would consist of four members: two staff members stationed at each of the IPW trailhead parking lots (i.e., one at the Mitchell Lake Trail Parking Lot, and one at Long Lake Trail Parking Lot), one roving staff member, and one member stationed in the Gateway Trailhead Parking Lot. The IPW trailhead parking lot team of two individuals would use two-way radios to inform the third member of the parking management team and the USFS staff at the Courtesy Station when the trailhead parking lots are full, and when parking spaces become available again after the lots are full. The third member would be roving between various locations in BLRA throughout the day, depending on where parking is available. This member of the parking management team would be responsible for directing visitors to available parking spaces and blocking the roadway to prevent visitors from driving to the IPW trailhead parking lots when they are full. Staff at the Courtesy Station would inform arriving visitors of their parking options, based on the information received via radio from the three members of the parking management team inside of BLRA. A fourth member of the parking management team would direct traffic in the Gateway Trailhead Parking Lot when BLRA lots are full (for additional detail see *Recommendation 4: Require mandatory queuing and/or parking at Gateway Trailhead Parking Lot when other lots are full and prohibit queuing at Courtesy Station*).

3. Require mandatory queuing and/or parking at Gateway Trailhead Parking Lot when other lots are full and prohibit queuing at Courtesy Station

The BLRA capacity analysis shows that at current use levels the stated site capacity of available designated parking spaces is not exceeded. However, this conclusion only holds true when those vehicles that cannot park inside BLRA park in the Gateway Trailhead Parking Lot. Some BLRA visitors would rather wait in line in their vehicles for parking to become available inside BLRA than park in the Gateway Trailhead Parking Lot to access BLRA destinations. Under current traffic and parking management, this queuing for BLRA parking occurs on the Brainard Lake Road at the Courtesy Station. Queuing on the road at the Courtesy Station is frustrating for visitors, creates traffic backups on Brainard Lake Road, and creates unsafe roadway conditions for pedestrians and vehicles alike. Therefore, vehicles waiting in line to access BLRA should be required to queue in a portion of the Gateway Trailhead Parking Lot nearest to the Courtesy Station rather than on Brainard Lake Road (Figure 9-3).

A dedicated traffic and parking management staff member should be stationed at the Courtesy Station to manage the vehicle queue in the Gateway Trailhead Parking Lot. As stated previously, when the IPW trailhead parking lots and the BLRA Day Use Lot are full, USFS staff at the Courtesy Station and the three parking management team members inside BLRA would stop visitors from entering BLRA. At this point, visitors would be required to park in the Gateway Trailhead Parking Lot or would be given the option to wait in their vehicle in a queue in the Gateway Trailhead Parking Lot until parking spaces become available inside BLRA. A fourth member of the parking management team, stationed in the Gateway Trailhead Parking Lot, would manage queuing of vehicles in the Gateway Trailhead Parking Lot. This parking management team member would communicate with the Courtesy Station staff and the parking management team members inside BLRA to coordinate entry of queued vehicles (from the Gateway Trailhead Parking Lot) into BLRA as parking spots become available. Visitors ***would not*** be allowed to queue on the road at the Courtesy Station while waiting for parking spaces to become available in BLRA. Visitors would be allowed to freely enter BLRA again after the peak hours of the day when a substantive number of parking spaces are available in BLRA and active parking management is no longer needed to prevent unendorsed roadside parking.

4. ***Install onsite signs and barriers to deter and prevent unendorsed roadside parking***

   Existing barriers and signs should be retained at their current locations. These signs and barriers prevent roadside parking on Brainard Lake Road and the access road to the Mitchell Lake and Long Lake Trail Parking Lots, where it once occurred in large numbers. In addition, roadside barriers should be installed on Brainard Lake Road south of Brainard Lake to prevent roadside parking from occurring when moose are sighted in the area.

5. ***Deploy variable message signs to communicate traffic and parking conditions***

As stated previously, the BLRA capacity analysis shows that at current use levels, the stated site capacity of available designated parking spaces is not exceeded when the Gateway Trailhead Parking Lot is fully utilized as a parking option for BLRA visitors. Portable (trailer style) variable message signs (VMS; Figure 9-2) should be used on Brainard Lake Road and the Peak-to-Peak Highway to communicate parking conditions and resultant parking options to approaching BLRA visitors (Figure 9-3). Specifically, VMS should be used to direct visitors to the Gateway Trailhead Parking Lot when parking areas inside BLRA are full, using a message such as, “BLRA Parking Closed, Park in Gateway Trailhead Parking Lot.” Alternative VMS messages for other BLRA parking scenarios include, “Mitchell Lake Parking Closed, Use BLRA Day Lot,” or, “All Lots Open.” Using VMS in this manner would assist the parking management team in directing visitors to available parking options and restricting unendorsed parking through setting visitor expectations about parking options before arrival at the Courtesy Station. As future recommendations are implemented at BLRA VMS messaging should be updated to reflect management changes and direct visitors appropriately. It should be noted that a NEPA analysis may be needed for VMS sign use along State Highway 72; the NEPA analysis would need to be done in coordination with Colorado Department of Transportation (CDOT).

Figure 9-2. Mobile variable message sign (VMS) example.

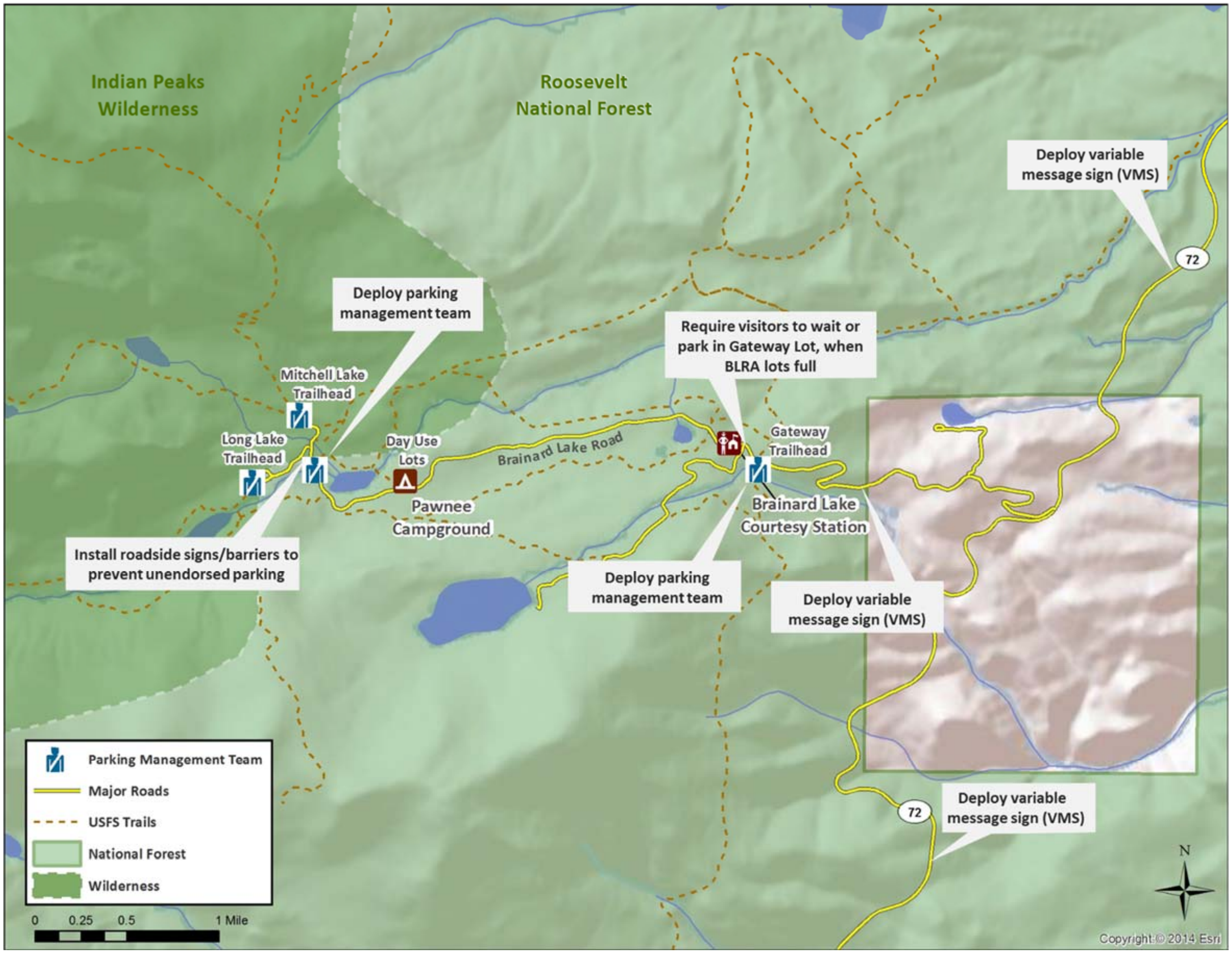

Figure 9-3. Phase 1 Recommendations: Parking management and queuing restrictions for BLRA (Recommendations 2-5).

6. ***Complete trail connection between the Gateway Trailhead Parking Lot and Brainard Lake via the Waldrop Trail***

   Construction of a connector trail (which has already begun as this report was compiled) between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot should be completed as soon as possible to provide a safe pathway for visitor travel between BLRA destinations and the Gateway Trailhead Parking Lot (Figure 9-4). The connector trail should initially follow the existing trail alignment from the Gateway Trailhead Parking Lot to the Waldrop Trail. The trail alignment should continue along the existing Waldrop Trail alignment until the Waldrop Trail begins to head north toward the South St Vrain Trail (#909). At this point, a new trail alignment heading north from the Waldrop Trail to Brainard Lake should begin to complete the connector trail from the Gateway Trailhead Parking Lot to Brainard Lake.

   Until the connector trail between the Gateway Trailhead Parking Lot and Brainard Lake is finished, a temporary bike and pedestrian lane should be designated on Brainard Lake Road from the Gateway Parking Area into BLRA to increase visitor safety (if existing road geometry allows for this designation).

7. ***Install improved onsite wayfinding signage in parking areas***

   Improved wayfinding and directional signs should be installed at all BLRA parking areas to reduce visitor confusion about how to get to and from parking lots (or future shuttle stops) and their target destinations within BLRA and/or the IPW (Figure 9-4). Active parking management at BLRA will influence where visitors park — this may lead to visitors parking away from their intended destination in an unintended parking area. Installing wayfinding and directional signs in all designated parking areas will provide visitors with information about how to access destinations of interest in BLRA regardless of where their vehicles are parked. Additionally, trail junctions located outside of federally designated wilderness should be marked with directional signs to assist visitors in moving between parking lots and recreational destinations in BLRA.

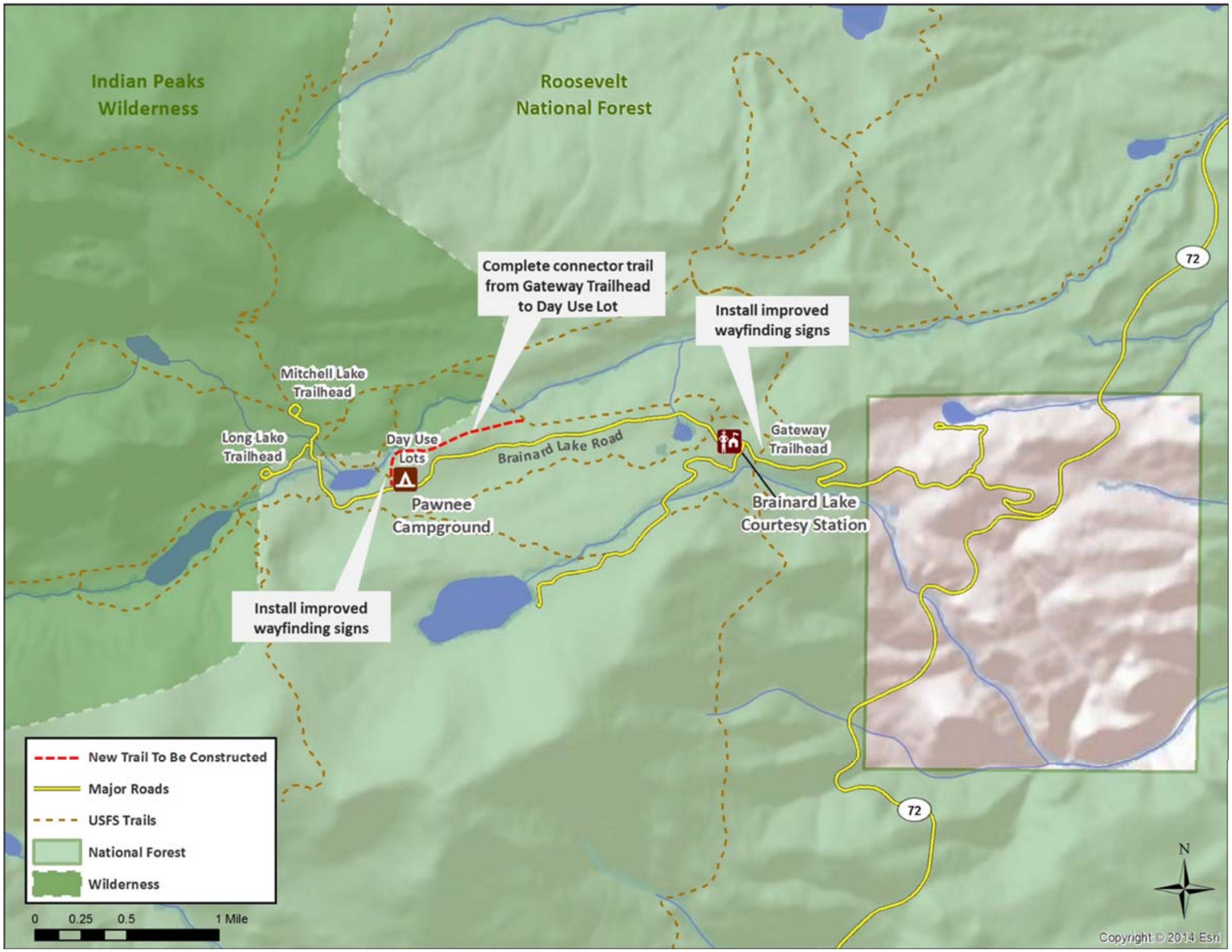

Figure 9-4. Phase 1 Recommendations: Improved onsite wayfinding and connectivity between parking areas (Recommendations 6 & 7).

8. ***Provide pre-trip information through ARNF website, smartphone apps, and info centers***

BLRA survey data show that over 80% of BLRA visitors report that they would likely use the ARNF website as a source of information about parking and crowding conditions at BLRA, if it was available for planning a future trip. Other sources of information that ranked highly among visitors include smartphone applications and tourist information centers. Web resources should be used to communicate parking and crowding conditions to potential BLRA visitors. Currently, such information about BLRA is unavailable on the ARNF website. Pre-trip information including parking management practices and policies, maps of connector trails between parking areas, and information about peak use times and crowding should be made available to BLRA visitors via web resources. Messages and related content should be designed to provide visitors with information about the advantages of visiting BLRA during off-peak periods and to set expectations about peak-period conditions and parking availability inside BLRA and in the Gateway Trailhead Parking Lot. In addition, links to websites and information about other outdoor recreation and tourist destinations in the vicinity of BLRA could be provided to inform visitors of options to consider as alternatives to visiting BLRA during peak periods.

Paper brochures should be made available at tourist information centers to distribute information about parking management practices and policies, maps of alternative parking locations and connector trails, and information about peak use times and/or recreation alternatives.

Visitors across all three study sites indicated that they would be likely to use a smartphone application to access information about parking and crowding conditions if it was available for planning a future trip. A smartphone application should be developed for the ARNF, providing information about parking and crowding conditions specific to each of the three study sites. The ROM cost provided for the smartphone application (included in Table 9-1) provides an estimate of the cost for development of a single application, rather than an application specific to BLRA.

It should be noted that visitor survey results show that other methods of information provision such as using social media, highway advisory radio, telephone information lines, and text updates tended to receive significantly less anticipated use than website, smartphone app, and tourist information center options.

Phase 2: Midterm Visitor Use, Parking, and Traffic Management Components

9. ***Construct access trail to improve the flow of pedestrian traffic between parking areas***

Construction of access trails between the Brainard Lake Day Use Parking Lot and the IPW trailheads (which has already begun as this report was compiled) should be completed (Figure 9-5). The new access trails will provide pedestrian access from the BLRA Day Use Parking Lot to the Mitchell Lake and Long Lake Trails. In-depth descriptions of suggested trail alignments for the recommended trails are reported in *Chapter 1: Brainard Lake*

Recreation Area Summary of Data Findings, in the section titled "Brainard Lake Recreation Area Alternative Trail Alignment Analysis, Summer 2012."

10. Construct recreation trails to increase visitor opportunities and enhance enjoyment

Construction of the following three recreation trails in BLRA should be completed to increase visitor opportunities for recreation and enhance enjoyment (Figure 9-5). One of the recommended trails would provide universal access to mobility impaired visitors. The other recommended trails would increase recreation opportunities outside of the IPW, with the intent that some visitor use may be shifted away from the IPW by providing alternative recreation access. In-depth descriptions of suggested trail alignments for the recommended trails are reported in *Chapter 1: Brainard Lake Recreation Area Summary of Data Findings*, in the section titled "Brainard Lake Recreation Area Alternative Trail Alignment Analysis, Summer 2012."

1. *Accessible loop trail around Brainard Lake*
   A universally accessible nature trail would be constructed around Brainard Lake, providing access for pedestrians, bicyclists, and visitors with mobility impairments. The trail would enhance the accessibility of recreational opportunities at BLRA.

2. *Loop trail connecting the Sourdough and Little Raven Trails*
   New trail alignments would be developed to connect the Sourdough and Little Raven Trails. The new trail alignments would create opportunities for loop hikes from the Gateway Trailhead Parking Lot and potentially shift some visitor use away from the IPW.

3. *Trail connecting the Little Raven Trail to Left Hand Park Reservoir*
   A new trail alignment would be developed to connect the Little Raven Trail to Left Hand Park Reservoir. The new trail alignment would provide off-road pedestrian and bicycle access to Left Hand Park Reservoir and potentially shift some visitor use away from the IPW.

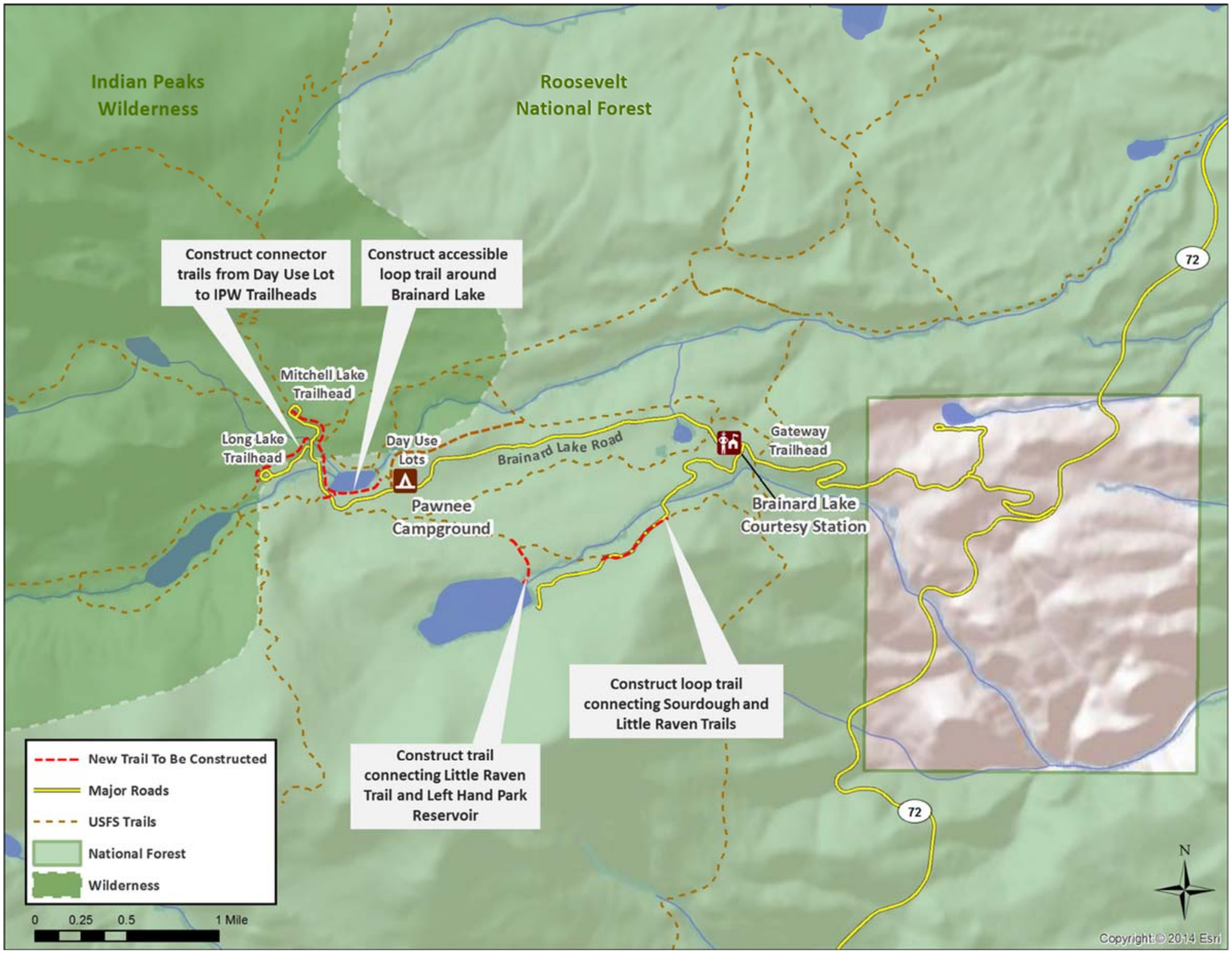

Figure 9-5. Phase 2 Recommendations: Increased access and wildlife-viewing area (Recommendations 9-10).

Phase 3: Long-Term Visitor Use, Parking, and Traffic Management Components

11. Operate a circulator shuttle from Gateway Trailhead Parking Lot to Day Use Lot

The capacity analysis for BLRA indicates that current visitor use levels at BLRA do not exceed the stated capacity of available designated parking spaces at BLRA. However, this conclusion about capacity only holds when visitors to BLRA use the Gateway Trailhead Parking Lot as a parking option because the demand for parking inside BLRA exceeds the available parking spaces inside BLRA. The visitor survey also shows that current visitor use levels are not causing unacceptable crowding conditions in the IPW or other BLRA destinations, indicating that current levels can be maintained while still achieving desired resource conditions. To increase visitor safety and provide a convenient transportation option between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot, circulator shuttle service should be provided between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot (Figure 9-6).

The transit demand analysis for this shuttle service estimates that approximately 195 passengers per day would use the recommended shuttle service. The service would operate from 7:00 a.m. to 6:00 p.m. during peak season weekend days and holidays between Memorial Day weekend and Labor Day. The service schedule would operate on a 20-minute loop between the Gateway Trailhead Parking Lot and the BLRA Day Use Lot, deliberately excluding direct service to the IPW trailheads to prevent over-delivering of visitors to these Wilderness trailheads. The parking capacity and transit ridership demand analyses behind this recommendation are reported in *Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis, by Site*. The preliminary estimated costs, proposed schedule, and operation details are described in *Chapter 7: Transit Feasibility Analyses and Recommendations by Site*. An implementation plan with updated visitation numbers and more specific costs should be developed before the suggested shuttle service is implemented.

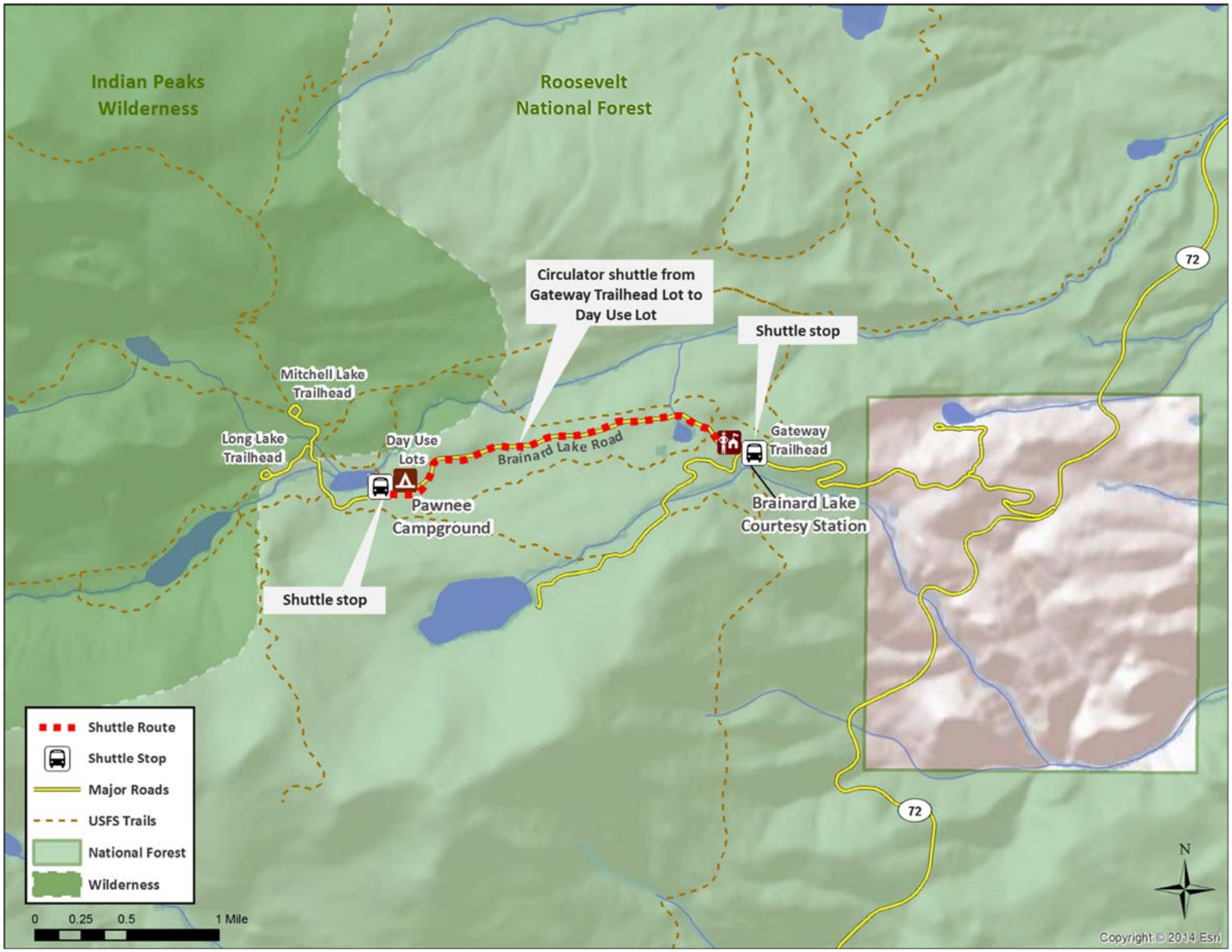

Figure 9-6. Phase 3 Recommendation: Circulator shuttle service between Gateway Trailhead Parking Lot and Day Use Lot (Recommendation 12).

12. Adaptive Strategy for Long-Term Management

Following direction from the BLRA Management Plan, a long-term visitor use monitoring plan should be implemented at BLRA to track trends in visitor use (as described in *Recommendation 1: Implement visitor use monitoring for adaptive management*). Implementation of a visitor use monitoring plan is critical to verifying that visitor use does not increase to levels that result in unacceptable resource conditions. If trends identified through the monitoring plan indicate that visitor use increases significantly (compared to baseline use levels) at BLRA during the monitoring period, a more in-depth study should be initiated at that time to determine the extent of increased use and corresponding impacts to Wilderness resources in the IPW. Such in-depth studies would provide data-driven results to guide evaluation of the potential need for development of a day use permit quota for IPW trailheads and/or parking at BLRA.

A potential management action that could be considered is adaptive management is necessary at BLRA is the implementation of a managed-use permit system and quota for day use in BLRA and/or the IPW. Increases to trail use in the IPW or increased demand for parking that exceeds the capacity of all available parking at BLRA would be indicators that such a system may be necessary to manage visitor use.

If such a system were necessary, visitors would be required to obtain and display a permit for a specific date and time period during which they would be allowed to hike in the IPW and/or park at BLRA (depending on the target area for visitor use management). An online permit system could be used to allow visitors to obtain their permits in advance of their trip to BLRA, or permits could be obtained at one or more locations in BLRA (e.g., Gateway Trailhead Parking Lot, Courtesy Station) when visitors arrive. The number and distribution of day use permits would be based on crowding-related capacities for the IPW and/or operational capacity of BLRA (i.e., parking capacities, shuttle service capacities if applicable, etc.).

Guanella Pass Recommendations

Overview of GP Needs[75]

The following transportation, recreation, and resource management-related needs were identified at GP through considering public input, reviewing previous studies and planning documents, and collecting and analyzing new baseline data:

- Unendorsed roadside parking causes resource impacts and creates visitor safety risks.
- Extreme crowding occurs on the summit of Mount Bierstadt during peak use periods.
- Off-trail trampling of vegetation and soils affects resource conditions in the Mount Evans Wilderness.
- Visitor use exceeds the physical capacity of parking at GP and the Wilderness resource-related capacity on the Mt. Bierstadt Trail and summit.

GP Recommendations

GP recommendations are organized into three phases of implementation, together providing short-term and long-term approaches to managing transportation and visitor use according to the physical capacity of designated parking at GP and the Wilderness resource-based capacity of the Mt. Bierstadt Trail and summit. The recommendations and rough order of magnitude cost for implementation are summarized in Table 9-2 and described in more detail in the following subsections.

- Phase 1 recommendations seek to reduce unendorsed roadside parking and set the stage for active parking management; visitor use and user capacity monitoring is also recommended.
- Phase 2 recommendations focus on implementing a Wilderness permit system and quota, and deploying an onsite parking management and permit enforcement team.
- Phase 3 recommendations present three long-term management options for maximizing Mount Bierstadt Trail access under the managed-use permit system while balancing parking constraints and protecting resource and Wilderness values.

An adaptive strategy for management consideration is included after presentation of the phased recommendations. This strategy should be considered if substantial changes to visitor use of GP occur over the next five to ten years.

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[75] See *Chapter 4: Need Identification by Site* for a more detailed description of need identification for GP.

Table 9-2. Implementation Plan for Transportation and Visitor Use Management Recommendations, GP

Recommended Alternatives by Implementation Phase		Rough Order of Magnitude (ROM) Costs**	
Phase 1		**Capital**	**Operating & Maintenance**
1.	Implement visitor use monitoring for adaptive management*	$8,000	$20,000
	Automated Traffic Recorders	*($5,000)*	*($3,000)*
	Trail Counters	*($3,000)*	*($3,000)*
	Annual Interim Reports and Five-Year Evaluation for Trends	-	*($14,000)*
2.	Coordinate parking enforcement with Clear Creek County through Memorandum of Understanding	-	Included in 1
3.	Deploy variables message signs to communicate traffic and parking conditions	$80,000	$2,000
4.	Provide pre-trip information through ARNF website and smartphone apps*	$200,000	$54,000
	Updating and Maintenance of ARNF Website	-	*($14,000)*
	Development and Maintenance of Smartphone Application for ARNF	*($200,000)*	*($40,000)*
	Phase 1 ROM Cost**	**$288,000**	**$76,000**
Phase 2			
5.	Implement a managed-use Wilderness day use permit system and quota for Mount Bierstadt Trail (300 permits per day)	-	$71,000
6.	Deploy onsite parking management and permit quota team	-	$60,000
7.	Install onsite signs and barriers to deter and prevent unendorsed roadside parking	$11,000	-
8.	Designate parking areas for Mount Bierstadt Trail users (91 spaces) and "other" GP users (15 spaces)	$6,000	-
	Phase 2 ROM Cost**	**$17,000**	**$131,000**
Phase 3			
9.	***Option 1:*** Retain managed-use permit system and quota at 300 permits per day without expanding onsite parking as a long-term solution	-	*Included in 5*
10.	***Option 2:*** Increase the managed-use permit system and quota to 400 permits per day and expand onsite parking at GP to accommodate all permit holders in designated parking spaces	$113,000	$88,000
11.	***Option 3:*** Increase the managed-use permit system and quota to 400 permits per day, with shuttle service from Georgetown for those permit holders that cannot park in a designated space at GP	$575,000	$159,000
	Phase 3 ROM Cost**	*Dependent on Option Selected*	
Adaptive Management			
12.	Reduce permit quota for weekday Mount Bierstadt Trail use if demand shifts to weekdays to preserve a different experience for weekday users	N/A	N/A
13.	Increase transit and/or parking at GP if displacement of other GP users is excessive	N/A	N/A

*Recommendations with multiple line items included in cost have been broken out for context. **ROM costs are adapted from Class C cost estimates for other similar projects and provide only a rough estimate of cost; detailed cost estimates should be prepared prior to implementation.

Phase 1: Short-Term Visitor Use, Parking, and Traffic Management Components

1. ***Implement visitor use monitoring for adaptive management***

   In conjunction with the implementation of a managed-use permit system and quota for hiking the Mount Bierstadt Trail, a long-term visitor use monitoring plan should be implemented at GP, particularly focusing on use of the Mount Bierstadt Trail. Changes to visitor use can impact the effectiveness of the proposed day use permit system and quota and may cause unintended resource impacts. Research in other high-use wilderness areas has shown that weekend and peak season use limits can lead to unintended shifts in use to week days and other nonpeak periods increasing resource impacts[76]. Implementation of a long-term visitor use monitoring plan will enable managers to understand if resource conditions are likely to be impacted.

   To implement a long-term monitoring plan, Automated Traffic Recorders (ATRs) and trail counters should be deployed in some of the same locations as they were deployed during the 2012 data collection. This includes two ATRs on Guanella Pass Road and trail counters at the following trails: Mount Bierstadt Trail, Square Top Lakes Trail, and the Rosalie Trail (Figure 9-7). Interim reports should be issued on an annual basis, with an in-depth evaluation every five years to identify trends and determine if adaptive strategies for visitor use management should be considered (as described in *Adaptive Strategy for Long-Term Management* to follow).

[76] Pettebone, D., Meldrum, B., Leslie, C., Lawson, S., Newman, P., Reigner, N., & Gibson, A. (2013). A visitor use monitoring approach on the Half Dome cables to reduce crowding and inform park planning decisions in Yosemite National Park. *Landscape and Urban Planning 118*: 1-9.

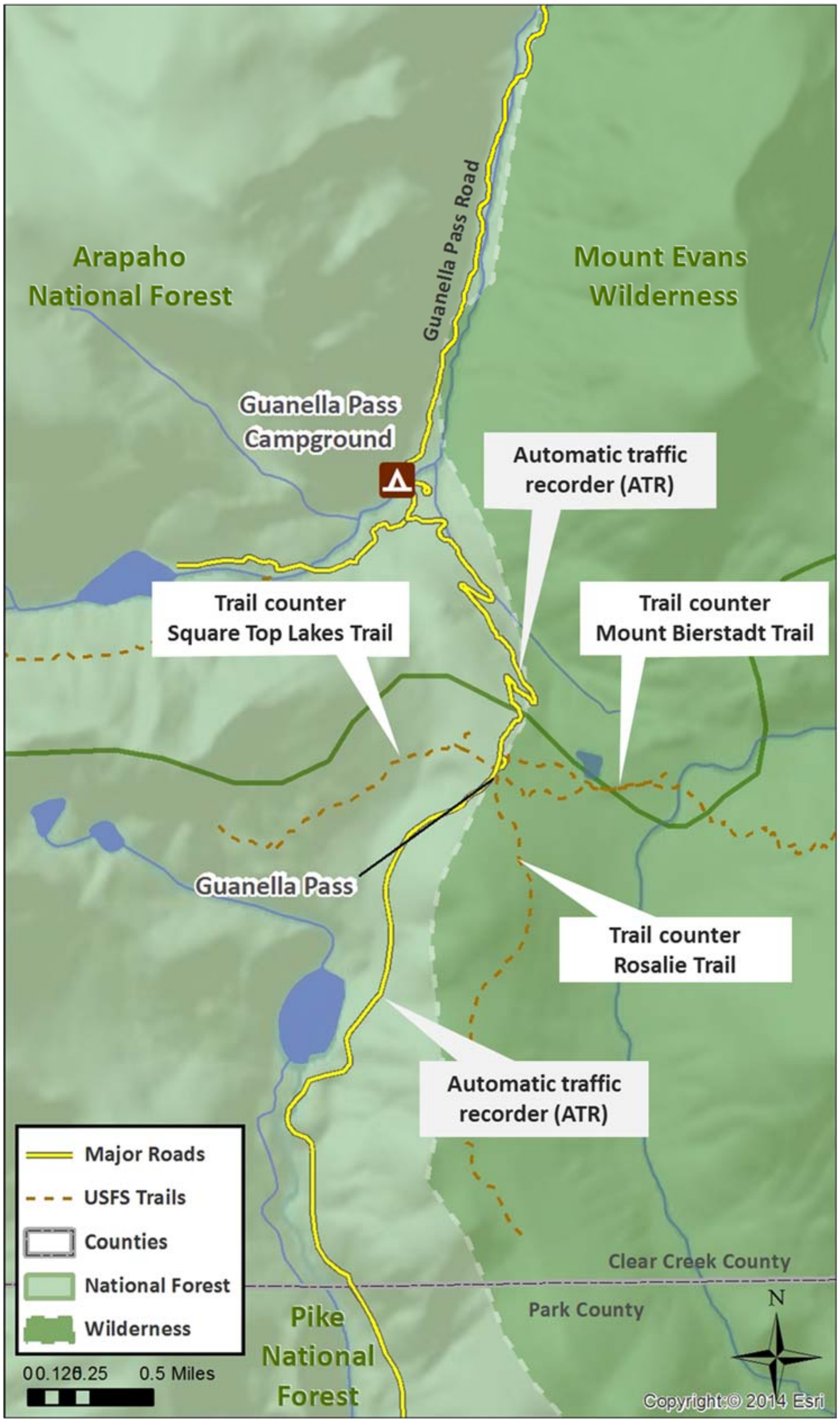

Figure 9-7. Phase 1 Recommendation: ATRs and trail counters for visitor use monitoring at GP (Recommendation 1).

2. Coordinate parking enforcement with Clear Creek County through MOU

Guanella Pass Road is a county road under the jurisdiction of Clear Creek County, Colorado; therefore, County cooperation is needed to reduce unendorsed roadside parking. USFS managers should partner with Clear Creek County to enforce parking restrictions at GP. Initial management partnerships could include a cooperative agreement to have County law enforcement perform occasional patrols of Guanella Pass Road on typically busy peak season days (preferably weekend days and holidays). Long-term, the USFS could work to establish a Memorandum of Understanding with Clear Creek County to have a designated parking management team at GP to manage parking to available spaces and restrict unendorsed roadside parking (as described in more detail in *Phase 2, Recommendation 8: Onsite parking management and permit quota team*).

3. Deploy variable message signs to communicate traffic and parking conditions

Portable (trailer style) variable message signs (VMS; Figure 9-2) should be used on Guanella Pass Road to communicate GP parking restrictions (and future Mount Bierstadt Trail permit restrictions) to arriving visitors (Figure 9-8). Specifically, VMS should be used to remind/inform GP visitors that roadside parking is prohibited at GP, using a message such as, "Roadside Parking Prohibited." VMS should also be used to communicate parking restrictions to inbound visitors when available designated parking spaces are full, using messages such as, "No Parking Available at GP. Drive Through Only," or "Lots Full Between 9:00 AM and 1 PM, Pass Through Only." Using VMS in this manner would communicate parking management policies, set USFS expectations of visitor parking behavior, and assist a future parking management team in directing visitors to available parking options. As future recommendations are implemented at GP (such as a managed-user permit system) VMS messaging should be updated to reflect such changes to visitor accessibility of the site. For example, VMS could be used to inform visitors of future permit restrictions with messages such as, "Permit Required for Mount Bierstadt Trail. Must Have Permit."

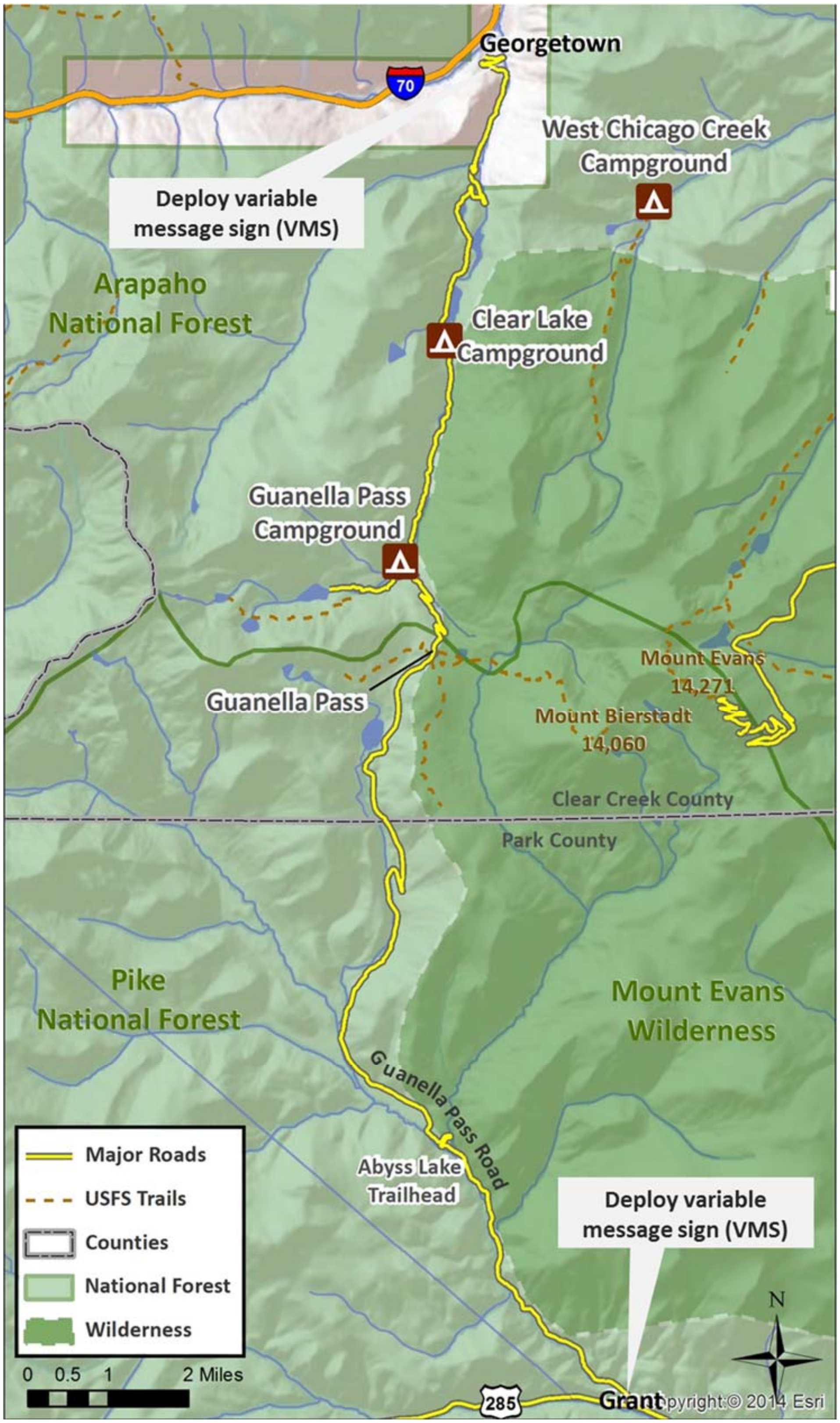

Figure 9-8. Phase 1 Recommendation: Deploy variable message signs to communicate traffic and parking conditions (Recommendation 2).

4. ***Provide pre-trip information through ARNF website and smartphone apps***

   GP survey data show that 88% of visitors to the Mount Bierstadt Trail report that they would likely use the ARNF website as a source of information about parking and crowding conditions at GP, if it were available for planning a future trip. The next highly ranked information source was a smartphone application (67%), which is the only other information source indicated by more than 50% of GP visitors. Currently, ARNF web resources provide little information about peak use times and, when provided, the information is difficult to locate. GP managers should use USFS web resources to communicate future permit requirements for the Mount Bierstadt Trail, parking restrictions and management policies, and peak use conditions to GP visitors before arrival at GP. Messages and related content should be designed to provide visitors with easily accessible information about the advantages of visiting GP during off-peak periods and to set expectations about peak-period conditions, parking availability, and use limits. As future recommendations are implemented at GP (such as a managed-user permit system) web resources should be updated to reflect such changes to visitor accessibility of the site. Secondarily, links to websites and information about other outdoor recreation and tourist destinations in the vicinity of GP could be provided to inform visitors of options to consider as alternatives to visiting GP during peak periods.

   Visitors across all three study sites indicated that they would be likely to use a smartphone application to access information about parking and crowding conditions if it was available for planning a future trip. A smartphone application should be developed for the ARNF, providing information about parking and crowding conditions specific to each of the three study sites. The ROM cost provided for the smartphone application (included in Table 9-2) provides an estimate of the cost for development of a single application, rather than an application specific to GP.

   It should be noted that other methods of information provision such as using social media, highway advisory radio, telephone information lines, and text updates tended to receive significantly less anticipated use than website and smartphone app options.

Phase 2: Midterm Visitor Use, Parking, and Traffic Management Components

5. ***Implement a managed-use Wilderness day use permit system and quota for Mount Bierstadt Trail (300 permits per day)***

   A managed-use Wilderness day use permit system and quota should be implemented to limit the number of day use visitors allowed to hike the Mount Bierstadt Trail on weekends and holidays to approximately 300 people per day (Figure 9-9). Baseline data collected in 2012 indicate that on typically busy peak season days, extreme crowding exists on the summit of Mount Bierstadt. A majority of both weekday and weekend day Mount Bierstadt Trail users indicate that they would feel crowded with 22 people or more in their viewscape while on the summit of Mount Bierstadt. Incorporating this expressed threshold for crowding, the draft Wilderness standard for experience quality that no more than 15% of

Mount Bierstadt Trail hikers experience greater than 22 or more people in their viewscape while on the summit at one time was proposed. Wilderness visitor use simulation modeling suggests that this standard can be achieved at a use level of approximately 400 hikers per day on the Mount Bierstadt Trail. However, GP does not currently have enough designated parking spaces to accommodate the vehicle volume that issuing 400 permits per day would generate. Therefore, the number of permits issued through the managed-use permit system should be limited to the parking capacity of GP — approximately 300 permits per day. Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis by Site provides a detailed description of how the standard and number of permitted hikers were developed. The proposed wilderness day use permit system and quota would require visitors to obtain and display a parking permit for a specific date on which they would be permitted to park at GP and hike the Mount Bierstadt Trail. An online permit system could be used to allow visitors to obtain their permits in advance of their trip to GP; the operation and maintenance cost estimate included for this component is based on an estimate of cost for administering a limited-use per quota system for Half Dome in Yosemite National Park. This recommendation should be implemented in conjunction with Recommendation 7: Deploy onsite parking management and permit quota team (described below).

6. ***Deploy onsite parking management and permit quota team***

An onsite parking management and permit quota team of three people should be deployed at GP full-time during the peak use season (Memorial Day Weekend through Labor Day) to enforce roadside and onsite parking, and issue citations (Figure 9-9). The parking management and permit quota team would operate from 6:00am to approximately 2:00pm (the approximate time when visitor demand for parking does not exceed available parking spaces), with staff members stationed at the entrance to each parking area (one at Lower Lot and one at Upper Lot) and one "roving" staff member. The two staff members stationed at the two designated parking areas would check Mount Bierstadt Trail permits upon entry to the parking area, only allowing those visitors with permits to enter and park in the designated Mount Bierstadt Trail parking spaces. The parking staff member in the Upper Lot would ensure that the spaces reserved for visitors not hiking the Mount Bierstadt Trail are kept available for those visitors. The third roving staff member would direct arriving visitors to parking lots with available parking spaces and direct pass-through traffic on Guanella Pass Road when all GP parking lots are full. The parking management and permit quota team would also be responsible for enforcing use of designated parking only by directing visitors to other destinations, and informing them of options to return during less congested times and/or days. The costs and associated procedures for getting a contract in place for the similar, currently functioning, traffic and parking management team at BLRA should be used as a model for implementing this recommendation at GP.

7. ***Install onsite signs and barriers to deter and prevent unendorsed roadside parking***

Signs and barriers should be installed on both sides of Guanella Pass Road at GP to prevent roadside parking from occurring (Figure 9-9). Historically, designated parking areas have filled to capacity by early morning on typically busy peak season days, with unendorsed roadside parking peaking by late morning. On the design day, unendorsed roadside parking reached its peak by late morning, at which time there were nearly twice as many vehicles parked in unendorsed roadside spaces (approximately 231 vehicles) than there were parked in designated spaces (approximately 106 spaces).

8. ***Designate parking areas for Mount Bierstadt Trail users and "other" GP users***

Parking designations should be implemented for Mount Bierstadt Trail users and "other" GP users (i.e., users that do not intend to hike the Mount Bierstadt Trail) at GP when the mandatory managed-use permit system and quota are in use (Figure 9-9). Ninety-one parking spaces should be designated for Mount Bierstadt Trail users to park, and 15 parking spaces should be reserved for "other" GP users. The proposed ratio of Mount Bierstadt Trail user parking spaces to "other" GP users was designed to maximize the number of Mount Bierstadt Trail permit holders that would have access to a designated parking space at GP, while retaining some parking access for visitors to GP who are not hiking the Mount Bierstadt Trail. Under this parking allocation scenario, some GP visitors, primarily "other" GP users, will be displaced from visiting GP due to a lack of available designated parking. However, this allocation scenario ensures that parking spaces are available to both GP visitor types. For additional detail on the determination of parking spaces for each GP user group see *Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis, by Site.*

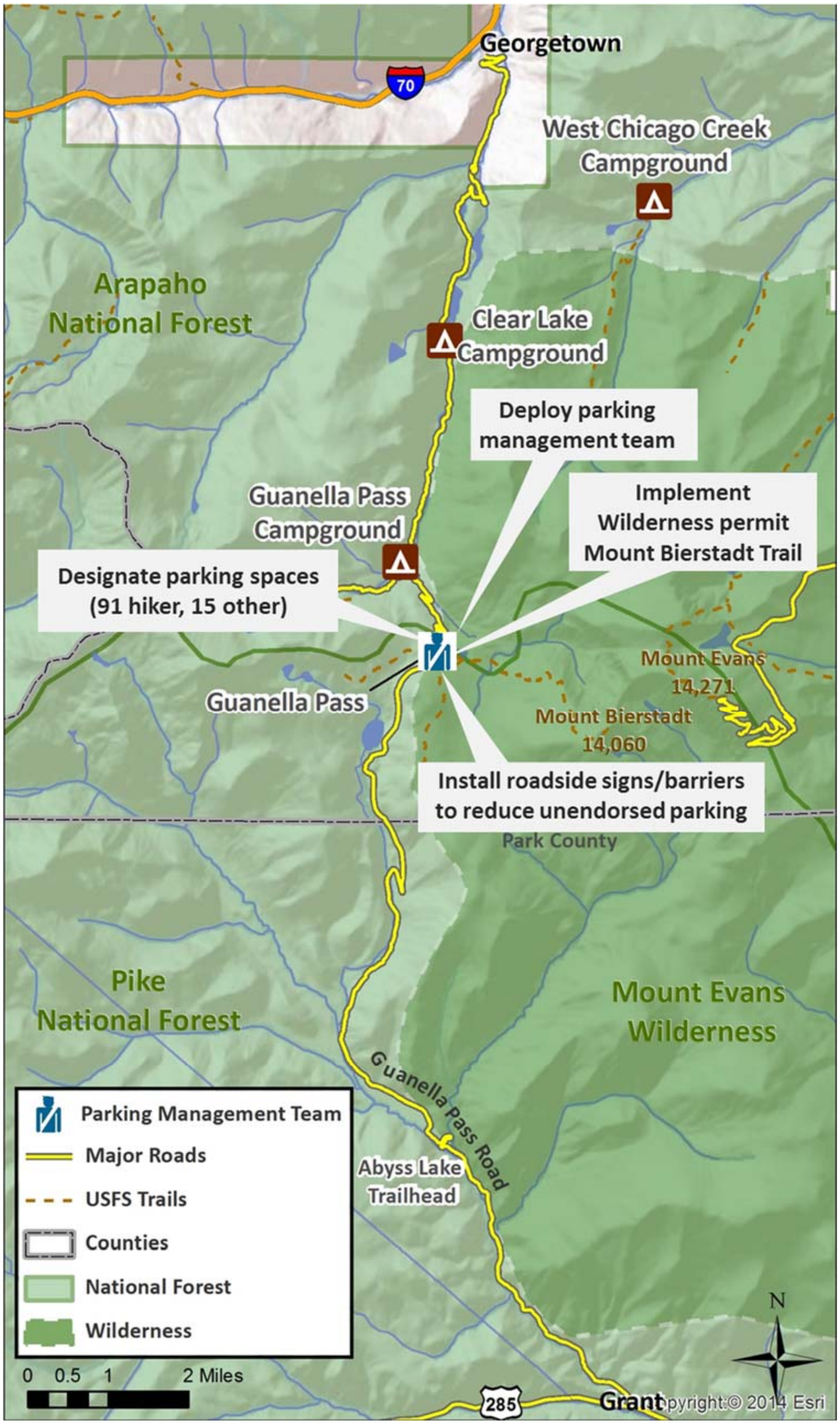

Figure 9-9. Phase 2 Recommendations: Active management of onsite parking (Recommendations 5-8).

Phase 3: Options for Long-Term Visitor Use, Parking, and Traffic Management Components

As previously noted, the parking allocation scenario proposed in *Recommendation 8: Designate parking areas for Mount Bierstadt Trail users and "other" GP users*, was designed with the intention of reducing unendorsed roadside parking at GP, while also ensuring that designated parking spaces are available for the different visitor types arriving at GP. The Wilderness capacity analysis shows that the Mount Bierstadt Trail can accommodate as many as 400 hikers per day while meeting the draft Wilderness crowding standard that no more than 15% of Mount Bierstadt Trail hikers experience crowding conditions on the summit that exceed the visitor-informed crowding indicator of 22 people per viewscape on the summit. However, under the proposed parking allocation scenario for the limited number of physical parking spaces at GP about one-quarter of all Mount Bierstadt Trail permit holders would not be able to park at GP. Similarly, approximately two-thirds of all visitors arriving at GP that do not intend to hike the Mount Bierstadt Trail would not be able to park in a designated parking space (approximately 300 visitors). To reduce and ultimately eliminate unendorsed roadside parking at GP, visitors arriving when parking is not available, both permit holders and non-permit-holders, would have to be turned away from GP. The Wilderness capacity analysis shows that even when use on the Mount Bierstadt Trail is managed to Wilderness capacity, the overall site capacity at GP for designated parking is still exceeded. The following recommendations provide three long-term options for maximizing visitor access to GP while protecting Wilderness resources and values.

9. ***Option 1: Retain managed-use permit system and quota at 300 permits per day without expanding onsite parking as a long-term solution***

   The implemented managed-use Wilderness day use permit system and quota could be limited to 300 permits per day for the long term (as outlined in *Recommendation 6*; Figure 9-10). Under this scenario, the number of allowable permits would be driven by the physical parking capacity of GP rather than the Wilderness capacity of the Mount Bierstadt Trail. Limiting the number of Mount Bierstadt Trail permits to 300 permits ensures that all permit holders would be able to park in one of the existing designated parking spaces at GP, while still retaining approximately 15 parking spaces for other GP visitors that do not intend to hike the Mount Bierstadt Trail. Therefore, this option would not require expansion of the onsite infrastructure at GP (i.e. no expansion of parking, no construction of shuttle stops, etc.)

   While this option would manage use to the parking capacity of GP, it would result in the displacement of a large number of visitors from GP. Under this scenario, Mount Bierstadt Trail use would be limited to less than the allowable use that can be accommodated on the Mount Bierstadt Trail while meeting visitor-established Wilderness experience quality standards — one-quarter of the allowable Mount Bierstadt Trail users (as determined by the Wilderness capacity analysis) would not be accommodated. Furthermore, the parking management and permit quota team described in *Recommendation 7* would have to be retained for the long term to limit parking to designated spaces only, turning away those users that arrive at GP without a permit and/or those users that arrive when there is no available parking at GP.

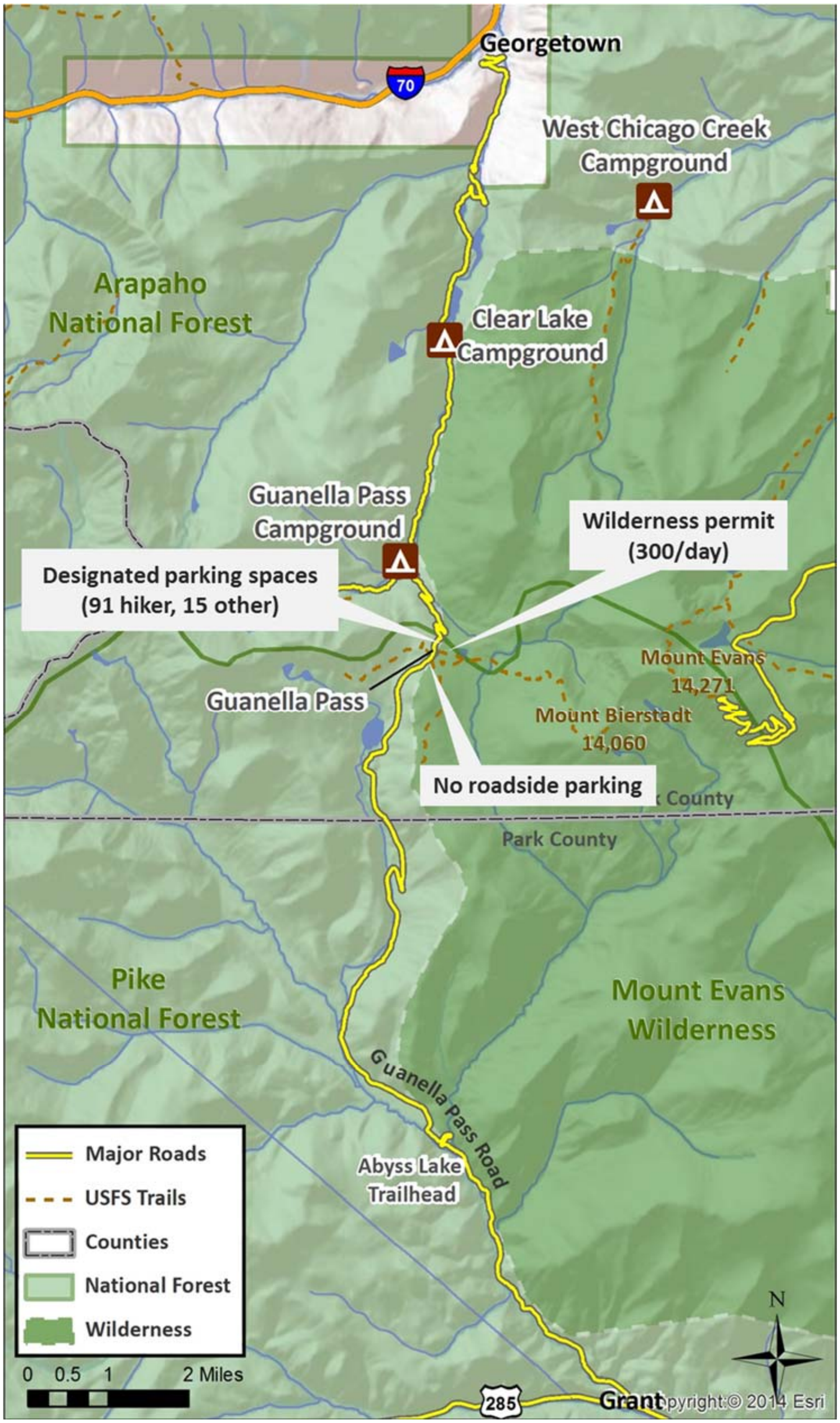

Figure 9-10. Phase 3, Option 1: Retain managed-use permits at 300 per day as a long-term solution (Recommendation 9).

10. Option 2: Increase the managed-use permit system and quota to 400 permits per day and expand onsite parking at GP to accommodate all permit holders in designated parking spaces

The Wilderness capacity analysis indicates that up to 400 hikers per day can be accommodated on the Mount Bierstadt Trail while still meeting the Wilderness experience standard of no more than 15% of Mount Bierstadt Trail users encountering 22 people or more in their viewscape on the summit of Mount Bierstadt. Under this management scenario, the managed-use Wilderness day use permit quota should be increased to this amount (from 300 permits per day) to maximize visitor access to the Mount Bierstadt Trail (Figure 9-11).

To accommodate this increased visitor volume at GP, new parking spaces would be added to the existing paved parking lots at GP to increase parking capacity and help address parking shortages that occur during peak use periods. Parking lot additions would be made to accommodate the 400 permit holders for the Mount Bierstadt Trail, maximizing the allowable use on the Mount Bierstadt Trail while meeting the suggested crowding-related standard. Approximately 30 parking spaces would need to be added to the existing 106 spaces to accommodate all permitted users while retaining 15 parking spaces for GP visitors that do not intend to hike the Mount Bierstadt Trail. Visitors that do not intend to hike the Mount Bierstadt Trail (and do not have a permit to do so) arriving when the 15 parking spaces reserved for "other" GP visitors are full, would be directed to pass through the area without stopping by the onsite parking management and permit quota team (described in *Recommendation 7: Deploy onsite parking management and permit quota team*). This option provides one avenue for accommodating the maximum allowable use on the Mount Bierstadt Trail while still meeting the Wilderness standard; however, the recommendation results in significant displacement of visitors not hiking the Mount Bierstadt Trail and an expanded footprint at GP. Furthermore, this option would continue to require a dedicated parking management and permit quota team during peak use periods to enforce parking restrictions.

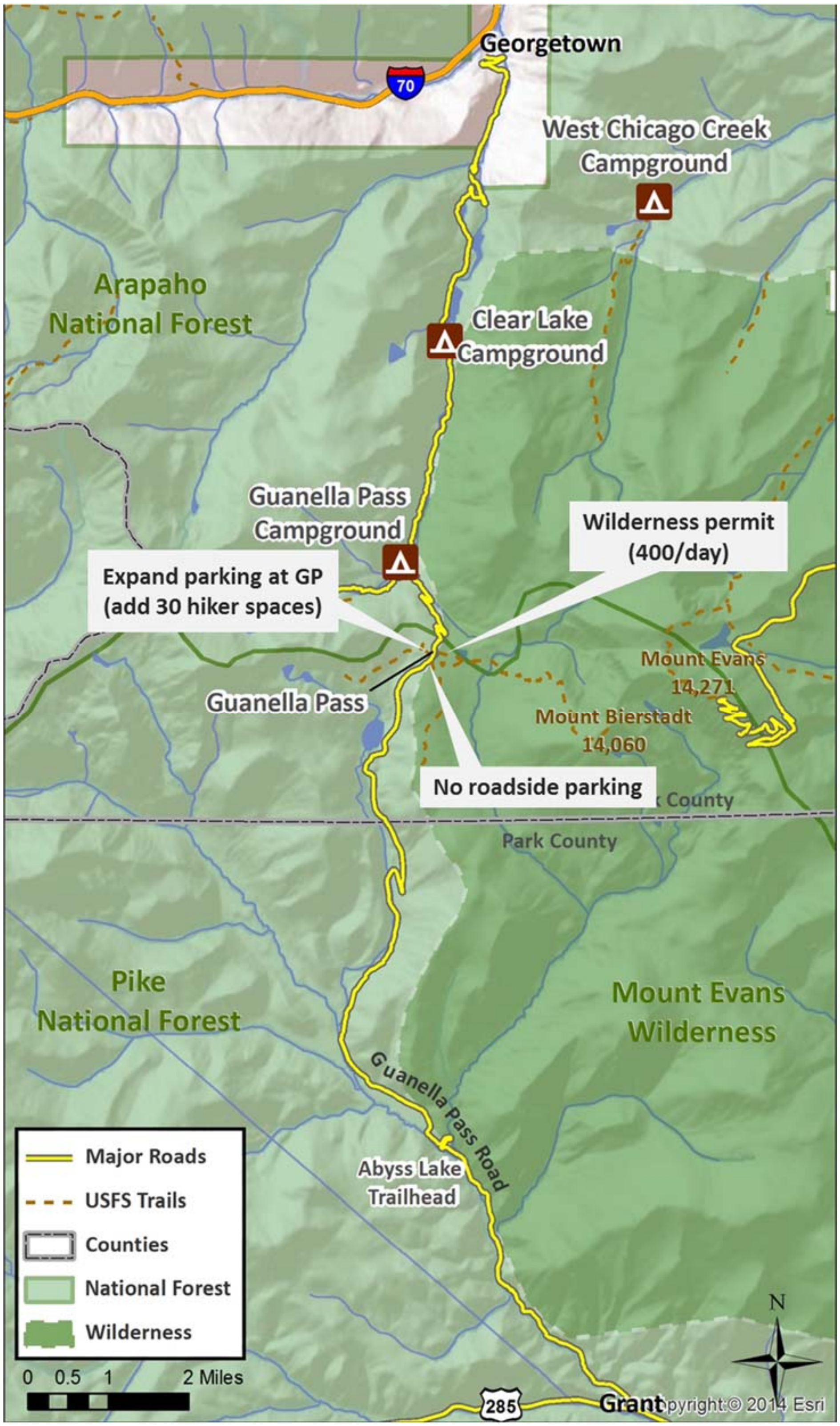

Figure 9-11. Phase 3, Option 2: Increase permit quota to 400 per day and expand onsite parking at GP to accommodate permitted hikers (Recommendation 10).

11. ***Option 3: Increase the managed-use permit system and quota to 400 permits per day, with shuttle service from Georgetown, Colorado, for those permit holders that cannot park in a designated space at GP.***

    As noted in *Recommendation 10*, the Wilderness capacity analysis indicates that up to 400 hikers per day can be accommodated on the Mount Bierstadt Trail while still meeting the Wilderness experience standard of no more than 15% of Mount Bierstadt Trail users encountering 22 people or more in their viewscape on the summit of Mount Bierstadt. Under this management scenario, the managed-use Wilderness day use permit quota would be increased to this amount (from 300 permits per day) to maximize visitor access to the Mount Bierstadt Trail.

    To accommodate the additional demand for permit-holder parking, shuttle buses would provide direct service between a designated park-and-ride lot in Georgetown, Colorado, and the Mount Bierstadt Trail, without any additional en route stops (Figure 9-12). Shuttle service would operate throughout the peak use season, from Memorial Day weekend through Labor Day, servicing the approximately 100 permit holders that would not be able to park at GP. Other GP visitors not able to park in one of the designated spaces at GP would also have the option of using this shuttle service to access GP. An implementation plan with updated visitation numbers and more specific costs should be developed before the recommended shuttle service is implemented at GP.

    To fully implement this recommendation, additional infrastructure would be necessary at GP and in Georgetown, Colorado. At GP, a shuttle drop-off and pick-up area would need to be constructed to provide protection for visitors waiting for the shuttle to return. Additionally, due to the continued parking restrictions, this option would also require continued (albeit reduced) presence of a dedicated traffic and parking management team at GP to enforce the parking allocation policies, prevent unendorsed roadside parking at GP, and to ensure that only permit holders hike the Mount Bierstadt Trail. In Georgetown, a park-and-ride lot would need to be identified and permission acquired for use of space. Infrastructure costs for parking in Georgetown are not included in the rough order of magnitude cost estimate provided (see *Chapter 7: Transit Feasibility Analyses and Recommendations by Site* for additional detail on cost estimation of assumptions for ROM costs for this shuttle service).

    Implementation of this option would provide an alternative to expanding parking capacity at GP; however, implementation would come with tradeoffs to Wilderness experience, visitor safety, and cost. For example, requiring offsite parking and use of shuttle service to access a Wilderness area increases visitor burden by decreasing the convenience of accessing the area. Additionally, intense afternoon thunder storms are known to occur at GP, particularly in the higher elevations at Mount Bierstadt. Unsafe weather conditions could cause surges in visitor demand for access to shuttle service when afternoon thunderstorms hit quickly, and at times, unexpectedly. Shuttle service for hikers would have to accommodate such surges in demand for ridership and shelter during inclement weather. Finally, the cost per passenger for this shuttle service may be cost prohibitive due to the low guaranteed ridership of 100 passengers per day (those 100 permit holders that cannot be accommodated by existing onsite GP parking spaces).

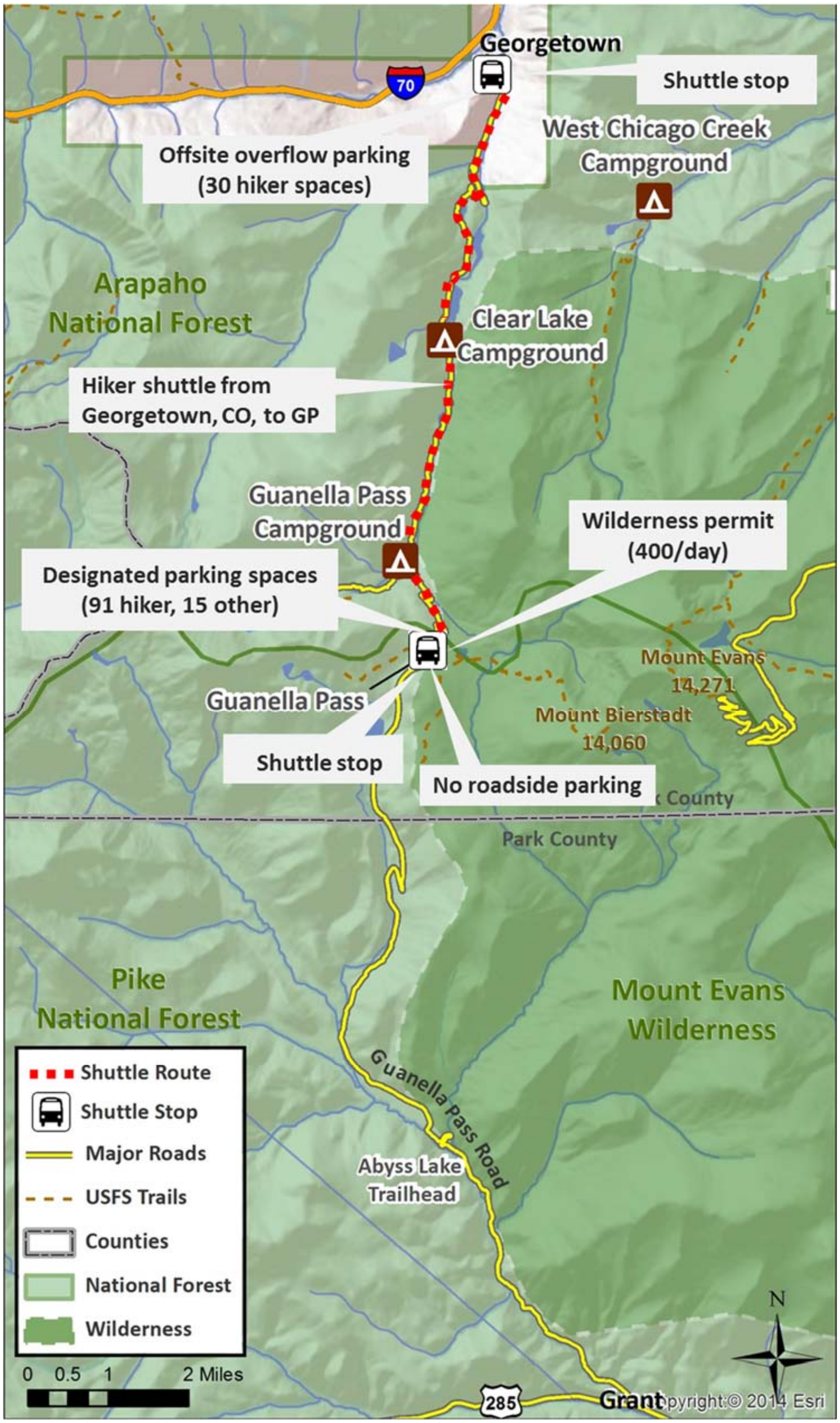

Figure 9-12. Phase 3, Option 3: Increase permit quota to 400 per day and provide transit for permit holders that will not fit in existing designated parking spaces at GP (Recommendation 11).

Adaptive Strategy for Long-Term Management

As described in Recommendation 1: Implement visitor use monitoring for adaptive management, a long-term visitor use monitoring plan should be implemented at GP to systematically document trends in visitor use. Implementation of a visitor use monitoring plan is critical to verifying that visitor use levels, managed according to the proposed recommendations, do not increase to levels that result in unacceptable resource conditions, particularly on the Mount Bierstadt Trail in the Mount Evans Wilderness. If results from the monitoring plan indicate that visitor use significantly increases at GP in the future, despite implementation of managed-use strategies, a more in-depth study should be initiated at that time to determine the extent of increased use and corresponding impacts to Wilderness resources. Such in-depth studies would provide data-driven recommendations to evaluate the potential changes to the managed-use permit quota for the Mount Bierstadt Trail and/or parking at GP. Two potential management actions that could be considered if adaptive management of the implemented recommendations is needed is reducing the number of permits available for weekday use and/or increasing the provision of parking and/or transit services.

12. ***Reduce permit quota for weekday Mount Bierstadt Trail use if demand shifts to weekdays to preserve a different experience for weekday users***

    Reducing the available permits for weekday use may be warranted if conditions on the Mount Bierstadt Trail change significantly during the week due to an influx of weekday trail users that have been displaced from using the trail on the weekend due to the permit quota. Differentiating the number of available permits between weekday and weekend use should only be considered if preserving current weekday use levels on the Mount Bierstadt Trail (which the present study found to be lower than weekend use levels) is a management priority.

13. ***Increase transit and/or parking at GP if displacement of other GP users is excessive***

    Increasing the provision of parking and/or transit service to GP could also be considered as an adaptive management strategy if displacement of existing GP users is excessive due to the implementation of parking restrictions at GP. Recommended actions may result in an unacceptable level of visitor displacement from the site, in which case additional parking and/or transit would be needed to increase access to the site while achieving goals of eliminating unendorsed roadside parking.

Mount Evans Recreation Area Recommendations

Overview of MERA Needs[77]

The following transportation, recreation, and resource management-related needs were identified at MERA through considering public input, reviewing previous studies and planning documents, and collecting and analyzing new baseline data:

- Unendorsed roadside parking causes resource impacts and visitor safety risks.
- Traffic congestion and gridlock occur on the road near Summit Lake and the Mount Evans Summit.
- Conflict exists between bicyclists and motor vehicles on the Mount Evans Highway.
- Extreme crowding occurs at the MERA Welcome Station during peak periods.
- The Mount Evans Highway is a steep, narrow, and scenic roadway, and existing deterioration of the roadway causes driver safety risks.

MERA Recommendations

MERA recommendations are organized into two phases of implementation, providing short-term and long-term approaches for managing transportation and visitor use according to the physical capacity of designated parking at MERA. The MERA recommendations reflect the paramount importance to visitors of scenic auto touring and need to address congestion-related impacts to scenic driving experiences. The recommendations further reflect the fact that Wilderness use at MERA is relatively low and Wilderness use impacts are not pronounced. The recommendations are summarized in Table 9-3 and described in more detail in the following subsections.

- Phase 1 recommendations seek to reduce parking congestion and unendorsed roadside parking through active parking management; visitor use and user capacity monitoring is also recommended.
- Phase 2 provides three options for limiting vehicle access into MERA according to the physical capacity of designated parking spaces, while maximizing overall visitor use via transit and/or a reservation system.

An adaptive strategy for management consideration is included after presentation of the phased recommendations. The adaptive management strategy should be considered depending on the long-term option selected in Phase 2 and the outcomes of implementing the selected long-term option.

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[77] See *Chapter 4: Need Identification by Site* for a more detailed description of need identification for MERA.

Table 9-3. Implementation Plan for Transportation and Visitor Use Management Recommendations, MERA

Recommended Alternatives by Implementation Phase		Rough Order of Magnitude (ROM) Costs**	
Phase 1		**Capital**	**Operating & Maintenance**
1.	Deploy onsite traffic and parking management team	-	$41,000
2.	Coordinate parking and queuing management with CDOT through Memorandum of Understanding	-	$14,000
3.	Install onsite signs and barriers to deter and prevent unendorsed roadside parking	$11,000	-
4.	Deploy variable message signs to communicate traffic and parking conditions	$40,000	$1,000
5.	Provide pre-trip information through ARNF website, smartphone apps, and info centers*	$210,000	$54,000
	Update and Maintenance of ARNF Website	-	*($14,000)*
	Creation and Distribution of Information at Information Centers	*($10,000)*	-
	Development and Maintenance of Smartphone Application for ARNF	*($200,000)*	*($40,000)*
6.	Designate dates and/or times for bicycle access	-	*Included in 2*
7.	Implement visitor use monitoring for adaptive management*	$6,000	$20,000
	Automated Traffic Recorders	*($3,000)*	*($3,000)*
	Trail Counters	*($3,000)*	*($3,000)*
	Annual Interim Reports and Five-Year Evaluation for Trends	-	*($14,000)*
	Phase 1 ROM Cost**	**$267,000**	**$130,000**
Phase 2			
8.	***Option 1:*** Designate mandatory parking in new overflow parking lot near Welcome Station when lots are full, and operate van tour service of MERA	$1,721,000	$134,000
9.	***Option 2:*** Designate mandatory overflow parking in Idaho Springs, Colorado, and operate transit and van tours of MERA, when lots at MERA are full	$2,475,000	$270,000
10.	***Option 3:*** Implement a managed-use reservation system (in partnership with CDOT), with or without overflow parking and transit (dependent on number and type of reservations available)	-	$220,000
	Phase 2 ROM Cost**	*Dependent on Option Selected*	
Adaptive Management			
11.	If applicable and needed, move toward implementation of Option 3 (above)	N/A	N/A

*Recommendations with multiple line items included in cost have been broken out for context. **ROM costs are adapted from Class C cost estimates for other similar projects and provide only a rough estimate of cost; detailed cost estimates should be prepared prior to implementation.

Phase 1: Short-Term Visitor Use, Parking, and Traffic Management Components

1. ***Deploy onsite traffic and parking management team***

   A four-person traffic and parking management team should be deployed at MERA on weekend days during the peak season (approximately Memorial Day Weekend through Labor Day; Figure 9-13) from 8:00am – 4:00pm. One staff member should be stationed at each of the designated parking lots (i.e., Mount Goliath Natural Area, Summit Lake, and the summit of Mount Evans). The three parking management team staff members deployed at the individual parking areas inside MERA would be responsible for limiting parking to the available designated parking spaces within their respective parking areas. These team members would use two-way radios to communicate with a fourth member of the parking management team and the USFS Welcome Station staff to signal when parking areas are full. The fourth member of the parking management team would be positioned at the Welcome Station to coordinate communication of parking conditions inside MERA (received from the three other parking management team members via radio) to the Welcome Station staff and manage the queue for vehicle access to MERA. If parking inside MERA is available, staff at the Welcome Station would let arriving visitors enter. If parking inside MERA is not available upon visitor arrival, the Welcome Station staff would inform visitors of the option to wait in a vehicle queue for an available space or to turn around and leave MERA. The costs and associated procedures for getting a contract in place for the similar, currently functioning, traffic and parking management team at BLRA should be used as a model for implementing this recommendation at MERA.

2. ***Coordinate parking and queuing management with CDOT through MOU***

   Management of the Mount Evans Scenic Byway, particularly as it relates to vehicle access and road closures, falls under the jurisdiction of the Colorado Department of Transportation (CDOT); therefore, CDOT cooperation is needed to actively manage vehicle access to MERA. USFS managers should partner with CDOT to enforce parking restrictions at MERA and to limit vehicle access to MERA when parking areas are full. A cooperative agreement or a Memorandum of Understanding (MOU) could be used to establish clear roles in the jurisdiction and responsibility of the USFS and CDOT as they relate to management of visitor entry to MERA via the Mount Evans Scenic Byway. Specifically, an agreement that enables the USFS to prevent vehicle access to MERA when all parking areas are full to increase visitor safety and avoid reaching absolute parking capacity should be established. As the MERA capacity analysis indicates, on typically busy peak season days, gridlock occurs on the Mount Evans Scenic Byway such that vehicles are, in essence, parked in the roadway. This creates visitor safety concerns in the event of a necessary rapid evacuation due to inclement weather. Vehicle queues at the Welcome Station have historically impacted traffic flow on the I-70 corridor, creating additional visitor safety concerns. Through a partnership enabling active management of vehicle entries and queuing, the USFS and CDOT can improve visitor safety and experience.

3. ***Install onsite signs and barriers to deter and prevent unendorsed roadside parking***

   Roadside signs and barriers should be installed on the Mount Evans Scenic Byway at the Mount Goliath Natural Area, Summit Lake, and the summit of Mount Evans to prevent roadside parking from occurring when parking lots in these locations are full (Figure 9-13). This recommendation should be paired with a dedicated traffic and parking management team in MERA to be effective in preventing the occurrence of unendorsed roadside parking (as described in detail in *Recommendation 1: Deploy onsite traffic and parking management team*).

4. ***Deploy variable message signs to communicate traffic and parking conditions***

   The MERA parking capacity analysis indicates that parking capacity is exceeded at MERA such that absolute parking capacity is reached, creating gridlock in parking areas and on the road way. A portable (trailer style) variable message sign (VMS; Figure 9-2) should be placed in an approved highway location en route to MERA on Route 103 near Idaho Springs, Colorado, to provide arriving visitors with up-to-date parking and traffic information. Messages displayed on the VMS should be used to inform visitors of available parking and scenic driving conditions, using messages such as, "All Mount Evans Parking Full, 50 Minute Wait Time," or, "Congested Road Conditions, Consider Alternate Route for Scenic Driving." Alternative VMS messages for other MERA parking conditions include, "All Mount Evans Parking Open," or "Use Mount Goliath Parking Area." Using VMS in this manner would assist the parking management team in 1) directing visitors to available parking options, and 2) restricting unendorsed parking through setting visitor expectations about available parking options before arrival at the Welcome Station (Figure 9-13).

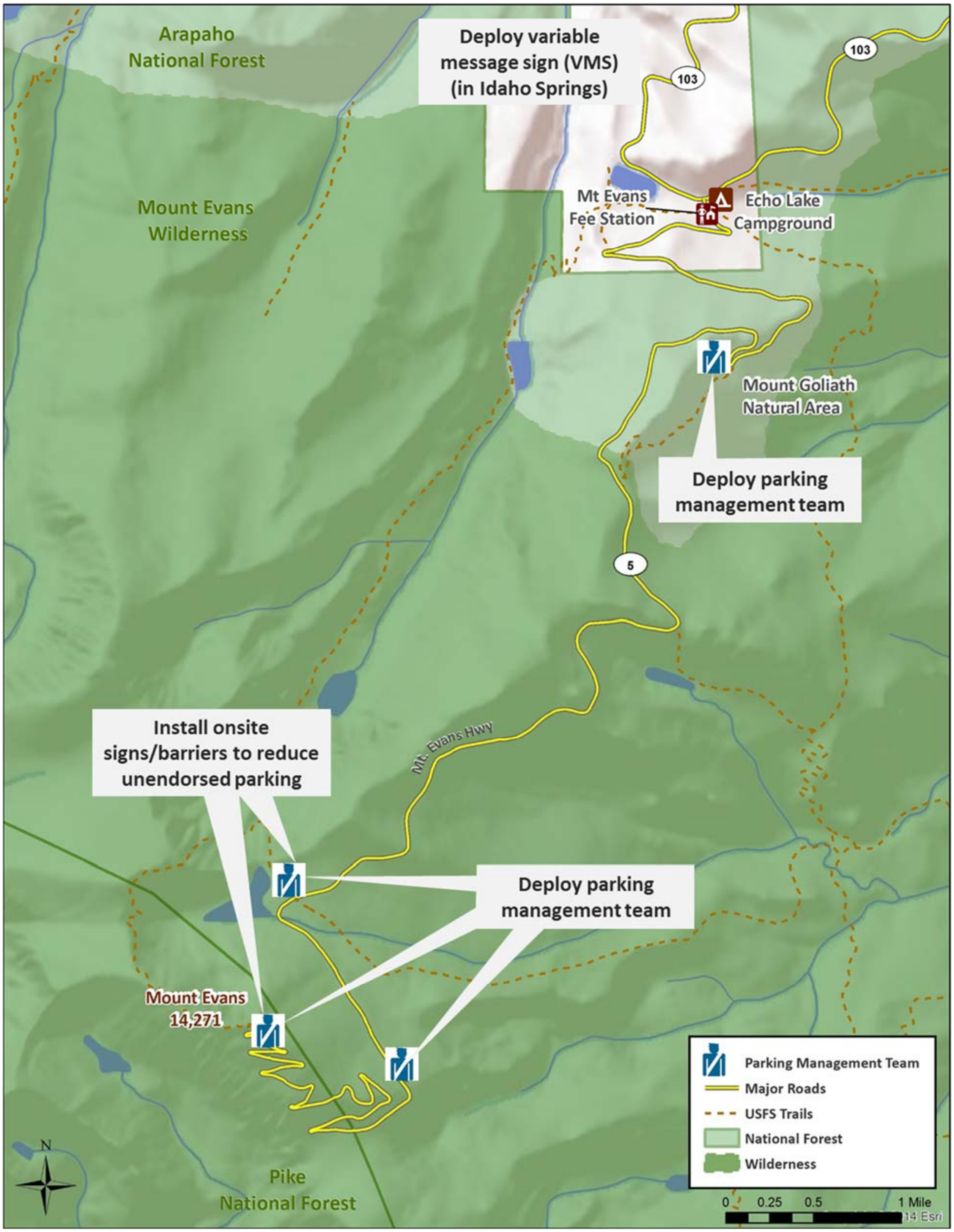

Figure 9-13. Phase 1 Recommendations: Onsite parking management within MERA and VMS (Recommendations 1-4)

5. Provide pre-trip information through ARNF website, smartphone apps, and info centers

MERA survey data show that 83% of visitors to MERA report that they would likely use the ARNF website as a source of information about parking and crowding conditions at MERA, if it was available for planning a future trip. Other sources of information that ranked highly among MERA visitors include tourist information centers (65%) and smartphone applications (64%). Currently, detailed information about peak use times and parking conditions at MERA is not readily available on the ARNF website. Pre-trip information should be made available to MERA visitors via web resources and tourist information centers with messages and related content designed to provide visitors with information about peak-period conditions and parking availability. Additionally, messaging encouraging visitation during off-peak periods may also be useful to visitor planning. Links to websites and information about other outdoor recreation and tourist destinations in the vicinity of MERA, particularly other scenic driving areas, could also be provided to inform visitors of options to consider as alternatives to visiting MERA during peak periods. This component could be coupled with one or more future transit components to provide pre-trip information about shuttle service and parking options to visitors.

Paper brochures should be made available at tourist information centers to distribute information about parking management practices and policies, maps of alternative parking locations and connector trails, and information about peak use times and/or recreation alternatives.

Visitors across all three study sites indicated that they would be likely to use a smartphone application to access information about parking and crowding conditions if it was available for planning a future trip. A smartphone application should be developed for the ARNF, providing information about parking and crowding conditions specific to each of the three study sites. The ROM cost provided for the smartphone application (included in Table 9-3) provides an estimate of the cost for development of a single application, rather than an application specific to GP.

It should be noted that other methods of information provision such as using social media, highway advisory radio, telephone information lines, and text updates tended to receive significantly less anticipated use than website, tourist information center, and smartphone app options for communicating pre-trip information.

6. Designate dates and/or times for bicycle access

Specific days of the week and/or times of day should be designated for bicycle access on the Mount Evans Scenic Byway between the Welcome Station and the summit of Mount Evans. Under this management action, cyclists would be allowed access to MERA only during designated periods. Managers could consider limiting or prohibiting motor vehicle access during periods of designated bicycle access to reduce conflicts between bicycles and motor vehicles.

7. ***Implement visitor use monitoring for adaptive management***

A long-term plan for visitor use monitoring should be implemented to gauge the impact of visitor use on resource conditions at MERA. The MERA capacity analysis suggests that parking capacity is exceeded at current visitor use levels. Results from the visitor survey also suggest that scenic driving is the primary visitor activity at MERA, and that a small proportion of visitors that hike to the true summit of MERA do not feel crowded on the summit. These conclusions about capacity and visitor use are derived from baseline measurements of use under current visitor use and transportation management strategies. Through the implementation of a long-term visitor use management plan, managers will be able to identify trends in visitor use that can be used to understand if resource conditions are likely to be impacted by changes in visitor use levels and patterns.

To implement a long-term monitoring plan, one Automated Traffic Recorder (ATR) and three trail counters should be deployed in the same locations as they were deployed during the 2012 baseline data collection. This includes an ATR on the Mount Evans Scenic Byway and trail counters at each the following trails: to the Mount Evans Trail (Summit Lake area), the Overlook Trail (Summit Lake area), and Summit Trail (Mount Evans summit; Figure 9-14). Interim visitor use monitoring reports should be issued on an annual basis, with an in-depth evaluation every five years to identify trends and determine if adaptive strategies for visitor use management should be considered.

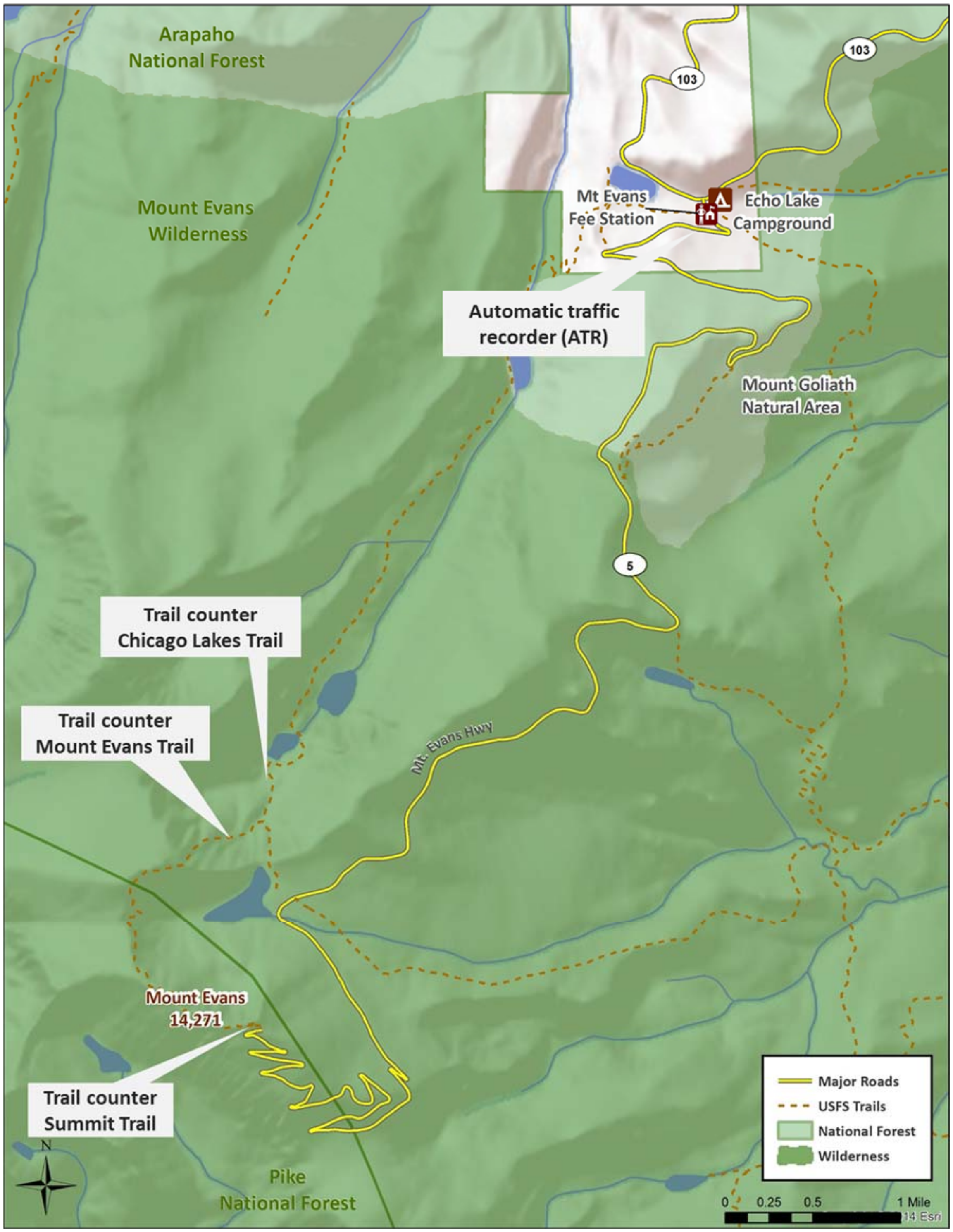

Figure 9-14. Phase 1 Recommendation: ATRs and trail counters for visitor use monitoring at MERA (Recommendation 7).

Phase 2: Options for Long-Term Visitor Use, Parking, and Traffic Management Components

As indicated by results of the MERA capacity analysis, visitor demand for parking in MERA exceeds available parking capacity. In fact, baseline data collection of traffic and parking conditions from 2012 show that MERA reaches absolute capacity on typically busy peak season days. Data from the visitor survey also suggest that scenic driving is the primary visitor activity at MERA, and that crowding on the "true" summit of Mount Evans is not a concern for visitors who make it there. These data together suggest that parking capacity, rather than Wilderness capacity, is the limiting factor at MERA. The recommendations included in Phase 1 are anticipated to only partially reduce unendorsed roadside parking at MERA because the recommended actions do not reduce and/or actively manage visitor demand for access into MERA. The three Phase 2 options for visitor use and transportation management included in the section to follow seek to build upon the progress generated through implementation of Phase 1 recommendations to manage visitor demand and access to MERA such that parking capacity is not exceeded.

8. ***Option 1: Designate mandatory parking in new overflow parking lot near Welcome Station when lots are full, and operate a circulator shuttle service of MERA***

   A new overflow parking lot would be constructed near the MERA Welcome Station (Figure 9-15). When all available parking lots in MERA are full, USFS staff members at the Welcome Station would not allow visitors to continue entering MERA. Instead, arriving vehicles would be directed to park in the newly constructed overflow parking area by a member of the parking and traffic management team. When all available overflow parking is full, arriving visitors would be turned away at the Welcome Station in order to prevent unsafe traffic conditions within MERA and on the surrounding roadways.

   Onsite scoping suggests that there are limited opportunities for constructing a new parking area near the MERA Welcome Station. The new parking area would need to accommodate 120 vehicles in order to accommodate current visitor demand for access to MERA. The following two potential options for overflow vehicle parking were identified through the transit feasibility analysis: 1) a property adjacent to Echo Lake Lodge and Campground, and 2) the old Echo Lake Ski Area. To date, contact with land owners has not be made to determine feasibility of actually developing such options.

   A circulator shuttle between the proposed overflow parking lot near the Welcome Station and MERA destinations would have to be implemented in conjunction with mandatory parking in the overflow lot to provide site access to visitors from this lot. The transit demand analysis for this shuttle service option estimates that approximately 552 passengers per day would use the service. Shuttle service would operate between the newly constructed overflow parking area near the Welcome Station and the summit of Mount Evans, with en route shuttle stops at Echo Lake Campground, Mount Goliath Natural Area, and Summit Lake. Shuttle service would operate on weekends and holidays from Memorial Day weekend through Labor Day, running from 10:00 am to 7:30 pm to accommodate visitor demand. The proposed service route would run on a 20-minute loop, with wait times decreasing during peak periods with the addition of extra shuttles servicing the route. The parking capacity and transit ridership demand analyses are reported in *Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis, by Site*, and the estimated costs and proposed schedule and operation details are described in *Chapter 7: Transit Feasibility Analyses and Recommendations by Site*. An implementation plan with updated visitation numbers and more specific costs should be developed before the recommended shuttle service is implemented at MERA.

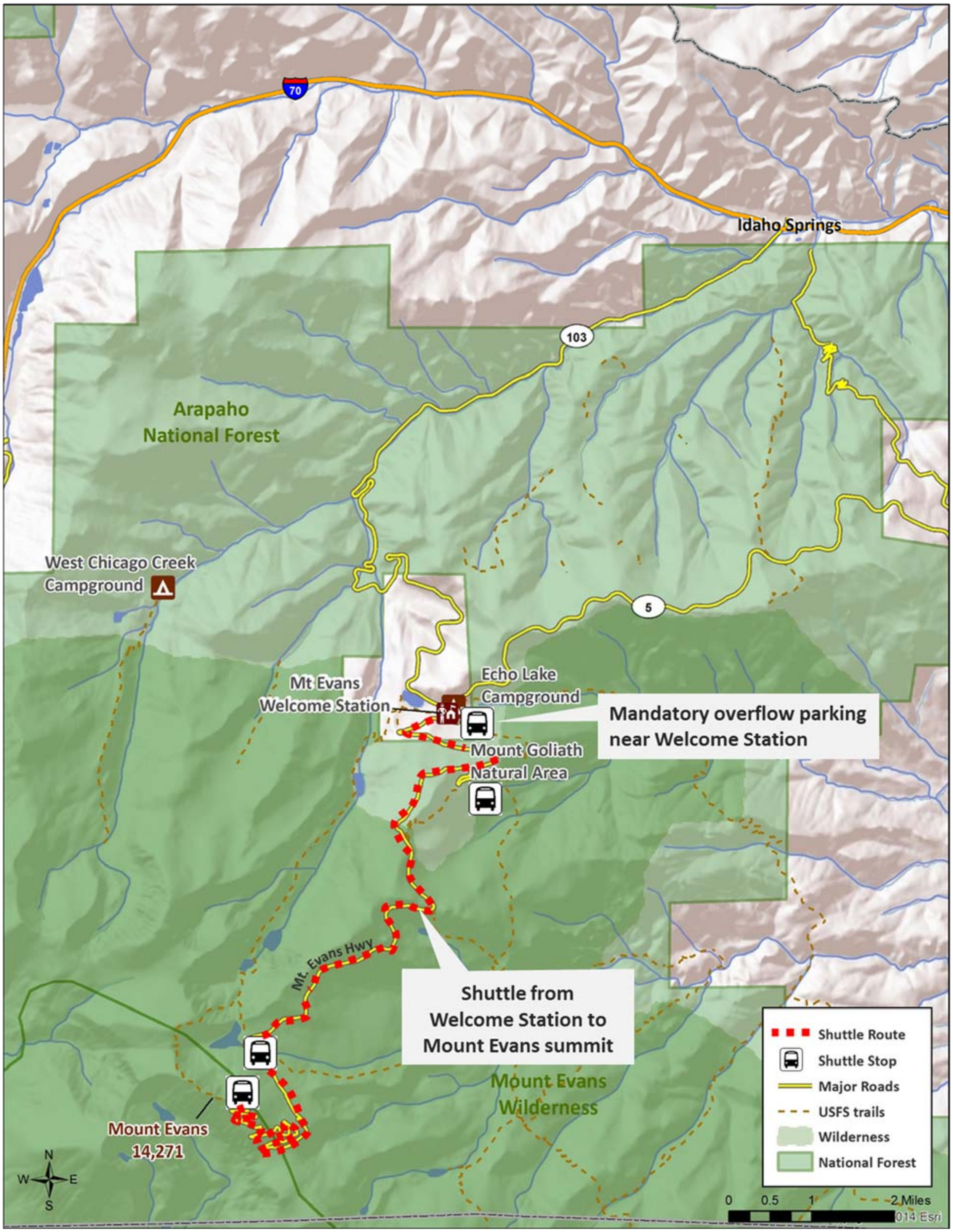

Figure 9-15. Phase 2, Option 1: Overflow parking at Welcome Station with shuttle to Mount Evans Summit (Recommendation 8).

9. *Option 2: Designate mandatory overflow parking in Idaho Springs, Colorado, and operate transit and van tours of MERA, when lots at MERA are full*

When parking lots inside MERA are filled to capacity, arriving visitors would not be allowed to enter MERA. En route VMS on I-70 (before Idaho Springs) and on Highway 103 would be updated with messaging to indicate that all MERA visitors must park in Idaho Springs and take a shuttle to access MERA (Figure 9-16). Shuttle service would operate between a designated park-and-ride lot in Idaho Springs, Colorado, and the summit of Mount Evans. En route shuttle stops would occur at Echo Lake, Echo Lake Campground, Mount Goliath Natural Area, and Summit Lake. The transit demand analysis for this shuttle service option estimates that approximately 211 passengers per day would use this service if it was their only option for visiting MERA. Shuttle service would run from 10:00 a.m. to approximately 8:00 p.m. The parking capacity and transit ridership demand analyses are reported in *Chapter 6: ARNF Integrated User Capacity and Transit Demand Analysis, by Site*. The estimated costs, proposed schedule, and operation details are described in *Chapter 7: Transit Feasibility Analyses and Recommendations by Site*. An implementation plan with updated visitation numbers and more specific costs should be developed before the recommended shuttle service is implemented at MERA.

This potential option for accommodating visitor demand for access while managing to parking capacity has tradeoffs that impact the effectiveness of this option. First, in order to fully implement this recommendation, a park-and-ride location would have to be identified in Idaho Springs, Colorado. Onsite scoping suggests that potential options for parking in Idaho Springs include the Idaho Springs High School, USFS Visitor Center, and the fairgrounds/rodeo located along I-70. At this time, these options have not been explored for feasibility, and land owners have not been contacted. Additionally, cost per passenger for this option is estimated to range from approximately $29.00 to $33.00 per passenger depending on vehicle acquisition by the USFS — implementation of this option may be cost prohibitive due to high cost per passenger. Finally, estimated ridership was determined through asking MERA visitors if they would be likely to use the shuttle service if it was their only option for visiting MERA on a future trip. Only 23% of respondents indicated that they would be likely to use the shuttle service. It was assumed that the remaining 66% would choose to go somewhere else. Due to the primacy of scenic driving as an activity and the longer shuttle ride between Mount Evans and Idaho Springs, it is not anticipated that this shuttle service would be fully utilize.

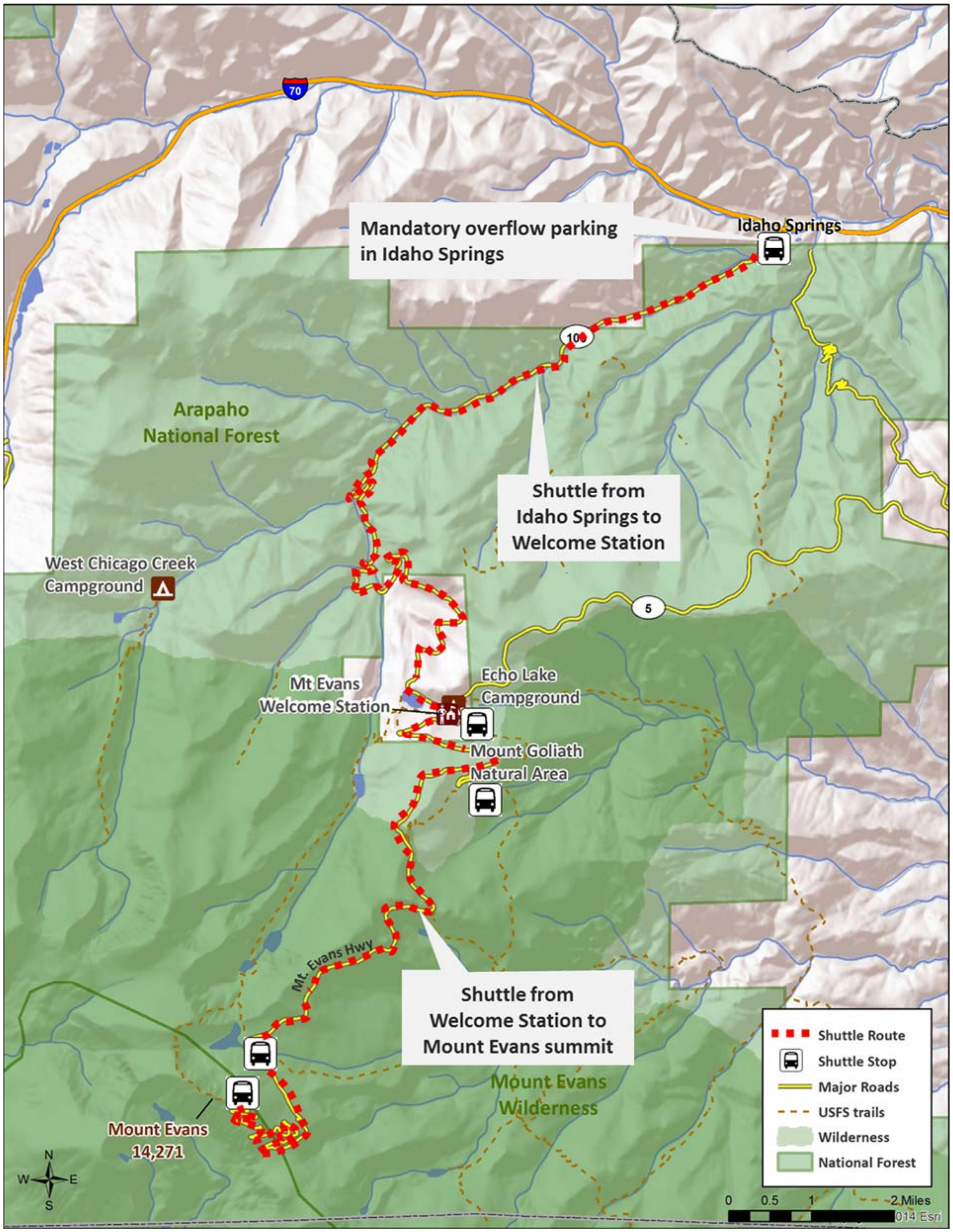

Figure 9-16. Phase 2, Option 2: Overflow parking at Welcome Station with shuttle to Mount Evans summit (Recommendation 9)

10. ***Option 3: Implement a managed-use reservation system (in partnership with CDOT), with or without overflow parking and transit***

A managed-use reservation system and quota would be implemented to manage the number and arrival pattern of day use visitors in MERA (Figure 9-17). Under such a system, all visitors would be required to obtain and display a permit for a specific date and time period during which they would be allowed to enter MERA. Through stratifying reservations by date and time of day, the permit system could maximize the number of individuals able to access MERA while ensuring that parking capacity is not exceeded at approximately 620 vehicles per day. An online reservation system should be used to allow visitors to obtain their permits in advance of their trip to MERA. The number and distribution of day use permits would be based on the parking capacity of MERA. This option could be implemented with or without overflow parking and/or transit service.

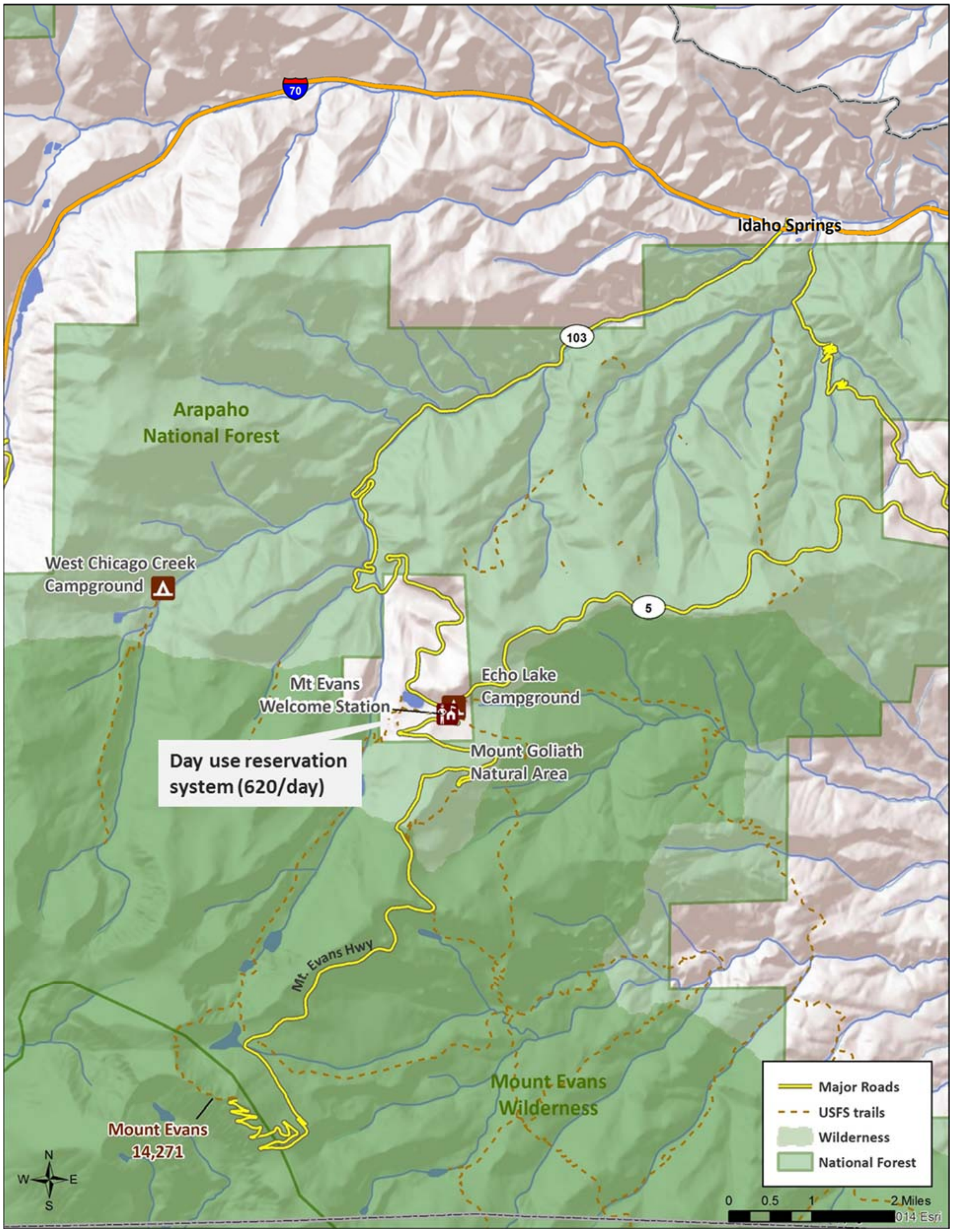

Figure 9-17. Phase 2, Option 3: Day use reservation system for access to MERA (Recommendation 11).

11. Adaptive Strategy for Long-Term Management

As described in *Recommendation 7: Implement visitor use monitoring for adaptive management*, a long-term visitor use monitoring plan should be implemented at MERA to identify trends in visitor use. Implementation of a visitor use monitoring plan is critical to verifying that visitor use levels, managed according to the proposed recommendations, do not increase to levels that result in unacceptable resource conditions. This is particularly important for conditions on the summit of Mount Evans, which were show to be acceptable under current use by visitor survey results. If results from the monitoring plan indicate that visitor use significantly increases at MERA in the future, despite implementation of managed-use strategies, a more in-depth study should be undertaken at that time to determine the extent of increased use and corresponding impacts to scenic driving and Wilderness resources in the Mount Evans Wilderness. Such in-depth studies would provide data-driven recommendations to evaluate the potential changes to visitor use and transportation management strategies at MERA.

A potential management action that could be considered if adaptive management of the implemented recommendations is needed, and dependent on which long-term management option is selected for initial implementation, is moving from a scenario that relies on overflow parking and/or provision of transit to manage visitor use and access to moving toward implementation of a managed-use reservation system (described in *Recommendation 10*). This action could be considered if the addition on overflow parking and/or shuttle service (if Options 1 or 2 are chosen) are insufficient to meet the demand for visitor access to MERA.

Appendix A. BLRA Indian Peaks Wilderness Visitor Survey Instrument

OMB #: 0596-0232
Expiration Date: 02/28/2017

Brainard Lake Recreation Area - Indian Peaks Wilderness Visitor Survey 2014

ID: ________ **Date:** ______________

Time:__________ **AM/PM** **Shuttle Car:** Yes/No

Respondent: Driver / Passenger **Motorcycle:** Yes / No

Weather: Sunny / Partly / Overcast / Raining **Camp at Pawnee:** Yes / No

Special Event: No/Yes____

PRIVACY ACT STATEMENT

16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by USDA Forest Service managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Thus the permanent data will be anonymous. Data collected through visitor surveys may be disclosed to the Department of Justice when relevant to litigation or anticipated litigation, or to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting a violation of law.

Burden Statement

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0232. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

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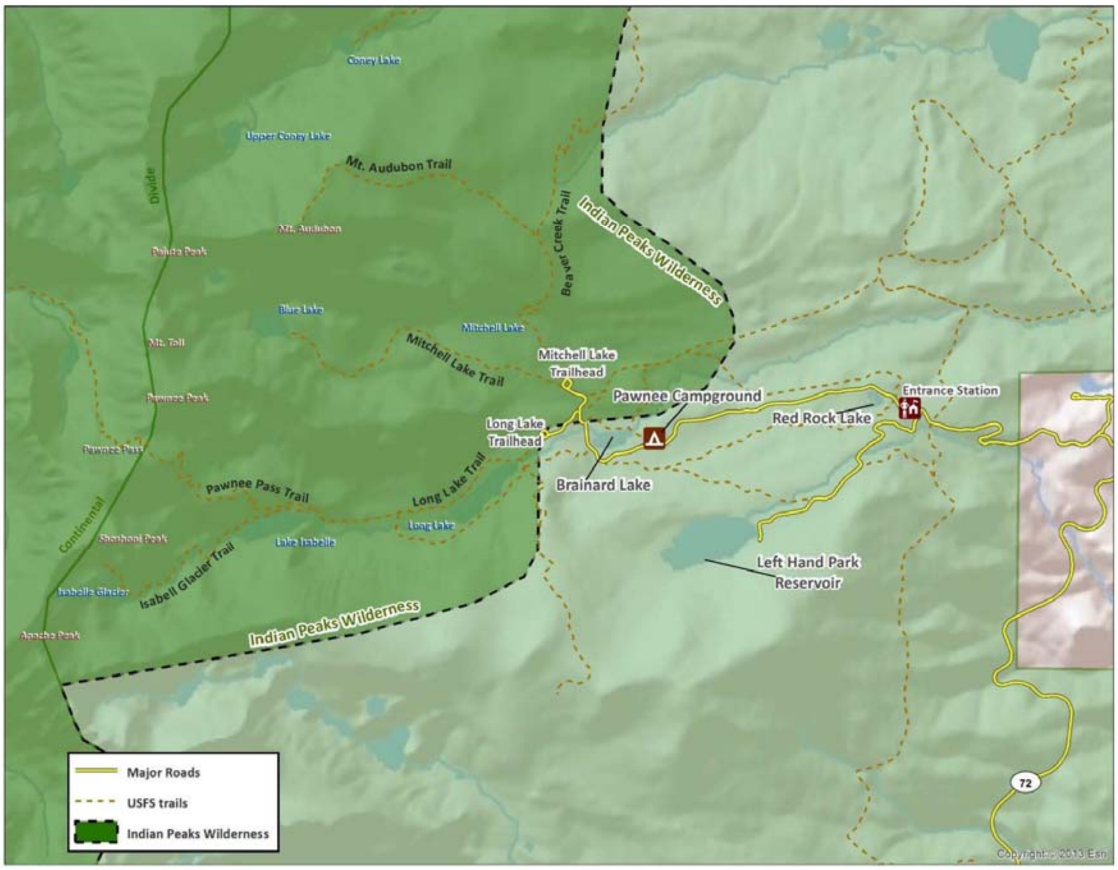
To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

INTRODUCTION

Thank you for agreeing to complete this survey, your responses to the questions are important! The questions in this survey ask about your trip to Brainard Lake Recreation Area (BLRA) and your hike today in the Indian Peaks Wilderness (IPW); this area is depicted in the below map.

Brainard Lake Recreation Area and Indian Peaks Wilderness



A. Trip Description

The questions in this section ask about your hike today in the Indian Peaks Wilderness (IPW). Please ask the surveyor to show you a map of the area, if you need it to help answer the questions.

1. **Including yourself, how many people were in your personal group during your hike today? (Enter number of people.)**

   Number of people:____________

2. **Were there any children under the age of 16 in your personal group on your hike today? (Check <u>one</u> box.)**

   ❑ Yes (Number of children):__________
   ❑ No

3. **Was your hike today a day hike or part of an overnight backpacking trip? (Check <u>one</u> box.)**

   ❑ Day hike (SKIP TO QUESTION 5)
   ❑ Overnight backpacking trip (# of nights):_______ (CONTINUE TO QUESTION 4)

4. **If your hike today was part of an overnight backpacking trip, at which trailhead did you start your backpacking trip? (Check <u>one</u> box.)**

   ❑ Mitchell Lake Trailhead
   ❑ Long Lake Trailhead
   ❑ Other Trailhead (Please specify):____

5. **Approximately how many hours did you hike <u>today</u>? (Enter time or check the box.)**

Approximate number of hours hiked <u>today</u>:_____________

OR

❑ Don't know/Not sure

6. **Where did you start and end your hike <u>today</u>? (Check <u>one</u> box for start and <u>one</u> box for end.)**

	Started Hiking Here Today	Ended Hiking Here Today
Day Use Parking Lot next to Brainard Lake	❑	❑
Mitchell Lake Trailhead	❑	❑
Long Lake Trailhead	❑	❑
Pawnee Campground	❑	❑
Backcountry campsite (Location):______________________________	❑	❑
Other (Please specify):___________________________	❑	❑
Don't know/Not sure	❑	❑

7. **Which of the following locations did you hike to or pass through <u>today</u>? (Refer to the surveyor's map of the area and check <u>all that apply</u>.)**

	Part of my Hiking Route Today
A. Mitchell Lake	❑
B. Blue Lake	❑
C. Long Lake	❑
D. Lake Isabelle	❑
E. Isabelle Glacier	❑
F. Shoshoni Peak	❑
G. Pawnee Pass	❑
H. Pawnee Peak	❑
I. Paiute Peak	❑
J. Mt. Toll	❑
K. Mt. Audubon	❑
L. Apache Peak	❑
M. Other (Please specify):______________________	❑

8. **Which of the locations listed in Question 7 was your primary destination on your hike <u>today</u>? (Enter letter of primary destination or check the box.)**

Letter of primary destination:_______

OR

❑ I did not have a primary destination on my hike <u>today</u>.

9. **Did you feel crowded during your hike <u>today</u>? (Check <u>all that apply</u>.)**

- ❑ Yes, I felt crowded <u>on the trail</u>
- ❑ Yes, I felt crowded <u>at destinations</u> (lakes, mountain summits, etc.)
- ❑ No, I did not feel crowded during my hike today

10. **Did the presence of other people on the trail make you feel rushed or slow you down at any point during your hike <u>today</u>? (Check <u>one</u> box.)**

- ❑ Yes
- ❑ No

11. **What is the maximum number of <u>people</u> you could pass/be passed by over the duration of a hike like you did <u>today</u> and not feel crowded? (Make a mark on the line or check <u>one</u> box).**

0—2—4—6—8—10—12—14—16—18—20—22—24—26—28—30—32—34—36—38—40— >40
(Make a mark on the line)

OR

❑ The number of other people I encounter doesn't affect whether or not I feel crowded

OR

❑ Don't know/Not sure

12. **Should the number of people allowed to hike in this area each day be limited if it is needed for any of the following reasons, <u>even if it limits when you can hike here</u>? (Check <u>one</u> box for each reason.)**

	Should the number of hikers per day be limited?		
Reason for Limit	**Yes**	**No**	**Don't Know/ Not Sure**
To protect the quality of visitors' experiences (i.e., prevent crowding)	❑	❑	❑
To reduce environmental impacts	❑	❑	❑

B. Travel and Parking

The next set of questions asks about your travel to and parking at BLRA on this trip.

13. Which route did you use to travel to BLRA on this trip? (Refer to the surveyor's route map and check <u>one</u> box.)

❑ Route #1 on route map
❑ Route #2 on route map
❑ Route #3 on route map
❑ Route #4 on route map
❑ Other (Please specify):____
❑ Don't know/Not sure

14. Which travel route will you use when you leave BLRA at the end of this trip? (Refer to the surveyor's route map and check <u>one</u> box.)

❑ Route #1 on route map
❑ Route #2 on route map
❑ Route #3 on route map
❑ Route #4 on route map
❑ Other (Please specify):____
❑ Don't know/Not sure

15. At approximately what time did you arrive at BLRA today? (Enter time or check <u>one</u> box.)

Approximate arrival time today:_____________AM/PM (CIRCLE ONE)

OR

❑ I arrived on a different day (Please specify date of arrival):__________________

OR

❑ Don't know/Not sure

16. In how many vehicles did you and your personal group travel to BLRA on this trip? (Enter number of vehicles.)

Number of vehicles:____________

17. Where did you park in BLRA for your hike today? (Refer to the surveyor's parking map and check <u>one</u> box.)

- ❑ Day Use Parking Lot next to Brainard Lake
- ❑ Long Lake Trailhead Parking Lot
- ❑ Mitchell Lake Trailhead Parking Lot
- ❑ Along the Roadside
- ❑ Pawnee Campground (SKIP TO QUESTION 27 on Page 10)
- ❑ Other (Please specify):________________________________

18. Do you agree or disagree with each of the following statements about where you parked in BLRA for your hike today? (Check <u>one</u> box for each item.)

Where I parked in BLRA for my hike was...	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Safe	❑	❑	❑	❑	❑
Convenient	❑	❑	❑	❑	❑
Easy to find	❑	❑	❑	❑	❑
Close to my destination(s)	❑	❑	❑	❑	❑
Well marked (e.g., paint striping)	❑	❑	❑	❑	❑
Uncongested	❑	❑	❑	❑	❑

19. How much parking congestion do you think there is at BLRA today? (Circle <u>one</u> number.)

No Parking Congestion at all	Slight Parking Congestion			Moderate Parking Congestion				Extreme Parking Congestion
1	2	3	4	5	6	7	8	9

20. Did you know that if you park in the lot near the entrance station (Gateway Lot) you don't have to pay the fee to visit BLRA? (Check <u>one</u> box.)

- ❑ Yes, and we dropped off one or more cars there
- ❑ Yes, but nobody in our group parked there
- ❑ No, but I would not have parked there anyway
- ❑ No, and I would have parked there if I knew

21. **For each of the following, if it was your only option for hiking here on a future trip because parking lots in BLRA were full, would you be likely to do it or would you probably choose not to hike here? (Check <u>one</u> box for each item.)**

If this was my only option for hiking here on a future trip…	**…I'd be likely to do it**	**…I'd probably choose not to hike here**
Park in the lot near the entrance station (Gateway Lot) and walk/hike about 3 miles on a trail to where I started my hike.	❑	❑
Park in the lot near the entrance station (Gateway Lot) and take a 10 minute shuttle bus ride to where I started my hike.	❑	❑
Park in town and take a 40 minute shuttle bus ride to where I started my hike.	❑	❑

22. **Do you agree or disagree with each of the following statements about potential actions when parking lots in BLRA are full? (Check <u>one</u> box for each item.)**

When parking lots in BLRA are full people should be…	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
…allowed to enter BLRA and drive around until a parking space opens up.	❑	❑	❑	❑	❑
…stopped at the entrance station until some parking spaces open up and only then allowed to enter.	❑	❑	❑	❑	❑
…directed to park at the lot near the entrance station (Gateway Lot) and walk/hike about 3 miles on a trail to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to park at the lot near the entrance station (Gateway Lot) and take a 10 minute shuttle bus ride to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to park in town and take a 40 minute shuttle bus ride to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to other recreation areas instead of visiting BLRA that day.	❑	❑	❑	❑	❑

C. Planning Your Trip to BLRA

The next set of questions asks about planning you may have done to prepare for this trip to BLRA.

23. How long ago did you decide to take this trip to BLRA? (Check <u>one</u> box.)

- ❑ Sometime today
- ❑ Yesterday
- ❑ In the last week
- ❑ More than a week ago, but less than a month ago
- ❑ A month or more before today

24. When you planned this trip to BLRA, did you think about the possibility that it might be difficult to find parking here? (Check <u>one</u> box.)

- ❑ Yes
- ❑ No (SKIP TO QUESTION 26)

25. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to BLRA, how did it affect your trip plans? (Check <u>all that apply</u>.)

- ❑ It did not affect my plans
- ❑ I visited at a time of day I thought would be less crowded
- ❑ I visited on a day of the week I thought would be less crowded
- ❑ I avoided places here I thought would be crowded today
- ❑ Other (Please specify):_______________________________________

26. How likely would you be to use each of the following sources for information about parking and crowding conditions at BLRA, if it was available for planning a future trip to BLRA? (Check <u>one</u> box for each item.)

	Likely	Not Likely	Don't Know/Not Sure
Website	❑	❑	❑
Smartphone app	❑	❑	❑
Social media (e.g., Facebook, Twitter)	❑	❑	❑
Text updates on cellular phone/smartphone	❑	❑	❑
AM radio station	❑	❑	❑
Telephone information line (message updated daily)	❑	❑	❑
Telephone information line (live person)	❑	❑	❑
Tourist information center	❑	❑	❑
Other (Please specify):____________________	❑	❑	❑

D. Background Information

27. What is your gender? (Check one box.)

- ❑ Male
- ❑ Female

28. In what year were you born?

Year born:___________

29. Do you live in the United States? (Check one box.)

- ❑ Yes (What is your zip code? __________)
- ❑ No (What country do you live in? ______________________________)

30. What is the highest level of formal education you have completed? (Check one box.)

- ❑ Some high school
- ❑ High school graduate or GED
- ❑ Some college, business or trade school
- ❑ College, business or trade school graduate
- ❑ Some graduate school
- ❑ Master's, doctoral or professional degree

31. Are you Hispanic or Latino? (Check one box.)

- ❑ Yes
- ❑ No

32. What is your race? (Check all that apply.)

- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Black or African American
- ❑ Native Hawaiian
- ❑ Pacific Islander other than Native Hawaiian
- ❑ White

Thank you for your help with this survey!
Please return it to the surveyor.

Appendix B. BLRA Day Use Area Visitor Survey Instrument

OMB #: 0596-0232
Expiration Date: 02/28/2017

Brainard Lake Recreation Area – Day Use Area Visitor Survey 2014

ID: ________ **Date:** ______________

Time:__________ **AM/PM** **Respondent:** Driver / Passenger

Weather: Sunny / Partly / Overcast / Raining **Motorcycle:** Yes / No

Special Event: No/Yes______________________________________

PRIVACY ACT STATEMENT

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Burden Statement

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To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

A. Trip Description

The questions in this section ask about your current trip to Brainard Lake Recreation Area (BLRA). Please ask the surveyor to show you a map of the area, if you need it to help answer the questions.

1. **Including yourself, how many people are in your personal group on this trip to Brainard Lake Recreation Area (BLRA)? (Enter number of people.)**

   Number of people:____________

2. **Are there any children under the age of 16 in your personal group on this trip to BLRA? (Check <u>one</u> box.)**

   ❑ Yes (Number of children):__________
   ❑ No

3. **Which of the following locations in BLRA have you/will you visit on this trip? (Refer to the surveyor's map of BLRA and check <u>all that apply</u>.)**

	Have Visited/Will Visit on This Trip
A. Brainard Lake	❑
B. Red Rock Lake	❑
C. Long Lake Trail	❑
D. Mitchell Lake Trail	❑
E. Pawnee Campground	❑
F. Left Hand Park Reservoir	❑
G. Other (Please specify):________________________	❑

4. **Which of the locations listed in Question 3 is/was your primary destination on this trip to BLRA? (Enter letter of primary destination or check the box.)**

   Letter of primary destination:_______

   OR

   ❑ I do not have a primary destination on this trip to BLRA.

5. Which of the following activities have you done/will you do during this trip to BLRA? (Check all that apply.)

	Have Done/Will Do on This Trip
A. Walking/Short hike (less than 1 hour)	❑
B. Day hiking (more than 1 hour)	❑
C. Backpacking (# of nights): ______	❑
D. Camping in Pawnee Campground (# of nights):______	❑
E. Picnicking	❑
F. Swimming	❑
G. Boating	❑
H. Fishing	❑
I. Mountain biking	❑
J. Creative arts (photography/drawing/ painting/writing)	❑
K. Other (Please specify):__________________________	❑

6. Which of the activities listed in Question 5 is/was your primary activity on this trip to BLRA? (Enter letter of primary activity or check the box.)

Letter of primary activity: _______

OR

❑ I do not have a primary activity on this trip to BLRA.

B. Travel and Parking

The next set of questions asks about your travel to and parking at BLRA on this trip.

7. **Which route did you use to travel to BLRA on this trip? (Refer to the surveyor's route map and check <u>one</u> box.)**

- ☐ Route #1 on route map
- ☐ Route #2 on route map
- ☐ Route #3 on route map
- ☐ Route #4 on route map
- ☐ Other (Please specify):____
- ☐ Don't know/Not sure

8. **Which travel route will you use when you leave BLRA at the end of this trip? (Refer to the surveyor's route map and check <u>one</u> box.)**

- ☐ Route #1 on route map
- ☐ Route #2 on route map
- ☐ Route #3 on route map
- ☐ Route #4 on route map
- ☐ Other (Please specify):____
- ☐ Don't know/Not sure

9. **At approximately what time did you arrive at BLRA today? (Enter time or check <u>one</u> box.)**

Approximate arrival time today:_____________AM/PM (CIRCLE ONE)

OR

☐ I arrived on a different day (Please specify date of arrival):__________________

OR

☐ Don't know/Not sure

10. **In how many vehicles did you and your personal group travel to BLRA on this trip? (Enter number of vehicles.)**

Number of vehicles:____________

11. **Where did you park in BLRA today? (Refer to the surveyor's parking map and check <u>all that apply</u>.)**

- ❑ Day Use Parking Lot next to Brainard Lake
- ❑ Long Lake Trailhead Parking Lot
- ❑ Mitchell Lake Trailhead Parking Lot
- ❑ Along the Roadside
- ❑ Pawnee Campground (SKIP TO QUESTION 17 on Page 6)
- ❑ Other (Please specify):_______________________________

12. **Do you agree or disagree with each of the following statements about where you parked in BLRA today? (Check <u>one</u> box for each item.)**

Where I parked in BLRA today was...	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Safe	❑	❑	❑	❑	❑
Convenient	❑	❑	❑	❑	❑
Easy to find	❑	❑	❑	❑	❑
Close to my destination(s)	❑	❑	❑	❑	❑
Well marked (e.g., paint striping)	❑	❑	❑	❑	❑
Uncongested	❑	❑	❑	❑	❑

13. **How much parking congestion do you think there is at BLRA today? (Circle <u>one</u> number.)**

No Parking Congestion at all	Slight Parking Congestion			Moderate Parking Congestion				Extreme Parking Congestion
1	2	3	4	5	6	7	8	9

14. **Did you know that if you park in the lot near the entrance station (Gateway Lot) you don't have to pay the fee to visit BLRA? (Check <u>one</u> box.)**

- ❑ Yes, and we dropped off one or more cars there today
- ❑ Yes, but nobody in our group parked there today
- ❑ No, but I would not have parked there today anyway
- ❑ No, and I would have parked there today if I knew

15. **For each of the following, if it was your only option for visiting BLRA on a future trip because parking lots in BLRA were full, would you be likely to do it or would you probably choose not to visit BLRA? (Check <u>one</u> box for each item.)**

If this was my only option for visiting BLRA on a future trip…	…I'd be likely to do it	…I'd probably choose not to visit BLRA
Park in the lot near the entrance station (Gateway Lot) and walk/hike about 2 miles on a trail to your destination(s) in BLRA.	❑	❑
Park in the lot near the entrance station (Gateway Lot) and take a 10 minute shuttle bus ride to your destination(s) in BLRA.	❑	❑
Park in town and take a 40 minute shuttle bus ride to your destination(s) in BLRA.	❑	❑

16. **Do you agree or disagree with each of the following statements about potential actions when parking lots in BLRA are full? (Check <u>one</u> box for each item.)**

When parking lots in BLRA are full people should be…	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
…allowed to enter BLRA and drive around until a parking space opens up.	❑	❑	❑	❑	❑
…stopped at the entrance station until some parking spaces open up and only then allowed to enter.	❑	❑	❑	❑	❑
…directed to park at the lot near the entrance station (Gateway Lot) and walk/hike about 2 miles on a trail to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to park at the lot near the entrance station (Gateway Lot) and take a 10 minute shuttle bus ride to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to park in town and take a 40 minute shuttle bus ride to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to other recreation areas instead of visiting BLRA that day.	❑	❑	❑	❑	❑

C. Planning Your Trip to BLRA

The next set of questions asks about planning you may have done to prepare for this trip to BLRA.

17. How long ago did you decide to take this trip to BLRA? (Check one box.)

❑ Sometime today
❑ Yesterday
❑ In the last week
❑ More than a week ago, but less than a month ago
❑ A month or more before today

18. When you planned this trip to BLRA, did you think about the possibility that it might be difficult to find parking here? (Check one box.)

❑ Yes
❑ No (SKIP TO QUESTION 20)

19. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to BLRA, how did it affect your trip plans? (Check all that apply.)

❑ It did not affect my plans
❑ I visited at a time of day I thought would be less crowded
❑ I visited on a day of the week I thought would be less crowded
❑ I avoided places here I thought would be crowded today
❑ Other (Please specify):_______________________________________

20. How likely would you be to use each of the following sources for information about parking and crowding conditions at BLRA, if it was available for planning a future trip to BLRA? (Check one box for each item.)

	Likely	Not Likely	Don't Know/Not Sure
Website	❑	❑	❑
Smartphone app	❑	❑	❑
Social media (e.g., Facebook, Twitter)	❑	❑	❑
Text updates on cellular phone/smartphone	❑	❑	❑
AM radio station	❑	❑	❑
Telephone information line (message updated daily)	❑	❑	❑
Telephone information line (live person)	❑	❑	❑
Tourist information center	❑	❑	❑
Other (Please specify):____________________	❑	❑	❑

D. Background Information

21. What is your gender? (Check one box.)

- ❑ Male
- ❑ Female

22. In what year were you born?

Year born:___________

23. Do you live in the United States? (Check one box.)

- ❑ Yes (What is your zip code? __________)
- ❑ No (What country do you live in? ______________________________)

24. What is the highest level of formal education you have completed? (Check one box.)

- ❑ Some high school
- ❑ High school graduate or GED
- ❑ Some college, business or trade school
- ❑ College, business or trade school graduate
- ❑ Some graduate school
- ❑ Master's, doctoral or professional degree

25. Are you Hispanic or Latino? (Check one box.)

- ❑ Yes
- ❑ No

26. What is your race? (Check all that apply.)

- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Black or African American
- ❑ Native Hawaiian
- ❑ Pacific Islander other than Native Hawaiian
- ❑ White

Thank you for your help with this survey!
Please return it to the surveyor.

APPENDIX C. BLRA GATEWAY TRAILHEAD PARKING LOT VISITOR SURVEY INSTRUMENT

OMB #: 0596-0232
Expiration Date: 02/28/2017

Brainard Lake Recreation Area – Gateway Lot Visitor Survey 2014

ID: ________ **Date:** ______________

Time:___________ **AM/PM** **Respondent:** Driver / Passenger

Weather: Sunny / Partly / Overcast / Raining **Motorcycle:** Yes / No

Special Event: No/Yes____

PRIVACY ACT STATEMENT

16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by USDA Forest Service managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Thus the permanent data will be anonymous. Data collected through visitor surveys may be disclosed to the Department of Justice when relevant to litigation or anticipated litigation, or to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting a violation of law.

Burden Statement

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0232. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

A. Trip Description

The questions in this section ask about your current trip to Brainard Lake Recreation Area (BLRA). Please ask the surveyor to show you a map of the area, if you need it to help answer the questions.

1. **Including yourself, how many people are in your personal group on this trip to Brainard Lake Recreation Area (BLRA)? (Enter number of people.)**

   Number of people:____________

2. **Are there any children under the age of 16 in your personal group on this trip to BLRA? (Check one box.)**

   ❑ Yes (Number of children):__________
   ❑ No

3. **Which of the following activities have you done/will you do during this trip to BLRA? (Check all that apply.)**

	Have Done/Will Do on This Trip
A. Walking/Short hike (less than 1 hour)	❑
B. Day hiking (more than 1 hour)	❑
C. Backpacking (# of nights): ______	❑
D. Camping in Pawnee Campground (# of nights):______	❑
E. Picnicking	❑
F. Swimming	❑
G. Boating	❑
H. Fishing	❑
I. Mountain biking	❑
J. Creative arts (photography/drawing/ painting/writing)	❑
K. Other (Please specify):__________________________	❑

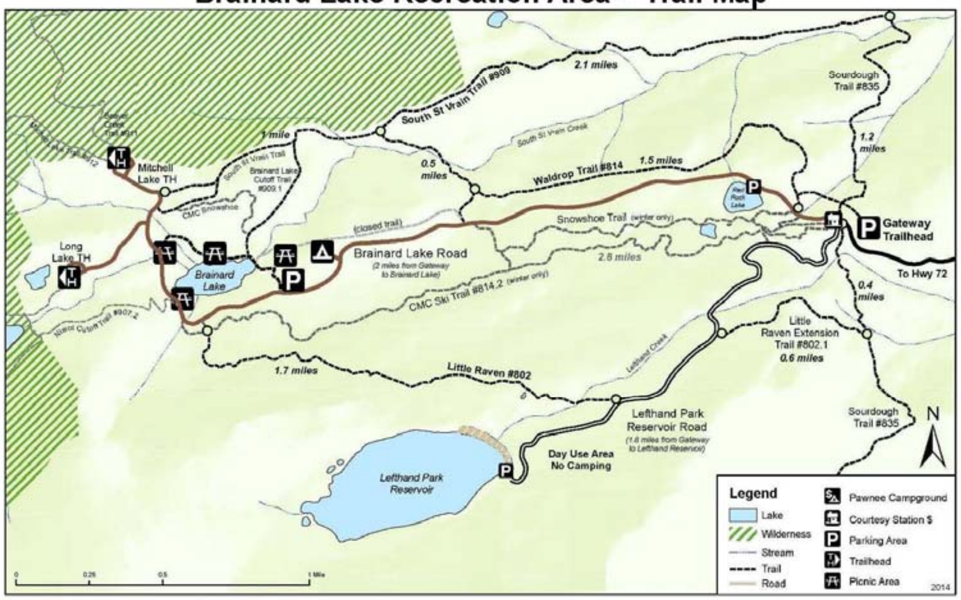
4. **Which of the activities listed in Question 3 is/was your primary activity on this trip to BLRA? (Enter letter of primary activity or check the box.)**

   Letter of primary activity: _______

   OR

   ❑ I do not have a primary activity on this trip to BLRA.

5. **Please use arrows to record on the map below your route of travel through BLRA <u>today.</u> Please also mark with an "X" each destination in BLRA you stopped to visit today.**



6. **Which location in BLRA is/was your primary destination on this trip? (Enter name of location for primary destination or check the box.)**

Primary destination in BLRA on this trip:____________________________

OR

☐ I do not have a primary destination on this trip to BLRA.

B. Travel and Parking

The next set of questions asks about your travel to and parking at BLRA on this trip.

7. **Which route did you use to travel to BLRA on this trip? (Refer to the surveyor's route map and check <u>one</u> box.)**

- ❑ Route #1 on route map
- ❑ Route #2 on route map
- ❑ Route #3 on route map
- ❑ Route #4 on route map
- ❑ Other (Please specify):____
- ❑ Don't know/Not sure

8. **Which travel route will you use when you leave BLRA at the end of this trip? (Refer to the surveyor's route map and check <u>one</u> box.)**

- ❑ Route #1 on route map
- ❑ Route #2 on route map
- ❑ Route #3 on route map
- ❑ Route #4 on route map
- ❑ Other (Please specify):____
- ❑ Don't know/Not sure

9. **At approximately what time did you arrive at BLRA today? (Enter time or check <u>one</u> box.)**

Approximate arrival time today:_____________AM/PM (CIRCLE ONE)

OR

❑ I arrived on a different day (Please specify date of arrival):__________________

OR

❑ Don't know/Not sure

10. **In how many vehicles did you and your personal group travel to BLRA on this trip? (Enter number of vehicles.)**

Number of vehicles:____________

11. **This parking lot where you have parked today is called the "Gateway Lot". Do you agree or disagree with each of the following statements about parking in the Gateway Lot today? (Check <u>one</u> box for each item.)**

Where I parked today was...	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Safe	❑	❑	❑	❑	❑
Convenient	❑	❑	❑	❑	❑
Easy to find	❑	❑	❑	❑	❑
Close to my destination(s)	❑	❑	❑	❑	❑
Well marked (e.g., paint striping)	❑	❑	❑	❑	❑
Uncongested	❑	❑	❑	❑	❑

12. **Did parking in the Gateway Lot interfere with what you were planning to do at BLRA today? (Check <u>all that apply</u>.)**

❑ No, parking here did not interfere with my plans today (SKIP TO QUESTION 14)
❑ Yes, I was planning to hike on the Mitchell Lake Trail, but didn't because I had to park here
❑ Yes, I was planning to hike on the Long Lake Trail, but didn't because I had to park here
❑ Yes, I was planning to visit Brainard Lake, but didn't because I had to park here
❑ Other (Please specify):____

13. **If parking in the Gateway Lot interfered with what you were planning to do at BLRA today, what did you do instead? (Check <u>all that apply</u>.)**

❑ Hiked on trails from the Gateway Trailhead
❑ Mountain biked on trails from the Gateway Trailhead
❑ Biked on Brainard Lake Road
❑ Walked, Hiked, or Biked to Left Hand Reservoir
❑ Other (Please specify):____

14. **What reasons best explain why you parked in the Gateway Lot today? (Check <u>all that apply</u>.)**

I parked in the Gateway Lot today because…

- ❑ I knew I wouldn't have to pay the fee to visit BLRA if I parked here.
- ❑ I wanted to park closer to my destination, but closer parking lots were full.
- ❑ I wanted to hike or bike from this parking lot to my destination.
- ❑ This parking lot is the closest parking to my destination.
- ❑ Hiking or biking on trails from this parking lot was my primary reason for visiting BLRA.
- ❑ Other (please specify):____

15. **How much parking congestion do you think there is in the Gateway Lot today? (Circle <u>one</u> number.)**

No Parking Congestion at all	Slight Parking Congestion			Moderate Parking Congestion				Extreme Parking Congestion
1	2	3	4	5	6	7	8	9

16. **Do you agree or disagree with each of the following statements about parking in the Gateway Lot? (Check <u>one</u> box for each item.)**

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
It's worth it to park in the Gateway Lot to avoid paying the entrance fee.	❑	❑	❑	❑	❑
I would not have come here, if I knew I would park this far from my destination(s) in BLRA.	❑	❑	❑	❑	❑

17. **For each of the following, if it was your only option for visiting BLRA on a future trip because parking lots in BLRA were full, would you be likely to do it or would you probably choose not to visit BLRA? (Check one box for each item.)**

If this was my only option for visiting BLRA on a future trip…	…I'd be likely to do it	…I'd probably choose not to visit BLRA
Park in the Gateway Lot and walk/hike about 2 miles on a trail to your destination(s) in BLRA.	❑	❑
Park in the Gateway Lot and take a 10 minute shuttle bus ride to your destination(s) in BLRA.	❑	❑
Park in town and take a 40 minute shuttle bus ride to your destination(s) in BLRA.	❑	❑

18. **Do you agree or disagree with each of the following statements about potential actions when parking lots in BLRA are full? (Check one box for each item.)**

When parking lots in BLRA are full people should be…	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
…allowed to enter BLRA and drive around until a parking space opens up.	❑	❑	❑	❑	❑
…stopped at the entrance station until some parking spaces open up and only then allowed to enter.	❑	❑	❑	❑	❑
…directed to park in the Gateway Lot and walk/hike about 2 miles on a trail to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to park in the Gateway Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to park in town and take a 40 minute shuttle bus ride to their destination(s) in BLRA.	❑	❑	❑	❑	❑
…directed to other recreation areas instead of visiting BLRA that day.	❑	❑	❑	❑	❑

C. Planning Your Trip to BLRA

The next set of questions asks about planning you may have done to prepare for this trip to BLRA.

19. How long ago did you decide to take this trip to BLRA? (Check one box.)

❑ Sometime today
❑ Yesterday
❑ In the last week
❑ More than a week ago, but less than a month ago
❑ A month or more before today

20. When you planned this trip to BLRA, did you think about the possibility that it might be difficult to find parking here? (Check one box.)

❑ Yes
❑ No (SKIP TO QUESTION 22)

21. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to BLRA, how did it affect your trip plans? (Check all that apply.)

❑ It did not affect my plans
❑ I visited at a time of day I thought would be less crowded
❑ I visited on a day of the week I thought would be less crowded
❑ I avoided places here I thought would be crowded today
❑ Other (Please specify):____

22. How likely would you be to use each of the following sources for information about parking and crowding conditions at BLRA, if it was available for planning a future trip to BLRA? (Check one box for each item.)

	Likely	Not Likely	Don't Know/Not Sure
Website	❑	❑	❑
Smartphone app	❑	❑	❑
Social media (e.g., Facebook, Twitter)	❑	❑	❑
Text updates on cellular phone/smartphone	❑	❑	❑
AM radio station	❑	❑	❑
Telephone information line (message updated daily)	❑	❑	❑
Telephone information line (live person)	❑	❑	❑
Tourist information center	❑	❑	❑
Other (Please specify):_____________________	❑	❑	❑

D. Background Information

23. What is your gender? (Check <u>one</u> box.)

- ❑ Male
- ❑ Female

24. In what year were you born?

Year born:___________

25. Do you live in the United States? (Check <u>one</u> box.)

- ❑ Yes (What is your zip code? __________)
- ❑ No (What country do you live in? ______________________________)

26. What is the highest level of formal education you have completed? (Check <u>one</u> box.)

- ❑ Some high school
- ❑ High school graduate or GED
- ❑ Some college, business or trade school
- ❑ College, business or trade school graduate
- ❑ Some graduate school
- ❑ Master's, doctoral or professional degree

27. Are you Hispanic or Latino? (Check <u>one</u> box.)

- ❑ Yes
- ❑ No

28. What is your race? (Check <u>all that apply</u>.)

- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Black or African American
- ❑ Native Hawaiian
- ❑ Pacific Islander other than Native Hawaiian
- ❑ White

Thank you for your help with this survey!
Please return it to the surveyor.

APPENDIX D. BLRA INDIAN PEAKS WILDERNESS VISITOR SURVEY CODE BOOK

Variable Name	Description	Question	Values
ID	Survey ID number	Front page	#
Date	Date of survey	Front page	mm/dd/yyyy
Weekend	Whether or not survey was administered on a weekend day or weekday	Front page	0 = Weekday 1 = Weekend
Time	Time at which respondent began survey	Front page	hh:mm AM/PM
ShuttleCar	Whether or not the respondent used a shuttle car	Front page	0 = No 1 = Yes
Respondent	Whether the respondent was a driver or passenger	Front page	1 = Driver 2 = Passenger
Motorcycle	Whether or not the respondent drove in on a motorcycle	Front page	0 = No 1 = Yes
Weather	Weather conditions at the start of the survey	Front page	1 = Sunny 2 = Partly 3 = Overcast 4 = Raining
CampPawnee	Whether or not respondent camped at Pawnee Campground	Front page	0 = No 1 = Yes
SpecialEvent	Whether or not there was a special event at the survey site that day	Front page	0 = No 1 = Yes
Event_Text	Description of the special event	Front page	text
Q1_GroupSize	Number of people in respondent's personal group	Q1	#
Q1_GroupSizeCat	Number of people in group, categorized	Q1	1 = 1 Person 2 = 2 People 3 = 3 or 4 People 5 = 5 or more People

Variable Name	Description	Question	Values
Q2_ChildrenInGroup	Presence of children under 16 in respondent's personal group	Q2	0 = No 1 = Yes
Q2_NumChild	Number of children under 16 in respondent's personal group	Q2	#
Q2_NumChildCat	Number of children in group, categorized	Q2	1 = 1 Child 2 = 2 Children 3 = 3 or 4 Children 5 = 5 or more Children
Q3_DayVsOvernight	Whether respondent's hike was a day-hike or part of an overnight hike	Q3	1 = Day hike 2 = Overnight backpacking trip
Q3_NumberNights	Number of nights of overnight backpacking	Q3	#
Q4_OvernightTrailhead	Trailhead that respondent began overnight hike	Q4	1 = Mitchell Lake Trailhead 2 = Long Lake Trailhead 3 = Other Trailhead
Q4_OtherSpecify	Description of other trailhead respondent began overnight hike	Q4	text
Q5A_HoursHiked	Approximate number of hours respondent hiked in the Indian Peaks Wilderness	Q5	99 = Don't know/Not sure
Q5A_HoursHikedCat	Approximate number of hours respondent hiked in the Indian Peaks Wilderness, categorized	Q5	1 = 1 hour 2 = 2-3 hours 4 = 4-5 hours 6 = 6-7 hours 8 = 8 or more hours 99 = Don't know/Not sure
Q5C_DontKnow	Whether or not respondent doesn't know/isn't sure of time spent hiking in the Indian Peaks Wilderness	Q5	99 = Don't know/Not sure

Variable Name	Description	Question	Values
Q6A_StartedHike	Location of where respondent started their hike in the Indian Peaks Wilderness	Q6	1 = Day Use Parking Lot Next to Brainard Lake 2 = Mitchell Lake Trailhead 3 = Long Lake Trailhead 4 = Pawnee Campground 5 = Backcountry campsite 6 = Other 99 = Don't know/Not sure
Q6A_StartedHike_Recode	Location of where respondent started their hike in the Indian Peaks Wilderness, recoded depending on their Q7_Location responses	Q6	1 = Day Use Parking Lot Next to Brainard Lake 2 = Mitchell Lake Trailhead 3 = Long Lake Trailhead 4 = Pawnee Campground 5 = Backcountry campsite 6 = Other 99 = Don't know/Not sure
Q6A_Specify	Description of where respondent started their hike	Q6	text
Q6B_EndedHike	Location of where respondent ended their hike in the Indian Peaks Wilderness	Q6	1 = Day Use Parking Lot Next to Brainard Lake 2 = Mitchell Lake Trailhead 3 = Long Lake Trailhead 4 = Pawnee Campground 5 = Backcountry campsite 6 = Other 99 = Don't know/Not sure
Q6B_Specify	Description of where respondent ended their hike	Q6	text
Q7_LongLakeRecode	Whether or not respondent has hiked near the Long Lake recreation area	Q7	0 = No 1 = Yes
Q7_MitchellLakeRecode	Whether or not respondent has hiked near the Mitchell Lake recreation area	Q7	0 = No 1 = Yes
Q7A_MitchellLake		Q7	0 = No

Variable Name	Description	Question	Values
	Whether or not respondent has hiked to or passed through: Mitchell Lake		1 = Yes
Q7B_BlueLake	Whether or not respondent has hiked to or passed through: Blue Lake	Q7	0 = No 1 = Yes
Q7C_LongLake	Whether or not respondent has hiked to or passed through: Long Lake	Q7	0 = No 1 = Yes
Q7D_LakeIsabelle	Whether or not respondent has hiked to or passed through: Lake Isabelle	Q7	0 = No 1 = Yes
Q7E_IsabelleGlacier	Whether or not respondent has hiked to or passed through: Isabelle Glacier	Q7	0 = No 1 = Yes
Q7F_ShoshoniPeak	Whether or not respondent has hiked to or passed through: Shoshoni Peak	Q7	0 = No 1 = Yes
Q7G_PawneePass	Whether or not respondent has hiked to or passed through: Pawnee Pass	Q7	0 = No 1 = Yes
Q7H_PawneePeak	Whether or not respondent has hiked to or passed through: Pawnee Peak	Q7	0 = No 1 = Yes
Q7I_PaiutePeak	Whether or not respondent has hiked to or passed through: Paiute Peak	Q7	0 = No 1 = Yes
Q7J_MtToll	Whether or not respondent has hiked to or passed through: Mt. Toll	Q7	0 = No 1 = Yes
Q7K_MtAudubon	Whether or not respondent has hiked to or passed through: Mt. Audubon	Q7	0 = No 1 = Yes
Q7L_ApachePeak	Whether or not respondent has hiked to or passed through: Apache Peak	Q7	0 = No 1 = Yes
Q7M_Other	Whether or not respondent has hiked to or passed through: Other locations	Q7	0 = No 1 = Yes
Q7M_OtherSpecify	Description of other locations respondent has hiked to or passed through	Q7	text

Variable Name	Description	Question	Values
Q8_PrimaryDestination	Respondent's primary destination for this trip	Q8	1 = Mitchell Lake 2 = Blue Lake 3 = Long lake 4 = Lake Isabelle 5 = Isabelle Glacier 6 = Shoshoni Peak 7 = Pawnee Pass 8 = Pawnee Peak 9 = Paiute Peak 10 = Mt. Toll 11 = Mt. Audubon 12 = Apache Peak 13 = Other 99 = Did not have a primary destination
Q9A_YesTrailCrowd	Whether or not respondent felt crowded in the Indian Peaks Wilderness trails	Q9	0 = No 1 = Yes
Q9B_YesDestinations	Whether or not respondent felt crowded at the Indian Peaks Wilderness destinations	Q9	0 = No 1 = Yes
Q9C_No	Whether or not respondent did NOT feel crowded during his/her hike	Q9	0 = No 1 = Yes
Q10_RushedSlow	Whether or not presence respondent felt rushed or was slowed down by presence of other people on trails	Q10	0 = No 1 = Yes
Q11_MaxNumPeople	Maximum number of people respondent could pass/be passed by during hike and NOT feel crowded	Q11	# of people (0-40) 41 = >40 people 98 = The number of other people I encounter doesn't affect whether or not I feel crowded 99 = Don't know/Not sure

Variable Name	Description	Question	Values
Q11_MaxNumPeopleCat	Maximum number of people respondent could pass/be passed by during hike and NOT feel crowded, categorized	Q11	0 = 0 People 1 = 1 to more than 40 People 98 = Number of other people I encounter doesn't affect whether or not I feel crowded 99 = Don't know/Not sure
Q11_MaxNumPeopleCat_Buckets	Maximum number of people respondent could pass/be passed by during hike and NOT feel crowded, categorized	Q11	0 = 0 People 1 = 1 Person 2 = 2 to 9 People 10 = 10 to 19 People 20 = 20 to 29 People 30 = 30 to 39 People 40 = 40 or more People 98 = Number of other people I encounter doesn't affect whether or not I feel crowded 99 = Don't know/Not sure
Q12A_VisitorsExperience	Whether or not respondent believes the number of people hiking in Indian Peaks Wilderness should be limited to: Protect the quality of visitors' experiences (i.e., to prevent crowding)	Q12	0 = No 1 = Yes 99 = Don't know/Not sure
Q12B_EnvImpacts	Whether or not respondent believes the number of people hiking in Indian Peaks Wilderness should be limited to: Reduce environmental impacts	Q12	0 = No 1 = Yes 99 = Don't know/Not sure

Variable Name	Description	Question	Values
Q13_RouteComplete	Which routes respondent used to travel to and from BLRA	Q13	1 = Route #1 to BLRA, Route #1 from BLRA 2 = Route #1 to BLRA, Route #2 from BLRA 3 = Route #1 to BLRA, Route #3 from BLRA 4 = Route #1 to BLRA, Route #4 from BLRA 5 = Route #2 to BLRA, Route #1 from BLRA 6 = Route #2 to BLRA, Route #2 from BLRA 7 = Route #2 to BLRA, Route #3 from BLRA 8 = Route #2 to BLRA, Route #4 from BLRA 9 = Route #3 to BLRA, Route #1 from BLRA 10 = Route #3 to BLRA, Route #2 from BLRA 11 = Route #3 to BLRA, Route #3 from BLRA 12 = Route #3 to BLRA, Route #4 from BLRA 13 = Route #4 to BLRA, Route #1 from BLRA 14 = Route #4 to BLRA, Route #2 from BLRA 15 = Route #4 to BLRA, Route #3 from BLRA 16 = Route #4 to BLRA, Route #4 from BLRA

Variable Name	Description	Question	Values
Q13_RouteToBLRA	Which route respondent used to travel to BLRA	Q13	1 = Route #1 on route map 2 = Route #2 on route map 3 = Route #3 on route map 4 = Route #4 on route map 5 = Other 99 = Don't know/Not sure
Q13_RouteSpecify	Description of respondent's alternate route to BLRA	Q13	text
Q14_RouteHome	Which route respondent will use to travel when they leave BLRA	Q14	1 = Route #1 on route map 2 = Route #2 on route map 3 = Route #3 on route map 4 = Route #4 on route map 5 = Other 99 = Don't know/Not sure
Q14_RouteSpecify	Description of respondent's alternate route leaving BLRA	Q14	text
Q15A_ArrivalTime	Respondent's approximate arrival time at BLRA today	Q15	hh:mm AM/PM
Q15A_ArrivalTimeCat	Respondent's approximate arrival time at BLRA today, categorized	Q15	5 = Before 7 AM 7 = 7 AM to 8:59 AM 9 = 9 AM to 10:59 AM 11 = 11 AM to 12:59 PM 13 = 1 PM to 2:59 PM 15 = After 3 PM
Q15B_DifferentDay	Whether or not respondent arrived at BLRA on a different day	Q15	0 = Respondent indicated their arrival time today 1 = Respondent arrived on a different day
Q15B_Specify	Date of respondent's arrival, if on a different day	Q15	mm/dd/yyyy
Q15C_DontKnow	Whether or not respondent doesn't know/isn't sure of arrival time at BLRA	Q15	0 = Respondent indicated arrival time at BLRA today, OR respondent arrived at BLRA on a different day

Variable Name	Description	Question	Values
			1 = Respondent doesn't know/isn't sure of arrival time at BLRA today
Q16A_NumVehicles	Number of vehicles in which respondent and personal group traveled to BLRA	Q16	#
Q16A_NumVehiclesCat	Number of vehicles in which respondent and personal group traveled to BLRA, categorized	Q16	1 = 1 car 2 = 2 cars 3 = 3 or more cars
Q17_WherePark	Where respondent parked in BLRA	Q17	1 = Day Use Parking Lot next to Brainard Lake 2 = Long Lake Trailhead Parking Lot 3 = Mitchell Lake Trailhead Parking Lot 4 = Along the Roadside 5 = Pawnee Campground 6 = Other
Q17_OtherSpecify	Description of respondent's alternate parking location	Q17	text
Q17_WherePark_DayUseVsTrailhead	Whether respondent parked in the Day Use Parking lot or one of the Trailhead Parking lots		1 = Day Use Parking Lot 2 = Long Lake or Mitchell Lake Trailhead Parking Lot
Q18A_Safe	Respondent's opinion - where they parked at BLRA was: Safe	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18B_Convenient	Respondent's opinion - where they parked at BLRA was: Convenient	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18C_EasyToFind	Respondent's opinion - where they parked at BLRA was: Easy to find	Q18	1 = Strongly Agree 2 = Agree

Variable Name	Description	Question	Values
			3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18D_CloseToDestination	Respondent's opinion - where they parked at BLRA was: Close to destination(s)	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18E_WellMarked	Respondent's opinion - where they parked at BLRA was: Well marked (e.g., paint striping)	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18F_Uncongested	Respondent's opinion - where they parked at BLRA was: Uncongested	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q19_HowMuchParkingCong	How much parking congestion there was when respondent parked	Q19	1 = No Parking Congestion at all 2 = Slight Parking Congestion 3 4 5 = Moderate Parking Congestions 6 7 8 9 = Extreme Parking Congestion
Q20_LotNearEnt	Did respondent know that parking in Gateway Lot doesn't require a fee	Q20	1 = Yes, and we dropped off one or more cars there 2 = Yes, but nobody in our group parked there

Variable Name	Description	Question	Values
			3 = No, but I would not have parked there anyway 4 = No, and I would have parked there if I knew
Q21A_ParkInLotNearEnt	Whether or not respondent would visit BLRA if their only option were to: Park in Gateway Lot and walk/hike about 3 miles on a trail to where he/she started hiking	Q21	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q21B_10minShuttle	Whether or not respondent would visit BLRA if their only option were to: Park in Gateway Lot and take a 10 minute shuttle bus ride to where he/she started hiking	Q21	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q21C_40minShuttle	Whether or not respondent would visit BLRA if their only option were to: Park in town and take a 40 minute shuttle bus ride to where he/she started hiking	Q21	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q22A_DriveParkWherever	Respondent's opinion - when parking lots in BLRA are full, people should be: Allowed to enter BLRA and drive around until a parking space opens up	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22B_StoppedEntStation	Respondent's opinion - when parking lots in BLRA are full, people should be: Stopped at the entrance station until some parking spaces open up and only then allowed to enter	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22C_GatewayHike	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park at the lot near Gateway Lot and walk/hike about 3 miles on a trail to their destination(s) in BLRA	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22D_10MinShuttle	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park at the	Q22	1 = Strongly Agree 2 = Agree

Variable Name	Description	Question	Values
	lot near Gateway Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA		3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22E_40MinShuttle	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park in town and take a 40 minute shuttle bus ride to their destination(s) in BLRA	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22F_OtherRecAreas	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to other recreation areas instead of visiting BLRA that day	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q23_DecideToTakeTrip	How long ago respondent decided to visit BLRA	Q23	1 = Sometime today 2 = Yesterday 3 = In the last week 4 = More than a week ago, but less than a month ago 5 = A month or more before today
Q24_DifficultParking	Whether or not respondent thought that it might be difficult to find parking in BLRA, when they planned their trip	Q24	0 = No 1 = Yes
Q25A_DidNotAffect	The possibility that it might be difficult to find parking in BLRA: Did not affect respondent's plans	Q25	0 = No 1 = Yes
Q25B_VisitedTimeOfDay	The possibility that it might be difficult to find parking in BLRA caused respondent to: Visit at a time of day they thought would be less crowded	Q25	0 = No 1 = Yes
Q25C_VisitedDayOfWeek	The possibility that it might be difficult to find parking in BLRA caused respondent to: Visit on a day of the week they thought would be less crowded	Q25	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q25D_AvoidedPlaces	The possibility that it might be difficult to find parking in BLRA caused respondent to: Avoid places in BLRA they thought would be crowded	Q25	0 = No 1 = Yes
Q25E_Other	The possibility that it might be difficult to find parking in BLRA caused respondent to: Take other action	Q25	0 = No 1 = Yes
Q25E_OtherSpecify	Description of respondent's other action	Q25	text
Q26A_Website	Whether or not respondent would be likely to use this source for info about parking and crowding: Website	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26B_Smartphone	Whether or not respondent would be likely to use this source for info about parking and crowding: Smartphone app	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26C_SocialMedia	Whether or not respondent would be likely to use this source for info about parking and crowding: Social media (e.g., Facebook, Twitter)	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26D_TextUpdates	Whether or not respondent would be likely to use this source for info about parking and crowding: Text updates on cell phone/smartphone	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26E_AMRadio	Whether or not respondent would be likely to use this source for info about parking and crowding: AM radio station	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26F_TelephoneMessage	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ message update daily	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26G_TelephonePerson	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ live person	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26H_TouristCenter		Q26	1 = Likely 2 = Not likely

Variable Name	Description	Question	Values
	Whether or not respondent would be likely to use this source for info about parking and crowding: Tourist info center		99 = Don't know/Not sure
Q26I_Other	Whether or not respondent would be likely to use this source for info about parking and crowding: Other info source	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26I_OtherSpecify	Description of other info source respondent would use	Q26	text
Q27_Gender	Respondent's gender	Q27	1 = Male 2 = Female
Q28_YearBorn	Respondent's year of birth	Q28	####
Q28_Age	Respondent's age	Q28	#
Q28_AgeCat	Respondent's age, categorized	Q28	18 = 18 to 24 25 = 25 to 34 35 = 35 to 44 45 = 45 to 54 55 = 55 to 64 65 = 65 and older
Q29_LiveInUS	Whether or not respondent lives in the United States	Q29	0 = No 1 = Yes
Q29_ZipCode	Respondent's zip code, if a resident of the US	Q29	#####
Q29_Country	Respondent's country of residence	Q29	text
Q29_State	Respondent's state of residence, if a resident of the US	Q29	text
Q29_County	Respondent's county of residence, if a resident of Colorado	Q29	text
Q29_MetroArea	Respondent's metropolitan area of residence, if a resident of Colorado	Q29	text
Q30_Education	Highest level of formal education that respondent has completed	Q30	1 = Some high school 2 = High school graduate or GED 3 = Some college, business or trade school

Variable Name	Description	Question	Values
			4 = College, business or trade school graduate 5 = Some graduate school 6 = Master's, doctoral or professional degree
Q31_Hispanic	Whether or not respondent is Hispanic or Latino	Q31	0 = No 1 = Yes
Q32A_AmericanIndian	Whether or not respondent's race is: American Indian or Alaska Native	Q32	0 = No 1 = Yes
Q32B_Asian	Whether or not respondent's race is: Asian	Q32	0 = No 1 = Yes
Q32C_Black	Whether or not respondent's race is: Black of African American	Q32	0 = No 1 = Yes
Q32D_NativeHawaiian	Whether or not respondent's race is: Native Hawaiian	Q32	0 = No 1 = Yes
Q32E_PacificIslander	Whether or not respondent's race is: Pacific Islander other than Native Hawaiian	Q32	0 = No 1 = Yes
Q32F_White	Whether or not respondent's race is: White	Q32	0 = No 1 = Yes

APPENDIX E. BLRA DAY USE AREA VISITOR SURVEY CODE BOOK

Variable Name	Description	Question	Values
ID	Survey ID number	Front page	#
Date	Date of survey	Front page	mm/dd/yyyy
Weekend	Whether or not survey was administered on a weekend day or weekday	Front page	0 = Weekday 1 = Weekend
Time	Time at which respondent began survey	Front page	hh:mm AM/PM
Respondent	Whether the respondent was a driver or passenger	Front page	1 = Driver 2 = Passenger
Weather	Weather conditions at the start of the survey	Front page	1 = Sunny 2 = Partly 3 = Overcast 4 = Raining
Motorcycle	Whether or not the respondent drove in on a motorcycle	Front page	0 = No 1 = Yes
SpecialEvent	Whether or not there was a special event at the survey site that day	Front page	0 = No 1 = Yes
Event_Text	Description of the special event	Front page	text
Q1_GroupSize	Number of people in respondent's personal group	Q1	#
Q1_GroupSizeCat	Number of people in group, categorized	Q1	1 = 1 Person 2 = 2 People 3 = 3 or 4 People 5 = 5 or more People
Q2_ChildrenInGroup	Presence of children under 16 in respondent's personal group	Q2	0 = No 1 = Yes
Q2_NumberChild	Number of children under 16 in respondent's personal group	Q2	#

Variable Name	Description	Question	Values
Q2_NumChildCat	Number of children in group, categorized	Q2	1 = 1 Child 2 = 2 Children 3 = 3 or 4 Children 5 = 5 or more Children
Q3A_BrainardLake	Whether or not respondent has visited/will visit: Brainard Lake	Q3	0 = No 1 = Yes
Q3B_RedRockLake	Whether or not respondent has visited/will visit: Red Rock lake	Q3	0 = No 1 = Yes
Q3C_LongLake	Whether or not respondent has visited/will visit: Long Lake Trail	Q3	0 = No 1 = Yes
Q3D_MitchellLake	Whether or not respondent has visited/will visit: Mitchell Lake Trail	Q3	0 = No 1 = Yes
Q3E_PawneeCG	Whether or not respondent has visited/will visit: Pawnee Campground	Q3	0 = No 1 = Yes
Q3F_LeftHandPark	Whether or not respondent has visited/will visit: Left Hand Park Reservoir	Q3	0 = No 1 = Yes
Q3G_Other	Whether or not respondent has visited/will visit: Other location	Q3	0 = No 1 = Yes
Q3G_OtherSpecify	Description of other location respondent has visited/will visit	Q3	text
Q4_PrimaryDestination	Respondent's primary destination for this trip	Q4	1 = Brainard Lake 2 = Red Rock Lake 3 = Long Lake Trail 4 = Mitchell Lake Trail 5 = Pawnee Campground 6 = Left Hand Park Reservoir 7 = Other 99 = I do not have a primary destination on this trip to BLRA.
Q5A_Walking	Whether or not respondent has done/will do: Walking/Short hike (less than 1 hour)	Q5	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q5B_DayHiking	Whether or not respondent has done/will do: Day hiking (more than 1 hour)	Q5	0 = No 1 = Yes
Q5C_Backpacking	Whether or not respondent has done/will do: Backpacking	Q5	0 = No 1 = Yes
Q5C_Nights	Number of nights respondent backpacked in BLRA	Q5	#
Q5D_CampingPawnee	Whether or not respondent has done/will do: Camping in Pawnee Campground	Q5	0 = No 1 = Yes
Q5D_Nights	Number of nights respondent camped in Pawnee Campground	Q5	#
Q5D_NightsCat	Number of nights respondent camped in Pawnee Campground, categorized	Q5	1 = 1 night 2 = 2 nights 3 = 3 or more nights
Q5E_Picnicking	Whether or not respondent has done/will do: Picnicking	Q5	0 = No 1 = Yes
Q5F_Swimming	Whether or not respondent has done/will do: Swimming	Q5	0 = No 1 = Yes
Q5G_Boating	Whether or not respondent has done/will do: Boating	Q5	0 = No 1 = Yes
Q5H_Fishing	Whether or not respondent has done/will do: Fishing	Q5	0 = No 1 = Yes
Q5I_MountainBiking	Whether or not respondent has done/will do: Mountain biking	Q5	0 = No 1 = Yes
Q5J_CreativeArts	Whether or not respondent has done/will do: Creative arts (photography/drawing/painting/writing)	Q5	0 = No 1 = Yes
Q5K_Other	Whether or not respondent has done/will do: Other activity	Q5	0 = No 1 = Yes
Q5K_OtherSpecify	Description of other activity respondent has done/will do	Q5	text
Q6_PrimaryActivity	Respondent's primary activity for this trip	Q6	1 = Walking/Short Hike (less than 1 hour) 2 = Day hiking (more than 1 hour)

Variable Name	Description	Question	Values
			3 = Backpacking
			4 = Camping in Pawnee Campground
			5 = Picnicking
			6 = Swimming
			7 = Boating
			8 = Fishing
			9 = Mountain biking
			10 = Creative arts (photography/drawing/painting/writing)
			11 = Other
			99 = Did not have a primary activity.

Variable Name	Description	Question	Values
Q7_RouteComplete	Which routes respondent used to travel to and from BLRA	Q7	1 = Route #1 to BLRA, Route #1 from BLRA 2 = Route #1 to BLRA, Route #2 from BLRA 3 = Route #1 to BLRA, Route #3 from BLRA 4 = Route #1 to BLRA, Route #4 from BLRA 5 = Route #2 to BLRA, Route #1 from BLRA 6 = Route #2 to BLRA, Route #2 from BLRA 7 = Route #2 to BLRA, Route #3 from BLRA 8 = Route #2 to BLRA, Route #4 from BLRA 9 = Route #3 to BLRA, Route #1 from BLRA 10 = Route #3 to BLRA, Route #2 from BLRA 11 = Route #3 to BLRA, Route #3 from BLRA 12 = Route #3 to BLRA, Route #4 from BLRA 13 = Route #4 to BLRA, Route #1 from BLRA 14 = Route #4 to BLRA, Route #2 from BLRA 15 = Route #4 to BLRA, Route #3 from BLRA 16 = Route #4 to BLRA, Route #4 from BLRA

Variable Name	Description	Question	Values
Q7_RouteToBLRA	Which route respondent used to travel to BLRA	Q7	1 = Route #1 on route map 2 = Route #2 on route map 3 = Route #3 on route map 4 = Route #4 on route map 5 = Other 99 = Don't know/Not sure
Q7_RouteSpecify	Description of respondent's alternate route to BLRA	Q7	text
Q8_RouteHome	Which route respondent will use to travel when they leave BLRA	Q8	1 = Route #1 on route map 2 = Route #2 on route map 3 = Route #3 on route map 4 = Route #4 on route map 5 = Other 99 = Don't know/Not sure
Q8_RouteSpecify	Description of respondent's alternate route leaving BLRA	Q8	text
Q9A_ArrivalTime	Respondent's approximate arrival time at BLRA today	Q9	hh:mm AM/PM
Q9A_ArrivalTimeCat	Respondent's approximate arrival time at BLRA today, categorized	Q9	5 = Before 7 AM 7 = 7 AM to 8:59 AM 9 = 9 AM to 10:59 AM 11 = 11 AM to 12:59 PM 13 = 1 PM to 2:59 PM 15 = After 3 PM
Q9B_DifferentDay	Whether or not respondent arrived at BLRA on a different day	Q9	0 = Respondent indicated their arrival time today 1 = Respondent arrived on a different day
Q9B_Specify	Date of respondent's arrival, if on a different day	Q9	mm/dd/yyyy
Q9C_DontKnow	Whether or not respondent doesn't know/isn't sure of arrival time at BLRA	Q9	0 = Respondent indicated arrival time at BLRA today, OR respondent arrived at BLRA on a different day 1 = Respondent doesn't know/isn't sure of arrival time at BLRA today

Variable Name	Description	Question	Values
Q10_NumVehicles	Number of vehicles in which respondent and personal group traveled to BLRA	Q10	#
Q10_NumVehiclesCat	Number of vehicles in which respondent and personal group traveled to BLRA, categorized	Q10	1 = 1 car 2 = 2 cars 3 = 3 or more cars
Q11A_DayUse	Whether or not respondent parked in: Day Use Parking Lot next to Brainard Lake	Q11	0 = No 1 = Yes
Q11B_LongLake	Whether or not respondent parked in: Long Lake Trailhead Parking Lot	Q11	0 = No 1 = Yes
Q11C_MitchellLake	Whether or not respondent parked in: Mitchell Lake Trailhead Parking Lot	Q11	0 = No 1 = Yes
Q11D_Roadside	Whether or not respondent parked in: Along the Roadside	Q11	0 = No 1 = Yes
Q11E_PawneeCG	Whether or not respondent parked in: Pawnee Campground	Q11	0 = No 1 = Yes
Q11F_Other	Whether or not respondent parked in: Other location	Q11	0 = No 1 = Yes
Q11F_OtherSpecify	Description of respondent's alternate parking location	Q11	text
Q12A_Safe	Respondent's opinion - where they parked at BLRA was: Safe	Q12	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q12B_Convenient	Respondent's opinion - where they parked at BLRA was: Convenient	Q12	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree

Variable Name	Description	Question	Values
Q12C_EasyToFind	Respondent's opinion - where they parked at BLRA was: Easy to find	Q12	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q12D_CloseToDestination	Respondent's opinion - where they parked at BLRA was: Close to destination(s)	Q12	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q12E_WellMarked	Respondent's opinion - where they parked at BLRA was: Well marked (e.g., paint striping)	Q12	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q12F_Uncongested	Respondent's opinion - where they parked at BLRA was: Uncongested	Q12	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q13_HowMuchParkingCong	How much parking congestion there was when respondent parked	Q13	1 = No Parking Congestion at all 2 = Slight Parking Congestion 3 4 5 = Moderate Parking Congestions 6 7 8 9 = Extreme Parking Congestion

Variable Name	Description	Question	Values
Q14_LotNearEnt	Did respondent know that parking in Gateway Lot doesn't require a fee	Q14	1 = Yes, and we dropped off one or more cars there 2 = Yes, but nobody in our group parked there 3 = No, but I would not have parked there anyway 4 = No, and I would have parked there if I knew
Q15A_ParkInGatwayLot	Whether or not respondent would visit BLRA if their only option were to: Park in Gateway Lot and walk/hike about 2 miles on a trail to my destination(s) in BLRA.	Q15	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q15B_10minShuttle	Whether or not respondent would visit BLRA if their only option were to: Park in Gateway Lot and take a 10 minute shuttle bus ride to my destination(s) in BLRA.	Q15	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q15C_40minShuttle	Whether or not respondent would visit BLRA if their only option were to: Park in town and take a 40 minute shuttle bus ride to my destination(s) in BLRA.	Q15	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q16A_DriveParkWherever	Respondent's opinion - when parking lots in BLRA are full, people should be: Allowed to enter BLRA and drive around until a parking space opens up	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q16B_StoppedEntStation	Respondent's opinion - when parking lots in BLRA are full, people should be: Stopped at the entrance station until some parking spaces open up and only then allowed to enter	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q16C_GatewayHike	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park at the lot near Gateway Lot and walk/hike about 3 miles on a trail to their destination(s) in BLRA	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree

Variable Name	Description	Question	Values
Q16D_10MinShuttle	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park at the lot near Gateway Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q16E_40MinShuttle	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park in town and take a 40 minute shuttle bus ride to their destination(s) in BLRA	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q16F_OtherRecAreas	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to other recreation areas instead of visiting BLRA that day	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q17_DecideToTakeTrip	How long ago respondent decided to visit BLRA	Q17	1 = Sometime today 2 = Yesterday 3 = In the last week 4 = More than a week ago, but less than a month ago 5 = A month or more before today
Q18_DifficultParking	Whether or not respondent thought that it might be difficult to find parking in BLRA, when they planned their trip	Q18	0 = No 1 = Yes
Q19A_DidNotAffect	The possibility that it might be difficult to find parking in BLRA: Did not affect respondent's plans	Q19	0 = No 1 = Yes
Q19B_VisitedTimeOfDay	The possibility that it might be difficult to find parking in BLRA caused respondent to: Visit at a time of day they thought would be less crowded	Q19	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q19C_VisitedDayOfWeek	The possibility that it might be difficult to find parking in BLRA caused respondent to: Visit on a day of the week they thought would be less crowded	Q19	0 = No 1 = Yes
Q19D_AvoidedPlaces	The possibility that it might be difficult to find parking in BLRA caused respondent to: Avoid places in BLRA they thought would be crowded	Q19	0 = No 1 = Yes
Q19E_Other	The possibility that it might be difficult to find parking in BLRA caused respondent to: Take other action	Q19	0 = No 1 = Yes
Q19E_OtherSpecify	Description of respondent's other action	Q19	text
Q20A_Website	Whether or not respondent would be likely to use this source for info about parking and crowding: Website	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20B_Smartphone	Whether or not respondent would be likely to use this source for info about parking and crowding: Smartphone app	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20C_SocialMedia	Whether or not respondent would be likely to use this source for info about parking and crowding: Social media (e.g., Facebook, Twitter)	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20D_TextUpdates	Whether or not respondent would be likely to use this source for info about parking and crowding: Text updates on cell phone/smartphone	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20E_AMRadio	Whether or not respondent would be likely to use this source for info about parking and crowding: AM radio station	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20F_TelephoneMessage	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ message update daily	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20G_TelephonePerson	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ live person	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure

Variable Name	Description	Question	Values
Q20H_TouristCenter	Whether or not respondent would be likely to use this source for info about parking and crowding: Tourist info center	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20I_Other	Whether or not respondent would be likely to use this source for info about parking and crowding: Other info source	Q20	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q20I_OtherSpecify	Description of other info source respondent would use	Q20	text
Q21_Gender	Respondent's gender	Q21	1 = Male 2 = Female
Q22_YearBorn	Respondent's year of birth	Q22	####
Q28_Age	Respondent's age	Q28	#
Q28_AgeCat	Respondent's age, categorized	Q28	18 = 18 to 24 25 = 25 to 34 35 = 35 to 44 45 = 45 to 54 55 = 55 to 64 65 = 65 and older
Q23_LiveInUS	Whether or not respondent lives in the United States	Q23	0 = No 1 = Yes
Q23_ZipCode	Respondent's zip code, if a resident of the US	Q23	#####
Q23_Country	Respondent's country of residence, if not the US	Q23	text
Q23_State	Respondent's state of residence, if a resident of the US	Q23	text
Q23_CO_or_Not	Whether or not respondent resides in the state of Colorado	Q23	0 = Other 1 = Colorado
Q23_County	Respondent's county of residence, if a resident of Colorado	Q23	text
Q23_MetroArea	Respondent’s metropolitan area of residence, if a resident of Colorado	Q23	text
Q24_Education	Highest level of formal education that respondent has completed	Q24	1 = Some high school 2 = High school graduate or GED

Variable Name	Description	Question	Values
			3 = Some college, business or trade school 4 = College, business or trade school graduate 5 = Some graduate school 6 = Master's, doctoral or professional degree
Q25_Hispanic	Whether or not respondent is Hispanic or Latino	Q25	0 = No 1 = Yes
Q26A_AmericanIndian	Whether or not respondent's race is: American Indian or Alaska Native	Q26	0 = No 1 = Yes
Q26B_Asian	Whether or not respondent's race is: Asian	Q26	0 = No 1 = Yes
Q26C_Black	Whether or not respondent's race is: Black of African American	Q26	0 = No 1 = Yes
Q26D_NativeHawaiian	Whether or not respondent's race is: Native Hawaiian	Q26	0 = No 1 = Yes
Q26E_PacificIslander	Whether or not respondent's race is: Pacific Islander other than Native Hawaiian	Q26	0 = No 1 = Yes
Q26F_White	Whether or not respondent's race is: White	Q26	0 = No 1 = Yes

APPENDIX F. BLRA GATEWAY TRAILHEAD PARKING LOT VISITOR SURVEY CODE BOOK

Variable Name	Description	Question	Values
ID	Survey ID number	Front page	#
Date	Date of survey	Front page	mm/dd/yyyy
Weekend	Whether or not survey was administered on a weekend day or weekday	Front page	0 = Weekday 1 = Weekend
Time	Time at which respondent began survey	Front page	hh:mm AM/PM
Respondent	Whether the respondent was a driver or passenger	Front page	1 = Driver 2 = Passenger
Weather	Weather conditions at the start of the survey	Front page	1 = Sunny 2 = Partly 3 = Overcast 4 = Raining
Motorcycle	Whether or not the respondent drove in on a motorcycle	Front page	0 = No 1 = Yes
SpecialEvent	Whether or not there was a special event at the survey site that day	Front page	0 = No 1 = Yes
Event_Text	Description of the special event	Front page	text
Q1_GroupSize	Number of people in respondent's personal group	Q1	#
Q1_GroupSizeCat	Number of people in group, categorized	Q1	1 = 1 Person 2 = 2 People 3 = 3 or 4 People 5 = 5 or more People
Q2_ChildrenInGroup	Presence of children under 16 in respondent's personal group	Q2	0 = No 1 = Yes
Q2_NumChild	Number of children under 16 in respondent's personal group	Q2	#
Q2_NumChildCat	Number of children in group, categorized	Q2	1 = 1 Child

Variable Name	Description	Question	Values
			2 = 2 Children 3 = 3 or 4 Children 5 = 5 or more Children
Q3A_Walking	Whether or not respondent has done/will do: Walking/Short hike (less than 1 hour)	Q3	0 = No 1 = Yes
Q3B_DayHiking	Whether or not respondent has done/will do: Day hiking (more than 1 hour)	Q3	0 = No 1 = Yes
Q3C_Backpacking	Whether or not respondent has done/will do: Backpacking	Q3	0 = No 1 = Yes
Q3C_Nights	Number of nights respondent backpacked in BLRA	Q3	#
Q3D_CampingPawnee	Whether or not respondent has done/will do: Camping in Pawnee Campground	Q3	0 = No 1 = Yes
Q3D_Nights	Number of nights respondent camped in Pawnee Campground	Q3	#
Q3E_Picnicking	Whether or not respondent has done/will do: Picnicking	Q3	0 = No 1 = Yes
Q3F_Swimming	Whether or not respondent has done/will do: Swimming	Q3	0 = No 1 = Yes
Q3G_Boating	Whether or not respondent has done/will do: Boating	Q3	0 = No 1 = Yes
Q3H_Fishing	Whether or not respondent has done/will do: Fishing	Q3	0 = No 1 = Yes
Q3I_MountainBiking	Whether or not respondent has done/will do: Mountain biking	Q3	0 = No 1 = Yes
Q3J_CreativeArts	Whether or not respondent has done/will do: Creative arts (photography/drawing/painting/writing)	Q3	0 = No 1 = Yes
Q3K_Other	Whether or not respondent has done/will do: Other activity	Q3	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q3K_OtherSpecify	Description of other activity respondent has done/will do	Q3	text
Q4_PrimaryActivity	Respondent's primary activity for this trip	Q4	1 = Walking/Short Hike (less than 1 hour) 2 = Day hiking (more than 1 hour) 3 = Backpacking 4 = Camping in Pawnee Campground 5 = Picnicking 6 = Swimming 7 = Boating 8 = Fishing 9 = Mountain biking 10 = Creative arts (photography/drawing/painting/writing) 11 = Other 99 = Did not have a primary activity.
Q5_Route	Which route respondent used to travel through BLRA	Q5	1 = Brainard Lake via roads 2 = Brainard Lake via a combination of trails and roads 3 = Trails generally (not to or through IPW and not to or through Brainard Lake) 4 = IPW via a combination of trails and roads 5 = IPW via trails 6 = To Lefthand Reservoir or Red Rock Lake
Q5_RouteRecode	Which route respondent used to travel through BLRA	Q5	2 = Brainard Lake via trails and/or roads

Variable Name	Description	Question	Values
			3 = Trails generally (not to or through IPW and not to or through Brainard Lake) 4 = IPW via trails and/or roads 6 = To Lefthand Reservoir or Red Rock Lake
Q6A_PrimaryDestination	Respondent's primary destination for this trip	Q6	text
Q6B_PrimaryDestination	Whether or not respondent has a primary destination	Q6	0 = No 1 = Yes
Q6_PrimaryDestination_Recode	Respondent's primary destination for this trip, recoded	Q6	1 = Brainard Lake 2 = Indian Peaks Wilderness 3 = Gateway Trails 4 = Lefthand Reservoir and Red Rock Lake 5 = Otrher 99 = Did not have a primary destination

Variable Name	Description	Question	Values
Q7_RouteComplete	Which routes respondent used to travel to and from BLRA	Q7	1 = Route #1 to BLRA, Route #1 from BLRA 2 = Route #1 to BLRA, Route #2 from BLRA 3 = Route #1 to BLRA, Route #3 from BLRA 4 = Route #1 to BLRA, Route #4 from BLRA 5 = Route #2 to BLRA, Route #1 from BLRA 6 = Route #2 to BLRA, Route #2 from BLRA 7 = Route #2 to BLRA, Route #3 from BLRA 8 = Route #2 to BLRA, Route #4 from BLRA 9 = Route #3 to BLRA, Route #1 from BLRA 10 = Route #3 to BLRA, Route #2 from BLRA 11 = Route #3 to BLRA, Route #3 from BLRA 12 = Route #3 to BLRA, Route #4 from BLRA 13 = Route #4 to BLRA, Route #1 from BLRA 14 = Route #4 to BLRA, Route #2 from BLRA 15 = Route #4 to BLRA, Route #3 from BLRA 16 = Route #4 to BLRA, Route #4 from BLRA

Variable Name	Description	Question	Values
Q7_RouteToBLRA	Which route respondent used to travel to BLRA	Q7	1 = Boulder Canyon 2 = Rt. 119 3 = Peak to Peak Highway 4 = Left Hand Canyon 5 = Other 99 = Don't know/Not sure
Q7_RouteSpecify	Description of respondent's alternate route to BLRA	Q7	text
Q8_RouteHome	Which route respondent will use to travel when they leave BLRA	Q8	1 = Boulder Canyon 2 = Rt. 119 3 = Peak to Peak Highway 4 = Left Hand Canyon 5 = Other 99 = Don't know/Not sure
Q8_RouteSpecify	Description of respondent's alternate route leaving BLRA	Q8	text
Q9A_ArrivalTime	Respondent's approximate arrival time at BLRA today	Q9	hh:mm AM/PM
Q9A_ArrivalTimeCat	Respondent's approximate arrival time at BLRA today, categorized	Q9	5 = Before 7 AM 7 = 7 AM to 8:59 AM 9 = 9 AM to 10:59 AM 11 = 11 AM to 12:59 PM 13 = 1 PM to 2:59 PM 15 = After 3 PM
Q9B_DifferentDay	Whether or not respondent arrived at BLRA on a different day	Q9	0 = Respondent indicated their arrival time today 1 = Respondent arrived on a different day
Q9B_Specify	Date of respondent's arrival, if on a different day	Q9	mm/dd/yyyy
Q9C_DontKnow	Whether or not respondent doesn't know/isn't sure of arrival time at BLRA	Q9	0 = Respondent indicated arrival time at BLRA today, OR respondent arrived at BLRA on a different day 1 = Respondent doesn't know/isn't sure of arrival time at BLRA today
Q10_NumVehicles	Number of vehicles in which respondent and personal group traveled to BLRA	Q10	#

Variable Name	Description	Question	Values
Q11A_Safe	Respondent's opinion - where they parked at BLRA was: Safe	Q11	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q11B_Convenient	Respondent's opinion - where they parked at BLRA was: Convenient	Q11	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q11C_EasyToFind	Respondent's opinion - where they parked at BLRA was: Easy to find	Q11	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q11D_CloseToDestination	Respondent's opinion - where they parked at BLRA was: Close to destination(s)	Q11	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q11E_WellMarked	Respondent's opinion - where they parked at BLRA was: Well marked (e.g., paint striping)	Q11	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q11F_Uncongested	Respondent's opinion - where they parked at BLRA was: Uncongested	Q11	1 = Strongly Agree 2 = Agree

Variable Name	Description	Question	Values
			3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q12A_No	Respondent's opinion - parking did NOT interfere with their plans	Q12	0 = No 1 = Yes
Q12B_YesHikeMitchell	Respondent's opinion - they were planning to hike on the Mitchell Lake Trail, but didn't because they had to park here	Q12	0 = No 1 = Yes
Q12C_YesHikeLong	Respondent's opinion - they were planning to hike on the Long Lake Trail, but didn't because they had to park here	Q12	0 = No 1 = Yes
Q12D_YesPlanningVisit	Respondent's opinion - they were planning to visit Brainard Lake, but didn't because they had to park here	Q12	0 = No 1 = Yes
Q12E_Other	Respondent's opinion - other explanation	Q12	0 = No 1 = Yes
Q12E_Specify	Description of respondent's other explanation regarding parking in the Gateway Lot	Q12	text
Q13A_Hiked	Respondent's opinion - Because the parking in the Gateway Lot interfered with their plans, they chose to: Hike on trails from the Gateway Trailhead	Q13	0 = No 1 = Yes
Q13B_MountainBiked	Respondent's opinion - Because the parking in the Gateway Lot interfered with their plans, they chose to: Mountain bike on trails from the Gateway Trailhead	Q13	0 = No 1 = Yes
Q13C_Biked	Respondent's opinion - Because the parking in the Gateway Lot interfered with their plans, they chose to: Bike on Brainard Lake Road	Q13	0 = No 1 = Yes
Q13D_Walked	Respondent's opinion - Because the parking in the Gateway Lot interfered with their plans, they chose to: Walk, hike, or bike to Left Hand Reservoir	Q13	0 = No 1 = Yes
Q13E_Other	Respondent's opinion - Because the parking in the Gateway Lot interfered with their plans, they chose to: Do an alternate activity	Q13	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q13E_Specify	Description of respondent's alternate activity due to parking interfering with their plans	Q13	text
Q14A_KnewWouldntPay	Respondent's opinion - They parked in the Gateway Lot because: They knew they wouldn't have to pay the fee to visit BLRA if they parked here.	Q14	0 = No 1 = Yes
Q14B_WantedParkCloser	Respondent's opinion - They parked in the Gateway Lot because: They wanted to park closer to their destination, but closer parking lots were full.	Q14	0 = No 1 = Yes
Q14C_WantedToHike	Respondent's opinion - They parked in the Gateway Lot because: They wanted to hike or bike from this parking lot to their destination.	Q14	0 = No 1 = Yes
Q14D_ThisParkingLot	Respondent's opinion - They parked in the Gateway Lot because: This parking lot is the closest parking to their destination.	Q14	0 = No 1 = Yes
Q14E_HikingOrBiking	Respondent's opinion - They parked in the Gateway Lot because: Hiking or biking on trails from this parking lot was their primary reason for visiting BLRA.	Q14	0 = No 1 = Yes
Q14F_Other	Respondent's opinion - They parked in the Gateway Lot because: Other reason	Q14	0 = No 1 = Yes
Q14F_Specify	Description of respondent's other reason for why they parked in the Gateway Lot	Q14	text
Q15_HowMuchParkingCong	How much parking congestion there was when respondent parked	Q15	1 = No Parking Congestion at all 2 = Slight Parking Congestion 3 4 5 = Moderate Parking Congestions 6 7 8 9 = Extreme Parking Congestion
Q16A_ItsWorthIt	Respondent's opinion - It's worth it to park in the Gateway Lot to avoid paying the entrance fee.	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree

Variable Name	Description	Question	Values
			4 = Disagree 5 = Strongly Disagree
Q16B_IWouldNot	Respondent's opinion - They would not have come here, if they knew they would park this far from their destination(s) in BLRA.	Q16	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q17A_ParkInGatwayLot	Whether or not respondent would visit BLRA if their only option were to: Park in Gateway Lot and walk/hike about 2 miles on a trail to their destination(s) in BLRA.	Q17	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q17B_10minShuttle	Whether or not respondent would visit BLRA if their only option were to: Park in Gateway Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA.	Q17	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q17C_40minShuttle	Whether or not respondent would visit BLRA if their only option were to: Park in town and take a 40 minute shuttle bus ride to their destination(s) in BLRA.	Q17	1 = Would be likely to do it 2 = Probably wouldn't visit BLRA
Q18A_DriveParkWherever	Respondent's opinion - when parking lots in BLRA are full, people should be: Allowed to enter BLRA and drive around until a parking space opens up	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18B_StoppedEntStation	Respondent's opinion - when parking lots in BLRA are full, people should be: Stopped at the entrance station until some parking spaces open up and only then allowed to enter	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18C_GatewayHike	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park at the lot near	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree

Variable Name	Description	Question	Values
	Gateway Lot and walk/hike about 2 miles on a trail to their destination(s) in BLRA		4 = Disagree 5 = Strongly Disagree
Q18D_10MinShuttle	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park at the lot near Gateway Lot and take a 10 minute shuttle bus ride to their destination(s) in BLRA	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18E_40MinShuttle	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to park in town and take a 40 minute shuttle bus ride to their destination(s) in BLRA	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18F_OtherRecAreas	Respondent's opinion - when parking lots in BLRA are full, people should be: Directed to other recreation areas instead of visiting BLRA that day	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q19_DecideToTakeTrip	How long ago respondent decided to visit BLRA	Q19	1 = Sometime today 2 = Yesterday 3 = In the last week 4 = More than a week ago, but less than a month ago 5 = A month or more before today
Q20_DifficultParking	Whether or not respondent thought that it might be difficult to find parking in BLRA, when they planned their trip	Q20	0 = No 1 = Yes
Q21A_DidNotAffect	The possibility that it might be difficult to find parking in BLRA: Did not affect respondent's plans	Q21	0 = No 1 = Yes
Q21B_VisitedTimeOfDay	The possibility that it might be difficult to find parking in BLRA caused respondent to: Visit at a time of day they thought would be less crowded	Q21	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q21C_VisitedDayOfWeek	The possibility that it might be difficult to find parking in BLRA caused respondent to: Visit on a day of the week they thought would be less crowded	Q21	0 = No 1 = Yes
Q21D_AvoidedPlaces	The possibility that it might be difficult to find parking in BLRA caused respondent to: Avoid places in BLRA they thought would be crowded	Q21	0 = No 1 = Yes
Q21E_Other	The possibility that it might be difficult to find parking in BLRA caused respondent to: Take other action	Q21	0 = No 1 = Yes
Q21E_OtherSpecify	Description of respondent's other action	Q21	text
Q22A_Website	Whether or not respondent would be likely to use this source for info about parking and crowding: Website	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22B_Smartphone	Whether or not respondent would be likely to use this source for info about parking and crowding: Smartphone app	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22C_SocialMedia	Whether or not respondent would be likely to use this source for info about parking and crowding: Social media (e.g., Facebook, Twitter)	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22D_TextUpdates	Whether or not respondent would be likely to use this source for info about parking and crowding: Text updates on cell phone/smartphone	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22E_AMRadio	Whether or not respondent would be likely to use this source for info about parking and crowding: AM radio station	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22F_TelephoneMessage	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ message update daily	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure

Variable Name	Description	Question	Values
Q22G_TelephonePerson	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ live person	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22H_TouristCenter	Whether or not respondent would be likely to use this source for info about parking and crowding: Tourist info center	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22I_Other	Whether or not respondent would be likely to use this source for info about parking and crowding: Other info source	Q22	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q22I_OtherSpecify	Description of other info source respondent would use	Q22	text
Q23_Gender	Respondent's gender	Q23	1 = Male 2 = Female
Q24_YearBorn	Respondent's year of birth	Q24	####
Q28_Age	Respondent's age	Q28	#
Q28_AgeCat	Respondent's age, categorized	Q28	18 = 18 to 24 25 = 25 to 34 35 = 35 to 44 45 = 45 to 54 55 = 55 to 64 65 = 65 and older
Q25_LiveInUS	Whether or not respondent lives in the United States	Q25	0 = No 1 = Yes
Q25_ZipCode	Respondent's zip code, if a resident of the US	Q25	#####
Q25_Country	Respondent's country of residence, if not the US	Q25	text
Q25_State	Respondent's state of residence, if a resident of the US	Q25	text
Q25_CO_or_Not	Whether or not respondent resides in the state of Colorado	Q25	0 = Other 1 = Colorado
Q25_County	Respondent's county of residence, if a resident of Colorado	Q25	text

Variable Name	Description	Question	Values
Q25_MetroArea	Respondent’s metropolitan area of residence, if a resident of Colorado	Q25	text
Q26_Education	Highest level of formal education that respondent has completed	Q26	1 = Some high school 2 = High school graduate or GED 3 = Some college, business or trade school 4 = College, business or trade school graduate 5 = Some graduate school 6 = Master's, doctoral or professional degree
Q27_Hispanic	Whether or not respondent is Hispanic or Latino	Q27	0 = No 1 = Yes
Q28A_AmericanIndian	Whether or not respondent's race is: American Indian or Alaska Native	Q28	0 = No 1 = Yes
Q28B_Asian	Whether or not respondent's race is: Asian	Q28	0 = No 1 = Yes
Q28C_Black	Whether or not respondent's race is: Black of African American	Q28	0 = No 1 = Yes
Q28D_NativeHawaiian	Whether or not respondent's race is: Native Hawaiian	Q28	0 = No 1 = Yes
Q28E_PacificIslander	Whether or not respondent's race is: Pacific Islander other than Native Hawaiian	Q28	0 = No 1 = Yes
Q28F_White	Whether or not respondent's race is: White	Q28	0 = No 1 = Yes

Appendix G. BLRA Indian Peaks Wilderness Visitor Survey "Other" Responses

Table 1. List of backcountry campsites where respondent started their hike

Backcountry campsite	**Frequency** (n=4)
Buchanan Pass	25%
Fox Park-Buchanan Creek	25%
Goned Lake	25%
Near Trail Jet Cascade	25%

Table 2. List of other locations where respondent started their hike

Other Location	**Frequency** (n=19)
Niwot Picnic Area	84%
Gateway Lot	5%
South St Vrain	5%
West side of Brainard Lake	5%

Table 3. List of backcountry campsites where respondent ended their hike

Backcountry Campsite	**Frequency** (n=1)
Niwot Picnic Area	100%

Table 4. List of other locations where respondent ended their hike

Other Location	**Frequency** (n=18)
Niwot Picnic Area	83%
Audobon Saddle	6%
Gateway Lot	6%
West side of Brainard Lake	6%

Table 5. List of other locations respondent hiked or passed through

Other Location	**Frequency** (n=15)
Niwot Ridge	33%
Buchanan Pass	20%
Brainard Lake	13%
Jean Lunning Trail	13%
Cirque N of Isabelle	7%
Day picnic	7%
Little Pawnee	7%

Table 6. List of other routes taken by respondents to travel to or from BLRA

Country	**Frequency** (n=23)
Coal Creek Canyon	22%
Nederland	13%
Route 7	13%
South St. Vrain	13%
Jamestown	9%
Route 7 via Lyons	9%
Longmont-Lyons	4%
Nederland Rt. 72	4%
Route 72	4%
Route 72 to Denver	4%
Sugarloaf Road	4%

Table 7. List of other locations where respondents parked

Other Location	**Frequency** (n=20)
Niwot Picnic Area	85%
CMC cabin lot	5%
Gateway Lot	5%
Other side of Brainard Lake	5%

Table 8. List of other effects that parking had on trip plans

Other affects of plans	**Frequency** (n=4)
I arrived Thursdat, hiked Friday and Saturday	25%
My husband dropped me off till space opened	25%
Planned for August.	25%
We carpooled.	25%

Table 9. List of other sources for information about parking and crowding

Other Sources	**Frequency** (n=7)
Word of mouth	29%
Giant sign at entrance	14%
Phone Library	14%
Show up and see	14%
Shuttle	14%
Telepathy	14%

Table 10. List of respondent's country of residence

Country	**Frequency** (n=275)

United States	96.7%
United Kingdom	1.1%
Anatolia	0.4%
France	0.4%
Germany	0.4%
Poland	0.4%
Sweden	0.4%
Switzerland	0.4%

Table 11. List of respondent's state of resident, if a resident of the United States

State	**Frequency** (n=229)
Colorado	81.2%
Texas	2.2%
California	1.7%
Illinois	1.7%
Ohio	1.7%
Arizona	1.3%
Massachusetts	1.3%
Missouri	1.3%
Kansas	0.9%
Minnesota	0.9%
New Jersey	0.9%
Connecticut	0.4%
Hawaii	0.4%
Iowa	0.4%
Michigan	0.4%
North Carolina	0.4%
Nebraska	0.4%
New Mexico	0.4%
New York	0.4%
South Carolina	0.4%
Virginia	0.4%
Vermont	0.4%

Table 12. List of respondent's ZIP code of residence, if a resident of Colorado

ZIP Code	**Frequency** (n=186)
80304	10.8%
80301	6.5%
80302	5.9%
80503	5.4%
80305	4.3%
80027	3.8%
80026	3.2%
80517	3.2%
80501	2.7%
80504	2.7%
80303	2.2%
80020	1.6%
80209	1.6%
80210	1.6%
80211	1.6%
80235	1.6%
80401	1.6%
80481	1.6%
80525	1.6%
80538	1.6%
80004	1.1%
80013	1.1%
80015	1.1%
80122	1.1%
80207	1.1%
80466	1.1%
80516	1.1%
80534	1.1%
80537	1.1%
80540	1.1%
80601	1.1%
80002	0.5%
80003	0.5%
80005	0.5%
80010	0.5%
80011	0.5%
80012	0.5%
80014	0.5%
80023	0.5%
80030	0.5%

ZIP Code	**Frequency** (n=186)
80111	0.5%
80128	0.5%
80200	0.5%
80203	0.5%
80205	0.5%
80206	0.5%
80212	0.5%
80214	0.5%
80215	0.5%
80220	0.5%
80228	0.5%
80229	0.5%
80230	0.5%
80231	0.5%
80233	0.5%
80234	0.5%
80236	0.5%
80241	0.5%
80260	0.5%
80306	0.5%
80308	0.5%
80343	0.5%
80403	0.5%
80509	0.5%
80510	0.5%
80521	0.5%
80526	0.5%
80634	0.5%
80642	0.5%
80829	0.5%
80831	0.5%
80904	0.5%
80908	0.5%
89127	0.5%

APPENDIX H. BLRA DAY USE AREA VISITOR SURVEY “OTHER” RESPONSES

Table 13. List of other locations respondents visited on their trip to BLRA

Other Location	**Frequency** (n=13)
Lake Isabelle	38%
Lake Isabelle and Blue Lake	15%
Blue Lake	8%
Lake Isabelle Glacier	8%
Lake Isabelle and Lake Isabelle Glacier	8%
Little Raier	8%
Niwot Picnic Area	8%
Rainbow Lakes	8%

Table 14. List of other activities respondents have done on their trip to BLRA

Other Activities	**Frequency** (n=19)
Driving	32%
Check out the area	16%
Moose watching	11%
Reading	11%
Wildlife viewing	11%
Dog walking	5%
Kite Flying	5%
Mushroom hunting	5%
Niwot Picnic Area	5%

Table 15. List of other routes taken by respondents to travel to or from BLRA

Country	**Frequency** (n=12)
Coal Creek Canyon	17%
Gold Hill Rd	8%
Liallan	8%
Lyons Rte 7	8%
Lyons South St. Vrain	8%
Nederland	8%
Rte 7	8%
Rte 7 from Lyons	8%
Rte 72	8%
Rte 72 Coal Creek Canyon	8%
South St. Vrain	8%

Table 16. List of other locations where respondents parked in BLRA

Other Location	**Frequency** (n=14)
Niwot Picnic Area	50%
Did not park	29%
Brainard lake	7%
Pauite Picnic Ground	7%
Red Rock Lake	7%

Table 17. List of other effects parking had on trip plans

Other affects on plans	**Frequency** (n=4)
I got here early	25%
Longer with little kids	25%
My husband drove up on a weekday to get a camp spot a I met him later which is why we had 2 cars then.	25%
Was flexible	25%

Table 18. List of respondent's country of residence

Country	**Frequency** (n=128)
United States	98%
United Kingdom	2%

Table 19. List of respondent's state of residence, if a resident of the United States

State	**Frequency** (n=104)
Colorado	85%
Pennsylvania	3%
Arkansas	2%
Nebraska	2%
California	1%
Illinois	1%
Maryland	1%
Michigan	1%
New Jersey	1%
New Mexico	1%
New York	1%
Ohio	1%
Oklahoma	1%

Table 20. List of respondent's ZIP code of residence, if a resident of Colorado

ZIP Code	**Frequency** (n=88)
80233	5%
80303	5%
80305	5%
80503	5%
80304	3%
80022	2%
80026	2%
80027	2%
80031	2%
80123	2%
80127	2%
80212	2%
80238	2%
80301	2%
80302	2%
80501	2%
80504	2%
80516	2%
80014	1%
80016	1%
80017	1%
80020	1%
80028	1%
80033	1%
80112	1%
80113	1%
80129	1%
80130	1%
80205	1%
80221	1%
80228	1%
80234	1%
80237	1%
80247	1%
80249	1%
80307	1%
80317	1%
80403	1%
80405	1%
80421	1%

ZIP Code	**Frequency** (n=88)
80422	1%
80439	1%
80465	1%
80467	1%
80474	1%
80481	1%
80514	1%
80526	1%
80536	1%
80537	1%
80538	1%
80540	1%
80544	1%
80550	1%
80602	1%
80634	1%
80904	1%
80906	1%
80918	1%
80929	1%

Appendix I. BLRA Gateway Trailhead Parking Lot Visitor Survey “Other” Responses

Table 21. List of other activities respondents have done during their trip to BLRA

Other Activity	**Frequency** (n=5)
Running	60%
Bike Patrol	20%
Geocaching	20%

Table 22. List of other primary destinations

Other Activity	**Frequency** (n=4)
All of it	25%
Beane Pond	25%
Pawnee Campground	25%
Wandering/familiarization with trails	25%

Table 23. List of other routes taken to get to or from BLRA

Other Activity	**Frequency** (n=14)
Rte 72	29%
Coal Creek Canyon	14%
Rte 7	14%
From/to Ward	7%
Rte 7 Lyons	7%
Rte 7 South St. Vrain	7%
Rte 7 to Rte 72	7%
Rte 72 Coal Creek Canyon	7%
Sugarloaf Rd	7%

Table 24. List of other ways parking in the Gateway Lot inferred with respondents plans

Other Plans	**Frequency** (n=1)
Pay for wilderness not expected	100%

Table 25. List of other activities respondents did because parking interfered with their plans

Other Plans	**Frequency** (n=5)
Did what I inteded to do anyway	20%
Hitch hiked to trail head	20%
Short hike	20%
Walked road to Long Lake	20%
Walked to Red Rock Lake	20%

Table 26. List of other reasons respondent parked in the Gateway Lot

Other Reasons	**Frequency** (n=18)
BLRA full	6%
Bumper to bumper traffic ahead	6%
Couldn't drive because of 1-in-1-out	6%
Decided to hike from here instead	6%
Dogs	6%
First to turn in	6%
Line to get past fee station	6%
Missed Sourdough trailhead	6%
More convenient	6%
Never parked here before	6%
No parking at Long Lake trailhead	6%
Other lot full	6%
Shorter drive	6%
The one we found	6%
There was a line at the other	6%
To avoid paying	6%
Traffic stopped into park	6%
Walking here first then on to the lake	6%

Table 27. List of other sources for information about parking and crowding

Other Sources	**Frequency** (n=3)
Info in Nederland	33%
Just come	33%
Sign at Peak to Peak	33%

Table 28. List of respondent's country of residence

Country	**Frequency** (n=84)
United States	99%
Canada	1%

Table 29. List of respondent's state of residence, if a resident of the United States

State	**Frequency** (n=73)
Colorado	90%
California	3%
Connecticut	1%
Idaho	1%
Minnesota	1%
Missouri	1%
New York	1%

Table 30. List of respondent's ZIP code of residence, if a resident of Colorado

ZIP Code	**Frequency** (n=66)
80301	9%
80302	9%
80026	6%
80027	6%
80305	6%
80513	6%
80031	5%
80206	5%
80304	5%
80504	5%
80205	3%
80218	3%
80303	3%
80501	3%
80503	3%
80003	2%
80005	2%
80023	2%
80112	2%
80207	2%
80209	2%
80222	2%
80230	2%

ZIP Code	**Frequency** (n=66)
80237	2%
80306	2%
80401	2%
80403	2%
80465	2%
80537	2%
80540	2%
80631	2%

APPENDIX J. GP VISITOR SURVEY INSTRUMENT

OMB #: 0596-0232
Expiration Date: 02/28/2017

Guanella Pass
Visitor Survey
2014

ID: ________ **Date:** ______________

Time:__________ **AM/PM** **Binder #:** ___________

Respondent: Driver / Passenger

Weather: Sunny / Partly / Overcast / Raining

Special Event: No/Yes____

PRIVACY ACT STATEMENT

16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by USDA Forest Service managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Thus the permanent data will be anonymous. Data collected through visitor surveys may be disclosed to the Department of Justice when relevant to litigation or anticipated litigation, or to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting a violation of law.

Burden Statement

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0232. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

A. Trip Description

The questions in this section ask about your current trip to Guanella Pass. Please ask the surveyor to show you a map of the area, if you need it to help answer the questions.

1. **Including yourself, how many people are there in your personal group on this trip to Guanella Pass? (Enter number of people.)**

   Number of people:____________

2. **Are there any children under the age of 16 in your personal group on this trip to Guanella Pass? (Check <u>one</u> box.)**

   ❑ Yes (Number of children):__________
   ❑ No

3. **Which of the following activities have you done/will you do during this trip to Guanella Pass? (Check <u>all that apply</u>.)**

	Have Done/Will Do on This Trip
A. Hiking on Mt. Bierstadt Trail	❑
B. Hiking on Square Top Lakes Trail	❑
C. Hiking on Rosalie Trail	❑
D. Walking/Short hike (less than 1 hour)	❑
E. Overnight backpacking (# of nights):________	❑
F. Picnicking	❑
G. Scenic driving	❑
H. Fishing	❑
I. Horseback riding	❑
J. Road biking	❑
K. Other (Please specify):_________________________	❑

4. **Which of the activities listed in Question 3 is your primary activity on this trip to Guanella Pass? (Enter letter of primary activity or check the box.)**

   Letter of primary activity:_____

   OR

   ❑ I do not have a primary activity on this trip to Guanella Pass.

5. **Which of the following other locations on Guanella Pass Road have you/will you visit on this trip to Guanella Pass? (Check <u>all that apply</u>.)**

	Have Visited/Will Visit on This Trip
Hiking Trails at Silver Dollar Lake	❑
Hiking Trails at Silverdale	❑
Hiking Trails at Abyss Lake	❑
Picnic Area	❑
Clear Lake Campground (# of nights):________	❑
Roadside Campsite (# of nights): ________	❑
Other (Please specify):__________________________	❑

B. Hike to Mt. Bierstadt Summit

6. **Did you hike part or all of the way to the summit of Mt. Bierstadt today? (Check <u>one</u> box.)**

- ☐ Yes, I hiked <u>part of the way</u> to the summit
- ☐ Yes, I hiked <u>all of the way</u> to the summit
- ☐ No (SKIP TO QUESTION 13 on Page 5)

7. **Approximately how many hours did you hike on the Mt. Bierstadt Trail <u>today</u>? (Enter time or check <u>one</u> box.)**

Approximate number of hours hiked <u>today</u>:____________

OR

☐ I hiked less than one hour today

OR

☐ Don't Know/Not Sure

8. **Did you feel crowded during your hike <u>today</u>? (Check <u>all that apply</u>.)**

- ☐ Yes, I felt crowded <u>on the trail</u>
- ☐ Yes, I felt crowded <u>on the summit of Mt. Bierstadt</u>
- ☐ No, I did not feel crowded during my hike today (SKIP TO QUESTION 10)

9. **Did you feel like crowding increased your risk or other people's risk of being injured at any point during your hike <u>today</u>? (Check <u>all that apply</u>.)**

- ☐ Yes, crowding increased the risk of injuries <u>on the trail</u>
- ☐ Yes, crowding increased the risk of injuries <u>on the summit of Mt. Bierstadt</u>
- ☐ No

10. **Did the presence of other people on the trail make you feel rushed or slow you down at any point during your hike <u>today</u>? (Check <u>one</u> box.)**

- ☐ Yes
- ☐ No

For the next question, please ask the surveyor to show you the photos she has of people on the summit of Mt. Bierstadt.

11. **For each photograph, please tell us if you would feel crowded if you were on the summit of Mt. Bierstadt with the number of people depicted in the photograph. (Check one box for each photo.)**

If I was on the summit of Mt. Bierstadt when there were this many people there...

	... I would feel crowded	
	Yes	**No**
Photo 1	❑	❑
Photo 2	❑	❑
Photo 3	❑	❑
Photo 4	❑	❑
Photo 5	❑	❑
Photo 6	❑	❑

12. **Should the number of people allowed to hike on the Mt. Bierstadt Trail each day be limited if it is needed for any of the following reasons, even if it limits when you can hike the trail? (Check one box for each reason.)**

	Should the number of hikers per day be limited?		
Reason for Limit	**Yes**	**No**	**Don't Know/ Not Sure**
To protect the quality of visitors' experiences (i.e., prevent crowding)	❑	❑	❑
To protect visitors' safety	❑	❑	❑
To reduce environmental impacts	❑	❑	❑

C. Travel and Parking

The next set of questions asks about your travel to and parking at Guanella Pass on this trip.

13. Which route did you use to travel to Guanella Pass on this trip? (Refer to the surveyor's route map and check <u>one</u> box.)

- ❑ Route #1 on route map
- ❑ Route #2 on route map
- ❑ Other (Please specify):____
- ❑ Don't know/Not sure

14. In which direction will you travel when you leave Guanella Pass today? (Refer to the surveyor's route map and check <u>one</u> box.)

- ❑ Toward Georgetown
- ❑ Toward Grant
- ❑ Don't know/Not sure

15. At approximately what time did you arrive at Guanella Pass today? (Enter time or check <u>one</u> box.)

Approximate arrival time today:_____________AM/PM (CIRCLE ONE)

OR

❑ I arrived on a different day (Please specify date of arrival):___________________

OR

❑ Don't know/Not sure

16. In how many vehicles did you and your personal group travel to Guanella Pass on this trip? (Enter number of vehicles or check the box.)

Number of vehicles:____________

OR

❑ I/we bicycled to Guanella Pass on this trip (SKIP TO QUESTION 21 on Page 7)

17. **Where did you park on this trip to Guanella Pass? (Refer to the surveyor's parking map and check <u>one</u> box.)**

❑ Lower parking lot (Mt. Bierstadt Trailhead)
❑ Upper parking lot (Square Top Lakes Trailhead)
❑ Along the roadside on Guanella Pass Road
❑ Other (Please specify):______________________________

18. **Do you agree or disagree with each of the following statements about where you parked at Guanella Pass? (Check <u>one</u> box for each item.)**

Where I parked was...	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
Safe	❑	❑	❑	❑	❑
Convenient	❑	❑	❑	❑	❑
Easy to find	❑	❑	❑	❑	❑
Well marked (e.g., paint striping)	❑	❑	❑	❑	❑
Uncongested	❑	❑	❑	❑	❑

19. **How much parking congestion do you think there was when you parked at Guanella Pass on this trip? (Circle <u>one</u> number.)**

No Parking Congestion at all	Slight Parking Congestion			Moderate Parking Congestion				Extreme Parking Congestion
1	2	3	4	5	6	7	8	9

20. For each of the following, if it was your only option for visiting Guanella Pass on a future trip because parking lots were full, would you be likely to do it or would you probably choose not to visit Guanella Pass? (Check one box for each item.)

If this was my only option for visiting Guanella Pass on a future trip...	... I'd be likely to do it	... I'd probably choose not to visit Guanella Pass
Park at a designated lot in town and take a 30 minute shuttle bus ride to Guanella Pass.	❑	❑
Park at a designated lot on Guanella Pass Road and take a 15 minute shuttle bus ride to Guanella Pass.	❑	❑

21. Do you agree or disagree with each of the following statements about potential actions when parking lots are full at Guanella Pass? (Check one box for each item.)

When parking lots at Guanella Pass are full people should be...	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
...allowed to drive here and park wherever they can, including on the roadside.	❑	❑	❑	❑	❑
...allowed to drive here to look for parking anyway, but not allowed to park on the roadside.	❑	❑	❑	❑	❑
...directed to park at a designated lot in town and take a 30 minute shuttle bus ride to Guanella Pass.	❑	❑	❑	❑	❑
...directed to park at a designated lot on Guanella Pass Road and take a 15 minute shuttle bus ride to Guanella Pass.	❑	❑	❑	❑	❑
...directed to other recreation areas instead of visiting Guanella Pass that day.	❑	❑	❑	❑	❑

D. Planning Your Trip to Guanella Pass

The next set of questions asks about planning you may have done to prepare for this trip to Guanella Pass.

22. How long ago did you decide to take this trip to Guanella Pass? (Check <u>one</u> box.)

- ❑ Sometime today
- ❑ Yesterday
- ❑ In the last week
- ❑ More than a week ago, but less than a month ago
- ❑ A month or more before today

23. When you planned this trip to Guanella Pass, did you think about the possibility that it might be difficult to find parking here? (Check <u>one</u> box.)

- ❑ Yes
- ❑ No (SKIP TO QUESTION 25)

24. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to Guanella Pass, how did it affect your trip plans? (Check <u>all that apply</u>.)

- ❑ It did not affect my plans
- ❑ I visited at a time of day I thought would be less crowded
- ❑ I visited on a day of the week I thought would be less crowded
- ❑ I avoided places here I thought would be crowded today
- ❑ Other (Please specify):____

25. How likely would you be to use each of the following sources for information about parking and crowding conditions at Guanella Pass, if it was available for planning a future trip to Guanella Pass? (Check <u>one</u> box for each item.)

	Likely	Not Likely	Don't Know/Not Sure
Website	❑	❑	❑
Smartphone app	❑	❑	❑
Social media (e.g., Facebook, Twitter)	❑	❑	❑
Text updates on cellular phone/smartphone	❑	❑	❑
AM radio station	❑	❑	❑
Telephone information line (message updated daily)	❑	❑	❑
Telephone information line (live person)	❑	❑	❑
Tourist information center	❑	❑	❑
Other (Please specify):____________________	❑	❑	❑

E. Background Information

26. What is your gender? (Check one box.)

- ❑ Male
- ❑ Female

27. In what year were you born?

Year born:___________

28. Do you live in the United States? (Check one box.)

- ❑ Yes (What is your zip code? __________)
- ❑ No (What country do you live in? ____________________________)

29. What is the highest level of formal education you have completed? (Check one box.)

- ❑ Some high school
- ❑ High school graduate or GED
- ❑ Some college, business or trade school
- ❑ College, business or trade school graduate
- ❑ Some graduate school
- ❑ Master's, doctoral or professional degree

30. Are you Hispanic or Latino? (Check one box.)

- ❑ Yes
- ❑ No

31. What is your race? (Check all that apply.)

- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Black or African American
- ❑ Native Hawaiian
- ❑ Pacific Islander other than Native Hawaiian
- ❑ White

Thank you for your help with this survey!
Please return it to the surveyor.

APPENDIX K. GP VISITOR SURVEY CODE BOOK

Variable Name	Description	Question	Values
ID	Survey ID number	Front page	#
Date	Date of survey	Front page	mm/dd/yyyy
Weekend	Whether or not survey was administered on a weekend day or weekday	Front page	0 = Weekday 1 = Weekend
Time	Time at which respondent began survey	Front page	hh:mm AM/PM
Binder	Number of binder used for survey	Front page	1 = Binder 1 2 = Binder 2 3 = Binder 3 4 = Binder 4 5 = Binder 5
Respondent	Whether the respondent was a driver or passenger	Front page	1 = Driver 2 = Passenger
Weather	Weather conditions at the start of the survey	Front page	1 = Sunny 2 = Partly 3 = Overcast 4 = Raining
SpecialEvent	Whether or not there was a special event at the survey site that day	Front page	0 = No 1 = Yes
Event_Text	Description of the special event	Front page	text
Q1A_GroupSize	Number of people in respondent's personal group	Q1	#
Q1B_GroupSizeCategory	Number of people in personal group by size category	Q1	1 = 1 person 2 = 2 people 3 = 3 or 4 people 4 = 5 or more people
Q2_ChildrenInGroup	Presence of children under 16 in respondent's personal group	Q2	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q2_NumChild	Number of children under 16 in respondent's personal group	Q2	#
Q2_NumChildCat	Number of children in personal group by size category	Q2	1 = 1 person 2 = 2 people 3 = 3 or 4 people 4 = 5 or more people
Q3A_HikeBierstadt	Whether or not respondent: Has hiked/will hike on Mt Bierstadt Trail	Q3	0 = No 1 = Yes
Q3B_HikeSquareTop	Whether or not respondent: Has hiked/will hike on Square Top Lakes Trail	Q3	0 = No 1 = Yes
Q3C_HikeRosalie	Whether or not respondent: Has hiked/will hike on Rosalie Trail	Q3	0 = No 1 = Yes
Q3D_Walk	Whether or not respondent: Has done/will do walking/short hike less than 1 hr	Q3	0 = No 1 = Yes
Q3E_Backpack	Whether or not respondent: Has done/will do overnight backpacking	Q3	0 = No 1 = Yes
Q3E_Nights	Number of nights of overnight backpacking	Q3	#
Q3E_NightsCat	Number of nights of overnight backpacking, categorized	Q3	1 = 1 night 2 = 2-3 nights 4 = 4 or more nights
Q3F_PIcnicking	Whether or not respondent has done/will do: Picnicking in the GP area	Q3	0 = No 1 = Yes
Q3G_ScenicDriving	Whether or not respondent was done/will do: Scenic driving in the GP area	Q3	0 = No 1 = Yes
Q3H_Fishing	Whether or not respondent has done/will do: Fishing in the GP area	Q3	0 = No 1 = Yes
Q3I_Horseback	Whether or not respondent has done/will do: Horseback riding in the GP area	Q3	0 = No 1 = Yes
Q3J_RoadBiking		Q3	0 = No

Variable Name	Description	Question	Values
	Whether or not respondent has done/will do: Road biking in the GP area		1 = Yes
Q3K_Other	Whether or not respondent has done/will do: Other activities in the GP area	Q3	0 = No 1 = Yes
Q3K_OtherSpecify	Description of other activities respondent has done/will do in the GP area	Q3	text
Q4_PrimaryActivity	Respondent's primary activity of this trip	Q4	1 = Hiking on Mt Bierstadt Trail 2 = Hiking on Square Top Lakes Trail 3 = Hiking on Rosalie Trail 4 = Walking/short hike (<1 hr) 5 = Overnight backpacking 6 = Picnicking in the GP area 7 = Scenic driving in the GP area 8 = Fishing in the GP area 9 = Horseback riding in the GP area 10 = Road biking in the GP area 11 = Other activities in the GP area 99 = No primary activity on this trip to Guanella Pass
Q5A_HikeSilverDollar	Whether or not respondent has visited/will visit: Hiking trails at Silver Dollar Lake	Q5	0 = No 1 = Yes
Q5B_HikeSilverdale	Whether or not respondent has visited/will visit: Hiking trails at Silverdale	Q5	0 = No 1 = Yes
Q5C_HikeAbyssLake	Whether or not respondent has visited/will visit: Hiking trails at Abyss Lake	Q5	0 = No 1 = Yes
Q5D_PicnicArea	Whether or not respondent has visited/will visit: The picnic area	Q5	0 = No 1 = Yes
Q5E_ClearLake	Whether or not respondent has visited/will visit: Clear Lake Campground	Q5	0 = No 1 = Yes
Q5E_ClearLake_Nights	Number of nights at Clear Lake Campground	Q5	#

Variable Name	Description	Question	Values
Q5E_ClearLake_NightsCat	Number of nights at Clear Lake Campground, categorized	Q5	1 = 1 night 2 = 2-3 nights 4 = 4 or more nights
Q5F_RoadsideCampsite	Whether or not respondent has visited/will visit: Roadside campsites	Q5	0 = No 1 = Yes
Q5F_Roadside_Nights	Number of nights at roadside campsites	Q5	#
Q5F_Roadside_NightsCat	Number of nights at roadside campsites, categorized	Q5	1 = 1 night 2 = 2 nights 3 = 3 or more nights
Q5G_Other	Whether or not respondent has visited/will visit: Other locations on Guanella Pass Road	Q5	0 = No 1 = Yes
Q5G_OtherSpecify	Description of other locations respondent has visited/will visit	Q5	text
Q6_HikeToSummit	Whether or not respondent hiked part or all the way to the summit of Mt. Bierstadt	Q6	1 = Hiked part way to the summit 2 = Hiked all the way to the summit 3 = Hiked neither part nor all of the way to the summit
Q7A_HoursHiked	Approximate number of hours respondent hiked on the Mt. Bierstadt Trail	Q7	#
Q7A_HoursHikedCat	Approximate number of hours respondent hiked on the Mt Bierstadt Trail, categorized	Q7	0 = Less than 1 hour 1 = 1 hour 2 = 2-3 hours 4 = 4-5 hours 6 = 6-7 hours 8 = 8 or more hours 99 = Greater than 1 hour
Q7B_LessThan1Hour	Whether or not respondent hiked less than one hour on the Mt. Bierstadt Trail	Q7	0 = Respondent hiked more than one hour, OR doesn't know/isn't sure how long they hiked 1 = Respondent hiked less than one hour on the Mt. Bierstadt Trail

Variable Name	Description	Question	Values
Q7C_DontKnow	Whether or not respondent doesn't know/isn't sure of time spent hiking on Mt. Bierstadt Trail	Q7	0 = Respondent indicated how many hours they hiked on the Mt. Bierstadt Trail, OR respondent hiked less than one hour 1 = Respondent doesn't know/isn't sure of time spent hiking on Mt. Bierstadt Trail
Q8A_YesTrailCrowd	Whether or not respondent felt crowded on Mt. Bierstadt Trail	Q8	0 = No 1 = Yes
Q8B_YesSummitCrowd	Whether or not respondent felt crowded on the summit of Mt. Bierstadt	Q8	0 = No 1 = Yes
Q8C_No	Whether or not respondent did NOT feel crowded during hike	Q8	0 = Respondent felt crowded at some point during hike 1 = Respondent did NOT feel crowded during hike
Q9A_YesTrailRisk	Whether or not respondent felt like crowding increased the risk of injuries on the trail	Q9	0 = No 1 = Yes
Q9B_YesSummitRisk	Whether or not respondent felt like crowding increased the risk of injuries on the summit of Mt. Bierstadt	Q9	0 = No 1 = Yes
Q9C_No	Whether or not respondent did NOT feel like crowding increased the risk of injuries during hike	Q9	0 = Respondent felt like crowding increased the risk of injuries at some point during hike 1 = Respondent did NOT feel like crowding increased the risk of injuries at any point during hike
Q10_RushedSlow	Whether or not the presence of others on the trail made respondent feel rushed or slowed down at any point	Q10	0 = No 1 = Yes
Q11A_Photo1	Whether or not respondent would feel crowded on the summit of Mt. Bierstadt in: Photo 1	Q11	0 = No 1 = Yes
Q11B_Photo2	Whether or not respondent would feel crowded on the summit of Mt. Bierstadt in: Photo 2	Q11	0 = No 1 = Yes
Q11C_Photo3	Whether or not respondent would feel crowded on the summit of Mt. Bierstadt in: Photo 3	Q11	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q11D_Photo4	Whether or not respondent would feel crowded on the summit of Mt. Bierstadt in: Photo 4	Q11	0 = No 1 = Yes
Q11E_Photo5	Whether or not respondent would feel crowded on the summit of Mt. Bierstadt in: Photo 5	Q11	0 = No 1 = Yes
Q11F_Photo6	Whether or not respondent would feel crowded on the summit of Mt. Bierstadt in: Photo 6	Q11	0 = No 1 = Yes
Q11A_Photo1_NumPeople	Number of people in photo	Q11	#
Q11A_Photo2_NumPeople	Number of people in photo	Q11	#
Q11A_Photo3_NumPeople	Number of people in photo	Q11	#
Q11A_Photo4_NumPeople	Number of people in photo	Q11	#
Q11A_Photo5_NumPeople	Number of people in photo	Q11	#
Q11A_Photo6_NumPeople	Number of people in photo	Q11	#
Q12A_VisitorsExperience	Whether or not respondent believes the number of people hiking on Mt. Bierstadt Trail should be limited to: Protect the quality of visitors' experiences (i.e., to prevent crowding)	Q12	0 = No 1 = Yes 99 = Don't know/Not sure
Q12B_VisitorsSafety	Whether or not respondent believes the number of people hiking on Mt. Bierstadt Trail should be limited to: Protect visitors' safety	Q12	0 = No 1 = Yes 99 = Don't know/Not sure
Q12C_EnvImpacts	Whether or not respondent believes the number of people hiking on Mt. Bierstadt Trail should be limited to: Reduce environmental impacts	Q12	0 = No 1 = Yes 99 = Don't know/Not sure
Q13_RouteToGP	Which route respondent used to travel to GP	Q13	1 = From Georgetown 2 = From Grant 3 = Other

Variable Name	Description	Question	Values
			99 = Don't know/Not sure
Q13_RouteSpecify	Description of respondent's alternate route to GP	Q13	text
Q14_RouteHome	Which route respondent will use to travel when they leave GP	Q14	1 = Toward Georgetown 2 = Toward Grant 99 = Don't know/Not sure
Q14_RouteComplete	Which route respondent will use to travel to GP and when they leave GP	Q13 and Q14	1 = From Georgetown, to Georgetown 2 = From Georgetown, to Grant 3 = From Grant, to Grant 4 = From Grant, to Georgetown
Q15A_ArrivalTime	Respondent's approximate arrival time at GP today	Q15	hh:mm AM/PM
Q15A_Recode	Recode of respondent's approximate arrival time at GP today	Q15	1 = Before 5:00 AM 2 = Between 5 and 6 AM 3 = Between 6 and 7 AM 4 = Between 7 and 8 AM 5 = Between 8 and 9 AM 6 = Between 9 and 10 AM 7 = Between 10 AM and noon (12 PM) 8 = After noon (12 PM)
Q15B_DifferentDay	Whether or not respondent arrived at GP on a different day	Q15	0 = Respondent indicated their arrival time today, OR doesn't know/isn't sure of arrival time 1 = Respondent arrived on a different day
Q15B_Specify	Date of respondent's arrival, if on a different day	Q15	text
Q15C_DontKnow	Whether or not respondent doesn't know/isn't sure of arrival time at GP	Q15	0 = Respondent indicated arrival time at GP today, OR respondent arrived at GP on a different day 1 = Respondent doesn't know/isn't sure of arrival time at GP today
Q16A_NumVehicles	Number of vehicles in which respondent and personal group traveled to GP	Q16	#
Q16A_NumVehiclesCat	Number of vehicles in which respondent and personal group traveled to GP, categorized	Q16	1 = 1 car

Variable Name	Description	Question	Values
			2 = 2 cars 3 = 3 or more cars
Q16B_Bicycled	Whether or not respondent and personal group bicycled to GP	Q16	0 = No 1 = Yes
Q17_WherePark	Where respondent parked at GP	Q17	1 = Lower parking lot (Mt. Bierstadt Trailhead) 2 = Upper parking lot (Square Top Lakes Trailhead) 3 = Along the roadside on GP Road 4 = Other
Q17_WherePark_LotVsRoad	Whether respondent parked in a parking lot or along the roadside	Q17	1 = Parking lot 2 = Along the roadside
Q17_OtherSpecify	Description of respondent's alternate parking location	Q17	text
Q18A_Safe	Respondent's opinion - where they parked at GP was: Safe	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18B_Convenient	Respondent's opinion - where they parked at GP was: Convenient	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree or Disagree 4 = Disagree 5 = Strongly Disagree
Q18C_EasyToFind	Respondent's opinion - where they parked at GP was: Easy to find	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18D_WellMarked	Respondent's opinion - where they parked at GP was: Well marked (e.g., paint striping)	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree

Variable Name	Description	Question	Values
			4 = Disagree 5 = Strongly Disagree
Q18E_Uncongested	Respondent's opinion - where they parked at GP was: Uncongested	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q19_HowMuchParkingCong	How much parking congestion there was when respondent parked	Q19	1 = No Parking Congestion at all 2 = Slight Parking Congestion 3 4 5 = Moderate Parking Congestion 6 7 8 9 = Extreme Parking Congestion
Q20A_30minShuttle	Whether or not respondent would visit GP if their only option were to: Park at a designated lot in town and take a 30 min shuttle bus ride to GP	Q20	1 = Would be like to do it 2 = Probably wouldn't visit GP
Q20B_15minShuttle	Whether or not respondent would visit GP if their only option were to: Park at a designated lot in on GP Road and take a 15 min shuttle bus ride to GP	Q20	1 = Would be likely to do it 2 = Probably wouldn't visit GP
Q21A_DriveParkWherever	Respondent's opinion - when parking lots at GP are full, people should be: Allowed to park wherever they can, including on the roadside	Q21	1 = Strongly Agree 2 = Agree 3 = Neither Agree Nor Disagree 4 = Disagree 5 = Strongly Disagree
Q21B_DriveLookForParking	Respondent's opinion - when parking lots at GP are full, people should be: Allowed to look for parking, but not allowed to park on the roadside	Q21	1 = Strongly Agree 2 = Agree

Variable Name	Description	Question	Values
			3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q21C_30MinShuttle	Respondent's opinion - when parking lots at GP are full, people should be: Directed to park at a designated lot in town and take a 30 min shuttle bus ride to GP	Q21	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q21_15MinShuttle	Respondent's opinion - when parking lots at GP are full, people should be: Directed to park at a designated lot on GP Road and take a 15 min shuttle bus ride to GP	Q21	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q21_OtherRecAreas	Respondent's opinion - when parking lots at GP are full, people should be: Directed to other recreation areas instead of visiting GP	Q21	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22_DecideToTakeTrip	How long ago respondent decided to visit GP	Q22	1 = Sometime today 2 = Yesterday 3 = In the last week 4 = More than a week ago, but less than a month ago 5 = A month or more before today
Q23_DifficultParking_Orig	Whether or not respondent thought that it might be difficult to find parking at GP, when they planned their trip	Q23	0 = No 1 = Yes

Variable Name	Description	Question	Values
Q23_Recode	Whether or not respondent thought that it might be difficult to find parking at GP, when they planned their trip - RECODE	Q23	0 = No 1 = Yes
Q24A_DidNotAffect	The possibility that it might be difficult to find parking at GP: Did not affect respondent's plans	Q24	0 = It may have affected respondent's plan 1 = It did not affect respondent's plans
Q24B_VisitedTimeOfDay	The possibility that it might be difficult to find parking at GP caused respondent to: Visit at a time of day they thought would be less crowded	Q24	0 = No 1 = Yes
Q24C_VisitedDayOfWeek	The possibility that it might be difficult to find parking at GP caused respondent to: Visit on a day of the week they thought would be less crowded	Q24	0 = No 1 = Yes
Q24D_AvoidedPlaces	The possibility that it might be difficult to find parking at GP caused respondent to: Avoid places at GP they thought would be crowded	Q24	0 = No 1 = Yes
Q24E_Other	The possibility that it might be difficult to find parking at GP caused respondent to: Take other action	Q24	0 = No 1 = Yes
Q24E_OtherSpecify	Description of respondent's other action	Q24	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25A_Website	Whether or not respondent would be likely to use this source for info about parking and crowding: Website	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25B_Smartphone	Whether or not respondent would be likely to use this source for info about parking and crowding: Smartphone app	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25C_SocialMedia	Whether or not respondent would be likely to use this source for info about parking and crowding: Social media (e.g., Facebook, Twitter)	Q25	1 = Likely 2 = Not likely

Variable Name	Description	Question	Values
			99 = Don't know/Not sure
Q25D_TextUpdates	Whether or not respondent would be likely to use this source for info about parking and crowding: Text updates on cell phone/smartphone	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25E_AMRadio	Whether or not respondent would be likely to use this source for info about parking and crowding: AM radio station	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25F_TelephoneMessage	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ message update daily	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25G_TelephonePerson	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ live person	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25H_TouristCenter	Whether or not respondent would be likely to use this source for info about parking and crowding: Tourist info center	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25I_Other	Whether or not respondent would be likely to use this source for info about parking and crowding: Other info source	Q25	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q25I_OtherSpecify	Description of other info source respondent would use	Q25	text
Q26_Gender	Respondent's gender	Q26	1 = Male 2 = Female
Q27A_YearBorn	Respondent's year of birth	Q27	yyyy
Q27B_Age	Respondent's age	Q27	#
Q27C_AgeCategory	Respondent's age category	Q27	1 = 18-24 2 = 25-34

Variable Name	Description	Question	Values
			3 = 35-44 4 = 45-54 5 = 55-64 6 = 65 or older
Q28_LiveInUS	Whether or not respondent lives in the United States	Q28	1 = Yes 2 = No
Q28_ZipCode	Respondent's zip code, if a resident of the US	Q28	#####
Q28_State	Respondent’s state of residence, if a resident of the US	Q28	text
Q28_CO_or_Not	Whether or not respondent resides in the state of Colorado	Q28	0 = Other 1 = Colorado
Q28_County	Respondent's county of residence, if a resident of Colorado	Q28	text
Q28_MetroArea	Respondent’s metropolitan area, if a resident of Colorado	Q28	text
Q28_Country	Respondent's country of residence, if not the US	Q28	text
Q29_Education	Highest level of formal education that respondent has completed	Q29	1 = Some high school 2 = High school graduate or GED 3 = Some college, business or trade school 4 = College, business or trade school graduate 5 = Some graduate school 6 = Master's, doctoral or professional degree
Q30_Hispanic	Whether or not respondent is Hispanic or Latino	Q30	0 = No 1 = Yes
Q31A_AmericanIndian	Whether or not respondent's race is: American Indian or Alaska Native	Q31	0 = No 1 = Yes
Q31B_Asian	Whether or not respondent's race is: Asian	Q31	0 = No 1 = Yes
Q31C_Black	Whether or not respondent's race is: Black of African American	Q31	0 = No 1 = Yes
Q31D_NativeHawaiian	Whether or not respondent's race is: Native Hawaiian	Q31	0 = No

Variable Name	Description	Question	Values
			1 = Yes
Q31E_PacificIslander	Whether or not respondent's race is: Pacific Islander other than Native Hawaiian	Q31	0 = No 1 = Yes
Q31F_White	Whether or not respondent's race is: White	Q31	0 = No 1 = Yes

APPENDIX L. GP VISITOR SURVEY PHOTO SIMULATIONS


0 People


1 Person

4 People

7 People


10 People


13 People


16 People


19 People


22 People


30 People


45 People


60 People

Appendix M. GP Visitor Survey "Other" Activities Reported by Respondents

Table 31. List of other activities respondents have done/will do during their trip to GP

Other Activities	**Frequency** (n=47)
Camping	34%
Mt. Evans	13%
Sawtooth and Mt. Evans	9%
Eating	4%
Sawtooth	4%
Climbing	2%
Dining	2%
Dispersed camping Saturday night	2%
Konnig	2%
Monnhann Dike/Canoeing	2%
Mountain biking	2%
Mt. Evans via Spalding Gulch	2%
Painting	2%
Rehab a knee	2%
Running, skiing	2%
RV camping	2%
Silver Dollar Lake Trail	2%
Silverdale site	2%
Surviving early morning storms	2%
Train from Georgetown	2%
White Water Rafting	2%
Wildflowers	2%

Appendix N. GP Visitor Survey “Other” Locations Reported by Respondents

Table 32. List of other locations on GP Road that respondents have visited/will visit during their trip to GP

Other Location	**Frequency** (n=9)
Guanella Pass Campground	44%
Beaver Ponds Fishing	11%
Biking	11%
Burning Bear campsite	11%
Falls west side of pass	11%
Mt. Evans	11%

Appendix O. GP Visitor Survey "Other" Information Sources Reported by Respondents

Table 33. List of other information sources that respondents would likely use to access information about parking and crowding conditions at GP when planning a future trip

Other Information Source	**Frequency** (n=4)
14ers.com	50%
I don't really think about parking	25%
Variable message sign at I/70 Georgetown exit	25%

Appendix P. GP Visitor Survey Country of Residence Reported by Respondents

Table 34. List of respondent's country of residence

Country	**Frequency** (n=394)
United States	99.2%
Germany	0.3%
Italy	0.3%
Slovenia	0.3%

Appendix Q. GP Visitor Survey States of Residence Reported by Respondents

Table 35. List of respondent's state of residence, if a resident of the United States

State	**Frequency** (n=339)
CO	76%
MN	2%
IA	2%
CA	1%
KS	1%
MO	1%
TX	1%
OH	1%
FL	1%
GA	1%
IL	1%
MI	1%
NE	1%
PA	1%
MD	1%
NC	1%
OR	1%
RI	1%
SD	1%
VA	1%
AR	0%
AZ	0%
DC	0%
DE	0%
IN	0%
MA	0%
ME	0%
NJ	0%
NV	0%
NY	0%
OK	0%
WA	0%
WI	0%
WV	0%

Appendix R. GP Visitor Survey ZIP codes Reported by Respondents Who Reside in Colorado

Table 36. List of respondent's ZIP code of residence, if a resident of Colorado

ZIP code	**Frequency** (n=257)
80211	3.1%
80027	2.3%
80134	2.3%
80209	2.3%
80210	2.3%
80401	2.3%
80521	2.3%
80014	1.9%
80220	1.9%
80403	1.9%
80439	1.9%
80015	1.6%
80108	1.6%
80120	1.6%
80123	1.6%
80125	1.6%
80126	1.6%
80205	1.6%
80206	1.6%
80212	1.6%
80302	1.6%
80919	1.6%
80003	1.2%
80013	1.2%
80020	1.2%
80021	1.2%
80026	1.2%
80033	1.2%
80112	1.2%
80113	1.2%
80121	1.2%
80124	1.2%
80129	1.2%
80203	1.2%
80218	1.2%
80246	1.2%
80303	1.2%
80305	1.2%
80465	1.2%
80110	0.8%

ZIP code	Frequency (n=257)
80118	0.8%
80127	0.8%
80204	0.8%
80219	0.8%
80226	0.8%
80227	0.8%
80228	0.8%
80241	0.8%
80301	0.8%
80421	0.8%
80433	0.8%
80501	0.8%
80524	0.8%
80526	0.8%
80534	0.8%
80542	0.8%
80904	0.8%
80918	0.8%
80002	0.4%
80004	0.4%
80005	0.4%
80006	0.4%
80011	0.4%
80012	0.4%
80016	0.4%
80017	0.4%
80018	0.4%
80022	0.4%
80045	0.4%
80107	0.4%
80109	0.4%
80111	0.4%
80115	0.4%
80116	0.4%
80122	0.4%
80136	0.4%
80202	0.4%
80207	0.4%
80214	0.4%
80222	0.4%
80223	0.4%

ZIP code	Frequency (n=257)
80224	0.4%
80229	0.4%
80230	0.4%
80231	0.4%
80232	0.4%
80233	0.4%
80234	0.4%
80237	0.4%
80238	0.4%
80304	0.4%
80424	0.4%
80435	0.4%
80466	0.4%
80477	0.4%
80505	0.4%
80507	0.4%
80513	0.4%
80525	0.4%
80532	0.4%
80547	0.4%
80549	0.4%
80550	0.4%
80601	0.4%
80603	0.4%
80631	0.4%
80702	0.4%
80720	0.4%
80903	0.4%
80905	0.4%
80920	0.4%
80922	0.4%
80923	0.4%
81212	0.4%
81506	0.4%
81601	0.4%
81615	0.4%
81620	0.4%

APPENDIX S. MERA VISITOR SURVEY INSTRUMENT

OMB #: 0596-0232
Expiration Date: 02/28/2017

Mount Evans Recreation Area
Visitor Survey
2014

ID: ________ **Date:** ______________

Time:__________ **AM/PM** **Binder #:** __________

Respondent: Driver / Passenger **Motorcycle:** Yes / No

Weather: Sunny / Partly / Overcast / Raining

Special Event: No/Yes____

PRIVACY ACT STATEMENT

16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by USDA Forest Service managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Thus the permanent data will be anonymous. Data collected through visitor surveys may be disclosed to the Department of Justice when relevant to litigation or anticipated litigation, or to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting a violation of law.

Burden Statement

According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0596-0232. The time required to complete this information collection is estimated to average 10 minutes per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, gender, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at 202-720-2600 (voice and TDD).

To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, 1400 Independence Avenue, SW, Washington, DC 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

A. Trip Description

The questions in this section ask about your current trip to Mount Evans Recreation Area (MERA). Please ask the surveyor to show you a map of the area, if you need it to help answer the questions.

1. Including yourself, how many people are there in your personal group on this trip to Mount Evans Recreation Area (MERA)? (Enter number of people.)

Number of people:____________

2. Are there any children under the age of 16 in your personal group on this trip to MERA? (Check <u>one</u> box.)

❑ Yes (Number of children):__________
❑ No

3. Which of the following locations in MERA did you visit <u>today</u>? (Refer to the surveyor's map of the area and check <u>all that apply</u>.)

	Visited on this Trip
A. Mount Evans Summit	❑
B. Summit Lake	❑
C. Mount Goliath Natural Area	❑
G. Other (Please specify):________________________	❑

OR

❑ I did not stop to visit any of the above locations today (SKIP TO QUESTION 5)

4. Which of the locations listed in Question 3 was your primary destination in MERA <u>today</u>? (Enter letter of primary destination or check the box.)

Letter of primary destination:______

OR

❑ I did not have a primary destination in MERA today.

5. Which of the following activities did you do on this trip to MERA? (Check all that apply.)

	Did on This Trip
A. Scenic driving	❑
B. Walking/Short hike (less than 1 hour)	❑
C. Day hiking (more than 1 hour)	❑
D. Overnight backpacking (# of nights):________	❑
E. Picnicking	❑
F. Road biking	❑
G. Wildlife viewing	❑
H. Attend ranger program	❑
I. Fishing	❑
J. Creative arts (photography/drawing/ painting/writing)	❑
K. Other (Please specify):_________________________	❑

6. Which of the activities listed in Question 5 was your primary activity on this trip to MERA? (Enter letter of primary activity or check the box.)

Letter of primary activity:_______

OR

❑ I did not have a primary activity on this trip to MERA.

B. Walk/Hike to Mt. Evans Summit

7. Did you walk/hike to the summit of Mt. Evans <u>today</u>? (Refer to the surveyor's map of the area and check <u>one</u> box.)

- ❑ Yes, I walked from the parking lot just below the summit
- ❑ Yes, I hiked from Summit Lake
- ❑ Yes, I hiked from another location (Please specify):________________________________
- ❑ No (SKIP TO QUESTION 12 on Page 5)

8. Did you think it was crowded on the summit of Mt. Evans <u>today</u>? (Check <u>one</u> box.)

- ❑ Yes, it was crowded on the summit of Mt. Evans <u>today</u> (CONTINUE TO QUESTION 9)
- ❑ No, it wasn't crowded on the summit of Mt. Evans <u>today</u> (SKIP TO QUESTION 10)

9. Did you feel like crowding on the summit of Mt. Evans increased your risk or other people's risk of being injured at any point while you were there <u>today</u>? (Check <u>one</u> box.)

- ❑ Yes
- ❑ No

For the next question, please ask the surveyor to show you the photos she has of people on the summit of Mt. Evans.

10. For each photograph, please tell us if you would feel crowded if you were on the summit of Mt. Evans with the number of people depicted in the photograph. (Check <u>one</u> box for each photo.)

If I was on the summit of Mt. Evans when there were this many people there…

	… I would feel crowded	
	Yes	**No**
Photo 1	❑	❑
Photo 2	❑	❑
Photo 3	❑	❑
Photo 4	❑	❑
Photo 5	❑	❑
Photo 6	❑	❑

11. Should the number of people allowed to visit Mt. Evans each day be limited if it is needed for any of the following reasons, <u>even if it limits when you can visit MERA</u>? (Check <u>one</u> box for each reason.)

	Should the number of people per day be limited?		
Reason for Limit	**Yes**	**No**	**Don't Know/ Not Sure**
To protect the quality of visitors' experiences on the summit (i.e., prevent crowding)	❑	❑	❑
To protect visitors' safety on the summit	❑	❑	❑
To reduce environmental impacts on the summit	❑	❑	❑

C. Travel and Parking

The next set of questions asks about your travel to and parking at MERA on this trip.

12. **Which route did you use to travel to MERA on this trip? (Refer to the surveyor's route map and check <u>one</u> box.)**

- ❑ Route #1 on route map
- ❑ Route #2 on route map
- ❑ Other (Please specify):____
- ❑ Don't know/Not sure

13. **In which direction will you travel when you leave MERA today? (Refer to the surveyor's route map and check <u>one</u> box.)**

- ❑ Rte. 103 toward Idaho Springs
- ❑ Rte. 103 toward Evergreen
- ❑ Don't know/Not sure

14. **At approximately what time did you arrive at MERA today? (Enter time or check <u>one</u> box.)**

Approximate arrival time:_____________AM/PM (CIRCLE ONE)

OR

❑ I arrived on a different day (Please specify date of arrival):___________________

OR

❑ Don't know/Not sure

15. **In how many vehicles did you/your personal group travel to MERA on this trip? (Enter number of vehicles.)**

Number of vehicles:____________

16. Did you experience traffic congestion at the entrance station to enter MERA on this trip? (Check <u>one</u> box.)

❑ Yes
❑ No

17. Did you experience traffic congestion while you were driving on the Mt. Evans Road <u>today</u>? (Check <u>one</u> box.)

❑ Yes
❑ No

18. Do you agree or disagree with each of the following statements about driving on the Mt. Evans Road <u>today</u>? (Check <u>one</u> box for each item.)

	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree
The number of cars on the Mt. Evans Road made driving conditions unsafe.	❑	❑	❑	❑	❑
I enjoyed driving on the Mt. Evans Road today.	❑	❑	❑	❑	❑
I would prefer to tour MERA by shuttle bus or van than drive on the Mt. Evans Road myself.	❑	❑	❑	❑	❑
The number of bicycles on the Mt. Evans Road made driving conditions unsafe.	❑	❑	❑	❑	❑

19. **For each location in MERA that you visited <u>today</u>, do you agree or disagree with each of the following statements about where you parked? (Check the box for each location you visited, and then check <u>one</u> box for each item at locations you visited.)**

	Mount Evans Summit		Summit Lake		Mount Goliath Natural Area	
	❑ Visited Today		❑ Visited Today		❑ Visited Today	
Where I parked at this location today was…	**Agree**	**Disagree**	**Agree**	**Disagree**	**Agree**	**Disagree**
Safe	❑	❑	❑	❑	❑	❑
In a designated parking lot	❑	❑	❑	❑	❑	❑
Not an actual parking space (e.g., on road shoulder)	❑	❑	❑	❑	❑	❑
Convenient	❑	❑	❑	❑	❑	❑
Uncongested	❑	❑	❑	❑	❑	❑

OR

❑ I did not stop to visit any of the above locations today.

20. **How much parking congestion do you think there is in MERA today? (Circle <u>one</u> number.)**

No Parking Congestion at all	Slight Parking Congestion			Moderate Parking Congestion				Extreme Parking Congestion
1	2	3	4	5	6	7	8	9

21. **For each of the following, if it was your only option for visiting MERA on a future trip because parking lots in MERA were full, would you be likely to do it or would you probably choose not to visit MERA? (Check <u>one</u> box for each item.)**

If this was my only option for visiting MERA on a future trip…	**…I'd be likely to do it**	**…I'd probably choose not to visit MERA**
Park near the MERA entrance station and tour MERA by shuttle bus or van.	❑	❑
Park at a designated lot outside of MERA, ride a shuttle bus (less than 15 minutes) to MERA, and tour MERA by shuttle bus or van.	❑	❑
Park at a designated lot outside of MERA, ride a shuttle bus (up to 1 hour) to MERA, and tour MERA by shuttle bus or van.	❑	❑

22. **Do you agree or disagree with each of the following statements about potential actions when parking lots are full at MERA? (Check <u>one</u> box for each item.)**

When parking lots at MERA are full people should be…	**Strongly Agree**	**Agree**	**Neither Agree nor Disagree**	**Disagree**	**Strongly Disagree**
…allowed to enter MERA and park wherever they can, including on the roadside.	❑	❑	❑	❑	❑
…stopped at the entrance station until some parking spaces open up and only then allowed to enter.	❑	❑	❑	❑	❑
…directed to park at a designated lot outside of MERA, ride a shuttle bus (less than 15 minutes) to MERA, and tour MERA by shuttle bus or van.	❑	❑	❑	❑	❑
…directed to other recreation areas instead of visiting MERA that day.	❑	❑	❑	❑	❑

D. Planning Your Trip to MERA

The next set of questions asks about planning you may have done to prepare for this trip to MERA.

23. How long ago did you decide to take this trip to MERA? (Check one box.)

❑ Sometime today
❑ Yesterday
❑ In the last week
❑ More than a week ago, but less than a month ago
❑ A month or more before today

24. When you planned this trip to MERA, did you think about the possibility that it might be difficult to find parking here? (Check one box.)

❑ Yes
❑ No (SKIP TO QUESTION 26)

25. If you thought about the possibility that it might be difficult to find parking here when you planned this trip to MERA, how did it affect your trip plans? (Check all that apply.)

❑ It did not affect my plans
❑ I visited at a time of day I thought would be less crowded
❑ I visited on a day of the week I thought would be less crowded
❑ I avoided places here I thought would be crowded today
❑ Other (Please specify):____

26. How likely would you be to use each of the following sources for information about parking and crowding conditions at MERA, if it was available for planning a future trip to MERA? (Check one box for each item.)

	Likely	Not Likely	Don't Know/Not Sure
Website	❑	❑	❑
Smartphone app	❑	❑	❑
Social media (e.g., Facebook, Twitter)	❑	❑	❑
Text updates on cellular phone/smartphone	❑	❑	❑
AM radio station	❑	❑	❑
Telephone information line (message updated daily)	❑	❑	❑
Telephone information line (live person)	❑	❑	❑
Tourist information center	❑	❑	❑
Other (Please specify):____________________	❑	❑	❑

E. Background Information

27. What is your gender? (Check one box.)

- ❑ Male
- ❑ Female

28. In what year were you born?

Year born:___________

29. Do you live in the United States? (Check one box.)

- ❑ Yes (What is your zip code? __________)
- ❑ No (What country do you live in? ______________________________)

30. What is the highest level of formal education you have completed? (Check one box.)

- ❑ Some high school
- ❑ High school graduate or GED
- ❑ Some college, business or trade school
- ❑ College, business or trade school graduate
- ❑ Some graduate school
- ❑ Master's, doctoral or professional degree

31. Are you Hispanic or Latino? (Check one box.)

- ❑ Yes
- ❑ No

32. What is your race? (Check all that apply.)

- ❑ American Indian or Alaska Native
- ❑ Asian
- ❑ Black or African American
- ❑ Native Hawaiian
- ❑ Pacific Islander other than Native Hawaiian
- ❑ White

Thank you for your help with this survey!
Please return it to the surveyor.

APPENDIX T. MERA VISITOR SURVEY PHOTO SIMULATIONS


0 People


1 Person


4 People


7 People


10 People


13 People


16 People


19 People


22 People


30 People


45 People


60 People

APPENDIX U. MERA VISITOR SURVEY CODE BOOK

Variable Name	Description	Question	Values
ID	Survey ID number	Front page	#
Date	Date of survey	Front page	mm/dd/yyyy
Weekend	Whether or not survey was administered on a weekend day or weekday	Front page	0 = Weekday 1 = Weekend
Time	Time at which respondent began survey	Front page	hh:mm AM/PM
Binder	Binder	Front page	1 = Binder 1 2 = Binder 2 3 = Binder 3 4 = Binder 4 5 = Binder 5
Respondent	Whether the respondent was a driver or passenger	Front page	1 = Driver 2 = Passenger
Motorcycle	Whether or not the respondent drove in on a motorcycle	Front page	0 = No 1 = Yes
Weather	Weather conditions at the start of the survey	Front page	1 = Sunny 2 = Partly 3 = Overcast 4 = Raining
SpecialEvent	Whether or not there was a special event at the survey site that day	Front page	0 = No 1 = Yes
Event_Text	Description of the special event	Front page	text
Q1_GroupSize	Number of people in respondent's personal group	Q1	#
Q1_GroupSizeCat	Number of people in group, categorized	Q1	1 = 1 Person 2 = 2 People 3 = 3 or 4 People 5 = 5 or more People
Q2_ChildrenInGroup	Presence of children under 16 in respondent's personal group	Q2	0 = No 1 = Yes
Q2_NumChild	Number of children under 16 in respondent's personal group	Q2	#

Variable Name	Description	Question	Values
Q2_NumChildCat	Number of children in group, categorized	Q2	1 = 1 Child 2 = 2 Children 3 = 3 or 4 Children 5 = 5 or more Children
Q3A_MountEvansSummit	Whether or not respondent has visited: Mount Evans Summit	Q3	0 = No 1 = Yes
Q3B_SummitLake	Whether or not respondent has visited: Summit Lake	Q3	0 = No 1 = Yes
Q3C_MountGoliath	Whether or not respondent has visited: Mount Goliath Natural Area	Q3	0 = No 1 = Yes
Q3D_Other	Whether or not respondent has visited: Other	Q3	0 = No 1 = Yes
Q3D_OtherSpecify	Description of other location respondent has visited	Q3	text
Q3E_DidNotStop	Whether or not respondent stopped to visit any of the above locations	Q3	0 = No 1 = Yes
Q4_PrimaryDestination	Respondent's primary destination for this trip	Q4	1 = Mount Evans Summit 2 = Summit Lake 3 = Mount Goliath Natural Area 4 = Other 99 = Did not have a primary destination in MERA
Q5A_ScenicDriving	Whether or not respondent has done: Scenic driving	Q5	0 = No 1 = Yes
Q5B_Walking	Whether or not respondent has done: Walking/Short hike (less than 1 hour)	Q5	0 = No 1 = Yes
Q5C_DayHiking	Whether or not respondent has done: Day hiking (more than 1 hour)	Q5	0 = No 1 = Yes
Q5D_Backpacking	Whether or not respondent has done: Overnight backpacking	Q5	0 = No 1 = Yes
Q5D_NumNights	Number of nights respondent spent backpacking	Q5	#

Variable Name	Description	Question	Values
Q5E_Picnicking	Whether or not respondent has done: Picnicking	Q5	0 = No 1 = Yes
Q5F_RoadBiking	Whether or not respondent has done: Road biking	Q5	0 = No 1 = Yes
Q5G_WildlifeViewing	Whether or not respondent has done: Wildlife viewing	Q5	0 = No 1 = Yes
Q5H_RangerProgram	Whether or not respondent has done: Attend ranger program	Q5	0 = No 1 = Yes
Q5I_Fishing	Whether or not respondent has done: Fishing	Q5	0 = No 1 = Yes
Q5J_CreativeArts	Whether or not respondent has done: Creative arts (photography/drawing/painting/writing)	Q5	0 = No 1 = Yes
Q5K_Other	Whether or not respondent has done: Other	Q5	0 = No 1 = Yes
Q5K_OtherSpecify	Description of respondent's other activity at MERA	Q5	text
Q6_PrimaryActivity	Respondent's primary activity at MERA	Q6	1 = Scenic driving 2 = Walking/Short Hike (less than 1 hour) 3 = Day hiking (more than 1 hour) 4 = Overnight backpacking 5 = Picnicking 6 = Road biking 7 = Wildlife viewing 8 = Attend ranger program 9 = Fishing 10 = Creative arts (photography/drawing/painting/writing) 11 = Other 99 = Did not have a primary activity.
Q7_HikeToSummit	Whether or not respondent walked/hiked to the summit of Mt. Evans, and from where	Q7	1 = Yes, I walked from the parking lot just below the summit 2 = Yes, I hiked from Summit Lake 3 = Yes, I hiked from another location 4 = No

Variable Name	Description	Question	Values
Q7_OtherLocationSpecify	Description of other location respondent hiked from	Q7	text
Q8_CrowdedSummit	Whether or not respondent thought it was crowded on the summit of Mt. Evans	Q8	0 = No 1 = Yes
Q9_SummitRisk	Whether or nor respondent felt like crowding on the summit of Mt. Evans increased your risk or other people's risk of being injured at any point	Q9	0 = No 1 = Yes
Q10A_Photo1	Whether or not respondent would feel crowded if they were on the summit of Mt. Evans with the number of people depicted in the photograph	Q10	0 = No 1 = Yes
Q10B_Photo2	Whether or not respondent would feel crowded if they were on the summit of Mt. Evans with the number of people depicted in the photograph	Q10	0 = No 1 = Yes
Q10C_Photo3	Whether or not respondent would feel crowded if they were on the summit of Mt. Evans with the number of people depicted in the photograph	Q10	0 = No 1 = Yes
Q10D_Photo4	Whether or not respondent would feel crowded if they were on the summit of Mt. Evans with the number of people depicted in the photograph	Q10	0 = No 1 = Yes
Q10E_Photo5	Whether or not respondent would feel crowded if they were on the summit of Mt. Evans with the number of people depicted in the photograph	Q10	0 = No 1 = Yes
Q10F_Photo6	Whether or not respondent would feel crowded if they were on the summit of Mt. Evans with the number of people depicted in the photograph	Q10	0 = No 1 = Yes
Q11A_VisitorsExperience	Whether or not respondent believes the number of people allowed to visit Mt. Evans should be limited to: Protect the quality of visitors' experiences (i.e., to prevent crowding)	Q11	0 = No 1 = Yes 99 = Don't know/Not sure
Q11B_VisitorsSafety	Whether or not respondent believes the number of people allowed to visit Mt. Evans should be limited to: Protect visitors' safety on the summit	Q11	0 = No 1 = Yes 99 = Don't know/Not sure
Q11C_EnvImpacts	Whether or not respondent believes the number of people allowed to visit Mt. Evans should be limited to: Reduce environmental impacts on the summit	Q11	0 = No 1 = Yes 99 = Don't know/Not sure

Variable Name	Description	Question	Values
Q12_RouteToME	Which route respondent used to travel to MERA	Q12	1 = Route #1 on route map 2 = Route #2 on route map 3 = Other 99 = Don't know/Not sure
Q12_RouteSpecify	Description of respondent's alternate route to MERA	Q12	text
Q13_RouteHome	Which route respondent will use to travel when they leave MERA	Q13	1 = Rte. 103 toward Idaho Springs 2 = Rte. 103 toward Evergreen 99 = Don't know/Not sure
Q14A_ArrivalTime	Respondent's approximate arrival time at MERA today	Q14	hh:mm AM/PM
Q14A_ArrivalTimeCat	Respondent's approximate arrival time at MERA today, categorized	Q14	5 = Before 7 AM 7 = 7 AM to 8:59 AM 9 = 9 AM to 10:59 AM 11 = 11 AM to 12:59 PM 13 = 1 PM to 2:59 PM 15 = After 3 PM
Q14B_DifferentDay	Whether or not respondent arrived at MERA on a different day	Q14	0 = Respondent indicated their arrival time today 1 = Respondent arrived on a different day
Q14B_Specify	Date of respondent's arrival, if on a different day	Q14	text
Q15A_NumVehicles	Number of vehicles in which respondent and personal group traveled to MERA	Q15	#
Q15A_NumVehiclesCat	Number of vehicles in which respondent and personal group traveled to MERA, categorized	Q15	1 = 1 car 2 = 2 cars 3 = 3 or more cars
Q16_CongEntranceStation	Whether or not respondent experienced traffic congestion at the entrance station to enter MERA	Q16	0 = No 1 = Yes
Q17_CongRoad	Whether or not respondent experienced traffic congestion while driving on the Mt. Evans Road	Q17	0 = No 1 = Yes
Q18A_NumCarsRoad	Respondent's opinion - The number of cars on the Mt. Evans Road made driving conditions unsafe.	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree

Variable Name	Description	Question	Values
Q18B_EnjoyedDriving	Respondent's opinion - I enjoyed driving on the Mt. Evans Road today.	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18C_PreferShuttle	Respondent's opinion - I would prefer to tour MERA by shuttle bus or can than drive on the Mt. Evans Road myself.	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q18D_NumBicycles	Respondent's opinion - The number of bicycles on the Mt. Evans Road made driving conditions unsafe.	Q18	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q19_Visit_MountEvans	Whether or not respondent visited Mount Evans Summit	Q19	0 = No 1 = Yes
Q19A_Safe_MountEvans	Respondent's opinion - where I parked at this location today was: Safe	Q19	1 = Agree 2 = Disagree
Q19B_Designated_MountEvans	Respondent's opinion - where I parked at this location today was: In a designated parking lot	Q19	1 = Agree 2 = Disagree
Q19C_NotActual_MountEvans	Respondent's opinion - where I parked at this location today was: Not an actual parking space (e.g., on road shoulder)	Q19	1 = Agree 2 = Disagree
Q19D_Convenient_MountEvans	Respondent's opinion - where I parked at this location today was: Convenient	Q19	1 = Agree 2 = Disagree
Q19D_Uncongested_MountEvans	Respondent's opinion - where I parked at this location today was: Uncongested	Q19	1 = Agree 2 = Disagree
Q19_Visit_SummitLake	Whether or not respondent visited Summit Lake	Q19	0 = No 1 = Yes
Q19A_Safe_SummitLake		Q19	

Variable Name	Description	Question	Values
	Respondent's opinion - where I parked at this location today was: Safe		1 = Agree 2 = Disagree
Q19B_Designated_SummitLake	Respondent's opinion - where I parked at this location today was: In a designated parking lot	Q19	1 = Agree 2 = Disagree
Q19C_NotActual_SummitLake	Respondent's opinion - where I parked at this location today was: Not an actual parking space (e.g., on road shoulder)	Q19	1 = Agree 2 = Disagree
Q19D_Convenient_SummitLake	Respondent's opinion - where I parked at this location today was: Convenient	Q19	1 = Agree 2 = Disagree
Q19D_Uncongested_SummitLake	Respondent's opinion - where I parked at this location today was: Uncongested	Q19	1 = Agree 2 = Disagree
Q19_Visit_MountGoliath	Whether or not respondent visited Mount Goliath Natural Area	Q19	0 = No 1 = Yes
Q19A_Safe_MountGoliath	Respondent's opinion - where I parked at this location today was: Safe	Q19	1 = Agree 2 = Disagree
Q19B_Designated_MountGoliath	Respondent's opinion - where I parked at this location today was: In a designated parking lot	Q19	1 = Agree 2 = Disagree
Q19C_NotActual_MountGoliath	Respondent's opinion - where I parked at this location today was: Not an actual parking space (e.g., on road shoulder)	Q19	1 = Agree 2 = Disagree
Q19D_Convenient_MountGoliath	Respondent's opinion - where I parked at this location today was: Convenient	Q19	1 = Agree 2 = Disagree
Q19D_Uncongested_MountGoliath	Respondent's opinion - where I parked at this location today was: Uncongested	Q19	1 = Agree 2 = Disagree
Q19_DidNotStop	Respondent did not stop to visit any of these locations today.	Q19	99 = Did not stop to visit any of these locations today.
Q20_HowMuchParkingCong	How much parking congestion there was when respondent parked	Q20	0 = No parking congestion at all 1 = Slight parking congestion 2 3 4 5 = Moderate parking congestion 6 7

Variable Name	Description	Question	Values
			8 9 = Extreme parking congestion
Q21A_ParkNearEntrance	Whether or not respondent would visit MERA if their only option were to: Park near the MERA entrance station and tour MERA by shuttle bus or van	Q21	1 = I'd be likely to do it 2 = I'd probably choose not to visit MERA
Q21B_15minShuttle	Whether or not respondent would visit MERA if their only option were to: Park at a designated lot outside of MERA, ride a shuttle bus (less than 15 minutes) to MERA, and tour MERA by shuttle bus or van	Q21	1 = I'd be likely to do it 2 = I'd probably choose not to visit MERA
Q21C_1hourShuttle	Whether or not respondent would visit MERA if their only option were to: Park at a designated lot outside of MERA, ride a shuttle bus (up to 1 hour) to MERA, and tour MERA by shuttle bus or van	Q21	1 = I'd be likely to do it 2 = I'd probably choose not to visit MERA
Q22A_DriveParkWherever	Respondent's opinion - when parking lots at MERA are full, people should be: Allowed to enter MERA and drive around until a parking space opens up	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22B_StoppedEntrance	Respondent's opinion - when parking lots at MERA are full, people should be: Stopped at the entrance station until some parking spaces open up and only then allowed to enter	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22C_15MinShuttle	Respondent's opinion - when parking lots at MERA are full, people should be: Directed to park at a designated lot outside of MERA, ride a shuttle bus (Less than 15 minutes) to MERA, and tour MERA by shuttle bus or van.	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q22D_OtherRecAreas	Respondent's opinion - when parking lots at MERA are full, people should be: Directed to other recreation areas instead of visiting MERA that day	Q22	1 = Strongly Agree 2 = Agree 3 = Neither Agree nor Disagree 4 = Disagree 5 = Strongly Disagree
Q23_DecideToTakeTrip	How long ago respondent decided to visit MERA	Q22	

Variable Name	Description	Question	Values
			1 = Sometime today 2 = Yesterday 3 = In the last week 4 = More than a week ago, but less than a month ago 5 = A month or more before today
Q24_DifficultParking	Whether or not respondent thought that it might be difficult to find parking in MERA, when they planned their trip	Q24	0 = No 1 = Yes
Q25A_DidNotAffect	The possibility that it might be difficult to find parking in MERA: Did not affect respondent's plans	Q25	0 = No 1 = Yes
Q25B_VisitedTimeOfDay	The possibility that it might be difficult to find parking in MERA caused respondent to: Visit at a time of day they thought would be less crowded	Q25	0 = No 1 = Yes
Q25C_VisitedDayOfWeek	The possibility that it might be difficult to find parking in MERA caused respondent to: Visit on a day of the week they thought would be less crowded	Q25	0 = No 1 = Yes
Q25D_AvoidedPlaces	The possibility that it might be difficult to find parking in MERA caused respondent to: Avoid places in MERA they thought would be crowded	Q25	0 = No 1 = Yes
Q25E_Other	The possibility that it might be difficult to find parking in MERA caused respondent to: Take other action	Q25	0 = No 1 = Yes
Q25E_OtherSpecify	Description of respondent's other action	Q25	text
Q26A_Website	Whether or not respondent would be likely to use this source for info about parking and crowding: Website	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26B_Smartphone	Whether or not respondent would be likely to use this source for info about parking and crowding: Smartphone app	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26C_SocialMedia	Whether or not respondent would be likely to use this source for info about parking and crowding: Social media (e.g., Facebook, Twitter)	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26D_TextUpdates	Whether or not respondent would be likely to use this source for info about parking and crowding: Text updates on cell phone/smartphone	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure

Variable Name	Description	Question	Values
Q26E_AMRadio	Whether or not respondent would be likely to use this source for info about parking and crowding: AM radio station	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26F_TelephoneMessage	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ message update daily	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26G_TelephonePerson	Whether or not respondent would be likely to use this source for info about parking and crowding: Telephone info line w/ live person	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26H_TouristCenter	Whether or not respondent would be likely to use this source for info about parking and crowding: Tourist info center	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26I_Other	Whether or not respondent would be likely to use this source for info about parking and crowding: Other info source	Q26	1 = Likely 2 = Not likely 99 = Don't know/Not sure
Q26I_OtherSpecify	Description of other info source respondent would use	Q26	text
Q27_Gender	Respondent's gender	Q27	1 = Male 2 = Female
Q28_YearBorn	Respondent's year of birth	Q28	yyyy
Q28_Age	Respondent's age	Q28	#
Q28_AgeCat	Respondent's age, categorized	Q28	18 = 18 to 24 25 = 25 to 34 35 = 35 to 44 45 = 45 to 54 55 = 55 to 64 65 = 65 and older
Q29_LiveInUS	Whether or not respondent lives in the United States	Q29	0 = No 1 = Yes
Q29_ZipCode	Respondent's zip code, if a resident of the US	Q29	#####

Variable Name	Description	Question	Values
Q29_State	Respondent's state, if a resident of the US	Q29	text
Q29_County	Respondent's county, if a resident of Colorado	Q29	text
Q29_MetroArea	Respondent’s metropolitan area, if a resident of Colorado	Q29	text
Q29_Country	Respondent's country of residence, if not the US	Q29	text
Q30_Education	Highest level of formal education that respondent has completed	Q30	1 = Some high school 2 = High school graduate or GED 3 = Some college, business or trade school 4 = College, business or trade school graduate 5 = Some graduate school 6 = Master's, doctoral or professional degree
Q31_Hispanic	Whether or not respondent is Hispanic or Latino	Q31	0 = No 1 = Yes
Q32A_AmericanIndian	Whether or not respondent's race is: American Indian or Alaska Native	Q32	0 = No 1 = Yes
Q32B_Asian	Whether or not respondent's race is: Asian	Q32	0 = No 1 = Yes
Q32C_Black	Whether or not respondent's race is: Black of African American	Q32	0 = No 1 = Yes
Q32D_NativeHawaiian	Whether or not respondent's race is: Native Hawaiian	Q32	0 = No 1 = Yes
Q32E_PacificIslander	Whether or not respondent's race is: Pacific Islander other than Native Hawaiian	Q32	0 = No 1 = Yes
Q32F_White	Whether or not respondent's race is: White	Q32	0 = No 1 = Yes

Appendix V. MERA Visitor Survey "Other" Information Sources Reported by Respondents

Table 37. List of other information sources that respondents would likely use to access information about parking and crowding conditions at MERA when planning a future trip

Other Source	**Frequency** (n=9)
Word of mouth	22%
Advisory signs at entrance	11%
Books, been here before	11%
Gate	11%
Go and see	11%
Predictive time that parking will fill based on time, day, and month	11%
Road Signs	11%
Talk to hikers	11%

APPENDIX W. MERA VISITOR SURVEY COUNTRY OF RESIDENCE REPORTED BY RESPONDENTS

Table 38. List of respondent's country of residence

Country	**Frequency** (n=450)
United States	97%
Canada	1%
United Kingdom	1%
Denmark	0%
Finland	0%
Germany	0%
Italy	0%
New Zealand	0%
Scotland	0%
Sweden	0%

APPENDIX X. MERA VISITOR SURVEY STATES OF RESIDENCE REPORTED BY RESPONDENTS

Table 39. List of respondent's state of residence, if a resident of the United States

State	**Frequency** (n=382)
Colorado	49.2%
Kansas	4.7%
Texas	4.5%
Florida	4.2%
Illinois	3.1%
Nebraska	2.6%
Oklahoma	2.6%
Pennsylvania	2.6%
Wisconsin	2.6%
Iowa	2.1%
Missouri	2.1%
Virginia	1.8%
Minnesota	1.3%
Ohio	1.3%
Georgia	1.0%
Indiana	1.0%
New York	1.0%
Washington	1.0%
Kentucky	0.8%
Maryland	0.8%
New Jersey	0.8%
New Mexico	0.8%
Tennessee	0.8%
Alabama	0.5%
Arkansas	0.5%
Arizona	0.5%
California	0.5%
District of Columbia	0.5%
Louisiana	0.5%
Michigan	0.5%
New Hampshire	0.5%
Idaho	0.3%
Massachusetts	0.3%
Maine	0.3%
Mississippi	0.3%
North Carolina	0.3%
North Dakota	0.3%
Nevada	0.3%
Oregon	0.3%
Rhode Island	0.3%
South Carolina	0.3%
Utah	0.3%

Appendix Y. MERA Visitor Survey ZIP codes Reported by Respondents Who Reside in Colorado

Table 40. List of respondent's ZIP code of residence, if a resident of Colorado

ZIP Code	**Frequency** (n=188)
80003	3%
80439	3%
80016	3%
80112	2%
80122	2%
80129	2%
80210	2%
80211	2%
80220	2%
80231	2%
80237	2%
80452	2%
80002	2%
80013	2%
80015	2%
80104	2%
80126	2%
80223	2%
80227	2%
80228	2%
80233	2%
80004	1%
80014	1%
80017	1%
80022	1%
80023	1%
80026	1%
80111	1%
80123	1%
80125	1%
80127	1%
80130	1%
80134	1%
80202	1%
80209	1%
80214	1%
80222	1%
80232	1%
80301	1%
80302	1%

ZIP Code	Frequency (n=188)
80501	1%
80503	1%
80538	1%
80601	1%
80602	1%
80005	1%
80007	1%
80011	1%
80012	1%
80021	1%
80027	1%
80031	1%
80033	1%
80109	1%
80110	1%
80113	1%
80124	1%
80128	1%
80132	1%
80137	1%
80138	1%
80203	1%
80204	1%
80205	1%
80206	1%
80207	1%
80215	1%
80217	1%
80221	1%
80224	1%
80226	1%
80229	1%
80235	1%
80239	1%
80279	1%
80304	1%
80421	1%
80435	1%
80437	1%
80446	1%
80470	1%

ZIP Code	**Frequency** (n=188)
80474	1%
80497	1%
80504	1%
80514	1%
80526	1%
80535	1%
80537	1%
80549	1%
80603	1%
80612	1%
80631	1%
80642	1%
80643	1%
80701	1%
80817	1%
80903	1%
80906	1%
80916	1%
80918	1%
80919	1%
80921	1%
80923	1%
81507	1%
81647	1%

APPENDIX Z. ECOLOGICAL CONDITION ASSESSMENT MAPPING OF VISITOR-CREATED RESOURCE IMPACTS AT GP AND MERA

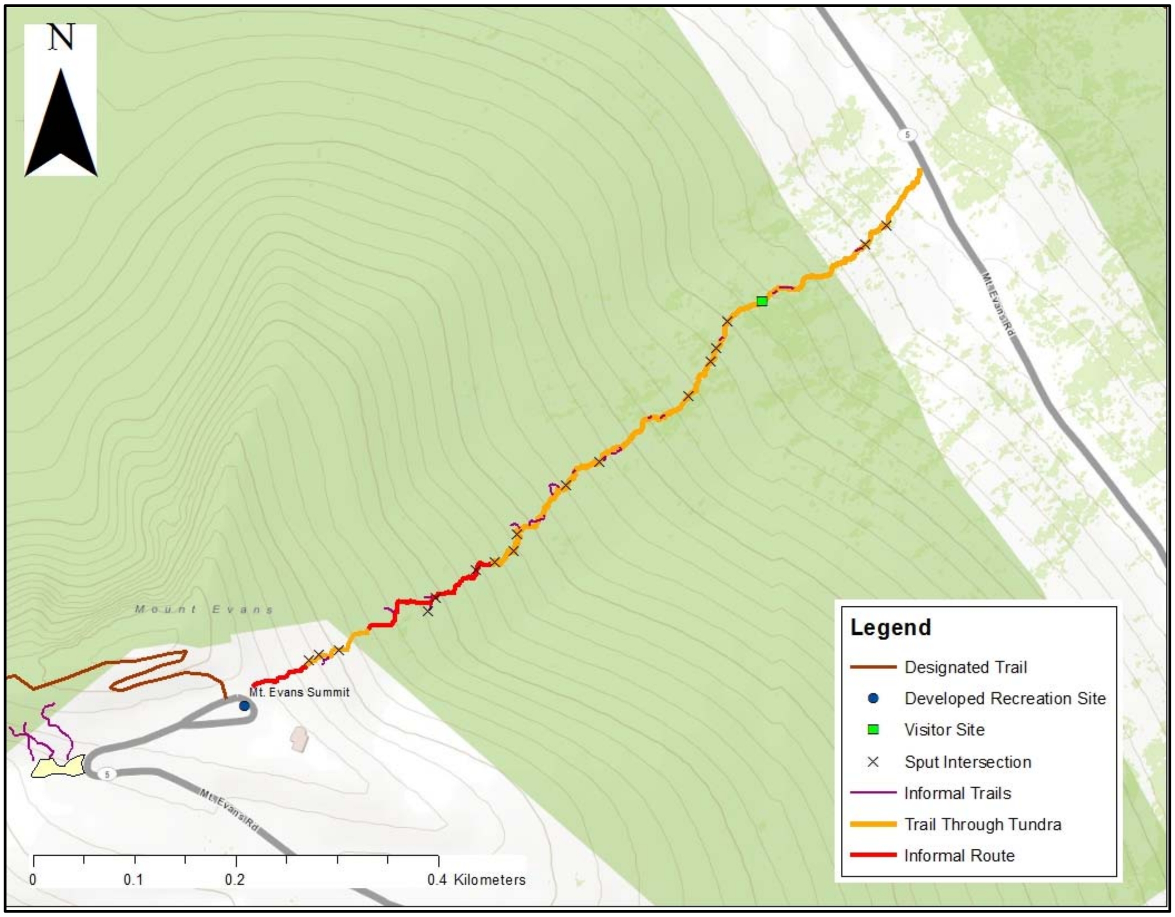


Figure 1: Large informal trail from near Summit Lake to the parking area at the summit of Mt. Evans. Route cuts through both tundra and rock; expanding into a route when cutting through rock area.

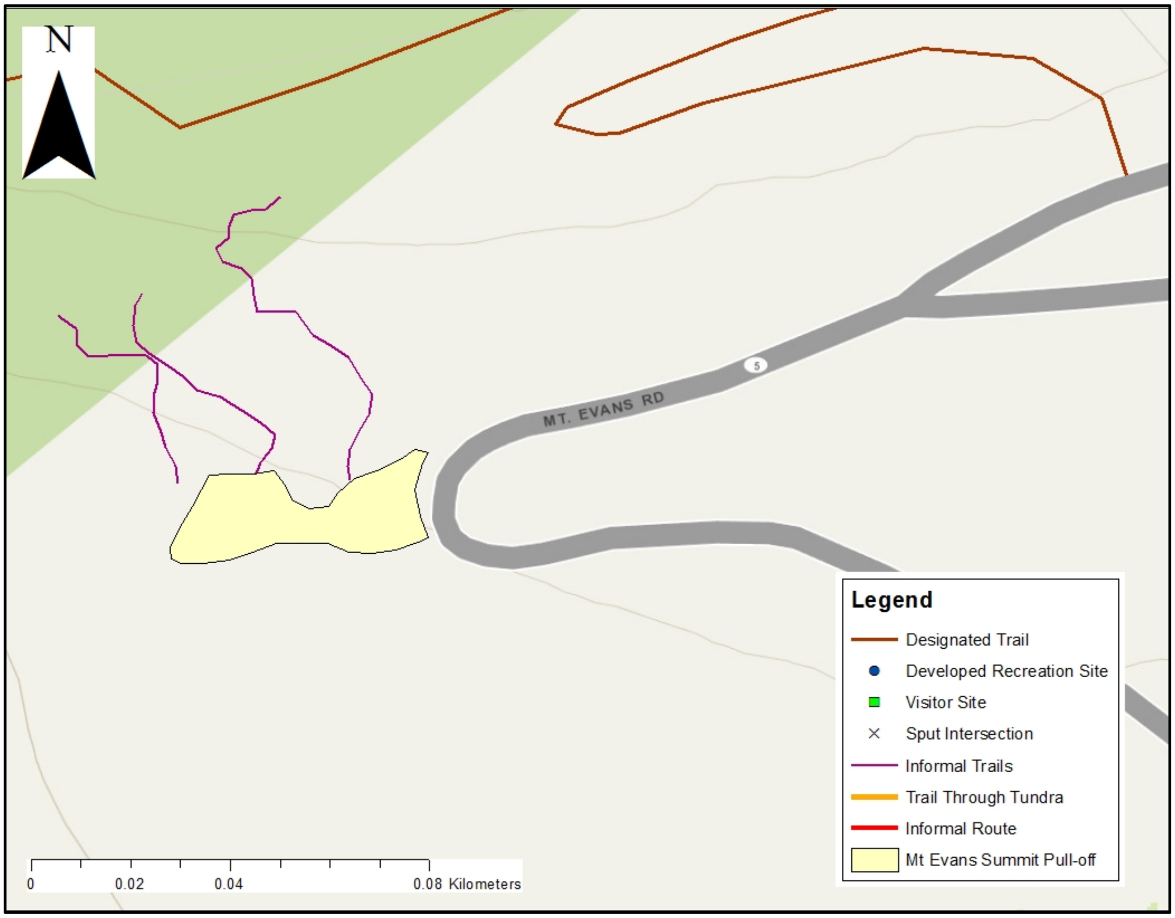


Figure 2: Pull-off near Mt. Evans summit parking and informal trails used to access designated trail to summit.

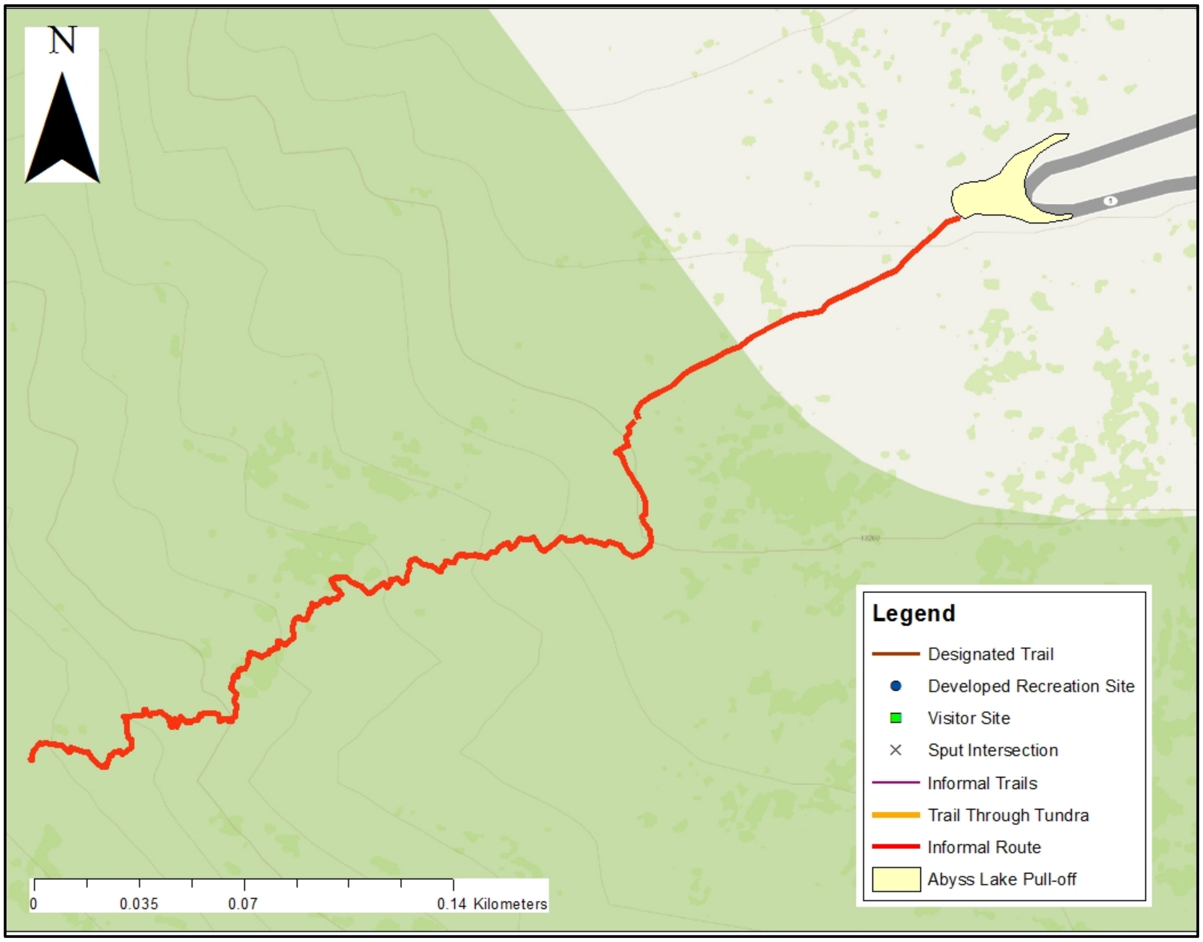


Figure 3: Informal route from pull-off area on Mt. Evans road used to access the Abyss Lake trail.

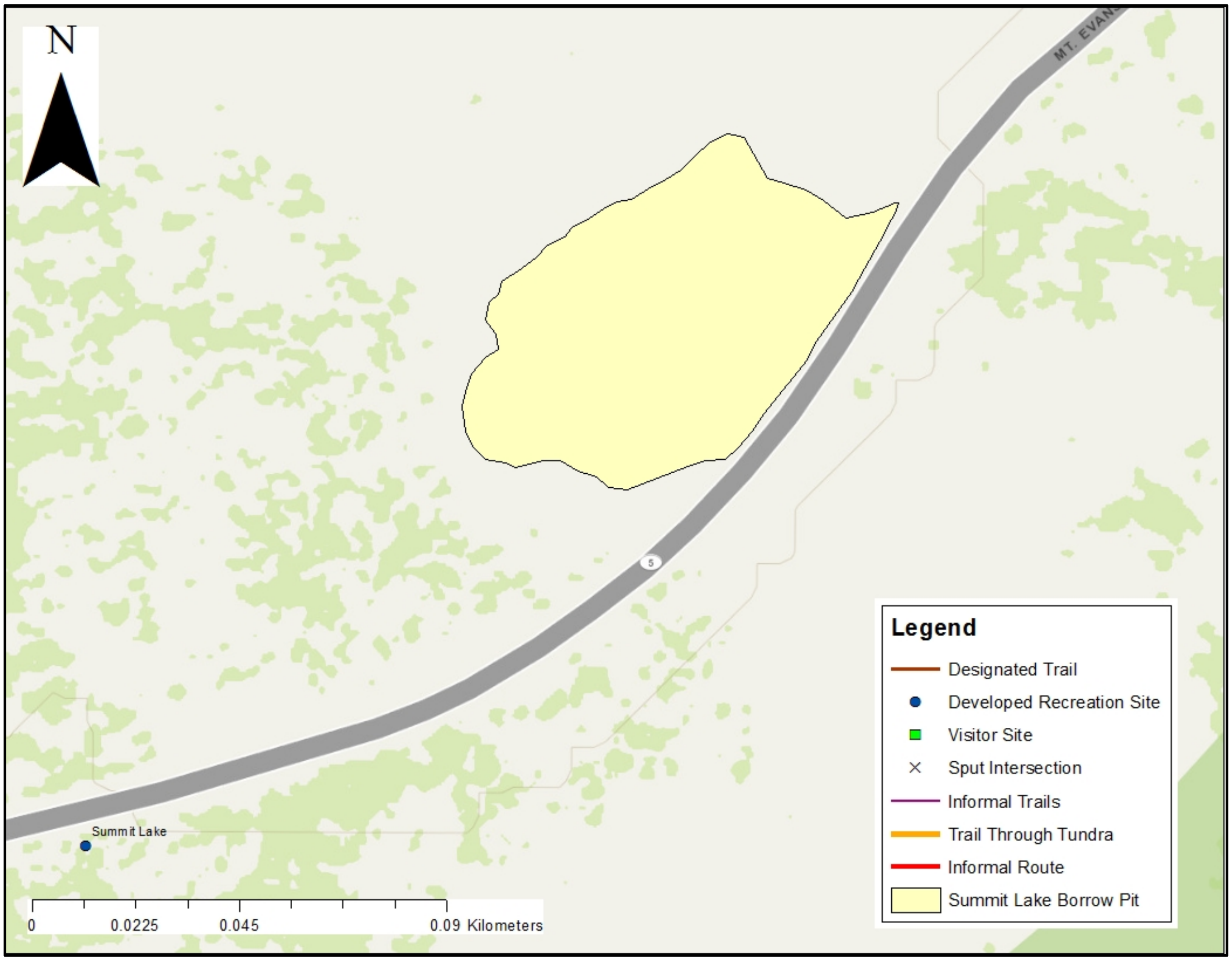


Figure 4: Borrow pit east of Summit Lake; possible location for future parking.

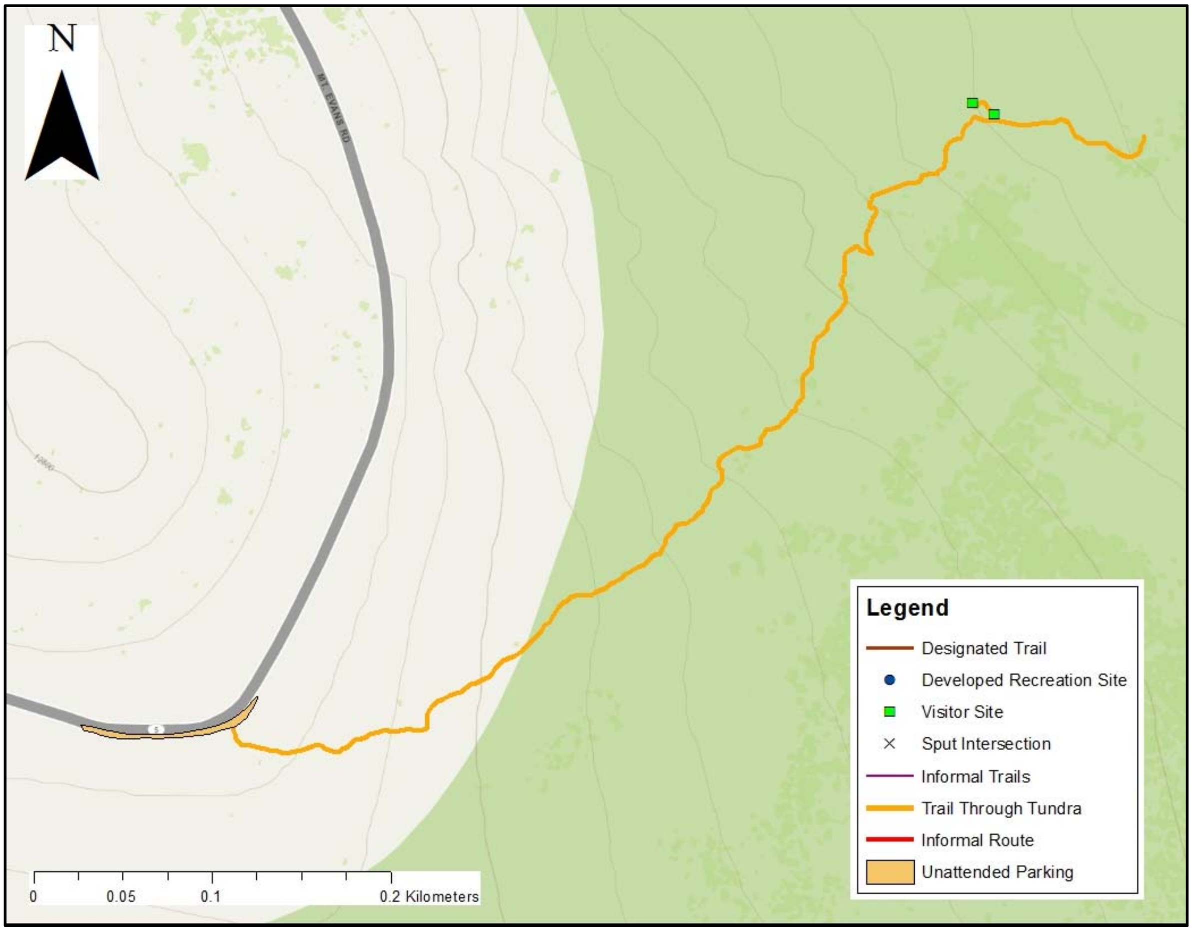


Figure 5: Unattended parking at terminus of informal trail through tundra to Lincoln Lake bouldering area.

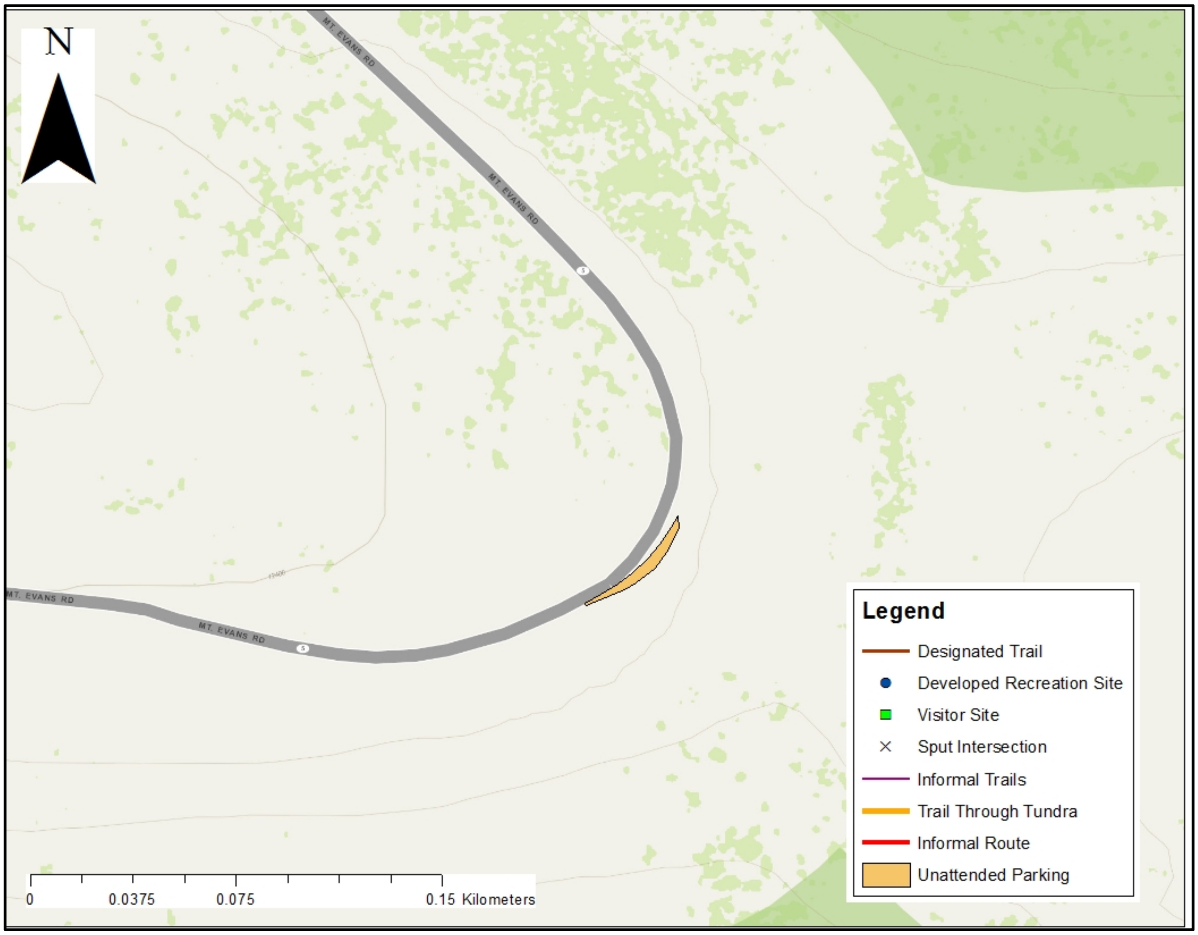


Figure 6: Other unattended parking area that is presumed to be used by individuals using Lincoln Lake.

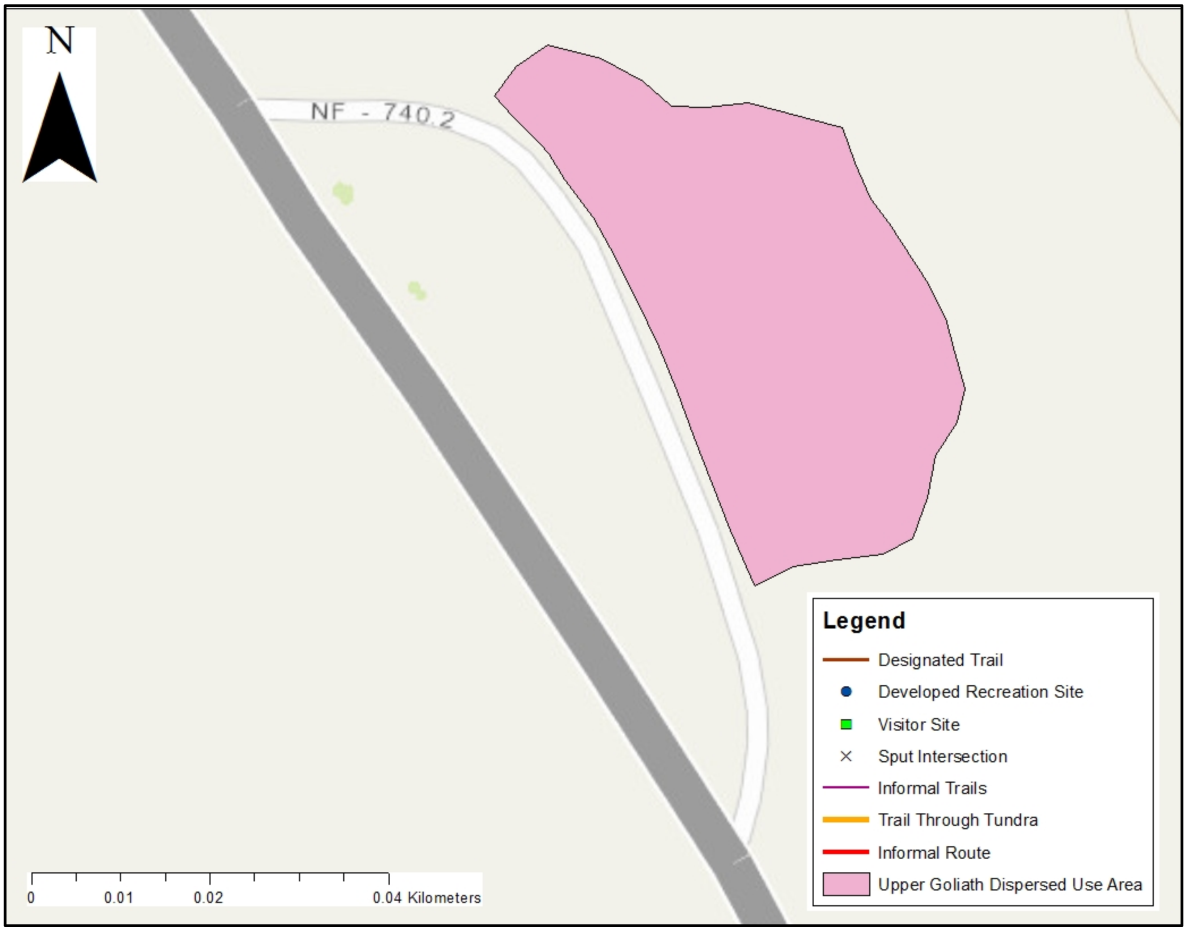


Figure 7: Area of dispersed visitor use at Upper Goliath trailhead and directly adjacent to parking area.

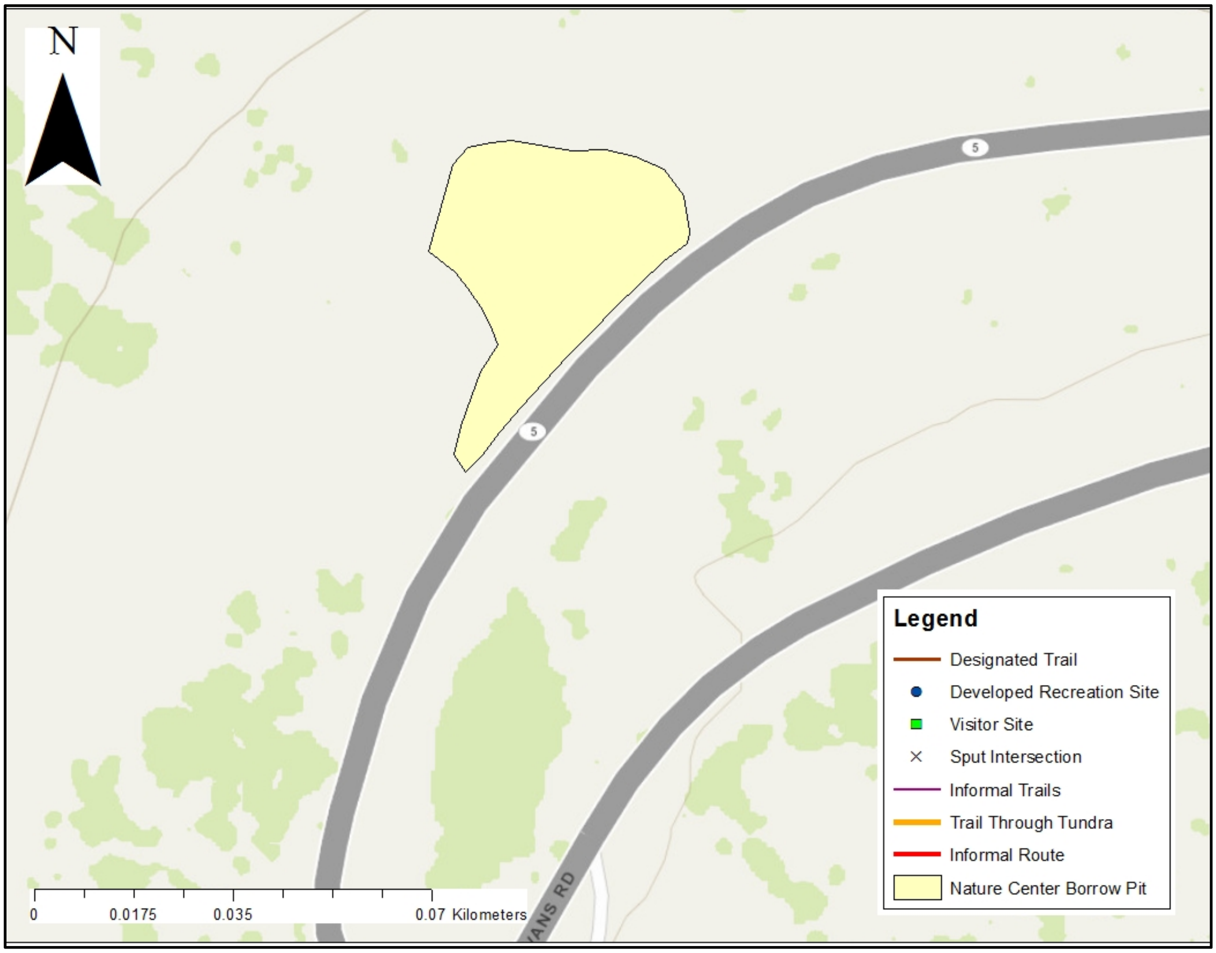


Figure 8: Borrow pit near Nature Center; possible location for future parking.

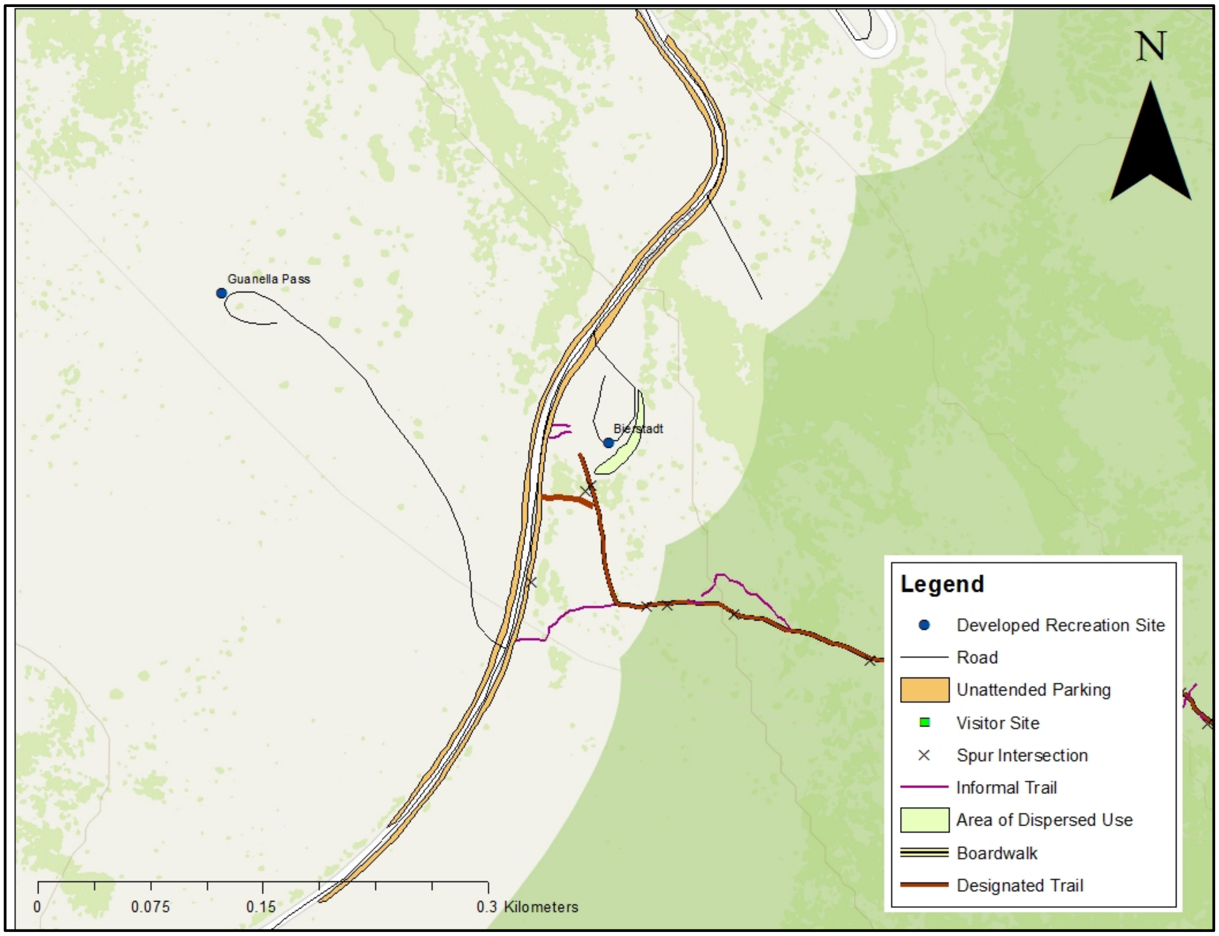


Figure 9: Visitor-created impacts at the trailhead of Mt. Bierstadt trail

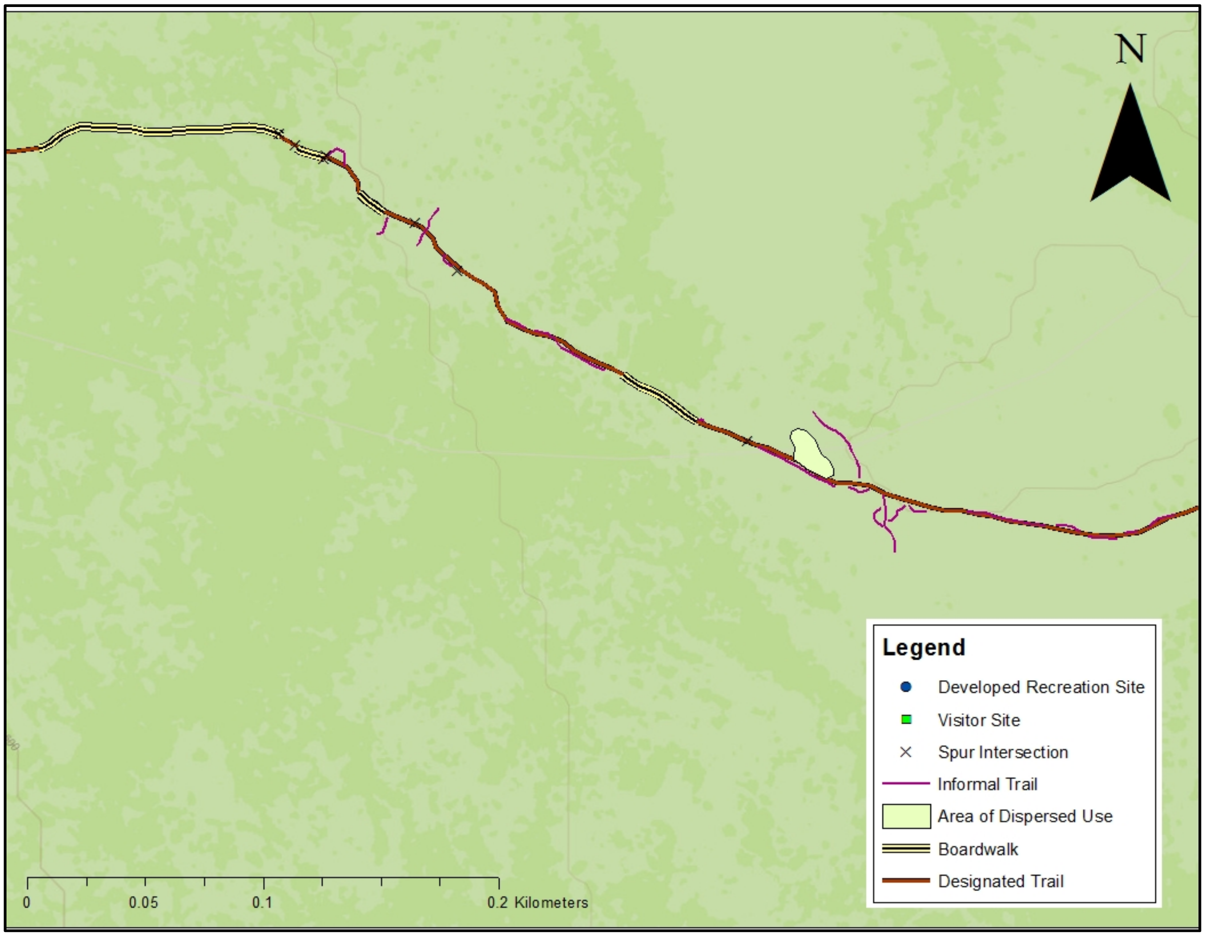


Figure 10: Visitor-created impacts between boardwalk area of Mt. Bierstadt trail

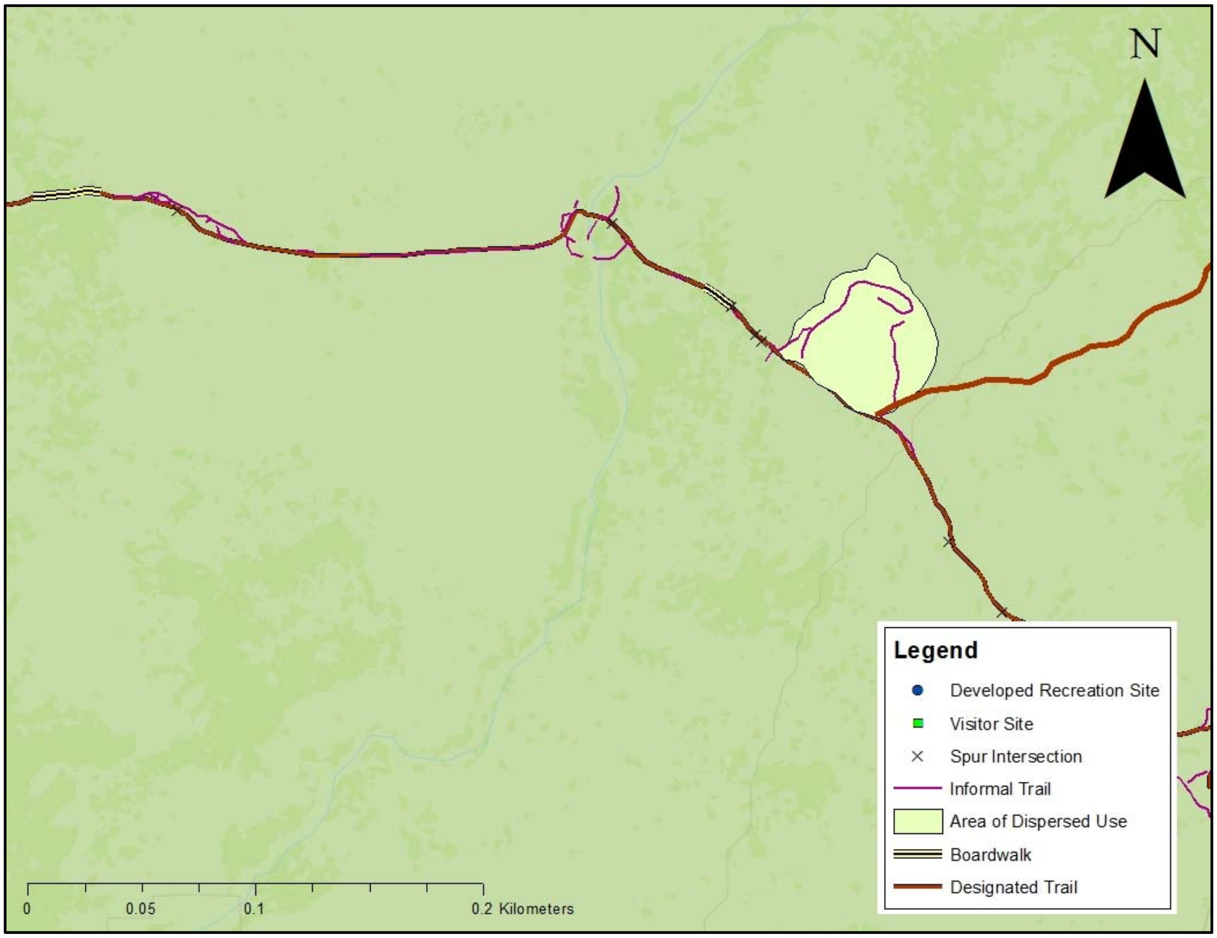


Figure 11: Visitor-created impacts near river-crossing on Mt. Bierstadt trail; including beginning of long, informal trail to access Mt. Evans.

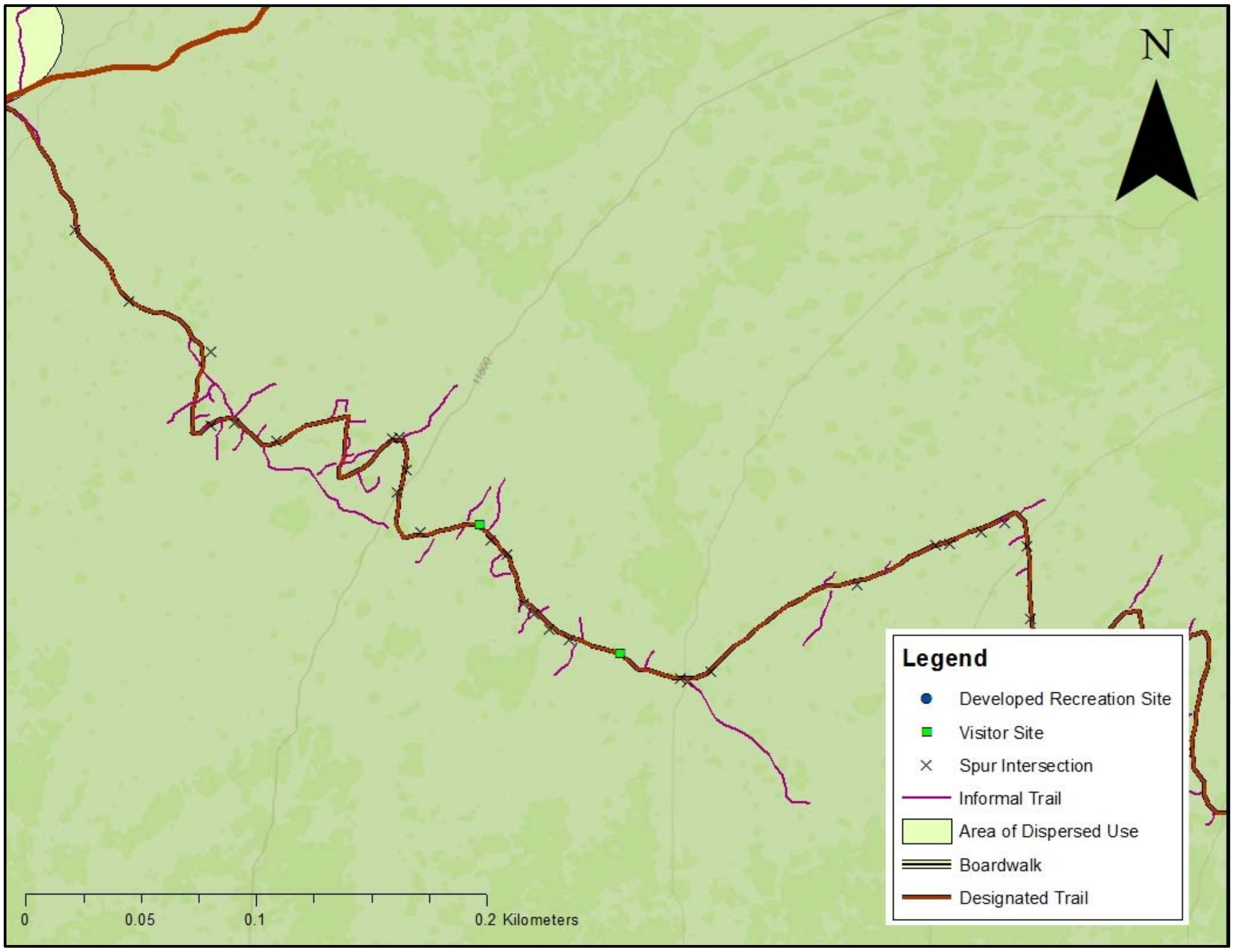


Figure 12: Visitor-created impacts along set of switchbacks to Mt. Bierstadt summit.

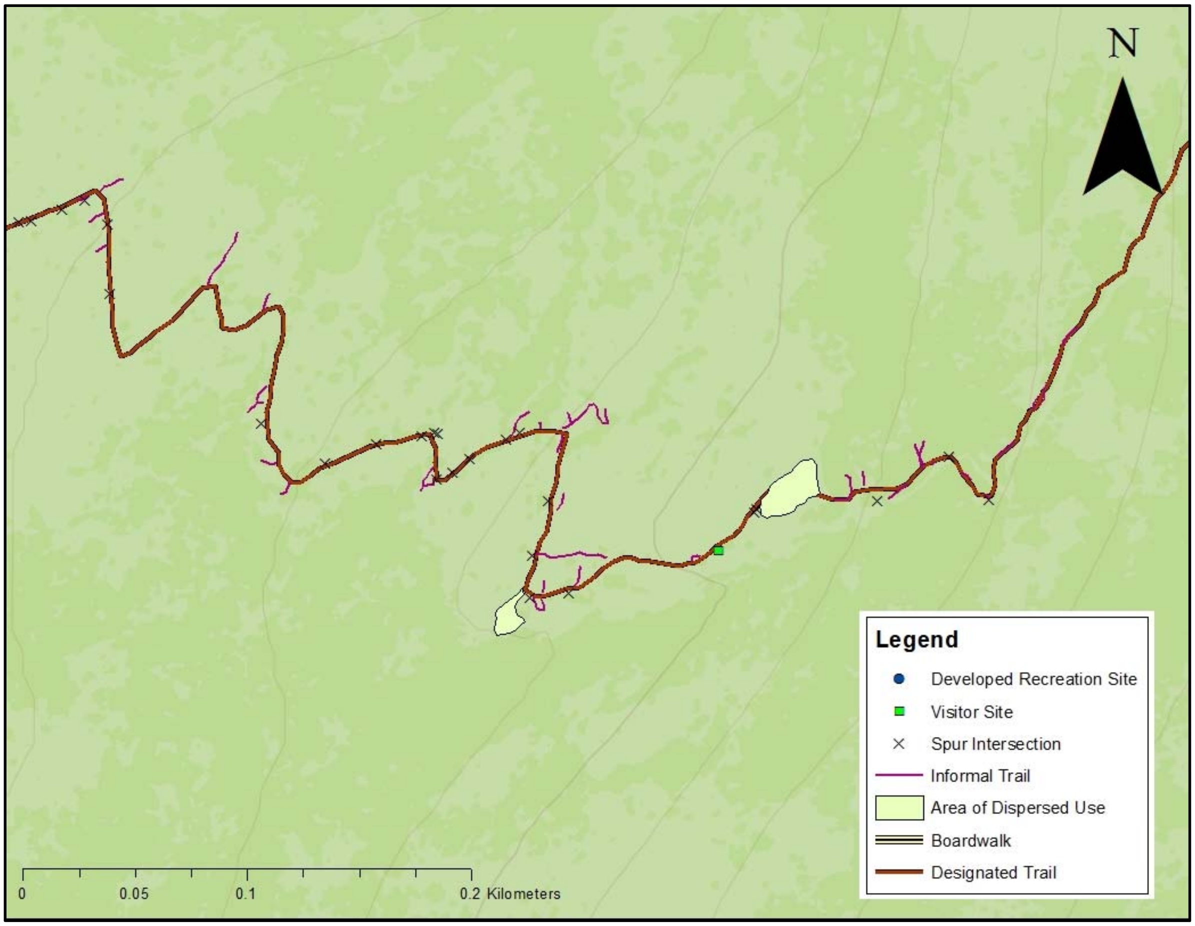


Figure 13: Visitor-created impacts through second section of switchbacks (through mostly tundra) to Mt. Bierstadt summit.

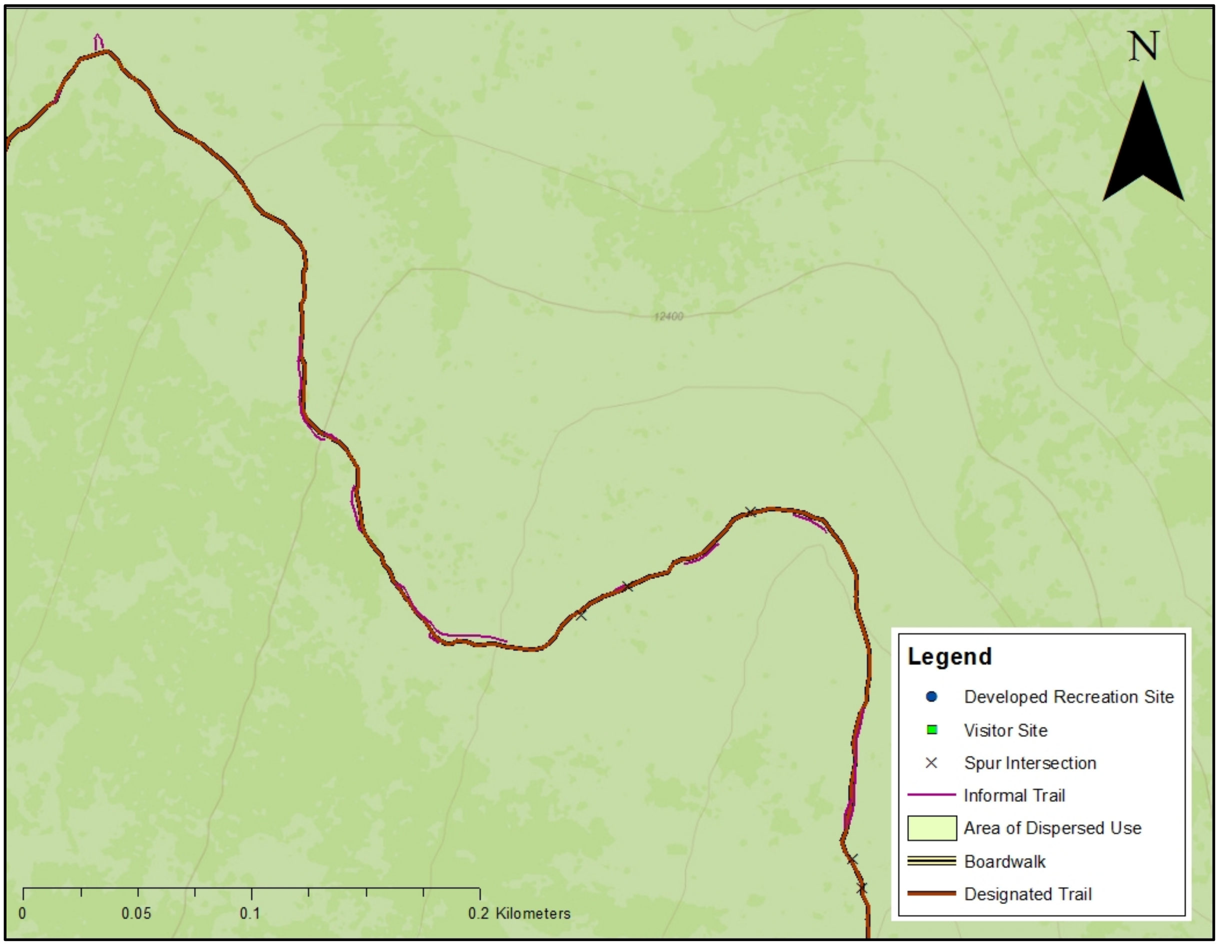


Figure 14: Visitor-created impacts along Mt. Bierstadt trail.

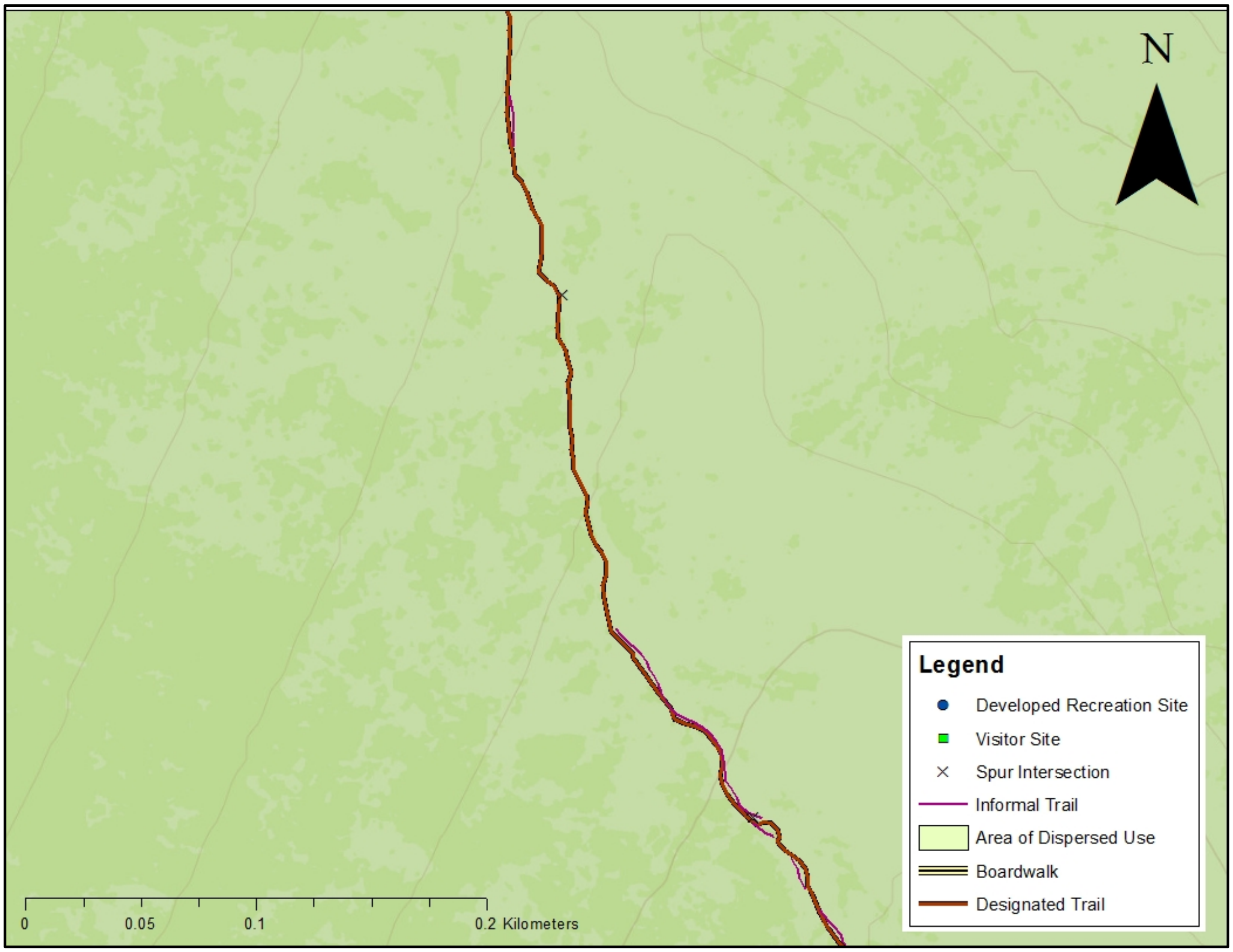


Figure 15: Visitor-created impacts through straight section of trail through tundra to Mt. Bierstadt summit.

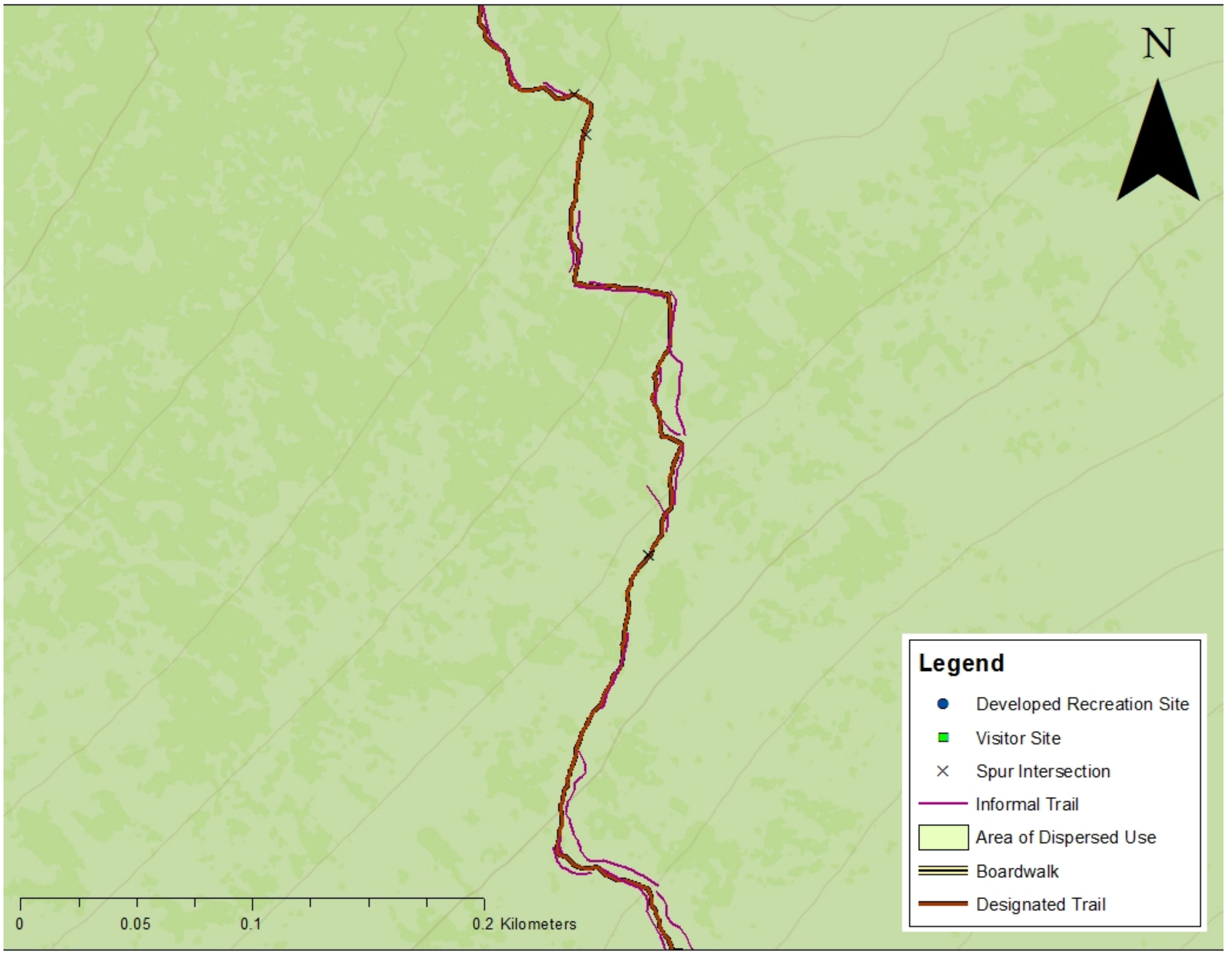


Figure 16: Visitor-created impacts along Mt. Bierstadt trail; this section of trail is beginning to climb the slope to the summit of Mt. Evans and begins to become more rocky.

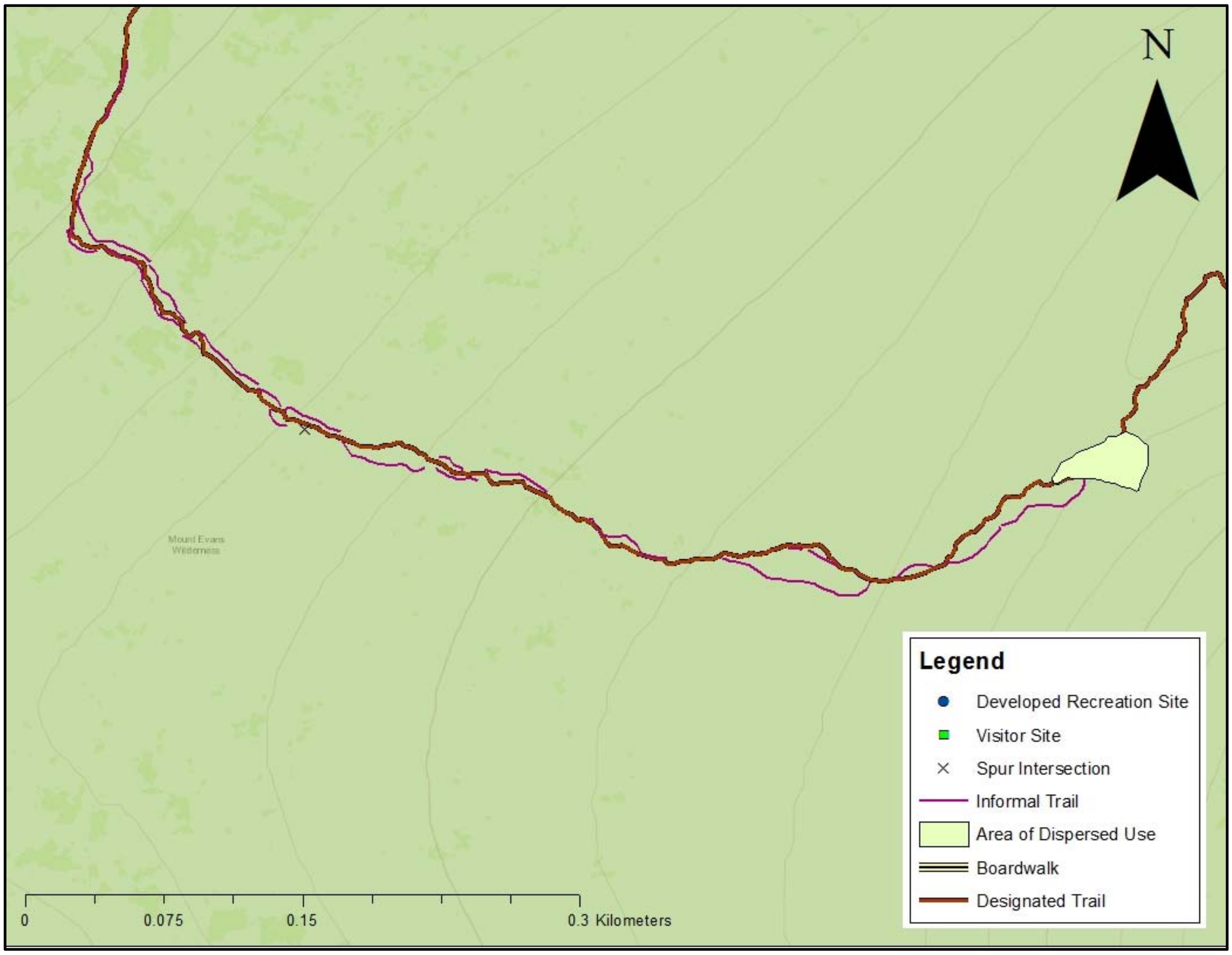


Figure 17: Visitor-created impacts along the summit of Mt. Bierstadt; final section of trail before reaching the final climb to the summit.

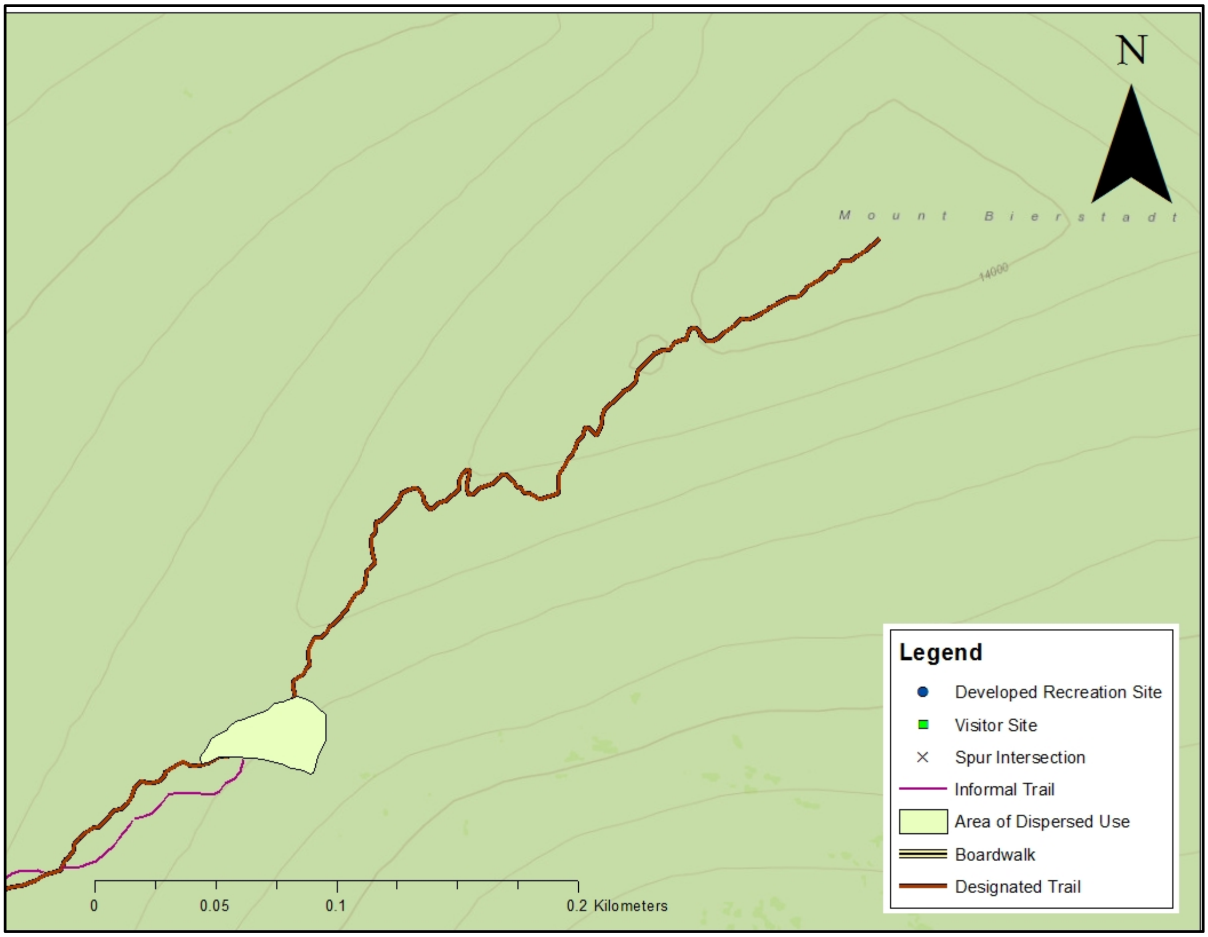


Figure 18: Visitor-created impacts for the final section of trail to the summit of Mt. Bierstadt

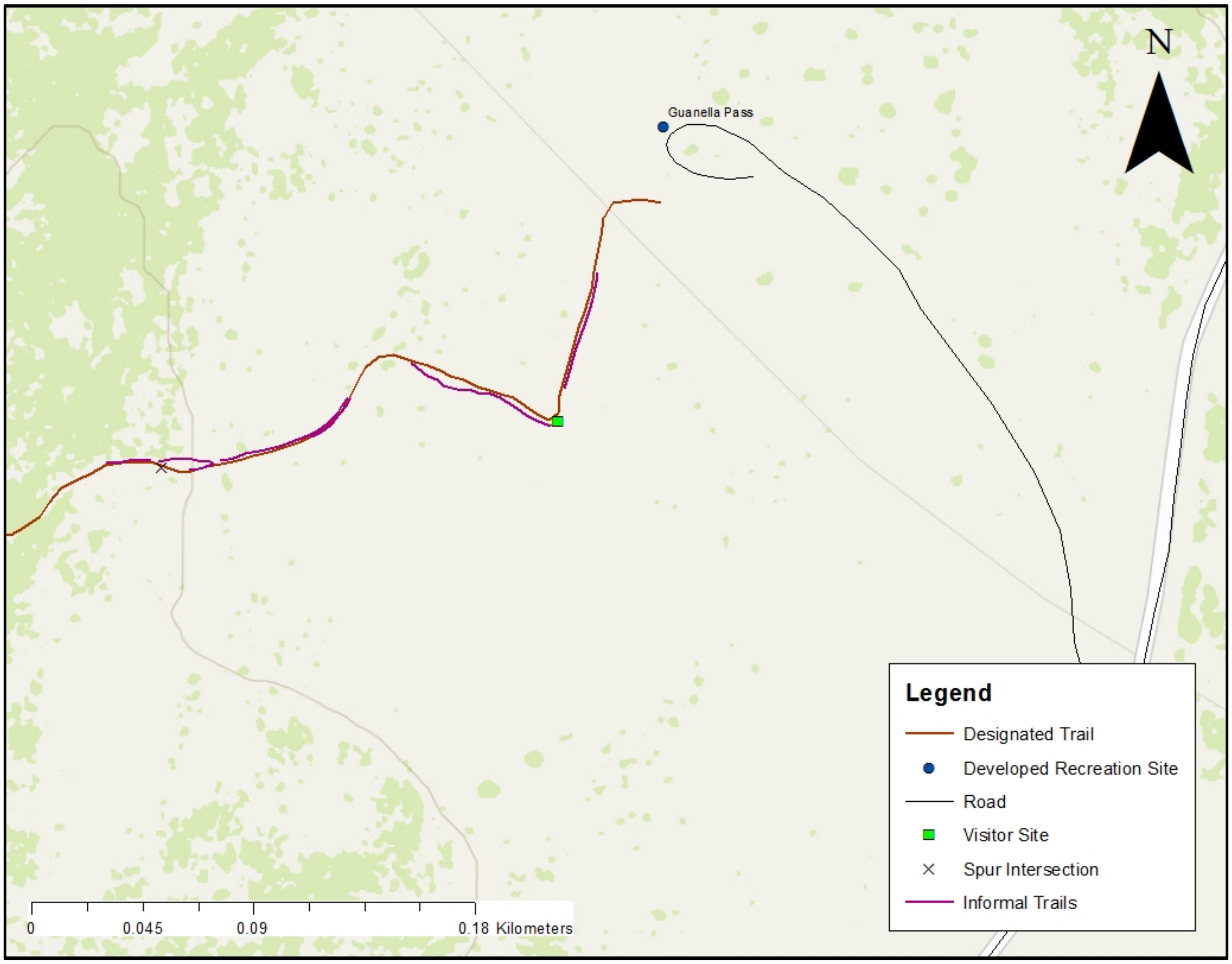


Figure 19: Visitor-created impacts at the Square Top Lakes trailhead.

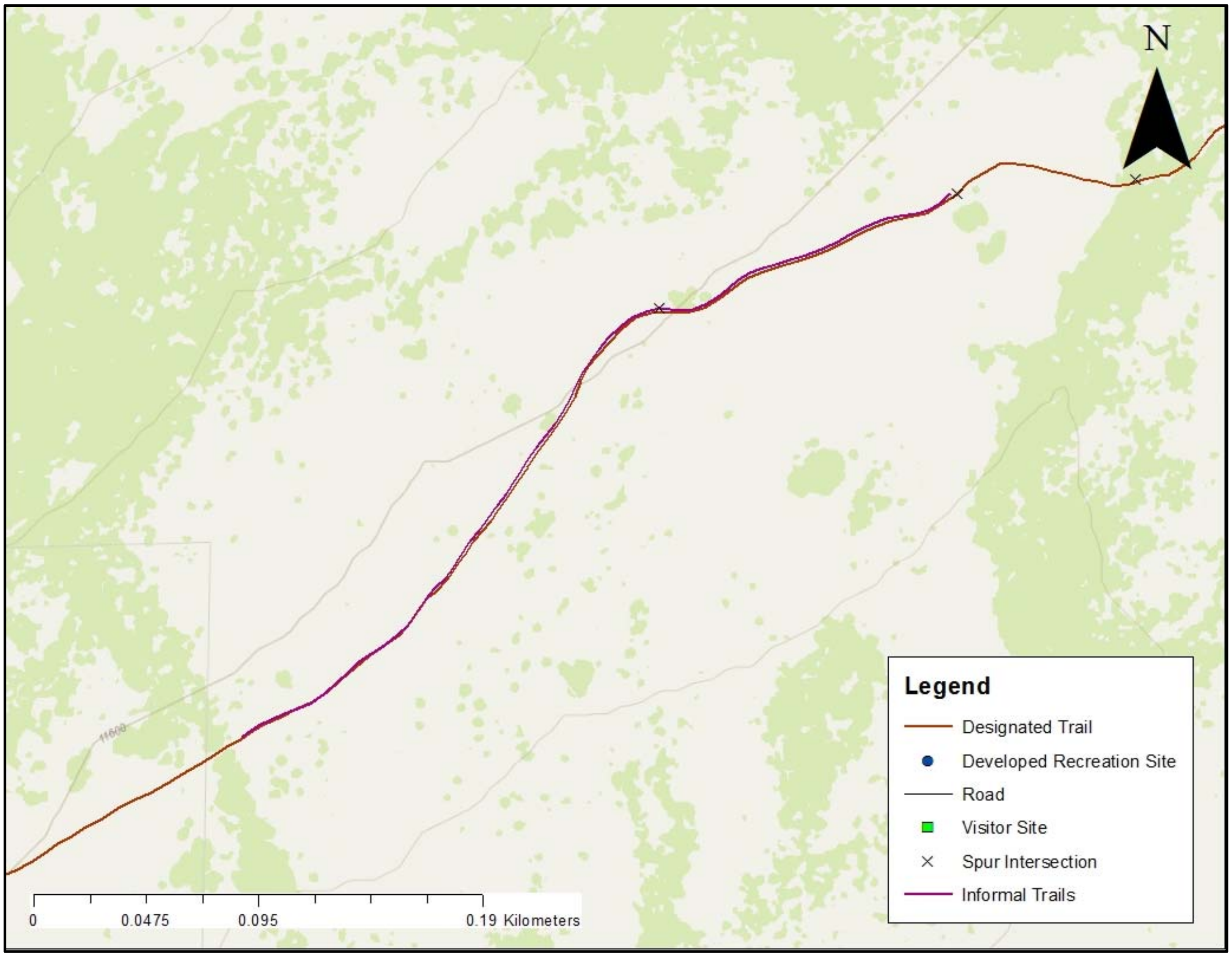


Figure 20: Visitor-created impacts along the first section of the Square Top Lakes trail.

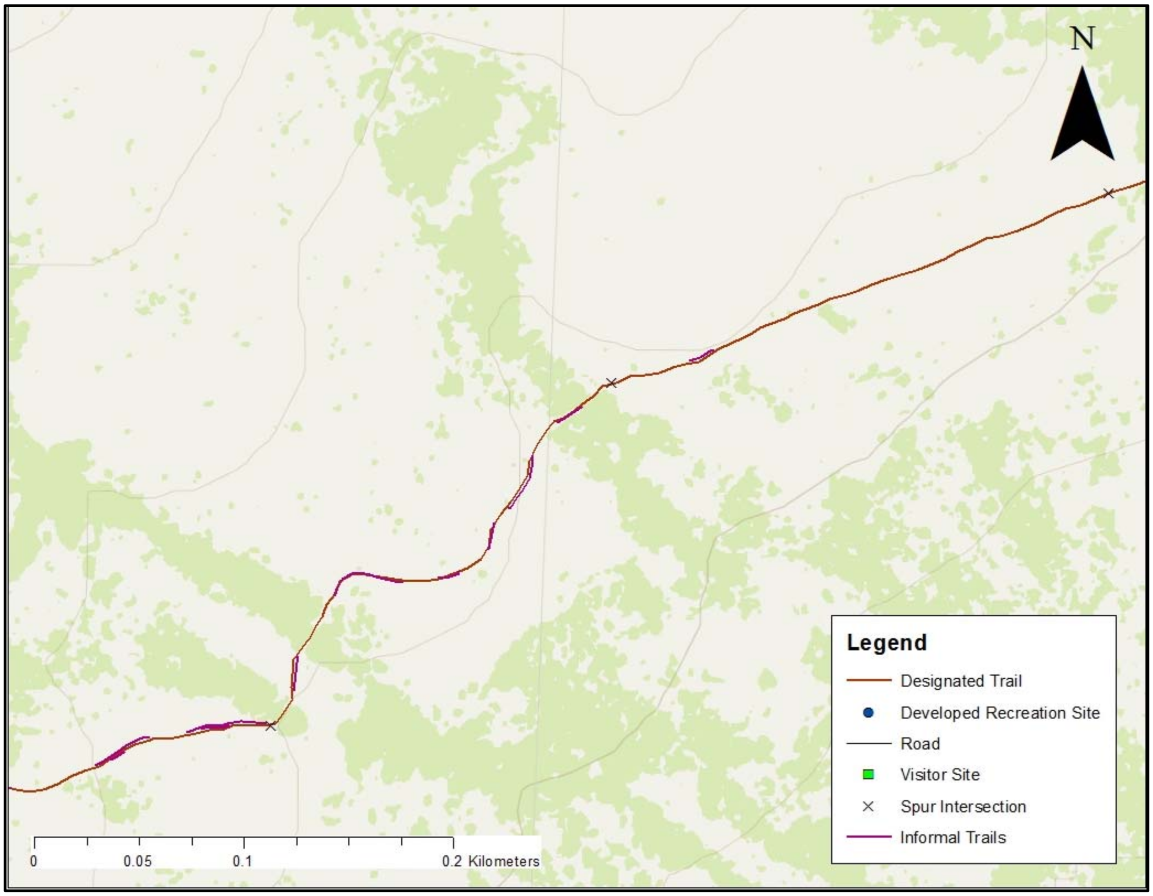


Figure 21: Visitor-create impacts along the Square Top Lakes trail.

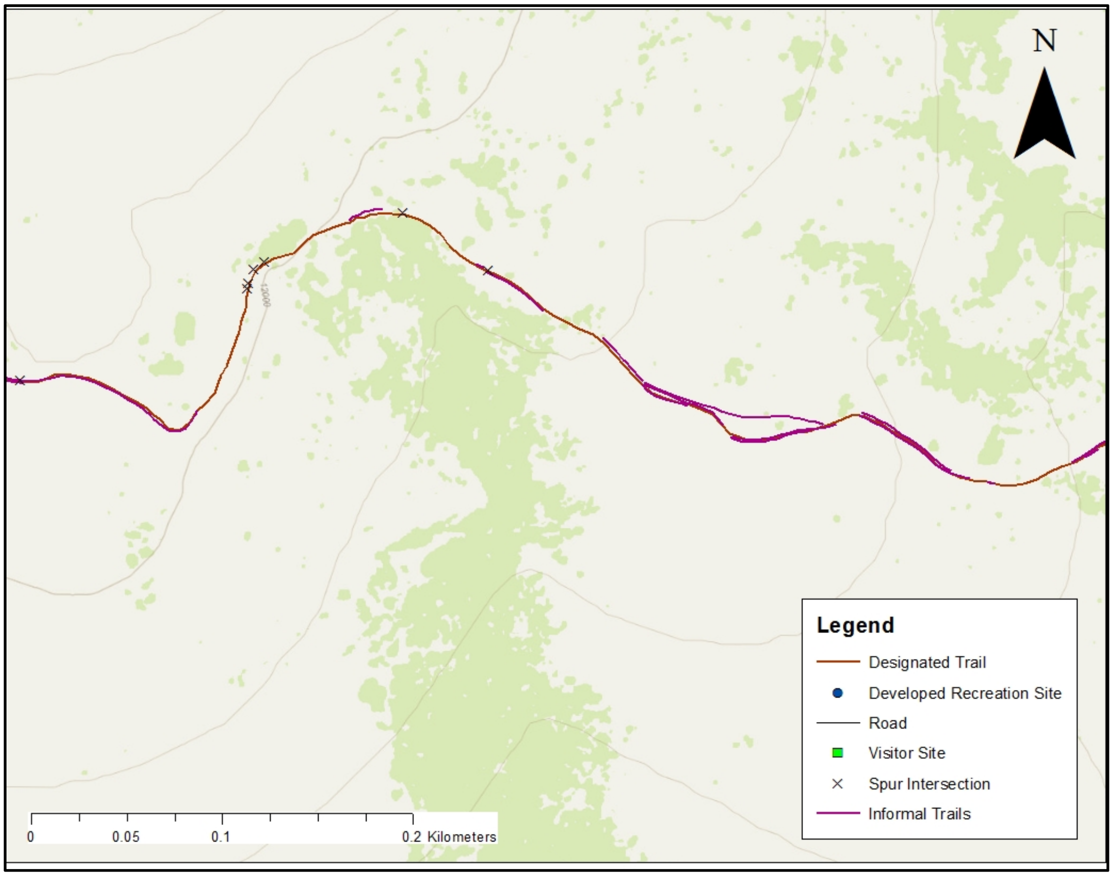


Figure 22: Visitor-created impacts along the first section of switch backs to Square Top Lakes.

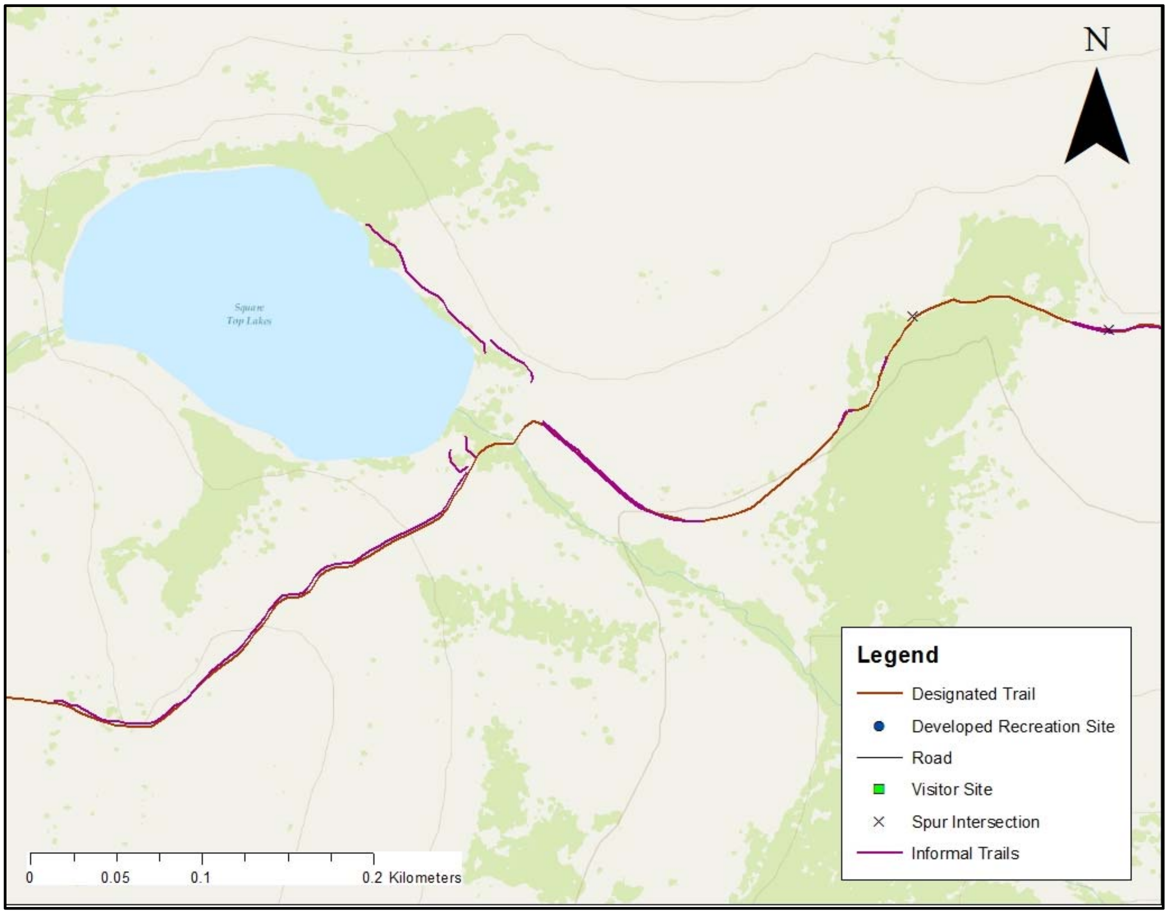


Figure 23: Visitor-created impacts around the lower lake on the Square Top Lakes trail.

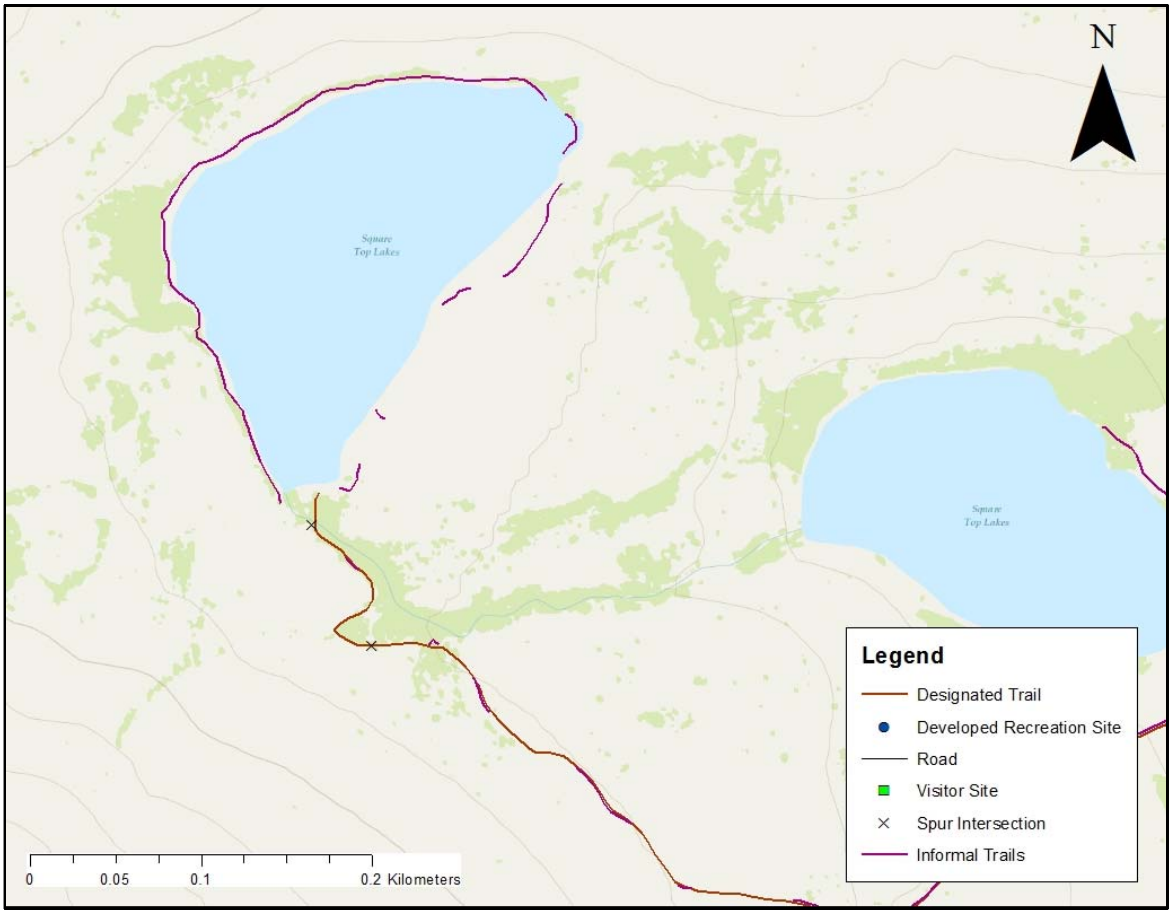
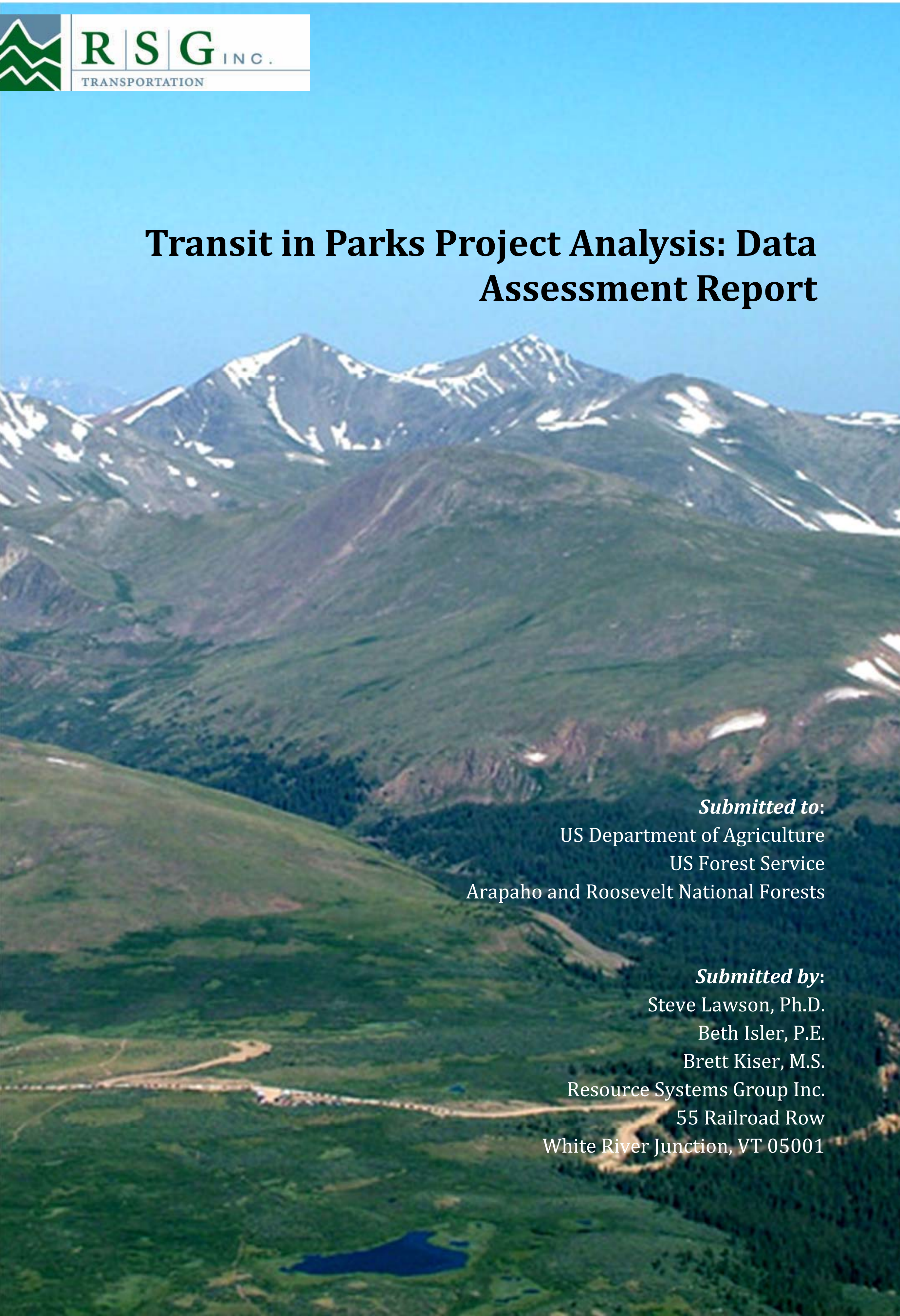


Figure 24: Visitor-created impacts around the upper lake on the Square Top Lake trail.

APPENDIX AA. TRANSIT IN PARKS PROJECT ANALYSIS: DATA ASSESSMENT REPORT



Transit in Parks Project Analysis: Data Assessment Report

***Submitted to*:**
US Department of Agriculture
US Forest Service
Arapaho and Roosevelt National Forests

***Submitted by*:**
Steve Lawson, Ph.D.
Beth Isler, P.E.
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White River Junction, VT 05001

PLANNING ■ ENGINEERING ■ DESIGN

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1.0 Introduction and Purpose

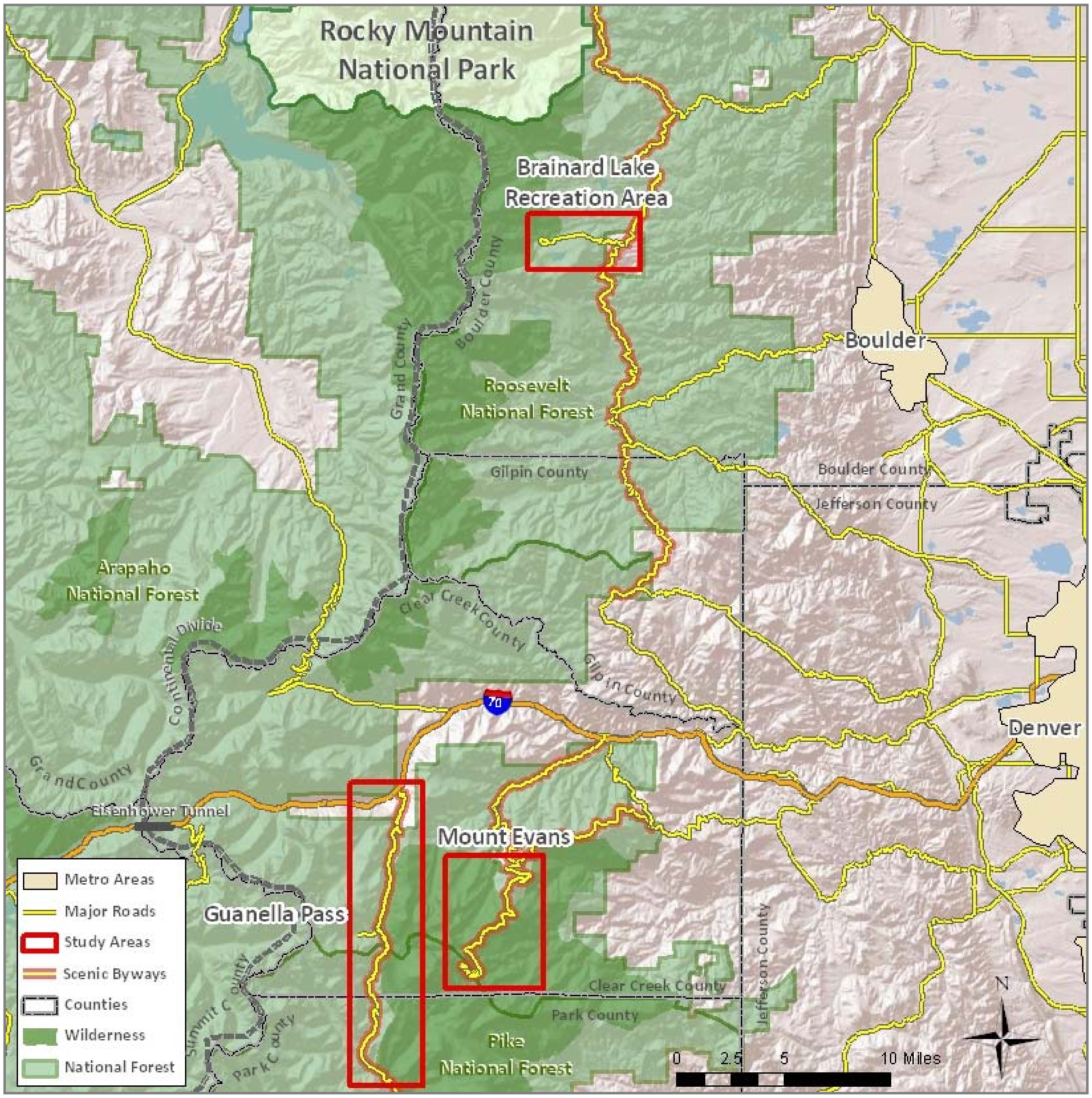
1.1 Introduction

In February 2009, the Arapaho-Roosevelt National Forest and Pawnee National Grassland (ARNF-PNG) submitted a proposal to the Paul S. Sarbanes Transit in Parks (TRIP) Program to support coordinated, multi-agency transportation planning in the Colorado Rockies. This action grew out of recommendations from the 2007 Front Range Interagency Transportation Assistance Group (TAG) report. The proposed project is to consider potential alternative transportation solutions to reduce traffic and parking congestion at three high-use, Front Range US Forest Service (USFS) recreation destinations; Brainard Lake Recreation Area (BLRA), Guanella Pass, and Mount Evans (Figure 25). The proposed TRIP project would evaluate each site using an integrated modeling system that incorporates USFS management objectives and corresponding acceptable use and carrying-capacity policies. The decision whether to fund the proposed TRIP project will be made in FY2010.

In the interim, the USFS has initiated a project with Resource Systems Group Inc. (RSG) entitled "Arapaho and Roosevelt National Forests Transit in Parks Project Analysis". The project has three integrated components:

1. Perform an assessment of existing literature/studies on the BLRA, Guanella Pass, and Mount Evans, and then prepare a data assessment report of existing information, data gaps, and management conflicts in preparation of implementation of the TRIP study.
2. Produce a preliminary scope of work, in collaboration with the USFS, Colorado State University, and Utah State University for the TRIP study, which is the next phase of this project.
3. Present the data assessment report to ARNF-PNG staff.

Figure 25. Study Sites



1.2 Purpose and Organization of This Report

This report constitutes the data assessment report noted, and has been compiled to document current transportation, visitor use, and resource conditions at the BLRA, Guanella Pass, and Mount Evans, based on a review of existing information and an onsite scoping trip in September, 2009. This report supports the work necessary for successful implementation of the proposed TRIP project by locating, summarizing, and consolidating past studies and research at the three USFS sites. This literature review identifies and summarizes existing data and gaps that will be critical to the TRIP project planning.

Even if the TRIP funding is not awarded, this report will help the USFS better understand: existing traffic numbers, types, and peak times; visitor numbers, origins, destinations, activities, and peak times; and baseline resource data. This data assessment will assist the USFS in developing management prescriptions for these areas that could better protect Forest resources and improve the visitor experience.

The report is organized in the following manner. Section 1 serves to introduce the project and establish the purpose and organization of this report. Section 2 summarizes key elements of planning documents and existing information that are forest-wide and/or regional in scope, and therefore apply to all three recreation sites considered in this project. Section 3 reviews and synthesizes information from the documents and data that were included in the literature review for each of the three specific study sites for this project (Section 3.1-BLRA; Section 3.2-Guanella Pass; and Section 3.3-Mount Evans). Each recreation site-specific section (Section 3.1-Section 3.3) is organized into sub-sections to describe each site's:

- Location
- Visitor Use and Recreation-related Issues
- Transportation Systems, Infrastructure, and Issues

Further, each site-specific section concludes with a summary of key issues and associated data gaps. Section 4 provides a summary of issues and themes that are common across the three study sites and consequently serve as potential points of focus for the proposed TRIP project.

2.0 Forest-Wide and Regional Context

While many of the documents reviewed for this project focus specifically on the BLRA, Guanella Pass, or Mount Evans, several provide a Forest-wide and/or regional perspective. These broader-scoped documents provide insights regarding visitor use, transportation, and resource conditions in the ARNF-PNG that apply across the three study areas for this project; information from them is reviewed in this section. It should be noted that a small number of the regional context-oriented documents reviewed for this project provide less directly relevant information for the proposed TRIP project and are consequently not directly referenced in this section. However, abstracts summarizing key information from these documents are contained in 0.

2.1 Forest-Wide Context

1997 Revision of the Land and Resource Management Plan: Arapaho and Roosevelt National Forests and Pawnee National Grassland *(USFS, 1997)*

Among the documents that provide a Forest-wide perspective is the 1997 Revision of the Land and Resource Management Plan: Arapaho and Roosevelt National Forests and Pawnee National Grassland (hereafter referred to as the Forest Plan). The Forest Plan serves as a foundational planning document designed to provide guidance on the management of the ARNF-PNG over a 10-15 year period. The Forest Plan documents the resources of the ARNF-PNG, establishes goals and objectives for the Forest, and defines prescriptive management zones that specify desired resource, social, and management conditions of specific land units within the Forest. Thus, the Forest Plan provides a framework for this project to understand and evaluate visitor use, transportation, and resource conditions at the BLRA, Guanella Pass, and Mount Evans. Key elements of the Forest Plan, with respect to this project, are reviewed in the following paragraphs.

The ARNF-PNG are a single administrative unit of the USFS and part of the USFS's Region 2, with headquarters in Lakewood, CO; headquarters of the ARNF-PNG, itself, are in Fort Collins, CO. The ARNF-PNG is nearly 1.5 million acres in size, comprised of the foothills and most of the high mountain country along the Colorado Front Range, from west of Denver north to the Wyoming border. Much of the ARNF is above 12,000 feet elevation, and includes three peaks above 14,000 feet, including Mt. Bierstadt at Guanella Pass, and Mount Evans.

The ARNF is referred to in the Forest Plan as an "urban National Forest," due to its close proximity to the Front Range metro area population of nearly 3 million people. As a result of the urban-proximate nature of the Forest, coupled with Colorado's longstanding popularity for nature-based tourism, the ARNF ranks among the top National Forests in the country, in terms of year-round recreational use. Thus, there are often competing interests at play among residents of the local mountain communities and recreationists visiting the Forest, as well as significant recreation pressures on Forest resources and visitor experiences.

The challenges of recreation-related issues in the ARNF are underscored by the fact that they are among the topics of focus in the Forest Plan. A number of specific recreation-related issues are noted within the Forest Plan that are of particular relevance to this project and are outlined here.

- Intensive visitation and inadequate or deteriorating facilities due to budget limitations in developed recreation areas, like the BLRA.
- Recreation impacts to Forest resources and visitor experiences attributed to rapidly growing visitation in dispersed recreation areas. Visitor use in dispersed recreation areas account for the majority of recreational use on the ARNF and is growing to the point that it may double every 8 or 9 years. All three study sites for this project provide direct access to and contain dispersed recreation areas.
- Increasing conflict among different recreational user groups (e.g., motorized vs. non-motorized, wilderness vs. frontcountry recreationists, etc.).

The Forest Plan specifies goals, standards, and guidelines to provide direction for addressing recreation-related and other issues at a general level. With respect to this project, the most salient goals (GO), standards (ST), and guidelines (GL) noted in the Forest Plan include:

- (GO) Ensure that all management activities are consistent with the adopted Recreation Opportunity Spectrum (ROS) class as shown on the *ROS decision map*.
- (GO) Encourage outfitters and guides to provide desired recreational experiences within the resource capacity of the area.
- (ST) Make facilities provided at trailheads consistent with the recreational settings and provide for parking, trail information, and appropriate sanitation facilities.
- (GL) Close, rehabilitate, or otherwise mitigate dispersed sites when:
    - Campsite condition reaches Frissell class 4 (heavy) or 5 (severe)
    - Site occupancy exceeds the adopted visual quality objective
    - There are social use conflicts
    - Unacceptable environmental damage is occurring, per Frissell (1978)

The Forest Plan also provides the framework for addressing recreation-related and other issues in the ARNF at a more focused level by prescribing Management Areas to specific land units within the Forest. The Forest Plan includes 26 prescriptive Management Areas that range from totally natural conditions (1.1 Wilderness) to extensive human-use and modifications (8.22 ski-based resorts). By allocating prescriptive Management Areas to land units within the ARNF, the USFS specifies the types of recreational activities and other uses/values that will be given priority in various areas of the Forest. Therefore, an understanding of the prescriptive Management Areas for each of the three study sites in this project is necessary; this is addressed in the site-specific sections of the report.

The National Visitor Use Monitoring Program

The National Visitor Use Monitoring Program (NVUM) is a national program of the USFS designed to collect information about visitor use and satisfaction in National Forests on a five-year cycle. In the ARNF, NVUM studies have been conducted in 2000 and 2005, and a third NVUM study is planned for the ARNF in 2010. Data from the 2000 and 2005 NVUM studies were compiled, reviewed, and synthesized as part of the background information review for this project, results of which provide Forest-wide and site-specific information about recreational use in the ARNF. Site-specific findings from the 2000 and 2005 NVUM studies are presented in each of the site-specific sections of the report, while Forest-wide findings from the 2000 NVUM study (Forest-wide findings from 2005 were not available for review in this project) are summarized here:

- Approximately 2,390 recreational users in the ARNF participated in the 2000 NVUM study.
- During the 2000 calendar year, there were an estimated 6.2 million recreational visits to the ARNF, including approximately 0.4 million Wilderness visits.
- About two-thirds of ARNF visitors during 2000 were male; about one-quarter were between 31 and 40 years of age; and almost 94% classified their race/ethnicity as "White".
- The average length of stay for a Forest visit during 2000 was 24 hours, and about 15% of visitors reported an overnight stay on the Forest.
- ARNF visitors, on average, went to 1.3 recreation sites within the Forest during their visit in 2000, and generally spent about 9 hours at each site they visited.
- The five most popular activities reported by visitors to the ARNF during 2000 include:
  - Wildlife viewing (78%)
  - General use/relaxation (74%)
  - Hiking/walking (55%)
  - Viewing of natural features (48%)
  - Pleasure driving (39%)
- The facilities and specially designated areas in the ARNF most frequently used by recreational visitors in 2000 included:
  - Hiking/biking/horseback trails (41%)
  - Scenic byways (38%)
  - Other forest roads (28%)

The Arapaho and Roosevelt National Forests and Pawnee National Grassland Interpretive Strategy *(USFS, 2005)*

Additional Forest-wide perspectives regarding recreational use in the ARNF are provided by The Arapaho and Roosevelt National Forests and Pawnee National Grassland Interpretive Strategy *(USFS, 2005)*, which was reviewed as part of this project. In developing the 10-year interpretive strategy, the ARNF conducted an "audience inventory and analysis" in 2004, results of which suggest:

- The most striking and recurrent theme in the studies reviewed for the audience inventory and analysis relates to the rapid growth of the Front Range population and recreational users in the ARNF.
- The availability of information about recreation and adequacy of signs is important to ARNF visitors, but only marginally satisfactory. The issue is found to be particularly pronounced for wilderness visitors.
- The majority of recreational users get their information about the ARNF from friends and family (87%) or from newspapers (64%), but an increasing number are obtaining information from the internet (45%).

- The greatest growth in Rocky Mountain recreation is in active sports such as kayaking and mountain biking, and in snow/ice recreation such as snowboarding and snowmobiling. Specifically, each of these four activities has increased over 100% since 1995.
- Colorado attracts the most hunters and anglers of any of the 8 Rocky Mountain states, and the ARNF is a popular destination for these activities.
- For Colorado residents, open space and natural areas play significantly into what they value about their state. For example, 90% of Colorado state residents report using recreation trails.
- ARNF visitors know very little about the National Forest System and cannot distinguish the national forests from national parks and other public lands.

In addition to describing the ARNF audiences for interpretive messages and services, the interpretive strategy provides an inventory of existing interpretive and information services. The inventory includes information regarding existing conditions of:

- Signs and kiosk structures
- Sign message content
- Forest and grassland interpretive trails
- Interpretive programs
- Public Affairs Key Messages and Communication Strategies
- Internet information

Finally, and importantly for this and the proposed TRIP project, the interpretive strategy provides recommendations and action items to meet the needs for interpretive and information services. The document suggests that the ARNF should seek opportunities for collaborating with research stations, tourism entities, and educational institutions to support and use visitor studies to address the following types of questions:

- What interests, opinions, and knowledge do ARNF visitors have? What do they want to know and what do they need to know?
- What perceptions do ARNF visitors have about Forest recreation or Forest issues?
- What expectations do ARNF visitors have for their Forest visit?
- What and how do ARNF visitors learn from their forest experiences?
- What specific outcomes are realized by the USFS as a result of visitors' encounters with Forest information and interpretive media?
- What venues and media are the most effective in different settings and situations?

While not all of these questions are directly related to the objectives of the proposed TRIP project, many of them could potentially be addressed with data collection efforts that would likely be included in the study, if funded.

2.2 Regional Context

Regional factors play an important contributing role to many of the Forest-wide issues noted in the preceding paragraphs. Several of the documents included in the background information review for this project provide insights about population trends and transportation conditions in the Colorado Front Range region that are relevant to this project; these are reviewed in the following paragraphs.

Colorado Statewide Comprehensive Outdoor Recreation Plan *(Colorado State Parks, 2008)*

Perhaps the most noteworthy regional trend is the dramatic rate of population growth in the Colorado Front Range. The Colorado Statewide Comprehensive Outdoor Recreation Plan (SCORP) includes population growth projections for various regions of the state, which indicate particularly pronounced population growth in the Denver metro area to the east of the ARNF (**Error! Reference source not found.** and **Error! Reference source not found.**).

Figure 26. Population in Colorado, by County (source: Colorado State Demography Office, 2007*, excerpted from* 2008 Colorado SCORP*)*

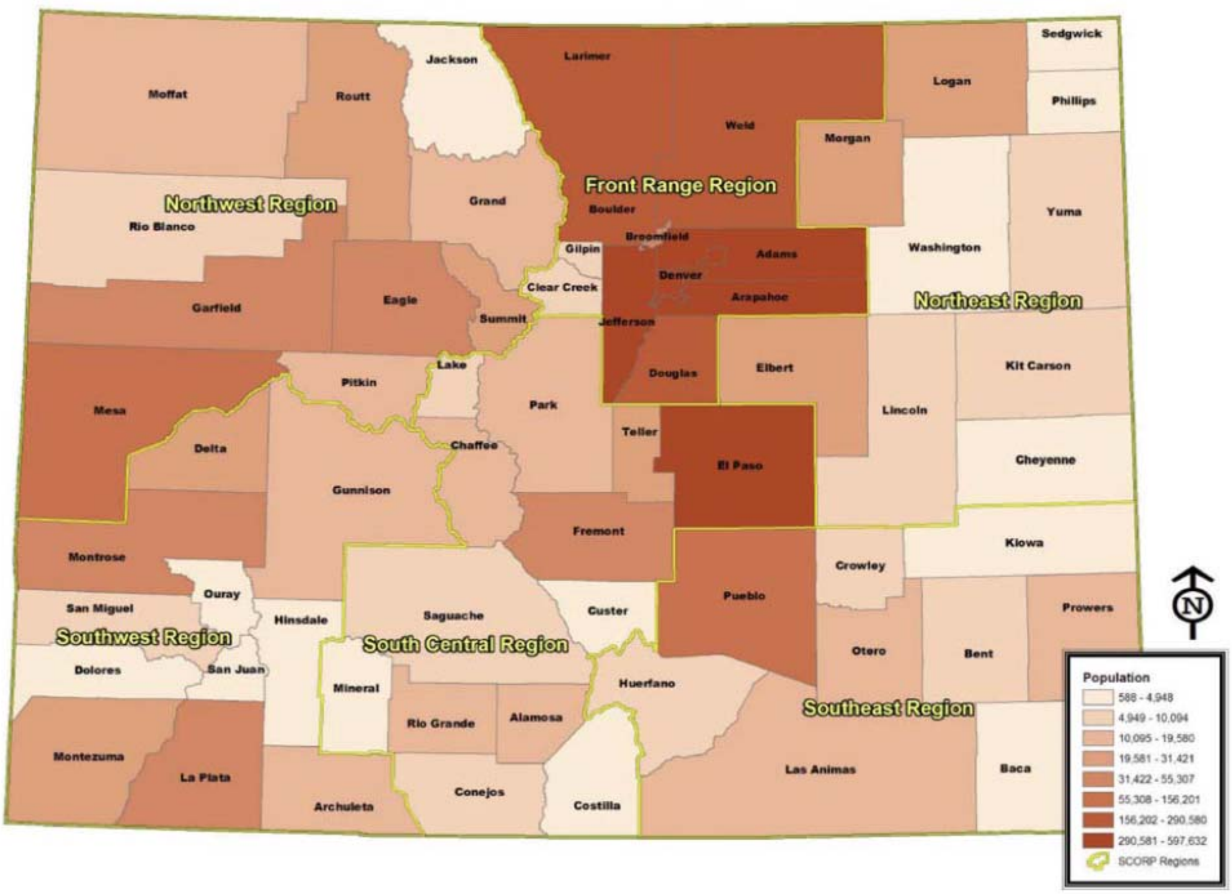
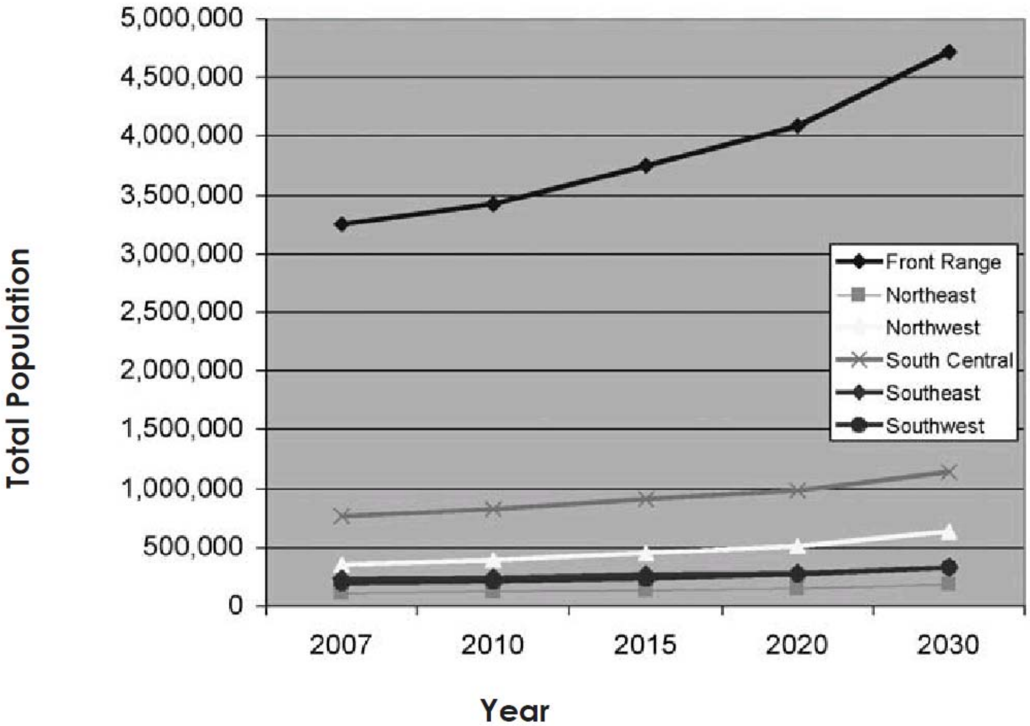


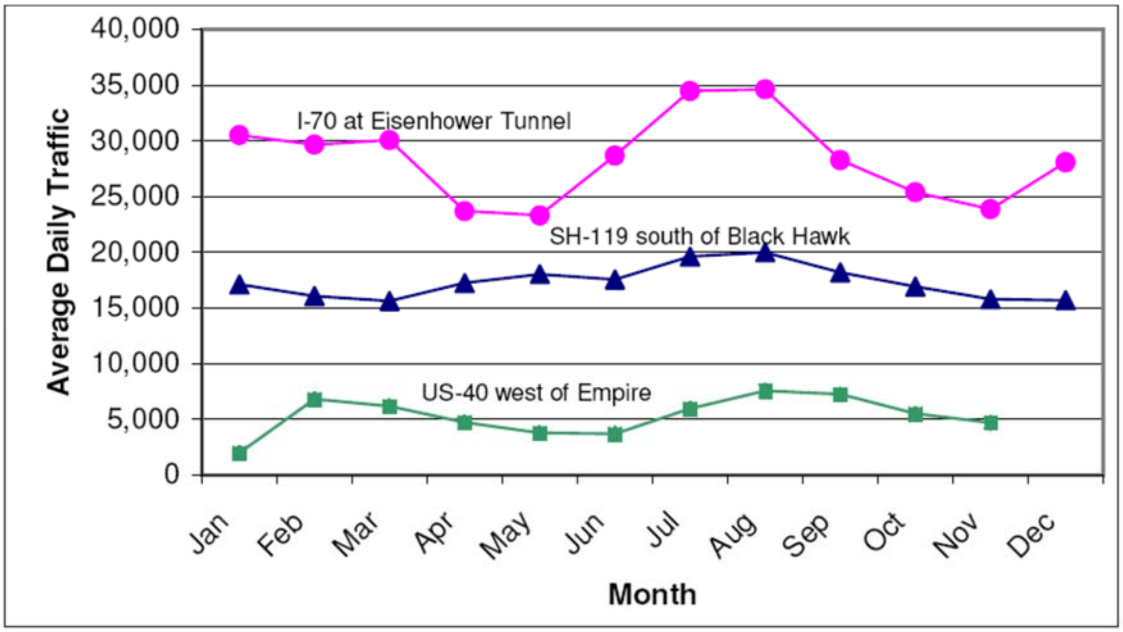
Figure 27. Projected Population Growth in Colorado, by Region of the State (source: Colorado State Demography Office, 2007, excerpted from 2008 Colorado SCORP)



2030 Mountains and Plains Transportation Plan *(DRCOG, 2005)*

The burgeoning Front Range population is a significant contributing factor to the outdoor recreation pressures in the ARNF as noted. Furthermore, population growth in the region has resulted in significant transportation issues throughout the region, with particularly congested conditions in the I-70 corridor. However, I-70 traffic congestion can be attributed not only to population growth in the region, but also to recreation-related travel. In particular, traffic data collected by the Colorado Department of Transportation (CDOT) and reported in the *2030 Mountains and Plains Transportation Plan* suggest that recreation trips comprise the majority of traffic on I-70 and that this results in significant impacts for local residents (Figure 28). The traffic data also suggest that the summer months of July and August have the highest traffic volumes at about 35,000 vehicles per day, while the skiing months of December through March generally see about 30,000 vehicles per day. Furthermore, traffic projections for the I-70 corridor suggest congestion will worsen over the next decade. For example, recreation trips on I-70 in the Georgetown area in 2025 are projected to be about 80% above their 2000 levels. In addition, summer weekday traffic volumes in 2025 are projected to surpass 2000 winter weekend volumes (*I-70 Mountain Corridor Programmatic Environmental Impact Statement, 2004)*.

Figure 28. Monthly Distribution of Traffic Volumes on Mountainous Roadways in 2003 (source: DRCOG 2030 Mountains and Plains Transportation Plan, 2005*)*



I-70 Mountain Corridor Draft Programmatic Environmental Impact Statement *(CDOT & FHWA, 2004)*

In response to traffic congestion and related transportation issues in the I-70 corridor, the Federal Highway Administration (FHWA), Colorado Department of Transportation (CDOT), and regional transportation planning authorities are engaged in long range planning initiatives. Most notably, perhaps, is the *I-70 Mountain Corridor Draft Programmatic Environmental Impact Statement* (I-70 DPEIS), which was initiated by FHWA and CDOT in 2000. The purpose of the I-70 DPEIS is to develop and evaluate alternatives for addressing traffic congestion in the I-70 corridor, resulting in the selection of a Preferred Alternative. The alternatives included in the I-70 DPEIS are broadly categorized into those that have a transit orientation (e.g., rail, bus) and those that have a highway orientation (e.g., additional traffic lanes) to solving traffic congestion and related transportation issues on the I-70 corridor. Within the DPEIS, the alternatives are evaluated with respect to a number of factors, including the potential effects on recreation travel and trips to the ARNF; these recreation-related effects are outlined in the following paragraphs.

Results of the I-70 DPEIS alternatives analysis suggest that recreational use of the ARNF would likely be affected to different degrees, depending on the Preferred Alternative selected in the I-70 DPEIS process (Figure 29 and Figure 30). In particular, transit alternatives are expected to encourage increased use of developed recreation areas in the ARNF and related activities such as downhill skiing/resort use. Highway alternatives are expected to encourage increased use of dispersed recreation areas in the ARNF and related activities such as camping, mountain biking, and ATV use. Thus, the I-70 DPEIS process and outcomes are highly relevant to this and the proposed TRIP project.

Figure 29. Possible Changes to Forest Destination Trips, Winter 2025 (source: I-70 DPEIS, 2004*)*

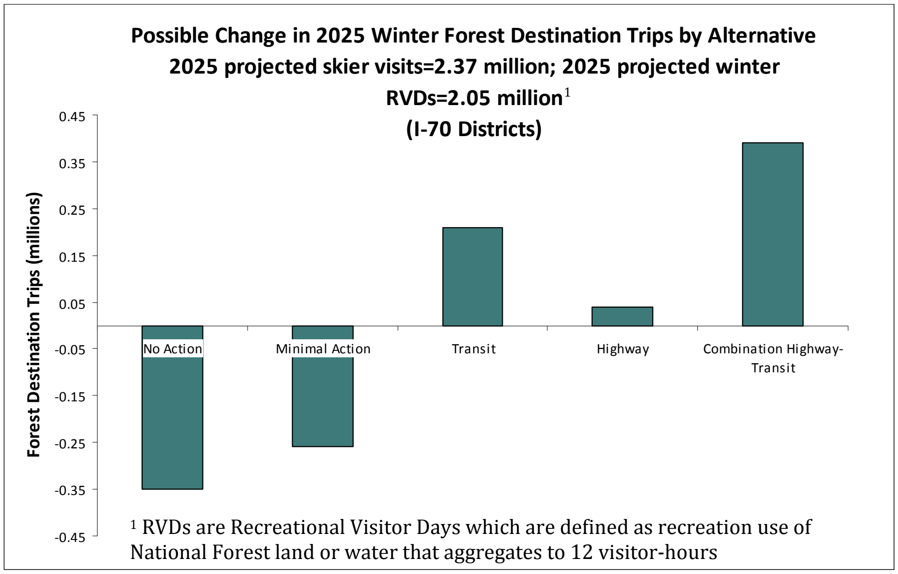
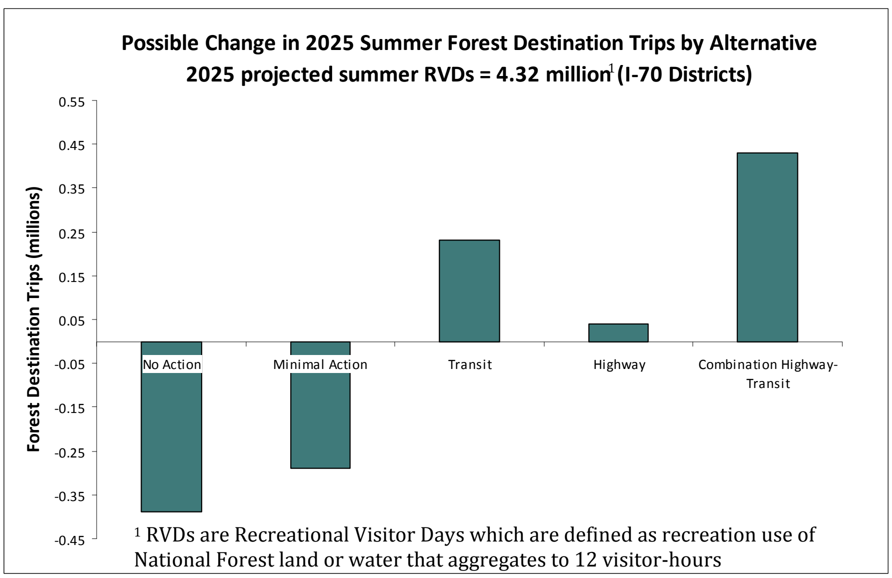


Figure 30. Possible Changes to Forest Destination Trips, Summer 2025 (source: I-70 DPEIS, 2004*)*



While the I-70 DPEIS analysis concludes that transit alternatives would generally encourage increased use of developed areas in the ARNF and related activities such as downhill skiing/resort use, it is suggested that transit linkages could be developed to support transit use by visitors to dispersed recreation areas in the Forest. These "feeder-system" transit services could, in turn, be connected to transit systems/service in the ARNF to deliver visitors to trailheads and other destinations for dispersed recreation activities. Thus, an integral component of such a system would involve transit service in the ARNF.

2.3 Alternative Transportation Studies on Public Lands

A series of three interrelated studies concerning the need for and feasibility of ATS on public lands was reviewed for this project. The studies were conducted by FHWA and the Federal Transit Administration (FTA) and are summarized in the following paragraphs.

Federal Lands Alternative Transportation Systems Study *(FHWA/FTA, 2001)*

The first of the three FHWA/FTA studies was designed to quantify the extent and costs of transit needs at sites managed by the National Park Service (NPS), the Bureau of Land Management (BLM), and the US Fish and Wildlife Service (USFWS). The study identified benefits and barriers to implementing transit on federally-managed lands. Specifically, the study results suggest transit can help achieve the following goals:

- Relieve traffic congestion and parking shortages.
- Enhance visitor mobility and accessibility.
- Preserve sensitive natural, cultural, and historic resources.
- Provide improved interpretation, education and visitor information services.
- Reduce pollution.
- Improve economic development opportunities for gateway communities.

Barriers to successful implementation of transit on federally-managed sites include:

- Lack of a dedicated funding source for developing, implementing, and operating and maintaining transit systems.
- Difficulty in selecting appropriate equipment.
- Lack of support for transit systems by certain gateway communities.
- Inadequate marketing and public information.
- Technical challenges.

Thus, this study provides a potential framework to evaluate benefits and barriers for ATS options at the BLRA, Guanella Pass, and/or Mount Evans. However, the framework should be expanded/adapted to incorporate user capacity considerations.

Federal Lands Alternative Transportation Systems Study: Summary of Forest Service ATS Needs *(FHWA/FTA, 2004)*

The second of the three FHWA/FTA studies discusses the ATS needs of USFS lands and includes the ARNF Peak-to-Peak Transit Service proposals for the BLRA and Mount Evans. The study identified several potential issues and opportunities relevant to implementation of ATS systems at USFS recreation sites, as follows:

- The study found that the majority of USFS recreation sites evaluated have relatively modest transit needs that can be served by a small number of vehicles operating on a seasonal basis.
- At some sites, there appear to be opportunities to recover at least a portion of operations and maintenance costs through fares.

- The study recommends that for USFS sites considering ATS solutions, opportunities should be sought to expand or connect with existing transit systems that serve other nearby federal lands or urban areas.
- The study further notes that one promising characteristic of partnerships with urban transit systems is that the peak usage of their vehicles occurs on weekdays, while peak demand in national forest recreation areas generally occurs on weekends. However, there are challenges in developing partnerships. Urban transit operating costs, even in small communities, can be very high, and available vehicles may not be suitable for areas with steep terrain and narrow roadways.
- Given the seasonal nature of most services, contracting with private providers can be a cost-effective strategy.
- Finally, the study suggests that in many USFS recreation areas, additional visitors can be accommodated without unacceptable resource and experiential impacts, but additional automobiles cannot. Further, environmental concerns, as well as topography, make roadway and parking lot expansion more costly and less desirable than ATS solutions in some USFS recreation areas. Thus, many site managers contacted in the study believe that ATS can serve as a cost-effective method of accommodating additional visitor demand, while at the same time protecting resources and the quality of visitor experiences. The proposed TRIP project would be designed to systematically evaluate these assumptions.

Arapaho-Roosevelt National Forest Field Report *(FHWA/FTA, Date unknown)*

The third of the three FHWA/FTA studies includes an evaluation of a potential ATS that would provide access to hiking trails and bicycling routes in the BLRA area and to the Peak-to-Peak and Mount Evans Scenic Byways. Discussion of the proposed systems, potential benefits, and challenges of implementation are discussed in the respective site-specific sections of the report (i.e., Section 3-1-BLRA and Section 3-3-Mount Evans). The study suggests that additional work is needed to finalize routes and schedules and develop funding strategies. The study further suggests that an evaluation of parking demand and strategies at the BLRA needs to be developed.

Transportation Observations, Considerations, and Recommendations relative to the Colorado Front Range *(TAG/ATPPL, 2007)*

In response to transportation issues and outdoor recreation pressures in the Front Range, a Transportation Assistance Group (TAG) was convened in the Front Range region during July 24-26, 2007. The TAG conducted a review of transportation and public lands-related issues in the Front Range region, on behalf of the USFS, in cooperation with the USFWS and NPS. The review sought to explore opportunities for improving regional connections for urban residents to/from federal recreation areas and to identify avenues for coordination between federal land management agencies and transportation planning organizations over the next 15-20 years. Furthermore, the USFS convened the TAG review as a means to explore potential partnering opportunities and strategies for enhancing alternative transportation access to public lands in the Colorado Front Range.

Key findings and recommendations from the TAG include:

- There is a need to address quality of life and economic development impacts of transportation, including the potential to improve visitor experience through interpretive resources.
- I-70 traffic and associated congestion limits access to recreation on public lands in the Front Range region.
- Federal land management agencies are moving toward travel management policies that will concentrate visitor use by function and area. Traveler information has the potential to shift visitors to areas that are underutilized, provided that the land management agencies are prepared to accommodate the shift.
- USFS staff senses that the national forests in the area can accommodate more visitors in the high use areas; however, the infrastructure cannot safely or conveniently handle more vehicles.
- Linkages between federal land management plans/activities and state/regional transportation planning processes are extremely weak, given the significance of federal lands and recreational travel in the Front Range.
- Opportunities exist to improve cooperative planning between federal land agencies and state / regional transportation agencies. The benefits of such cooperation can assist in coping with current shortfalls in funding relative to needs across all agencies. They can also help to build a regional strategy for securing more adequate financial support of critical investments to support recreation and tourism in the Front Range, consistent with Federal Land agency missions and objectives such as reconnecting people with nature, conserving natural and cultural resources, fostering healthier lifestyles, and providing quality visitor experiences.
- The USFS, in particular, faces a special challenge to ensure that public access issues are fully integrated rather than being overshadowed by advocacy efforts on the part of ski areas and other permitted users within transportation planning processes.
- There are several initial successes in providing environmentally sustainable transportation solutions and additional near term opportunities (such as at Guanella Pass and the BLRA) are evident.
- Improved understanding and methods for considering the transportation needs of federal lands in statewide and regional transportation planning processes and ongoing technical assistance are needed.

The TAG report concludes with recommendations to explore opportunities for cooperative ATPPL (i.e., TRIP) planning initiatives to address demand for recreational access by evaluating and developing feasible alternative transportation solutions in the ARNF. These recommendations were a primary basis for the TRIP proposal submitted by the ARNF-PNG in February 2009.

2.4 Regional Stakeholders and Potential Partners

Among the important insights from the background information reviewed in this section is knowledge of the various governmental, non-governmental, and volunteer organizations involved in transportation, recreation, and/or tourism-related issues in the Front Range region.

Organizations that appear to be particularly important stakeholders and potential partners, with respect to this project and the proposed TRIP project are discussed here:

- The Friends of Guanella was formed during the development of the Guanella Pass Scenic and Historic Byway Comprehensive Management Strategy (CMS). Members are charged with carrying out implementation efforts related to the CMS and are thus important partners, with respect to recreation and transportation planning in the Guanella Pass Road corridor.
- The Front Range Metropolitan Planning Organizations (MPO's) are important partners for the ARNF during its planning processes, particularly for sharing data. For instance the Front Range Travel Counts Survey (0), which is currently being conducted by the MPOs, CDOT, Regional Transportation District of Denver (RTD), and FHWA, will provide insight regarding travel patterns and behavior along the length of the Front Range.
- CDOT and FHWA work together on road projects such as the I-70 DPEIS and the Guanella Pass Road EIS. They are essential partners in identifying transportation needs, maintenance and operational issues, data availability, and problem solutions.
- As the regional transit provider, RTD represents the network that future ARNF shuttle systems may tie into. Collaborating with RTD will help ARNF to identify partnership opportunities, shared problems and needs, data resources, and a better understanding of transit technology, logistics, and system planning.
- Commercial service operators such as outfitters and tour guides are stakeholders and potential partners, with respect to the issues addressed in this and the proposed TRIP project. For example, there are at least two tour providers that serve the Mount Evans area, and a number of other regional tour providers that are potentially interested in providing a shuttle service to the Mount Evans summit.
- Regarding Guanella Pass Road specifically, there appears to be consensus that the USFS should lead any efforts pertaining to national forest access and FHWA should lead projects related to the road itself. The two agencies will need to coordinate closely with each other as well as with CDOT, Clear Creek and Park Counties, the Towns of Grant and Georgetown, and the Friends of Guanella. A third tier of management input might include the Denver Regional Council of Governments (DRCOG), Colorado State Parks, and the I-70 Coalition.
- Management of the Mount Evans Highway corridor is conducted in partnership with the CDOT, Colorado Division of Wildlife, University of Denver, City and County of Denver, Denver Botanic Gardens, and Clear Creek County.
- Denver Mountain Parks currently co-manages the Summit Lake area of Mount Evans. Denver Mountain Parks also manages the Echo Lake Lodge and Echo Lake Park at the intersection of Highway 103 and the Mount Evans Highway. Denver Mountain Parks have provided improvements for both the Echo Lake and Summit Lake areas, including increased parking facilities.
- Denver Botanic Gardens currently leads educational and interpretive tours on the M. Walter Pesman Trail on Mount Goliath in the Mount Evans Recreational Area, and provides volunteers and staff to maintain the alpine rock gardens and assist visitors at the Mount Goliath Research Natural Area (RNA).

- The Colorado Division of Wildlife is tasked with managing the wildlife and environmental resources that support the 960 wildlife species within Colorado. Specifically, the Division of Wildlife is concerned about recreation use within wildlife areas at Mount Evans and the impact this may have on each species' habitat and livelihood.
- Clear Creek County is concerned mostly with tourism within its boundaries. County officials want to see the Mount Evans Scenic Byway experience enhanced, resulting in additional tourism-based revenue for the County. County officials would also like to see additional marketing efforts initiated to promote visitation to the Mount Evans area.
- The University of Denver operates the Mount Evans Meyer-Womble Observatory located on the summit of Mount Evans. This facility offers the Department of Physics and Astronomy research and educational opportunities atop the 14,000+ foot mountain. Concerns raised by the University of Denver include the volume of traffic and safety concerns on the road leading to the summit of Mount Evans, the public's lack of basic Wilderness knowledge and awareness of the significance of the natural environment in the Mount Evans area.

3.0 Recreation Site-Specific Sections

From the Forest-wide and regional perspectives of the previous section, the report now moves to synthesis, analysis, and evaluation of information about transportation, visitor use, and resource conditions at each of the three recreation sites of focus in this project – the BLRA, Guanella Pass, and Mount Evans.

3.1 Brainard Lake Recreation Area

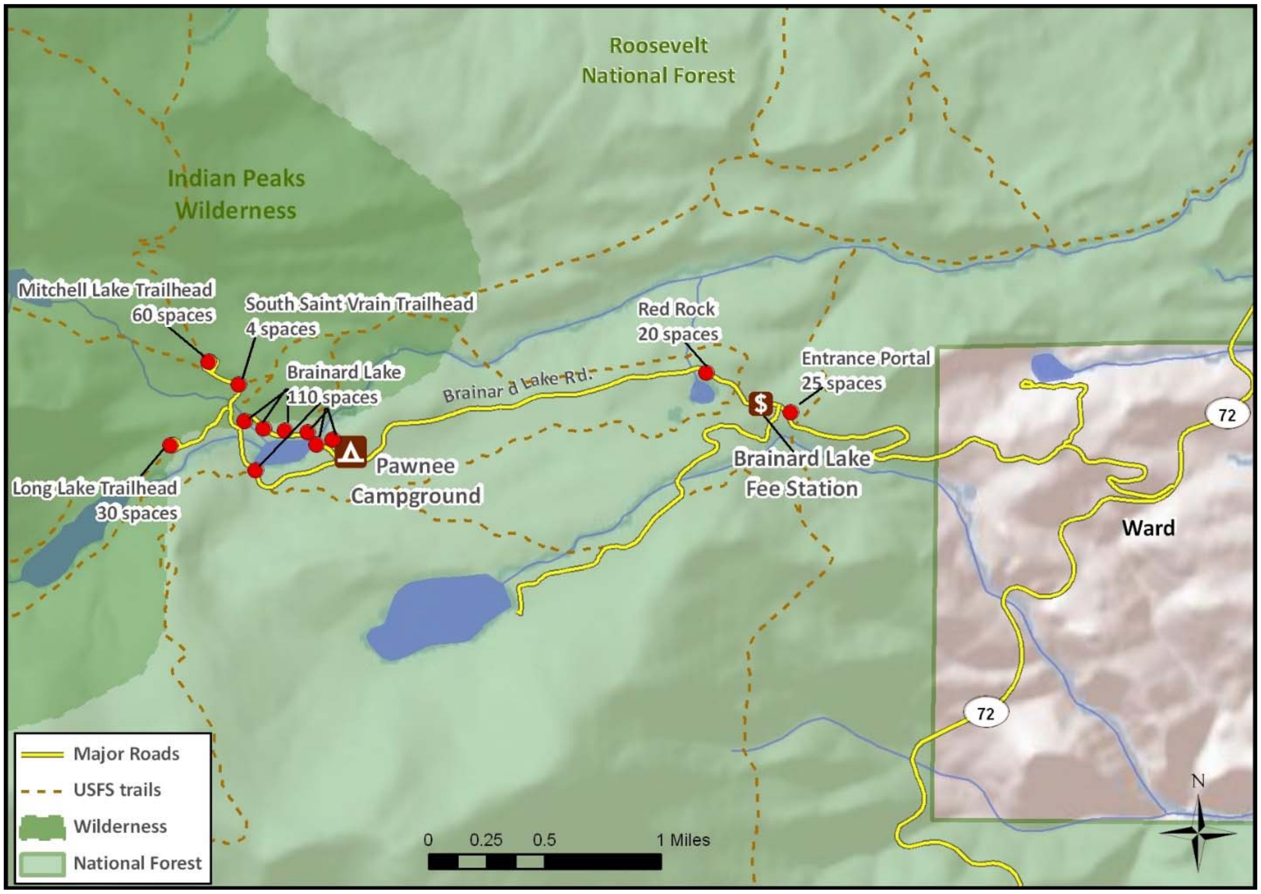
This section synthesizes, analyzes, and evaluates information about the BLRA, based on review of the following documents:

- Brainard Lake Recreation Area Management Plan (USFS, 2005)
- Federal Lands Alternative Transportation Systems Study: Summary of Forest Service ATS Needs (FHWA/FTA, 2004)
- Arapaho-Roosevelt National Forest Field Report (FHWA/FTA, date unknown)
- 1997 Revision of the Land and Resource Management Plan: Arapaho and Roosevelt National Forests and Pawnee National Grassland, a.k.a. the Forest Plan (USFS, 1997)
- Boulder County Mountain Town Transit Feasibility Study Scope of Work (Boulder County Transportation, 2009)
- Hessie Trailhead Shuttle Feasibility Study (Boulder County Transportation, 2009)

Location

The BLRA is an approximately 3,143 acre land unit on the Boulder Ranger District of the ARNF, bordered by the town of Ward to the east and the Indian Peaks Wilderness to the west (**Error! Reference source not found.**). It is located within a one to two hour drive from much of the Boulder-Denver metropolitan area and northern Front Range cities, including Longmont, Loveland, Greeley, and Fort Collins.

Figure 31. BLRA - Visitor Use Areas and Parking Facilities



Visitor Use and Recreation-related Issues

The BLRA's close proximity to the Front Range population centers makes it the highest use area in the Boulder Ranger District and one of the most popular recreation sites in the ARNF. While visitor use is highest during the summer and fall, a significant amount of recreational use also occurs in the winter due to the popularity of the area for backcountry skiing and snowshoeing. Other popular activities in the BLRA include hiking, picnicking, camping, fishing, mountain biking, viewing scenery, and connecting with nature. A parking fee is collected during summer and fall seasons.

The BLRA includes a number of developed recreation facilities, some of which meet the standards for the Americans with Disabilities Act (ADA). Developed recreation facilities include an entrance fee station, picnic sites, parking lots, restroom facilities, information kiosks, and a boat launch. In addition, there is a 55 site campground at the BLRA that accommodates tents, campers, trailers, and RV's up to 45 feet in length.

The developed recreation facilities at the BLRA are situated within the ARNF's prescriptive Management Area 8.21 – Developed Recreation Complexes. Within this Management Area, recreation is prescribed to occur within an intensively managed, highly regulated environment modified to accommodate a high level of interaction among visitor groups. Thus, there are few, if any, opportunities for visitors to experience solitude. Also within this Management Area, directional and regulatory signs are widely used, and visitor access may be controlled to an established capacity. Site hardening, including surfacing of trails, is used to meet visitors' needs and protect resources, and most facilities are prescribed to meet ADA standards.

The remaining portion of the BLRA is prescribed by the ARNF as Management Area 1.3 – Backcountry Recreation. Thus, this portion of the BLRA is managed for non-motorized recreation in a natural appearing landscape. While encounters are somewhat common along travelways, fewer contacts and opportunities for solitude are prescribed to occur away from trails. Similarly, sounds from people may be common on or near travelways, while further away from travelways and the area's edges, human-caused sounds should generally not be noticeable. The use of signs in the Backcountry Recreation Management Area are limited to those necessary for visitor safety and resource protection, and facilities are limited to those that provide for visitor safety, protect Forest resources, and/or enhance recreational experiences.

The BLRA has a number of trailheads, some of which provide direct access into the Indian Peaks Wilderness Area (IPW). These trailheads are very popular, with approximately 40% of BLRA visitors using the area to access the IPW. The IPW is congressionally designated Wilderness (Management Area 1.1 in the Forest Plan). As stated in the Forest Plan, Wilderness areas are managed such that their natural conditions predominate and opportunities for solitude and self reliance are provided. Thus, evidence of human activity is meant to be limited to that necessary for resource protection. Desired social and resource conditions are to be maintained by developing and implementing limits of acceptable change programs, to the extent that funding and resources allow.

In addition to specifying prescriptive Management Areas for the BLRA, the Forest Plan identifies goals and objectives for the area; transportation-related goals are summarized in the next section, recreation-related goals are summarized here:

- Maintain the undeveloped character of that portion of the BLRA away from roads and trails, and manage all trails for non-motorized use.
- Provide for year-round recreational use in the BLRA while also taking actions to protect and enhance the values of the adjacent IPW.
- Disperse existing recreational use into areas east of Brainard Lake and away from the IPW.
- Use an adaptive-management process to monitor the physical, biological, and social impacts of recreational use.
- Improve non-motorized recreational opportunities by considering connecting and loop trails for four-season multiple use that direct users away from Brainard Lake and the IPW.

The *Brainard Lake Recreation Area Management Plan*, *2005* (BLRA-MP) also specifies a number of goals, objectives, guiding principles, and desired future conditions for the BLRA. All of these provide context for this and the proposed TRIP project; several are particularly relevant and those are summarized here:

- Goals

- Specify where developed areas and concentrated use should occur…identify areas with undeveloped character and maintain or enhance (through limited access, facility removal, rehabilitation and restoration) those undeveloped areas.
- Ensure that recreational use of the BLRA is compatible with long-term protection of natural and cultural resources and the adjacent IPW.

▪ Objectives
  - Improve winter and non-motorized recreational opportunities.
  - Take actions to reduce impacts to the adjacent IPW.
  - Reduce conflicts among visitors, enhance visitor safety, and take actions to identify and restrict inappropriate uses.

▪ Guiding Principles
  - **Sense of Welcome.** The BLRA should be a place that the public has a strong desire to visit and return to visit, based on positive outdoor recreation experiences.
  - **Priority to Protect the IPW.** Visitors should understand that many designs and management controls within the BLRA are established to protect and enhance the resources of and visitor experience within the adjacent IPW as well as within the BLRA.
  - **Monitoring.** The USFS…shall seek to monitor the visitor experience, visitor infrastructure, and resource conditions to assess the effects of management actions and visitor use in the BLRA.
  - **Adaptive Management.** Based on monitoring results, changes in conditions, and new information, the USFS shall implement an adaptive management approach that assesses the effectiveness of existing management actions and visitor use patterns and revises them appropriately under current planning and public notification guidelines.

▪ Desired Future Conditions
  - Visitors to the BLRA will experience an environment where the sights and sounds of nature predominate at levels greater than currently exist.
  - Visitor safety and satisfaction are provided for at levels greater than the existing condition.
  - Natural resources (soil, water, wildlife, vegetation, etc.) will be protected and enhanced to conditions better than currently exist.

As noted, the BLRA is the highest use area in the Boulder Ranger District of the ARNF. Thus, the BLRA and adjacent IPW experience intensive levels of visitation that present obstacles to achieving the USFS' prescribed social and resource conditions, goals, and objectives for these areas. For example, an estimated 119,000 persons visited BLRA trailheads in the summer months (June through September) of 2001. In 2002, approximately 2,647 overnight camping permits were issued for the IPW (which is accessed via BLRA trailheads).

Information reviewed for this project includes BLRA entrance fee station visitation data, which support additional insights about visitor use in the BLRA. For example, the BLRA visitation data in Figure 32 suggest that July is the busiest month of the entrance fee collection period, with August a close second. Use ramps up sharply in July from relatively low visitation numbers in June, while it declines more gradually from August into September, before dropping off substantially in October. However, anectdotal evidence from correspondence with the USFS and Boulder County suggest that winter use may sometimes be higher than that observed during summer months, particularly at the lower parking lot near the entrance fee station.

Figure 32. BLRA - Average Monthly Visitation (2001-2009; source: USFS Fee Station Data)

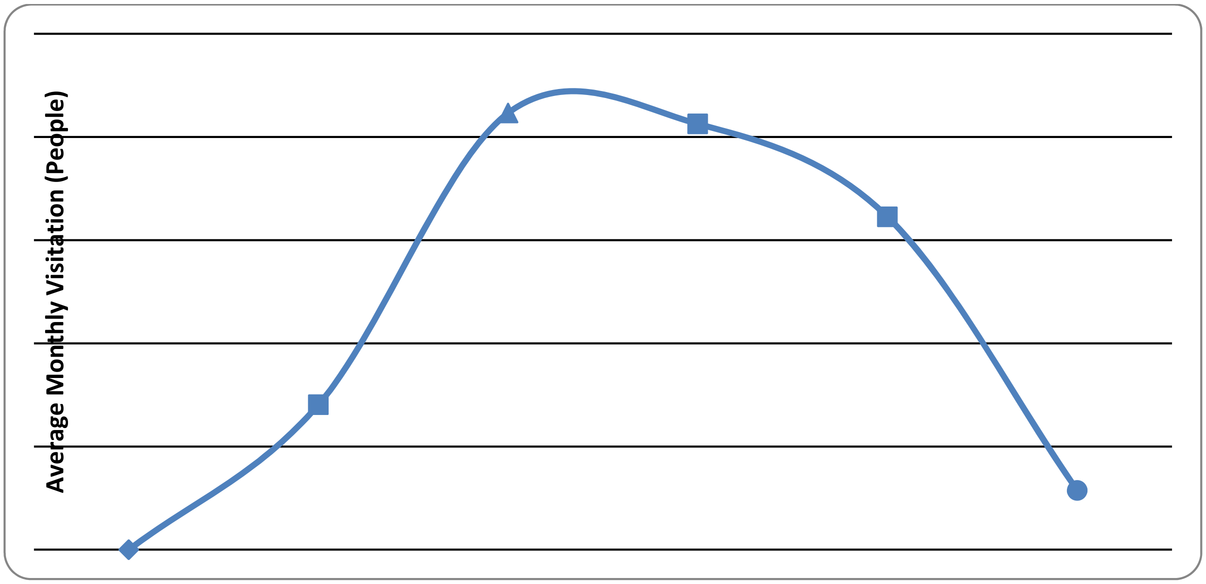
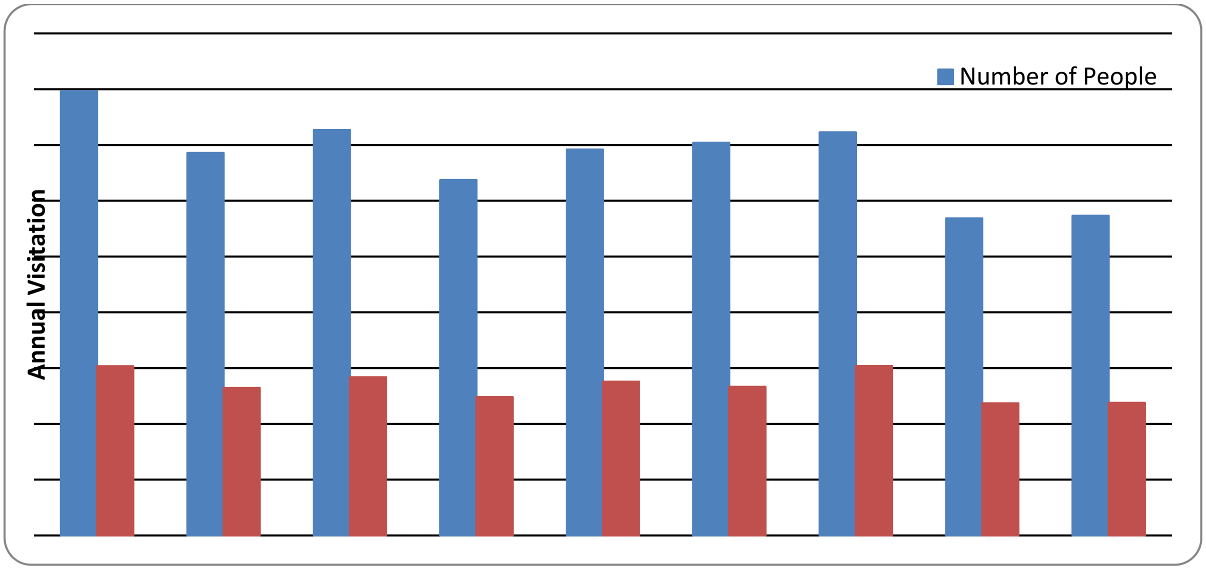


Figure 33 presents annual visitation during the fee collection months for 2001 through 2009, both in terms of number of people and number of vehicles. While there is some question about the reliability of the data to support statements about actual visitation in any particular year, the data do support conclusions about visitation trends. A visual inspection of the data in Figure 33 suggests that BLRA visitation has been relatively stable over the last decade, with a moderately declining trend.

Figure 33. BLRA - Annual Visitation During Fee Collection Period (2001-2009; source: USFS Fee Station Data)

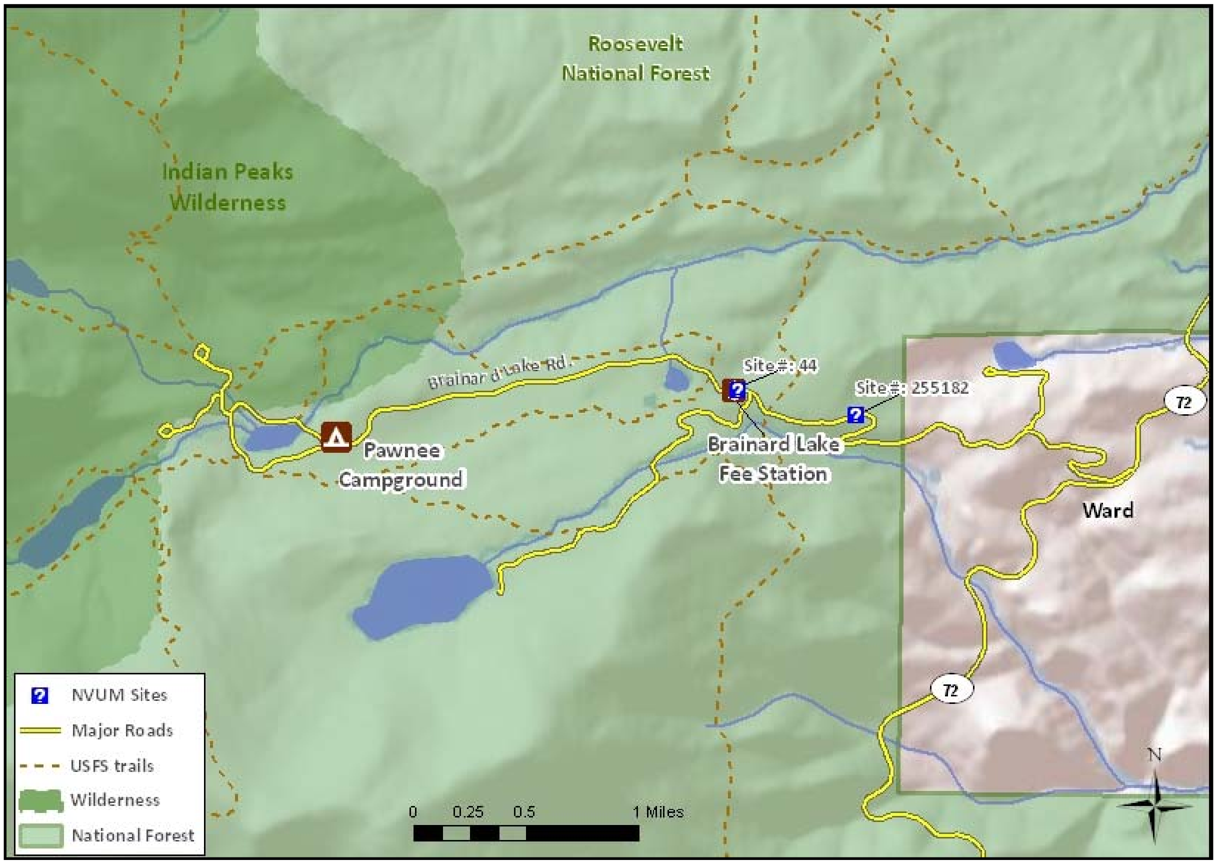


While the annual visitation data suggest a moderating trend in BLRA visitation, onsite observations during September 2009 suggest that the BLRA continues to receive intensive levels of visitation that cause impacts to Forest resources and visitor experiences, parking shortages, and public safety issues. These user capacity issues are exacerbated by the fact that the BLRA's Developed Recreation Complex is located directly adjacent to the IPW.

The BLRA-MP notes that in 2004, the USFS completed a report titled *Assessment of Capacity: Brainard Lake Recreation Area*. The report contains information regarding visitation trends in the BLRA and IPW, as well as information about parking capacities. Based on information from this report and direction from the Forest Plan, the USFS developed a set of recommendations to address user capacity. These recommendations, which are documented in the BLRA-MP, center almost exclusively around parking and vehicle traffic management, and are therefore discussed in the next section of this report. One exception is the recommendation to monitor conditions within the BLRA to ensure impacts to the natural resources do not exceed acceptable levels, and implement management actions when necessary to prevent exceeding these levels.

NVUM studies conducted in 2000 and 2005 provide another relatively recent source of information about visitor use in the BLRA. The NVUM studies included interviews with visitors at one location in the BLRA during the 2000 study (Site 44) and two locations (Site 44 and Site 255182) during the 2005 study (Figure 34). A copy of the 2005 NVUM survey instrument is in 0. Another NVUM study is planned for the BLRA during summer 2010.

Figure 34. BLRA - Lake NVUM Site Locations



One of the NVUM study sites at the BLRA (Site 44) is classified by NVUM methods as being located in a Day-use Developed Site (DUDS) and the other (Site 255182) is classified as being located in a General Forest Area (GFA). The NVUM interview sample sizes, by study site and year, are reported in (Table 41). Key results from the 2000 and 2005 NVUM interviews are reported and compared in the following paragraphs. However, the relatively low sample sizes for the 2000 NVUM interviews at the DUDS site and 2005 interviews at the GFA site suggest that results of the studies, including comparisons across study years, should be interpreted with caution.

Table 41. BLRA - Number of NVUM Interview Respondents per Year (source: NVUM)

Site	Site Type	2000	2005	Total
44 – Brainard Lake	DUDS	90	154	244
255182 – Brainard Lake	GFA	-	99	99

Visitors were asked to indicate which activities they had participated in or will participate in during their visit to the BLRA (Table 42 and Table 43; specific activities corresponding to each of the activity groupings in Table 42 and Table 43 are in 0). At both the DUDS and GFA sampling locations, viewing and/or learning and non-motorized activities were, by far, the most commonly reported. A substantial proportion of visitors at the DUDS site also reported motorized activities. In addition, the proportion who reported camping and other overnight activities at the DUDS site increased from 2000 to 2005 (Table 42).

Table 42. BLRA (Site 44) - Participating in Activity Group (source: NVUM)

Activity Types *	2000 (n=60)	2005 (n=106)	Change
Hunting and/or Fishing	15.0%	12.3%	-2.7
Viewing and/or Learning	96.7%	82.1%	-14.6
Non Motorized	93.3%	85.8%	-7.5
Motorized	38.3%	28.3%	-10.0
Camping or Other Overnight	8.3%	15.1%	+6.8
Other Activities	26.7%	52.8%	+26.1

Table 43. BLRA (Site 255182) - Participating in Activity Group (source: NVUM)

Activity Types *	2000 (n=0)	2005 (n=88)	Change
Hunting and/or Fishing	-	0.0%	-
Viewing and/or Learning	-	3.4%	-
Non Motorized	-	100.0%	-
Motorized	-	0.0%	-
Camping or Other Overnight	-	2.3%	-
Other Activities	-	9.1%	-

The majority of visitors sampled at both study locations reported their race/ethnicity as "White"; very few reported any other response (Table 44 and Table 45.)

Table 44. BLRA (Site 44) - Ethnicity and Race (source: NVUM)

	2000 (n=90)	2005 (n=154)	Change
Spanish, Hispanic, or Latino	1.1%	0.6%	-0.5%
American Indian/Alaskan Native	0.0%	1.9%	+1.9%
Native Hawaiian/Pacific Islander	0.0%	0.0%	0.0%
Asian	1.1%	0.0%	-1.1%
Black/African American	0.0%	0.0%	0.0%
White	56.7%	68.2%	+11.5%
Other	6.7%	-	-
No Answer	34.4%	27.9%	-6.5%

Table 45. BLRA (Site 255182) - Ethnicity and Race (source: NVUM)

	2000 (n=0)	2005 (n=99)	Change
Spanish, Hispanic, or Latino	-	4.0%	-
American Indian/Alaskan Native	-	1.0%	-
Native Hawaiian/Pacific Islander	-	1.0%	-
Asian	-	5.1%	-
Black/African American	-	0.0%	-
White	-	83.8%	-
Other	-	-	-
No Answer	-	13.1%	-

The ages of visitors at the DUDS sampling location were fairly evenly distributed between 31 and 70 years of age (Table 46), while a majority of visitors contacted at the GFA study site were between 31-50 years of age (Table 47).

Table 46. BLRA (Site 44) - Age Categories (source: NVUM)

2000 Categories/2005 Categories	2000 (n=90)	2005 (n=154)	Change
16-20 / 16-19	1.1%	1.3%	+0.2%
21-30 / 20-29	4.4%	5.2%	+0.8%
31-40 / 30-39	15.6%	9.7%	-5.9%
41-50 / 40-49	18.9%	13.0%	-5.9%
51-60 / 50-59	11.1%	13.6%	+2.5%
61-70 / 60-69	11.1%	15.6%	+4.5%
71+ / 70+	3.3%	9.7%	+6.4%
No Answer [a]	34.4%	31.8%	-2.6%

Table 47. BLRA (Site 255182) - Age Categories (source: NVUM)

2000 Categories/2005 Categories	2000 (n=0)	2005 (n=99)	Change
16-20 / 16-19	-	0.0%	-
21-30 / 20-29	-	12.1%	-
31-40 / 30-39	-	35.4%	-
41-50 / 40-49	-	21.2%	-
51-60 / 50-59	-	15.2%	-
61-70 / 60-69	-	3.0%	-
71+ / 70+	-	1.0%	-
No Answer [a]	-	12.1%	-

Visitors were asked to indicate the number of people in their vehicle on the day they were contacted for the interview (Table 48). Average group size, based on responses to this question and regardless of sampling site or year, were 2.2 or 2.3 people/vehicle.

Table 48. BLRA - Number of People in Vehicle (source: NVUM)

Site		2000	2005	% Change
	Average	2.2	2.3	+5%
44 – Brainard Lake	*St. Dev*	1.1	1.3	-
	n	59	106	-
	Average	-	2.2	-
255182 – Brainard Lake	*St. Dev*	-	1.0	-
	n	-	87	-

Finally, in the 2005 NVUM inteview, respondents were asked to indicate how far they had traveled from their home to get to the BLRA (Table 49). Mean values ranged from 245-322 miles, which suggests an average travel time of roughly 4-6 hours.

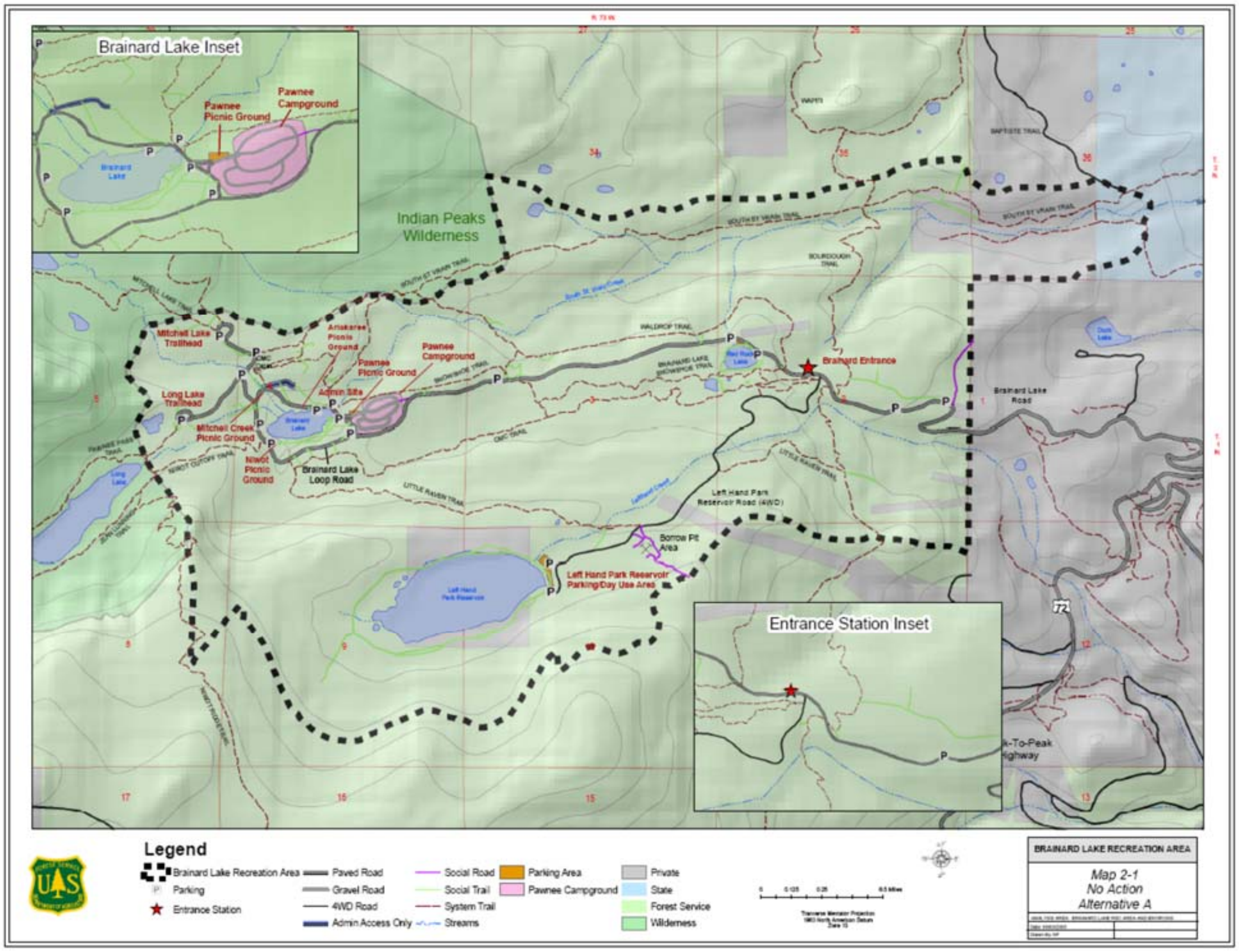
Table 49. BLRA - Distance Traveled from Home (miles; source: NVUM)

Site		2000	2005	% Change
	Average	-	322	-
44 – Brainard Lake	*St. Dev*	-	692	-
	N	-	106	-
	Average	-	245	-
255182 – Brainard Lake	*St. Dev*	-	1170	-
	N	-	87	-

Transportation Systems, Infrastructure, and Issues

The background information reviewed for this project suggests that there are substantial transportation-related issues in the BLRA. Further, the background information review suggests that transportation planning and management play central roles in visitor access and user capacity management strategies at the BLRA. Thus, there are a number of changes to the BLRA's transportation system that have been proposed and/or are underway. Presently, the BLRA has an access road from the entrance fee station to a parking area on the east side of Brainard Lake and adjacent to the Pawnee picnic area and campground (**Error! Reference source not found.**). From there, the road travels north along Brainard Lake, providing access to trailhead parking and entry into the IPW. The road turns south along the west side of Brainard Lake and loops back to the parking area east of Brainard Lake. The road is presently closed beyond the trailhead parking access at the point where it turns south, due to a washed out culvert.

Figure 35. BLRA - Existing Facilities (source: Brainard Lake Recreation Area Management Plan, 2005)



As noted in the "Alternative A" (existing conditions) portion of Table 50, there are substantial parking facilities in the BLRA (325 parking spaces in total, excluding roadside parking), including parking areas near the entrance fee station, adjacent to Brainard Lake, and at the Wilderness trailheads.

Table 50. BLRA - Parking Capacity (source: Brainard Lake Recreation Area Management Plan, 2005*)*

Existing and Proposed Designated and Dispersed Parking Capacity

		Alternative A		Alternative E	
		Summer Spaces	**Winter Spaces**	**Summer Spaces**	**Winter Spaces**
Wilderness Trailhead Zone	Mitchell Lake Trailhead (TH)	55	0	55	0
	Long Lake Trailhead	29	0	29	0
	South St. Vrain Trailhead (West)	4	0	0	0
	Dispersed Roadside Parking	8	0	0	0
	Subtotal	**96**	**0**	**84**	**0**
Brainard Lake Zone	Brainard Lake Overlook	4	0	0	0
	Fishing Bridge	11	0	0	0
	Brainard Cutoff Trailhead	11	0	0	0
	Arickaree Picnic Area (seven tables)	20	0	0	0
	Mitchell Creek Picnic Area (six tables)	6	0	0	0
	Niwot Picnic Area (eight tables)	16	0	18-22	0
	Loop Roadside Parking	224	0	0	0
	Pawnee Picnic Area (14 tables)	40	0	0	0
	West Parking Area			170-220	0
	Subtotal	**332**	**0**	**188-242**	**0**
Red Rock Lake Zone	Red Rock Lake Parking	20	0	20-27	0
	Subtotal	**20**	**0**	**20-27**	**0**
Entrance Station/ Red Rock Sourdough Trailhead Zone	Red Rock/Sourdough TH (East Parking Area)	25	15	200-235	220-235
	Dispersed Brainard Roadside	10	235		
	Subtotal	**35**	**250**		
Left Hand Park Reservoir and Road	Left Hand Park Reservoir	58	0	15	0
	Dispersed Parking/Camping	8	0	0	0
	Subtotal	**66**	**0**	**15**	**0**
Total Parking All Zones	Wilderness Trailhead Zone	96	0	84	0
	Brainard Lake Zone	332	0	188-242	0
	Red Rock Lake Zone	20	0	20-27	0
	Red Rock/Sourdough TH (East Parking Area)	35	250	200-235	0
	Left Hand Park Reservoir/Road	66	0	15	0
	Total Parking	**549**	**250**	**507-603**	**220-235**

* The short-term parking spaces for seven vehicles at fee entrance station are not included in the total for the Proposed Action.

Despite this, the existing parking is inadequate for peak use on weekends and holidays during the summer months. Thus, parking shortages occur during peak periods, resulting in overflow parking along the roadside adjacent to Brainard Lake. This roadside parking causes resource impacts, public safety issues (people walking in the road with moving vehicle traffic), and degrades the scenic quality of the area (Figure 36).

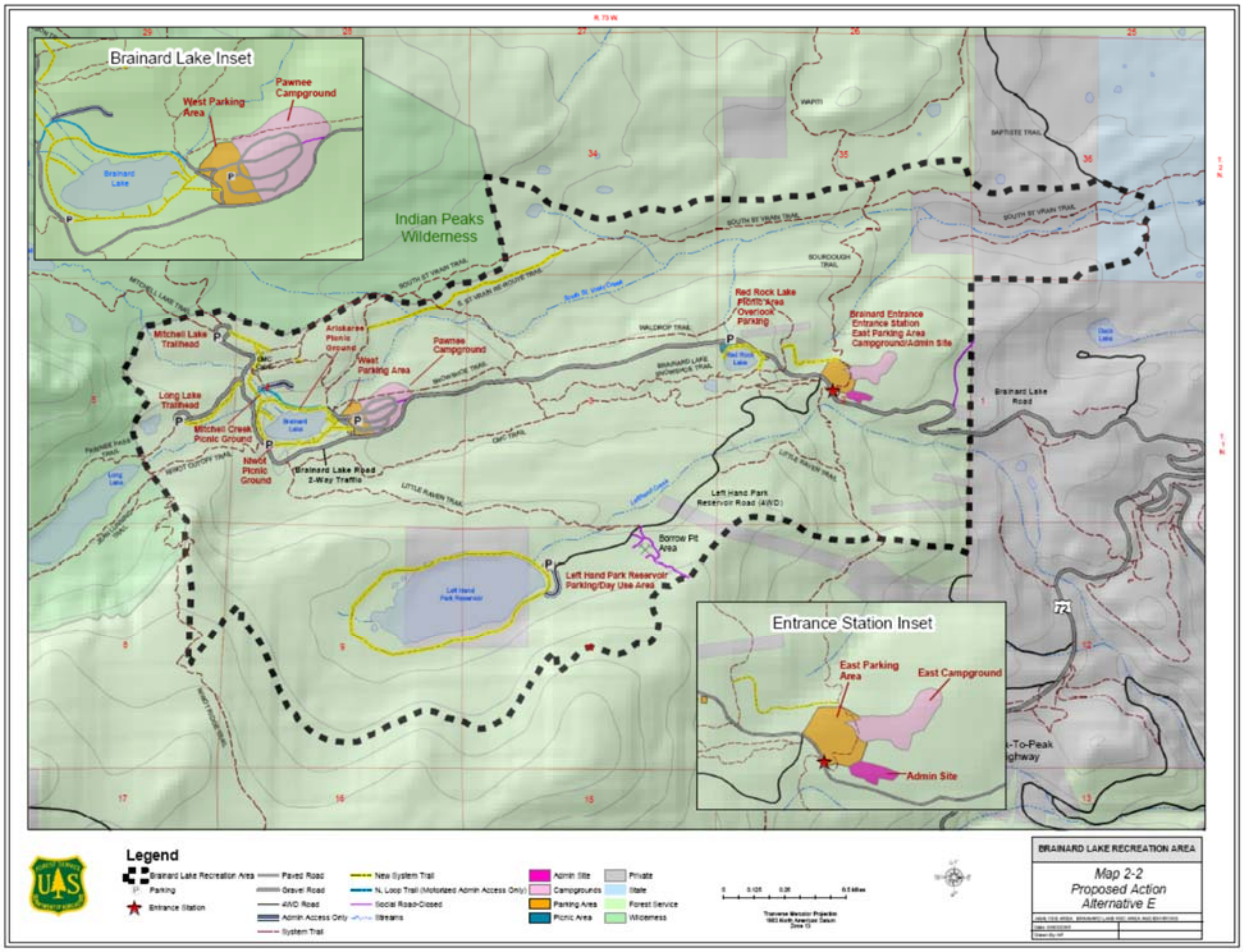
Figure 36. BLRA - Overflow Parking on Roadside (September 2009)

To address vehicle traffic and parking congestion issues, the BLRA-MP specified a set of visitor access management strategies and user capacity recommendations. These strategies and recommendations are based on direction from the Forest Plan and the capacity report noted, and include:

- Manage vehicle access within the BLRA based on available designated parking spaces. When parking lots fill up, take management actions to restrict and/or re-direct vehicles to alternative parking sites within the area or to the parking area east of the entrance station.
- Restrict all parking to designated parking spaces in the BLRA.
- Develop a winter day-use parking area near the entrance fee station area. Utilize a portion of this parking area in the summer to alleviate parking congestion at lots adjacent to Brainard Lake and the Wilderness trailheads.
- Develop a summer day-use parking area on the east side of Brainard Lake, and relocate some of the existing parking spaces to this area.
- Manage the road on the south and west side of Brainard Lake for two- way vehicle traffic for access to the Niwot Picnic Area and the Wilderness Trailheads west of Brainard Lake, to prevent vehicles from dominating the landscape around the lake and to minimize vehicle traffic over the historic Brainard Lake Dam and Bridge.
- Concurrently, prohibit vehicle access on the north side of Brainard Lake beginning just prior to the bridge/dam and continuing west to the junction of the 2-way road.
- To reduce unnecessary traffic up to and throughout the BLRA, install at the entry point from the Peak-to-Peak Highway a Variable Message Sign (VMS) to inform potential visitors of campground occupancy, Wilderness trailhead parking occupancy, and other key information.
- Consider a commuter trail from the proposed parking area at the entrance fee station area to Brainard Lake.

The changes proposed in the above listed strategies and recommendations are depicted visually in **Error! Reference source not found.**. Further, proposed changes in the number and location of parking facilities are listed in the "Alternative E" (proposed conditions) portion of Table 50.

Figure 37. BLRA - Proposed Facilities (source: Brainard Lake Recreation Area Management Plan, 2005)



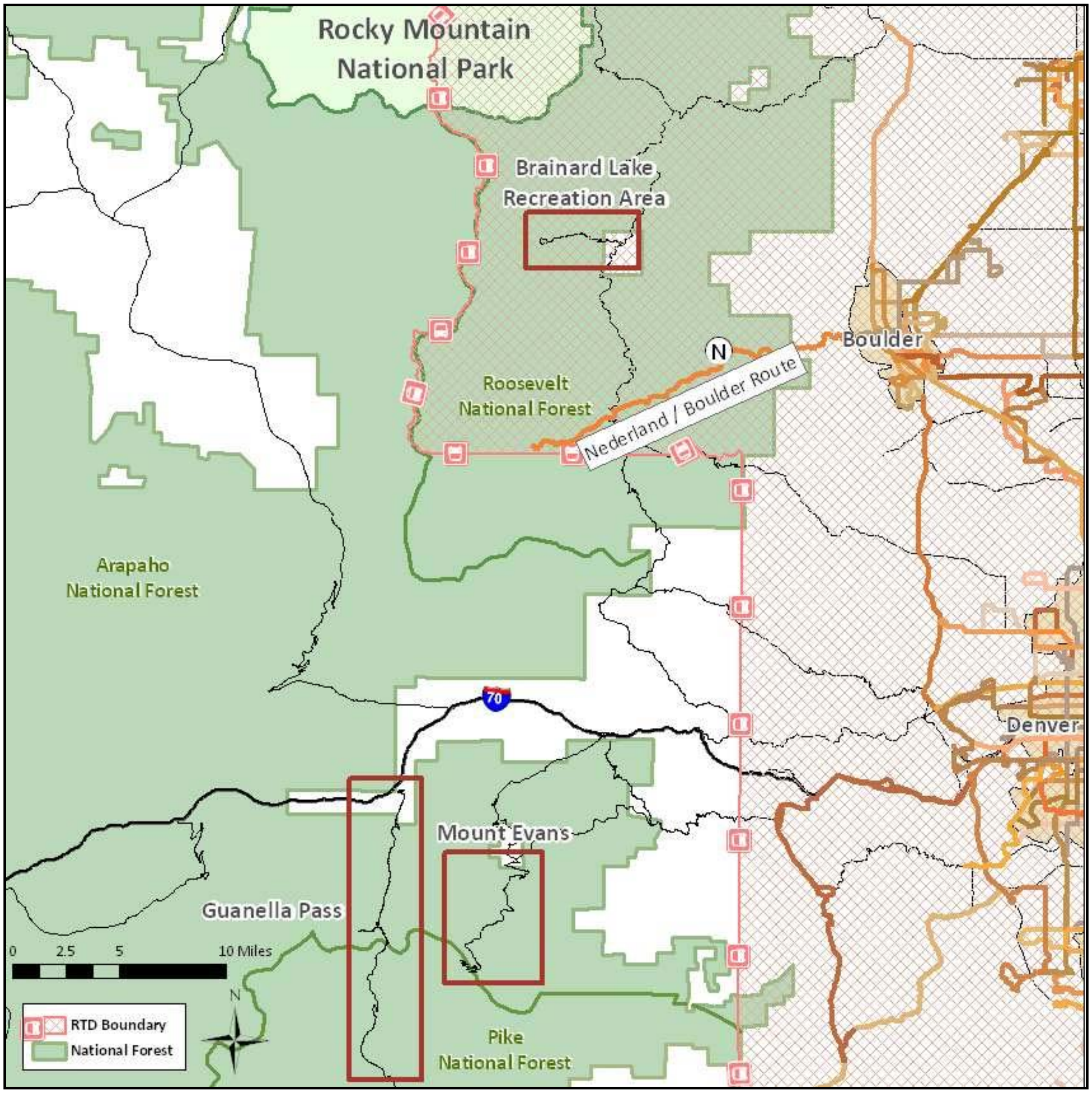
The proposed parking and vehicle access management changes noted would reduce designated parking adjacent to Brainard Lake and at the Wilderness trailheads and eliminate overflow parking along the roadside. Consequently, it is reasonable to expect that a substantial proportion of visitors would be unable to find parking near the lake or trailheads and alternative visitor access options would be needed. Thus, the USFS is considering the use of shuttle service in the BLRA, and FHWA has conducted studies of the feasibility of shuttle service there. In particular, the FHWA Field Report for the ARNF describes and evaluates shuttle service options for the BLRA, as follows:

> *For Brainard Lake in the Boulder Ranger District, a proposed shuttle system would connect the Nederland area with the Brainard Lake Recreation Area and include stops along the way at trailheads and parking areas. The shuttle route would operate along the Peak-to-Peak Highway from the Denver Regional Transit District (RTD) Park-and-Ride lot in Nederland to and through the Brainard Lake Recreation Area (*Figure 38*). This system would connect with the existing RTD Regional Bus Route N, providing public transit service from Boulder and the Denver Metropolitan Area to the Brainard Lake area. In the future, the shuttle system could be expanded to serve campgrounds and trailheads along the Peak-to-Peak highway between Brainard Lake and Estes Park as well as areas south of Nederland.*

A first phase option would be to limit the shuttle service to the Brainard Lake area itself. Users would be given the option of parking outside of the fee station and taking a shuttle or tram into the area. The fee charged for the shuttle service would have to be competitive with the $6.00 fee now charged for automobiles, possibly using a family or group pass. During times when the Brainard Lake parking area is full, use of the shuttle would be required. This system could be supplemented by a portable VMS along the Peak-to-Peak Highway, which could be used to advise approaching drivers that parking is full but the shuttle is available. Some drivers may respond to this information by diverting to less crowded areas of the Forest.

The FHWA study includes initial estimates of up-front and operating costs for the shuttle systems described. However, the data and methods used to conduct the feasibility analysis are not reported, so it is uncertain how precise the cost estimates are. Further, it is unclear to what extent potential ridership (i.e., willingness of visitors to use the system) was analyzed; there is no mention of survey research to assess this. Finally, the analysis does not include assessment of how to optimize shuttle service to conform to desired social and resource conditions in the BLRA. Nonetheless, the study provides a strong foundation from which to design additional information collection and analysis to assess shuttle service options for the BLRA; it is expected this would be a point of focus for the proposed TRIP project, if it is funded.

Figure 38. BLRA - Transit Service Evaluated by FHWA (source: FHWA Field Report*)*



Summary

The background information and data regarding the BLRA reviewed for this project highlight several important themes and potential points of focus for the proposed TRIP project. These include:

- The BLRA is the most heavily visited year-round recreation site in the Boulder Ranger District.
- The BLRA provides immediate access to the IPW, desired conditions for which are threatened by intensive and increasing visitation.
- Parking demand frequently exceeds parking supply at the BLRA, resulting in unendorsed parking along the roadside that causes resource, safety, and scenic quality issues.

- USFS objectives for the BLRA include dispersing existing recreational use into areas east of Brainard Lake and away from the IPW.
- Visitor access management and user capacity strategies recommended in the BLRA-MP focus on vehicle traffic and parking management. To date, resource and social factors do not appear to have been as explicitly incorporated into user capacity strategies for the BLRA.
- A number of changes to the BLRA's transportation system have been proposed and/or are being implemented, many of which influence the amount and location of recreational use in the area.
- Options for ATS are being considered for the BLRA, including linkages to transit service between the Towns of Boulder and Nederland, in order to offset reduced visitor access associated with proposed changes to parking facilities and management.

The background information reviewed for this project suggests that primary information and analysis needs for the BLRA center around transportation planning, visitor access management, and user capacity issues. There is substantial data, analysis, and documentation related to the BLRA's transportation system and operation; there appears to be limited resource and visitor experience information as it relates to establishing and managing user capacities for the BLRA. Thus, if the proposed TRIP project is funded, potential points of focus for new data collection and analysis include:

- Visitor-based indicators and standards of quality for resource and social conditions in the developed and backcountry areas of the BLRA, as well as in the IPW.
- Visitor characteristics and motivations for visiting; perceptions of soundscape, resource, and visitor experience conditions; recreation setting preferences; and attitudes about recreation and transportation-related management options.
- Visitor "transportation behavior", including likelihood to use various shuttle service options.
- Evaluation of the effectiveness of alternative messages to influence visitors' "transportation behavior" and manage/manipulate how visitor use is dispersed to different areas of the BLRA.
- Visitor use models for attraction areas in the developed area and/or trails in the backcountry areas of the BLRA and/or the IPW to estimate user capacities based on resource and social standards of quality.
- Linkages between visitor use models and transportation data/models to evaluate the effects of potential visitor use and transportation management actions on estimates of user capacities.
- Measurement of the extent and severity of recreation and transportation-related resource and soundscape impacts.
- Observation and evaluation of visitor behavior to identify and mitigate visitor use-related factors contributing to resource and soundscape impacts.
- Analysis of parking demand and capacity, under existing and proposed transportation system conditions.

- Modeling and/or analysis of alternative transportation solutions (e.g., transit, ITS) to mitigate parking congestion, with respect to cost, effectiveness, and visitor/public support.

3.2 Guanella Pass

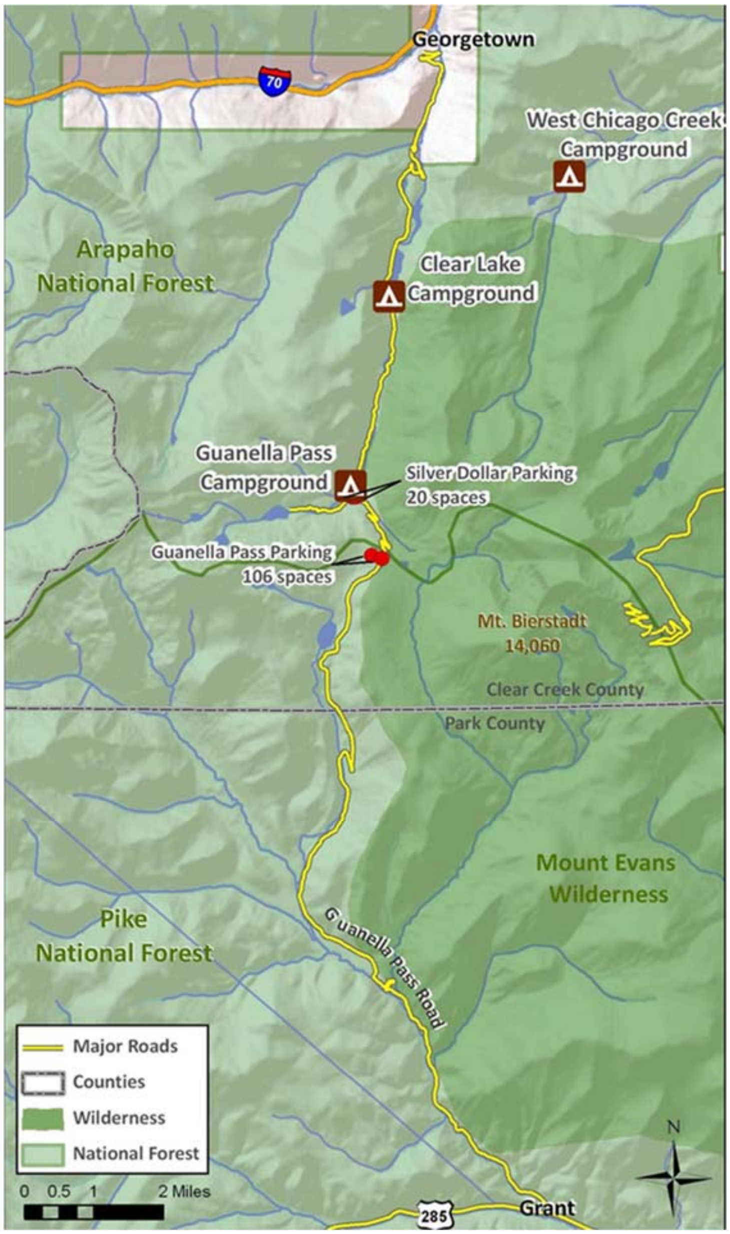
This section synthesizes, analyzes, and evaluates information about Guanella Pass, based on review of the following documents:

- Guanella Pass Surface Treatment Evaluation Traffic Technical Memorandum (FHWA Central Federal Lands Highway Division, 2009)
- Guanella Pass Scenic and Historic Byway Revised Interpretive Plan (USFS Center for Design & Interpretation, 2008)
- 2030 Mountains and Plains Transportation Plan (DRCOG, 2005)
- Guanella Pass Road Final Environmental Impact Statement (FHWA Central Federal Lands Highway Division, 2002)
- Guanella Pass Road Year 2025 Traffic Projections (FHWA Central Federal Lands Highway Division, 2002)
- Guanella Pass Scenic and Historic Byway Corridor Management Strategy (Guanella Pass Scenic Byway Committee in association with USFS, 2001)
- 1997 Revision of the Land and Resource Management Plan: Arapaho and Roosevelt National Forests and Pawnee National Grassland, a.k.a. the Forest Plan (USFS, 1997)

Location

Guanella Pass Road is a National Forest Scenic Byway located approximately 40 miles west of the Denver Metropolitan Region. It travels 24 miles between the town of Grant, on US 285 in the south, and Georgetown, on I-70 in the north (**Error! Reference source not found.**). Guanella Pass Road connects Park County and Pike National Forest (PNF) in the south with Clear Creek County and the ARNF in the north. According to DRCOG's *2030 Mountains and Plains Transportation Plan*, between 1980 and 2005, the population of Guanella Pass' neighboring communities (Clear Creek and Gilpin Counties) increased 50% from 9,745 to 16,410 residents. The population is projected to increase to 27,970 by 2030. Georgetown is the primary gateway for the Guanella Pass corridor and is the Clear Creek County seat. Georgetown is a National Historic Landmark District due to its mining origins, and it is the second largest population center in the county. The I-70 Coalition identified Georgetown as a potential station site for transit-oriented solutions to I-70 traffic congestion considered in the I-70 DPEIS.

Figure 39. Guanella Pass - Visitor Use Areas and Parking Facilities



Visitor Use and Recreation-related Issues

Guanella Pass Road provides year-round recreation access within the ARNF and PNF, including hiking, camping, fishing, horseback riding, hunting, cross-country skiing, snowshoeing, snowmobiling and ATV riding, picnicking, and sightseeing. There are a number of recreation sites and facilities situated along Guanella Pass Road, including developed campgrounds, picnic areas, trailheads with parking, and vista points (Table 51).

Table 51. Guanella Pass - Recreation Sites and Facilities (source: CMS, 2001*)*

		Number of Sites
Developed Campgrounds		
	Clear Lake	8
	Guanella Pass	17
	Geneva Park	26
	Burning Bear	13
	Whiteside	7
Picnic Areas		
	Clear Lake	4
	Duck Creek	5
	Geneva Creek	5
Trailheads with Parking Lots		
	Silver Dollar Lake	-
	Guanella Pass	-
	Silverdale	-
	Abyss Lake	-
Vista Points		6

The Guanella Pass Summit is situated at an elevation of 11,700 feet and is the area of particular focus for the proposed TRIP project. The summit area includes two parking lots that provide trailhead access to the Mount Evans Wilderness to the east of Guanella Pass and the Square Top Mountain area to the west. Part of Guanella Pass' attraction is that the summit area parking provides relatively easy hiking access to Mt. Bierstadt (**Error! Reference source not found.**), one of Colorado's 14,000+ foot peaks (i.e., 14'ers).

Most of the recreational facilities along Guanella Pass Road, and the Guanella Pass Byway itself, are situated within the ARNF's prescriptive Management Area 4.2 – Scenery. Within this Management Area, frequent encounters between individuals or parties are acceptable on travelways, while contact away from trails is prescribed to generally be infrequent. Sounds from people or motorized recreational activities are usually common and limit opportunities for solitude or isolation. Developed facilities may be common in this Management Area, for the purposes of improving recreation opportunities and enjoyment of scenery. Furthermore, the use of directional, regulatory, and informational signs is acceptable, and their presence may be frequent.

While most of Guanella Pass Road and its recreational facilities are located in Management Area 4.2, the area immediately to the east of Guanella Pass Summit, including the Mt. Bierstadt summit, is Congressionally designated Wilderness (Management Area 1.1 in the Forest Plan). As stated in the Forest Plan, Wilderness areas are managed such that their natural conditions predominate and opportunities for solitude and self reliance are provided. Thus, evidence of human activity is meant to be limited to that necessary for resource protection. Desired social and resource conditions are to be maintained by developing and implementing limits of acceptable change programs, to the extent that funding and resources allow.

The area to the west of the Guanella Pass Summit is also popular for hiking, and is prescribed by the ARNF as Management Area 1.3 – Backcountry Recreation. Thus, the area is managed for non-motorized recreation in a natural appearing landscape. While encounters are somewhat common along travelways, fewer contacts and opportunities for solitude are prescribed to occur away from trails. Similarly, sounds from people may be common on or near travelways, while further away from travelways and the area's edges, human-caused sounds should generally not be noticeable. The use of signs in the Backcountry Recreation Management Area are limited to those necessary for visitor safety and resource protection, and facilities are limited to those that provide for visitor safety, protect Forest resources, and/or enhance recreational experiences.

In addition to the management prescriptions set forth in the Forest Plan for the various Management Areas of the Guanella Pass area, the *Guanella Pass Scenic and Historic Byway Conservation Management Strategy* (CMS) specified a number of desired conditions and action items for the Guanella Pass Summit and adjacent area. Those desired conditions and action items with a transportation-related focus are reported in the next section; recreation-related desired conditions and action items of particular relevance to this and the proposed TRIP project include:

- Emphasize a summit experience that highlights the value of wilderness and the sensitivity of subalpine and alpine ecosystems.
- Steer recreational use away from Wilderness and sensitive tundra areas onto designated interpretive trails through design characteristics.
- Protect the environmental resources as the primary management goal.
- Manage the number of users in the Guanella Pass summit area not to exceed carrying capacities.
- Monitor use of the Square Top area, mitigate impacts and implement management strategies as necessary.

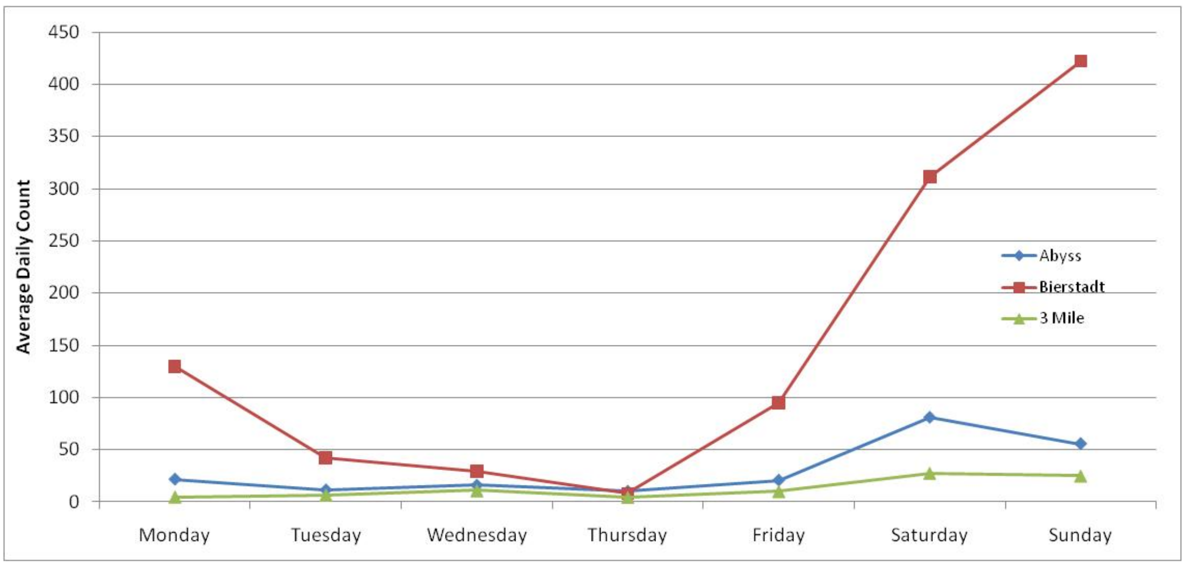
The CMS made several other recommendations to protect resources and maintain a quality visitor experience at Guanella Pass. Recommendations of particular relevance to this project and the proposed TRIP project include:

1. A fee system and/or fee demo system should be explored and used to help manage visitor use.
2. Parking and camping should be allowed only in designated areas with adequate facilities or within Forest Service guidelines. The Byway should be designed to clearly mark areas intended for recreation and discourage use in areas to be restored and revegetated.
3. Through a carrying capacity study, determine visitor carrying capacity and manage appropriately.
4. Studies should be completed as soon as possible to ascertain if use along the Byway should be restricted seasonally or throughout the year.

A primary theme among the key issues and recommendations in the CMS is the need to address the impacts of increasing visitation on natural resources, the character of recreation settings, and the quality of visitor experiences. The CMS references a 1995 Recreation Capacity Study conducted by the PNF, the results of which suggested that visitor use on several of the trails in the Mount Evans Wilderness exceeded the social capacity of the area. More recently, fencing and boardwalks have been used along the Bierstadt Trail to reduce off-trail trampling impacts, which may actually exacerbate social capacity issues there. Thus, the CMS defines as a goal for the USFS the development of a social capacity analysis for the Byway corridor and management of the area to desired user capacities.

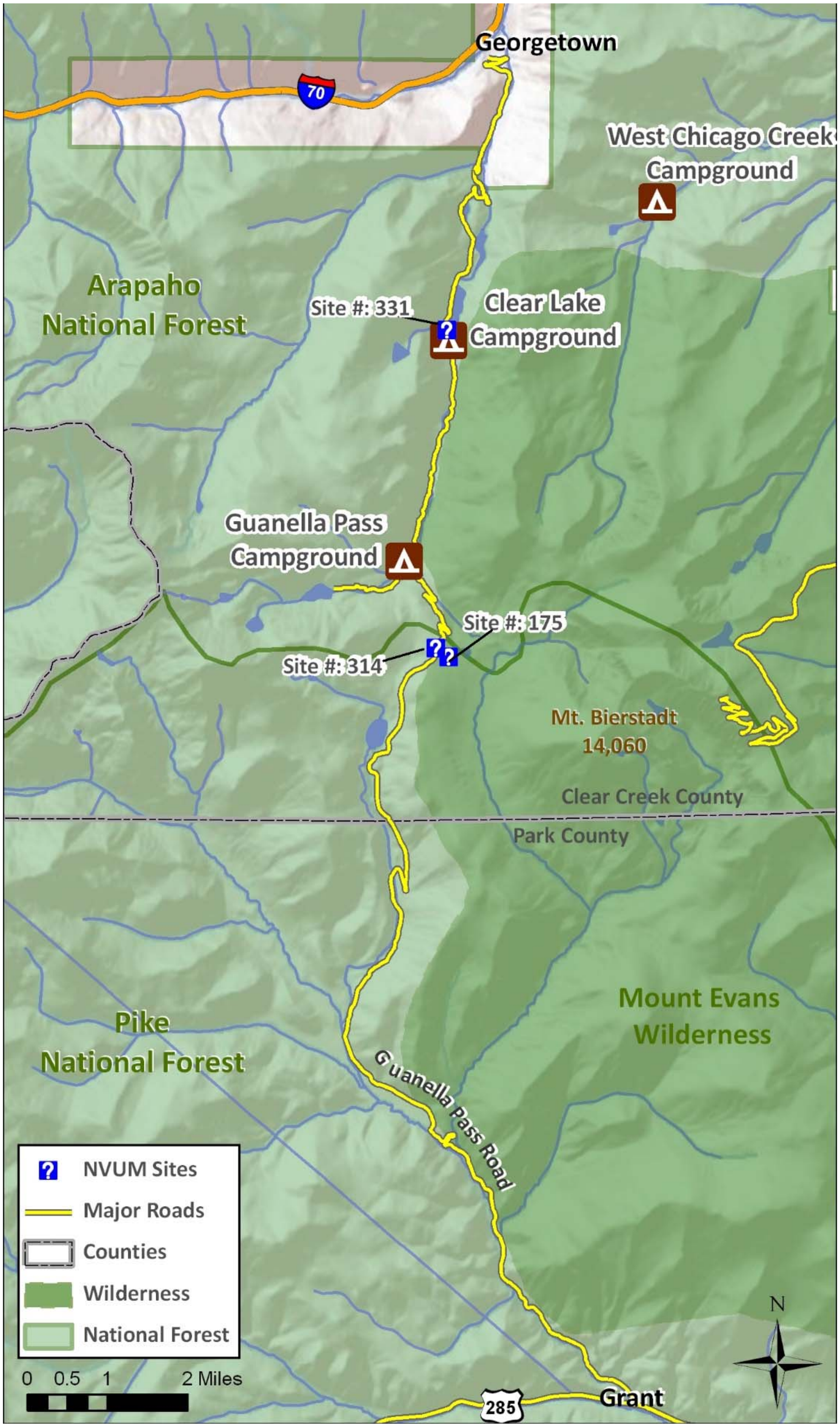
While the CMS references relatively dated visitation data, more recent data collected by the USFS via infrared trail use monitors suggest that, during weekends, the Bierstadt Trail continues to receive intensive levels of visitation that far exceed that of the other trails at Guanella Pass (Figure 40). It should be noted that the data in Figure 40 are not calibrated, and consequently only provide insight about the relative amount of use across the three trails reported.

Figure 40. Guanella Pass - Average Daily Trailhead Counts (~September 2008 to Early October 2008; source: USFS trail counters)



NVUM studies conducted in 2000 and 2005 provide another relatively recent source of information about visitor use in the Guanella Pass area. The NVUM studies included interviews with visitors at two locations within the Guanella Pass area (Site 314 and Site 331) in 2000 and at three locations (Site 175, Site 314, and Site 331) in 2005 (Figure 41). A copy of the 2005 NVUM survey instrument is in 0. Another NVUM study is planned for Guanella Pass during summer 2010.

Figure 41. Guanella Pass Area - NVUM Study Sites



The two NVUM study sites included in 2000 study (Site 314 and Site 331 in Figure 41) are classified by NVUM methods as General Forest Area (GFA), while the third site (Site 175 in Figure 41), which was included in the 2005 study, is in Wilderness. The NVUM interview sample sizes, by study site and year, are reported in Table 52. Key results from the 2000 and 2005 NVUM interviews are reported and compared in the following paragraphs. However, the relatively low sample sizes for the 2000 and 2005 NVUM interviews suggest that results of the studies, including comparisons across study years, should be interpreted with caution.

Table 52. Guanella Pass - Number of NVUM Interview Respondents per Year (source: NVUM)

Site	Site Type*	2000	2005	Total
175 – Mount Evans: Guanella Pass TH	WILD	-	63	63
314 – Guanella Pass Rd (S) – Pike NF	GFA	14	16	30
331 – Guanella Pass Rd (N) – Georgetown Streets	GFA	191	277	468

* WILD = Wilderness; GFA = General Forest Area.

Within the NVUM interviews, visitors were asked to indicate which activities they had participated in or will participate in during their visit to Guanella Pass (Table 53 and Table 54; specific activities corresponding to each of the activity type groupings in Table 53 and Table 54 are in 0). At both the GFA and Wilderness sampling locations, viewing and learning activities, non-motorized, and motorized activities were the most commonly reported. The proportion who reported motorized activities at the GFA sites decreased from 2000 to 2005, while the proportion who reported non-motorized activities increased. A substantial proportion of visitors contacted at the Wilderness sampling point reported overnight/camping activities (Table 53).

Table 53. Guanella Pass (Sites 314 and 331) - Activity Type During Visit (source: NVUM)

Activity Types *	2000 (n=136)	2005 (n=142)	Change
Hunting and/or Fishing	3.0%	7.9%	+4.9%
Viewing and/or Learning	33.2%	22.5%	-10.7%
Non Motorized	24.5%	27.8%	+3.3%
Motorized	24.8%	19.4%	-5.4%
Camping or Other Overnight	9.7%	5.6%	-4.1%
Other Activities	4.9%	16.9%	+12.0%

Table 54. Mount Evans: Guanella Pass TH (Site 175) - Activity Type During Visit (source: NVUM)

Activity Types *	2000 (n=0)	2005 (n=53)	Change
Hunting and/or Fishing	-	1.9%	-
Viewing and/or Learning	-	71.7%	-
Non Motorized	-	100.0%	-
Motorized	-	28.3%	-
Camping or Other Overnight	-	20.8%	-
Other Activities	-	34.0%	-

Several demographic questions were asked of NVUM interview participants. The majority of visitors sampled at all three study locations reported their race/ethnicity as "White"; "Spanish, Hispanic, or Latino" was the second most frequently reported response (Table 55 and Table 56).

Table 55. Guanella Pass (Sites 314 and 331) - Ethnicity and Race (source: NVUM)

	2000 (n=205)	2005 (n=293)	Change
Spanish, Hispanic, or Latino	4.4%	2.6%	-1.8%
American Indian/Alaskan Native	0.0%	0.4%	+0.4%
Native Hawaiian/Pacific Islander	0.0%	1.3%	+1.3%
Asian	1.5%	0.0%	-1.5%
Black/African American	0.5%	0.9%	+0.4%
White	58.5%	60.1%	+1.6%
Other	1.0%	-	-
No Answer	34.1%	34.6%	+0.5%

Table 56. Mount Evans: Guanella Pass TH (Site 175) - Ethnicity and Race (source: NVUM)

	2000 (n=0)	2005 (n=63)	Change
Spanish, Hispanic, or Latino	-	4.8%	-
American Indian/Alaskan Native	-	0.0%	-
Native Hawaiian/Pacific Islander	-	0.0%	-
Asian	-	3.2%	-
Black/African American	-	0.0%	-
White	-	79.4%	-
Other	-	-	-
No Answer	-	12.7%	-

Visitors at all three sampling locations, and across study years, were generally between 21 and 50 years of age (Table 57 and Table 58). Ages were somewhat more evenly distributed at the two GFA sites in 2005 than they were in 2000.

Table 57. Guanella Pass (Sites 314 and 331) - Age Categories (source: NVUM)

2000 Categories/2005 Categories	2000 (n=205)	2005 (n=293)	Change
16-20 / 16-19	1.5%	1.4%	-0.1%
21-30 / 20-29	15.3%	10.2%	-5.1%
31-40 / 30-39	16.8%	10.6%	-6.2%
41-50 / 40-49	16.8%	10.6%	-6.2%
51-60 / 50-59	8.9%	10.2%	+1.3%
61-70 / 60-69	5.9%	4.1%	-1.8%
71+ / 70+	1.5%	0.3%	-1.2%
No Answer [a]	34.7%	52.6%	+17.9%

Table 58. Mount Evans: Guanella Pass TH (Site 175) - Age Categories (source: NVUM)

2000 Categories/2005 Categories	2000 (n=0)	2005 (n=63)	Change
16-20 / 16-19	-	1.6%	-
21-30 / 20-29	-	22.2%	-
31-40 / 30-39	-	23.8%	-
41-50 / 40-49	-	17.5%	-
51-60 / 50-59	-	15.9%	-
61-70 / 60-69	-	3.2%	-
71+ / 70+	-	0.0%	-
No Answer [a]	-	15.9%	-

Visitors were asked to indicate the number of people in their vehicle on the day they were contacted for the NVUM interview (Table 59). Average group size, based on responses to this question, ranged from 1.4 people/vehicle to 2.6 people/vehicle. The sample sizes at Site 331 are substantially higher than either of the other two sampling locations, thus mean values based on these data (mean = 2.3 and mean = 2.2 people/vehicle) constitute the most robust estimates of visitor group sizes in the Guanella Pass Summit area.

Table 59. Guanella Pass Area - Number of People in Vehicle (source: NVUM)

Site		2000	2005	% Change
175 – Mount Evans: Guanella Pass TH	*Average*	-	2.6	-
	St. Dev	-	1.6	-
	n	-	53	-
314 – Guanella Pass Rd (S) – Pike NF	*Average*	1.4	2.0	+43%
	St. Dev	0.5	1.0	-
	n	9	12	-
331 – Guanella Pass Rd (N) – Georgetown Streets	*Average*	2.3	2.2	-4%
	St. Dev	1.2	1.0	-
	n	126	331	-

Finally, in 2005 NVUM respondents were asked to indicate how far they had traveled from their home to the Guanella Pass Summit area (Table 60). Again, the most robust results are from Site 331, which had a sample size more than double that of either of the other two sampling locations. There, the mean distance traveled to visit Guanella Pass was approximately 120 miles, which suggests an average travel time of roughly 2-3 hours.

Table 60. Guanella Pass Area - Distance Traveled from Home (miles; source: NVUM)

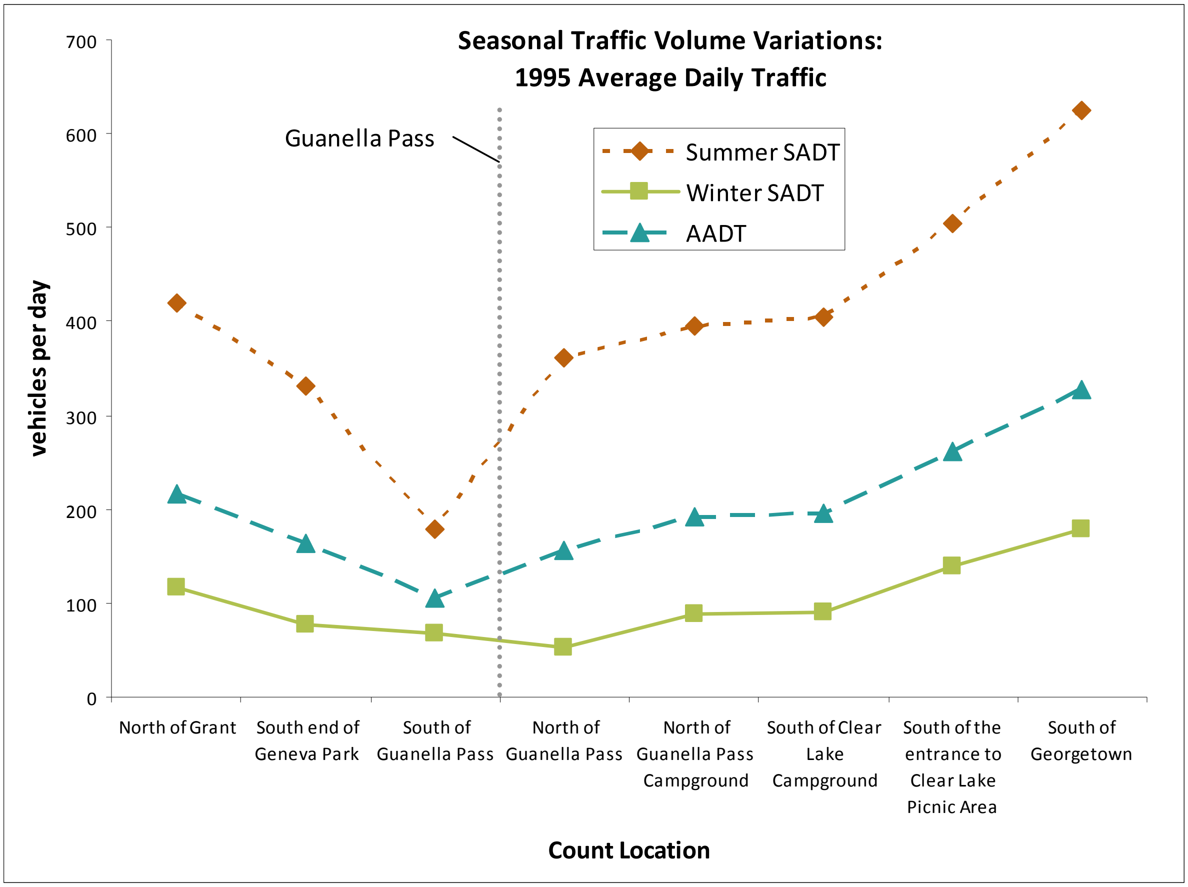
Site		2000	2005	% Change
175 – Mount Evans: Guanella Pass TH	*Average*	-	221	-
	St. Dev	-	429	-
	n	-	53	-
314 – Guanella Pass Rd (S) – Pike NF	*Average*	-	366	-
	St. Dev	-	610	-
	n	-	12	-
331 – Guanella Pass Rd (N) – Georgetown Streets	*Average*	-	124	-
	St. Dev	-	336	-
	n	-	131	-

Transportation Systems, Infrastructure, and Issues

Guanella Pass Road is also known as Colorado Forest Highway 80, Park County Road 62, Clear Creek County Road 381, Forest Development Road 118, and the Guanella Pass Scenic and Historic Byway Corridor. As noted, the road travels 24 miles between the towns of Grant in the south and Georgetown (on I-70) in the north. It traverses Guanella Pass (elevation 11,669 feet) through the PNF and ARNF, and through Park and Clear Creek Counties (**Error! Reference source not found.**). The Guanella Pass Road has paved and gravel sections; the paved portions have a speed limit of 35 mph, and the gravel sections have speed limits of 20 mph.

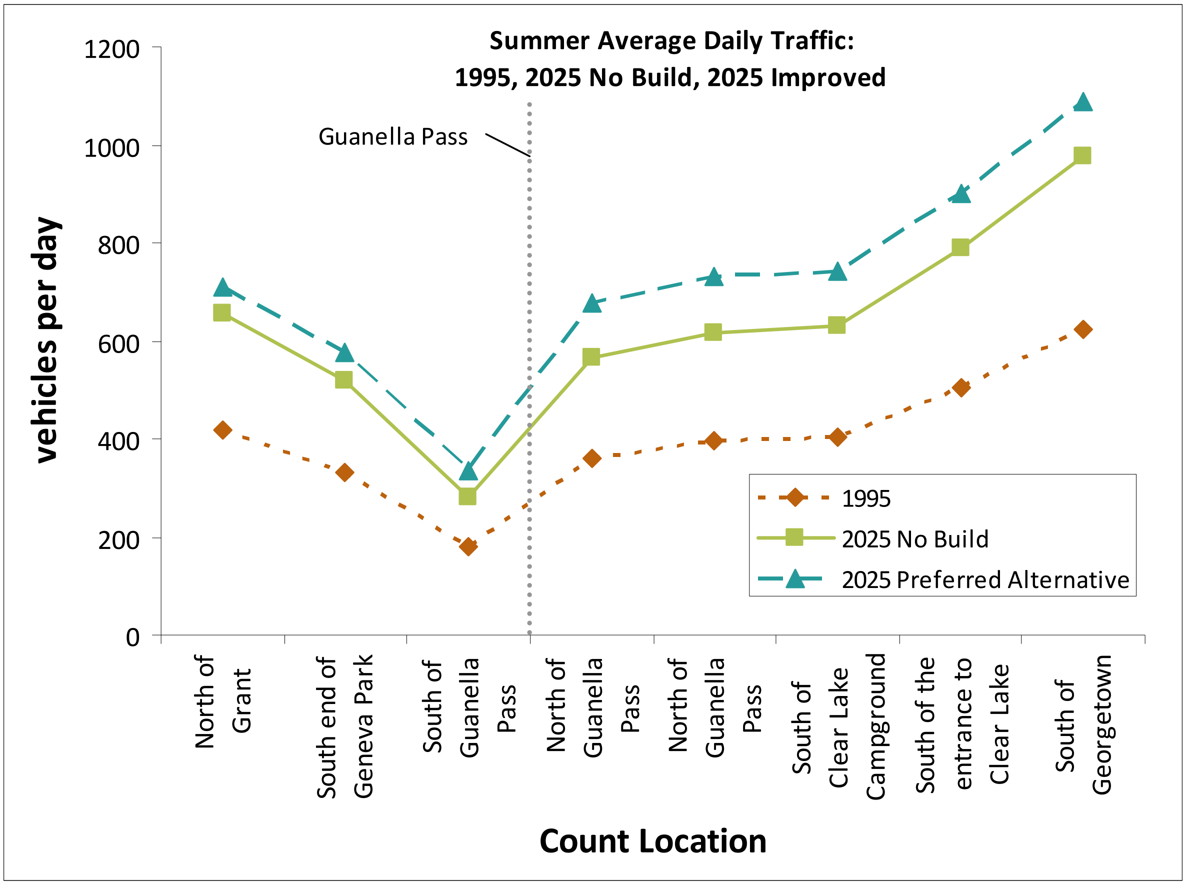
Vehicle traffic on Guanella Pass Road is highest between late spring and fall (due to the fact that it is predominantly recreation-related) and is concentrated on the Georgetown side of the pass (Figure 42). The traffic volumes reported in Figure 42 represent Seasonal Average Daily Traffic (SADT), which is the average number of vehicles traveling the road over the course of one day during the corresponding season. The SADT of the Guanella Pass Road was recorded in summer 1995 at 650 vehicles per day at a location just south of Georgetown. The winter traffic volumes are estimated to be 75% less than the summer volumes since the road is often closed in winter at the top of the pass.

Figure 42. Guanella Pass Road - 1995 Seasonal Traffic Volumes (source: Guanella Pass Road Year 2025 Traffic Projections, 2002*)*



Traffic projections for the Guanella Pass Road suggest that vehicle traffic will be substantially higher in 2025 than in 1995 (Figure 43). In particular, data in Figure 43 suggest that the peak season ADT in 2025 would be 56% greater than in 1995, if no improvements (e.g., surfacing, widening) are made to Guanella Pass Road, and approximately 80% greater if road improvements are made (a detailed discussion of relevant roadway improvements are discussed later in this section).

Figure 43. Guanella Pass Road - Projected Summer ADT (source: Guanella Pass Road Year 2025 Traffic Projections, 2002*)*



As noted, the vehicle traffic on Guanella Pass Road is primarily recreation-related. There are a number of formally designated parking facilities along the Byway to provide access to recreation facilities, trailheads, and vistas, and these are documented in the CMS (Table 61).

Table 61. Guanella Pass - Recreation Sites and Capacities (source: CMS, 2001)

	Number of Designated Parking Spaces
Developed Campgrounds	72
Picnic Areas	39
Trailheads with Parking Lots	86
Vista Points	26

Note: Data reported in the table reflect parking facilities in 2001. Parking has since been expanded at the Guanella Pass Summit to 106 parking spaces. It is assumed that parking facilities at the Guanella Pass Summit were included within the “Trailheads with Parking Lots” category of the CMS inventory.

The CMS reports that demand for parking at the summit of Guanella Pass frequently exceeds designated parking capacity there. Consequently, many visitors park their cars along the roadside near the summit, causing visitor safety issues, resource impacts, and degrading the scenic quality of the area. Thus, the CMS specifies a number of transportation-related desired conditions and action items for the Guanella Pass Summit area, including:

- Design future parking to provide a net long-term benefit to the environment.
- Emphasize short-term parking and minimize long-term parking at the summit.
- Allow parking in designated areas and avoid having a single large parking lot.
- Design roads so that vehicles cannot drive or park off the defined roadway.
- Reduce current levels of parking at the summit (including in designated parking spaces and along the road).
- Enforce parking restrictions at the summit.
- Disperse the long-term parking for Wilderness entry to other than the summit trailheads.

The CMS also recommends that ATS could be used to: 1) direct visitor use to recreation sites along the Guanella Pass Road that can sustain such use; 2) reduce parking congestion at the Guanella Pass summit; and 3) potentially help moderate recreation-related traffic through the towns of Georgetown and Grant.

Thus, issues and potential solutions related to parking demand/shortages at Guanella Pass are potentially important points of focus for the proposed TRIP project. The parking and ATS-related action items suggested in the CMS serve as potential starting points for this work. Recreation-related issues documented in the CMS and summarized in this report also suggest that any evaluation of parking-related issues and potential solutions must be made in the context of concerns about increasing visitation and associated impacts to Forest resources, the character of the recreation setting, and visitor experiences in the Wilderness and Backcountry Recreation areas at the Guanella Pass Summit.

Review of background information about Guanella Pass conducted for this project suggest there are also engineering-related transportation issues on Guanella Pass Road. These issues have potential implications for the character of the recreation settings and opportunities in the Guanella Pass area, as well as potential traffic-related impacts to the towns of Georgetown and Grant. Consequently, there has been substantial public controversy surrounding them, as described here.

In the 1990’s, the need for improvements to Guanella Pass Road was identified, based on environmental concerns, current and projected traffic volumes, roadway and maintenance deficiencies, and safety considerations. To address the need for roadway improvements, FHWA, USFS, CDOT, and other cooperating agencies initiated a planning process to develop a Final Environmental Impact Statement (FEIS) and selected a Preferred Alternative for improving Guanella Pass Road.

A primary component of the roadway improvements for Guanella Pass contained in the FEIS’ Preferred Alternative involved resurfacing some portions of the road with a hardened surface (i.e., asphalt and/or macadam, rather than gravel) to preserve and protect water quality in adjacent streams and wetland/riparian areas. In addition, the Preferred Alternative included roadway widening in some areas to address safety and operational concerns.

While most public comments received during the FEIS planning process suggested agreement with the need for repair or maintenance of the road, many expressed concerns about the extent of improvements in the Preferred Alternative. In particular, concerns were expressed that the proposed roadway improvements would result in:

- A loss or change in the character of the Guanella Pass area; public comments suggested a desire to retain rustic, unmanaged, backcountry characteristics of the setting in the area.
- Increased traffic on Guanella Pass Road, because it would become a potentially attractive alternative route between the Denver metro area and the Rocky Mountains to the congested I-70 corridor. Increased traffic on the Guanella Pass Road would, in turn, result in traffic and community impacts to the towns of Georgetown and Grant.
- Increased speeds and associated safety issues.

In response to public comments about the concerns noted, a new alternative was developed by the FHWA in cooperation with Clear Creek County, the town of Georgetown, Park County, the USFS, and CDOT. The new alternative was designed to emphasize rehabilitation or minimal improvements to Guanella Pass Road, and was based on the outcomes of work group sessions that took place during early February through early May 2000 and were open to the public for observation.

The new alternative (Alternative 6), specified roadway classification and design elements that allow for lower speeds, sharper roadway curves, and a narrower roadway width than was proposed in the original Preferred Alternative. Further, macadam, rather than asphalt, was selected for most of the resurfacing to be done on some gravel sections of the road.

As part of the planning process, CFL conducted a traffic study on Guanella Pass Road in 2002 which projected traffic volumes in 2025 with and without proposed roadway improvements. The study included 24-hour automatic traffic counts at eight locations on Guanella Pass Road to determine existing ADT and project future ADT, as well as SADT. The study also included manual traffic counts, a parking survey, and an origin/destination study. Based on the estimates used in this study, traffic at the summit of Guanella Pass Road could increase by 56% over 1995 levels by the year 2025 if no road improvements are made (Figure 43). The study projected traffic volumes to grow by 88% to 183% with improvements to Guanella Pass Road (Figure 43).

The FHWA concluded that the roadway improvements specified in Alternative 6 constitute the minimum that can be built and no further reduction in design standards would be advisable. The FHWA further suggested that the Alternative 6 roadway improvement projects reduce environmental impacts of projected traffic increases to the greatest extent possible. Thus, FHWA concluded that any further reduction in projected traffic increases can be accomplished only by the land management agencies (USFS, Clear Creek County, Park County, and Georgetown) implementing policies that serve to restrict use of the area.

A Record of Decision was released in January 2003, supporting Alternative 6 as the Preferred Alternative for Guanella Pass Road improvements, and a CFL Guanella Pass newsletter indicated the project would be phased as follows:

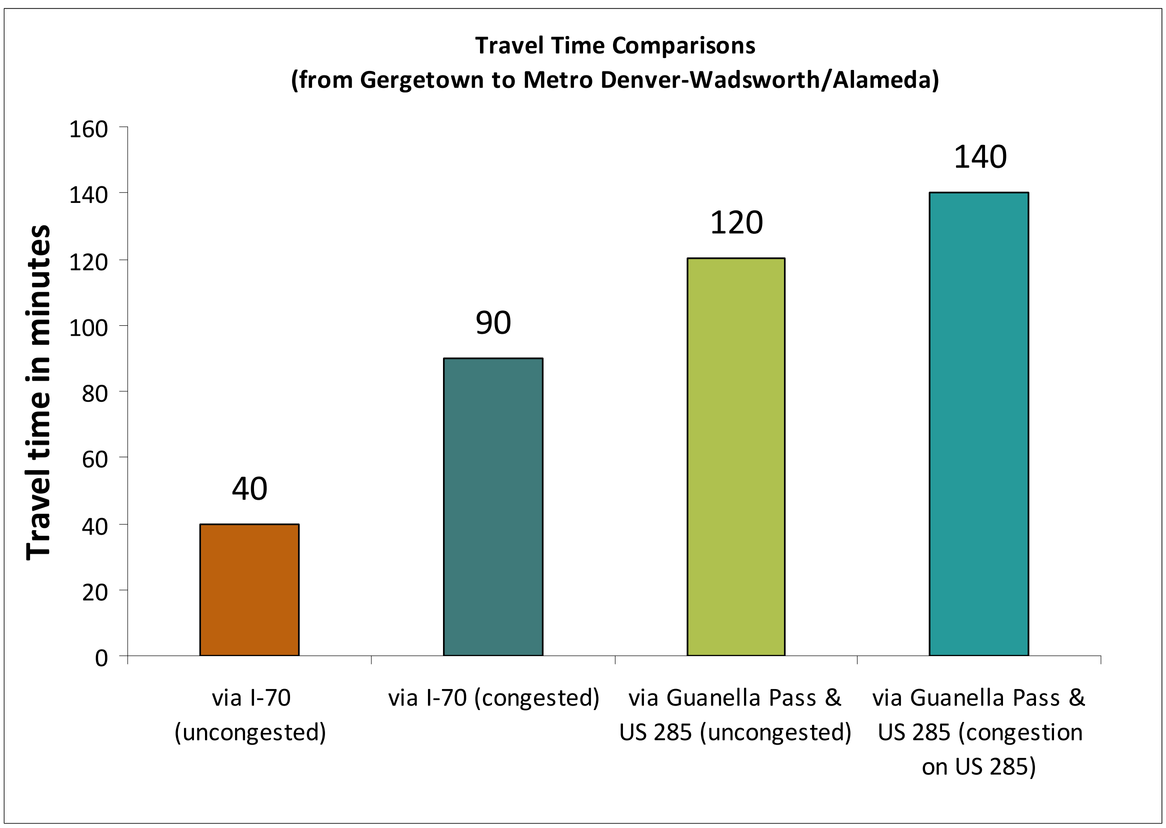
- Phase I - construction from milepost 9.3 to milepost 17.0 was completed in 2007.
- Phase II - construction from milepost 17.0 to the town of Georgetown is currently underway.

- Phase III - construction (on the Park County side) is planned for 2012.

Since initiating the project, there have been severe erosion and surface degradation issues on the gravel and macadam sections of Guanella Pass Road. Thus, in a March 2009 memorandum, FHWA recommended surfacing the gravel and macadam portions of the roadway with a permanent and sustainable surface. Thus, FHWA re-evaluated the FEIS to determine if any changes to the project and any changed circumstances or new information would result in significant impacts not evaluated in the FEIS. It was determined that paving these sections of Guanella Pass Road would have no new significant impacts, thus, these sections of road will be paved the summer of 2010.

As part of the process to re-evaluate the FEIS, FHWA produced revised traffic forecasts based on proposed changes to roadway resurfacing. Revised traffic forecasts were estimated using new traffic data, additional data on population growth from the Colorado Division of Local Government Demography Office, and travel time analysis. In addition, traffic data for roadways similar to Guanella Pass were collected for comparison purposes. The revised forecasts of 2025 traffic volumes were slightly higher than those in the 2002 CFL traffic study. However, the FHWA concluded from a travel time analysis that, even with resurfacing, Guanella Pass Road would not be a feasible alternative route to I-70 (Figure 44).

Figure 44. Travel Time Comparisons of Alternative Routes (source: Guanella Pass Surface Evaluation: Effect to Traffic Volumes and Speeds Technical Memo, 2009*)*



The USFS and FHWA are handling additional engineering-related issues on the Guanella Pass Road that have implications for recreation-related travel and tourism-related traffic impacts in the towns of Georgetown and Grant. In August 2009, Guanella Pass Road between the Clear Lake day-use area and the Clear Lake Campground was closed indefinitely due to concerns that a rockmass in the area could fall across the road due to instability created by above normal precipitation that occurred in summer 2009. A press release indicated that the large rock mass could be anywhere from 20,000 to 60,000 cubic yards in volume, and would fill up to 6,000 dump trucks. The surface area of the mass may be approximately a football field in size. Since summer 2009, the USFS has been working with CFL to evaluate options to monitor and manage the situation. Presently, the road closure is still in effect and will remain that way until May 2010 when an assessment of the slide will be conducted.

Summary

The background information and data regarding Guanella Pass reviewed for this project highlight several important themes and potential points of focus for the proposed TRIP project. These include:

- Rapid population growth is occurring in the communities neighboring Guanella Pass.
- Anecdotal evidence suggests recreational use in the Guanella Pass area is increasing.
- The Guanella Pass summit area provides immediate access to Backcountry Recreation and Wilderness Management Areas, desired conditions for which are threatened by intensive and increasing visitation.
- Previous user capacity research (1995) suggests that social capacity on trails in the Guanella Pass summit area are exceeded and recreational use is causing off-trail trampling and other resource impacts there.
- Recreation management-related action items recommended in the CMS focus on conducting user capacity studies to support the USFS in managing the number of recreational users, particularly in the Guanella Pass summit area, to protect Forest resources and the quality of visitor experiences.
- Traffic volumes on Guanella Pass Road are high, particularly from late spring through fall.
- Traffic volumes are projected to increase substantially over the next two decades.
- Parking demand frequently exceeds parking supply at the Guanella Pass summit, resulting in unendorsed parking along the roadside that causes resource, safety, and scenic quality issues.
- Transportation management-related action items recommended in the CMS focus on parking management at the Guanella Pass summit and consideration of ATS to manage the amount and location of visitor use in the Byway corridor, parking congestion, and traffic in the towns of Georgetown and Grant.
- Roadway improvement projects managed by FHWA and USFS are underway, with particular focus on resurfacing and roadway geometry improvements. These improvements are controversial due to concerns about change to the natural/rustic character of the area and traffic impacts to the towns of Georgetown and Grant.
- A section of the Guanella Pass Road near the summit area is closed due to concern about a rockfall; the road closure will be re-evaluated in May, 2010.

The background information reviewed for this project suggests that some data and analysis results exist to address the issues noted, but many of those information sources are dated and/or incomplete. Thus, there are a number of potential information and analysis needs that should be considered if the proposed TRIP project is funded, including:

- Trail use counts and hiking routes for trails in the Guanella Pass summit area.
- Visitor-based indicators and standards of quality for resource and social conditions in the Backcountry Recreation and Wilderness Management Areas adjacent to the summit.
- Visitor characteristics and motivations for visiting the summit area; perceptions of soundscape, resource, and visitor experience conditions; recreation setting preferences; and attitudes about recreation and transportation-related management options.
- Visitor use models for trails in the summit area to estimate user capacities based on resource and social standards of quality.
- Linkages between visitor use models and transportation data/models to evaluate the effects of potential visitor use and transportation management actions on estimated user capacities.
- Measurement of the extent and severity of recreation and transportation-related resource and soundscape impacts.
- Observation and evaluation of visitor behavior to identify and mitigate visitor use-related factors contributing to resource and soundscape impacts.
- Analysis of parking demand and capacity, under existing and proposed transportation system conditions.
- Modeling and/or analysis of alternative transportation solutions (e.g., transit, ITS) to mitigate parking congestion, with respect to cost, effectiveness, and visitor/public support.

3.3 Mount Evans

This section synthesizes, analyzes, and evaluates information about Mount Evans, based on review of the following documents:

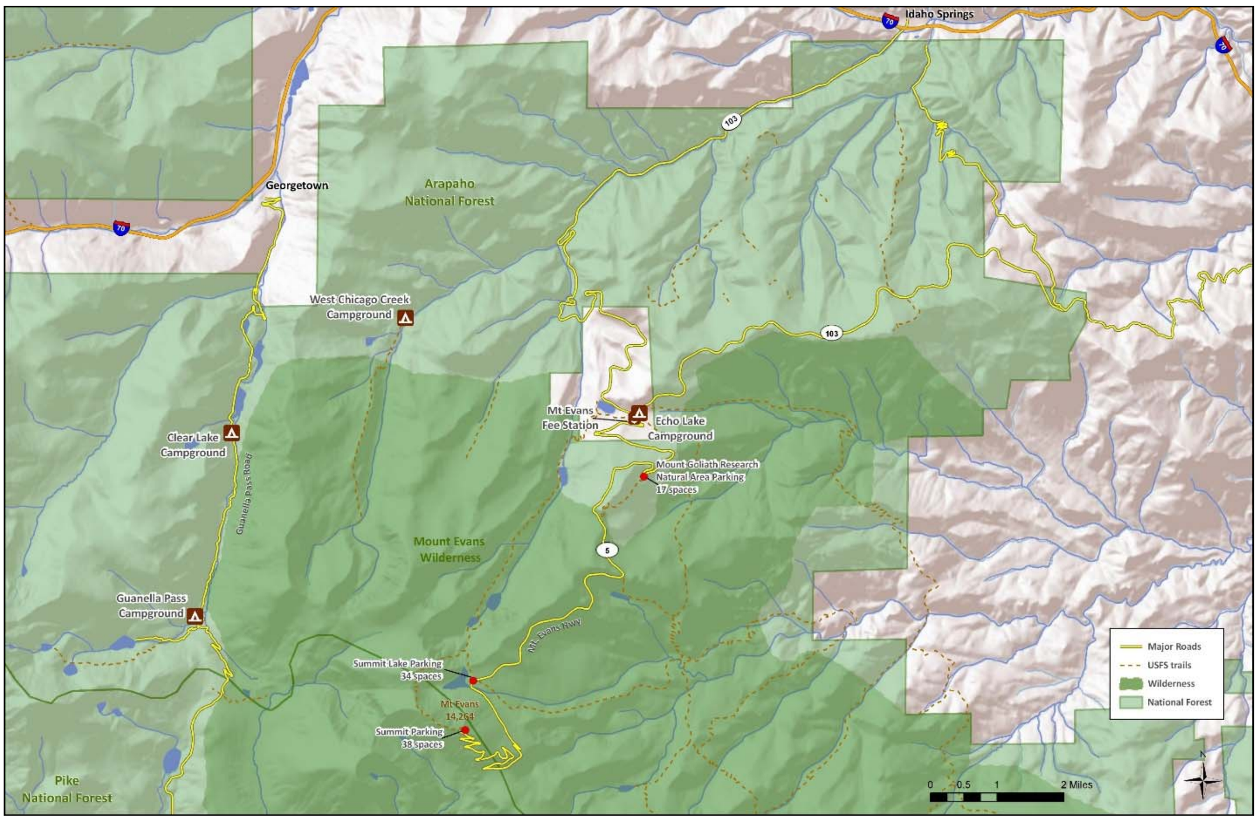
- Mount Evans Recreation Enhancement Project: Business Plan (USFS, 2007)
- 2030 Mountains and Plains Transportation Plan (DRCOG, 2005)
- Mount Evans Scenic and Historic Byway Corridor Management Plan (Clear Creek County Tourism Board & Community Matters, Inc., 2000)
- 1997 Revision of the Land and Resource Management Plan: Arapaho and Roosevelt National Forests and Pawnee National Grassland, a.k.a. the Forest Plan (USFS, 1997)
- Analysis of the Feasibility of the Shuttle System (Lewin, Brust, Gulas, Ohmart, & Velarde, 1993)

Location

Mount Evans is located approximately 70 miles southwest of the Denver Metro area, and 28 miles southwest of Idaho Springs. Primary access to Mount Evans is from I-70 via the Idaho Springs exit and Colorado Highway 103 to the intersection of Colorado Highway 5/Mount Evans Highway. The

Mount Evans entrance fee station is situated at the base of the Mount Evans Highway, which travels from the fee station 14 miles to the summit of Mount Evans. The summit of Mount Evans is 14,264 feet in elevation, making the Mount Evans Highway the highest elevation paved road in North America reaching 14,130 feet. The entire route from Idaho Springs to the summit of Mount Evans is designated as the Mount Evans Scenic and Historic Byway. The Mount Evans Highway is within both the ARNF and PNF, and runs directly through the Mount Evans Wilderness (**Error! Reference source not found.**). The Mount Evans Highway is open seasonally, roughly between Memorial Day and the first weekend in October, depending on weather and road conditions, although the road beyond Summit Lake is closed on the Tuesday after Labor Day.

Figure 45. Mount Evans - Visitor Use Areas and Parking Facilities



Visitor Use and Recreation-related Issues

As noted, the Mount Evans Highway provides seasonal recreation access within the ARNF and PNF, roughly between Memorial Day and the first weekend of October, although the road beyond Summit Lake is closed on the Tuesday after Labor Day. The USFS charges an entrance fee for travel on the Mount Evans Highway. Recreation activities include sightseeing, hiking, wildlife viewing, wildflower viewing, photography, bicycling, snowshoeing, cross country skiing, and many educational opportunities. There are a number of recreation sites and facilities located along the Mount Evans Highway, including picnic areas, trailheads with parking, and interpretive or visitor centers. Primary facilities and attractions along the Mount Evans Highway include:

- The Summit area and Crest House, which offer panoramic views, interpretive opportunities, and trails to the Mount Evans summit.
- Summit Lake Park, National Natural Landmark, which includes restrooms, a historic shelter, and trails to Summit Lake.
- The Mount Evans Wilderness, which provides access to over 100 miles of trails.
- The Mount Goliath Research Natural Area (RNA), which includes the Alpine Interpretive Garden, Dos Chappell Nature Center, and universally accessible trails. This area is jointly managed by the USFS and Denver Botanic Gardens.
- The University of Denver Observatory, which is located in the summit area, but is not open to the public.

Located just outside of the Mount Evans area are numerous picnic areas, vista points, and Echo Lake and West Chicago Creek Campgrounds. These facilities are accessed via Colorado Highway 103. Echo Lake is located at the base of the Mount Evans Highway and is identified in studies reviewed for this project as a potential staging location for shuttle service to the summit of Mount Evans.

Most of the recreation facilities noted along the Mount Evans Highway are situated in the USFS's prescriptive Management Area 4.2 – Scenery. Within this Management Area, frequent encounters between individuals or parties are acceptable on travelways, while contact away from trails is prescribed to generally be infrequent. Sounds from people or motorized recreational activities are usually common and limit opportunities for solitude or isolation. Developed facilities may be common in this Management Area, for the purposes of improving recreation opportunities and enjoyment of scenery. Furthermore, the use of directional, regulatory, and informational signs is acceptable, and their presence may be frequent.

While most of the Mount Evans Highway corridor and its recreational facilities are located in Management Area 4.2, almost all of the surrounding area lies within Congressionally designated Wilderness (Management Area 1.1 in the Forest Plan). As stated in the Forest Plan, Wilderness areas are managed such that their natural conditions predominate and opportunities for solitude and self reliance are provided. Thus, evidence of human activity is meant to be limited to that necessary for resource protection. Desired social and resource conditions are to be maintained by developing and implementing limits of acceptable change programs, to the extent that funding and resources allow.

The Forest Plan also specified a number of desired conditions and action items for the Mount Evans Wilderness and Mount Evans National Scenic Byway corridor. Those desired conditions and action items with a transportation-related focus are reported in the next section; recreation-related desired conditions and action items of particular relevance to this and the proposed TRIP project include:

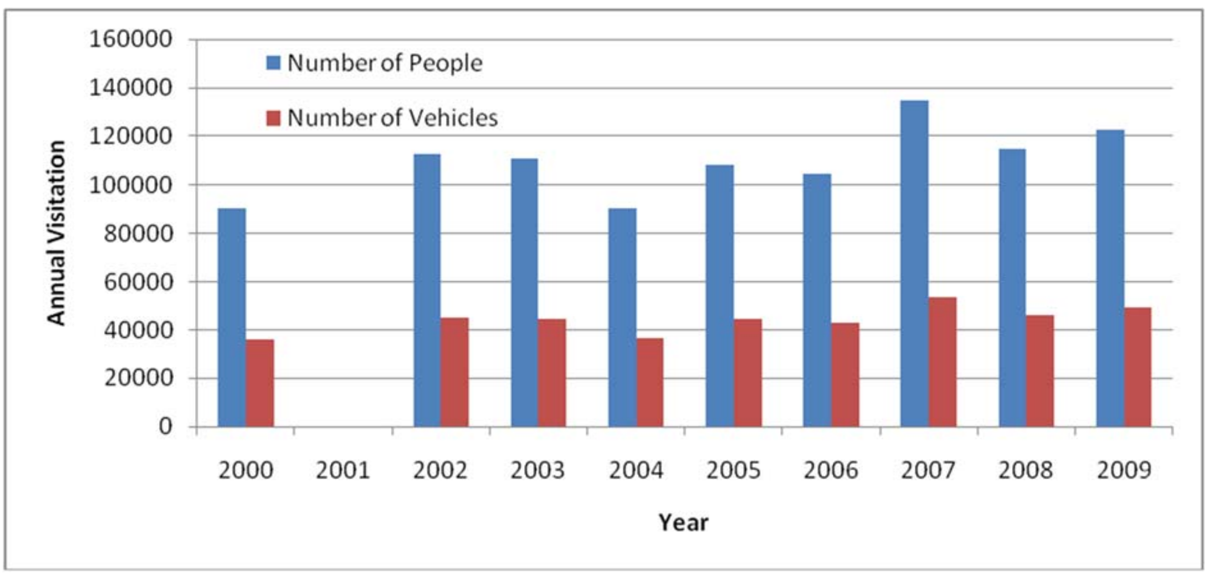
- Provide opportunities for recreational use of the area while protecting the alpine ecosystems and the integrity of the Wilderness area.
- Concentrate most use of the area within the Byway corridor.

- Identify limits of acceptable change to the environment and manage the area to stay within these limits.
- Accommodate recreational use along the trail corridors in which upper limits of use are based on environmental effects with less emphasis on social factors.

In addition to the Forest Plan, the *Mount Evans Scenic and Historic Byway Corridor Management Plan, 2000* (CMP) identified additional issues of focus for the area. Among the issues of focus in the CMP were impacts of intensive visitation at recreation sites along the Mount Evans Highway. Thus, while there is a general understanding that the Mount Evans Highway is a popular recreation and tourism destination due to its proximity to the Denver metro area and road access to the summit of Mount Evans, empirical information about visitor use is important.

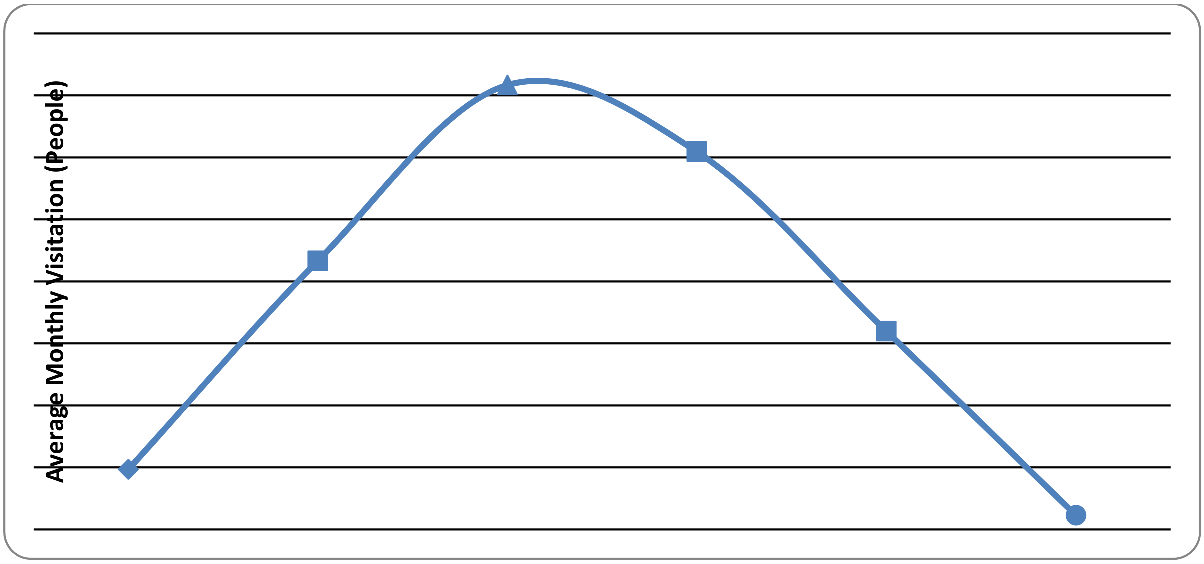
Information reviewed in this project include various sources of visitation data that provide insights about annual visitation and trends over time. For example, visual inspection of the Mount Evans entrance fee station visitation data in Figure 46 suggests that visitation to Mount Evans has been relatively steady over time, with a slight increasing trend since 2000.

Figure 46. Mount Evans - Annual Visitation (2000, 2002-2009; source: USFS Fee Station Data)



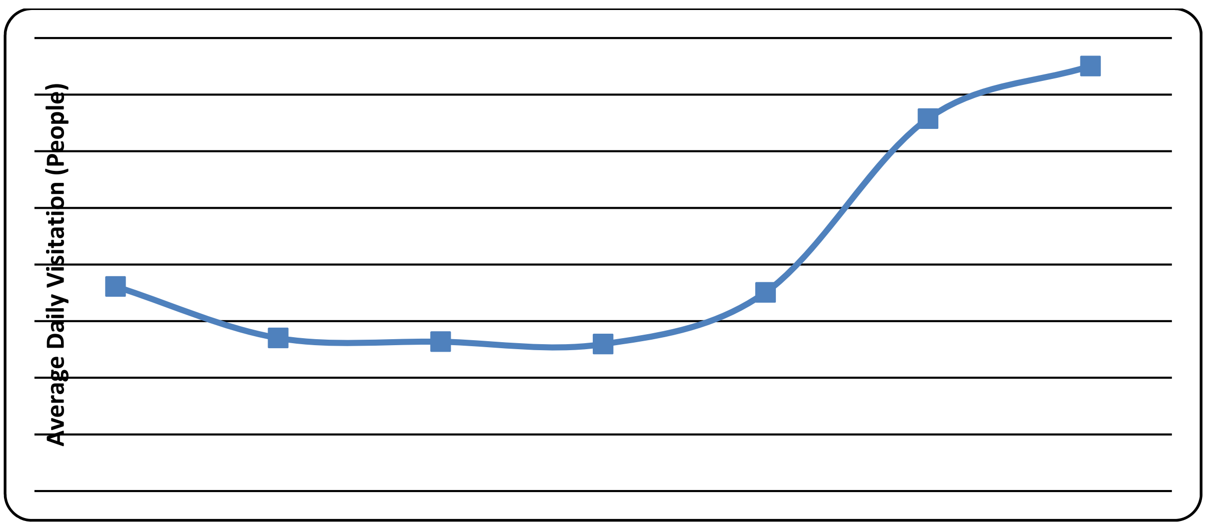
The data in Figure 47 suggest that visitation to Mount Evans peaks during the month of July and is nearly as high in August. Further, visitation increases substantially from May to June and from June to July, while it declines sharply after August.

Figure 47. Mount Evans - Average Monthly Visitation (2000, 2002-2009; source: USFS Fee Station Data)



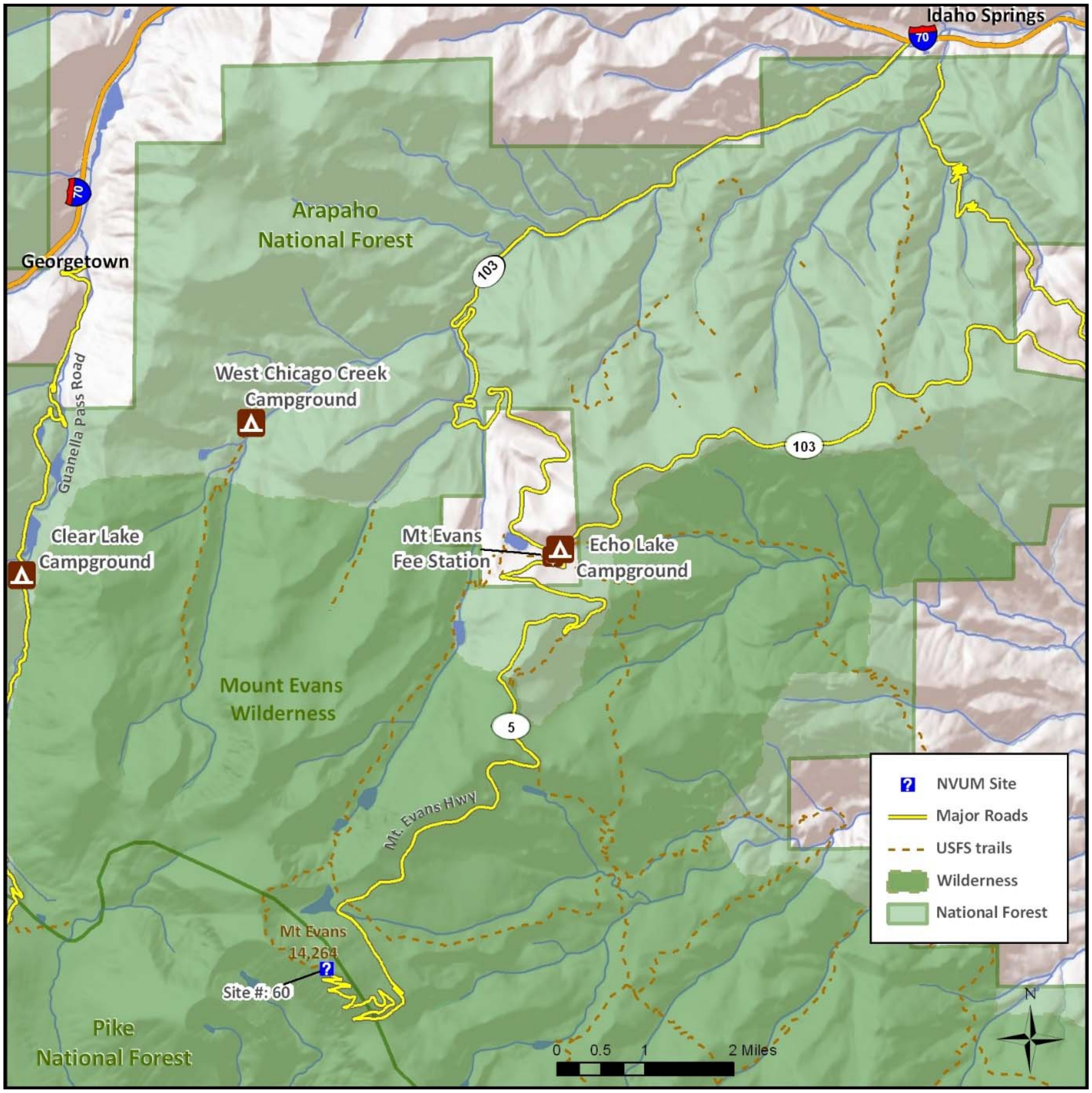
As might be expected, weekend visitation to Mount Evans is substantially higher than weekday visitor use (Figure 48). Visitation is generally slightly higher on Sundays than on Saturdays.

Figure 48. Mount Evans - Average Daily Visitation (2000, 2002-2009; source: USFS Fee Station Data)



NVUM studies conducted in 2000 and 2005 provide another relatively recent source of information about visitor use in the Mount Evans area. The NVUM studies in 2000 and 2005 included interviews with visitors at one sampling location in the Mount Evans summit area (Figure 49). A copy of the 2005 NVUM survey instrument is in 0. Another NVUM study is planned for the Mount Evans area during summer 2010.

Figure 49. Mount Evans - NVUM Site Locations



The NVUM study site included in the 2000 and 2005 study is classified by NVUM methods as a Day-use Developed Site (DUDS). The NVUM interview sample sizes, by year, are reported in Table 62. Key results from the 2000 and 2005 NVUM interviews are reported and compared in the following paragraphs. However, the relatively low sample sizes for the 2000 and 2005 interviews suggest that results of the studies, including comparisons across study years, should be interpreted with caution.

Table 62. Mount Evans - Number of NVUM Interview Respondents per Year (source: NVUM)

Site	Site Type*	2000	2005	Total
60 – Mount Evans	DUDS	9	52	61

* DUDS = Day-use developed site.

Within the NVUM interviews, visitors were asked to indicate which activities they had participated in or will participate in during their visit to Mount Evans (Table 63; specific activities corresponding to each of the activity groupings in Table 63 are in 0). Viewing and learning activities, motorized activities, and non-motorized activities were the most commonly reported. The proportion who reported camping or other overnight activities decreased from 2000 to 2005, while the proportion that reported all of the other activity types increased.

Table 63. Mount Evans (Site 60) - Participating in Activity Group (source: NVUM)

Activity Types *	2000 (n=8)	2005 (n=38)	Change
Hunting and/or Fishing	0.0%	2.6%	+2.6
Viewing and/or Learning	87.5%	94.7%	+7.2
Non Motorized	75.0%	78.9%	+3.9
Motorized	62.5%	84.2%	+21.7
Camping or Other Overnight	25.0%	7.9%	-17.1
Other Activities	12.5%	81.6%	+69.1

Several demographic questions were asked of NVUM interview participants. The vast majority of visitors reported their race/ethnicity as "White" (Table 64).

Table 64. Mount Evans (Site 60) - Ethnicity and Race (source: NVUM)

	2000 (n=9)	2005 (n=52)	Change
Spanish, Hispanic, or Latino	0.0%	0.0%	0.0%
American Indian/Alaskan Native	10.0%	0.0%	+10.0%
Native Hawaiian/Pacific Islander	0.0%	0.0%	0.0%
Asian	0.0%	1.9%	+1.9%
Black/African American	0.0%	0.0%	0.0%
White	88.9%	71.2%	-17.7%
Other	0.0%	-	-
No Answer	11.1%	26.9%	+15.8%

A majority of visitors interviewed at the Mount Evans summit area during 2000 were between 31 and 50 years of age, while in 2005 the majority of respondents were between 40 and 69 years of age (Table 65).

Table 65. Mount Evans (Site 60) - Age Categories (source: NVUM)

2000 Categories/2005 Categories	2000 (n=9)	2005 (n=52)	Change
16-20 / 16-19	11.1%	0.0%	-11.1%
21-30 / 20-29	11.1%	9.6%	-1.5%
31-40 / 30-39	22.2%	5.8%	-16.4%
41-50 / 40-49	33.3%	15.4%	-17.9%
51-60 / 50-59	11.1%	23.1%	+12.0%
61-70 / 60-69	0.0%	15.4%	+15.4%
71+ / 70+	0.0%	3.8%	+3.8%
No Answer [a]	11.1%	26.9%	+15.8%

Visitors were asked to indicate the number of people in their vehicle on the day they were contacted for the NVUM interview (Table 66). Average group size, based on responses to this question, ranged from 1.8 people/vehicle to 2.6 people/vehicle. However, the reliability of either estimate of group size is limited due to low sample sizes in both NVUM study years.

Table 66. Mount Evans - Number of People in Vehicle (source: NVUM)

Site		2000	2005	% Change
	Average	1.8	2.6	+44%
60 – Mount Evans	*St. Dev*	0.7	1.4	-
	n	8	37	-

Finally, in 2005 NVUM respondents were asked to indicate how far they had traveled from their home to the Mount Evans summit area (Table 67). The average distance traveled by NVUM respondents in 2005 visit Mount Evans was approximately 668 miles, which suggests an average travel time of roughly 11 hours. The mean travel time should be interpreted with caution, due to the low sample size.

Table 67. Mount Evans - Distance Traveled (miles; source: NVUM)

Site		2000	2005	% Change
	Average	-	668	-
60 – Mount Evans	*St. Dev*	-	678	-
	n	-	38	-

In addition to the NVUM studies of 2000 and 2005, several other visitor surveys were conducted at Mount Evans between 1994 and 1999 (e.g., a copy of a visitor survey instrument administered in 1999 is included in 0). While these surveys are less recent than the NVUM studies, they were designed to support more reliable statistical results about Mount Evans visitor use and visitors than the NVUM studies, which are designed for a more Forest-wide perspective. Results of these studies support several insights about Mount Evans visitor use and visitors, including:

- Mount Evans visitors are generally 45-64 years of age, married, college educated, and with household incomes of $50,000 or more (1999 dollars).
- Most (70%) Mount Evans visitors travel in their own vehicles.

- The majority (75%) of visitors do not have children in their groups.
- About half of all Mount Evans visitors are from Colorado and half are from outside Colorado, with about one-quarter from east of the Mississippi River.
- Most visitors learned about the Mount Evans Scenic Byway by word of mouth/from friends and family.
- A majority (55%) of visitors said they would take a shuttle, if service were provided on the Mount Evans Scenic Byway; large minorities of visitors said they would not take a shuttle because it would take too long to get to the summit (46%) and they would not be able to stop where they wanted (39%).
- Most (70%) visitors to Mount Evans are first-time visitors to the area.
- Pleasure driving and enjoying the scenery are the predominant visitor activities reported.
- Most visitors reported that harassment of wildlife, including feeding and scaring wildlife while taking photographs, is a problem at Mount Evans.

Transportation Systems, Infrastructure, and Issues

The Mount Evans Highway, also known as Colorado Highway 5, consists of a 14-mile drive from Echo Lake to the Summit area. It is part of the greater Mount Evans Scenic and Historical Byway, which also includes Colorado Highway 103 from Idaho Springs to Echo Lake. As noted, the Mount Evans Highway is the highest paved road in North America, reaching an elevation of over 14,000 feet at the summit of Mount Evans. The roadway is a two-lane, paved road with a speed limit of 20-30 mph, and is closed during the winter season. There are currently two private tour operators that provide transportation between Denver, the Mount Evans summit, and other tourist attractions in the area. However, most visitors travel to and along the Mount Evans Highway in their own vehicles.

There are three primary parking areas along the Mount Evans Highway, all three with limited parking capacity. In particular, there is a 17-space parking area at the Mount Goliath RNA, a 34-space parking area at Summit Lake and a 38-space parking area at the summit of Mount Evans. Buses and cars with small trailers are not allowed to travel beyond the Summit Lake parking area due to the narrow, winding nature of the road.

Vehicle traffic data for the Mount Evans Highway suggest that visitation has declined moderately from 1996 to 2000, but has increased slightly between 2000 and 2006; this is consistent with entrance fee station visitation data trends noted. Over the ten year period for which data were available for review in this project, annual vehicle traffic averaged just under 45,000 vehicles. Maximum annual vehicle traffic between 1996 and 2006 was just over 63,000 vehicles in 1998, while the minimum was observed in 2000 at 33,240 vehicles (Table 68).

Table 68. Mount Evans - Vehicle and Visitor Counts 1996-2006 (source: Mount Evans Business Plan/Recreation Enhancement Act Project, 2007*)*

Year	Vehicle Count
1996	52,500
1997	42,800
1998	63,043
1999	51,528
2000	33,240
2001	37,410
2002	47,617
2003	47,569
2004	38,108
2005	39,655
2006	39,828
Average	44,586

The background information reviewed for this study suggests that parking demand at the Summit Lake and Mount Evans Summit parking typically exceeds capacity during summer weekends and holidays. Parking congestion at the Summit Lake and summit area parking lots cause bottlenecks as cars wait for parking spaces to become available. Furthermore, many visitors park their cars in undesignated areas along the road when the designated parking areas are full. Pull-outs located along the Mount Evans Highway also fill-up with parked vehicles quickly during peak periods.

The congested parking conditions noted cause visitor frustration, resource impacts, and public safety issues. Parking congestion issues are exacerbated by the fact that steep terrain and harsh climatic conditions limit possibilities for providing new or expanded parking or turnouts along the Mount Evans Highway. These issues have been documented at Mount Evans for several decades and were systematically studied in 1993, when the USFS was considering to convert Mount Evans area to a USFS Park (*Analysis of the Feasibility of the Shuttle System, 1993*).

The focus of the study in 1993 was on assessing the feasibility of implementing a shuttle system on the Mount Evans Highway. The study cites parking congestion as a primary motivation for considering shuttle service at Mount Evans. The study also suggests a shuttle system would improve visitor enjoyment by allowing visitors to better enjoy the scenic views than they are able to when concentrating on the challenging driving conditions presented by the Mount Evans Highway.

The 1993 study of the feasibility of a Mount Evans shuttle system states that the first consideration in designing a system should be the recreation carrying capacity (hereafter referred to as user capacity) of Mount Evans. The study further notes that, at the time of the study, the USFS had not yet established numerical user capacities for the area and that a model to estimate user capacity was needed. The study suggests that a user capacity model, coupled with visitor use data (e.g., visitor counts) is essential in order to design a shuttle system for Mount Evans that is in accord with sustainable levels of visitor use. The study report includes a definition of user capacity and suggests an indicator-based process (i.e., Limits of Acceptable Change) for establishing user capacities at

Mount Evans. Several potential indicators of resource, social, and facility quality are suggested as a basis for indicator-based user capacity analysis at Mount Evans, including the following that are particularly pertinent to this and the proposed TRIP project:

- Resource Indicators
  - Percent of specified types of ground cover
  - Number of specified plants or animals observed
  - Soil compaction
  - Soil erosion
- Facility Indicators
  - Number of people, groups, or vehicles per parking lot or shuttle bus
  - Time waiting for shuttle service
- Social Indicators
  - Number of encounters with other people per hour, day, etc. while hiking
  - Number of people at one time at attraction sites

The discussion of user capacity in the 1993 study also suggests that information about the travel patterns of visitors while visiting the Mount Evans area is essential. Finally, the study outlines several pros and cons of implementing shuttle service for Mount Evans, with respect to user capacity considerations. The following summarizes key points made in the 1993 study report, with respect to advantages and disadvantages of shuttle service, in terms of user capacity considerations:

- Pros
  - Can make visitors' tour more educational, including learning about the fragile ecosystem and how to protect it.
  - Can control the number of visitors, which potentially reduces resource and social impacts of recreational use.
  - Potentially reduces transportation-related air, noise, and greenhouse gas (GHG) emissions.
  - Potentially allows visitors to relax and enjoy the surroundings more than if they were driving.
  - Provides an opportunity for visitors to socialize with others (Note: This could be interpreted as a pro or a con, depending on the experience motives of visitors).
- Cons
  - Buses potentially accelerate the deterioration of the road.
  - Would potentially require converting some camping facilities into parking lots for shuttle service staging.
  - Potentially increases noise impacts to hikers and bikers.
  - Potentially decreases the personal experience associated with traveling in your own vehicle.

- Potentially increases visitors' feeling of being controlled and potentially decreases sense of privacy.
- Potentially inhibits visitors' ability to use the hiking trails in the area, as they may not have adequate time to do so before returning to their shuttle buses.
- The presence of buses may have particularly pronounced adverse experiential impacts on hikers and bikers.
- Shuttle tours of Mount Evans potentially disproportionately appeal to older visitors, which could cause displacement among younger generations of visitors.
- Potential for onboard crowding, long wait times for buses, and time restrictions to have significant adverse impacts to visitor experience.

Within the analysis of shuttle system feasibility, three sites were considered as potential staging areas for a Mount Evans shuttle system. The potential staging area locations include: 1) the Visitors Center in Idaho Springs, 2) Echo Lake; and 3) Summit Lake. The report discusses primary advantages and disadvantages of each staging area option, which are summarized here:

- Visitors Center in Idaho Springs – Advantages
  - Ample parking.
  - Easy access from I-70.
  - Longer duration tour, which some visitors would enjoy (though others might prefer minimizing time on shuttle buses versus being in their own vehicles).
  - Eliminates the need for visitors to drive the challenging road conditions on the Mount Evans Highway.
- Visitors Center in Idaho Springs – Disadvantages
  - The length of the shuttle bus tour may be too long for some visitor groups, including those with children or people on a time schedule.
  - Visitors would not be able to stop at recreation facilities along the road to the Mount Evans Highway.
  - The beginning of the tour would be through residential areas with little appeal to tourists and recreationists.
  - Difficult to manage shuttle service fee collection and ensure ridership is tourism-based, rather than commuter-based from this location.
- Echo Lake – Advantages
  - Location at the junction of State Highway 5 and the Mount Evans Highway serves as a good staging location.
  - Ample parking.
  - Located at the halfway point between Idaho Springs and the summit of Mount Evans, resulting in a roughly one-hour tour. Thus, not constraining to visitors on a time schedule.
  - Serves as a good control point for managing vehicle access to the Mount Evans Highway and ridership on the shuttle buses.

- Attractions at Echo Lake provide visitors with something to do while they wait for the bus.
- Echo Lake – Disadvantages
  - To expand parking, it may be necessary to eliminate some campsites at Echo Lake.
  - An hour-long tour may still be too long for some visitors.
- Summit Lake – Advantages
  - Located only 5 miles from the summit, so visitors would only be on shuttle buses for roughly 30 minutes. Visitors may prefer this and the cost of service would be lower.
  - Still allows visitors to avoid driving the most difficult section of the Mount Evans Highway, which is between Summit Lake and the Mount Evans summit.
- Summit Lake – Disadvantages
  - Limited existing parking means that substantial additional parking would need to be developed, causing serious resource impacts.
  - Still requires visitors to drive some challenging sections of the Mount Evans Highway.

The 1993 study report concludes from the analysis of potential staging areas that Echo Lake would be the preferred option. The report further suggested that upon request or every three hours a shuttle bus leave Echo Lake for the summit of Mount Evans, with stops at Summit Lake on the way up and down.

More recently, the CMP identified a set of projects deemed to be feasible means to implement the CMP. Among the projects identified to implement the CMP was a peak season Byway shuttle system. The CMP noted the same reasons as the 1993 study for considering shuttle service for Mount Evans, including mitigation of parking congestion and improvement of the visitor experience associated with eliminating the stress of driving in challenging road conditions.

The shuttle system proposed in the CMP includes a staging area in Idaho Springs, in part to bolster the economy of the town. This is in contrast to the 1993 study's recommendation for a staging area at Echo Lake. The CMP identified several next steps regarding shuttle service for Mount Evans. These next steps focus on the USFS working cooperatively with the local counties and CDOT to:

- Identify drop-off/pick-up locations in Idaho Springs
- Engage local businesses in developing marketing material for the shuttle service
- Develop partnerships with private entities to secure vehicles and other resources
- Monitor vehicle traffic on the Byway

In addition, the CMP contains a copy of a memorandum written on behalf of the USFS to Land Rover requesting sponsorship of a Mount Evans shuttle system. In particular, the memo suggests providing Land Rover exclusive rights to operate a shuttle service transporting visitors to the summit of Mount Evans. The memo suggests that a meeting was held with Land Rover in 2000, but the outcome of this meeting is unknown.

Finally, within the background information reviewed for this project, the FHWA suggested that shuttle service focus on providing transit service for those visitors who arrive at the base of the Mount Evans Highway via their own automobile but would prefer to ride a shuttle van to the summit. The FHWA further suggested that the USFS could purchase the vehicles for this service to ensure the vehicles meet standards for comfort and safety and contract the operation of the vehicles to a private provider. The FHWA estimated the cost of this shuttle service arrangement at $340,000 for vehicles to serve Mount Evans and an additional $25,000 estimated for signs and shelters to support the shuttle service. These cost estimates are based on the assumption that no additional parking would be needed and that the shuttle service would be provided by private companies with no operating subsidy.

Summary

The background information and data regarding Mount Evans reviewed for this project highlight several important themes and potential points of focus for the proposed TRIP project. These include:

- Visitation and vehicle traffic data for the Mount Evans Highway suggest that visitor use has been relatively stable or slightly increasing since 2000. However, visitation has declined somewhat from the late 1990's.
- During summer weekends and holidays, parking demand exceeds parking supply at the Mount Goliath RNA, Summit Lake, and Summit Areas, resulting in visitor frustration, resource impacts, and safety issues.
- The steep, narrow roadway, coupled with outstanding scenic views from the Mount Evans Highway are sources of concern among visitors and the USFS about visitors' safety while driving to the summit of Mount Evans.
- To address parking and visitor safety issues noted, a shuttle system has been recommended to transport visitors from Idaho Springs or Echo Lake to the summit of Mount Evans.
- A majority of visitors interviewed in a 1999 survey indicated they would be willing to ride in a shuttle bus to the summit of Mount Evans, but substantial minorities indicated that they would not because it would take too long and/or they would not be able to stop where they wanted.
- The Mount Evans Highway offers immediate access into the heart of the Mount Evans Wilderness, desired conditions for which may be threatened by intensive and potentially increasing visitation.

The background information reviewed for this project suggests that some data and analysis results exist to address the issues noted, but many of those information sources are dated and/or incomplete. This is particularly true with respect to the need noted in the 1993 study to understand relationships among visitor use levels, user capacity, and shuttle service design. Thus, there are a number of potential information and analysis needs that should be considered if the proposed TRIP project is funded, including:

- Trail use counts and hiking routes for trails in the Mount Goliath RNA, Summit Lake, and Mount Evans summit areas.
- Visitor-based indicators and standards of quality for resource and social conditions at the Mount Goliath RNA, Summit Lake and Mount Evans summit areas, and in the Mount Evans Wilderness adjacent to these areas.

- Visitor characteristics and motivations for visiting the Mount Evans Highway and summit area; perceptions of soundscape, resource, and visitor experience conditions; recreation setting preferences; and attitudes about recreation and transportation-related management options.
- Assessment of visitors' willingness/likelihood to use various shuttle service options and ecological impacts of alternative shuttle service options.
- Visitor use models for the attraction areas at the Mount Goliath RNA, Summit Lake and summit area, and trails in these areas, to estimate user capacities based on resource and social standards of quality.
- Linkages between visitor use models and transportation data/models to evaluate the effects of potential visitor use and transportation management actions on estimated user capacities.
- Measurement of the extent and severity of recreation and transportation-related resource and soundscape impacts.
- Observation and evaluation of visitor behavior to identify and mitigate visitor use-related factors contributing to resource and soundscape impacts.
- Analysis of parking demand and capacity, under existing and proposed transportation system conditions.
- Modeling and/or analysis of alternative transportation solutions (e.g., transit, ITS) to mitigate parking congestion, with respect to cost, effectiveness and visitor/public support.

4.0 Conclusion

As the preceding review of Forest-wide, regional, and site-specific information suggests, there are several themes and issues that are common to the BLRA, Guanella Pass, and Mount Evans. These themes provide potential points of focus for the proposed TRIP project and include:

- While visitation to the three study sites has been relatively stable over the last decade, all three areas receive intensive levels of visitor use during the summer months.
- Regional population growth and the popularity of the Colorado Rocky Mountains for nature-based tourism suggest that the study areas are likely to continue to experience intensive visitation into the future.
- Intensive visitation at the BLRA, Guanella Pass, and Mount Evans are causing impacts to Forest resources, the quality of visitors' experiences, and public safety. Further, the character of backcountry and Wilderness areas in each of the three study sites is threatened by intensive visitation to the adjacent developed recreation areas.
- Parking congestion and associated resource, social, and public safety issues are significant at all three study sites, particularly during summer weekends and holidays.
- Despite the transportation, resource protection, and visitor experience-related capacity issues noted, all three sites lack systematically and empirically defined user capacities.
- Concepts have been developed for ATS solutions to parking and related capacity issues at each of the three study sites, but only limited analyses of the feasibility of these options have been conducted to date. In addition, while potential opportunities exist to expand or connect existing transit systems that serve nearby urban areas or Federal Lands (i.e., Rocky Mountain National Park), there have been no systematic studies to support implementation of such approaches. Further, there has been no substantial analysis of ATS solutions, with respect to user capacities of the study sites; thus, systematic design of ATS solutions in accordance with desired resource and visitor experience conditions is yet to be evaluated.

Thus, while ATS solutions have substantial potential to alleviate resource protection, visitor experience, and transportation-related issues at the BLRA, Guanella Pass, and Mount Evans, additional data collection and analysis are needed. Specific information and analysis needs are noted in the Summary at the end of each of the site-specific sections. These recommendations regarding additional information and analysis needs are potentially important points of focus for the proposed TRIP project, if it is funded.

Appendix A (of Appendix AA): Other Colorado Front Range Regional Transportation Planning Studies

Rocky Mountain Rail Authority High-Speed Rail Feasibility Study *(Transportation Economics & Management Systems, Inc., 2010)*

Project Purpose & Description

The Rocky Mountain Rail Authority is conducting a one-year study of the technical, financial and economic feasibility of implementing high-speed intercity rail service within Colorado and into neighboring states that could provide seamless travel throughout the state's most populated corridors. Study activities began in June of 2008 and a final report was issued in March, 2010, after the literature review for this project was completed.

The study is examining the feasibility of high-speed rail service in two primary corridors: the I-25 corridor along Colorado's Front Range from Wyoming to New Mexico, and the I-70 mountain corridor from Denver to Grand Junction. Five secondary corridors will also be examined, linking the I-70 corridor to Central City, Winter Park, Breckenridge, Aspen, and Steamboat Springs and Craig.

The High-Speed Rail Feasibility Study will provide a fresh, independent, and objective evaluation of alignments, station locations and high-speed rail technologies to identify the most feasible alternatives for both corridors and develop an investment-grade business plan for their implementation. The most feasible alternatives will be submitted to the Federal Railroad Administration for designation as High-Speed Rail Corridors which would make them eligible for specially targeted funding.

Project website: http://www.rmrastudy.net/

Front Range Travel Counts Survey *(North Front Range MPO, DRCOG, Pikes Peak Area Council of Governments, Pueblo Area Council of Governments, CDOT, RTD & FHWA; in progress)*

Project Purpose & Description

The Front Range Travel Counts Survey is the first in-depth study of urban household travel behavior covering all of Colorado's Front Range. The survey is looking at urban household travel behavior along Colorado's Front Range. The results of this effort will help the survey partners plan for future transportation needs in the Front Range. Approximately 12,000 households along the Front Range will be randomly selected and asked to identify where and how they traveled on a specific, designated travel day (24 hours). Later phases of the study will look at commercial vehicle trips, and trips to special facilities, such as airports.

The survey began in the North Front Range area in August 2009 and will run through December 2009. Surveys began in the Denver metro area in September 2009 and will conclude in spring 2010. Surveys will be conducted in the Colorado Springs and Pueblo areas in spring and fall 2010, respectively.

Project website: http://sites.nustats.com/frontrange/

I-70 Mountain Corridor Collaborative Effort Consensus Recommendation *(The Collaborative Effort, 2008)*

Document Purpose & Description

The Collaborative Effort, a 27-member group representing varied interests of the corridor, was charged with reaching consensus on a recommended transportation solution for the I-70 Mountain Corridor. CDOT and FHWA were active participants in this group and committed to adopt the consensus recommendation in the I-70 DPEIS.

Conclusions/Preferred Alternatives/Implications for Transportation and Visitor Use Management

Non-infrastructure related components (such as enforcement, driver education and traveler information systems) can begin in advance of major infrastructure improvements to address some of the issues in the corridor today. These strategies and the potential tactics for implementation require actions and leadership by agencies, municipalities and other stakeholders beyond CDOT and FHWA.

An Advanced Guideway System (AGS) is a central part of the recommendation and includes a commitment to the evaluation and implementation of AGS within the corridor, including a vision of transit connectivity beyond the study area and local accessibility to such a system.

Future Information Needs/Identified Action Items

Additional information is necessary to advance implementation of an AGS system within the corridor:

- Feasibility of high speed rail passenger service
- Potential station locations and local land use considerations
- Transit governance authority
- Alignment
- Technology
- Termini
- Funding requirements and sources
- Transit ridership
- Potential system owner/operator
- Interface with existing and future transit systems
- Role of AGS in freight delivery both in and through the corridor

Ongoing stakeholder engagement is necessary because the aforementioned improvements may or may not fully address the needs of the corridor beyond 2025, and the recommendation does not preclude nor commit to the additional multi-modal capacity improvements. As such, CDOT and FHWA will convene a committee that retains that the Collaborative Effort member profile. The committee will establish its own meeting schedule based on progress made against the approved triggers, with check-ins at least every two years.

In 2020, there will be a thorough assessment of the overall purpose and need and effectiveness of implementation of these decisions. At that time, CDOT and FHWA, in conjunction with the stakeholder committee, may consider the full range of improvement options.

I-70 Coalition Land Use Planning Study for Rail Transit Alignment throughout the I-70 Corridor *(I-70 Coalition, 2009)*

Document Purpose & Description

The I-70 Coalition envisions a high speed Advanced Guideway System (AGS) designed to serve the residents, employees, resorts and visitors that comprise the travel pool in this corridor. (The geographic extents of the corridor are from Jefferson County in the east to Garfield County in the west, including the off-corridor communities of Gilpin County (Blackhawk and Central City), Grand County (Winter Park, Fraser, and Granby), Routt County (Steamboat Springs), Lake County (Leadville), and Pitkin County (Aspen).) The study planning process engaged representatives from all communities along the corridor in conversations about local transit, land use decision-making and regional mobility. This year-long collaborative planning effort was designed to address local and corridor-wide visions, goals, and understanding of transit service implementation, along with concepts for land use development patterns that support and integrate with future transit.

Identified Issues/Opportunities

The Coalition summarized the community's overall guiding principle for future transit in Clear Creek County (where Guanella Pass and Mount Evans are located):

> *Future AGS or high speed rail through Clear Creek County should provide key connections to adjacent communities in order to accommodate the local needs for connectivity and improve access to the Clear Creek community for tourist activity. It should create a transit system that creates the "wow" factor while maintaining the historic character of the towns.*

Data Provided and Methodology

The study established a framework for cooperation and coordination among all corridor jurisdictions. It is essential groundwork for future system planning, station sub-area planning, and community education and involvement.

Conclusions/Preferred Alternatives/Implications for Transportation and Visitor Use Management

The study worked with County Working Groups to recommend station sites for the AGS. The final station siting criteria for group evaluation and discussion included the following questions:

- Does the location serve a population center?
- Is the location an established activity center (or will be someday)?
- Does the location serve a geographic area (have the potential to capture ridership)?
- Is the location compatible with future land use plans?
- Does the location have good vehicular access?
- Does the location complement future transit plans and connections?
- Are there any known environmental issues with the location?
- Is there County Working Group support for the location?

Recommendations by the County Working Groups for major hub locations (called Tier 1 regional station locations) are as follows. (These recommendations, however, do not preclude additional or alternative locations that might be served by spurs or skip service that could be developed at a later date. The list represents each County Working Group's recommendation of what locations they believe would best serve the people in the community, as well as those traveling to their communities. The County Working Groups recognize that technical data, such as ridership, are still being developed and such information may cause these recommendations to be reconsidered.)

- Jefferson County
    - I-70/US 6 Interchange Area (or Washington Street/SH 58 Area)
- Clear Creek County
    - Idaho Springs (includes five potential sites)
    - Empire Junction/Georgetown (or somewhere in between)
- Summit County
    - Frisco or Silverthorne
    - Also recognizing that Keystone, Breckenridge, and Copper Mountain may be preferred depending on ridership and alignment considerations. Copper Mountain is likely to have a station regardless because potential alignments are likely to pass through there.
- Eagle County
    - Vail or Avon (east end of county)
    - Eagle Airport (west end of county)
    - Garfield County
    - Glenwood Springs - Downtown Wye
    - Mid-valley/Carbondale if alignment follows Cottonwood Pass

Future Information Needs/Identified Action Items

Near Term Planning- Today's Actions

- Continue to coordinate with ongoing I-70 corridor studies.
- Develop a vision for transit in your community through a broad-based community visioning process.
- Strengthen the policy language in the comprehensive/master plans to signify a strong direction for transit and integrated land use.
- Develop policies that identify how to realize the vision and goals for transit.
- Evaluate whether current zoning practices or planned unit development (PUD) allowances ensure desired development patterns, mixed-use, higher density or greater walkability.
- Continue specialty planning efforts such as bicycle/pedestrian master plans, transit service plans, design guidelines, etc..
- Evaluate existing and future needs for a local transit system.

Mid Term Planning – Three to Ten Years Prior to AGS

- Confirm station site and begin/continue local land assemblage.
- Develop a station area sub-plan.

- Evaluate infrastructure availability and set a plan to deal with these limitations. This could include improving the infrastructure or limiting development.
- Identify funding mechanisms.
- Continue planning, funding and implementation of local transit system if needed.
- Continue coordination with the AGS or corridor transit planning team.

Long Term Planning – One to Three Years Prior to AGS

- Coordinate and implement infrastructure improvements related to the site if not already underway.
- Continue coordination with developer on site development.
- Implement transit system connections to tie into AGS.

It will also be critical to identify a path for decision-making and information going forward. It will be important to continue the momentum established during this planning process and to maintain an increased communication level with local agency staff and their communities over the next several years. The continuation of the County Working Group structure organized for this study process may prove to be an appropriate vehicle for open and collaborative dialogue and ongoing planning cooperation for the corridor. Additionally, CDOT's Public Information team for the I-70 corridor and the CSS I-70 Project Leadership Teams will be future forums for collaboration and information. The ability of the multitude of agencies to stay informed and be involved rests in a central location for that activity. The I-70 Coalition represents the broadest participation of agencies in or adjacent to the I-70 corridor and is a good conduit for this ongoing coordination.

Appendix B (of Appendix AA): 2005 NVUM Survey Instrument

2005

National Visitor Use Survey
Basic Individual Interview Form

OMB approval: OMB 0596-0110
Exp. date: 4/30/06 Rev. 6

ADMINISTRATION INFORMATION (complete prior to starting interview)

Region | Forest | Site Number | Date (Month - Day - Year: 2004, 2005, 2006) | Time Interview started (military): | Hand-Tally count at start of interview | Vehicle Axle Count

Interviewer say: The Forest Service is conducting interviews of visitors on the ________ National Forest. The information collected will help us better serve our visitors by knowing what activities they do, how long they stay, and how satisfied they are with the facilities and services provided. Your participation is voluntary and all information is confidential.

SECTION 1: SCREENING QUESTIONS

1 Would you be willing to take a few minutes to participate in this interview?

- Yes (person agreed to be interviewed)
- No (did not agree to be interviewed)

What is your home ZIP code?

- Don't Know

OR

If visitor is from another country select:

- Canada
- Mexico
- S. & C. America
- Asia
- Europe
- Other

2 I need to select just one of you to complete this interview. Which of you had the most recent birthday and is 16 years of age or older? *(Direct ALL questions to only this person.)*

Day Use, Overnight, & Wilderness ONLY

3 What is the primary purpose of your visit to *(say site name)*? *(choose only one)*

- Working or commuting to work
- Only stopping to use the bathroom
- Only passing through, going somewhere else
- Some other reason

*"Thank-you. That's all the information I need today." **(End Interview)***

- Recreation *(GO TO Q4)*

4 When do you plan to leave *(say site name)* for the last time on this visit? *(choose only one)*

- Not leaving this site today *(End Interview)*
- Don't Know *(End Interview)*
- Leaving now *(GO TO Q5)*
- Leaving later today *(Record time they plan to leave today then GO TO Q5)*

Time (military)

5 When did you first arrive at *(say site name)* for this visit? *(record date/ time)*

Date (Month - Day - Year: 2004, 2005, 2006) | Time (military)

Note: There is no Q6 for this side of the form.

GO TO NEXT PAGE Q7

GFA ONLY

3a What is the primary purpose of your visit to this *(say NF name)* National Forest?

- Working or commuting to work
- Only stopping to use the bathroom
- Only passing through, going somewhere else
- Some other reason

(GO TO Q3b)

- Recreation *(GO TO Q4)*

3b What is the major reason you chose this route? *(do not read list or prompt visitor)*

- View scenery
- Some other reason

*"Thank-you. That's all the information I need today." **(End Interview)***

4 Today we are interested in interviewing people who have recreated in the undeveloped areas of this national forest. This includes things like hiking trails (not in designated Wilderness), exploring forest roads, camping in undeveloped areas and streams. Have you recreated in the undeveloped areas of this forest sometime during your visit? *(choose only one)*

- Yes, recreated in the GFA *(GO TO Q5)*
- No, did not recreate in the GFA - *"Thank-you. That's all the information I need today." **(End Interview)***

5 Are you leaving the undeveloped areas of this national forest for the last time on the visit? *(choose only one)*

- Not leaving today ***(End Interview)***
- Don't know ***(End Interview)***
- Leaving now *(GO TO Q6)*
- Leaving later today *(GO TO Q6)*

6 In TOTAL, during this visit, how much time will you have spent in the undeveloped areas of this national forest? *(record hours/minutes if 24 hours or less; record to nearest day if over 24 hours)*

If 24 hours or less: Hours | Minutes **OR** **If over 24 hours:** Days

GO TO NEXT PAGE Q7

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SECTION 2: NATIONAL FOREST VISIT

7 **Did you spend last night in the *(say forest name)* NF?**

- No
- Yes - How many nights in a row do you plan to spend in the NF? *(write in # of nights & this answer must match total time spent on forest (Q9-Q8))*

8 **When did you first arrive at this NF on this recreation visit?**

Date: Month – Day – Year (2004 / 2005 / 2006); Time (military) :

- Same as site arrival time (not applicable to GFA)

9 **When do you plan to finish your visit to this National Forest?**

Date: Month – Day – Year (2004 / 2005 / 2006); Time (military) :

- Same as interview time

Now, I would like to ask you a few questions about where you will go during this visit to this national forest. When you answer please include your use of this and other areas of this national forest. Include areas you already used as well as places you plan to use before you leave this national forest for the last time on this visit.

10 **On this visit to this National Forest, did you go or do you plan to go to any areas for recreation other than this one?**

- No *(GO TO Q11)*
- Yes *(GO TO Q10a)*
- Don't Know *(GO TO 10a)*

10a *(Interviewer fill in Wilderness name)* **are Congressionally Designated Wilderness. Did you enter or do you plan to enter a Wilderness at any time during this national forest visit?**

- No
- Yes

10b **Now think about forest roads, trails, rivers, lakes, and other undeveloped areas of this national forest. Did you enter or do you plan to enter these types of areas during this national forest visit?**

- No
- Yes

10c **Lodging facilities include campgrounds, cabins, hotels and lodges. How many different lodging facilities have you used or do you plan to use during this national forest visit?** *(fill in # of different ones)*

0 1 2 3 4 5 6 7 8 9

10d **Developed day use sites include picnic areas, visitor centers, interpretive sites, developed swimming areas, and developed ski areas on this national forest. How many different developed day use sites have you used or do you plan to use during the national forest visit?** *(fill in # of different ones)*

0 1 2 3 4 5 6 7 8 9

Hand visitor flash card for Q11 & 12. Read them the activities for Q11 as they follow along. Choose all that apply. For Q12, have them pick only one primary activity from Q11.

11 **In which of the following activities have you participated or will you participate during this national forest visit?**

12 **Which one of those is your primary activity for this recreation visit on this NF?**

Question 11 answers *(can choose more than one)* — **Question 12 answer** *(choose only one)*

- Fishing - all types
- Hunting - all types

VIEWING & LEARNING NATURE & CULTURE

- Viewing wildlife, birds, fish, etc.
- Viewing natural features such as scenery, flowers, etc.
- Visiting historic and prehistoric sites/areas
- Nature Study
- Visiting a nature center, nature trail or visitor center

NONMOTORIZED ACTIVITIES

- Hiking or walking
- Horseback riding
- Bicycling, including mountain bikes
- Nonmotorized water travel (canoe, sailing, raft, etc.)
- Downhill skiing or snowboarding
- Cross-country skiing, snowshoeing
- Other nonmotorized activities (swimming, games, and sports)

MOTORIZED ACTIVITIES

- Driving for pleasure on roads (paved, gravel or dirt)
- Riding on motorized trails (non-snow)
- Riding in designated off-road vehicle areas (non-snow)
- Snowmobile travel
- Motorized water travel (boats, ski sleds, etc.)
- Other motorized activities (enduro events, games, plane, etc.)

CAMPING OR OTHER OVERNIGHT

- Camping in developed sites (family or group sites)
- Primitive Camping (motorized)
- Backpacking, camping in unroaded areas
- Resorts, cabins, or other accommodations on FS managed lands (private or FS)

OTHER ACTIVITIES

- Gathering mushrooms, berries, firewood, or other natural products
- Relaxing, hanging out, escaping heat, noise, etc.
- Picnicking and family day gatherings in developed sites (family or group)
- OTHER (fill in activity) ____________

13 **Including this visit, about how many times have you come to this National Forest for recreation in the past 12 months?** *(record # of times)*

14 **How many of those visits were to participate in the main activity you identified a moment ago?** *(record # of times for main activity)*

15 **About how many hours did you spend doing your main activity during this visit?** *(record # of hours)*

(Hand visitor flash card for Q16. Have them read you the number of their answer, record only one choice)

16 **Overall, how satisfied or dissatisfied are you with this visit to *(interviewer fill in forest name)* National Forest, using a scale of 1 to 5, where 1 means very dissatisfied and 5 means very satisfied?**

- (1) very dissatisfied
- (2) somewhat dissatisfied
- (3) neither dissatisfied nor satisfied
- (4) somewhat satisfied
- (5) very satisfied

SECTION 3: THIS TRIP AWAY FROM HOME

17 **About how far from your home did you travel to get here?** *(record road miles)*

18 **Which of the following choices best describe the purpose of your trip?** *(read list and have visitor choose only one)*

- Primarily for recreation- this NF was my main destination
- Primarily for recreation- my main destination was NOT this NF
- Primarily for business, family, or other reasons, this NF was a side trip
- Some other reason

19 **Are you staying overnight away from home on this trip?**

- Yes
- No- *(GO TO Q23)*

20 **How many total nights will you be away from home?** *(record # nights then GO TO 21)*

21 **Of these, how many are within 50 miles of here?** *(record # nights)*

- none- *(GO TO Q23)*

Interviewer: Hand visitor flash card for Q22 and read them the answer choices.

22 **What types of lodging are you using within 50 miles of here?** *(choose all that apply)*

ON this NF

- NF campgrounds ON this national forest
- Camping in the undeveloped area ON this national forest
- Cabins, lodges, hotels or huts, etc. ON this NF

OFF this NF

- Other public campground (Park Service, State Parks, County, etc.)
- Private campground NOT ON this national forest
- Rented home, condo, cabin, lodge, hotel, etc. NOT ON this NF
- Private home of a friend or relative
- A home, cabin, or condo that you own
- Other

SECTION 4: DEMOGRAPHICS

This set of questions will help us better understand you and compare your answers to those of other people. All your answers are strictly confidential and will not be used for anything other than to create general categories of recreation visitors.

23 **How many people (including you) traveled here in the same vehicle as you?**

24 **How many of those people are less than 16 years old?**

Interviewer: Hand visitor flash cards for Q25, 26, and 27 separately. Have them call out number for their answers.

25 **Now I would like to collect age and gender information on everyone in your group.** *(record everyone in group- if more than 4 people do 1st four with most recent birthday)*

	Person Interviewed	Person 2	Person 3	Person 4
Gender:	Male	Male	Male	Male
	Female	Female	Female	Female
Age:	(1) under 16	(1) under 16	(1) under 16	(1) under 16
	(2) 16-19	(2) 16-19	(2) 16-19	(2) 16-19
	(3) 20-29	(3) 20-29	(3) 20-29	(3) 20-29
	(4) 30-39	(4) 30-39	(4) 30-39	(4) 30-39
	(5) 40-49	(5) 40-49	(5) 40-49	(5) 40-49
	(6) 50-59	(6) 50-59	(6) 50-59	(6) 50-59
	(7) 60-69	(7) 60-69	(7) 60-69	(7) 60-69
	(8) 70+	(8) 70+	(8) 70+	(8) 70+

Interviewer: Direct remaining questions back to person selected for interview.

26 **Are you of Spanish, Hispanic, or Latino ethnic origin?** *(choose only one)*

- (1) No
- (2) Yes
- (3) Refused

27 **Please select one or more of the following categories that best describe your race** *(choose one or more)*

- (1) White
- (2) American Indian/Alaskan Native
- (3) Asian
- (4) Black/ African American
- (5) Native Hawaiian or other Pacific Islander

SECTION 5: FOR PROXY SITES

Code = RE1, RE2:

1 **How many nights did your group stay here on this visit to this site or area?**

2 **How many people (including you) were in your group?**

Code = FR1, ST1

1 **What kind of ticket/ pass did you use today?**

- DID NOT USE ONE *(SKIP Q2)*
- SINGLE DAY/PART OF DAY *(SKIP Q2)*
- MULTIPLE DAY *(points, season, multiday, etc.)* *(GO TO Q2)*

2 **How many total days do you plan to use THIS ticket/pass THIS season?**

Code = RE4, DUR4, DUR5:

1 **How many nights were you here on this visit to this site?**

2 **How many people (including you) were with you in the room/ site you used?**

Code = MA2, FR2, FR5, FE4, SUP4:

1 **How many fee envelopes/ permits/tickets were used to cover you on this visit to this site?**

2 **How many people, (including you) were represented by the fee envelopes/ permits/ tickets that covered you?**

Appendix C (of Appendix AA): 2000 and 2005 NVUM List of Specific Activities

Activity Group	2000	2005
Fishing and Hunting	▪ Fishing – all types ▪ Hunting – all types	▪ Fishing – all types ▪ Hunting – all types
Viewing and Learning Nature and Culture	▪ Viewing wildlife ▪ Viewing natural features ▪ Visiting historic sites ▪ Nature Study ▪ Nature center activities	▪ Viewing wildlife, birds, fish, etc. ▪ Viewing natural features such as scenery, flowers, etc. ▪ Visiting historic and prehistoric sites/areas ▪ Nature Study ▪ Visiting a nature center, nature trail or visitor center
Nonmotorized Activities	▪ Hiking or walking ▪ Horseback riding ▪ Bicycling ▪ Nonmotorized water activities ▪ Downhill skiing ▪ Cross-country skiing ▪ Other nonmotorized activities	▪ Hiking or walking ▪ Horseback riding ▪ Bicycling, including mountain bikes ▪ Nonmotorized water travel (canoe, sailing, raft, etc.) ▪ Downhill skiing or snowboarding ▪ Cross-country skiing, snowshoeing ▪ Other nonmotorized activities (swimming, games, and sports)
Motorized Activities	▪ Driving for pleasure ▪ Off-highway vehicle use ▪ Snowmobiling ▪ Motorized water activities ▪ Other motorized activities	▪ Driving for pleasure on roads (paves, gravel, or dirt) ▪ Riding on motorized trails (non-snow) ▪ Riding in designated off-road vehicle areas (non-snow) ▪ Snowmobile travel ▪ Motorized water travel (boats, ski sleds, etc.) ▪ Other motorized activities (endure events, games, plane, etc.)
Camping or other Overnight	▪ Developed camping ▪ Primitive camping ▪ Backpacking ▪ Resort use	▪ Camping in developed sites (family or group sites) ▪ Primitive camping (motorized) ▪ Backpacking, camping in unroaded areas ▪ Resorts, cabins, or other accommodations on FS managed lands (private or FS)

Activity Group	2000	2005
Other activities	▪ Gathering forest products ▪ Relaxing ▪ Picnicking	▪ Gathering mushrooms, berries, firewood, or other natural products ▪ Relaxing, hanging out, escaping heat, noise, etc. ▪ Picnicking and family day gatherings in developed sites (family or group) ▪ Other

Appendix D (of Appendix AA): 1999 Mount Evans Scenic Byway visitor Survey

Survey of Mount Evans Scenic Byway Users

Community Matters, Inc.

Introduction

In the summer of 1999, Community Matters, Inc. conducted a survey on the summit of the Mount Evans Scenic Byway to determine who was using the Byway, why they were using it, and what users thought of Byway facilities. The informal verbal survey was given to 61 respondents at the parking lot next to the Crest House below the summit of Mount Evans. The survey was administered on three separate occasions, typically around mid-day. Before being administered, the survey was reviewed by the United States Forest Service, Clear Creek County Tourism Board, and Community Matters, Inc. staff.

Findings/Results

The following are the survey questions, with a breakdown of responses, administered at the summit of Mount Evans:

1. What is your state of residency?
   - a. Colorado = 29 responses (48%)
   - b. States outside of Colorado, west of the Mississippi River = 14 responses (23%)
   - c. States outiside of Colorado, east of the Mississippi River = 18 responses (29%)
   - d. Other countries = 0 responses

2. Did you access Mount Evans from Bergen Park (Evergreen) or from I-70 (Idaho Springs)?
   - a. I-70/Idaho Springs = 44 responses (%)
   - b. Bergen Park/Evergreen = 15 responses (%)
   - c. Other = 2 (%)

3. How did you hear about Mount Evans?
   - a. From a friend = 33 responses (72%)
   - b. From a tourism guide = 10 responses (15%)
   - c. Off the Internet = 1 response (2%)
   - d. Other = 21 responses (32%) (includes hiking guides, maps, from word of mouth around Colorado)

4. What are the main reasons you decided to visit Mount Evans?
   - a. Witness beautiful scenery = 45 responses (54%)
   - b. See the wildlife = 28 responses (34%)
   - c. Family vacation = 6 responses (7%)
   - d. Recreation opportunities (hiking, biking, fishing, etc.) = 4 responses (5%)
   - e. Research or study = 0 responses

f. Other = 0 responses

5. Would you be interested in taking a shuttle van to the top if a shuttle system were available that provided interpretive/educational information and sightseeing opportunities?

a. Yes = 32 responses (55%)
b. No = 26 responses (45%)

6. What would be your greatest concerns with this sort of shuttle system

a. Cost = 0
b. It would take too long to get to the top = 21 responses (46%)
c. Would not be able to stop when I wanted to = 18 responses (39%)
d. Other = 7 (15%)

7. Are you satisfied with the facilities that are available at the top and along the Byway (i.e. restrooms, automobile pullouts, hiking opportunities, interpretive/educational information, picnic areas, etc.?

a. Very satisfied = 33 responses (58%)
b. Satisfied = 20 responses (35%)
c. Not Satisfied = 4 responses (7%)

8. If you are not completely satisfied, what would you like to see improved upon?

More wildlife = 2 responses
No wildlife feeding
More turnouts
Limit car usage
Better pulloffs = 3
Wider roads = 7
More bathrooms = 2
Flatten pulloffs
Have water at the top = 2
More informational signs = 5
No charge to bicyclists = 3
More guard rails = 2
More nature walks
Improve facilities at the top
Better lines on the road = 2
Need better shelter at top

9. Overall, how would you rate today's Mount Evan's experience?

a. Excellent = 45 responses (74%)
b. Very Good = 14 responses (23%)
c. Good = 2 (3%)
d. O.K. = 0 responses

Appendix E (of Appendix AA): List of Acronyms

AADT	Annual Average Daily Traffic
AGS	Advanced Guideway System
ARNF	Arapaho-Roosevelt National Forests
ARNF-PNG	Arapaho-Roosevelt National Forests and Pawnee National Grassland
ATPPL	Alternative Transportation in the Parks and Public Lands
ATS	Alternative Transportation System
BLM	Bureau of Land Management
CDOT	Colorado Department of Transportation
DRCOG	Denver Regional Council of Governments
EIS	Environmental Impact Statement
FEIS	Final Environmental Impact Statement
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
HOT	High-Occupancy Toll
HOV	High-Occupancy Vehicle
IMC	Intermountain Connection
MPO	Metropolitan Planning Organization
NEPA	National Environmental Policy Act
NPS	National Park Service
NVUM	National Visitor Use Monitoring Program
PEIS	Programmatic Environmental Impact Statement
ROD	Record of Decision
RTD	Regional Transit Authority of Denver
SADT	Seasonal Average Daily Traffic
STIP	Statewide Transportation Improvement Plan
TAG	Technical Assistance Group
TDM	Travel Demand Management
USDA	US Department of Agriculture
USDOI	US Department of Interior
USFS	US Forest Service
USFWS	US Fish and Wildlife Service