White River National Forest
Maroon Bells Scenic Area
Shuttle Staging Study Report

October 2019

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13. ABSTRACT (Maximum 200 words)

The Maroon Bells Scenic Area (MBSA) is characterized by 14,000-foot mountain peaks and scenic alpine lakes and forests. Summer visitation to the MBSA continues to increase despite increasing costs and congestion to access the site. The only way to access the MBSA during daytime summer hours is via a shuttle. During peak times, the parking deck where the shuttle originates becomes congested and cars queue on the road as they wait to park. During these times, the shuttles are caught in the queue and visitors must wait longer for a shuttle to pick them up and disembark. A stakeholder group has been meeting for several years to address congestion and safety concerns in and around the parking deck. The group asked the Volpe Center to initiate a study to determine how to effectively address these concerns in future years. This report summarizes and analyzes data from several sources and concludes with recommendations for future operations of the shuttle.

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Acronyms

CDOT: Colorado Department of Transportation
CNG: Compressed Natural Gas
FLAP: Federal Lands Access Program
GS: General Schedule
NEPA: National Environmental Policy Act
O&G: Outfitter and Guide
O&M: Operations and Maintenance
REA: Recreation Enhancement Act
RFP: Request for Proposals
RFTA: Roaring Fork Transportation Authority
USFS: United States Forest Service

Introduction

The Maroon Bells Scenic Area (MBSA) is an iconic area in west-central Colorado characterized by 14,000-foot mountain peaks and scenic alpine lakes and forests. Summer visitation to the MBSA in the Aspen-Sopris Ranger District of the White River National Forest (WRNF) continues to increase despite increasing costs and congestion to access the site.

The only way to access the MBSA during daytime hours from June until October is via a shuttle. Since 2000, the Roaring Fork Transportation Authority (RFTA) has provided shuttle service from Aspen Skiing Company's (ASC) Aspen Highlands parking deck, where the service is staged, to the MBSA. During peak times, the parking deck becomes congested and cars queue on Maroon Creek Road as they wait to park. During these times, the shuttles are caught in the queue and visitors must wait longer for a shuttle to pick them up and disembark.

To recoup costs for the operation and maintenance of the parking deck over the past few years, ASC has charged for parking at an increasing rate. Yet visitors continue to come and are willing to pay the higher prices: visitation has been increasing year over year during this time period.

A stakeholder group of staff from the WRNF, RFTA, Pitkin County, ASC, and the Town of Aspen have been meeting for several years to address congestion and safety concerns in and around the Aspen Highlands parking deck. In 2017, the group asked the John A. Volpe National Transportation Systems Center (Volpe Center) to initiate a study to determine how to effectively address these concerns in future years.

This report summarizes and analyzes data from the following data sources and previously developed reports and memos:

- RFTA shuttle ridership data (2018 season)
- RFTA driver log data (2018 season)
- Pitkin County traffic counter data (2018 season)
- ASC Highlands Garage parking data (2018 season)
- Evaluation of the Buttermilk Shuttle Pilot Draft Memo (November 2017)
- Public Lands Shuttle Reservation Systems Draft Memo (June 2018)
- MBSA Shuttle Staging Study Survey Report (February 2019)

Based upon the analysis of these resources, this report concludes with recommendations for future operations of the shuttle.

Analysis and Findings

RFTA Shuttle Ridership Data Analysis

Data used for this analysis are daily total riders from June 9 to October 8, 2018. Data for June represents only 21 days, and data for October represents only eight days.[1] In total, 121,582 people/riders are represented in the dataset. Accounting for a roundtrip, there are therefore 215,562 rides in 2017 and

[1] Note: the analysis conducted here represents only a snapshot in time for a single summer and may or may not be representative more broadly of trends over time. Additional data and analysis would be necessary to understand trends at Maroon Bells over time.

243,165 rides in 2018, representing a 12.8-percent increase in ridership from 2017 to 2018.

Figure 1 shows the total ridership by month. The number of riders was highest in September at 40,887 with August being the second highest at 30,386.

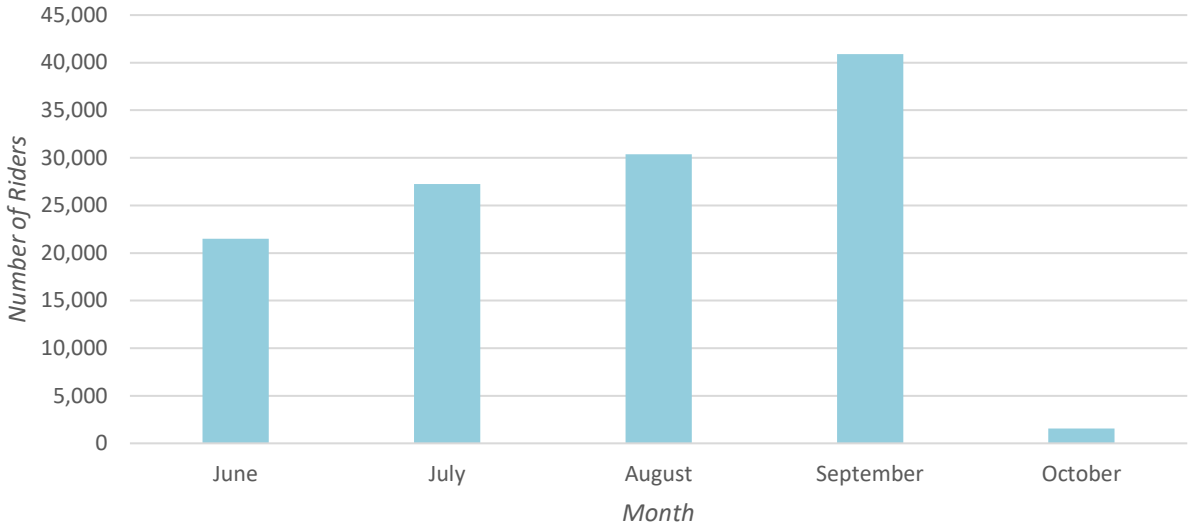

Figure 1: Total Riders by Month

Figure 2 shows the average ridership by month for both weekday and weekend days. Ridership was significantly higher, on average, during September weekends and October weekends than other weekends, largely due to those months being during prime leaf changing season, and weekend ridership was consistently higher than weekday ridership across months, though this difference was much greater for September and October.

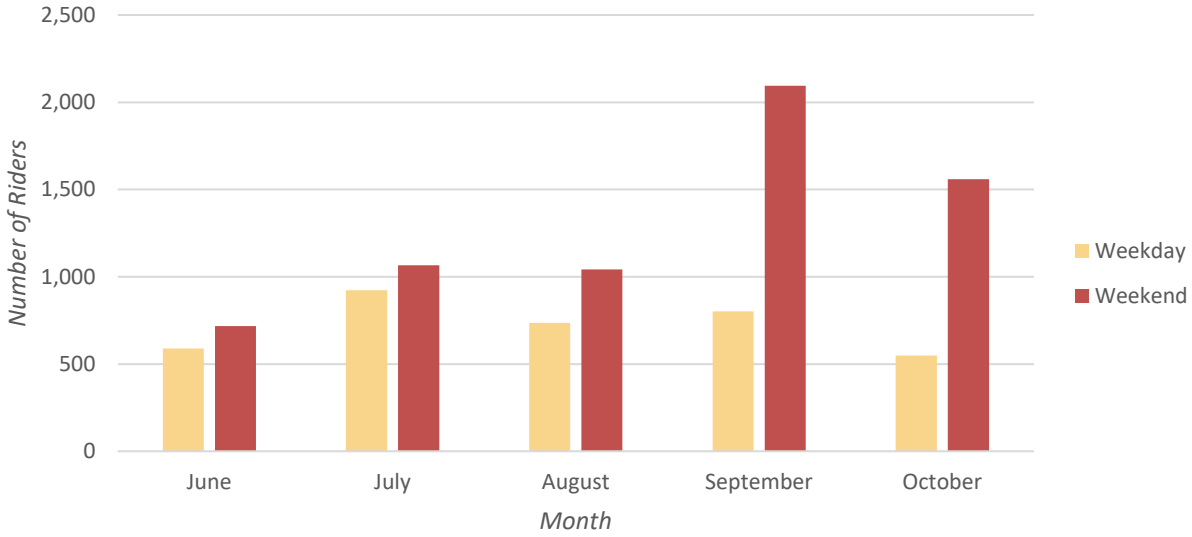

Figure 2: Average Daily Riders per Type of Day by Month

Looking across days by month shows additional notable trends (Figure 3). In particular, average ridership was highest on September Saturdays, followed by October Saturdays, with Sundays in both of these months also showing high ridership. Average Saturday ridership in July and August also exceeded 1,000

riders. Fridays in September and July also showed average ridership approaching or exceeding 1,000 riders as did Mondays in July.

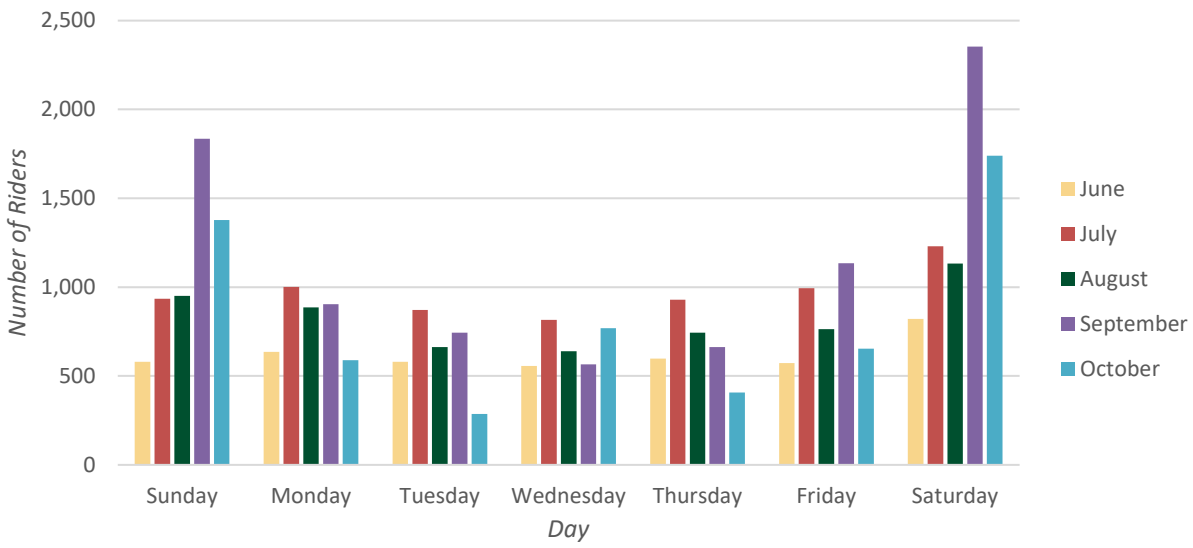

Figure 3: Average Daily Ridership per Month by Day

RFTA Driver Log Data

Driver log data, which tracks how many riders there were on each shuttle run and waiting in line for each shuttle as well, were available for 51 days between June 9 and September 24, 2018. The following analysis is based on the data available for these 51 days.

The project team's analysis of the driver log data identified trends in passenger counts and passenger queuing. Both passenger count and passenger queuing peak in the morning hours as people arrive and queue to be at the MBSA for the sunrise and morning and all-day hikes (Figure 4). The number of people in line decreases after this initial morning peak, but then steadily grows over the lunch hour for a second, smaller peak, after which it again steadily declines. Passenger counts are steady after the morning peak with a few smaller peaks in the afternoon as the service accommodates standing passengers.

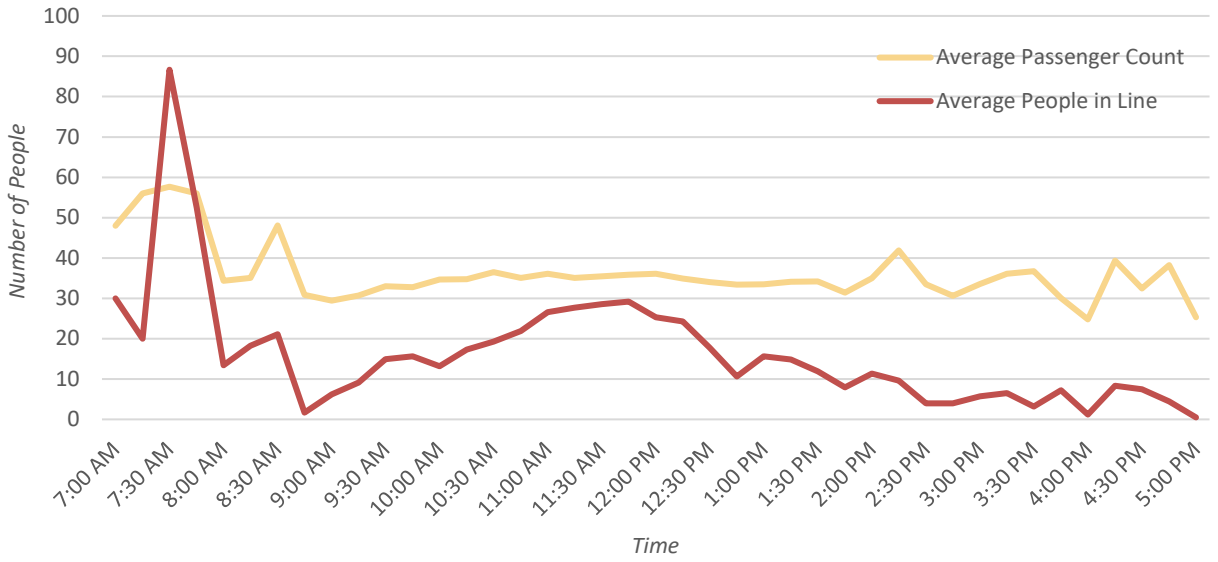

Figure 4: Average Passenger Count and Average Number of People in Line by Time of Day

Further analysis of the driver log data shows that visitation in September is driving the peaks of people queuing in the morning and mid-day (Figure 5). For all other months, data show that, on average, there are approximately 35 or fewer people in queue.

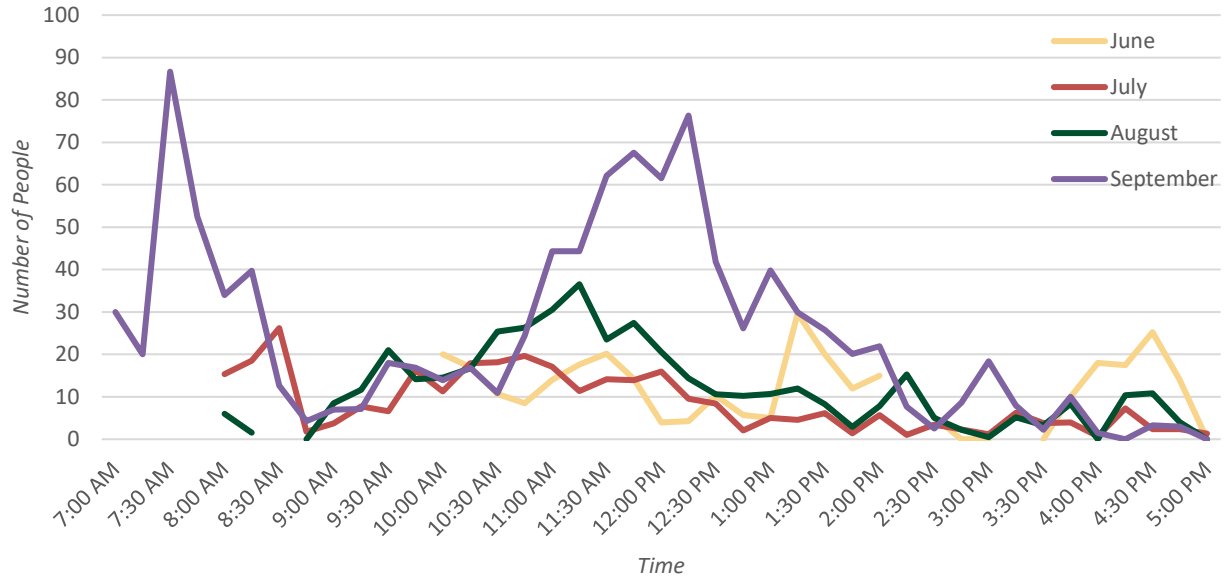

Figure 5: Average Number of People in Line by Time of Day per Month

Pitkin County Traffic Counter Data Analysis

Pitkin County installed three temporary traffic counters between Thursday, August 2, and Tuesday, August 7, 2018, which counted vehicles continuously as they passed over the counter going northbound and southbound on Maroon Creek Road. Figure 6 shows the location of the two counters closest to the MBSA parking garage. Counter 132 was located south of Glenn Gary and north of the parking deck. Counter 134 was located approximately 1/8 mile south of the parking deck. An additional traffic counter, Counter 135, was located 1/4 mile north of the welcome station; however, the project team did not use the data from this traffic counter for this analysis, which focused instead on the immediate

area surrounding the MBSA parking garage.

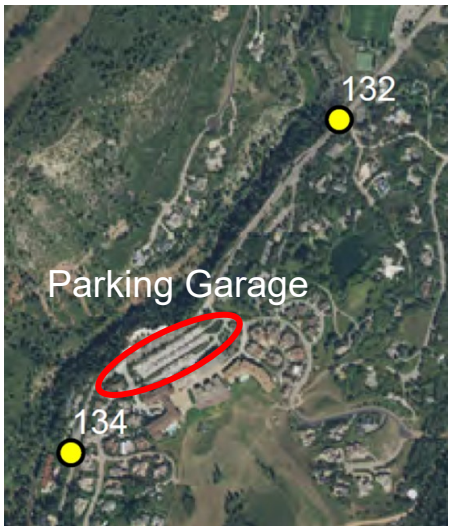

Figure 6: Traffic Counter Locations

By combining traffic counter and parking garage counter data, it is evident that the parking garage only accounts for slightly more than 15 percent of the traffic that passes counter 132 heading south. Additionally, traffic that passes counter 134 heading south only accounts for slightly more than 35 percent of the traffic that passes counter 132. Accordingly, nearly 50 percent of the vehicles that pass counter 132 end up traveling on roads and going to destinations between counters 132 and 134. Figure 7 shows the number of vehicles passing each counter and entering the parking garage by time of day.

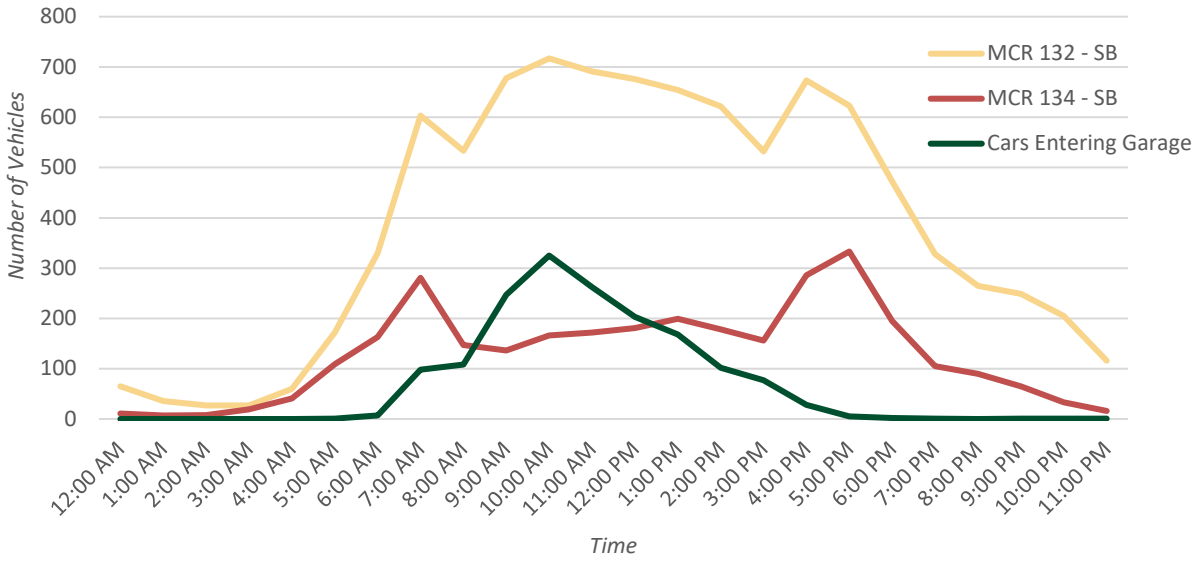

Figure 7: Number of Vehicles Traveling South & Into Garage

Similarly, Figure 8 shows that the parking garage only accounts for roughly 18 percent of the traffic that passes counter 132 heading north. Additionally, traffic that passes counter 134 heading north only accounts for roughly 33 percent of the traffic that passes counter 132. Accordingly, and as was the case with the southbound analysis, nearly 50 percent of traffic that passes counter 132 end up coming from roads and destinations between counters 132 and 134.

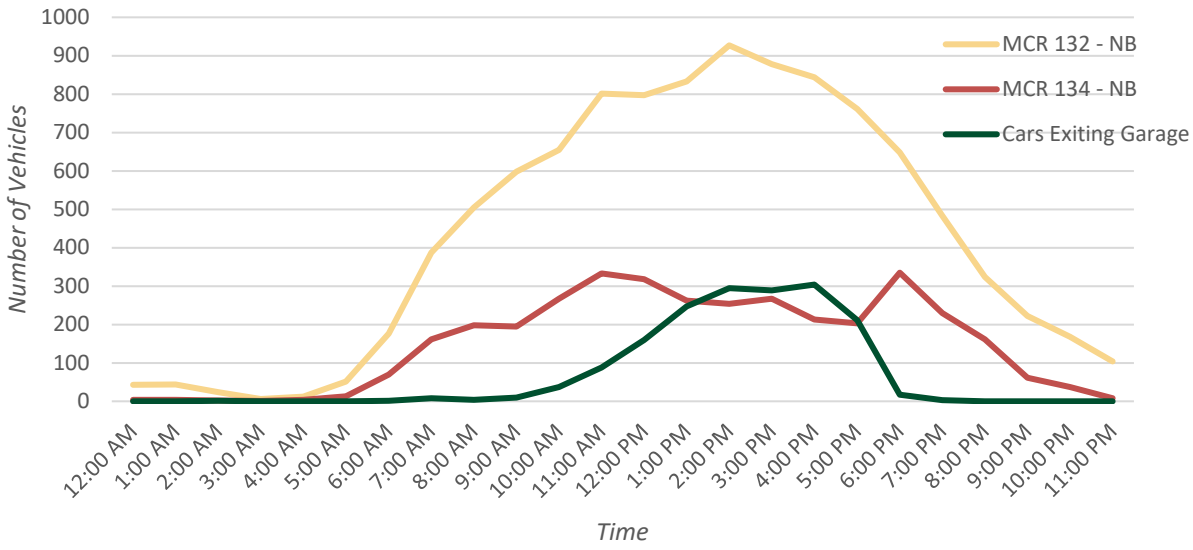

Figure 8: Number of Vehicles Traveling North & Out of Garage

Aspen Skiing Company Highlands Garage Data Analysis

The Highlands garage data used for this analysis was continuously time stamped and spans the period of time that the shuttle to MBSA operated from June 9 to October 8, 2018. Data for June represents only 21 days and data for October represents only eight days. In total, 33,732 vehicles are represented in the dataset.[2] For comparison, 28,437 vehicles were counted in 2017 between June 8 and October 1, 2017.

Figure 9 shows the total number of vehicles by month. The number of vehicles using the parking garage was highest during the month of September at 12,264 with July being the second highest at 8,162.

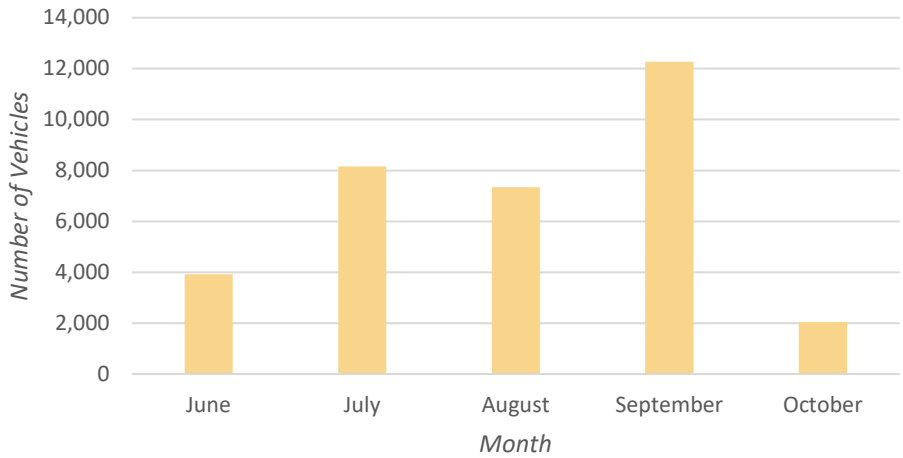

Figure 9: Total Number of Vehicles by Month

Similar to Figure 2, more vehicles use the parking garage on an average weekend day than on an average week day (Figure 10). While the average number of vehicles utilizing the parking garage per day was somewhat consistent across week days and weekend days by month, there were two clear

[2] It is important to note that the analysis conducted here represents only a snapshot in time for a single summer and may or may not be representative more broadly of trends over time. Additional data and analysis would be necessary to understand trends at Maroon Bells over time.

exceptions to this general trend. Weekend days in September and weekend days in October have much higher averages (50 to 400 percent more) than other months and days.

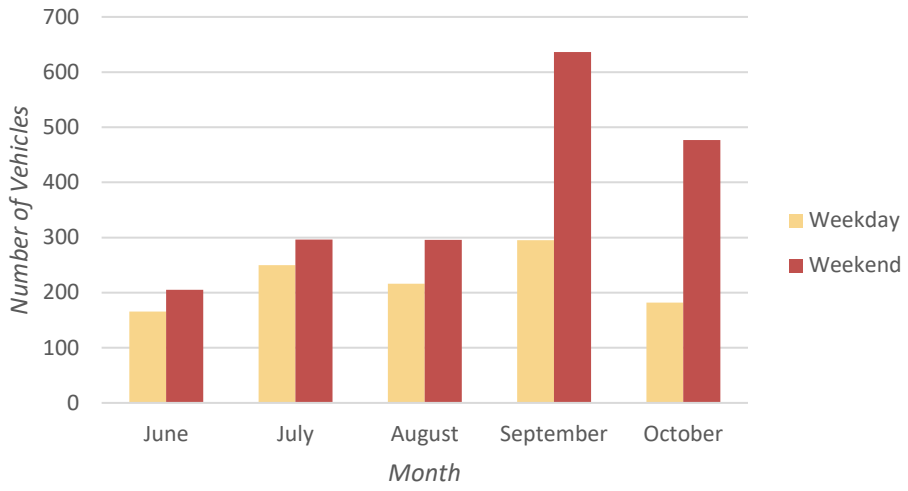

Figure 10: Average Number of Vehicles per Type of Day by Month

Similar to Figure 3, looking across days by month at a more granular level of detail shows that there was significantly higher visitation on September weekends (including September Fridays) than on other days and months (Figure 11). October Saturdays also saw higher visitation than other months, but because of few data points for October, it is not clear if this trend would hold if the data included the full month.

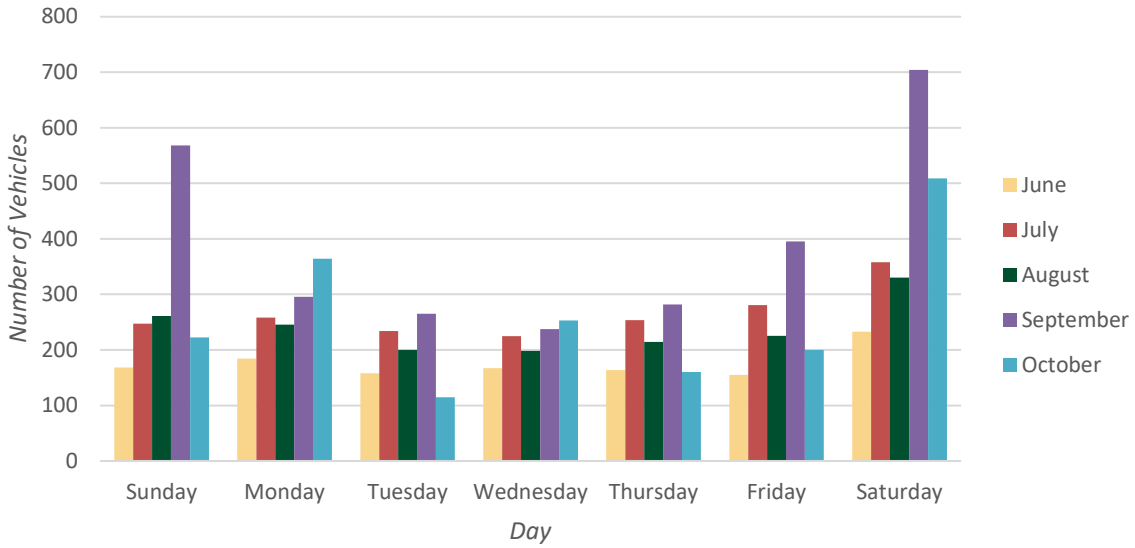

Figure 11: Average Number of Vehicles per Month by Day

Duration of Stay & Entry/Exit Data

According to parking garage data for the entire season (for vehicles parked less than 24 hours), vehicles are parked for an average of 199 minutes (or 3 hours and 19 minutes). Figure 12 shows the amount of time vehicles were parked in the parking garage. Data for vehicles staying over 10 hours were separated out into a separate analysis for overnight visitation. The figure shows that there is a medium peak of short-term visitors, a relatively few number of visitors who stay for around an hour, a significant number of visitors from two to four hours, and a steadily decreasing number of visitors for over four hours.

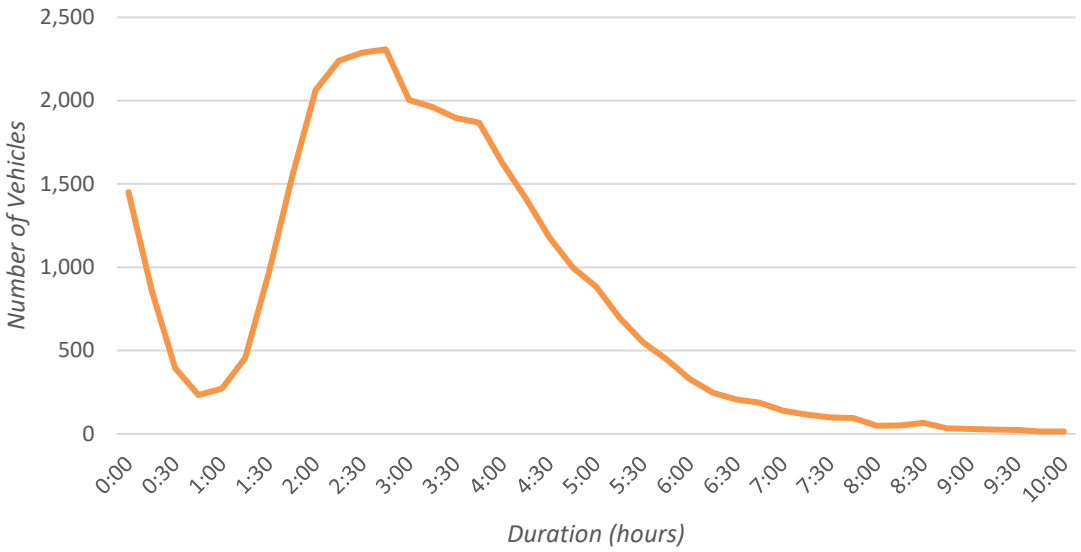

Figure 12: Number of Vehicles by Duration (excludes > 10 hours)

When duration patterns are broken out across months, the same shape curve can be seen for all months (Figure 13). This finding suggests that while the volume of vehicles may differ by month, the underlying parking duration patterns are fairly consistent across months, with a minor exception of a shorter duration peak for October than other months. However, due to the data limitations associated with the October data, it is not clear if this trend would hold if more data were available for analysis.

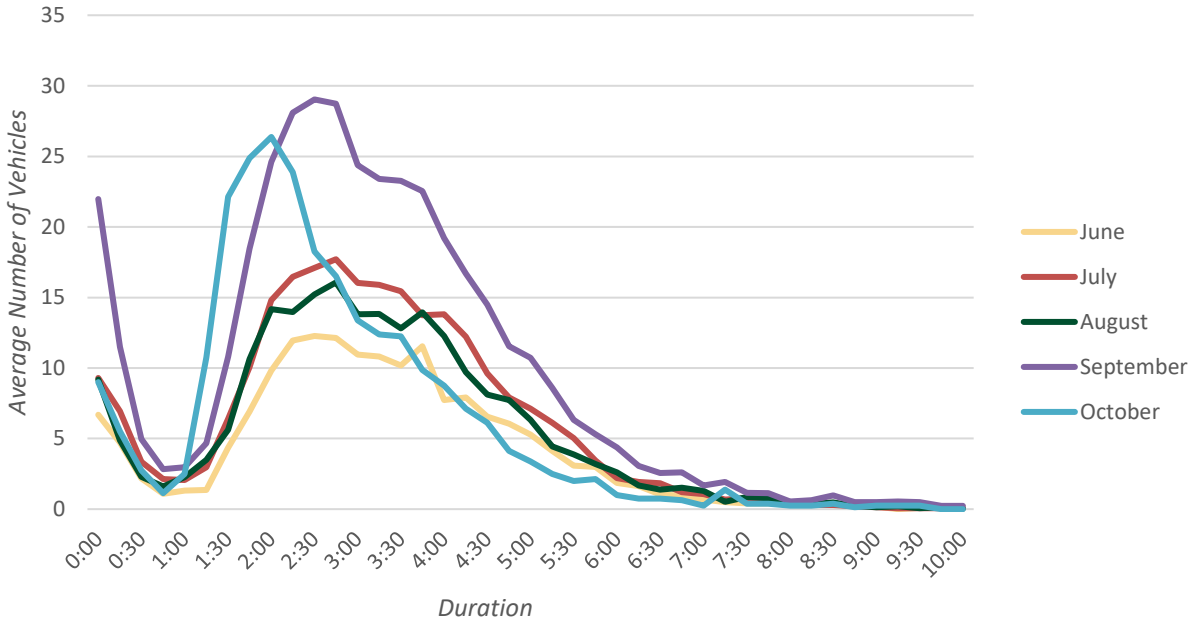

Figure 13: Average Daily Number of Vehicles per Month by Duration

When analyzed by day of the week for each month, the average duration is consistently near 3.5 hours except in the month of October when the average duration is closer to 2.75 hours each day of the week (Appendix A). However, Figure 14 shows that the average duration that vehicles are parked in the parking garage on most peak days (defined as over 500 vehicles) is longer than on the average non-peak

days. This observation is likely in part due to visitors having to wait in line for the shuttle for longer periods of time on peak days than on non-peak days.

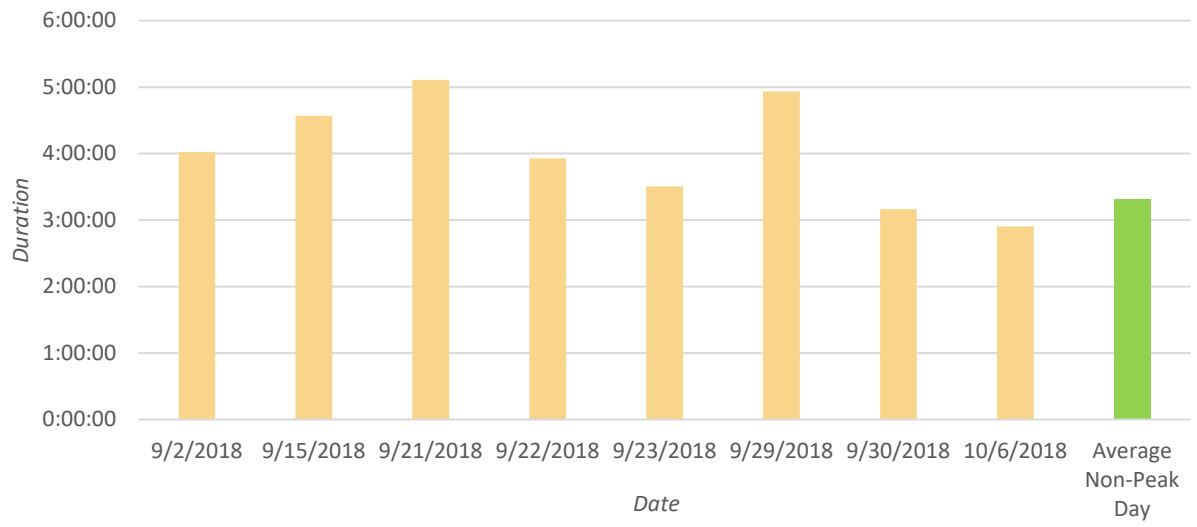

Figure 14: Average Duration of Stay (Peak v. Non-Peak)

The data also show that the average entry time is consistently around 11:30 AM across all days and months. Similarly, the average exit time is consistently around 2:30 PM across all days and months. Figure 15 shows this consistency across months for both average entry and average exit time by weekday and weekend days.

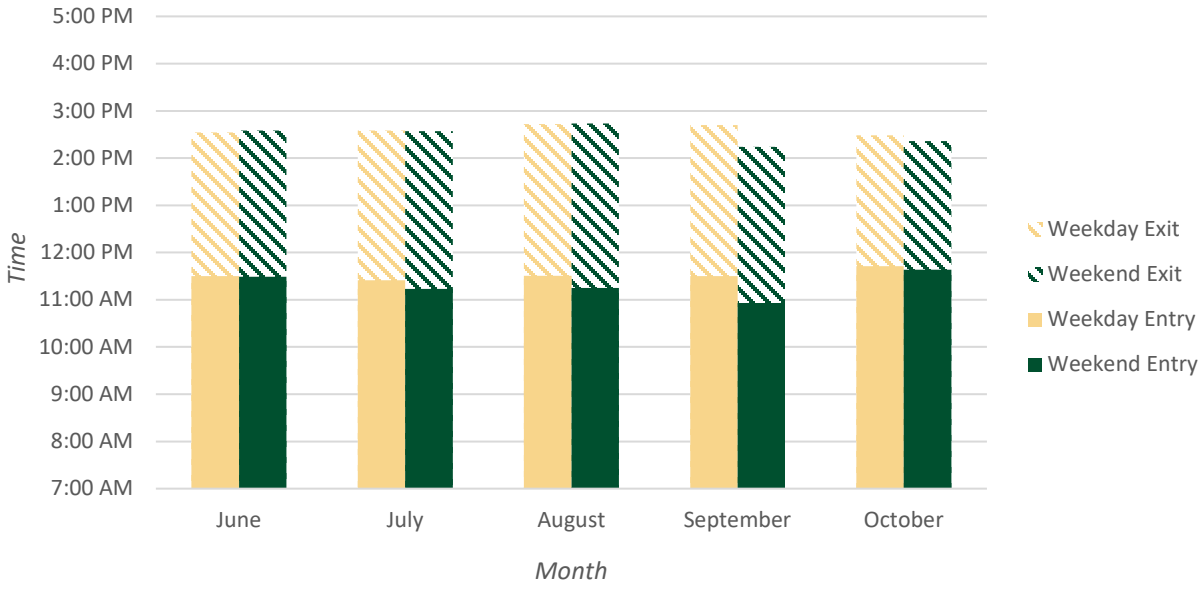

Figure 15: Average Entry and Exit Times per Month by Type of Day

The project team combined entry and exit data with duration data to analyze the number of vehicles parked at any given time. Figure 16 shows that the curve of the number of vehicles parked by time, month, and type of day is roughly consistent for most of the season except for October and September weekends. In general, there are more vehicles parked at any given time on weekends than weekdays for each month that the shuttle is running (Appendix A).

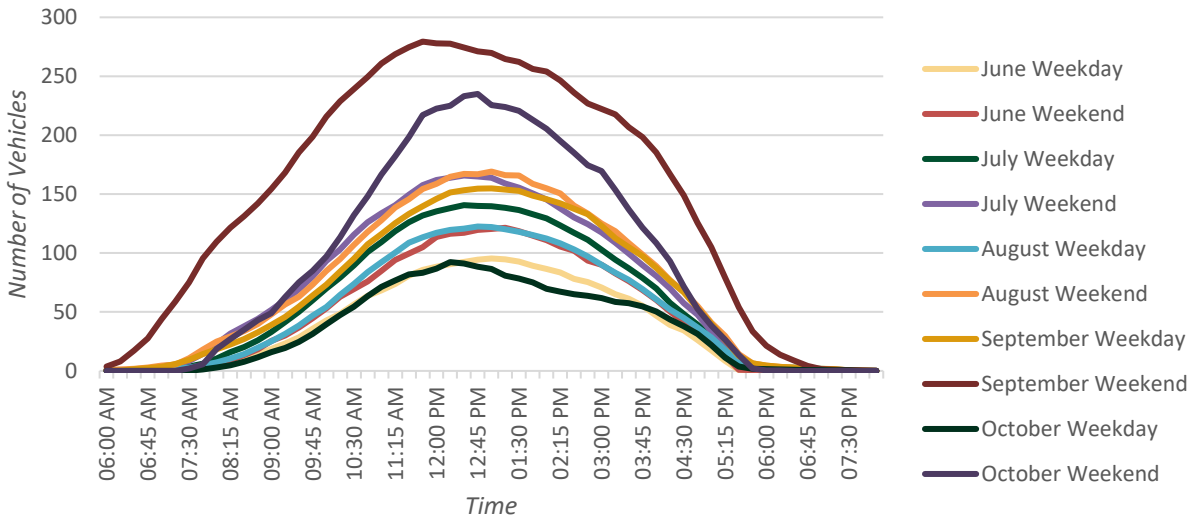

Figure 16: Number of Vehicles Parked by Time

Entry and Exit Time

Figure 17 shows the average number of vehicles by entry time for weekday and weekend days. The same general pattern can be seen across both types of days, with a higher average overall for weekend days.

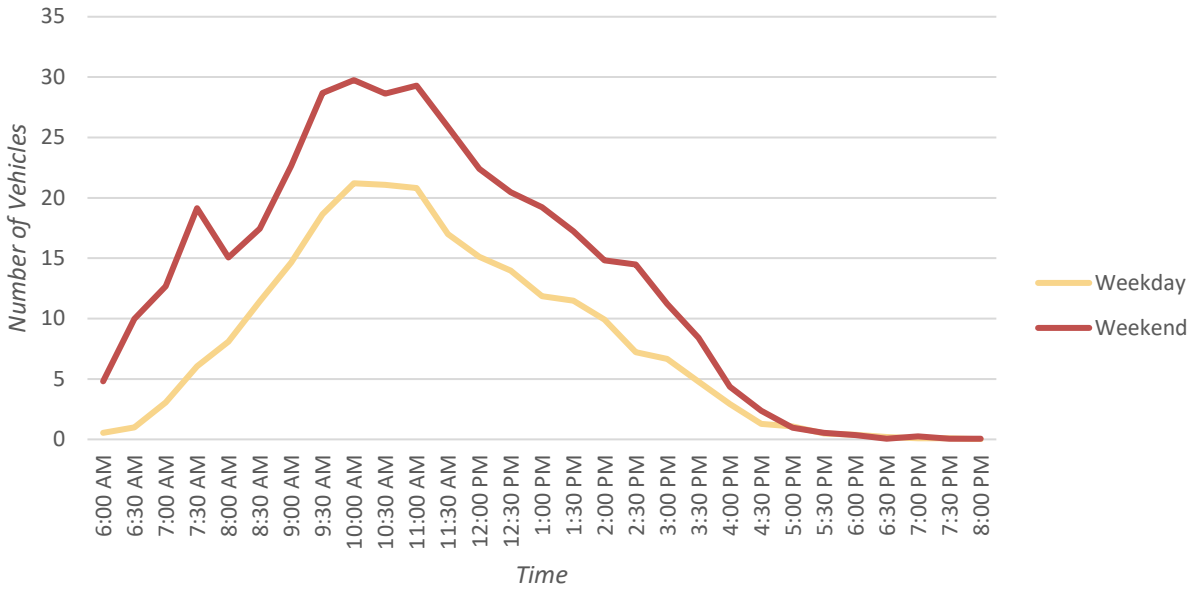

Figure 17: Average Number of Vehicles by Entry Time

Figure 18 shows the average number of vehicles by exit time for weekday and weekend days. The same general pattern can be seen across both types of days, with a higher average overall for weekend days.

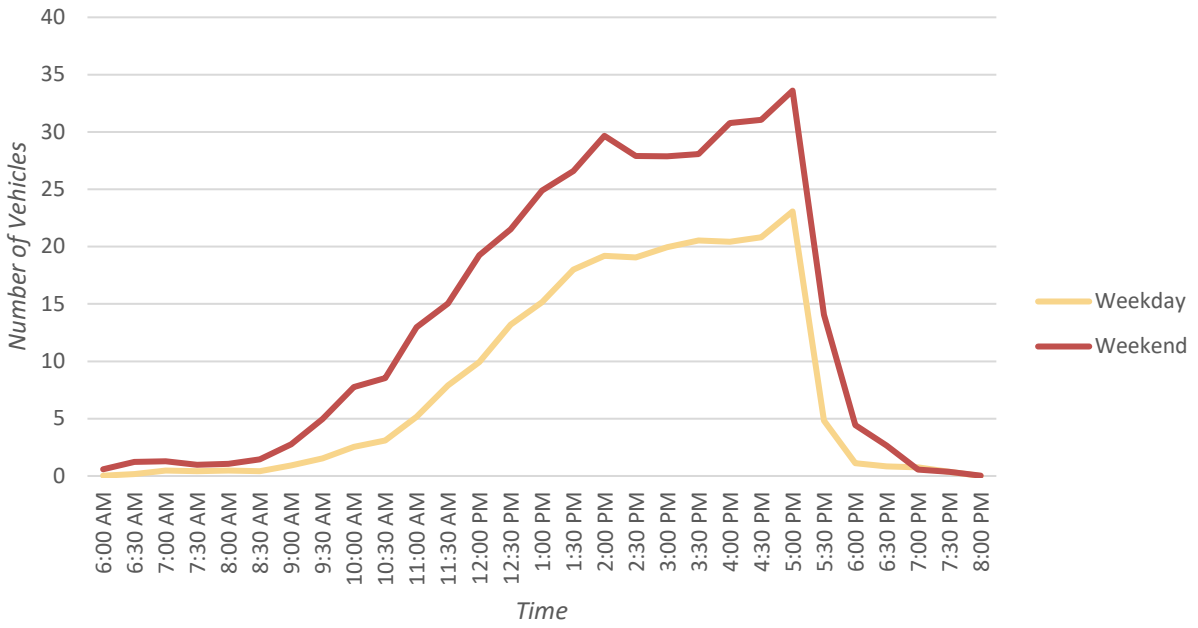

Figure 18: Average Number of Vehicles by Exit Time

Longer-Stay Vehicles (Vehicles with durations > 24 hours)

The project team also analyzed longer-stay vehicles, which are defined as vehicles with stays of 24 hours or more. Figure 19 shows the number of these vehicles by month. July and August saw the highest number of longer-stay vehicles, consistent with warmer summer weather, which is likely to attract campers.

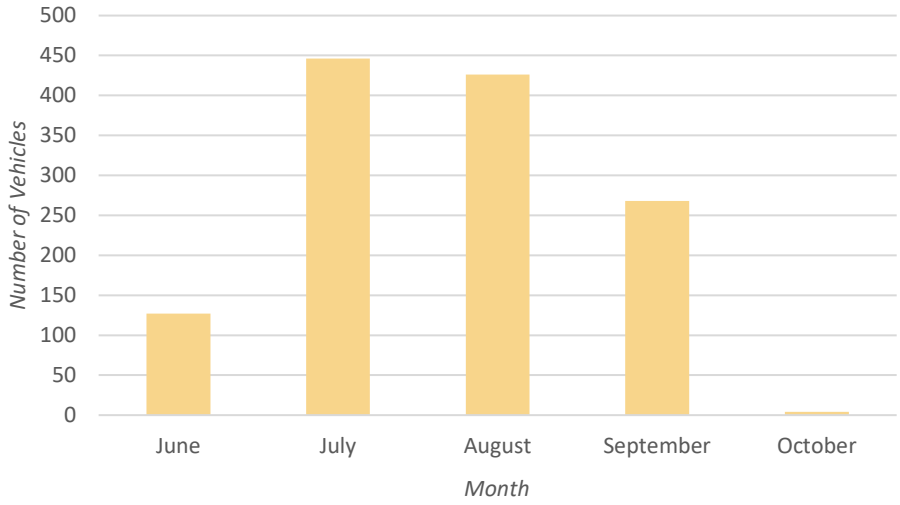

Figure 19: Number of Longer-Stay Vehicles by Month

An analysis of the number of vehicles by duration identified a clear pattern among longer-stay vehicles. As shown in Figure 20, duration peaks among longer-stay vehicles at ~30 hours, ~52 hours, ~76 hours, and ~180 hours. These peaks correspond with one-night trips, two-night trips, three-night trips, and seven-night trips, respectively, suggesting that most campers are likely to camp for one of these four options at Maroon Bells.

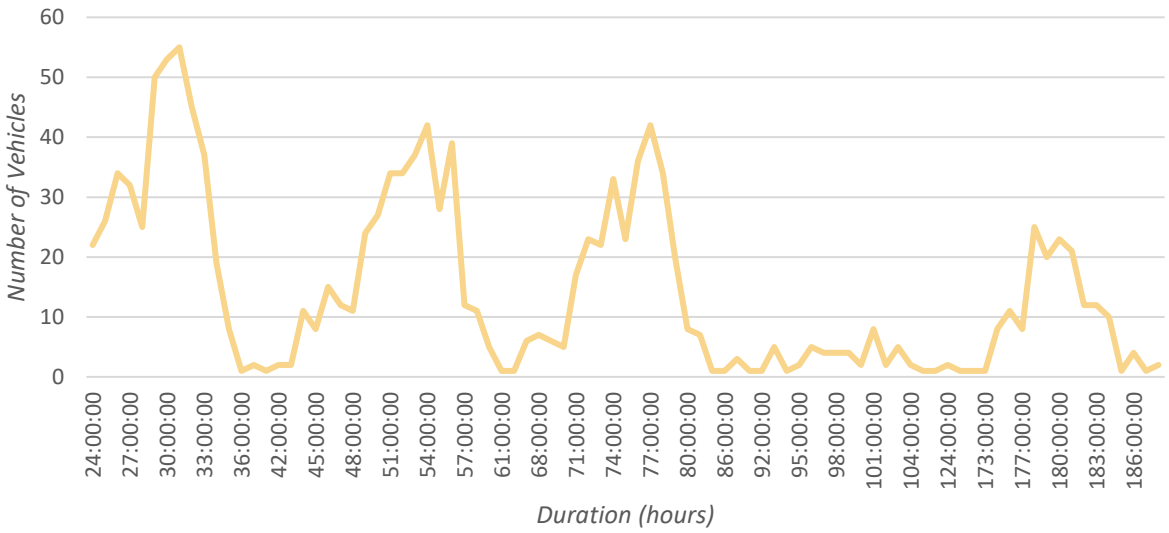

Figure 20: Number of Longer-Stay Vehicles by Duration

Evaluation of the Buttermilk Shuttle Pilot

The purpose of the 2017 Buttermilk Shuttle Pilot Project was to help mitigate congestion on Maroon Creek Road leading to Aspen Highlands as well as congestion at the Highlands parking deck during the peak season for ridership. To publicize and incentive using the shuttle, signage and websites directed visitors to park for free at the Buttermilk Ski Area remote parking lot where RFTA then transported visitors by shuttle (for free) to Aspen Highlands (Figure 21). Visitors could then transfer to shuttle buses traveling between there and Maroon Lake. The shuttle operated Friday to Sunday between September 8th and October 1st, 2017, during peak leaf-changing season in the area. The Volpe Center developed a memo to analyze and summarize data collected between the spring and fall of 2017 to determine whether the Pilot was successful in meeting its purpose. Data analyzed included ridership data, weather data, and traffic flow data.

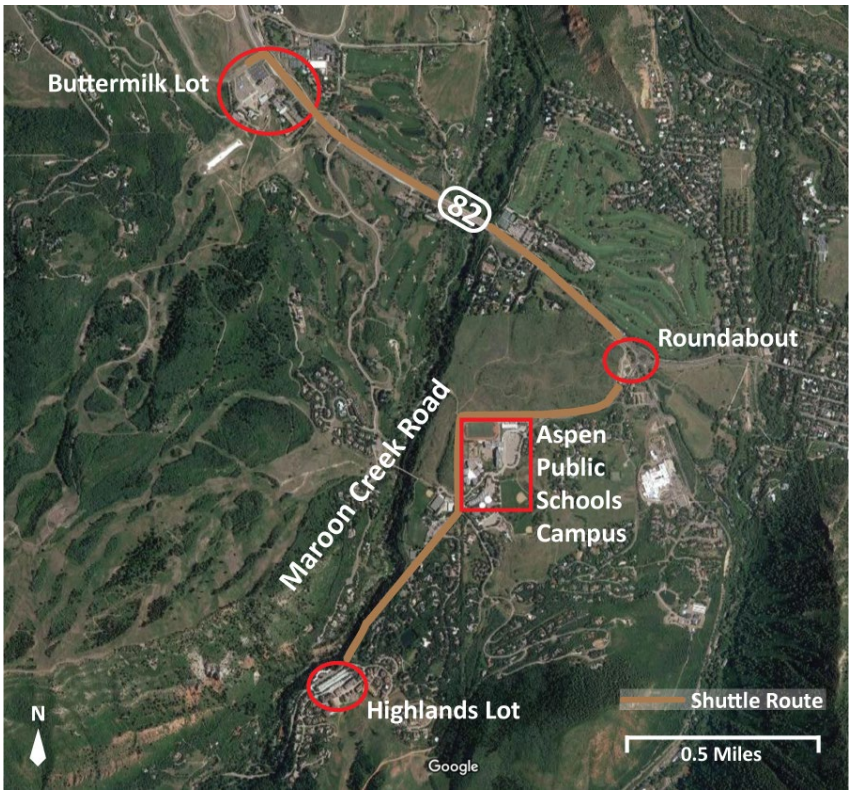

Figure 21: Buttermilk Shuttle Pilot Study Area and Key Locations

The memo concluded that considering that the route of the Buttermilk Shuttle is identical to those of vehicles accessing the Highlands parking lot, one can safely conclude that the shuttle replaced vehicles that its riders would have driven had no shuttle been operating. Assuming an average vehicle occupancy of 2.5 people, a typical day during the study period saw more than 60 fewer cars on Maroon Creek Road than there would have been without the Buttermilk shuttle (Table 1). On individual days, the traffic benefits were more substantial: nearly 300 fewer cars each on Sunday, September 24, and Saturday, September 30, corresponding to a six percent reduction in average daily traffic.

Table 1: Daily Ridership and Estimated Vehicles Diverted by Buttermilk Shuttle

	Sun.	*Fri.*	*Sat.*	*Sun.*	*Fri.*	*Sat.*	*Sun.*	*Sat.*	
	10-Sep	**15-Sep**	**16-Sep**	**17-Sep**	**22-Sep**	**23-Sep**	**24-Sep**	**30-Sep**	**Total**
Total Daily Ridership	56	12	103	102	24	111	353	373	1,134
Vehicles Diverted	22	5	41	41	10	44	141	149	453

The Highlands lot experienced heavy occupancy during the weekend of September 29 and 30, 2017; without the Buttermilk shuttle, the parking facility would likely have been overwhelmed. Vehicles unable to find a spot would have contributed to significant traffic jams in the lot, as well as overflow into Maroon Creek Road, including parking on the shoulder. While parking on the shoulder is not uncommon during the high season, long backups in the main traffic lane interfere with regular roadway operations, including those of the RFTA Maroon Bells route. At times observed anecdotally in previous years, the buses have had to pull into the opposing lane to get around the cars and continue on schedule. An

overflowing parking lot poses a number of concerns, chief among them safety; the benefits provided by the Buttermilk remote parking and shuttle service combination helped to mitigate these concerns.

Public Lands Shuttle Reservation Systems

In early 2018, the MBSA stakeholder group asked the Volpe Center to review shuttle reservation systems in use by other Federal land management agencies. In June 2018, Volpe completed a memo that described three case studies of shuttle systems on public lands involving reservations systems: Muir Woods National Monument, Denali National Park, and Sequoia and Kings Canyon National Parks. The memo presented information collected from interviews with park staff as well as research of publicly available information related to the systems. Subsequent to the issuance of this memo, the City of Glenwood Springs has been considering a reservation system for a shuttle that would exclusively serve Hanging Lake, another popular visitor destination in the WRNF, from Glenwood Springs starting in 2019.

The memo included major takeaways and concluded with lessons learned at each of the three locations such as:

- Of the parks interviewed, some sort of formal cooperative agreement is in place between the park and a transit authority or other concessionaire that operates the system. Typically, the operator runs the reservation system, collects the fares, and bears some or all of the cost of providing the service while the park sets the reservation policies and receives in return a fee to cover the cost of managing the contract. This arrangement can be tailored to the individual needs and specific division of labor between the partners.
- Reservations are offered online and by phone as well as in person. Most services allow for modifications and cancellations within a window not less than 24 hours before departure, sometimes with a fee. Additionally, it seems advantageous to set aside a number of reservations for late purchase to allow for more spontaneous travelers to participate. This can also enable those would-be visitors who are unaware of the reservation requirement to still access the park.
- International travelers tend to want to book trips long in advance, often much further in advance than domestic visitors. Both Aramark and Visalia Transit have contracted for 24-hour call centers to handle booking and customer service for these customers and mentioned that the contract should be for handling an unanticipated call volume.
- Implementation timelines may involve phased changes to collateral policies and infrastructure, such as parking. Muir Woods' use of an Environmental Assessment (EA) and a Memorandum of Understanding (MOU) formalized the responsibilities of the actors as well as publically vetted the approach to change.

MBSA Shuttle Staging Study Survey Report

From September 8 through September 17, 2018, the Roaring Fork Transportation Authority (RFTA) administered surveys on behalf of Pitkin County to Maroon Bells Scenic Area (MBSA) shuttle users to inform the potential implementation of a new MBSA shuttle ticket reservation system. The questions revolved around the following four key topics:

- **Visitor demographics**: Size of group (number adults/children), zip code of residence, and household income category.
- **Trip planning**: When visitors made the decision to visit Maroon Bells, information sources used prior to the visit, the most helpful source of information, awareness of the shuttle, and any previous visits to Maroon Bells.

- **Trip characteristics**: Number of nights spent away from home, where the visitor's vehicle is parked, difficulty finding parking, approximate time visitors boarded the shuttle to and from the Maroon Bells, activities participated in during the visit, and likelihood of visiting again in the future.
- **Opinions and attitudes related to a shuttle ticket reservation system:** Opinion of a ticket reservation system, impact of reservation system on visitors' likelihood of visiting, visitor needs related to a new system, and likelihood of using a satellite parking lot.

In sum, most visitors were happy with how the shuttle system served their needs. Sixty-four percent of visitors were very likely and 23 percent were somewhat likely to visit the MBSA in the future. When asked, "If a ticket reservation system were implemented, how strongly would you favor or oppose this ticket reservation system?" 14 percent of visitors said they would strongly oppose the system and 20 percent said they would somewhat oppose the system. Table 2 shows a summary of the reasons visitors gave for opposing the system.

Table 2: Reasons for Opposing the Ticket Reservation System (N=189)[3]

Category	Number of Responses	Percent of Responses
Excessive pre-planning/lack of flexibility	51	28%
Adverse effect on spontaneity	49	26%
Unforeseen delays (i.e., impacting ticket use)	23	13%
Too burdensome/inconvenient	21	12%
Situational need	12	7%
Lack of awareness of system	11	6%
Support current system	10	6%
Overregulation	9	5%
Other	10	6%
Total	205	--

Twenty-four percent of visitors said they would be less likely to visit the MBSA if a ticket reservation system was put into place in the future. Visitors were also asked about their likelihood of using a new satellite parking lot under various conditions. The findings from each scenario are presented in Table 3.

Table 3: Likelihood of Using a Satellite Parking Lot Under the Following Conditions

	Very likely	Somewhat likely	Not too likely	Not at all likely	Not sure
You can ride the shuttle directly to Maroon Bells (N=571)	72%	17%	4%	2%	5%
You need to change shuttles at the Aspen Highlands (N=561)	15%	30%	32%	15%	7%
The lot is located down valley not on the way from Aspen to Maroon Bells (N=545)	17%	29%	26%	14%	14%

[3] *Note: Some respondents provided multiple responses, so the total percentage is greater than 100%.*

Recommendations

The analysis of 2018 parking lot, ridership, and traffic data shows that the system is most congested on weekend days in September and October. The survey report shows that most people are generally happy with how the shuttle system currently operates, even on peak days. However, visitation on the approximately 10 peak days (i.e., weekend days in mid-to-late September and early October) overwhelm the parking deck, cause congestion and safety issues in the deck and along Maroon Creek Road, and result in long lines of visitors waiting to board the shuttle to the MBSA.

At this time, and especially in light of a very busy fall 2019 season, a ticket reservation system may be prudent to implement as a pilot during the fall 2020 season. Survey respondents were equally split (about 33 percent each) on opposing, favoring, and neither favoring or opposing such a system. However, a temporary piloting of a reservation system during the peak season would be informative to see if such a system could help manage overwhelming crowds at least on fall weekend days. While it may seem logical to just implement such a system on peak weekend days during the fall, for a pilot, it would be best to implement the system for seven days a week during the fall so that the messaging and communication about the system is consistent for visitors for that season. To accommodate spontaneous visitors, a set percentage of tickets, perhaps up to 20 percent of all tickets, could be held for day-of visitors.

The Buttermilk Pilot was effective in 2017 and anecdotally in 2018. The incentives to park for free and ride the shuttle for free from Buttermilk to Aspen Highlands attracts enough visitors to make a discernible difference on peak days. Therefore, this report recommends that the stakeholders continue the Buttermilk shuttle in future years to relieve pressure at Aspen Highlands as long as parking at Buttermilk remains free. Since visitors would clearly prefer not having to transfer shuttles, this report also recommends providing non-stop shuttle service from Buttermilk to the MBSA to further increase the likelihood that people will park at Buttermilk and to negate the need to have as many shuttles move through the already crowded parking garage deck. Last, this report recommends expanding the service period of the Buttermilk shuttle to include Columbus Day weekend. Though there are other events in the area this weekend that create competing needs for the parking lot at Buttermilk, it has increasingly become one of the busiest weekends of the season and would benefit from shuttle service from Buttermilk to relieve the pressure at Highlands.