Visitation and Use on Boulder County Regional Trails

Prepared for Boulder County Parks and Open Space and Transportation Departments

Stacey Schulte & Travis Flohr
P.O. Box 1083
Boulder, CO 80306
303-532-6628
Stacey.schulte@colorado.edu

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EXECUTIVE SUMMARY

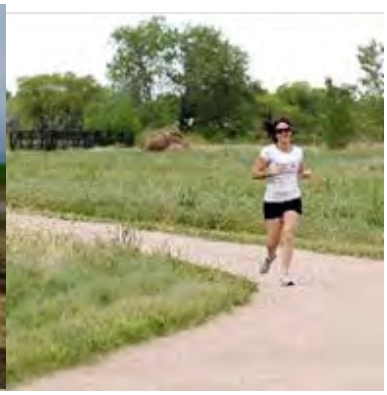
The following report documents use and visitation on Boulder County's regional trails. Regional trails are an increasingly important community and neighborhood amenity, which improve both public health and quality of life. Use data was collected in order to better equip staff to fund, manage and promote the growing trail system. One hundred and five hours of observation were completed at nine observation points along the Coal Creek, Rock Creek and LOBO regional trails. A total of 1,585 users were observed and recorded. Stratified observations were combined with an established estimation multiplier to derive rigorous estimations for season and annual use. The findings demonstrate a diversity of use and visitation among trails and between locations on a given trail.

Key Findings:

- Estimated annual use for all nine observation points = 268,000-300,000
- Estimated annual use for observed points on Coal Creek = 123,000-170,000
- Estimated annual use for observed points on Rock Creek = 66,000-123,000
- Estimated annual use for observed points on LOBO = 21,000-63,000
- The most typical user is an adult male biking alone.
- Non-senior adults (under 55) account for 80% of all users.
- 52% of all users are traveling alone.
- 52% of total user are biking.
- 9% of all users are walking or running with a dog.
- Biking is the most common activity on remote trail segments, whereas walking and dog walking is a more common activity on neighborhood segments.

Coal Creek Trail

LOBO Trail



Rock Creek Trail

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INTRODUCTION

Boulder County's regional trails traverse some of its most accessible landscapes. With 43 miles of completed trails and another 42 miles to be completed in the next several years, this system reflects the national interest in regional trails (American Trails 2013). Because many of these trails are in the eastern part of the county and provide neighborhood access, they support uses different from much of the other open space lands in the county. Boulder County's five-year visitor study for 2010 indicates that people are very happy with Coal Creek trail.

Although Boulder County's regional trail system is growing, this study is the first effort to establish a baseline for system-wide visitation. Some use estimates are available from vehicle and pedestrian counters and patrol observations, but they do not capture the extent and variety of users across the entire trail system. As the County works towards creating a cohesive trails system, data on visitor use will be a critical component of the process. The purpose of this project is to estimate the annual visitation and use of regional trails to better equip staff to fund, manage, and promote the regional trails system. Specifically, use and visitation data will help the County do the following:

- Support funding efforts for projects and program expansion;
- Promote the trail system to the public, media and municipalities;
- Prioritize maintenance needs on existing and new trails;
- Direct education and enforcement management efforts;
- Provide a baseline from which to track trends and changes in visitation; and
- Understand trail use in a way that may be useful to other municipalities.

Study Limitation - The Flood

The project proposal called for observations completed in May, July and September. Catastrophic flooding closed all trails in Boulder County in September 2013. This prevented the completion of the observations as outlined in the proposal. The results were compiled using the spring and summer observations.

Bridge over Coal Creek

Literature Review

Regional trails are an increasingly popular amenity for a variety of reasons. These trails, sometimes known as greenways, are an important part of healthy communities (Jackson, 2003; Searns, 1995). A large body of literature has shown trails have numerous societal benefits including: increased local economic prosperity (Bowker, Bergstrom, & Gill, 2007; Fabos, 1995), improved physical and mental health (Jackson, 2003; Sallis et al., 2006; Searns, 1995), ability to conserve rural and cultural resources (Fabos, 1995; Searns, 1995), ability to conserve vital ecological corridors (Sallis, et al., 2006), and provide an alternative means of transportation (Fabos, 1995). Trail users have differing motivations for using trails. Four common user groups include: localized walkers, recreationalists, commuters, and tourists (Furuseth & Altman, 1991).

The review of the literature of visitor use estimation focused on "urban" trails as opposed to park trails. Although Boulder County's regional trails span a variety of land use types, they compare most closely to urban trails. The visitor studies reviewed use either observations or infrared counters. Infrared sensors are able to count all users or groups of users, but do not distinguish between user types, activities or gender.

Extrapolation, or using sample counts to predict total uses, must account for variation in the number of visits. "Research has shown that traffic on pedestrian and cycling facilities and routes varies greatly by location, season, day of week, time of day and weather" (Lindsey 2007). One study found that when estimates are compared to actual counts from infrared counters, the results are within 20-30% accuracy.

Many methods are used to estimate total users for sample counts. All of these involve developing multipliers to explain variations of use and then applying these multipliers to observed counts. These are referred to as "adjustment factors." For example, sample counts are multiplied by the change in use for weekend/weekday, weather, and time of day. Use differences are accounted for by demographic variation of trail location. One study found that month, day of week and weather accounted for 41% of use variation and location and demographics accounted for 47%. (Lindsey 2004)

Sample findings from urban trail studies indicate the following:

- Traffic is typically 60% greater on weekends than weekdays (Lindsey 2007)
- 42-58% of all users travel in groups (Lindsey and Lindsey 2004)
- More women travel in early morning (Lindsey and Lindsey 2004)
- Higher percent of users are men (52-72%) (Lindsey 2004)
- Greater number of walkers found on trails close to neighborhoods (Bush 2011)

METHODS

Sampling & Observation Points

An observational research design was used to collect data regarding trail use for three regional trails within Boulder County, Colorado: Coal Creek, Rock Creek and LOBO. These trails were selected to reflect a variety of trail types in terms of location and use. Two to three observation points were selected on each trail in order to account for user's ability to enter and exit the trail at various access points (see Figures 1 and 2 for location of observation points). In order to capture variation in use patterns (i.e. stratified sample), observations were broken into time blocks and distributed throughout the day, days of week, and seasons. The observations were designed to be one hour each. In some cases, because of observers carpooling or other constraints, this time varied. Observational hours were distributed among locations based on staff priorities and to ensure an appropriate level of observations are performed for accurate statistical estimates of annual and seasonal visitation. A total of 101 hours of observation were conducted. The co-investigators, Stacey Schulte and Travis Flohr, and one student assistant conducted the observations. See Table 1 for a chart of observation times.

Although adequate observations to estimate annual use were conducted, some constraints disrupted the consistency of data collections. The Coal Creek trail near the Aquarius observation point was closed due to construction in the spring and early summer so this observation point only includes summer observation times. During the course of the study some observation points were altered in consultation with County staff. We added a point along LOBO-83rd and reduced observations at Rock Creek --Stearns and Rock Creek - Exempla. Additionally, the location of one observation point was corrected, which resulted in eliminating the Rock Creek - Park location and adding Rock Creek – Coalton. Even though regional trails are open 24-hours/day, observations were not conducted after dark due to the scope of the project and assumption that use is the lowest at that time. For example, use between 9pm-5am accounts for less than 3% of all use on City of Boulder Open Space and Mountain Parks properties (ERO Resources Corporation).

While the observation days and times were scheduled in advance, some observations times were canceled due to rain. Several days were unusually warm or stormy. The influence of these days is highlighted in the estimation results section of the report on page 22.

LOBO Trail

Figure 1: LOBO Observation Locations

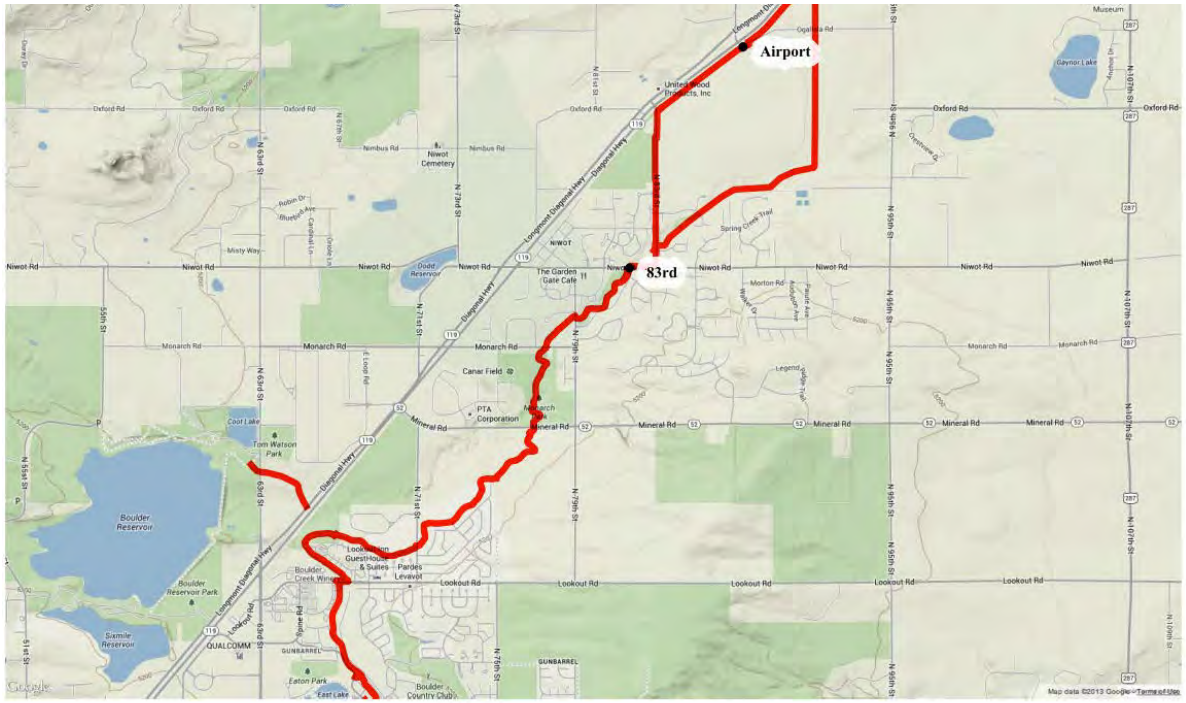


Figure 2: Coal Creek and Rock Creek Observation Points

Table 1: Observation Times in Minutes

SPRING		Observation Point								
Time of day		Coal Creek, Aquarius	Coal Creek, Public Road	Coal Creek, Town Hall	LOBO, 83rd	LOBO, Airport Rd	Rock Creek, Exempla	Rock Creek, Coalton	Rock Creek, Park	Rock Creek, Stearns
Weekday	Morning	30	120	180	Not observed in spring*	90	120	Not observed in spring*	90	0
	Afternoon	0	90	90		90	90		0	0
	Evening	0	90	90		90	90		90	90
Weekend	Morning	90	90	90		0	90		0	90
	Afternoon	90	0	90		60	90		0	90
	Evening	90	0	90		60	90		0	90
								Spring Total Minutes		*2,820*
								Spring Total Hours		*47*

SUMMER		Observation Point								
Time of day		Coal Creek, Aquarius	Coal Creek, Public Road	Coal Creek, Town Hall	LOBO, 83rd	LOBO, Airport Rd	Rock Creek, Exempla	Rock Creek, Coalton	Rock Creek, Park	Rock Creek, Stearns
Weekday	Morning	60	65	137	65	60	40	75	Not observed in summer*	60
	Afternoon	60	60	60	75	45	60	120		60
	Evening	60	120	120	65	60	60	190		60
Weekend	Morning	57	55	125	60	60	60	60		75
	Afternoon	60	60	60	60	60	0	60		0
	Evening	58	60	60	60	60	60	60		75
								Summer Total Minutes		*3,242*
								Summer Total Hours		*54*

COMBINED	Observation Point								
	Coal Creek, Aquarius	Coal Creek, Public Road	Coal Creek, Town Hall	LOBO, 83rd	LOBO, Airport Rd	Rock Creek, Exempla	Rock Creek, Coalton	Rock Creek, Park	Rock Creek, Stearns
Total minutes per trailhead	655	810	**1192**	**385**	**735**	**850**	**565**	**180**	**690**
Total minutes per trailhead as a percent of grand total	11%	13%	**20%**	**6%**	**12%**	**14%**	**9%**	**3%**	**11%**
							Grand Total Minutes		**6,062**
							Grand Total Hours		**101**

Observation Instrument

Data was collected using a modified version of the System for Observing Play and Recreation in Communities (SOPARC) observational instrument (McKenzie, Cohen, Sehgal, Williamson, & Golinelli, 2006). Using the instrument, users were counted and their activity, group size, age, gender, origin, and if they were traveling with a dog was noted. Age is the most subjective category, which was why broad categories were used. Observers used the following guidelines in estimating user age: child (baby-12), teen (13-19), adult (20-54), and senior (55+). Also, a modified instrument for summer observations was used to allow for more differentiation of data. (See instrument in Appendix A)

Summary Statistics and Estimates

The data is presented at two levels. First, summary statistics and cross-comparison of variables was done using Excel pivot tables. These numbers are based on all observations for spring and summer except where noted. Secondly, users counts were used to estimate seasonal and annual usage.

The guide for estimating trail usage at each location was Lindsey et. al's (2007) research summarized in: *Estimating Urban Trail Traffic: Methods for Existing and Proposed Trails*. This method requires creating conversion coefficients, or multipliers, to obtain site-visit estimates from proxy counts. Summary average estimates were calculated using the spring and summer data for weekday, weekend day, month, and annually. Lindsey et. al's (2007) multipliers were triangulated using people per hour and observed peak hour comparisons. An example, using *the Rock Creek-Coalton* summer observed data is provided below. The detailed estimation spreadsheet can be found in Appendix B.

View at Stearns Lake

Calculating Weekday Estimates

Using Lindsey et. al's (2007) peak hour proportions multiplier for July (when summer data was collected) and the observed peak hour average weekday estimates were calculated as follows:

Observed Peak Hour Average / July Multiplier[1] = Weekday Estimate

19.33/0.111=174.14 users per weekday

Due to seasonal differences, it is important to use the monthly estimate ratios. The ratios provided by Lindsey et. al (2007) were verified by calculating observed estimate multipliers using gathered data. This calculation is shown below. The verification process was repeated for nine other locations.

(Grand Total for all Observed People at all Rock Creek Locations / Weekday Mean Peak Hour Traffic)/100= Weekday Observed Multiplier [2]

(257/19.33)/100 = 13.3 weekday multiplier

Calculating Weekend Estimates

To calculate weekend estimates, weekday estimates were multiplied by the weekend multiplier. For example:

Weekday Estimate x Weekend Multiplier[3] = Weekend Estimate

(174 x 1.4) = 5,956

The ratios provided by Lindsey et. al (2007) were verified by calculating observed estimate multipliers using gathered data.This calculation is shown below. The verification process was repeated for nine other locations.

Weekday People per Hour / Weekend Day People per Hour = Weekend Observed Multiplier [4]

(33.7/22.3) = 1.5

[1] Lindsey et. al (2007)
[2] Lindsey et. al (2007)
[3] Lindsey et. al (2007)
[4] Lindsey et. al (2007)

Calculating Monthly Estimates

To calculate monthly estimates, the weekday and weekend totals are multiplied by the number of weekdays and weekends, and summed. There were 23 weekdays and eight weekend days in July 2013.

(Number of Weekdays x Weekday Estimate) + (Number of Weekend Days x Weekend Estimate) = Monthly Estimate

(23 x 174)+(8 x 243) = 5,956

In order to project the observed monthly estimate to other, unobserved months calculate the following (e.g. use July's observations to calculate August's estimates, this process was used to estimate each unobserved months estimate of trail users):

(Projected Month's Multiplier / Observed Month's Multiplier) x Estimated Monthly Traffic of Observed Month = August Estimate from July's Observed Estimate [5]

(7.2/7.2) x (5,956) = 5,956

Calculating Annual Estimates

To calculate annual estimates, the projection method described above was applied for each month of the year using the appropriate monthly multipliers for yearly estimates:

[January =(Projected Month's Multiplier / Observed Month's Multiplier) x Estimated Monthly Traffic of Observed Month] + … +[December =(Projected Month's Multiplier / Observed Month's Multiplier) x Estimated Monthly Traffic of Observed Month] = Annual Estimate [6]

Lindsey et al (2007) recommends dividing the annual estimates by two in order to account for round-trips and obtain an annual visits estimate. This study does not divide the annual estimate by two because during observations, round-trip users were only counted once. Anecdotal evidence also suggests that many trail users along Boulder County regional trail observation locations tended to use loop routes and not out-and-back trips on the trails.

[5] Lindsey et. al (2007)
[6] Lindsey et. al (2007)

RESULTS: Trip & User Characteristics

A total of 1,585 users were observed in spring and summer 2013. See Table 2 for distribution of observation times. The most likely user is an adult male biking alone. Visitor use varied by observation location. Location that are easily accessible from a nearby neighborhood are referred to as “neighborhood” trails and others as “remote.” The following statistics are based on the percentage of all users observed. When appropriate, these were broken down by observation locations. Expect where noted, percentages are for summer and spring use combined. Locations are more unique than the trail as a whole (Rock Creek, Coal Creek, and LOBO), and therefore user characteristics were not calculated by trail.

Aquarius trailhead looking east

Table 2: Observed Users by Observation Point

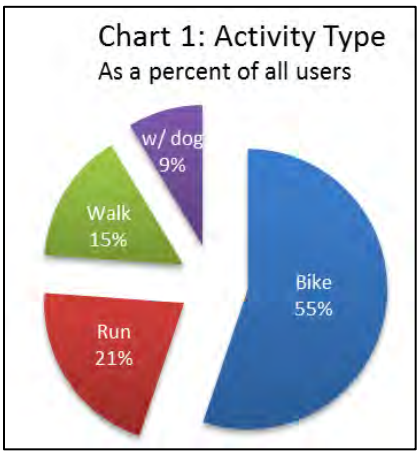
SPRING		Observation Point								
Time of day		Coal Creek, Aquarius	Coal Creek, Public Road	Coal Creek, Town Hall	LOBO, 83rd	LOBO, Airport Rd	Rock Creek, Exempla	Rock Creek, Coalton	Rock Creek, Park	Rock Creek, Stearns
Weekday	Morning	8	49	31	Not observed in spring*	20	6	Not observed in spring*	29	na
	Afternoon	na	36	12		13	14		na	na
	Evening	na	30	22		9	20		21	11
Weekend	Morning	9	43	29		na	9		na	13
	Afternoon	8	Na	25		30	13		na	4
	Evening	5	Na	27		9	7		na	7
		30	158	146	na	81	69	na	50	35
								Spring Total Users		569

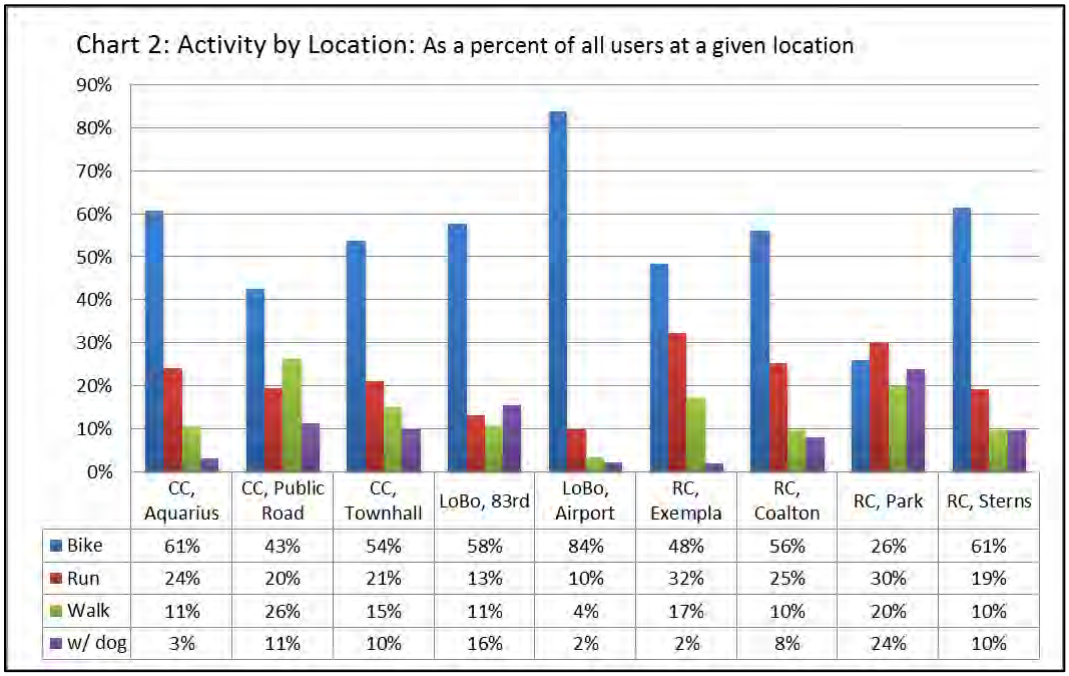
SUMMER		Observation Point								
Time of day		Coal Creek, Aquarius	Coal Creek, Public Road	Coal Creek, Town Hall	LOBO, 83rd	LOBO, Airport Rd	Rock Creek, Exempla	Rock Creek, Coalton	Rock Creek, Park	Rock Creek, Stearns
Weekday	Morning	23	36	37	25	20	4	56	Not observed in summer*	9
	Afternoon	12	17	16	13	4	1	4		17
	Evening	28	78	27	18	12	10	58		2
Weekend	Morning	51	51	47	23	12	4	24		15
	Afternoon	27	3	31	3	32	na	24		na
	Evening	44	41	19	1	8	5	19		5
		185	226	177	83	88	24	185	na	48
								Summer Total Users		1,016

COMBINED	Observation Point								
	Coal Creek, Aquarius	Coal Creek, Public Road	Coal Creek, Town Hall	LOBO, 83rd	LOBO, Airport Rd	Rock Creek, Exempla	Rock Creek, Coalton	Rock Creek, Park	Rock Creek, Stearns
Total Users per trailhead	**215**	**384**	**323**	**83**	**169**	**93**	**185**	**50**	**83**
Total Users per trailhead as a percent of grand total	**14%**	**24%**	**20%**	**5%**	**11%**	**6%**	**12%**	**3%**	**5%**
							Grand Total Observed Users		**1,585**

Activity Type

The uses tracked were biking, running, walking, walk/run with a dog and other. "Other" observations accounted for less than 1% and therefore are not shown in the charts below. Other was either skateboarding or scooters. Runners and walkers were merged into a single category when they were traveling with a dog. Biking was by far the most popular activity at 55%. Biking was most prevalent on the "remote" trail segments like Stearns, Airport Road and Aquarius. Running is next at 21% and walking at 15%. Only 9% of users were walking or running with a dog. However, dog walking was somewhat more popular on the "neighborhood" trail segments like LOBO- 83rd and Rock Creek - Park.

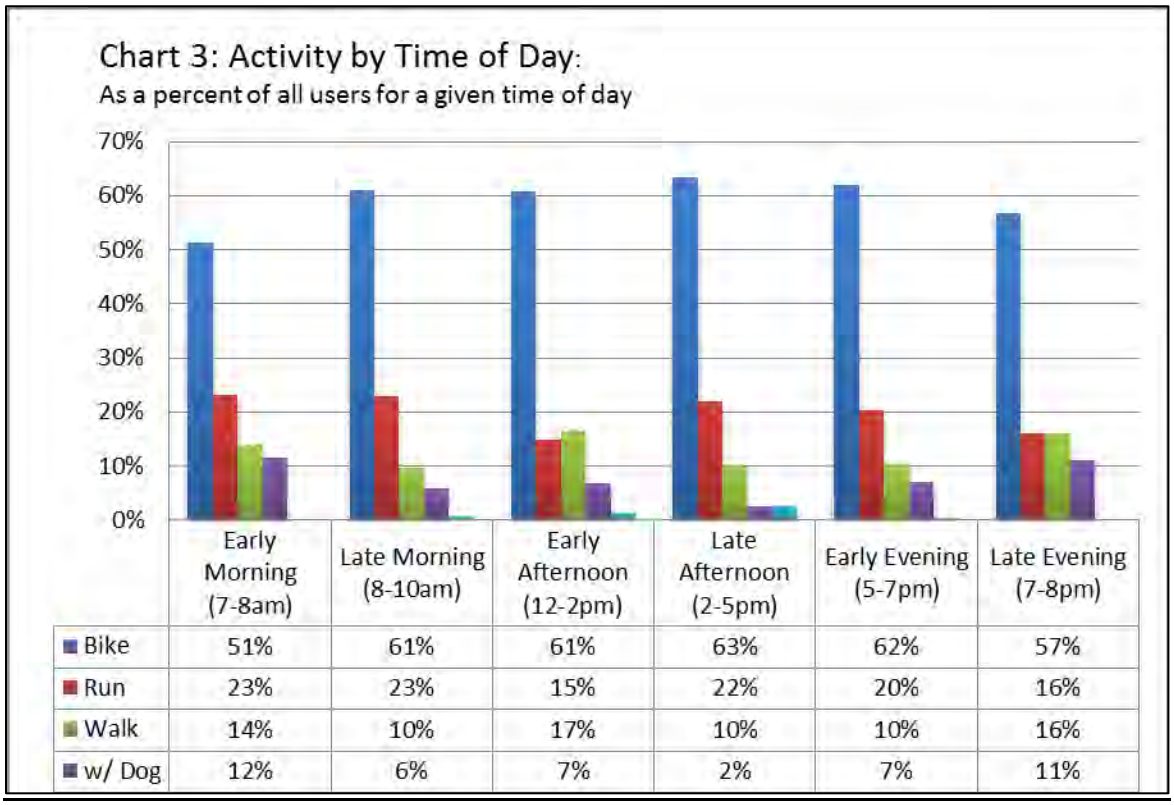




	CC, Aquarius	CC, Public Road	CC, Townhall	LoBo, 83rd	LoBo, Airport	RC, Exempla	RC, Coalton	RC, Park	RC, Sterns
Bike	61%	43%	54%	58%	84%	48%	56%	26%	61%
Run	24%	20%	21%	13%	10%	32%	25%	30%	19%
Walk	11%	26%	15%	11%	4%	17%	10%	20%	10%
w/ dog	3%	11%	10%	16%	2%	2%	8%	24%	10%

Time of day

Activity type by time of day shows some interesting, if expected, variations in use. Runners, as percent of all users, are higher in the morning and generally taper off throughout the day. Dog walkers are most active in the early morning and evening. This gives support to the assumption that neighborhood trails are used for dog walking before and after work. Biking is slightly lower in the morning and evenings.



	Early Morning (7-8am)	Late Morning (8-10am)	Early Afternoon (12-2pm)	Late Afternoon (2-5pm)	Early Evening (5-7pm)	Late Evening (7-8pm)
Bike	51%	61%	61%	63%	62%	57%
Run	23%	23%	15%	22%	20%	16%
Walk	14%	10%	17%	10%	10%	16%
w/ Dog	12%	6%	7%	2%	7%	11%

Age

Eighty percent of users are adults. This is unsurprising since the observers used a very broad category for adults. But it does show that very few families with children and older people use the trails. This is also shown in the "group size" data below in which most users are traveling alone. When looking at activity type by age, walking is slightly more evenly distributed then other activities. The high number of children at the Rock Creek - Park location is accounted for by the nearby elementary school. The observer at that site indicated that many children appeared to be traveling to or from school. As mentioned in the methods sections above, age is the most subjective category, which was why broad categories were used: child (baby-12), teen (13-19), adult (20-54), and senior (55+).

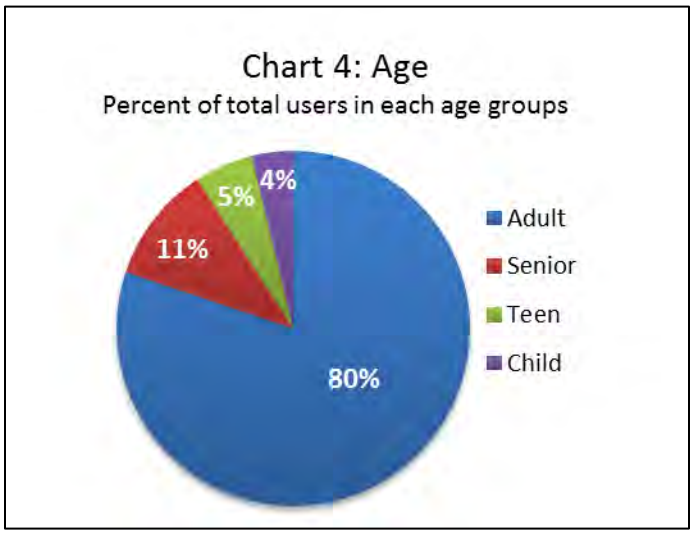
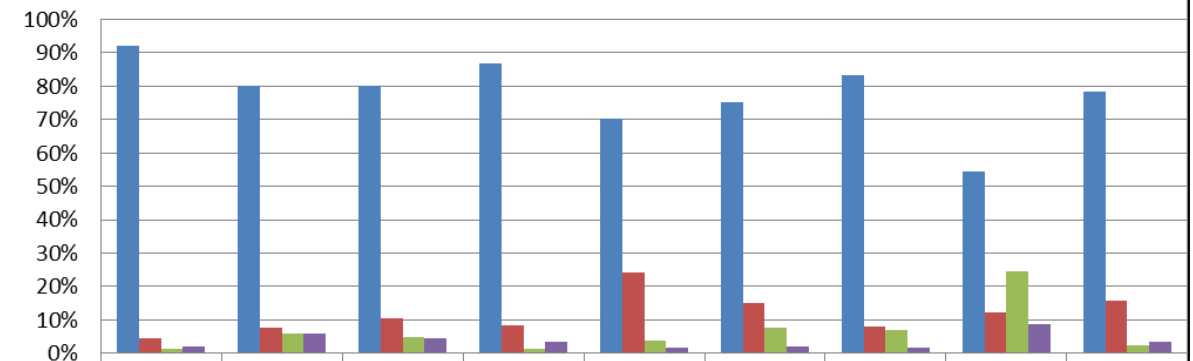


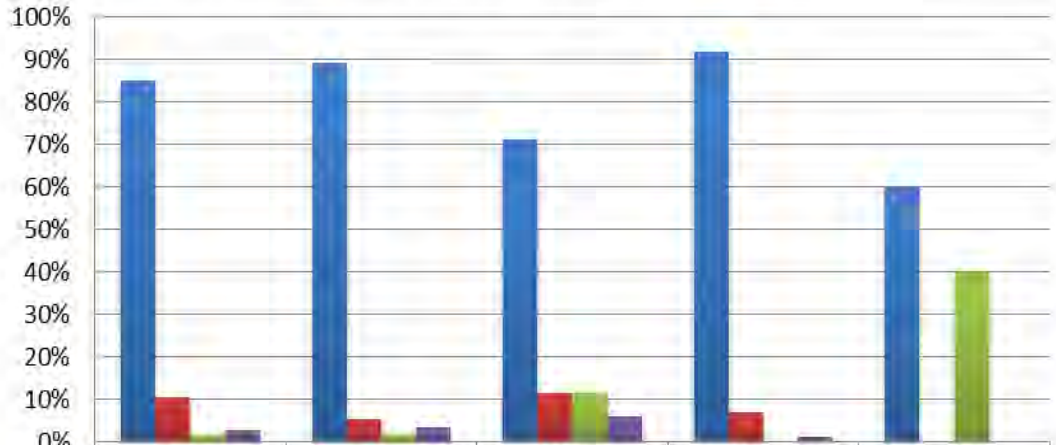
Chart 5: Age Group by Location. As a percent of all users at a given location



	CC, Aquarius	CC, Public Road	CC, Townhall	LoBo, 83rd	LoBo, Airport	RC, Exempla	RC, Coalton	RC, Park	RC, Sterns
Adult	92%	80%	80%	87%	70%	75%	83%	54%	78%
Senior	5%	8%	11%	8%	24%	15%	8%	12%	16%
Teen	1%	6%	5%	1%	4%	8%	7%	25%	2%
Child	2%	6%	4%	4%	2%	2%	2%	9%	4%

Chart 6: Activity by Age Group

As a percent of total users for each activity



	Bike	Run	Walk	Walk/Run Dog	Other
Adult	85%	89%	71%	92%	60%
Senior	10%	5%	11%	7%	0%
Child	2%	2%	11%	0%	40%
Teen	3%	3%	6%	1%	0%

Group size

Most people using the trail are traveling alone. Thirty percent are traveling with one other person. Only 18% are traveling in a group of 3 or more. Broken down by gender, we see that males are more likely to travel alone and females are more likely to travel in a pair. The highest percent of individual use is found at the more remote sections like Aquarius, Airport Road and Exempla. This may indicate that social use is more prevalent when a location is more accessible from a neighborhood. Walking is by far the most social activity whereas biking and running are the most solitary.

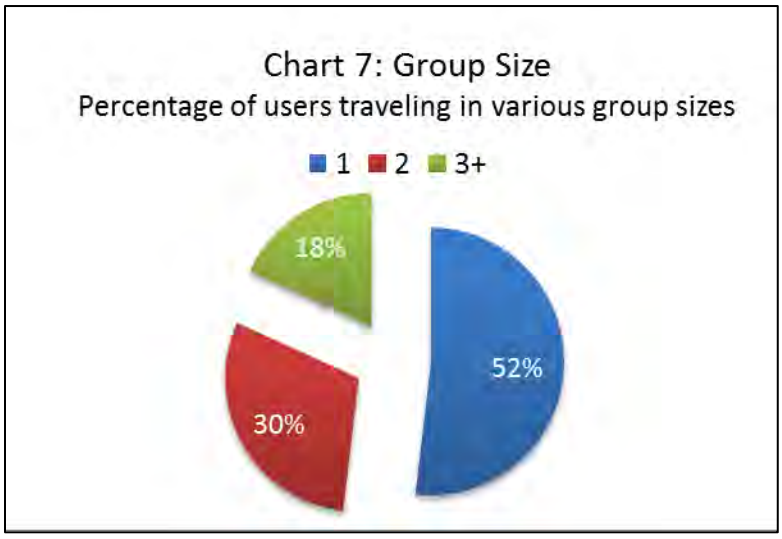
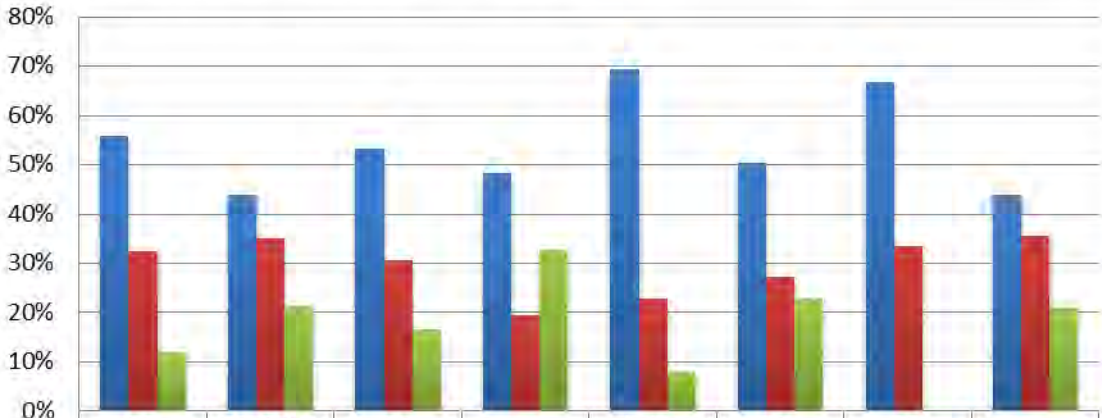


Chart 8: Group Size by Location.

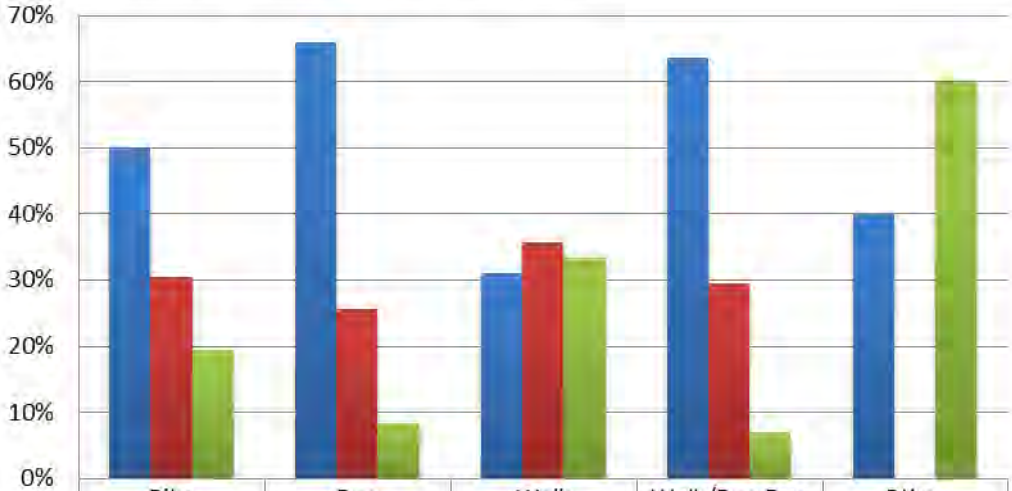
As a percent of total users for each location



	CC, Aquarius	CC, Public Road	CC, Townhall	LoBo, 83rd	LoBo, Airport	RC, Coalton	RC, Exempla	RC, Sterns
1	56%	44%	53%	48%	69%	50%	67%	44%
2	32%	35%	31%	19%	23%	27%	33%	35%
3+	12%	21%	16%	33%	8%	23%	0%	21%

Chart 9: Group Size by Activity Type

As a percent of all users for each activity type



	Bike	Run	Walk	Walk/Run Dog	Other
1	50%	66%	31%	64%	40%
2	30%	26%	36%	29%	0%
3+	19%	8%	33%	7%	60%

Trip origin

For the summer observations, trip origin was noted for each user. The observers noted if the user started at the observation point, i.e. the trailhead (usually meaning they drove or turned off on an adjoining road) or if they were passing through the observation point, i.e. did not start at the trailhead. For example, at the Coal Creek Public Road observation point, we counted a user as "trailhead" if they started from the parking lot or "through" if they were traveling from an origin other than the trailhead. Even at locations with a parking area, the majority of users did not originate from the trailheads. This may indicate that their entire trip is on foot or bike and not by car.

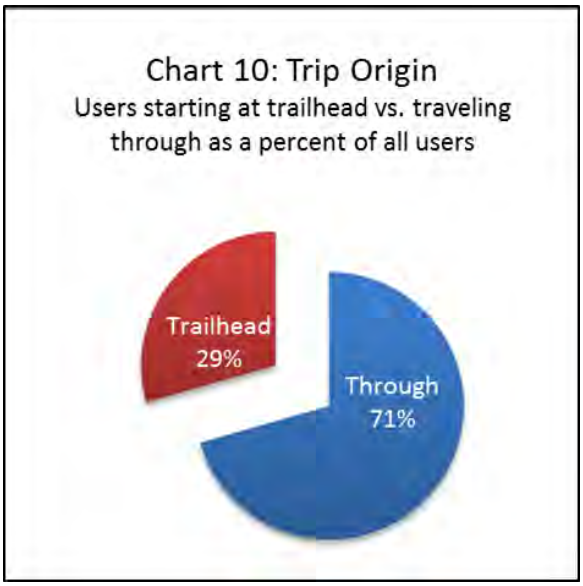
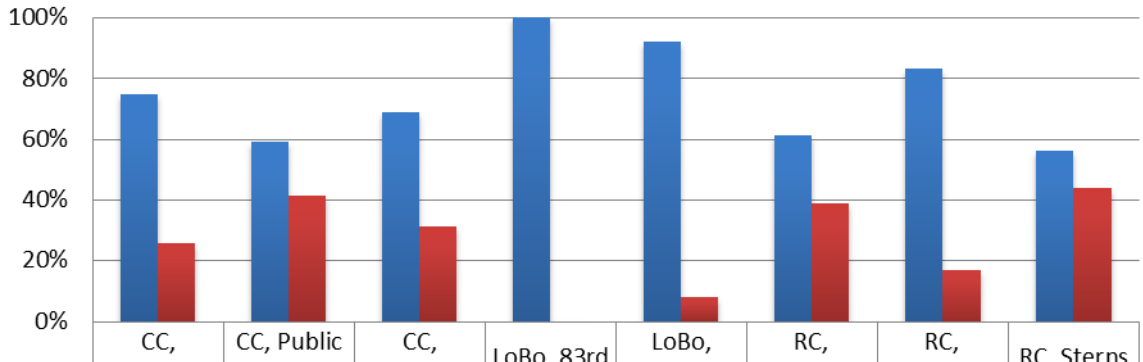


Chart 11: Trip Origin by Location

Percent of users starting at the traihead vs. traveling through



	CC, Aquarius	CC, Public Road	CC, Townhall	LoBo, 83rd	LoBo, Airport	RC, Coalton	RC, Exempla	RC, Sterns
Through	75%	59%	69%	100%	92%	61%	83%	56%
Trailhead	25%	41%	31%	0%	8%	39%	17%	44%

Results: User Estimates

User estimates are presented alphabetically by trail and observation location. Trail estimates are provided with the caveat that the numbers are not representative of use for the entire trail length. Only select locations were sampled. Not all access points were observed along the length of each trail so numbers potentially underestimate total trail use. Estimates for the Coal Creek trail may be the most accurate because most of the key locations along this trail were observed.

Overall annual usage may be underestimated due to three additional factors: 1) milder winter weather than at the location from which the multipliers were derived. 2) an active Boulder County population that may be less deterred by winter weather than at the location where the multipliers were derived and, 3) the omission of night use observations.

Table 3: Total Annual Estimates

Location	Annual Use Estimates - Based on Spring Observations	Annual Use Estimates - Based on Summer Observations
Coal Creak: Aquarius	0	59,268
Coal Creek: Public Road	71,118	82,551
Coal Creek: Town Hall	52,153	28,575
Coal Creek: Total	**123,270**	**170,395**
Longmont Boulder: 83rd	0	38,101
Longmont Boulder: Airport Rd	21,335	25,400
Longmont Boulder: Total	**21,335**	**63,501**
Rock Creek: Coalton	0	40,916
Rock Creek: Exempla	47,412	21,167
Rock Creek: Park	49,782	0
Rock Creek: Stearns	26,076	4,233
Rock Creek: Total	**123,270**	**66,316**
Grand Total	**267,876**	**300,212**

Coal Creek Trail

Coal Creek estimates are in Table 14. Aquarius has a monthly estimate of 8,627 and an annual estimate of 59,268 people, using the summer data. An estimate for Aquarius using the spring data is not provided because of the trail closure and therefore a lack of spring data. Public Road has a monthly estimate of 7,892 using spring data and 12,016 using summer data and an annual estimate of 71,118 using spring data and 82,551 using summer data. Town Hall has a monthly estimate of 5,788 using spring data and 4,159 using summer data and an annual estimate of 52,153 using spring data and 28,575 using summer data. The lower than expected estimate for Town Hall in the summer is likely caused by the weather. Several observation times were unseasonably cool and cloudy with what looked like rainy weather moving into the area.

Table 4: Coal Creek Estimates						
Observation Points	***Aquarius***		***Public Road***		***Town Hall***	
Season	**Spring**	**Summer**	**Spring**	**Summer**	**Spring**	**Summer**
Observed						
Weekday People Per Hour		21	29	33	12	16
Weekend People Per Hour		41	29	32	27	24
Estimates						
Weekday Average Estimates	-	252	231	351	169	122
Weekend Average Estimates	-	353	323	492	237	170
Monthly Estimates	-	8,627	7,892	12,016	5,788	4,159
Annual Estimates	-	59,268	71,118	82,551	52,153	28,575

LOBO Trail

Longmont-Boulder estimates are in Table 15. The 83rd street segment has a monthly estimate of 5,546 and an annual estimate of 38,101 people using the summer data. An estimate using the spring data is not provided because the Parks and Open Space and Transportation departments requested adding the 83rd observation location after the spring observations were completed. Airport Road has a monthly estimate of 2,368 using spring data and 3,697 using summer data and an annual estimate of 21,335 using spring data and 25,400 using summer data.

Table 5: LOBO Estimates

Observation Points	***83rd***		***Airport Road***	
Season	**Spring**	**Summer**	**Spring**	**Summer**
Observed				
Weekday People Per Hour	-	16	9	12
Weekend People Per Hour	-	9	20	17
Estimates				
Weekday Average Estimates	-	162	69	108
Weekend Average Estimates	-	227	97	151
Monthly Estimates	-	5,546	2,368	3,697
Annual Estimates	-	38,101	21,335	25,400

Rock Creek Trail

Rock Creek estimates are in Table 16. Using the summer data, Coalton has a monthly estimate of 5,956 and an annual estimate of 40,916 people. An estimate using the spring data is not provided because data was collected at Park in the spring and shifted to Coalton in the summer at the request of the County.

Exempla has a monthly estimate of 5,262 using spring data and 3,081 using summer data and an annual estimate of 47,412 using spring data and 21,167 using summer data. The reduction from the spring estimates to the summer estimates is likely caused by extremely warm observation periods during the summer. There is no shade along the Exempla portion of Rock Creek and people mostly likely are using shaded portions of the trail or not using the trail during this period. The Park location has a monthly estimate of 5,525 and an annual estimate of 49,782 using spring data. Summer observations were not collected for Park because the County requested we shift these hours to collect data at Coalton. However, as mentioned in the descriptive data previously, both of these observation locations have very different users and are extremely well used.

Stearns has a monthly estimate of 2,894 using spring data and 616 using summer data and an annual estimate of 26,076 using spring data and 4,233 using summer data. Stearns has the most significant difference between spring and summer data estimates for two reasons: 1) summer weather was mostly cloudy and stormy on the days observed here and 2) summer observers were more selective in counting only those who solely used the Rock Creek portions only whereas spring counts included those using the fishing access trails as well. Observers noted many people riding down 104th street, entering the trail south of Stearns or going thru the Cradleboard-Josh's Pond intersection. Table 17 summarizes the total Annual Estimated Usage of each location.

Table 6: Rock Creek Estimates

	Coalton		**Exempla**		**Park**		**Stearns**	
Season	***Spring***	***Summer***	***Spring***	***Summer***	***Spring***	***Summer***	***Spring***	***Summer***
Observed								
Weekday People Per Hour	-	34	8	5	17	-	7	9
Weekend People Per Hour	-	22	10	5	-	-	8	8
Estimates								
Weekday Average Estimates	-	174	154	90	162	-	85	18
Weekend Average Estimates	-	244	215	126	226	-	119	25
Monthly Estimates	-	5,956	5,262	3,081	5,525	-	2,894	616
Annual Estimates	-	40,916	47,412	21,167	49,782	-	26,076	4,233

DISCUSSION & CONCLUSION

Qualitative observations

During 100+ hours of observation the observers noted several issues. There seem to be two general types of user: 1) those that are out for exercise and 2) those out for a social experience. This assumption was based on speed of travel and clothing, among other factors noted above like group size. Regional trails seem to be serving both needs very well. However, there was very little evidence of users using these trails for transportation. The observers noted very few people who carried things with them, which may indicate they were commuting from one place to another (i.e. items like backpacks, messenger bags, or cycling work attire, instead of cycling attire). However, only a handful of these people were observed. Yet, without interviewing users it is impossible to say what type of trip they are taking. Kids traveling through the Rock Creek – Park location on the way to school would be the exception to this observation. Future research could interview users to validate this observation; however, in all likelihood it would be confirmed due to the lack of land use distributions that would facilitate a commute origin and destination.

Conclusion

The above findings on trail use patterns and user type are similar to findings from other studies outlined in the literature review above. The estimated annual use for all nine-observation points is between 268,000 and 300,000 (Coal Creek = 123,000-170,000; LOBO= 21,000-63,000; and Rock Creek = 66,000-123,000). These estimates indicate that regional trails are well used, but not by a diverse age range of users and not by many commuters or groups. Future research could help compare the current users to local demographic trends, land use, and interview data to determine if the trails are serving the local population. Another informative analysis would be to compare trail use to residential proximity, which may help guide future trail development.

Blue Heron seen from Coal Creek at Public Road

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APPENDIX

Appendix A: Observation instrument

Boulder County Regional Trails Visitation and Use Observations

Observer:	
Trail Name:	Coal Ck -1 Rock Ck - 2 LoBo -3
Trail Segment:	
Date (month/day):	
Day of week:	Mon Tues Wed Thurs Fri Sat Sun
Start Time:	
End Time:	
Weather:	Sunny Partly Cloudy Cloudy Rainy
Temperature:	

Comments:

USER	STARTING PLACE		ACTIVITY				DOG	GENDER		AGE				GROUP SIZE				Repeat?	Direction
	TrailHead	Thru	Walk	Jog/Run	Bike	Other	w/ dog?	Male	Female	Adult	Teen	Child	Senior	1	2	3	4+		
User 1																			
User 2																			
User 3																			
User 4																			
User 5																			
User 6																			
User 7																			
User 8																			
User 9																			
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Appendix B: Estimation Calculation Details

Location	Season	Weekday Sum (Observed)	Weekday people per hour	Weekend Sum (Observed)	Weekend people per hour	Grand Total	Weekday mean peak hour traffic (Observed)	Weekday mean (Observed)	Weekend peak hour traffic (Observed)	Weekend Avg (Observed)	Weekday Peak Hour Multiplier (Lindsey et al 2007)	Weekday Peak Hour Multiplier	Weekday Average Estimate (Daytime Only)	Weekend Multiplier (Lindsey et al 2007)	Weekend Multiplier	Weekend Average Estimate (Daytime Only)	Number of Weekdays per Month Multiplier	Number of Weekend Days per Month Multiplier	Monthly Average Estimate (Daytime Only)	Annual Traffic Estimates - no round trips (Daytime Only)
Estimates Based on Spring Obsevations																				
Coal Creak: Aquarius	Spring	8.0	16.00	22.00	4.89			8.00	5.00	22.00	13.00			1.40		-	23.00	8.00		-
Coal Creek: Public Road	Spring	115.0	28.75	43.00	28.67		30.00	28.75		43.00	13.00	11.13	230.77	1.40	1.00	323.08	23.00	8.00	7,892.31	71,117.58
Coal Creek: Town Hall	Spring	65.0	11.82	81.00	27.00		22.00	32.50	27.00	27.00	13.00		169.23	1.40	2.28	236.92	23.00	8.00	5,787.69	52,152.90
Coal Creek: Total	Spring	188.0		146.00		334.00	26.00	23.08	16.00	30.67			400.00			560.00			13,680.00	123,270.48
Longmont Boulder: 83rd	Spring										13.00			1.40		-	23.00	8.00		-
Longmont Boulder: Airport	Spring	42.0	9.33	39.00	19.50		9.00	14.00	9.00	19.50	13.00		69.23	1.40	2.09	96.92	23.00	8.00	2,367.69	21,335.28
Longmont Boulder: Total	Spring	42.0		39.00			9.00	14.00	9.00	19.50			69.23			96.92			2,367.69	21,335.28
Rock Creek: Coalton	Spring										13.00			1.40		-	23.00	8.00		-
Rock Creek: Exempla	Spring	40.0	8.00	29.00	9.67		20.00	10.00	7.00	9.67	13.00		153.85	1.40		215.38	23.00	8.00	5,261.54	47,411.72
Rock Creek: Park	Spring	50.0	16.67				21.00				13.00	7.33	161.54	1.40		226.15	23.00	8.00	5,524.62	49,782.31
Rock Creek: Sterns	Spring	11.0	7.33	24.00	8.00		11.00	11.00	7.00	8.00	13.00	14.00	84.62	1.40		118.46	23.00	8.00	2,893.85	26,076.45
Rock Creek: Total	Spring	101.0		53.00		154.00	17.33	7.00	7.00	5.89			400.00			560.00			13,680.00	123,270.48
Grand Total	**Spring**	**331.0**		**238.00**		**569.00**	**17.44**	**14.69**	**10.67**	**18.69**	**13.00**		**869.23**	**1.40**		**1,216.92**			**29,727.69**	**267,876.24**
Estimates Based on Summer Obsevations																				
Coal Creak: Aquarius	Summer	63.0	21.00	122.00	40.67		28.00	63.00	44.00	40.67	11.10	9.33	252.25	1.40	1.94	353.15	23.00	8.00	8,627.03	59,267.68
Coal Creek: Public Road	Summer	131.0	32.75	95.00	31.67		39.00	32.75	41.00	31.67	11.10	15.08	351.35	1.40	0.97	491.89	23.00	8.00	12,016.22	82,551.41
Coal Creek: Town Hall	Summer	80.0	16.00	97.00	24.25		13.50	16.00	19.00	24.25	11.10		121.62	1.40	1.52	170.27	23.00	8.00	4,159.46	28,575.49
Coal Creek: Total	Summer	274.0		314.00		588.00	26.83	37.25	34.67	32.19			725.23			1,015.32			24,802.70	170,394.57
Longmont Boulder: 83rd	Summer	56.0	16.00	27.00	9.00		18.00	14.00	1.00	9.00	11.10		162.16	1.40	0.56	227.03	23.00	8.00	5,545.95	38,100.65
Longmont Boulder: Airport	Summer	36.0	12.00	52.00	17.33		12.00	36.00	8.00	17.33	11.10		108.11	1.40		151.35	23.00	8.00	3,697.30	25,400.43
Longmont Boulder: Total	Summer	92.0		79.00			15.00	25.00	4.50	13.17			270.27			378.38			9,243.24	63,501.08
Rock Creek: Coalton	Summer	118.0	33.71	67.00	22.33		19.33	23.60	19.00	22.33	11.10	13.30	174.14	1.40	0.66	243.80	23.00	8.00	5,955.73	40,915.86
Rock Creek: Exempla	Summer	15.0	5.00	9.00	4.50		10.00	15.00	5.00	9.00	11.10		90.09	1.40		126.13	23.00	8.00	3,081.08	21,167.03
Rock Creek: Park	Summer										11.10			1.40		-	23.00	8.00		-
Rock Creek: Sterns	Summer	28.0	9.33	20.00	8.00		2.00	28.00	5.00	20.00	11.10		18.02	1.40		25.23	23.00	8.00	616.22	4,233.41
Rock Creek: Total	Summer	161.0		96.00		257.00	10.44	22.20	9.67	17.11			282.25			395.15	23.00	8.00	9,653.03	66,316.30
Grand Total	**Summer**	**527.0**		**489.00**		**1,016.00**	**17.43**	**28.15**	**16.28**	**20.82**	**11.10**		**1,277.75**	**1.40**		**1,788.85**	**23.00**	**8.00**	**43,698.97**	**300,211.94**