

Trail Use Study in Royal Gorge Open Space Area—Summer 2014

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The forest area on Donner Summit formerly owned by the Royal Gorge Ski Resort was acquired by the Truckee Donner Land Trust (TDLT) in 2012 and [a trail plan for the area](#) was presented by TDLT in the summer of 2013. The plan implemented a system of existing ski trails and logging roads based on a policy of multi-use for hikers, mountain bikers, trail runners and equestrians. The plan received general approval although there was significant criticism over the implementation of single-use hiking only trails. The criticism was predicated on the argument that hikers and mountain bikers could not share the trails without conflict.

In a series of articles at my website, [OnTheSummit.net](#), I discussed many of the issues concerning trail use in the Donner Summit area. These articles supported the multi-use policy adopted by TDLT and proposed that because of the large number of trails covering over 3000 acres of open space and the relatively light usage by the public, the area could support multi-use trails without significant negative interactions by different user groups. These predictions were made early in 2014 while the snow was still on the trails and would remain unproven until the actual usage could be studied in the summer of 2014. This report presents the data from a study of the trail system usage carried out using a trail monitoring camera during the summer months of 2014 and clearly supports earlier predictions of conflict-free trail use.

METHODS

Monitoring a system of trails covering 28 miles is of course a daunting proposition. Fortunately, technology has advanced to the point where it is relatively inexpensive to use a motion-activated trail camera to record still-images and video to monitor trail activity. All monitoring was done with a Bushnell HD Trophy Camera, Model 119537, capable of detecting motion up to 60 ft away and capturing still and video images. It would still be prohibitively expensive to monitor all trails at all times, but it was possible to do a survey of selected trails over the course of the summer to get a representative sampling. Trail monitoring locations were chosen for trails on the west side of the Royal Gorge area that had been designated hiking only and multi-use. The strategy for capturing trail activity was to monitor some of the busiest trail intersections in the area where maximum user traffic could be captured. Figure 1 shows a map of the capture locations with their monitoring periods. The study was done during the months of June through August of 2014.



Bushnell HD Trophy Camera

Analyzing the trail activity data was based on images captured during the study period. The camera was set to record three still images and 10 seconds of video upon each motion activation. This pattern allowed for the capture over an approximate duration of 20 seconds. This was necessary to make sure entire groups of users that could be stretched out were captured. In each activation the number of users was recorded with their type of activity. In addition the number of dogs with a user group was recorded. Within a group the number of children was also recorded. In one case two days of monitoring were lost due to batteries running down.

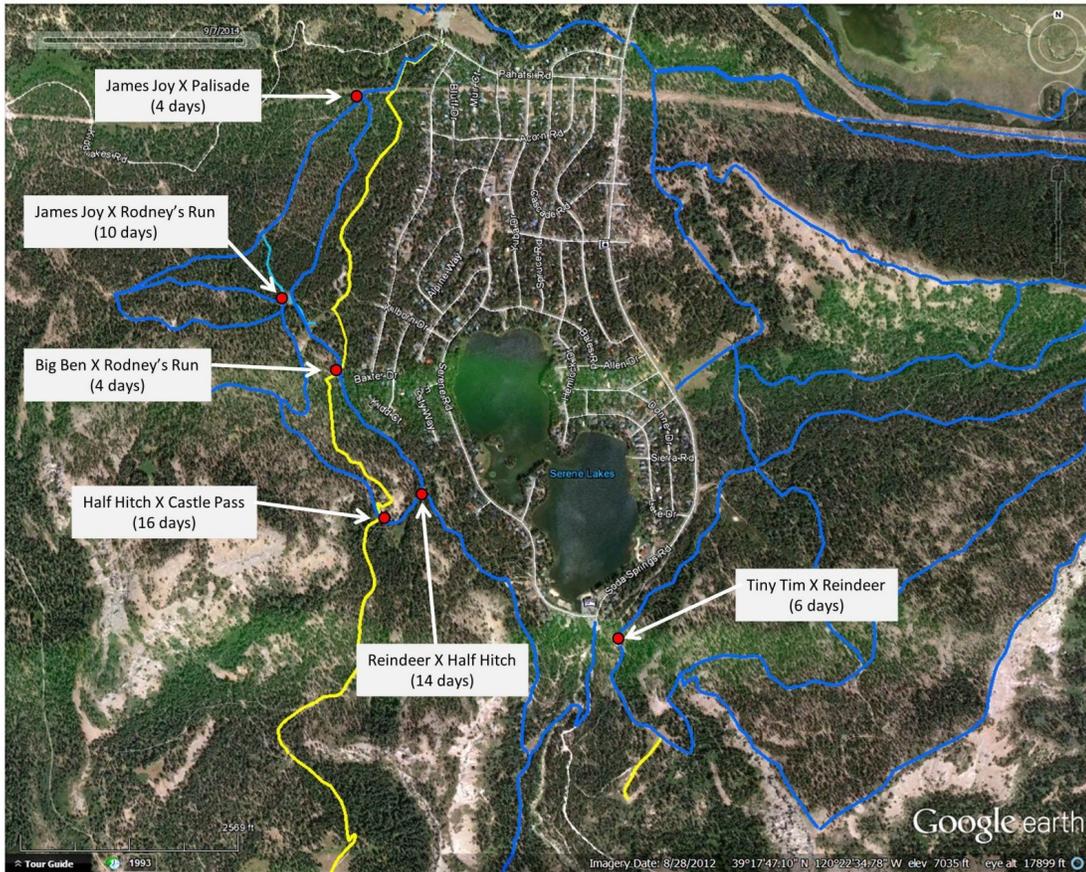


Figure 1. Map of monitoring locations in which the trail camera was set up in the Royal Gorge trails area. Locations focused on the trails on the west side of the Royal Gorge area on trails that had been designated hiking only and multi-use.

DATA

The trail activity data was quantified and graphed for each day that the camera was monitoring a trail. There were 7 monitoring periods set up during the summer. Periods varied in length from 4—14 days. Each monitoring period was set up so that it would span a weekend which is normally the busiest time for trail use. It should be noted that due to battery exhaustion, the weekend of Serene Lakes Days, one of the busiest weekends of the year was missed.

In Figure 2 the trail use statistics for each trail location and its monitoring period is shown for each day the trail was monitored. As the data shows there is considerable variation in trail use from location to location. This variation is probably also dependent upon the monitoring time period because resident populations vary from week to week in Serene Lakes. For example, the 4th of July weekend is particularly popular and the resident population is high during that week as well as the preceding week. This is shown in Panel 2 which shows relatively strong activity at the intersection of the Reindeer and Half Hitch trails. This intersection was expected to be more active because it is a main trail going around the lake, as well as a feeder trail for the hike over Castle Pass. It is also the closest trail to the Serene Lakes subdivision on the west side. This intersection did not disappoint, as it showed the most activity for all user groups during the two weeks it was monitored. It is obvious that other trails are much less used as shown by the results for the James Joy X Palisade intersection. The trails at this intersection are much more off the beaten path.

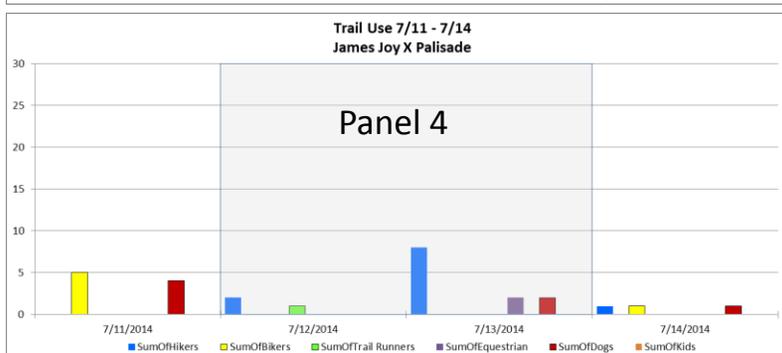
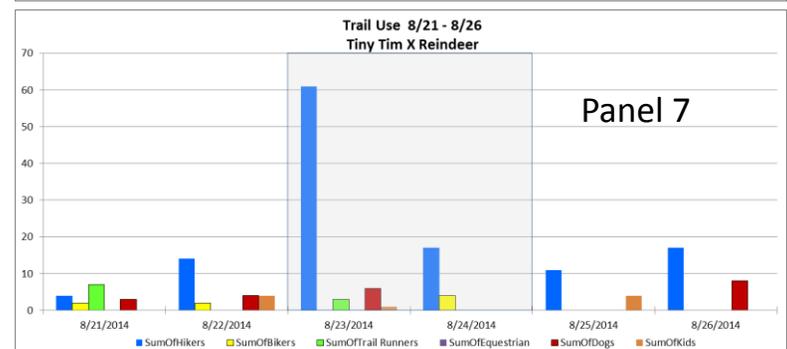
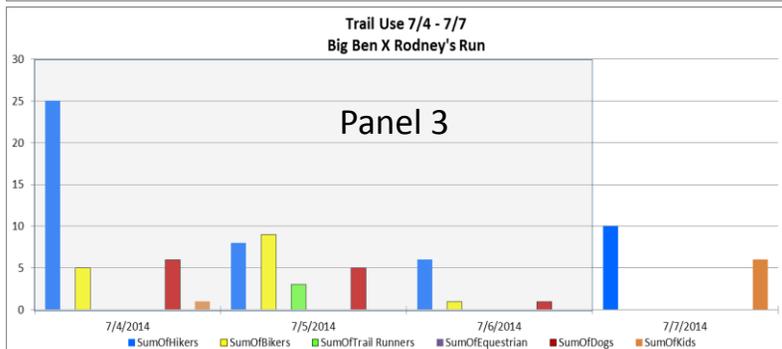
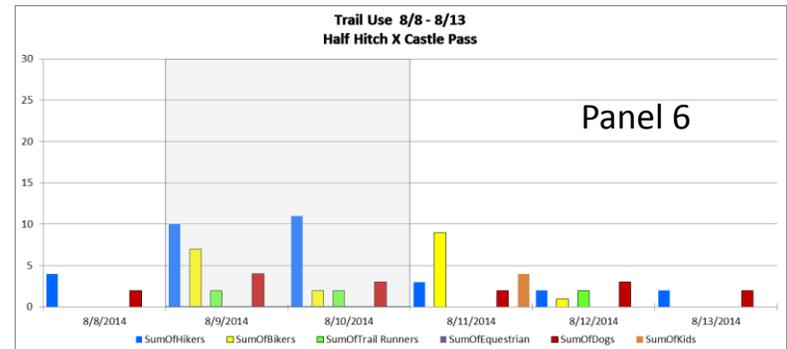
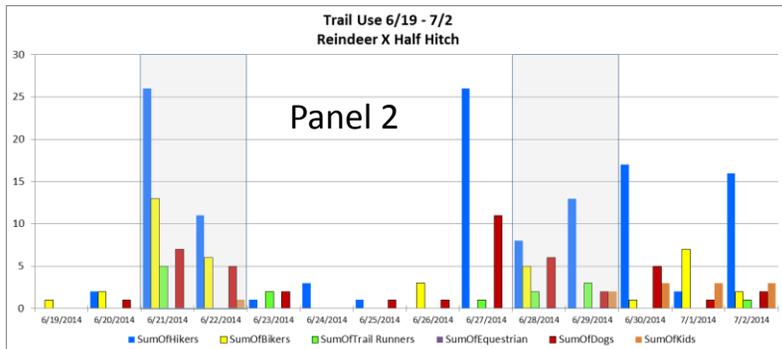
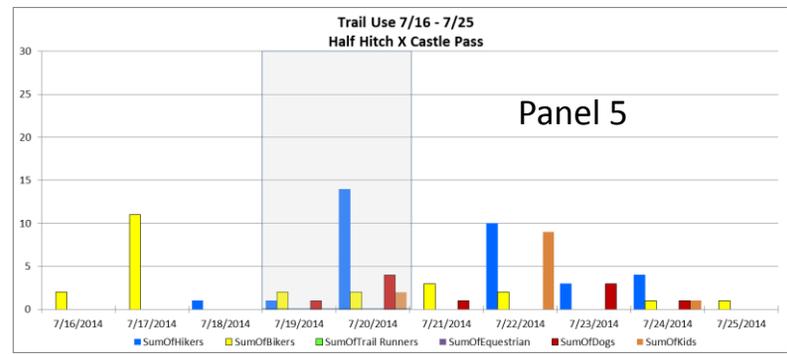
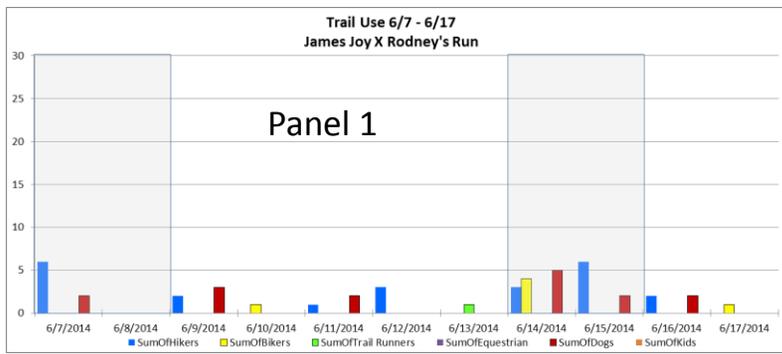


Figure 2: Results of trail monitoring for 7 locations in the Royal Gorge trail system. The total number of users from each group are plotted for each day of monitoring. The gray boxes signify weekend and holiday days.



Figure 3: Trail use is shown during the day for 6 Saturdays during the summer of 2014. Saturdays were chosen because they were found to have the most activity during the week. See Figure 1 for monitoring locations.

Daily usage patterns — The total number of users on a trail each day does not tell the whole story about use. The summer days are about 14 hours long which provides a large window of usage opportunity for each user. To better get at the temporal use of the trails during the day, usage was plotted as a function of time and the results are shown in Figure 3. The trail activity for six Saturdays at the different locations were chosen because Saturdays usually represented the peak of trail activity in any given week. The intention was to analyze the maximum activity on each trail. The data clearly show that for every trail the activity is usually spread over the entire day with the highest number of users on the trails in the middle part of the day. Probably the most important observation is that there was very little integration between individual user groups during the day. In the majority of observations there was a period of 10 minutes or more between different user groups passing a monitoring point at the same time (there were only three instances or simultaneous sightings of separate groups captured by the camera). This means that the potential for interactions between groups, positive or negative, is very small.

Wildlife on the trails — The forests surrounding Serene Lakes provide alpine mixed-conifer habitat for many species of birds, mammals, amphibians and reptiles as well as a robust invertebrate population (including a large contingent of mosquitoes). It is not surprising then that during the course of monitoring the trails, the camera caught several of our local creatures using the trails. The creature sightings are summarized in Table I. Not surprisingly, all of the animal sightings occurred at night as many of the fauna in the area conceal themselves during the day. It appears from this cursory survey that the wildlife freely use the trails to travel in the area which is not surprising since trails also make it easier for the wildlife to move through the forest. The presence of predators like coyote, bobcat and bear captured on the trails indicates that there is a healthy population of prey animals like the several species of rodents that burrow in the area. While the deer population is relatively small on the summit, they also appear to use the trails surrounding Serene Lakes.

Location	Animal	Sightings
James Joy X Rodney’s Run	Coyote	2
James Joy X Rodney’s Run	Fox	1
Reindeer X Half Hitch	Deer	3
Reindeer X Half Hitch	Coyote	2
Half Hitch X Castle Pass	Bear	1 (cub)
Half Hitch X Castle Passs	Bobcat	1
Tiny Tim X Reindeer	Deer	1 (buck)

Table I. Summary of sightings of wildlife on the trails. All but one of the sightings (a deer) were captured during the night time hours. In cases of multiple sightings of a specific type of animal, it was not possible to determine if the same or different individual animals were sighted.

CONCLUSIONS

This study of trail use in the Royal Gorge area surrounding the Serene Lakes community was designed to monitor the use of the trails by multiple user groups including hikers, mountain bikers, trail runners, and equestrians. The primary goal of the study was to determine a representative sampling of trail activity to assess the potential for trail conflicts. The use of a motion-activated trail camera that could capture still and video images made it possible to reliably capture activity on a 24/7 schedule to insure comprehensive trail monitoring. Sampling several different locations within the trail system made it possible to measure traffic on trails in different areas that were subject to more or less use depending on accessibility. Trails that were known to be busier and had mixed designations of hiking only and multi-use were chosen to concentrate on the potential for trail conflicts.

	Hikers	Bikers	Trail Runners	Equestrians	Dogs	Kids
Totals	398 (72%)	118 (21%)	35 (6%)	2 (.4%)	126	44
Avg/sighting	2.2	1.6	1.2	2	1.7	1.7
Avg/days monitored (54)	7.4/day	2.2/day	.6/day	.037/day	2.3/day	.8/day
Maximum/sighting	16	6	7	2	5	5
Minimum/sighting	1	1	1	2	1	1
Grand Total of all users	553					
Average of all users/days monitored	10/day					

Table II. Summary of totals for trail activity during the study period of 54 days of monitoring.

The monitoring data did provide a representative survey of the activity on the trails that did allow for the following general and specific conclusions concerning trail activities.

- The trails in the Royal Gorge area are being used. Table II summarizes the general trends for the data collected. Over 500 users of all different groups were observed on the trails during the study. Since this study was representative, we can assume over the entire area, there were many more users.
- Not surprisingly, the majority of users are hikers. Hikers make up 72% of the trail users. Mountain bikers make up 20% and trail runners only 6%. Only 2 equestrians were observed during the study. The small number of equestrians observed while representative of the monitored area, probably does not represent use over the entire Royal Gorge area because equestrian use is real-ly higher on the east side of the area which was not monitored.
- Canines make up a significant portion of the users of the trails. In fact there are more dogs out on the trails than mountain bikers. Apparently users of the area enjoy the company of their canine companions.

- For the most part use of the trails is by small groups of users. The average of 2.7 users per sighting indicates that for all user types, users travel in small groups. There were the occasional larger groups, but they were few and far between.
- Some trails are busier than others. Trails closer to the community of Serene Lakes tend to have more activity. Activity also tends to be directional on some trails that are part of loops (Reindeer, Castle Pass) while other trails to destination points see back and forth traffic (Tiny Tim). Trails to destinations like Mariah Pt and Rowton Peak tend to be more popular.
- The most telling statistic of this study was that even though there is significant use of the area, the density and frequency of users in any one location is very low. This is not unexpected and was in fact a prediction that this study set out to test. The overall average of 10 users/day at any one monitoring location clearly indicates that the area and trail availability provide enough capacity that the usage density is very low. Moreover, daily usage patterns even on busy weekend days, show that there is very little user overlap on the trails.

Assessing the potential for trail conflict was the basis for this study of trail usage. There were concerns raised for potential conflict between hikers and mountain bikers as does occur in other open space areas. These high conflict areas are usually in open space areas adjacent to high population areas such as Marin County where trail usage is high by both hikers and mountain bikers. This study shows that the Royal Gorge area is not currently experiencing high density use. In fact, the study show that the capacity of the area far exceeds the current use by all user types. The low numbers of users and low frequency of trail interactions makes the potential for trail conflicts very low. This seems to be born out by the fact that there have been no incidents of trail conflicts reported for the area during the summer of 2014. The area clearly has the capacity to support the multi-use trail plan implemented for the area.

