Visitor Use on Longs Peak: A Preliminary Assessment in Rocky Mountain National Park, Colorado

Report of Findings

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Abstract

Reaching the summit of Longs Peak is a highly sought-after visitor experience in Rocky Mountain National Park, with total ascents nearing 10,000 yearly. With high visitor use levels comes the potential for degradation of ecological conditions, as well as decreases in the quality of the visitor experience. The primary objective of this project was to test several methodological approaches to determine the most effective and accurate means of collecting visitor use data on the Keyhole Route of Longs Peak, the only non-technical route to the summit. This preliminary assessment of visitor use on Longs Peak used automated trail counters and cameras as well as GPS tracking approaches to better understand visitor use levels and behaviors on the Keyhole Route to Longs Peak. Both GPS tracking and camera results indicate that certain locations on the route, including the Keyhole, Trough, and Homestretch, are experiencing relatively high densities of visitor use that roughly correspond with potential areas of safety and visitor experience concern. Regression analysis of camera and counter data indicate a high degree of prediction accuracy between daily counts along the Longs Peak Trail and at the Homestretch. While determining thresholds of use was beyond the scope of this research, our results suggest that future research could be directed to the locations of high density use for threshold determinations.

Introduction

Rocky Mountain National Park (ROMO) is world renown for providing visitors with unique and challenging wilderness experiences. With recent increases in popularity of outdoor recreation and the growing population in Colorado, there exists a continued demand for quality outdoor recreation experiences—experiences both highly accessible and available in ROMO. Associated with this ever-present demand comes the potential for management issues related to visitor capacity, particularly crowding, visitor safety, and potential resource impacts associated with increasing use. In its most basic form, visitor capacity in parks refers to the amount and type of recreation that can be accommodated without unacceptable impacts to natural resources and the quality of the visitor experience (Manning, 2007). Understanding the primary dimensions of outdoor recreation—social, ecological, and managerial—is vital to the development of a visitor capacity/sustainable use strategy.

Contemporary management and research approaches to visitor capacity generally rely on the formulation of indicators and standards of quality for natural resources and the visitor experience (Manning, 2007; 2011). Indicators of quality are ecological and social variables that can be used to measure sustainability. Standards of quality define the minimum acceptable condition of indicator variables. Once indicators and standards of quality are formulated, indicator variables are monitored and management action is taken to ensure that standards of quality are maintained. Development of indicators for a capacity management approach necessitates knowledge of visitor use levels, spatial and temporal patterns of behavior, and visitor behavioral characteristics.

In ROMO, the Longs Peak area represents a quintessential challenge for park capacity management. First, hiking "14ers"—mountain peaks over 14,000'—is an increasingly popular pursuit among recreationists, especially in Colorado, which boasts 54 peaks over 14,000' (Colorado Fourteener's Initiative, n.d.). Iconic Longs Peak is the only 14,000' peak in ROMO. The majestic East Face dominates the view from many areas of ROMO and is visible to over a million residents of the north-central Front

Range. Second, an ascent of Longs Peak via the Keyhole Route is a highly sought after experience, with recent estimates of total annual ascents approaching 10,000 (Rocky Mountain National Park, 2015). Anecdotal information suggests that the majority of these ascents occur during a period of a few weeks during the summer season, when the Keyhole Route is relatively free of snow and ice. This short season is further complicated by the popularity of ROMO as a weekend destination—on some weekends there can be hundreds of people en route to the summit of Longs Peak. Currently, little quantitative information is available on the essential aspects of visitor use such as quantity of use, spatial and temporal distribution, waiting times in high traffic areas, length of trip, etcetera. Understanding these use characteristics is an important first step to the initiation of a broader study of capacity management on Longs Peak.

Methods

Study Site

The Longs Peak trailhead area of ROMO provides access to Estes Cone, Chasm Lake, and Longs Peak. Longs Peak (14,259’) is one of the most popular routes in Colorado (National Park Service, 2016). A variety of technical (i.e., requiring ropes and protective climbing gear) routes access the summit of Longs. The Keyhole Route, accessed via the Longs Peak Trail (Figure 1), provides a largely non-technical route to the summit of Longs Peak. While the Keyhole Route does not require ropes, it requires scrambling across narrow ledges, sheer rock faces, and steep cliffs, and exposes visitors to loose rock and potential rockfall (National Park Service, 2016). The rugged nature of this route to the summit provides challenges to monitoring visitor use levels, as placement and calibration of standard trail counters is impractical, if not impossible, in many key locations.

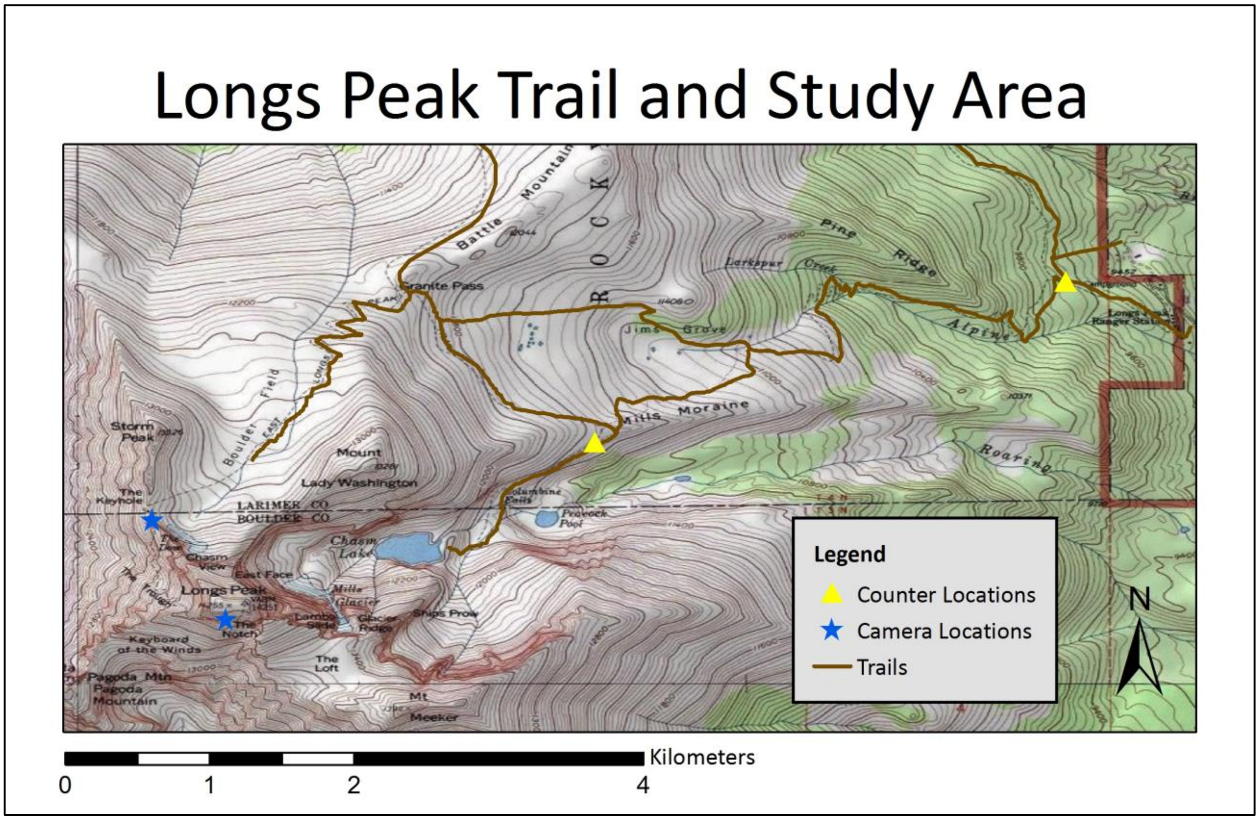


Figure 1: Longs Peak study area in Rocky Mountain National Park, Colorado.

Data Collection and Analysis

The primary objective of this project was to test several methodological approaches to determine the most effective and accurate means of collecting visitor use data on the Keyhole Route. Visitor use characteristics on the Keyhole Route of Longs Peak were assessed using both automated trail counting techniques and GPS-based assessment of spatial and temporal patterns of visitor use for a three-week period during the peak summer season (late July/early August). TrafX® automated trail counters were installed at junctions along the route in order to count visitor use at key locations. Counters were calibrated using a direct comparison with a sample of manual counts conducted by researchers and volunteers in the field. Due to the challenges posed by both the physical environment and visitor behavior above the Boulderfield, research-grade Reconyx® automated cameras were deployed at the Keyhole and the transition between the Narrows and the Homestretch in order to count and characterize visitor use at these locations. Additionally, visitor behavior was assessed using GPS tracking approaches where a randomly selected number of visitors were asked to carry and return Garmin eTrex 10 GPS trackers (D'Antonio et al., 2010). A positional error calibration procedure was used to determine the GPS error associated with the Garmin units. This margin of error can then be applied when examining on- and off-trail behavior and to the radius of stopping locations. GPS tracks were corrected by removing extraneous data points at the trailhead and other instances where obvious positional or operational errors occurred.

The cameras were programmed to take one photo every second when motion was sensed within the field of view. Each photo was automatically embedded with a date and time stamp. During data analysis, the date and time stamp of the photo was recorded when a visitor was seen entering the photo frame and again when the same visitor exited the photo frame. Also noted was the direction the visitor was traveling (i.e., ascending or descending). This allowed the number of ascending visitors to be counted within one-hour time slots and compared to the automated counter data.

A regression analysis was conducted utilizing Microsoft Excel and SPSS statistical software in order to investigate the relationship between counts of visitors (and associated error) obtained from the cameras and trail counters. Hourly counts of visitors obtained from the counters were offset by time intervals derived from GPS-tracks, which represent the median time it takes visitors to travel between the counters. These data were organized by day and compared with daily counts obtained from the automated camera.

Results

GPS Tracking

GPS tracking of visitors resulted in a total of 335 usable tracks from 349 solicitations, in which visitors hiking to Longs Peak were asked to carry a GPS unit with them while they hiked (96% response rate). When determining the sample population, we were interested primarily in visitors hiking to the summit of Longs Peak. The sample did not include visitors camping overnight in the Boulderfield or other back country camping areas accessible from the trail. The sample also did not include visitors attempting to summit Longs Peak via a technical route (rock climbers) who may have descended via the Keyhole Route. Of visitor groups intercepted during the sample period, 59% indicated that they were attempting to reach the summit of Longs. Of those who attempted, 49% (97 groups) successfully reached the summit (Table 1).

Table 1: GPS track descriptive data.

Date	Day of Week	Number of Tracks	Number of Summit Attempts	Number of Summits	Weather
17-Jul	Friday	30	20	3	Clear, windy
18-Jul	Saturday	33	21	2	Mostly clear, calm a few sprinkles
19-Jul	Sunday	31	16	5	Clear then overcast
20-Jul	Monday	28	11	4	Clear, slight breeze
21-Jul	Tuesday	23	7	4	Cloudy, sprinkles
23-Jul	Thursday	33	20	8	Clear, warm, sunny
24-Jul	Friday	34	21	9	Mostly sunny, warm, breezy
25-Jul	Saturday	32	18	16	Mild, clear-partly cloudy
26-Jul	Sunday	31	22	17	Clear and breezy
29-Jul	Wednesday	28	19	14	Clear and breezy
30-Jul	Thursday	32	22	15	Clear and breezy
Totals		335	197	97	

GPS data can also be used to examine visitor trip duration and use density (Table 2). Track duration has been broken down by track destination, thus providing average trip durations for visitors travelling to Chasm Lake as well as visitors attempting to reach the summit. Additionally, average start and finish times for visitor groups travelling to both destinations are reported.

Table 2: Average track start time, finish time, and duration.

	All	Weekday	Weekend
Total Average Track Duration (Hr:Min) Standard Deviation	8:25 ±2:57	8:23 ±3:05	8:26 ±2:52
Average Time to Chasm Lake, Roundtrip (Hr:Min) Standard Deviation	5:47 ±1:25	6:06 ±1:30	5:28 ±1:18
Average Time to Summit, Roundtrip (Hr:Min) Standard Deviation	10:00 ±2:30	10:16 ±2:43	9:48 ±2:19
Average Chasm Start Time	7:15am	6:55am	7:34am
Average Chasm Finish Time	1:02pm	1:02pm	1:02pm
Average Summit Start Time	3:34am	3:55am	3:35am
Average Summit Finish Time	1:43pm	2:11pm	1:23pm

Analysis of visitor use densities along the Longs Peak Trail (Figure 2) indicates the junction between the Chasm Lake Trail and the Longs Peak Trail, the eastern edge of Chasm Lake, the Boulderfield, the Keyhole, the Trough, and the top of the Homestretch and summit area experience the highest density of visitor use.

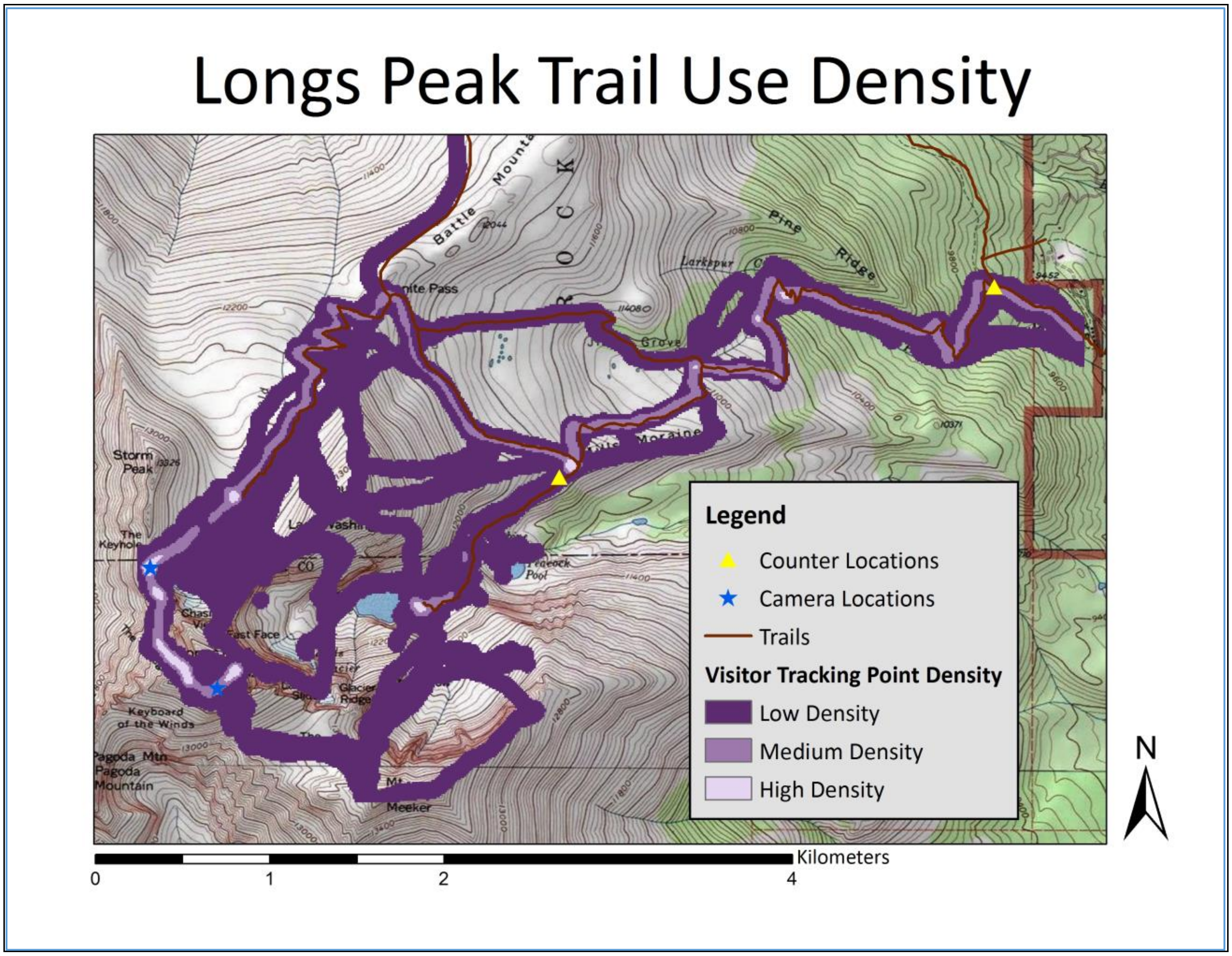


Figure 2: GPS track density along Longs Peak Trail.

Automated Counters

Automated counters were installed by park staff at the Longs Peak Trailhead (LP2), on the Estes Cone Trail (EC) just past the junction with the Longs Peak Trail, and on the Longs Peak Trail just past the junction with the Estes Cone Trail. One additional counter was installed on the Chasm Lake Trail (CHASM) just past the junction with the Longs Peak Trail. A direct observation calibration procedure (e.g., Pettebone, 2009) was used to obtain hourly and daily counts of visitors using the various trails. Calibrations were used to correct trail counter data to obtain average hourly, daily, and monthly levels of visitor use (Figures 3 through 5). A counter malfunction resulted in missing data for the EC counter between July 19 and August 14, 2015, and for the LP2 counter between August 5 and August 14, 2015. Data collected from the LP2 and EC counters were bootstrapped during analysis to account for missing data. This technique resampled the data 1,000+ times to obtain estimates of the daily and hourly visitation means (Pettebone, 2009). The smaller, more variable sample collected by the EC counter is reflected in the larger error (relative to the other counters) depicted by the error bars in Figure 4, below.

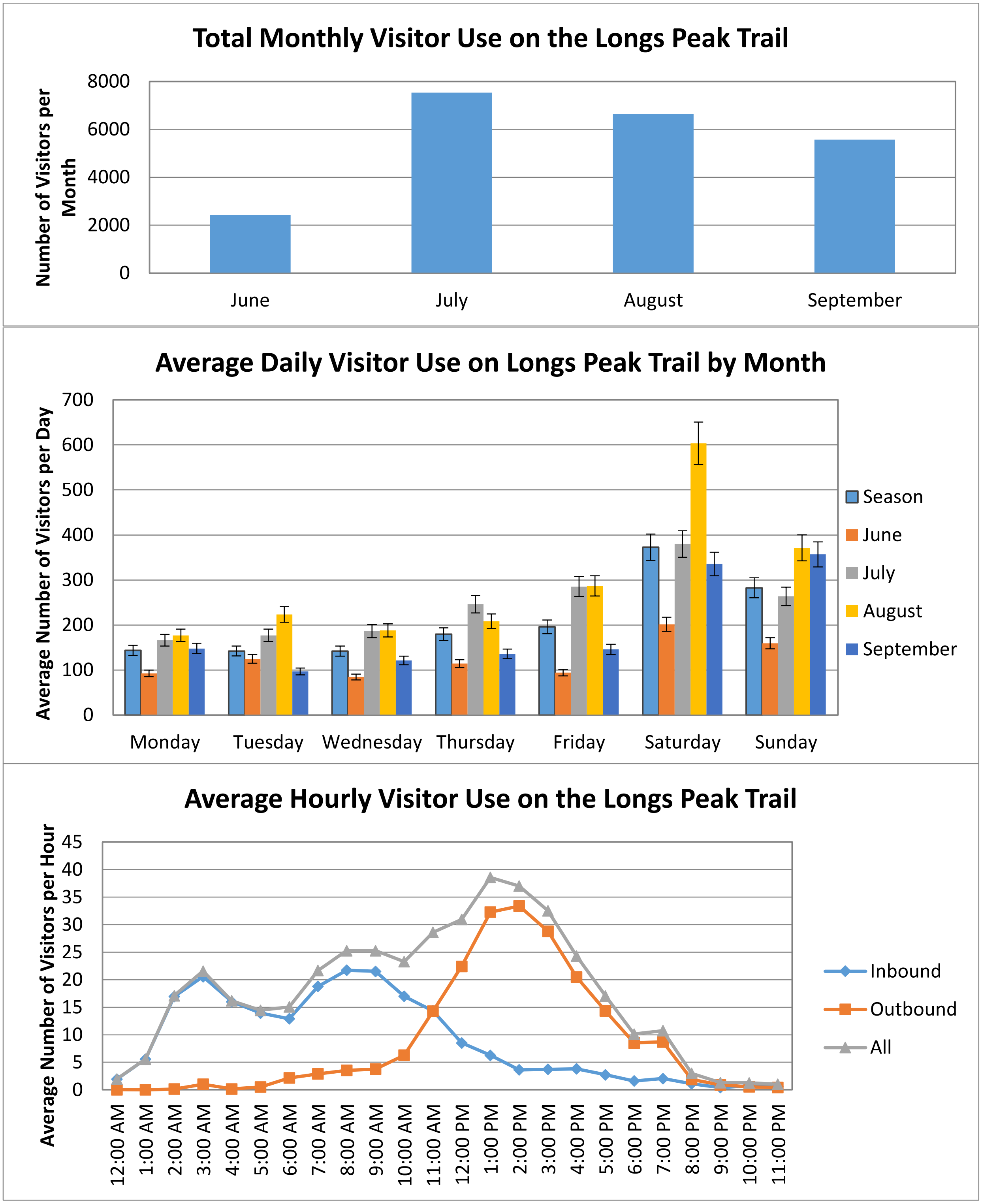
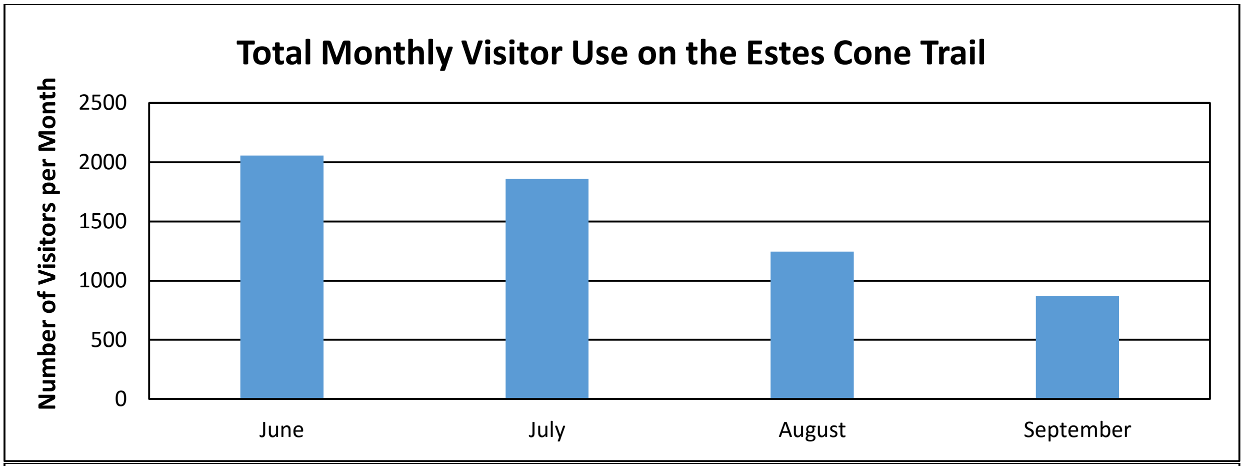
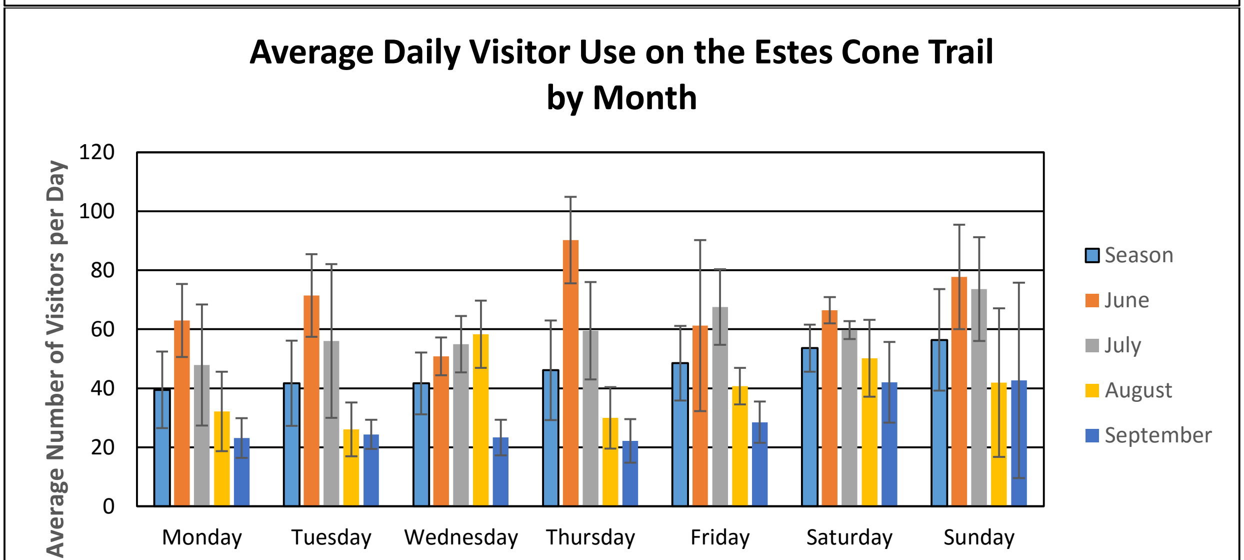


Figure 3: Total monthly, average daily, and average hourly visitation on the Longs Peak Trail in 2015. Note: Error bars represent 95% confidence intervals. Error bars for hourly use have been removed for clarity, see Appendix: Tables I-II.





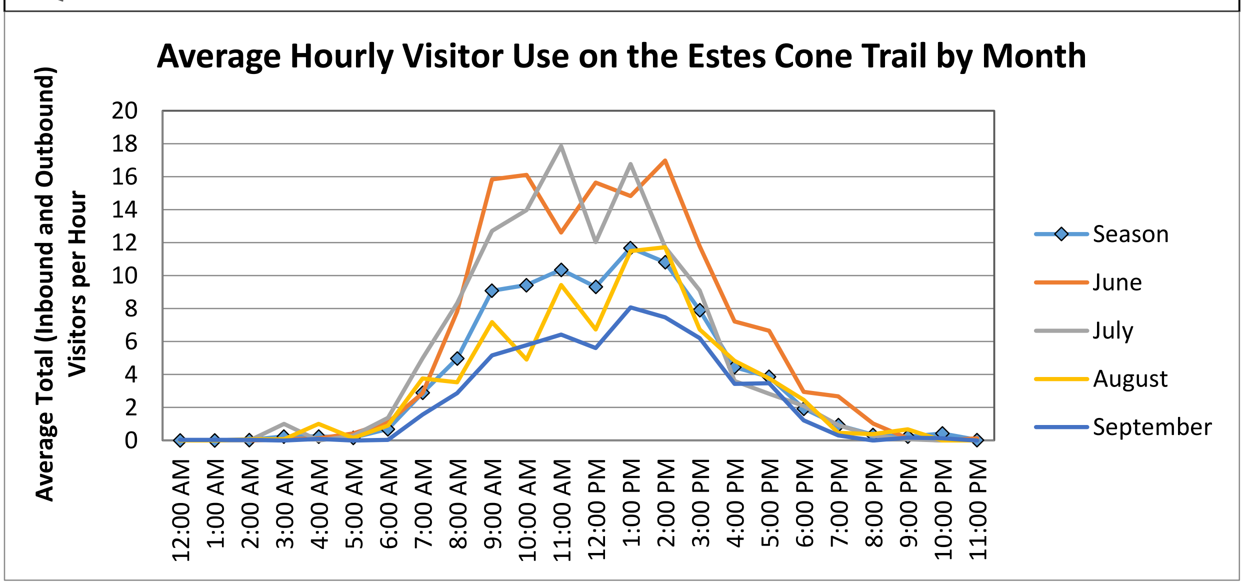
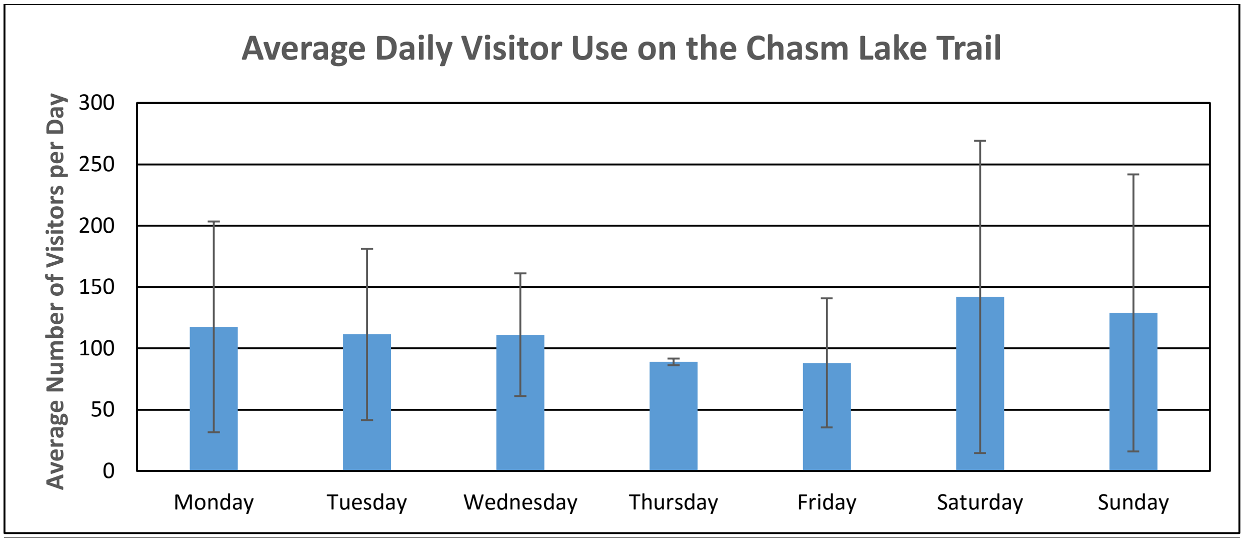


Figure 4: Total monthly, average daily, and average hourly visitation on the Estes Cone Trail in 2015. Note: Error bars represent 95% confidence intervals. Error bars for hourly use have been removed for clarity, see Appendix: Tables III-VII.



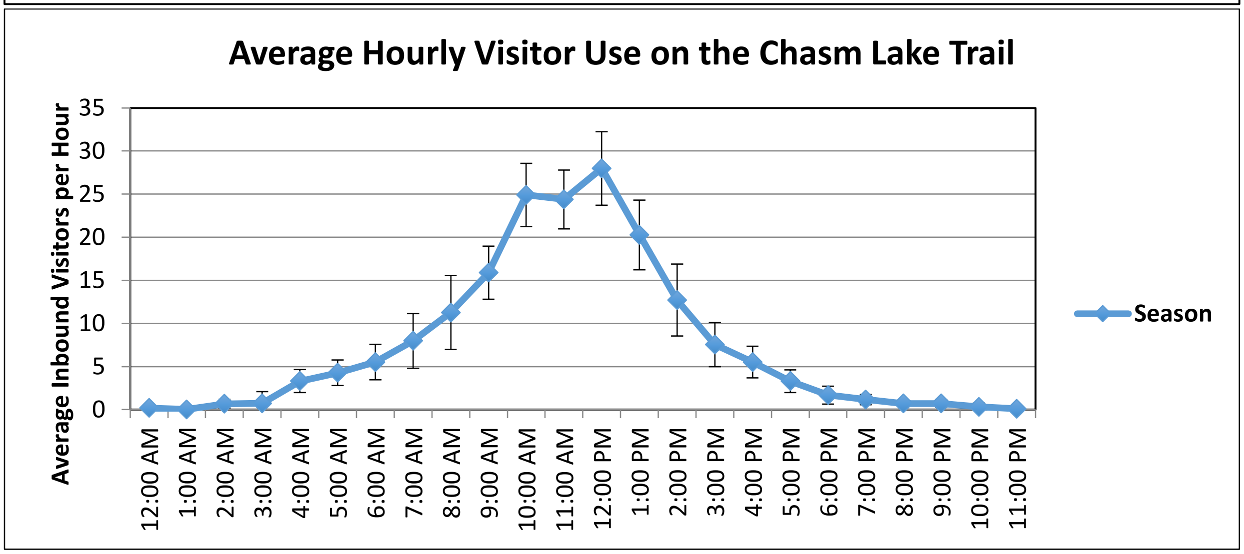


Figure 5: Average daily and hourly visitation on the Chasm Lake Trail during the study period (July 17-August 5, 2015). Note: Error bars represent 95% confidence intervals.

Automated Cameras

Automated cameras were installed at the Keyhole on the roof of the Agnes Vaille structure, and at the transition from the Narrows to the Homestretch. Cameras were attached to the rock using removable cording and bungees. Initial analysis of photos indicates that significantly more pictures were taken by the camera located at the Homestretch than the camera located at the Keyhole, though the Keyhole camera was deployed for a greater duration. An examination of photos taken by the Keyhole camera and our observations suggest that the main travel path of some visitors as they ascend to the Keyhole from the Boulderfield brings them very close to the Agnes Vaille structure. As the camera was placed on the roof of the structure, some visitors, by travelling close to the structure, never entered the field of view of the camera. Thus, the camera at the Keyhole location did not adequately capture movement and behavior. As such, visitor use characteristics were extracted from the photos taken by the automated camera located near the Homestretch section of the Longs Peak trail only. Over 30,000 photos from the Homestretch camera were examined. A summary of the number of pictures taken by each camera per day is provided (Table 3).

Table 3: Pictures per day taken at each camera location.

Date	Day of Week	Keyhole	Homestretch
9-Jul	Thursday	104	N/A
10-Jul	Friday	350	N/A
11-Jul	Saturday	86	N/A
12-Jul	Sunday	224	N/A
13-Jul	Monday	332	N/A
14-Jul	Tuesday	71	N/A
15-Jul	Wednesday	65	N/A
16-Jul	Thursday	131	N/A
17-Jul	Friday	479	290
18-Jul	Saturday	491	599
19-Jul	Sunday	254	893
20-Jul	Monday	56	467
21-Jul	Tuesday	173	428
22-Jul	Wednesday	221	395
23-Jul	Thursday	416	914
24-Jul	Friday	1235	1217
25-Jul	Saturday	470	3899
26-Jul	Sunday	179	2619
27-Jul	Monday	89	1343
28-Jul	Tuesday	215	506
29-Jul	Wednesday	1037	1700
30-Jul	Thursday	866	3002
31-Jul	Friday	1739	2769
1-Aug	Saturday	1224	5117
2-Aug	Sunday	326	3443
3-Aug	Monday	8	444
4-Aug	Tuesday	326	401

	“weekend” days
	partial day
	possible error

Despite the limitations resulting from placement of the Keyhole camera, the camera data is useful in examining visitor behavior patterns (see examples Figures 6-8).

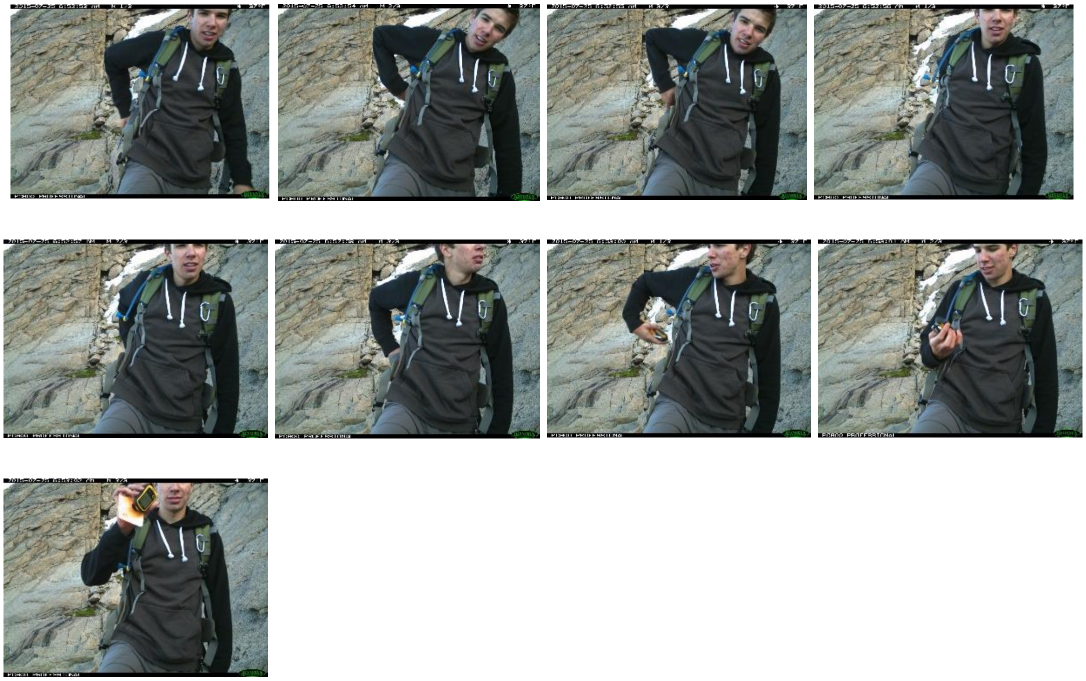


Figure 6: Visitor with GPS unit at the Homestretch.

Figure 7: Visitor “movement” and queuing along the Homestretch.

Figure 8: Visitor queuing along the Homestretch.

Both GPS tracking and camera data illustrate areas of possible visitor queuing and areas and times of high visitor use and density, which are indicative of possible "choke points" along the Keyhole Route. Visitor use level data obtained from the automated camera positioned at the Homestretch show increases in visitor use on weekend days (Saturday and Sunday), with an average of over 140 visitors per day during periods of highest use on Saturdays, as compared to an average of fewer than 20 visitors per day of lowest use on weekdays (Figure 9).

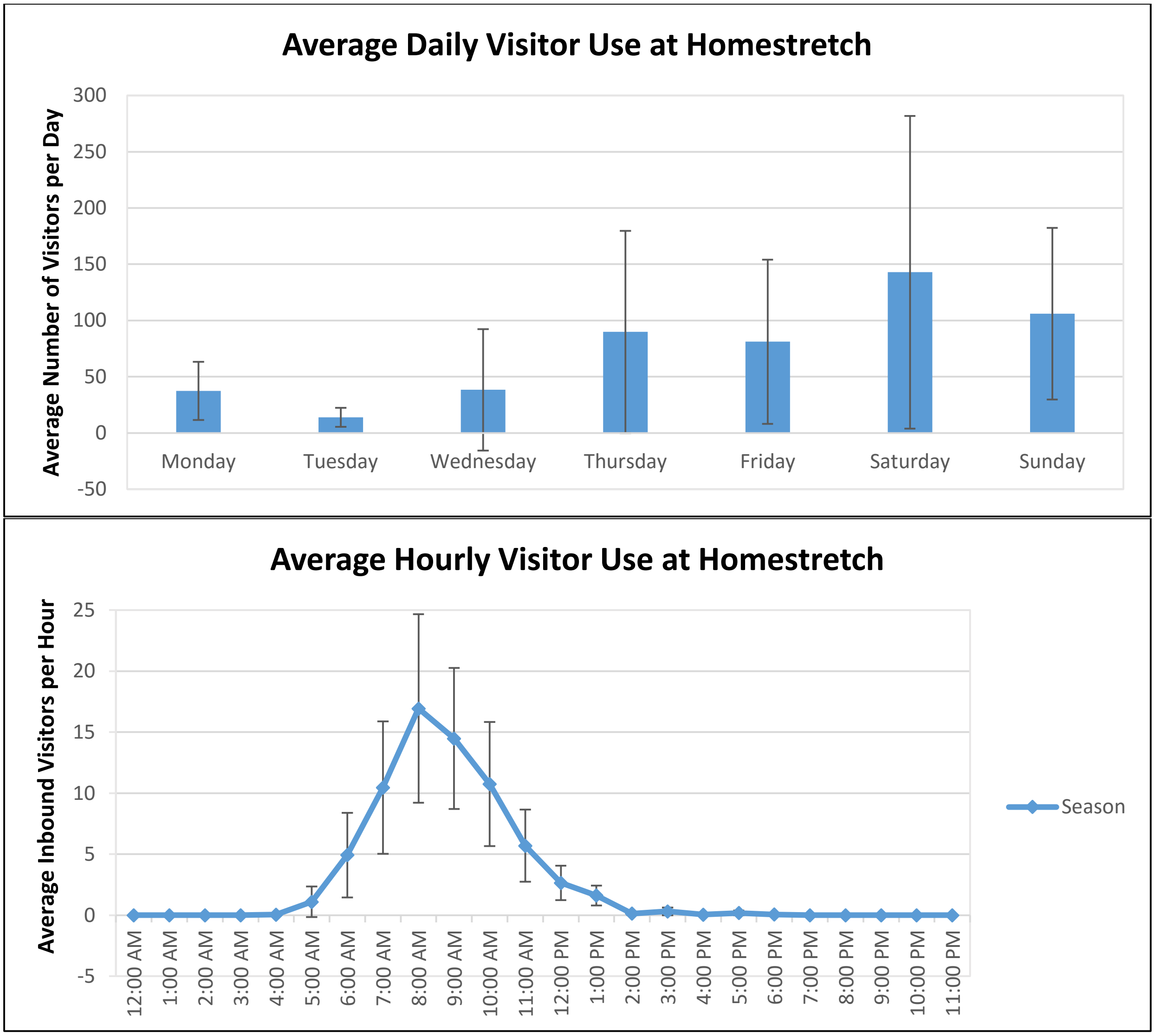


Figure 9: Average daily and hourly visitation on the Homestretch section of Longs Peak Trail during the study period (July 17-August 5, 2015). Note: Error bars represent 95% confidence intervals.

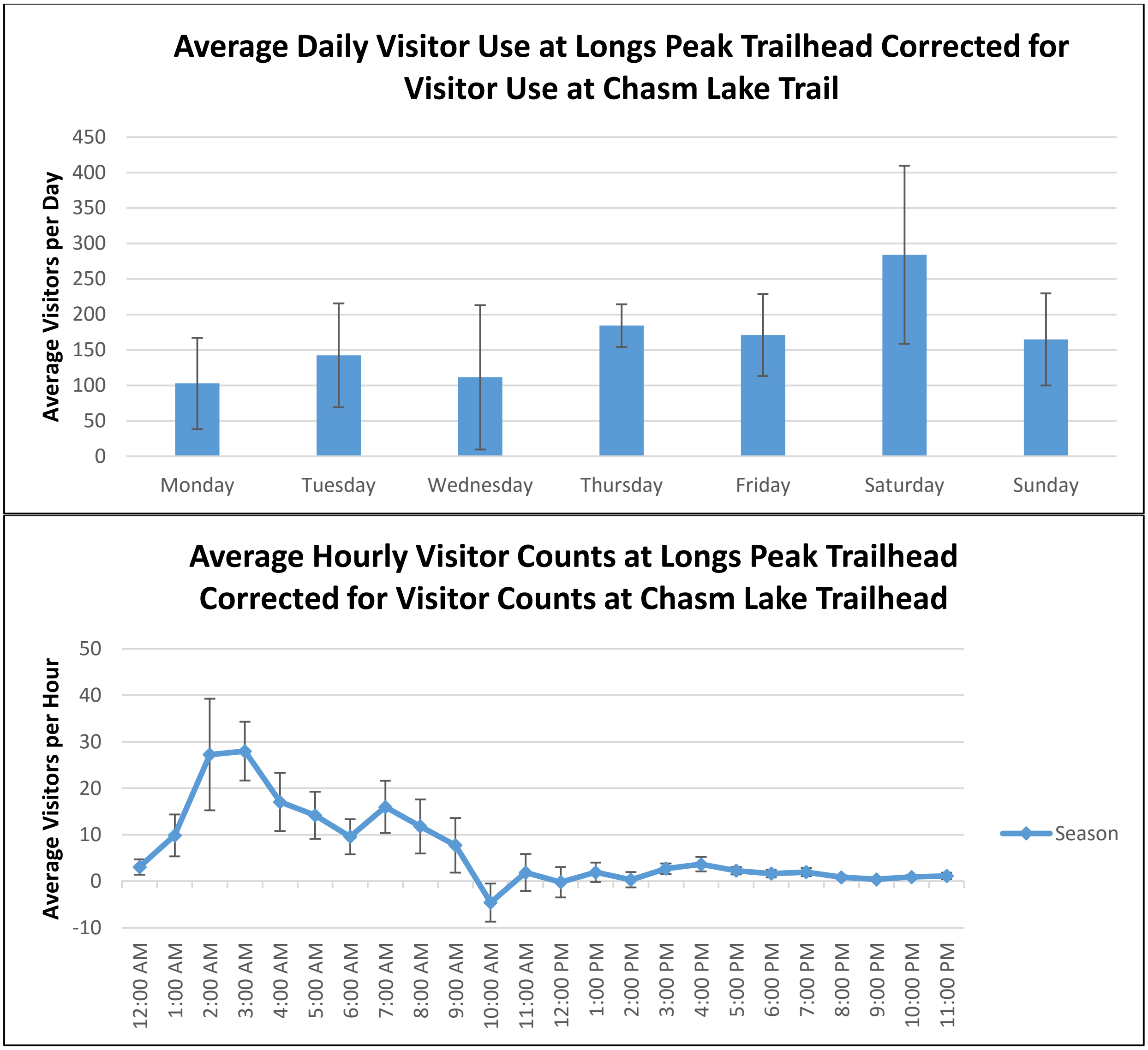


Figure 10: Average daily and hourly visitation at Longs Peak Trailhead when correcting for visitor counts at Chasm Lake Trail using the GPS track median time-delay during the study period with adequate data (July 18-August 4, 2015). Negative values indicate more visitors counted at Chasm Lake Trail than at Longs Peak Trailhead during the corresponding hour. Note: Error bars represent 95% confidence intervals.

Regression Analysis

Daily ascending visitor counts obtained from the camera located on the Homestretch section of the Longs Peak Trail were compared to the daily ascending visitor counts from the Longs Peak trailhead and Chasm Lake automated counters. Figure 11 shows the total daily ascending counts from the Longs Peak trailhead counter predicting the total daily ascending counts from the Homestretch camera using simple linear regression. The relationship between the visitors passing the trailhead counter and the visitors passing the Homestretch camera is strong, as shown by an R^2 value of 0.63. When the Longs Peak Trailhead daily ascending counts are corrected for visitors only going to the summit by removing the Chasm Lake counts, the simple linear regression relationship better predicts the Homestretch counts as shown by the increase of R^2 to 0.73 (Figure 12). The lines of fit were forced through the origins to better fit the low counts recorded at the Homestretch camera. One extremely low outlier was removed. Due to factors beyond our control, the field of view of the Homestretch camera was altered (presumably by a visitor) on the last day of its deployment which allowed some visitors to pass the camera undetected, resulting in inaccurate counts.

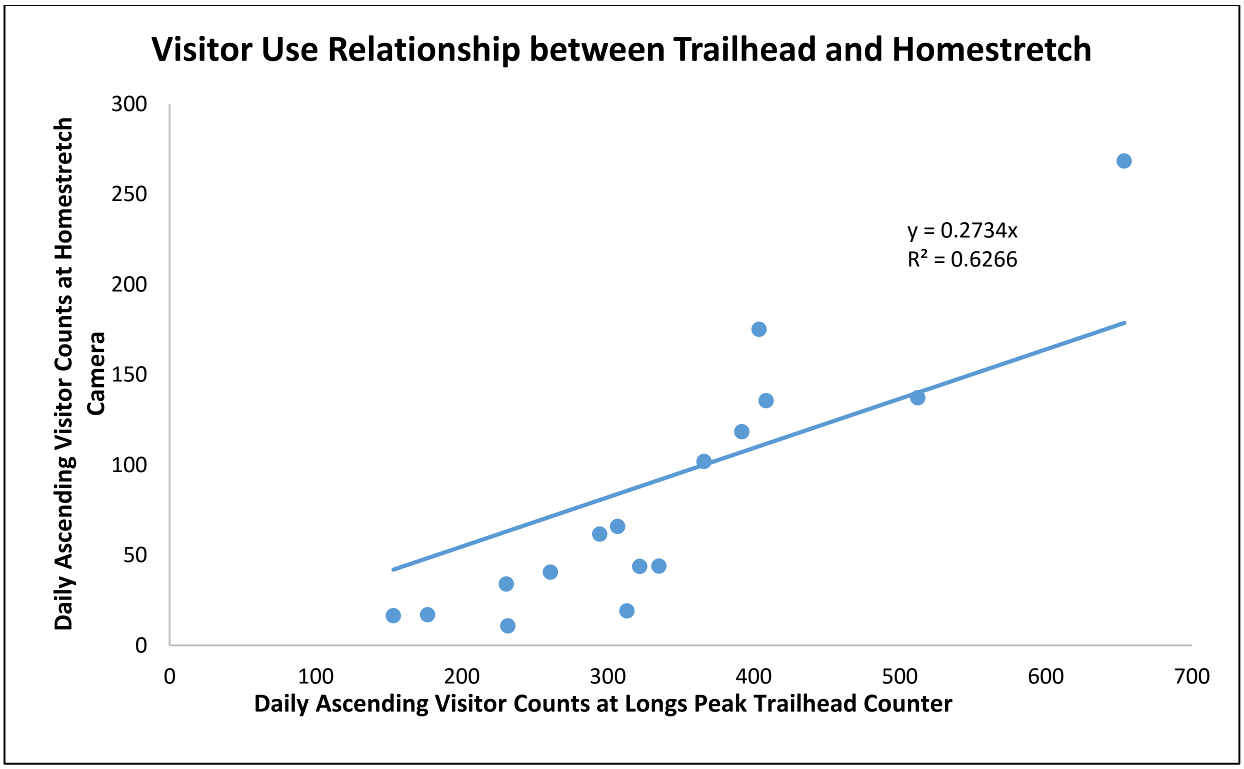


Figure 11: Regression analysis of the daily ascending visitor counts at Longs Peak Trailhead and Homestretch camera.

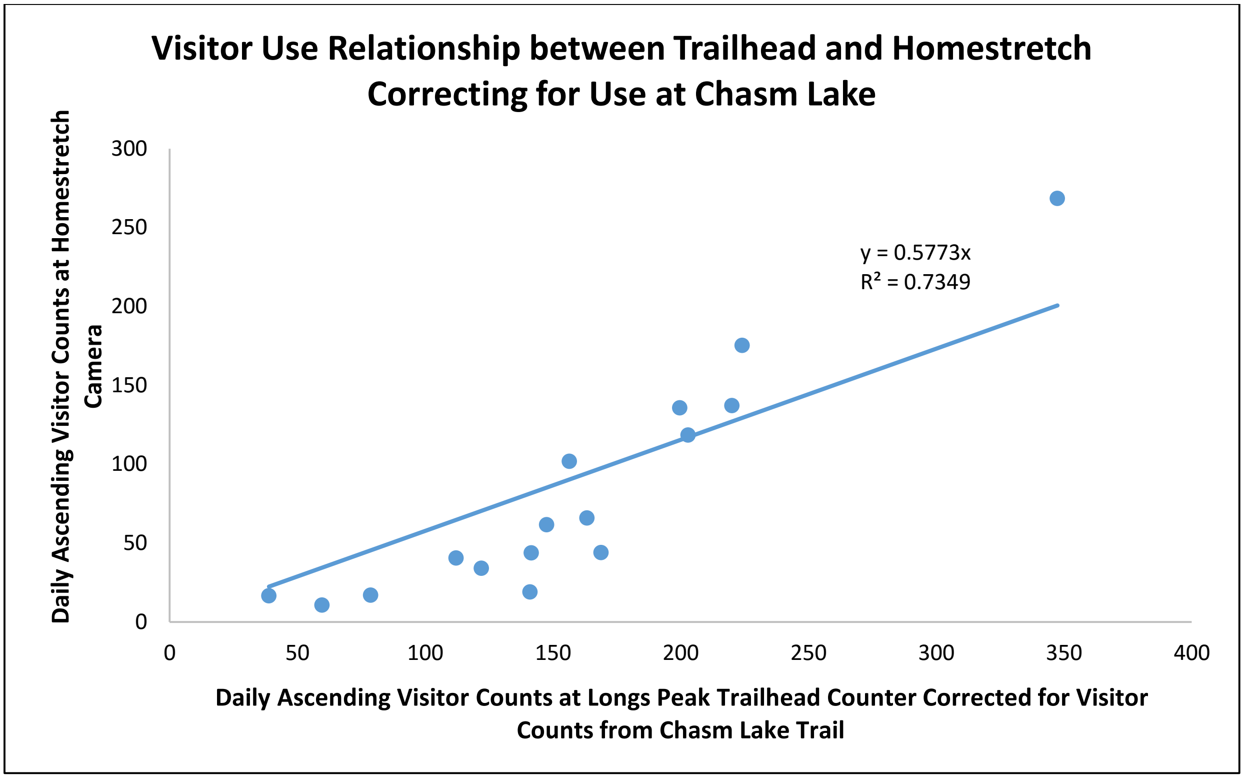


Figure 12: Regression analysis of the daily ascending visitor counts at Longs Peak Trailhead corrected for visitor counts at Chasm Lake Trail during the study period with adequate data (July 19-August 3, 2015).

Summary of Findings and Management Implications

GPS tracking of visitors suggests that several areas of high visitor density exist along the Keyhole route. The junction between the Longs Peak and Chasm Lake Trail, the Boulderfield, the Keyhole, a spot along the Ledges, the Trough, the Narrows, and the summit of Longs Peak are areas where visitors are congregating, or where queuing may be occurring, as visitors' speed of travel slows due to the difficulty of the terrain in these sections. As these areas are some of the steepest and most exposed on the route, they represent areas of safety concern as well as potential areas of visitor crowding. Future research could address establishing thresholds of use associated with these concerns.

Both camera and counter data suggest that visitor use of the Longs Peak Trail is highest on Saturdays in July when the route becomes snow-free. Visitor use of the Longs Peak Trail peaks at 2am (visitors attempting to summit Longs Peak) and again between 8-9am (visitors heading to Chasm Lake). Visitor use levels captured by the automated camera positioned at the Homestretch are highest at 9am, averaging 17 visitors per hour during the study period. Regression analysis comparing visitor use levels captured by the automated counter at the trailhead to the automated camera placed at the Homestretch reveals a strong relationship and therefore a high degree of prediction accuracy between daily counts along the Longs Peak Trail and at the Homestretch when corrected for visitors to Chasm Lake. No discernable relationship existed between hourly use at the Longs Peak counter and

Homestretch camera, likely due to the high variability of speed of travel between visitor groups on the Longs Peak Trail.

Additional work is necessary to fine-tune the use of automated cameras, particularly regarding optimal camera placement. Semi-permanent methods of anchoring the cameras, such as bolt placement or some sort of other anchor (like a post), would allow for a greater range of camera placement options and should be considered for future research. Our camera methods provide both visual representations of crowding and queuing, as well as actual counts of people (much like a trail counter). However, the time needed to process the camera data suggests that cameras should not be used as a substitute for trail counters along the Keyhole Route. This technology is particularly powerful in that it can be used in conjunction with GPS tracking of visitors to conduct relational analysis, comparing visitor groups as they move over space and time, and determining on which portions of the trail visitors spend the most time. However, the regression analysis indicates that we can estimate visitor use along the Keyhole Route at points where placement of trail counters is not feasible (such as in the Trough or at the Homestretch) from trail counters placed lower along the Longs Peak Trail. This may represent the most feasible way to "monitor" visitor use levels for managers with limited staff, budget, and/or time to devote to data analysis. An additional trail counter placed on the Longs Peak Trail just past the junction with the Chasm Lake Trail would improve the accuracy of visitor use estimation, as it would provide more accurate counts of visitors heading to the summit.

Visitor surveys conducted in conjunction with GPS-tracking could also reveal areas where visitors are perceiving crowding or unsafe conditions. Photos from the cameras can also be used as part of a normative approach to determine visitor thresholds of crowding along the Keyhole Route. Normative approaches typically ask visitors to rate the acceptability of different conditions, such as the number of visitor groups encountered along a portion of the trail (Manning, 2011). Photos depicting various trail conditions can constitute part of a survey of hikers examining perceptions of crowding and resource impact along the Keyhole Route. This survey could then be used in conjunction with data on actual visitor use levels and behaviors (obtained from automated counters and GPS-tracking) to inform visitor management based on perceived social and ecological conditions (Lawson et al., 2009).

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Appendix

Table I. Average hourly visitor use on Longs Peak Trail – All use. Note: Error values indicate a 95% confidence interval around the mean.

Hour	Mean	Error(±)
12:00 AM	1.96	0.73
1:00 AM	5.58	1.62
2:00 AM	17.10	4.31
3:00 AM	21.56	3.95
4:00 AM	16.17	3.66
5:00 AM	14.45	2.38
6:00 AM	15.07	2.34
7:00 AM	21.67	2.81
8:00 AM	25.27	4.77
9:00 AM	25.28	2.65
10:00 AM	23.29	2.96
11:00 AM	28.62	3.83
12:00 PM	30.94	4.22
1:00 PM	38.57	4.76
2:00 PM	37.01	5.06
3:00 PM	32.54	4.61
4:00 PM	24.29	3.62
5:00 PM	17.05	3.05
6:00 PM	10.13	1.84
7:00 PM	10.76	2.87
8:00 PM	2.99	0.70
9:00 PM	1.32	0.37
10:00 PM	1.27	0.48
11:00 PM	1.02	0.37

Table II. Average hourly visitor use on Longs Peak Trail – Inbound use. Note: Error values indicate a 95% confidence interval around the mean. No error for outbound use, which was calculated by subtracting the inbound use from total use.

Hour	Mean	Error(±)
12:00 AM	1.93	0.71
1:00 AM	5.58	1.62
2:00 AM	16.95	4.27
3:00 AM	20.55	3.77
4:00 AM	16.00	3.62
5:00 AM	13.93	2.29
6:00 AM	12.90	2.01
7:00 AM	18.78	2.44
8:00 AM	21.72	2.40
9:00 AM	21.52	2.26
10:00 AM	17.00	2.16
11:00 AM	14.33	1.92
12:00 PM	8.52	1.16
1:00 PM	6.28	0.77
2:00 PM	3.63	0.50
3:00 PM	3.72	0.53
4:00 PM	3.80	0.57
5:00 PM	2.73	0.49
6:00 PM	1.62	0.29
7:00 PM	2.04	0.40
8:00 PM	1.10	0.26
9:00 PM	0.42	0.12
10:00 PM	0.73	0.28
11:00 PM	0.61	0.22

Table III. Average hourly visitor use by season on Estes Cone Trail. Note: Error values used to calculate 95% confidence intervals in Tables III-VII.

Hour	**Mean**	**Error(±)**
12:00 AM	0.01	0.00
1:00 AM	0.01	0.00
2:00 AM	0.03	0.00
3:00 AM	0.24	0.02
4:00 AM	0.24	0.02
5:00 AM	0.17	0.01
6:00 AM	0.69	0.06
7:00 AM	2.89	0.25
8:00 AM	4.98	0.42
9:00 AM	9.09	0.77
10:00 AM	9.43	0.80
11:00 AM	10.36	0.88
12:00 PM	9.32	0.79
1:00 PM	11.68	0.99
2:00 PM	10.81	0.92
3:00 PM	7.90	0.67
4:00 PM	4.45	0.38
5:00 PM	3.87	0.33
6:00 PM	1.94	0.16
7:00 PM	0.93	0.08
8:00 PM	0.34	0.29
9:00 PM	0.23	0.02
10:00 PM	0.43	0.00
11:00 PM	0.03	0.00

Table IV. Average hourly visitor use by month on Estes Cone Trail – June.

Hour	Mean	Error(±)
12:00 AM	0.00	0.00
1:00 AM	0.00	0.00
2:00 AM	0.00	0.00
3:00 AM	0.07	0.01
4:00 AM	0.14	0.01
5:00 AM	0.42	0.04
6:00 AM	1.10	0.09
7:00 AM	2.88	0.24
8:00 AM	7.83	0.66
9:00 AM	15.84	13.45
10:00 AM	16.10	1.37
11:00 AM	12.61	1.07
12:00 PM	15.64	1.33
1:00 PM	14.83	1.26
2:00 PM	16.99	1.44
3:00 PM	11.79	1.00
4:00 PM	7.21	0.61
5:00 PM	6.66	0.57
6:00 PM	2.95	0.25
7:00 PM	2.68	0.23
8:00 PM	1.02	0.09
9:00 PM	0.14	0.01
10:00 PM	0.00	0.00
11:00 PM	0.13	0.01

Table V. Average hourly visitor use by month on Estes Cone Trail – July.

Hour	Mean	Error(±)
12:00 AM	0.00	0.00
1:00 AM	0.00	0.00
2:00 AM	0.00	0.00
3:00 AM	1.01	0.09
4:00 AM	0.00	0.00
5:00 AM	0.29	0.02
6:00 AM	1.37	0.12
7:00 AM	4.99	0.42
8:00 AM	8.32	0.71
9:00 AM	12.72	1.08
10:00 AM	13.97	1.19
11:00 AM	17.86	1.16
12:00 PM	12.04	1.02
1:00 PM	16.78	1.42
2:00 PM	11.73	1.00
3:00 PM	9.10	0.77
4:00 PM	3.61	0.31
5:00 PM	2.83	0.24
6:00 PM	2.10	0.18
7:00 PM	0.94	0.08
8:00 PM	0.28	0.02
9:00 PM	0.07	0.01
10:00 PM	0.00	0.00
11:00 PM	0.00	0.00

Table VI. Average hourly visitor use by month on Estes Cone Trail – August.

Hour	Mean	Error(±)
12:00 AM	0.00	0.00
1:00 AM	0.00	0.00
2:00 AM	0.08	0.01
3:00 AM	0.08	0.01
4:00 AM	1.00	0.08
5:00 AM	0.15	0.01
6:00 AM	0.92	0.08
7:00 AM	3.76	0.32
8:00 AM	3.53	0.30
9:00 AM	7.18	0.61
10:00 AM	4.92	0.42
11:00 AM	9.43	0.80
12:00 PM	6.73	0.57
1:00 PM	11.49	0.98
2:00 PM	11.73	1.00
3:00 PM	6.74	0.57
4:00 PM	4.83	0.41
5:00 PM	3.76	0.32
6:00 PM	2.46	0.21
7:00 PM	0.46	0.04
8:00 PM	0.38	0.03
9:00 PM	0.68	0.06
10:00 PM	0.00	0.00
11:00 PM	0.00	0.00

Table VII. Average hourly visitor use by month on Estes Cone trail – September.

Hour	Mean	Error(±)
12:00 AM	0.04	0.00
1:00 AM	0.04	0.00
2:00 AM	0.04	0.00
3:00 AM	0.00	0.00
4:00 AM	0.09	0.01
5:00 AM	0.00	0.00
6:00 AM	0.04	0.00
7:00 AM	1.56	0.13
8:00 AM	2.87	0.24
9:00 AM	5.17	0.44
10:00 AM	5.78	0.49
11:00 AM	6.43	0.55
12:00 PM	5.60	0.48
1:00 PM	8.08	0.69
2:00 PM	7.47	0.63
3:00 PM	6.21	0.53
4:00 PM	3.43	0.29
5:00 PM	3.47	0.30
6:00 PM	1.22	0.10
7:00 PM	0.30	0.03
8:00 PM	0.00	0.00
9:00 PM	0.17	0.01
10:00 PM	0.13	0.01
11:00 PM	0.00	0.00