

# Spring Brook Loop Trail Visitor Conflict Summer 2009

## *Monitoring Report*



Prepared by:

Deonne VanderWoude  
Resource Monitoring Technician

The City of Boulder  
Open Space and Mountain Parks Department  
Boulder, Colorado

**March 2010**

## **Acknowledgments**

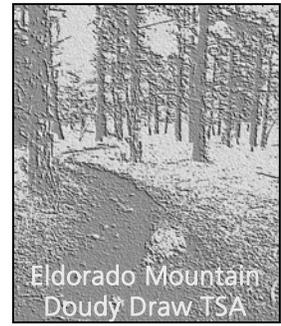
This report represents the collective work of the Monitoring Group within the City of Boulder Open Space and Mountain Parks (OSMP) Department. Steve Armstead, Mark Gershman, Marianne Giolitto and Ann Lezberg contributed to protocol development. Ann Lezberg, Donna Middleton and Deonne VanderWoude collected field data for the project. There were also numerous internal contributors and reviewers of the report.

### Suggested Citation:

VanderWoude, D. (2010). Spring Brook Loop Visitor Conflict *Monitoring Report*. The City of Boulder, Department of Open Space and Mountain Parks. Boulder, Colorado.

## Executive Summary

City of Boulder Open Space and Mountain Parks (OSMP) conducted an on-site survey at two exit points along the Spring Brook Loop Trail (SBL). Visitors were asked to complete a self-administered written questionnaire.



The specific objectives of the survey were to describe:

1. Conflict experiences on the day of the survey, and
2. Conflict experiences during the past six months.

OSMP defined conflict as “goal interference attributed to the behavior of others” (Jacob and Schreyer 1980, p. 369).

Additional information was collected to understand:

1. Trip characteristics (e.g., reason for visit, activity participation),
2. Visitor attitudes (e.g., perception of OSMP management success), and
3. Visitor characteristics (e.g., age, residence) and prior visitation rates.

Because it was an on-site survey, the survey did not measure visitor displacement (i.e. those visitors who have stopped visiting SBL because of conflict or other reasons). Results shown below are based upon this survey of SBL visitors ( $n = 766$ , response rate 91%) conducted during summer 2009.

### Major Findings

#### *Conflict*

- Six percent of the survey respondents reported experiencing conflict on the day of the survey. This value lies outside the pre-determined acceptable range (0-5%).
- Ten percent of the respondents reported experiencing conflict during the past six months. This value lies within the pre-determined acceptable range (0-20%).
- A greater percentage of hikers reported conflict than any other activity.
- For all respondents combined, cyclists and dogs were the number one and two top sources of conflict respectively.
- Serious problems accounted for only 7% of the estimated conflict on the day of the survey and 10% of the total conflict over the past six months.

#### *Trip Characteristics*

- Most respondents (68%) considered cycling their primary activity. The remainder was divided among hiking (18%), running (13%) and horseback riding (<1%).
- Less than three percent (2.8%) of the respondents brought at least one dog on the day they completed the survey. Of those with a dog, 81% were visiting with one dog and 19% had two or three dogs.
- Most respondents (65%) reported “good place to do the activities I enjoy” as the most important reason for visiting OSMP. The remainder was split between “to enjoy the place itself” (27%) and “spending time with family or friends” (7%).

### *Visitor Attitudes*

- The vast majority of respondents (95%) reported “just knowing dogs are in the area” was not a problem for them. Similarly, 96% of respondents reported “just knowing bicycles are in the area” was not a problem.
- Most respondents (91%) believed that OSMP was successfully managing SBL as a shared-use trail.

### *Visitor Characteristics*

- The average age of respondents was 41.2 years, and the median age of respondents was 41.0 years. Most of the respondents (71%) reported living within Boulder County.
- On average, respondents had visited OSMP areas for 9.9 years (median: 6.0 years).
- The average number of times per month respondents visited SBL was 3.5 (median: 2.0 visits).

### *Recommendations*

For managers, early detection of visitor conflicts and effective conflict resolution depends upon understanding where and how conflicts arise (Cordell & Tarrant. 2002). Because this study was designed to measure visitor conflict occurring within the first-year of the SBL opening, OSMP managers have timely results to inform proposed management actions and a reliable baseline against which OSMP may compare future conditions at SBL. Because the estimated overall visitor conflict rate for the day of the survey exceeded the established 0-5% range of acceptability, OSMP managers should consider the following to reduce conflict in the SBL area:

- Enhancing education, outreach and/or signs.
- Meeting with community groups and implementing strategies aimed at reducing conflict (e.g., volunteer patrols, education and outreach to constituents).
- Hosting trail “safety day” events that call attention to behaviors and activities that cause conflict.
- Clarifying the “yielding triangle” and broadly sharing this information.

## Table of Contents

	Page
Acknowledgments .....	i
Executive Summary .....	ii
Table of Contents .....	iv
List of Tables .....	v
List of Figures .....	v
Introduction .....	1
Planning Background and Guidance .....	2
Monitoring Objectives .....	3
Methods .....	3
Survey Instrument .....	4
Season and Duration of Sampling .....	4
Monitoring Schedule - Sampling Days and Times .....	4
Study Site .....	4
Data Collection, Documentation and Analysis .....	4
Results .....	6
Trip Characteristics .....	6
Conflict Rate Indicators .....	8
Individual Activity Group Conflict Rates, Conflict Sources, Conflict Between Activities and Overall Conflict Severity Levels .....	8
Conflict and Goal Interference .....	13
Visitor Attitudes .....	14
Visitor Characteristics .....	16
Survey Administration .....	21
Discussion .....	21
Conflict Factors .....	22
Social Values Conflict .....	23
Generalizability .....	24
Recommendations .....	24
SBL Recommendations .....	25
Additional System-wide Recommendations .....	25
Summary .....	26
References Cited.....	26
Appendix A. Ranges of Acceptability and Potential Management Responses .....	32
Appendix B. Visitor Survey Instrument .....	33
Appendix C. Non-Response/Session Information Documentation Sheet .....	35
Appendix D. Additional Survey Results and Analyses .....	36
Appendix E. Conflict Severity Ratings for each Source of Conflict and Themed Conflict Descriptions .....	38
Appendix F. Numeric Visitor Reported Zip Code Responses .....	41
Appendix G. Additional Survey Administration Results .....	42
Appendix H. Summary of OSMP and Peer Agency Conflict-Related Survey Questions ..	43
Appendix I. Information-Processing Model of Persuasion and Behavioral Change .....	46
Appendix J. Twelve Principles for Minimizing Conflict on Shared-Use Trails .....	47

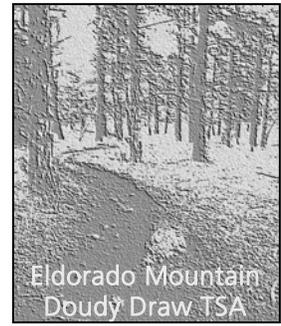
## List of Tables

	Page
Table 1. Reason for visiting OSMP on the day of the survey .....	7
Table 2. Activity group reason for visiting OSMP on the day of the survey .....	7
Table 3. SBL dog visitation on the day of the survey .....	7
Table 4. SBL conflict on the day of the survey .....	8
Table 5. SBL conflict during the past six months .....	8
Table 6. SBL visitor reported conflict between specific activities on the day of the survey .....	11
Table 7. SBL visitor reported conflict between specific activities during the past six months .....	12
Table 8. SBL visitor reported severity of experienced conflict .....	13
Table 9. Number and percent of SBL visitors reporting conflict on the day of the survey by reason for visiting OSMP .....	13
Table 10. Activity group visitor conflict reported on the day of the survey by reason for visiting OSMP .....	13
Table 11. Activity group visitor conflict reported during the past six months by reason for visiting OSMP .....	14
Table 12. Just knowing dogs or bicycles are in SBL area is a problem .....	14
Table 13. Just knowing dogs or bicycles are in the SBL area is a problem by activity group .....	15
Table 14. SBL management success .....	15
Table 15. SBL management success by activity group .....	16
Table 16. SBL visitor refusal rate by observed activity .....	21

## List of Figures

Figure 1. Spring Brook Loop Trail shown in purple .....	1
Figure 2. OSMP regulatory yielding sign .....	3
Figure 3. Spring Brook Loop survey administration sites .....	5
Figure 4. Visitor reported primary activity on the day of the survey .....	6
Figure 5. Percentage of each activity group reporting recreation conflict on the day of the survey .....	9
Figure 6. Percentage of each activity group reporting recreation conflict during the past six months .....	9
Figure 7. Distribution of the source of conflict based on respondents who reported experiencing conflict on the day of the survey .....	10
Figure 8. Distribution of the source of conflict based on respondents who reported experiencing conflict during the past six months .....	10
Figure 9. Distributions of the of the source of conflict and visitor reported primary activity on the day of the survey .....	11
Figure 10. Visitor reported monthly SBL visits .....	16
Figure 11. SBL visitor reported years visiting OSMP .....	17
Figure 12. SBL visitor reported age .....	17
Figure 13. Percentage of respondents reporting a Boulder County zip code .....	19
Figure 14. Percentage of respondents reporting a Metro Denver zip code .....	20

# Spring Brook Loop Trail Visitor Conflict Project Monitoring Report February 2010



## 1.0 Introduction

The City of Boulder Open Space and Mountain Parks (OSMP) trail system offers approximately 144 miles of designated<sup>1</sup> recreational trails. Over 48 miles of these trails are designated for bicycling and approximately 129 miles are open to dogs (City of Boulder 2010, p. 1). Completion of the Eldorado Mountain/Doudy Draw (EM/DD) Trail Study Area (TSA) Plan resulted in trail improvements including the addition of several shared-use trails that offer new recreational opportunities. Spring Brook Loop Trail is one of these newly opened shared-use trails.

The Spring Brook Loop Trail (SBL) comprises a new loop and connector trail within the Doudy Draw Natural Area (Figure 1).

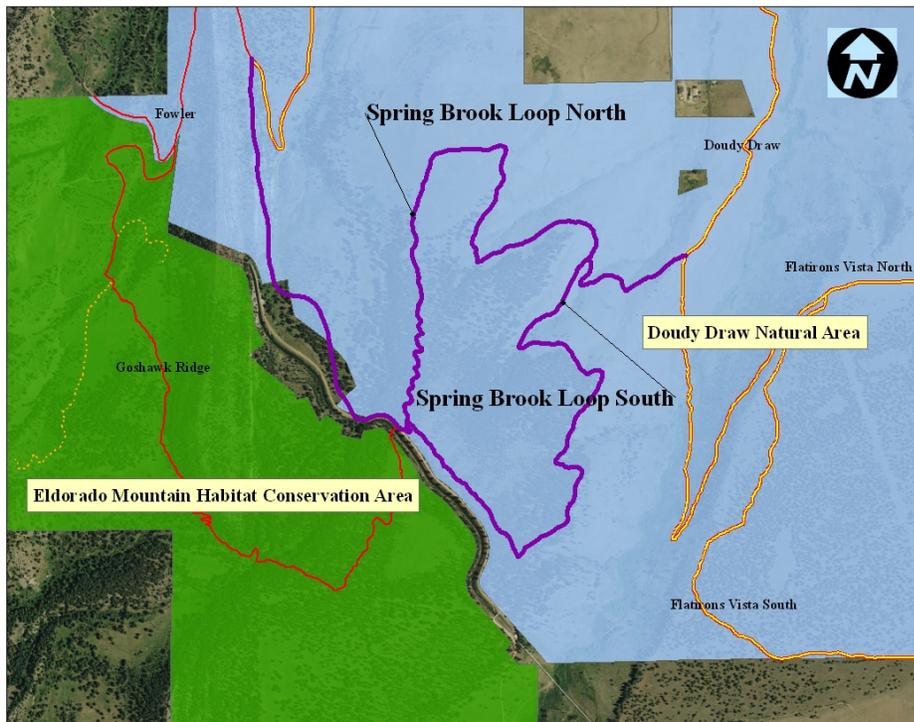


Figure 1. Spring Brook Loop Trail shown in purple

OSMP tries to manage SBL as a place where pedestrians, bicyclists, dogs and equestrians can harmoniously share the trail system in a manner that protects native plants and animals. On-trail travel is required for cyclists, equestrians and dogs on the SBL. Additionally, dogs must remain on-leash and are prohibited on SBL-south.

<sup>1</sup> Designated trails are those trails marked with signs that include a trail name and are indicated on OSMP trail maps.

### 1.1. Planning background and guidance

The Visitor Master Plan (VMP) includes a “User Conflict Reduction Initiative” with several management strategies designed to reduce conflict. The effectiveness of the initiative and its strategies are to be monitored through “resident and visitor surveys to measure types, location, and frequency of conflicts among visitors” (City of Boulder 2005, p. 63). The EM/DD TSA Plan proposed a survey of visitors (City of Boulder 2006, p. 22) to understand if the visitor experience is being adversely affected by providing opportunities for dog activity in this area. Community interest and input on proposed monitoring projects for SBL supported assessing how the visitor experience is being affected by all the activities occurring on SBL.

The Natural Resource and Sustainable Recreation Monitoring Plan (City of Boulder 2008, p. 13.) for EM/DD TSA states that recreational conflict on SBL will be monitored, and if measured conflict levels are not acceptable (i.e., within a publicly established range of acceptability), OSMP will take management actions to improve the situation. Appendix A presents potential management responses associated with various levels of measured conflict.

Conflict reduction planning included implementing a dogs on-leash regulation in the area. Additionally, the City of Boulder adopted a specific regulation under the Boulder Revised Code (B.R.C.) 8-3-3 which requires all OSMP visitors to yield the trail in a manner consistent with common Front Country<sup>2</sup> codes of conduct (Figure 2). B.R.C. 8-3-3.G(08) states:

*"All trail users on City of Boulder Open Space and Mountain Parks property are required to yield to other trail users in the following manner:*

*All users yield to equestrians;*

*Bicyclists yield to pedestrians, and bicyclists headed downhill yield to bicyclists headed uphill.*

*Yielding the right of way requires slowing down to a safe speed, being prepared to stop, establishing communication, and passing safely."*

Visitors to SBL have several opportunities to learn about applicable rules and requirements. There are regulatory signs and maps at trailhead kiosks as well as signs placed along the SBL corridor. In addition, OSMP promoted these requirements during public meetings, in local newspaper advertisements, through education and outreach activities, in a site-specific brochure and on the internet (e.g., email distribution, OSMP website). The SBL requirements can be difficult to enforce for various reasons including the SBL’s lower visitation level (ranger time is prioritized to busier areas) and remote location compared to trails near population centers (longer time to access for enforcement). Therefore, OSMP relies mostly upon visitors following the regulations (e.g., yielding, dogs on-leash) voluntarily.

---

<sup>2</sup> Front Country typically represents day-use recreational areas near population centers.



Figure 2. OSMP regulatory yielding sign

OSMP also designed and constructed the trail to include curves, grade changes and tread obstacles to reduce the potential for visitor conflict. Additionally, “Slow Down” and “Blind Curve” signs are in place to encourage safe travel speeds and increase visitor visibility.

### 1.2. Monitoring objectives

To understand the rates of visitor conflict for an individual day and for the general time period since SBL opened (December 2, 2008 to early summer 2009), OSMP developed two monitoring objectives:

1. Estimate the proportion of visitors who experience conflict arising from their interactions with others on the Spring Brook Loop Trail on a given day.
2. Estimate the proportion of visitors who experienced conflict arising from their interactions with others on the Spring Brook Loop Trail over the past six months.

Additional information was collected to guide management and understand SBL visitors:

1. Trip characteristics (e.g., reason for visit, activity participation),
2. Visitor attitudes (e.g., perception of OSMP management success), and
3. Visitor characteristics (e.g., age, residence) and prior visitation rates.

OSMP achieved the monitoring objectives described above by administering an on-site survey at two exit points (Figure 3) along the SBL. Because it was an on-site survey, the survey did not measure visitor displacement (i.e. those visitors who have stopped visiting SBL because of conflict or other reasons). The results of the survey are presented here and will be used to inform visitor management decisions for the SBL area.

## **2.0 Methods**

OSMP used the “recreation conflict” model developed by Jacob and Schreyer (1980) to define and estimate visitor conflict occurring along SBL on the day of the survey and over the past six months. This model defines recreation conflict as “goal interference attributed to the behavior of others”<sup>3</sup> (Jacob and Schreyer 1980, p. 369). This model is intended to measure interpersonal

---

<sup>3</sup> This interference can be the result of discourteous behavior, people not willing to share trails, or by the mere presence of another visitor (Gramann, 2002; Jacob & Schreyer, 1980).

conflict occurring in person, between two or more individuals. Asking about experienced interpersonal conflict allows OSMP managers to learn about conflicts occurring between visitors on the trail and to adaptively respond to reported problems.

Ranges of acceptability (Appendix A) were established for overall visitor conflict rates<sup>4</sup> reported on a given day (i.e., the day of the survey) and over the last six months. No ranges of acceptability were established for individual activity group conflict rates or any other presented results.

### 2.1. Survey instrument

An on-site visitor survey (Appendix B) was administered to visitors exiting SBL. The survey was designed by OSMP staff based on a literature review, review of peer agency surveys and previous OSMP survey questions. The survey was pre-tested with on-site visitors to determine if any revisions were needed (none were). The survey was administered by trained field technicians in four-hour blocks based on the sampling design. For a more detailed description of project methods, see VanderWoude (2009).

The individuals surveyed answered questions about the recreational conflict experienced as a result of their interactions with other visitors on SBL. The survey respondents also answered questions about trip characteristics, visitor attitudes and visitor characteristics.

### 2.2. Season and duration of sampling

Protocol testing and staff training occurred in early summer 2009. Survey administration occurred from June 18 to August 2, 2009. After this period, data were analyzed and staff evaluated the need for additional surveying. Additional surveying was not needed.

### 2.3. Monitoring schedule – sampling days and times

Survey administration was scheduled for six weeks on both weekend and week days. Survey days, times and sites were randomly selected. Survey administration sessions were limited to four hours to ensure attentiveness of the survey administrator. No more than two sessions occurred on a given day. Survey blocks were selected at random from 7:30 to 11:30, 11:30 to 15:30 or 15:30 to 19:30 hrs.

### 2.4. Study site

OSMP staff administered the visitor survey at the two exit points on SBL, the “ramp” and the “stem” (Figure 3). OSMP expected the majority of visitors to exit the SBL at these two points.

### 2.5. Data collection, documentation and analysis

Staff attempted to contact every adult ( $\geq 16$  years old) visitor who appeared to be exiting the SBL near the survey administration table and ask her/him to participate in the survey. Visitors on an official OSMP-led group activity (e.g., hike, bike ride) were included in the surveyed population.

---

<sup>4</sup> Overall visitor conflict rates were calculated using data from respondents who reported having experienced conflict. Overall conflict rates do not include respondents who reported “just knowing dogs or bicycles are in the area is a problem” but did not report experiencing conflict.

Staff did not attempt to administer the survey to the following individuals:

- Any person, paid or non-paid, conducting official OSMP business. This included OSMP staff, contractors, and volunteers.
- Any person who had previously completed a questionnaire.
- Any person passing by the survey location that had just entered the SBL and not yet traveled on SBL that day.

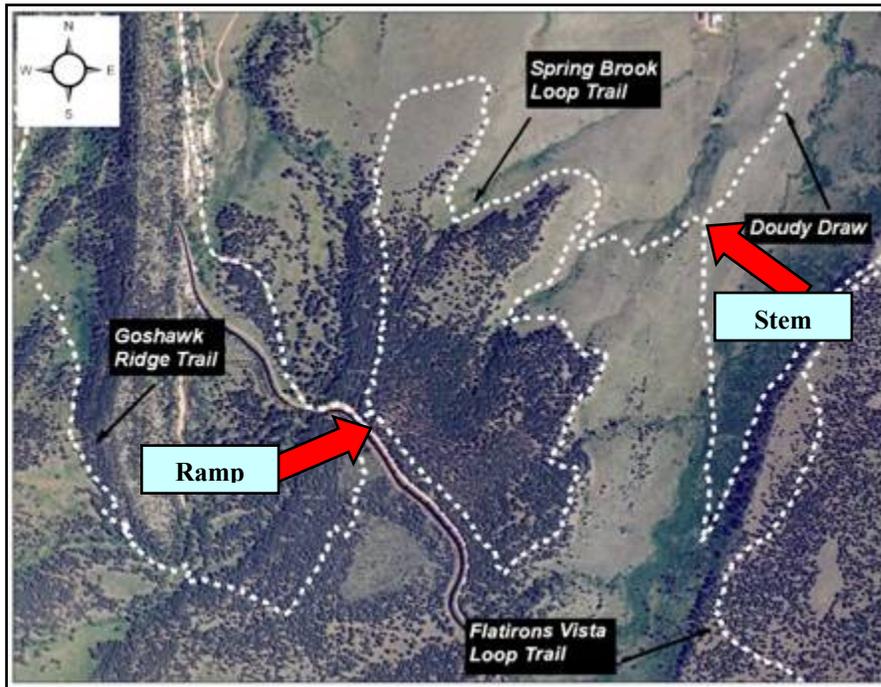


Figure 3. Spring Brook Loop survey administration sites

When an eligible visitor agreed to participate in the survey, staff gave her/him a questionnaire on a clip board and a pencil. Staff attempted to check each completed questionnaire for legibility and completeness as they were turned in, and asked the respondent to clarify any illegible or incomplete answers.

For visitors who refused to participate in the survey (refusals), passed by the survey administrator before she could contact them (passes), or informed the administrator that they had already completed the questionnaire (repeats), staff documented these visitors on a non-response/session information documentation sheet (Appendix C).

Data collected in the field was initially entered into Microsoft Excel® as soon after the field session as possible. Data entry was checked for accuracy by a staff member who did not enter the data. The data file was then exported into Statistical Package for the Social Sciences (SPSS®) version 12.0 for the majority of the analyses.

Data analyses used both Microsoft Excel and SPSS. Proportions were calculated from all survey sessions and both survey sites, treating each visitor participating in the survey as separate

independent units. Ninety percent confidence intervals around the estimated proportions (i.e., overall conflict rates) were calculated using exact method equations (Zar, 1996).

### 3.0 Results

OSMP staff spent approximately 140 hours in the field administering visitor surveys. A total of 766 surveys were collected during the six-week sampling period with a 91% response rate. Trip characteristics results are presented first to provide background when interpreting other results. These results are followed by project objectives results (overall visitor conflict rates), other conflict results and additional information including: individual activity group conflict rates, conflict sources, conflict between activities, overall conflict severity levels, visitor attitudes and visitor characteristics.

#### 3.1. Trip characteristics

Figure 4 presents the distribution of reported visitor activities on the SBL. Respondents selected which activity (biking, hiking, running, horseback riding) they considered to be their primary activity on the day of the survey. The majority of respondents (68%) reported biking as their primary activity with the remainder divided among hiking (18%), running (13%) and horseback riding (<1%).

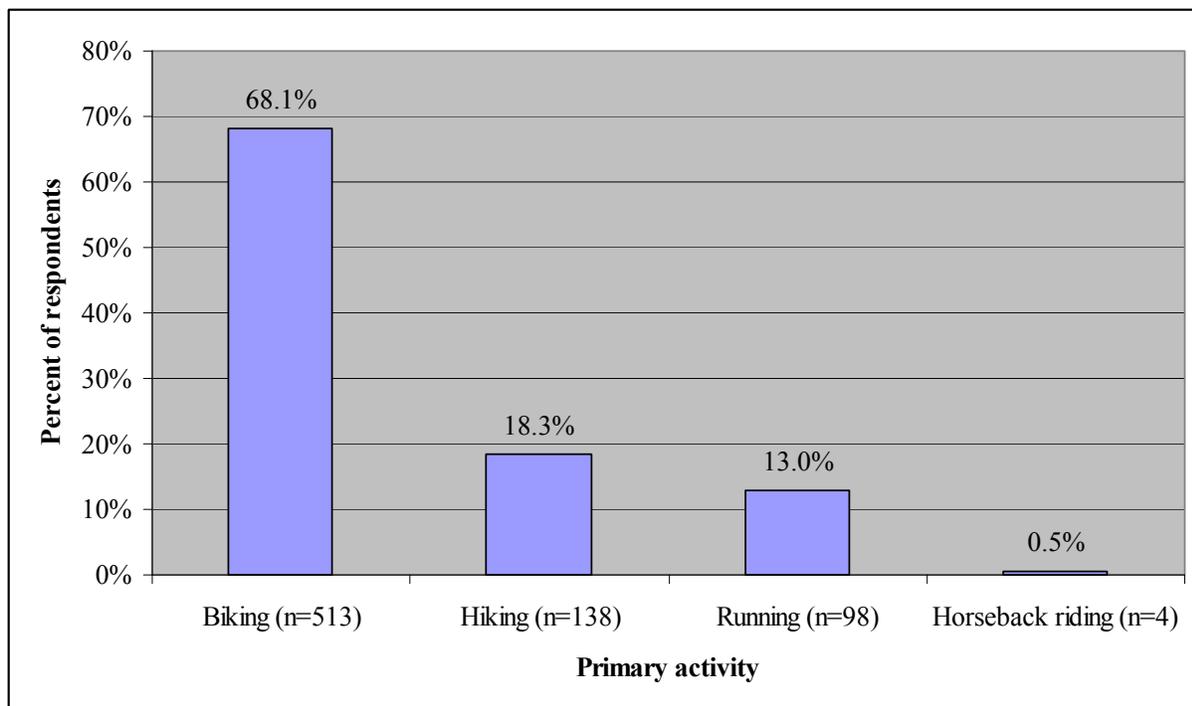


Figure 4. Visitor reported primary activity on the day of the survey

This study measured visitor conflict using the “goal interference” model (see section 2.0). To better understand SBL visitor goals, respondents identified their most important reason for visiting OSMP on the day of the survey. The majority of respondents (65.4%) reported visiting OSMP because it is a “good place to do the activities” they enjoy (Table 1). The remainder was split between “enjoying the place itself” (27.7%) and “spending time with family or friends” (7%).

Table 1. Reason for visiting OSMP on the day of the survey (n=719)

Reason	No. of Respondents	Percent of Respondents
Good place to do the <u>activities</u> I enjoy	470	65.4%
Enjoy the <u>place</u> itself	199	27.7%
Spend time with <u>family or friends</u>	50	7.0%
<b>Total</b>	<b>719</b>	<b>100.0%</b>

Table 2 shows the most important reason for visiting OSMP on the day of the survey for each activity group. Most cyclists (75%) and runners (70%) reported visiting OSMP because it is a “good place to do the activities” they enjoy while equestrians (75%) and hikers (51%) reported visiting OSMP to “enjoy the place itself” or “to spend time with family or friends” (hikers, 22%).

Table 2. Activity group reason for visiting OSMP on the day of the survey (n=707)

Activity Group	Most Important Reason for Visiting OSMP		
	Enjoy Activities	Family or Friends	Enjoy Place
Cyclist (n=480)	75%	4%	21%
Hiker (n=129)	27%	22%	51%
Runner (n=94)	70%	3%	27%
Equestrian (n=4)	25%	0%	75%

Table 3 provides information about the presence of dogs accompanying visitors to SBL. Although SBL represented a new opportunity for visitors with dogs, the vast majority of respondents (97.2%) did not have a dog with them on the day of the survey. Dogs are required to be on-leash on SBL-north and are prohibited from SBL-south. These regulations along with the trail’s distance from a major trailhead may contribute to the low numbers of reported dog activity. Additional dog and dog guardian data are included in Appendix D.

Table 3. SBL dog visitation on the day of the survey (n=752)

Number of dogs	No. of Respondents	Percent of Respondents
0	731	97.2%
1	17	2.3%
2	3	0.4%
3	1	0.1%
<b>Total</b>	<b>752</b>	<b>100.0%</b>

### 3.2. Conflict rate indicators

Survey respondents reported if they had experienced recreation conflict on the day of the survey and/or within the past six months. The estimated overall visitor conflict rate for the day of the survey fell outside the established 0-5% range of acceptability (Table 4). The confidence interval for this estimate ranges from just below to above the upper value of the acceptable range (90% CI: 4.7%, 7.7%). The estimated overall visitor conflict rate for the past six months was not outside the established 0-20% range of acceptability (Table 5).

---

Table 4. SBL conflict on the day of the survey

---

Response	No. of Respondents	Percent of Respondents
No	719	94.0%
Yes	46	<b>6.0%</b>
<b>Total</b>	<b>765</b>	<b>100.0%</b>

---

---

Table 5. SBL conflict during the past six months

---

Response	No. of Respondents	Percent of Respondents
No	675	89.8%
Yes	77	10.2%*
<b>Total</b>	<b>752</b>	<b>100.0%</b>

---

\*(90% CI: 8.5%, 12.2%)

### 3.3. Individual activity group conflict rates, conflict sources, conflict between activities and overall conflict severity levels

#### Individual activity group conflict rates

Figures 5 and 6 present the reported visitor conflict rates broken down by activity group. When asked about the day of the survey, the percentage of hikers who reported experiencing recreation conflict was more than twice the percentage of cyclists who reported experiencing recreation conflict. In contrast, these two activity groups reported experiencing recreation conflict in similar proportions when asked about the past six months. Also of interest are the runners, whose reported conflict rose sharply from 1.0% on the day of the survey to 12.8% for the past six months. Ranges of acceptability were not established for individual activity group rates of visitor conflict.

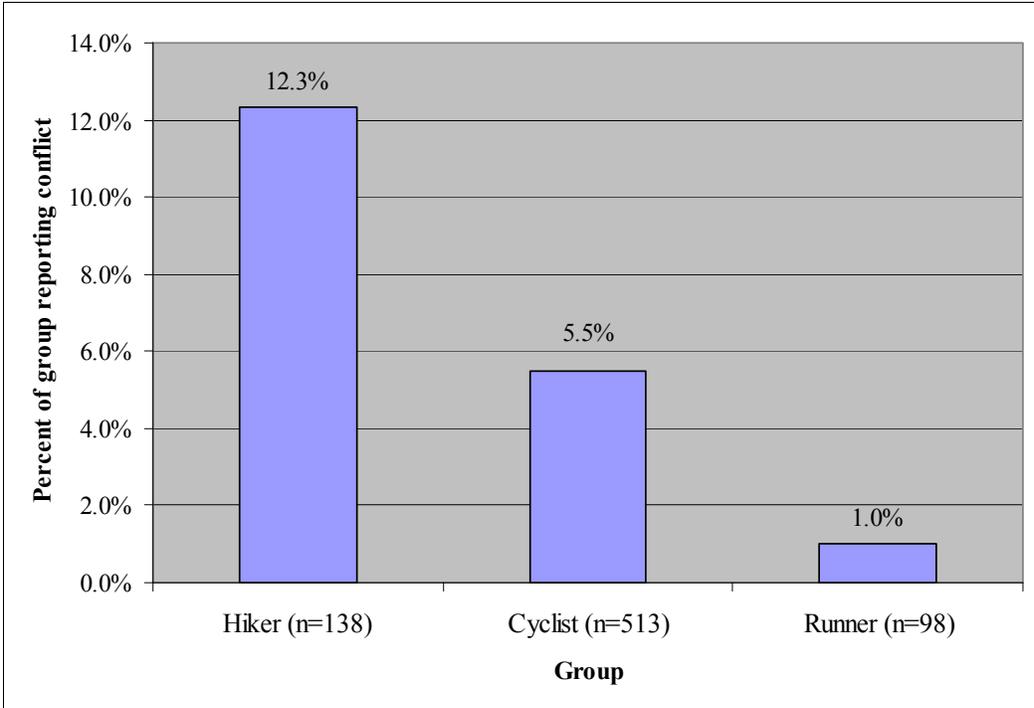


Figure 5. Percentage of each activity group reporting recreation conflict on the day of the survey (Note: None of the four equestrians surveyed reported recreational conflict.)

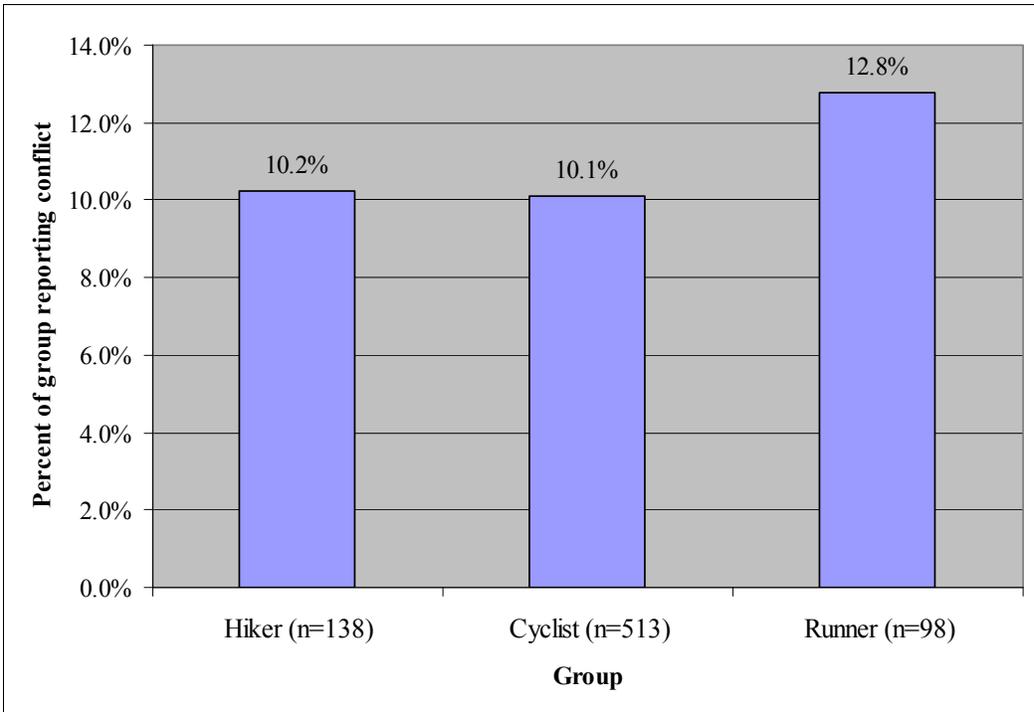


Figure 6. Percentage of each activity group reporting recreation conflict during the past six months (Note: None of the four equestrians surveyed reported recreational conflict.)

### Conflict sources

For both the day of the survey and during the past six months, cyclists were reported as the top source of conflict (Figures 7 and 8). This could be expected given that cyclists represent the majority of visitor activity reported along SBL (Figure 4). Conversely, 14% of the respondents who experienced conflict on the day of the survey indicated equestrians were the source of that conflict (Figure 7) despite low visitation to SBL by equestrians (Figure 4). Dog guardians with their dogs, while representing just less than three percent of respondents (Table 3), were reported as the second greatest source of conflict on the day of the survey (Figure 7). Dog guardians were tied with hikers as the second greatest source of conflict for the past six months (Figure 8). This suggests that relative to their visitation numbers along SBL, equestrians and dogs/dog guardians are causing the most conflict (Figure 9).

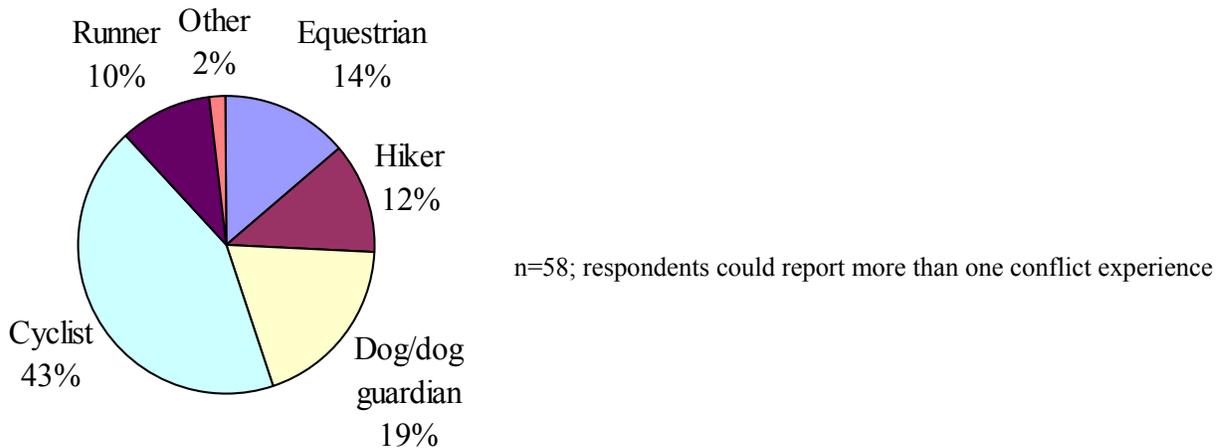


Figure 7. Distribution of the source of conflict based on respondents who reported experiencing conflict on the day of the survey

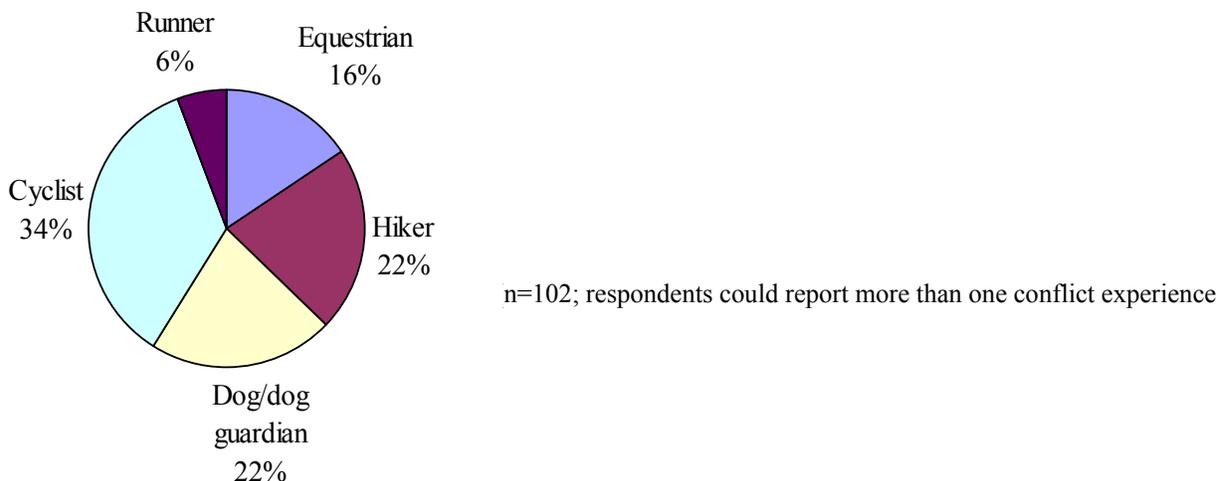


Figure 8. Distribution of the source of conflict based on respondents who reported experiencing conflict during the past six months

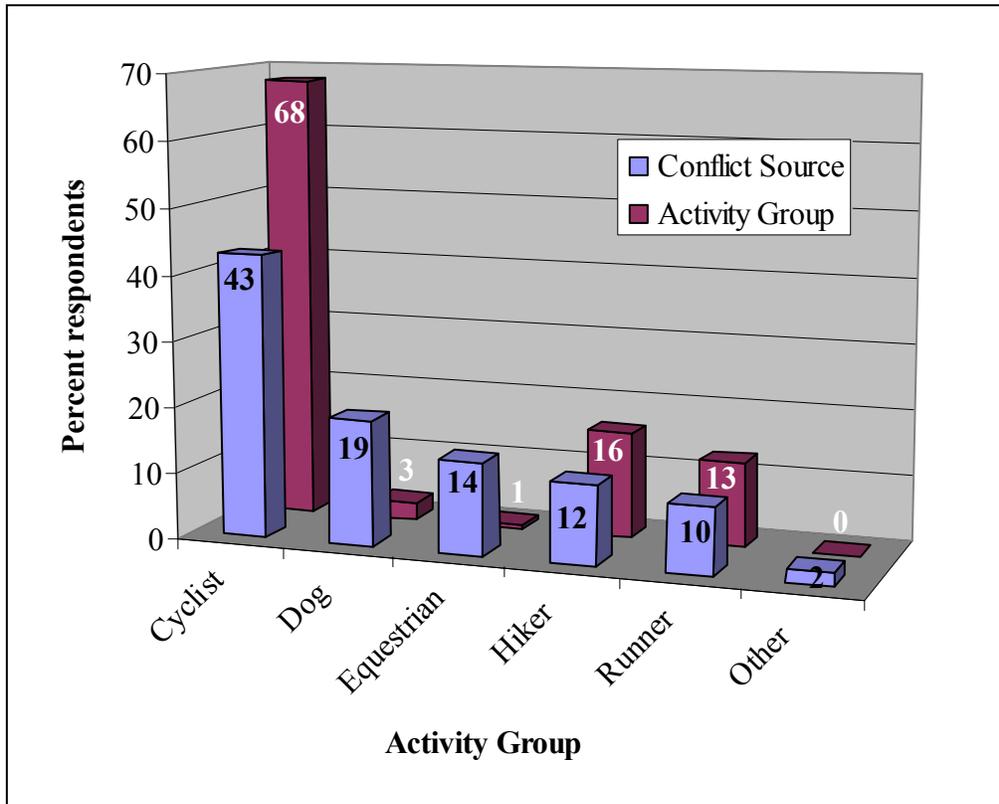


Figure 9. Distributions of the source of conflict (blue, n=57) and visitor reported primary activity (maroon, n=752) on the day of the survey

Conflict between activities

Tables 6 and 7 link the groups reporting conflict with the source of that conflict.

Table 6. SBL visitor reported conflict between specific activities on the day of the survey (n=57; respondents could report more than one conflict source)

Group Reporting Conflict*	Source of Conflict	No. of Respondents	Proportion of Reported Conflict
Cyclist	Dog/Dog guardian	10	26.3%
	Cyclist	8	21.1%
	Hiker	7	18.4%
	Equestrian	7	18.4%
	Runner	5	13.2%
	Other	1	2.6%
	<b>Total</b>		<b>38</b>
Hiker	Cyclist	17	89.5%
	Runner	1	5.3%
	Equestrian	1	5.3%
<b>Total</b>		<b>19</b>	<b>100.0%</b>

\* None of the four equestrians surveyed reported experiencing a conflict on the day of the survey; one runner reported experiencing conflict with a dog/dog guardian.

The greatest proportion of conflict was reported by cyclists. This is not surprising as most of the visitors to SBL are cyclists. Cyclists reported having conflict with every activity group including their own group. Cyclists were almost equally likely to experience conflict with another cyclist

as they were a dog/dog guardian, hiker, or equestrian. Hikers and runners typically reported experiencing conflict with a cyclist.

Table 7. SBL visitor reported conflict between specific activities during the past six months (n=102; respondents could report more than one conflict source)

Group Reporting Conflict*	Source of Conflict	No. of Respondents	Proportion of Reported Conflict
Cyclist	Cyclist	19	26.8%
	Hiker	19	26.8%
	Dog/Dog guardian	15	21.1%
	Equestrian	13	18.3%
	Runner	5	7.0%
<b>Total</b>		<b>71</b>	<b>100.0%</b>
Hiker	Cyclist	10	52.6%
	Dog/Dog guardian	4	21.1%
	Hiker	2	10.5%
	Equestrian	2	10.5%
	Runner	1	5.3%
<b>Total</b>		<b>19</b>	<b>100.0%</b>
Runner	Cyclist	7	58.3%
	Dog/Dog guardian	3	25.0%
	Hiker	1	8.3%
	Equestrian	1	8.3%
<b>Total</b>		<b>12</b>	<b>100.0%</b>

\* None of the four equestrians surveyed reported experiencing a conflict during the past six months

#### Overall conflict severity levels

Survey respondents rated most of the reported conflicts they experienced as “minor” problems (Table 8). Serious problems accounted for only 7% of the total reported conflict on the day of the survey and 10% of the total reported conflict over the past six months.

Additional conflict severity data as reported for each source of conflict (i.e., different activity groups) and generalized conflict descriptions provided by survey respondents in open ended portions of the survey are located in Appendix E.

Table 8. SBL visitor reported severity of experienced conflict

When Reported	Severity of Conflict Response	No. of Responses	Percent of Responses
On the Day of the Survey	Minor Problem	40	70.2%
	Moderate Problem	13	22.8%
	Serious Problem	4	7.0%
<b>Total</b>		<b>57</b>	<b>100.0%</b>
During the Past Six Months	Minor Problem	50	55.6%
	Moderate Problem	31	34.4%
	Serious Problem	9	10.0%
<b>Total</b>		<b>90</b>	<b>100.0%</b>

### 3.4. Conflict and goal interference

The majority of respondents (54.5%) who experienced conflict on the day of the survey had reported visiting OSMP that day because it is a “good place to do the activities” they enjoy (Table 9). This suggests the majority of people who experienced conflict on the day of the survey may have experienced conflict because their activity was disrupted.

Table 9. Number and percent of SBL visitors reporting conflict on the day of the survey by reason for visiting OSMP (n=44)

Reason	No. of Respondents	Percent of Respondents
Good place to do the <u>activities</u> I enjoy	24	54.5%
Enjoy the <u>place</u> itself	18	40.9%
Spend time with <u>family or friends</u>	2	4.5%

When broken down by activity group on the day of the survey, the majority of cyclists who experienced conflict (69.2%) indicated their primary reason for visiting OSMP that day was because it is a “good place to do the activities” they enjoy. This suggests the conflict they experienced may have been due to interference or disruption of their activity. Conversely, the majority of hikers who experienced conflict (58.8%) reported that their primary reason for visiting OSMP that day was because they “enjoyed the place itself”. The conflict they experienced may have been due to a disruption in enjoying the trail and/or natural environment offered in the SBL area (Table 10).

Table 10. Activity group visitor conflict reported on the day of the survey by reason for visiting OSMP (n=44)

Group Reporting Conflict	Most Important Reason for Visiting OSMP		
	Enjoy Activities	Family or Friends	Enjoy Place
Cyclist (n=26)	69.2%	0.0%	30.8%
Hiker (n=17)	29.4%	11.8%	58.8%
Runner (n=1)	100.0%	0.0%	0.0%

The pattern observed in Table 10 (for conflict experienced on the day of the survey) was more pronounced when respondents were asked about the past six months (Table 11).

Table 11. Activity group visitor conflict reported during the past six months by reason for visiting OSMP (n=74)

Group Reporting Conflict	Most Important Reason for Visiting OSMP		
	Enjoy Activities	Family or Friends	Enjoy Place
Cyclist (n=48)	81.3%	2.1%	16.7%
Hiker (n=14)	21.4%	7.1%	71.4%
Runner (n=12)	75.0%	0.0%	25.0%

### 3.5. Visitor attitudes

Because cycling and dog walking were newly designated in this area, managers had particular interest in understanding SBL visitor attitudes about these activities. Visitors were asked if “just knowing” dogs or bicycles were in the area created a problem for them. The vast majority of respondents reported that just knowing dogs (95%) or bicycles (95.9%) in the SBL area was not a problem for them (Table 12).

Table 12. Just knowing dogs or bicycles are in SBL area is a problem

Dogs or Bicycles	Response	No. of Respondents	Percent of Respondents
Dogs are problem	No	716	95.0%
	Yes	38	5.0%
<b>Total</b>		<b>754</b>	<b>100.0%</b>
Bicycles are problem	No	719	95.9%
	Yes	31	4.1%
<b>Total</b>		<b>750</b>	<b>100.0%</b>

Table 13 shows how different activity groups responded to “just knowing” dogs or bicycles were in the area. Runners reported just knowing dogs were in the area was a problem more than any other activity group (8%), while hikers reported just knowing bicycles were in the area was a problem more than the other activity groups (14%). None of the surveyed equestrians reported just knowing dogs or bicycles were in the SBL area was a problem for them.

Table 13. Just knowing dogs or bicycles are in SBL area is a problem by activity group

Activity Group	Dogs are Problem	
	No	Yes
Cyclist (n=509)	94.7%	5.3%
Hiker (n=135)	97.8%	2.2%
Runner (n=93)	92.5%	7.5%
Equestrian (n=4)	100.0%	0.0%

Activity Group	Bicycles are Problem	
	No	Yes
Cyclist (n=503)	98.8%	1.2%
Hiker (n=135)	85.9%	14.1%
Runner (n=95)	94.7%	5.3%
Equestrian (n=4)	100.0%	0.0%

Because SBL was intentionally designed as a shared-use trail designated for pedestrians, equestrians, dogs and bicycles, OSMP wanted to know if visitors were able to have a quality experience while sharing the trail. Survey respondents reported if OSMP was successfully managing SBL as “a place where visitors participating in different activities can share the trail system”. Most respondents (91.2%) reported thinking OSMP has been successfully managing SBL as a shared-use trail (Table 14).

Table 14. SBL management success (n=746)

Response	No. of Respondents	Percent of Respondents
Yes	680	91.2%
Somewhat	62	8.3%
No	4	0.5%
<b>Total</b>	<b>746</b>	<b>100.0%</b>

When asked if OSMP was successfully managing SBL as a place where different activities could share the trail, hikers reported the least success (78%) (Table 15). Conversely, 94% of cyclists and runners reported management success. Hikers also reported the greatest percentage of somewhat successful (20%) and not successful (2%) responses. All of the surveyed equestrians reported that OSMP was successfully managing SBL as a shared-use trail.

Table 15. SBL management success by activity group

Activity Group	Response		
	No	Somewhat	Yes
Cyclist (n=503)	0.2%	5.8%	94.0%
Hiker (n=132)	2.3%	19.7%	78.0%
Runner (n=95)	0.0%	6.3%	93.7%
Equestrian (n=3)	0.0%	0.0%	100.0%

### 3.6. Visitor characteristics

At the time of the survey (summer 2009), SBL had been open less than one year. As a newly opened recreational opportunity, OSMP had interest in understanding the visitation frequency for this trail, and so asked respondents how often they visited SBL. The modal response was one visit per month, with an average of 3.5 and median of 2.0 monthly visits (Figure 10). This suggests that SBL may be a less-visited trail compared with other OSMP trails closer to population centers (e.g. Chautauqua, Dry Creek).

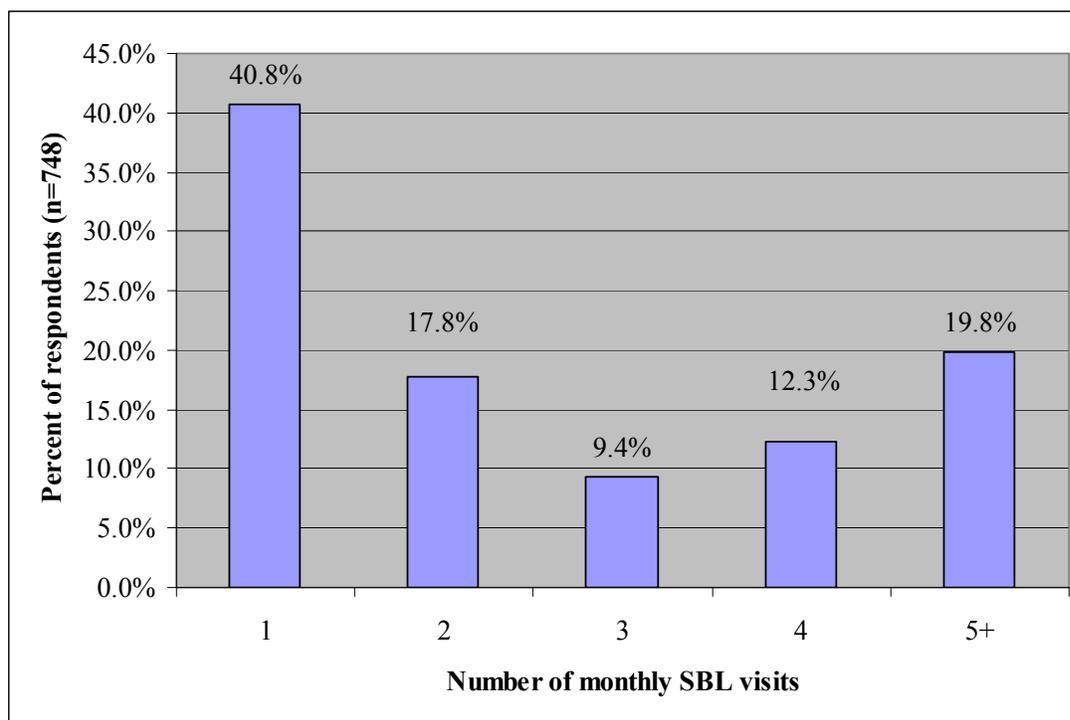


Figure 10. Visitor reported monthly SBL visits

Figure 11 shows the distribution of the number of years respondents have been visiting any OSMP area. The modal response was one year, with an average of 9.9 and a median of 6.0 years (Figure 11).

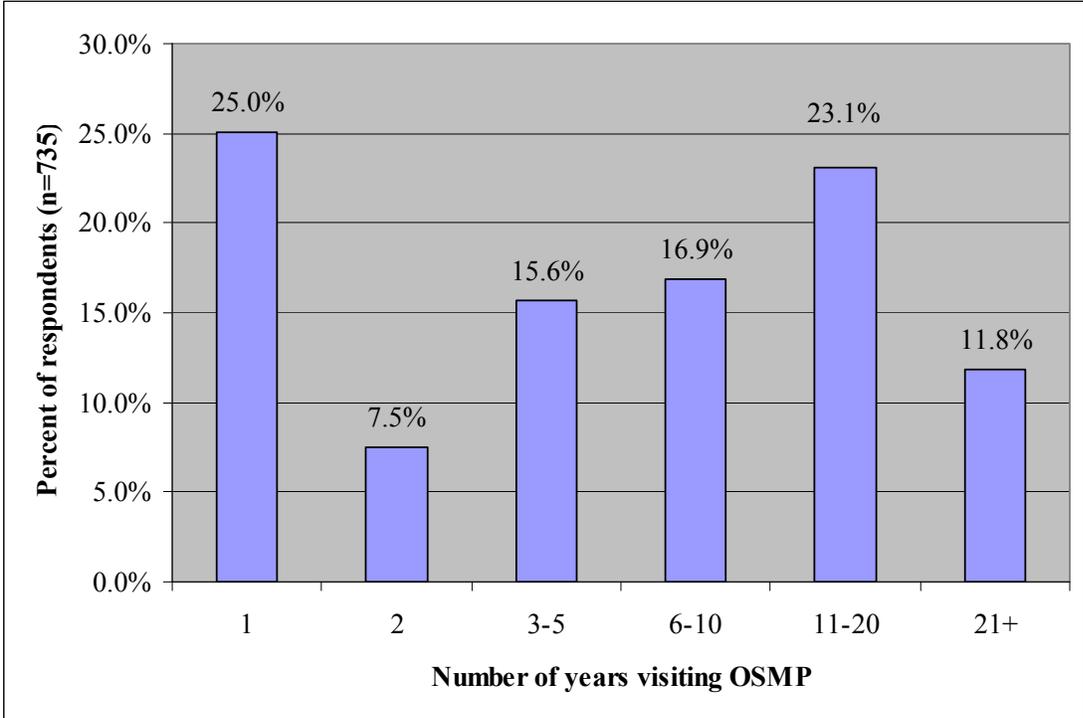


Figure 11. SBL Visitor reported years visiting OSMP

Figure 12 illustrates the age distribution of SBL area visitors. Survey respondents reported their age on the day of the survey. The majority of respondents were within the 30-39 years (31.4%) or the 40-49 years (31.3%) age groups (Figure 12). Less than one percent of respondents (0.3%) were within the 70+ years age group.

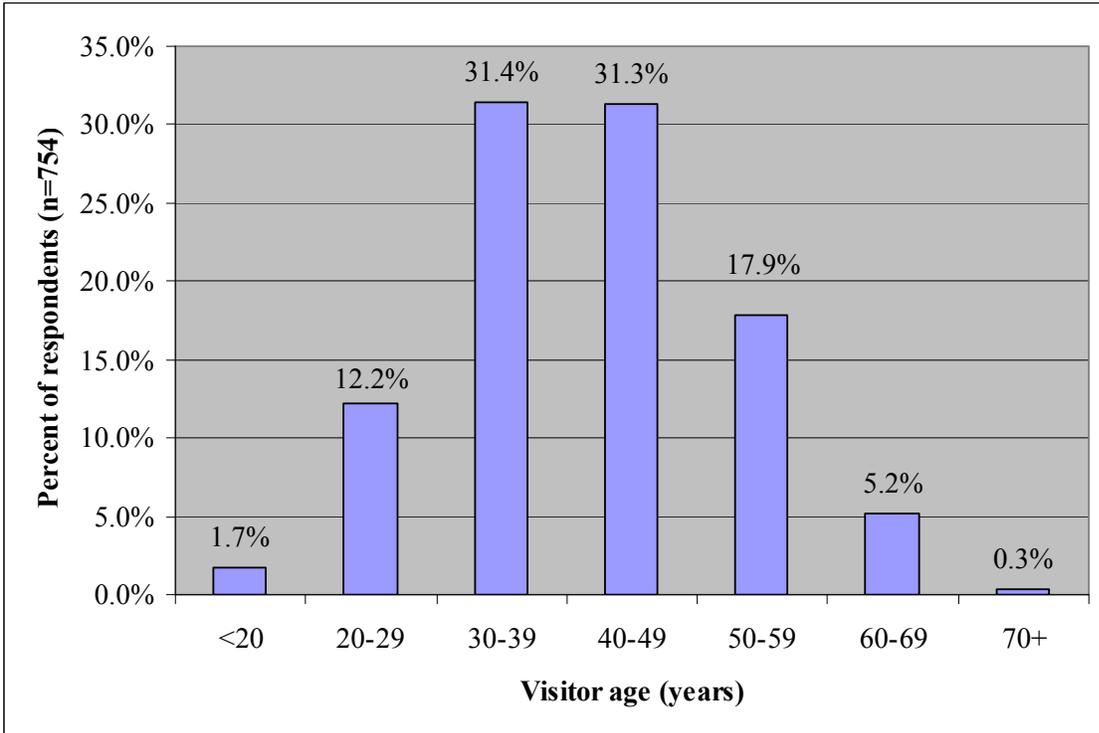


Figure 12. SBL Visitor reported age

Survey respondents provided their zip codes as a proxy for city of residence. Figure 13 shows the percent of respondents that report residing in each of the zip codes found within Boulder County (71%), while Figure 14 shows the percent of respondents that report residing in zip codes in the Metro Denver area (25%).

Appendix F provides a complete list of zip codes from survey respondents and the percentage of the respondents corresponding to each zip code. The greatest percentage of respondents reported residing in southwest Boulder, zip code 80305 (18%). The second greatest percentage of respondents were from zip code 80027 (13%), which includes large portions of Louisville and Superior. Responses from individual Metro Denver zip codes ranged from <1% to just under 3%, but as a whole, Metro Denver visitors made up approximately 25% of respondents.

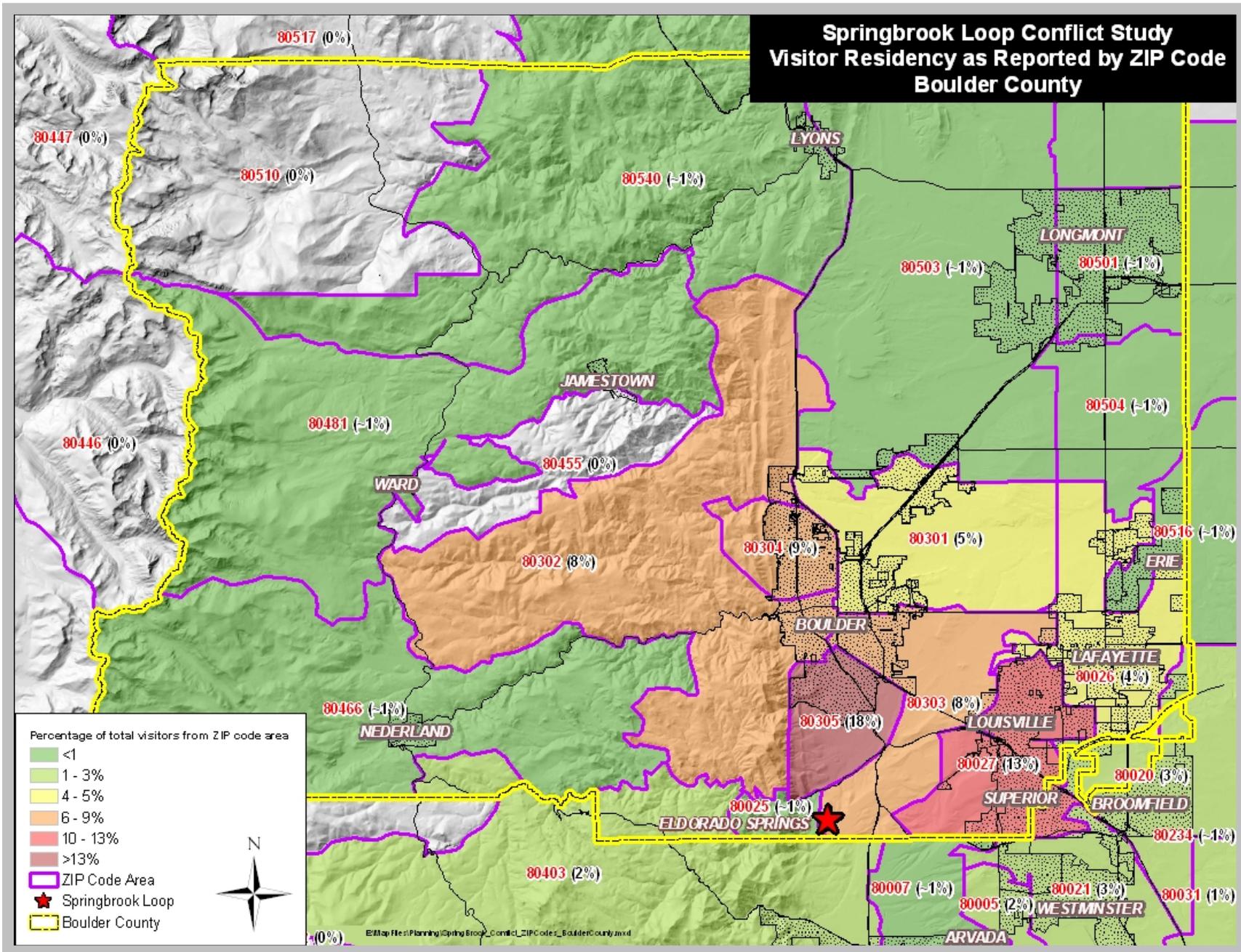


Figure 13. Percentage of respondents reporting a Boulder County zip code

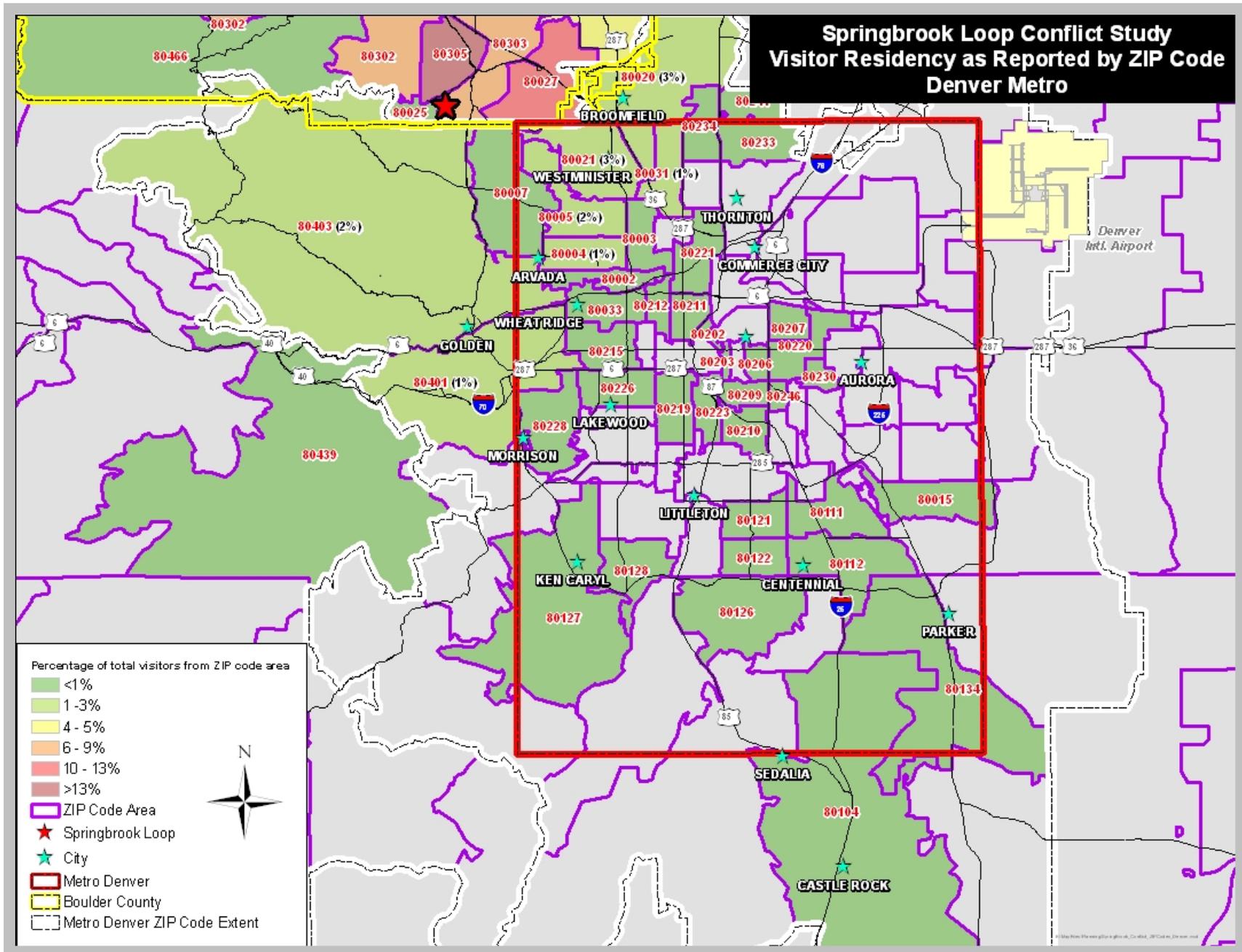


Figure 14. Percentage of respondents reporting a Metro Denver zip code  
Spring Brook Loop Visitor Conflict *Monitoring Report*

### 3.7. Survey administration

Weekends accounted for 31% of the survey administration sessions (11 of 35 four-hour sessions) but yielded 56% of the collected surveys. The remaining 44% of surveys were collected during weekday sessions.

Survey administration sessions were distributed randomly between the two study locations (Figure 3) with the “stem” receiving 19 sessions and the “ramp” receiving 16 sessions. The proportion of surveys collected at the “stem” (55%) and the “ramp” (45%) very closely mirrors the distribution of survey administration sessions.

For visitors who refused to participate in the survey (refusals), passed by the survey administrator before she could contact them (passes), or informed the administrator that they had already completed the questionnaire (repeats), staff documented these visitors on a non-response/session information documentation sheet (Appendix C). A visitor had to communicate his or her refusal to take the survey in response to being asked to participate by a staff member in order to be included in the refusal rate (Table 14). The number of recorded passes and repeats are included in Appendix G.

Table 16. SBL visitor refusal rate by observed activity

Activity	No. of Refusals	No. of Respondents	Total Possible Respondents	Refusal Rate
Equestrian	4	4	8	50.0%
Runner	16	98	114	14.0%
Hiker	14	138	152	9.2%
Cyclist	39	513	552	7.1%
<b>Total</b>	<b>73</b>	<b>753</b>	<b>826</b>	<b>8.8%</b>

### 4.0 Discussion

This study sought to understand visitor reported experienced conflict. OSMP has previously surveyed the public about visitor conflict. Appendix H provides a summary of many of the recent surveys that contained conflict related questions. Most of the questions on previous surveys focused upon understanding the potential for conflict. Understanding public perception of conflict potential gives managers information on how to prevent conflict before it occurs. *Alternatively*, asking the public about experienced conflict, as this survey did, allows managers to adaptively respond to the reported problems.

Most SBL respondents (94.0%) did not experience conflict on the day of the survey or during the past six months (89.8%) (Tables 4 and 5). These numbers are quite similar to other nearby open space districts. For example, Boulder County Parks and Open Space (BCPOS) reports 98% of respondents did not experience conflict on the day of the survey (Bauer, 2004) and 92% reported no conflicts during the past year (Bauer, 2006). Likewise, Jefferson County Open Space reports that at most parks surveyed, less than 10% of visitors report experiencing conflict on the day of the survey (Jean Reince Schwartz, personal communication, 12/23/2009, as of the 2008 findings).

For the day of the survey, SBL respondents reported cyclists and dogs as the top two sources of conflict (Figure 7). For the past six months, cyclists were reported as the top source of conflict and dogs were tied with hikers as the second greatest source of conflict (Figure 8). Previous OSMP studies (Public Information Corporation, 1999 and 2004; Vaske and Donnelly, 2008) have reported dogs and cyclists as the top two potentially conflicting or actually conflicting activities (for other visitors), (Appendix H). Similarly, a 2003 recreation conflict study conducted by BCPOS reported cyclists and dog walkers as the top two sources of visitor conflict (Bauer, 2004). Collectively, these studies suggest that people recreating in Boulder County perceive and/or experience the most visitor conflict with dogs and cyclists. These results should inform future shared-use trail planning and adaptive management discussions between area land managers and the community.

#### 4.1. Conflict factors

The likelihood that someone may experience conflict depends upon individual interpretations of past, present and future interactions with others (Moore, 1994). The “recreation conflict” model established by Jacob and Schreyer (1980), and used by OSMP to define conflict for the purposes of this survey, includes four predictors of recreation conflict. These are:

4.1.1. Activity Style: *How an individual assigns personal meaning to a recreational activity.* A visitor may define “activity style” through his/her intensity of participation, social status or range of experience. Perceived differences in style can contribute to visitor conflicts as what is meaningful to one person may not be meaningful to another or someone may perceive another’s style to negatively affect his/her own style.

4.1.2. Resource Specificity: *How an individual attaches significance to using a specific recreation resource for a given recreational experience.* Cyclists can only visit trails specifically designated for their activity and may not enjoy other activities interfering with these “special places”. Someone else hiking those same trails may not appreciate seeing activities that disrupt a “special place”. Some people are more dependent upon a particular place or resource than others (Watson, 2001) and this “attachment” to a certain experience (e.g., number of other people, less developed trail, types of other expected activities) can contribute to visitor conflicts when change occurs.

4.1.3. Mode of Experience: *What an individual intends to focus on during a recreational experience.* A cyclist may focus on the immediate terrain for enjoyment and/or personal safety while a bird watcher may focus on landscape-scale terrain scanning for bird activity. Meeting someone on the trail with a perceived “point of focus” (Watson, 2001) different than oneself can contribute to visitor conflicts as personal focus becomes interrupted.

4.1.4. Lifestyle Tolerance: *The tendency for an individual to accept or reject lifestyles perceived to be different from one’s own.* Some visitors “just don’t like” or are unwilling to share the trail with people who are engaged in activities dissimilar from their own. This theme, often expressed by “traditional” trail visitors (e.g., visitors who are walking, hiking or taking photographs), takes the form of resentment toward newcomers. This is

similar to the "last settler syndrome" (Nielson, Shelby and Haas 1977) where visitors want a particular place to remain the way it was when they first arrived (Moore, 1994).

When a speed differential is involved, problems related to the four conflict predictors may occur. Some visitors may not "tolerate" this difference or may think their "personal focus" has been disturbed. Faster moving recreationists may feel constrained by the presence of slower moving visitors, while slower moving recreationists may fear being run over (Jacob and Schreyer, 1980; Watson, 2001, Devall and Harry, 1981). SBL conflict descriptions, as reported by survey respondents (Appendix D), support this theory. Generally speaking, cyclists reported hikers, horses and dogs "blocking the trail" and dog guardians and hikers reported cyclists traveling "too fast" and "not warning when approaching".

People who view the environment as an integral part of the experience (focused on natural surroundings) are more susceptible to conflict than those who primarily see the environment as just a setting for their activity (Moore, 1994). The SBL conflict data support this theory. Most SBL hikers reported their primary reason for visiting SBL was to "enjoy the place itself" (Table 2). In other words, the environment or setting of SBL was an integral part of their experience. Hikers were also more likely than respondents from any other group to report experiencing conflict on the day of the survey (Figure 5). Conversely, the majority of cyclists and runners experiencing conflict reported the most important reason for visiting OSMP is "a good place to do activities that I enjoy" (Tables 10 and 11). These data suggest that hikers experience more conflict related to disrupting "enjoying the place itself" and cyclists and runners experience more conflict related to disrupting the "activities they enjoy."

The distribution of visitor activities (i.e., the number of people participating in each activity) can also affect the types of reported visitor conflicts. If one activity has proportionately high participation, the ability for visitors participating in different activities to "tolerate" each other could be diminished as individual "points of focus" are continually disrupted and/or differences in "activity style" are perceived. Most visitors to SBL during survey administration (summer 2009) were cyclists, followed by runners, hikers and equestrians (Appendix G). By numbers, it follows that for both the day of the survey and during the past six months, cyclists were reported as the top source of conflict and that cyclists reported the most problems with other activity types (Tables 6 and 7) perceived to be most incompatible with cycling (i.e., dogs and equestrians).

#### 4.2. Social values conflict

Another conceptual model available to help managers understand recreation conflict is based upon visitors' social values. This model of recreation conflict, the *social values* conflict model, explains conflict in terms of visitor normative beliefs and values toward expected recreational behaviors. When groups do not share similar norms<sup>5</sup> or values about an activity, social values conflict can occur (Vaske, Needham & Cline, 2007). Unlike interpersonal conflict, social values conflict can occur even when there is no direct contact between the groups (Carothers, Vaske & Donnelly, 2001). In other words, social differences among visitors can be more of a problem than the physical influences they might have on one another (Owens, 1985).

---

<sup>5</sup> Norms are standards that people use to evaluate behavior or the conditions created by behavior as acceptable or unacceptable (Vaske & Donnelly, 2007b).

To better understand whether social values conflict was occurring in the SBL area, visitors were asked<sup>6</sup>:

1. Does just knowing that dogs are in this area create a problem for you?
2. Does just knowing that bicycles are in this area create a problem for you?

The vast majority of respondents did not report a problem with “just knowing” bicycles (95.9%) or dogs (95.0%) were in the SBL area (Table 11). Hence, most respondents did not report having a social values conflict with these activities.

When the response to this question is analyzed by activity group, 14% of hikers reported just knowing bicycles were in the area was a problem for them, which is more than three times the average (14% vs. 4%) (Tables 12 and 13). Additionally, runners were more likely than any other activity group to report just knowing dogs were in the area was a problem for them (Table 13). These data suggest that hikers may have a social values conflict with bicycles and runners have a social values conflict with dogs in the SBL area.

#### 4.3. Generalizability

Vaske (2008) states that “in the science of survey research, generalizability addresses the breadth of inferences that can be drawn” (p. 2). The extent to which SBL-specific monitoring results are applicable elsewhere on the OSMP system is related to the four predictors of recreation conflict (see section 4.1.). While the opportunity for conflict exists anywhere visitors share the same trail, how these predictors come together and surface as conflict experiences varies widely.

Personal activity styles, the significance attached to particular trails/resources, visitor expectations for experiencing the natural world and the ability for visitors to tolerate others all likely vary across the OSMP system. Additionally, activity distribution, visitation volume, visitation frequency, residency (e.g., neighbor, out-of-state visitor), age, group size, etc. all vary across the OSMP system and may affect the potential for experiencing conflict.

Despite all the possible variability, conflict experiences similar to those reported along SBL would likely also occur along any other shared-use trail because of similarities in visitor attitudes and conflict predictors within similar recreational settings. Hence, the SBL conflict monitoring results presented here generally are applicable to other OSMP shared-use trails.

If surveyed, visitors to non-shared use OSMP trails likely would not report conflict experiences similar to those reported along SBL simply because cyclists would not be present. However, the reported rate of conflict for any given day would likely reflect SBL’s daily rate as the most recent system-wide Visitor Survey (2004-2005) reported an average 4% daily conflict rate for both shared and non-shared use OSMP trails.

## **5.0 Recommendations**

Interaction among the various activity groups, often with contrasting valuations of OSMP resources, contributes to varied amounts of conflict. Understanding the differences in attitudes toward OSMP and the values various activity groups attribute to OSMP resources is critical to

---

<sup>6</sup> The survey included questions specifically about cycling and dog walking because these activities were newly designated in the SBL area.

developing solutions for conflict management and managing the mix of activities in the future (Watson, 2001).

### 5.1. SBL recommendations

For managers, early detection of visitor conflicts and effective conflict resolution depends upon understanding where and how conflicts arise (Cordell & Tarrant, 2002). Because this study was designed to measure visitor conflict within the first year of the SBL opening, OSMP managers have timely results to inform proposed management actions and a reliable baseline against which OSMP may compare future conditions at SBL. Because the estimated overall visitor conflict rate for the day of the survey exceeded the established 0-5% range of acceptability, OSMP managers should consider the following to reduce conflict in the SBL area:

1. Enhancing education, outreach and/or signs regarding trail and activity etiquette.
2. Clarifying the “yielding triangle” requirements and broadly sharing this information.
3. Meeting with community groups and implementing strategies aimed at reducing conflict (e.g., volunteer patrols, education and outreach to constituents).
4. Hosting trail “safety day” events that call attention to specific behaviors and activities that caused reported conflicts.

### 5.2. Additional system-wide recommendations

Monitoring staff conducted a brief literature review to better understand the breadth of available conflict reduction strategies. Based upon this review, we recommend:

1. Creating and disseminating educational materials to inform OSMP visitors of the potential for encountering many different types of activities and/or crowded conditions on shared-use trails.
2. Promoting trail etiquette. Reported problematic behaviors (e.g., uncontrolled dog, traveling too fast, not warning on approach, blocking trail, etc.) could be addressed through an on-going “Share the Trail” educational campaign. Communication and behavior change theory (McGuire, 1985), Appendix I, could be considered an effective framework to enact desirable changes.
3. Developing, with public and Open Space Board of Trustees (OSBT) input, system-wide visitor conflict thresholds to guide on-the-ground management decisions.
4. Considering temporal activity separation on a portion of shared-use OSMP trails, which was one of the initial responses approved by the OSBT and the public (Appendix A). Because reported conflict on the day of the survey was more than double on the weekends compared to weekdays (Appendix D), activity-specific restrictions on the weekends would likely reduce conflict on shared-use OSMP trails.
5. Understanding visitor needs. Determine the motivations, desired experiences, norms, recreational setting preferences, and other needs of the present and future visitors (this process must be on-going) (Moore, 1994).

A comprehensive list of 12 recommended principles for minimizing conflict on shared-use trails (Moore, 1994) is included in Appendix J.

## 6.0 Summary

This project sought to better understand visitor conflicts occurring along SBL, a newly constructed shared-use trail in the EM/DD TSA. OSMP implemented visitor regulations and conducted education/outreach in an attempt to minimize the potential for conflict. OSMP also attempted to reduce conflict through trail design by including intentional curves, grade changes, “Slow Down” and “Blind Curve” signs and tread obstacles to manage cyclists’ speed. OSMP conducted an on-site visitor survey to measure and understand conflict rates in the SBL area during the summer of 2009.

The majority of respondents (68%) reported biking as their primary activity with the remainder divided among hiking (18%), running (13%) and horseback riding (<1%). The estimated 6% conflict rate on the day of the survey was outside of the acceptable 0-5% range while conflict reported during the past six months (10.2%) remained within the acceptable 0-20% range. A greater percentage of hikers reported conflict than any other activity group. For the entire sample (all activity groups combined), cyclists and dogs/dog guardians were the two most reported sources of conflict. Survey respondents rated most conflicts as “minor” problems. Serious problems accounted for only 7% of the estimated conflict on the day of the survey and 10% of the total conflict over the past six months.

Visitors may benefit from additional education geared at clarifying regulations, alerting visitors about the types and levels of activities they may encounter on the trail, sharing expected trail etiquette and explaining behaviors to avoid or minimize. OSMP may also consider separating activities with the greatest likelihood to cause conflict (i.e., cyclists and dogs/dog guardians).

When making decisions about building or designating other shared-use trails, OSMP should consider the range of factors likely to contribute to visitor conflict. These include activity style, resource specificity, mode of experience, lifestyle tolerance and other visitor/trip characteristics differences. Further monitoring could be conducted to better understand experienced visitor conflict in other OSMP areas along with differences in social values (i.e., potential for conflict). Managers could also consider development of system-wide conflict acceptability thresholds to guide on-the-ground management decisions.

## 7.0 References Cited

Carothers, P., Vaske, J.J. & Donnelly, M.P. (2001). Social values versus interpersonal conflict among hikers and mountain bikers. *Leisure Sciences*, 23(1), 47-61.

Cessford, G. (2002). Perception and Reality of Conflict: Walkers and mountain bikes on the Queen Charlotte Track in New Zealand. Pp: 102-108 in: Arnberger, A; Brandenburg, C. and Muhar, A. (eds.). *Monitoring and Management of Visitor Flows in Recreational and Protected Areas*. Proceedings of the Conference held at Bodenkultur University Vienna, Austria, January 30 – February 02, 2002. Institute for Landscape Architecture and Landscape Management, Bodenkultur University, Vienna.

Cordell, H. K. & Tarrant, M. A. (2002). Southern forest resource assessment highlights changing demographics, values, and attitudes. *Journal of Forestry*. 100(7): 28–33.

Devall, B. & Harry, J. (1981). Who hates whom in the great outdoors: The impact of recreational specialization and technologies of play. *Leisure Sciences*, 4(4), 399-418.

Graefe, A. R., Kuss, F. R. & Vaske, J.J. (1990). *Visitor Impact Management: The Planning Framework*. Washington, D.C.: National Parks and Conservation Association, 106 pps.

Graefe, A. G., & Thapa, B. (2004). Conflict in natural resource recreation. In Manfredi, M.J., Vaske, J.J., Bruyere, B.L., Field, D.R. & Brown, P. (eds.), *Society and natural resources: A summary of knowledge* (209 - 224). Jefferson, Missouri: Modern Litho.

Gramann, J. H. (2002). The role of crowding in visitor displacement at Mount Rainier and Olympic National Parks. University of Idaho Subcontract Report No. GNK097.

Hendee, J. C., Stankey, G.H. & Lucas, R.C. (1990). *Wilderness Management*. Golden, CO: North American Press, pps. 546.

Isbill, J. (1993). *Report on the Multi-Use Discussion with the Bay Area Ridge Trail Council County Committees*. San Francisco, CA: The Bay Area Ridge Trail Council.

Jacob, G. R. & Schreyer, R. (1980). Conflict in outdoor recreation: A theoretical perspective. *Journal of Leisure Research*, 12, 368-380.

Keller, K. (1990). *Mountain Bikes on Public Lands: A Manager's Guide to the State of Practice*. Washington, D.C.: Bicycle Federation of America, 68 pps.

Kulla, A. (1991). *A New Perspectives Approach in National Forest Recreation and its Application to Mountain Bike Management*. Unpublished paper prepared for Utah State University's Professional Development for Outdoor Recreation Managers/Planners Shortcourse, 56 pps.

Mann, C. & Absher, J. (2008). Recreation conflict potential and management implications in the northern/central Black Forest Nature Park. *Journal of Environmental Planning and Management* Vol. 51, No.3, 363-380.

McGuire, W.J. (1985). Attitudes and attitude change. In G. Lindzey and E. Aronson (Eds.) *The Handbook of Social Psychology* (3rd ed. vol. 2). New York: Random House.

Moore, R. (1994). Conflicts on multiple-use trails: Synthesis of the literature and state of the practice. Federal Highway Administration Report No. FHWA-PD-94-031 contracted with North Carolina State University Department of Parks, Recreation and Tourism Management. Raleigh, North Carolina.

Nielson, J., Shelby, B. & Haas, J.E. (1977). Sociological carrying capacity: The last settler syndrome. *Pacific Sociological Review*, 20(Oct.): 568-581.

Owens, P. L. (1985). Conflict as a social interaction process in environment and behavior research: The example of leisure and recreation research. *Journal of Environmental Psychology*, 5: 243-259.

Ramthun, R. (1995). Factors in user group conflict between hikers and mountain bikers. *Leisure Sciences*, 17, 159-169.

Roggenbuck, J. W. & Ham, S.H. (1986). Use of information and education in recreation management. In: A Literature Review, *The President's Commission on Americans Outdoors* (pp. Management 59-71). Washington, D.C.: U.S. Government Printing Office.

Ryan, K. L. (Ed.). (1993). *Trails for the Twenty-First Century*. Washington, D.C.: Island Press, 213 pps.

Schneider, I. E. (2000). Revisiting and revising recreation conflict research. *Journal of Leisure Research*, 32, 129-132.

Stankey, G. H., Cole, D. N., Lucas, R. C., Peterson, M. E. & Frissell, S.S. (1985). *The Limits for Acceptable Change (LAC) System for Wilderness Planning* (Gen. Tech. Report INT-176). USDA Forest Service, Intermountain Forest and Range Experiment Station.

VanderWoude, D.R. (2009). Spring Brook Loop Visitor Conflict Survey Monitoring Protocol. Unpublished planning document for City of Boulder Open Space and Mountain Parks.

Vaske, J. J., Needham, M. D. & Cline Jr., R.C. (2007). Clarifying interpersonal and social values conflict among recreationists. *Journal of Leisure Research*, 39, 182-195.

Vaske, J.J. & Donnelly, M.P. (1999). A value-attitude-behavior model predicting wildland voting intentions. *Society and Natural Resources*, 12, 523-537.

Vaske, J.J. (2008). *Survey research and analysis: Application in parks, recreation and human dimensions*. State College, Pennsylvania: Venture Publishing.

Watson, A. (2001). Goal interference and social value differences: Understanding wilderness conflicts and implications for managing social density. In: Freimund, W. A. & Cole, D. N., comps. 2001. Visitor use density and wilderness experience: proceedings; 2000 June 1-3; Missoula, MT. Proc. RMRS-P-20. Ogden, UT: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.

Zar, J.H. (1996). *Biostatistical analysis*, 3rd ed. Upper Saddle River, NJ: Prentice Hall.

### **Online Resources**

Bauer, M. (2004). Recreation Conflict at Six Boulder County Parks and Open Space Properties: a Baseline Study. Retrieved from [http://www.bouldercounty.org/openspace/recreating/public\\_parks/parks\\_pdfs/userstudy09-10-04.pdf](http://www.bouldercounty.org/openspace/recreating/public_parks/parks_pdfs/userstudy09-10-04.pdf). Accessed on February 9, 2010.

Bauer, M. (2006). Five-Year Visitor Study - 2005. Prepared for Boulder County Parks and Open Space. Retrieved from [http://www.bouldercounty.org/openspace/resources/res\\_funding/res\\_fund\\_pdfs/POS\\_Research/2005/2005POSFiveYear.pdf](http://www.bouldercounty.org/openspace/resources/res_funding/res_fund_pdfs/POS_Research/2005/2005POSFiveYear.pdf).

Accessed on February 9, 2010.

City of Boulder. Open Space and Mountain Parks Department. (2005). Visitor Master Plan. Unpublished report. Retrieved from

[http://www.bouldercolorado.gov/files/openspace/pdf\\_VMP/Final-VMP.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_VMP/Final-VMP.pdf).

Accessed on February 9, 2010.

City of Boulder. Open Space and Mountain Parks Department. (2006). Eldorado

Mountain/Doudy Draw Trail Study Area Plan. Unpublished report. Retrieved from

[http://www.bouldercolorado.gov/files/openspace/pdf\\_osbtmemos/final\\_emdd\\_tsa\\_plan.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_osbtmemos/final_emdd_tsa_plan.pdf).

Accessed on February 9, 2010.

City of Boulder. Open Space and Mountain Parks Department. (2008). Natural Resource and Sustainable Recreation Monitoring. Unpublished planning document. Retrieved from

[http://www.bouldercolorado.gov/files/openspace/pdf\\_TSA\\_Eldo/em\\_dd\\_tsa\\_monitoring\\_plan\\_final2.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_TSA_Eldo/em_dd_tsa_monitoring_plan_final2.pdf).

Accessed on February 9, 2010.

City of Boulder. Open Space and Mountain Parks Department. (2010). Trail Mileage and Percents for Dog Management Regulations and Trail Use Categories. Unpublished planning document. Retrieved from

[http://www.bouldercolorado.gov/files/openspace/pdf\\_TSA\\_West/CCG/OSMPtrails\\_Pre\\_Post\\_VMP\\_Table.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_TSA_West/CCG/OSMPtrails_Pre_Post_VMP_Table.pdf).

Accessed on February 23, 2010.

Public Information Corporation. (1999). A study of attitudes of Boulder, Colorado residents regarding City Open Space issues. Report for City of Boulder Open Space. Littleton: Colorado.

Retrieved from [http://www.bouldercolorado.gov/files/openspace/pdf\\_research/attitude99.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_research/attitude99.pdf).

Accessed on February 9, 2010.

Public Information Corporation. (2004). City of Boulder Open Space and Mountain Parks 2004 attitudinal survey. Report for City of Boulder Open Space and Mountain Parks. Littleton: Colorado. Retrieved from

[http://www.bouldercolorado.gov/files/openspace/pdf\\_research/04\\_Attitudinal\\_survey\\_results.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_research/04_Attitudinal_survey_results.pdf).

Accessed on February 9, 2010.

Vaske, J. J., & Donnelly, M. P. (2007a). Perceived conflict with off leash dogs at Boulder Open Space and Mountain Parks. (HDNRU Report No. 76). Report for Boulder Open Space and Mountain Parks. Fort Collins: Colorado State University, Human Dimensions in Natural Resources Unit. Retrieved from

[http://www.bouldercolorado.gov/files/openspace/pdf\\_research/conflict-dog.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_research/conflict-dog.pdf).

Accessed on February 9, 2010.

Vaske, J. J., & Donnelly, M. P. (2007b). Visitor tolerances and standards for off leash dogs at Boulder Open Space and Mountain Parks. (HDNRU Report No. 75). Report for Boulder Open Space and Mountain Parks. Fort Collins: Colorado State University, Human Dimensions in Natural Resources Unit. Retrieved from [http://www.bouldercolorado.gov/files/openspace/pdf\\_research/Norm-dog.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_research/Norm-dog.pdf). Accessed on February 9, 2010.

Vaske, J. J., & Donnelly, M. P. (2008). Visitor characteristics and beliefs about Boulder Open Space and Mountain Parks. (HDNRU Report No. 78). Report for Boulder Open Space and Mountain Parks. Fort Collins: Colorado State University, Human Dimensions of Natural Resources. Retrieved from [http://www.bouldercolorado.gov/files/openspace/pdf\\_osbtmemos/attachment\\_b\\_vaske\\_\\_donnelly\\_-\\_visitor\\_use\\_survey\\_2004-2005\\_-\\_final.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_osbtmemos/attachment_b_vaske__donnelly_-_visitor_use_survey_2004-2005_-_final.pdf). Accessed on February 9, 2010.

# Appendices

**Appendix A: Ranges of Acceptability and Potential Management Responses  
(City of Boulder, 2008)**

<b>Ranges of Acceptability</b>	<b>Potential Management Responses</b>
<p>0 to 20% of visitors report having ever experienced conflict in the Spring Brook Loop Trail area</p> <p><i>and</i></p> <p>0 to 5% report having experienced conflict in the Spring Brook Loop Trail area on the day of the survey.</p>	<ol style="list-style-type: none"> <li>1. Maintain or consider reducing existing levels of education, outreach and enforcement</li> <li>2. Acknowledge/Thank visitors</li> </ol>
<p>&gt;20% of visitors report having ever experienced conflict in the Spring Brook Loop Trail area</p> <p><i>and/or</i></p> <p>&gt;5% report having experienced conflict in the Spring Brook Loop Trail area on the day of the survey.</p>	<ol style="list-style-type: none"> <li>3. Changes in education, outreach, signs, or enforcement</li> <li>4. Meet with stakeholders and implement strategies aimed at reducing conflict (e.g., bike patrol, dog walker patrol)</li> <li>5. Spatial, temporal, or directional activity separation</li> <li>6. Construct trail modifications or modify trail (e.g., obstacles to slow speed)</li> </ol>
<p>Regulations prohibiting specific activities would be considered if less restrictive strategies are ineffective at achieving targeted conflict rates</p>	<ol style="list-style-type: none"> <li>7. Disallow cyclists, equestrians, or dogs on the Spring Brook Loop Trail</li> </ol>

## Appendix B: Visitor Survey Instrument



### Open Space and Mountain Parks Recreation Conflict Survey

The City of Boulder Open Space & Mountain Parks (OSMP) Department is conducting this survey to better understand how your experience is affected by the presence and behavior of other visitors in the Eldorado Mountain-Doudy Draw Area. Your participation is voluntary, your answers will be anonymous and results will help us improve the quality of the visitor experience.

**Thank you — your input is appreciated!**

1. Which **ONE** activity do you consider your **PRIMARY ACTIVITY** today?
 

<input type="checkbox"/> Biking	<input type="checkbox"/> Running	<input type="checkbox"/> Horseback riding
<input type="checkbox"/> Hiking	<input type="checkbox"/> Other _____	
  
2. How many dogs are with you today?     0     1     2     3     4     5
  
3. Which **ONE** of the following was the most important reason for visiting OSMP today?
  - I came here to enjoy the place itself.
  - I came here because it is a good place to do the activities that I enjoy.
  - I came here because I wanted to spend more time with family or friends.

**Sometimes the behavior of others can interfere with your visit to OSMP. This interference can result from behaviors such as failure to share the trail, approaching without warning or shouting loudly. In general, these types of situations are referred to as recreation conflict.**

4. Did you experience recreation conflict while visiting the Spring Brook Loop Trail **TODAY**?
 

<input type="checkbox"/> Yes – go to Question #5	<input type="checkbox"/> No – go to Question #6
--	---

5. Please tell us about your conflict **TODAY**. Check NO or Circle YES. If YES, rate severity and describe.

Conflict Description	NO	YES →	Conflict Severity (Circle ONE Number)				
			Minor Problem		Moderate Problem		Serious Problem
			1	2	3	4	5
<b>Did you experience a conflict with an equestrian?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a hiker?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a dog or dog guardian?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a bicyclist?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a runner?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Other</b>	NO	YES→	1	2	3	4	5
If YES, describe:							

**PLEASE FLIP OVER TO SECOND PAGE →**

6. Not including today, have you experienced **recreation conflict** while visiting the Spring Brook Loop Trail during the **PAST SIX MONTHS**?

- Yes – go to Question #7     No – go to Question #8

7. Please tell us about your conflict during the **PAST SIX MONTHS**. Check NO **or** Circle YES. If YES, rate severity and describe.

Conflict Description	NO	YES →	Conflict Severity (Circle ONE Number)				
			Minor Problem		Moderate Problem		Serious Problem
			1	2	3	4	5
<b>Did you experience a conflict with an equestrian?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a hiker?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a dog or dog guardian?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a bicyclist?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Did you experience a conflict with a runner?</b>	NO	YES→	1	2	3	4	5
If YES, describe:							
<b>Other</b>	NO	YES→	1	2	3	4	5
If YES, describe:							

8. Does just knowing that dogs are in this area create a problem for you?

- Yes     No    Why? \_\_\_\_\_

9. Does just knowing that bicycles are in this area create a problem for you?

- Yes     No    Why? \_\_\_\_\_

10. OSMP is striving to manage the Spring Brook Loop Trail as a place where visitors participating in different activities can share the trail system. Do you think OSMP has been successful?

- Yes                       Somewhat                       No

Why? \_\_\_\_\_  
 \_\_\_\_\_

11. Please estimate, on average, how many times **per month**, you visit the Spring Brook Loop Trail.

\_\_\_\_\_ **Times per month** (write 1 if this is your first visit)

12. How many **years** have you been visiting OSMP? \_\_\_\_\_ **Number of years**

13. What is your age? \_\_\_\_\_ Years

14. What is your zip code? \_\_\_\_\_

**THANK YOU FOR YOUR TIME!**

**Office Use Only**

Survey #	Initials	Date	Time	Day of Week	Survey Location
----------	----------	------	------	-------------	-----------------

## Appendix C: Non-Response/Session Information Documentation Sheet

Date:		Start time:		End time:		Recorder:	
<b>Sky</b>		<b>Temp (°F)</b>	<b>Wind</b>	<b>Precipitation</b>		<b>Location:</b>	<b>Day of Week</b>
Sunny    Overcast Partly sunny			<20 mph >20 mph	Rain    Hail None	Stem Ramp		
<b>Document →</b>		<b>By individual visitor</b>				<b>By visitor party</b>	
<b>Activity Type</b>		<b>Passes</b>	<b>Refusals</b>	<b>Repeats</b>		<b>Dog</b>	
Hiker							
Runner							
Biker							
Equestrian							
Other (describe)							
<b>Periods of Every 5th Visitor Contacted</b>							
Period #	Time Begin	Time End		Period #	Time Begin	Time End	
#1				#3			
#2				#4			
<b>NOTES</b>							

## Appendix D: Additional Survey Results and Analyses

Table D1. SBL conflict on the day of the survey by weekday or weekend (n=765)

Time	Response	No. of Respondents	Percent of Respondents
Weekday	No	322	96.7%
	Yes	11	3.3%
<b>Total</b>		<b>333</b>	<b>100.0%</b>
Weekend	No	397	91.9%
	Yes	35	8.1%
<b>Total</b>		<b>432</b>	<b>100.0%</b>

Table D2. Dog guardian<sup>7</sup> reported conflict (n=21)

Timeframe	Response	No. of Respondents	Percent of Respondents
On the day of the Survey	No	17	81.0%
	Yes	4	19.0%
<b>Total</b>		<b>21</b>	<b>100.0%</b>
During the Past Six Months	No	19	90.5%
	Yes	2	9.5%
<b>Total</b>		<b>21</b>	<b>100.0%</b>

Table D3. Dog guardian reported conflict with specific activities (n=21)

Timeframe	Source of Conflict	No. of Respondents	Proportion of Reported Conflict
On the Day of the Survey	Cyclist	3	75.0%
	Equestrian	1	25.0%
<b>Total</b>		<b>4</b>	<b>100.0%</b>
During the Past Six Months	Cyclist	2	100.0%
<b>Total</b>		<b>2</b>	<b>100.0%</b>

<sup>7</sup> Dog guardian was not one of the activities listed as a choice when respondents selected their primary activity (survey question number one). In tables and text that report results from dog guardians, a respondent was considered a dog guardian if he/she reported bringing at least one dog along with them on the day of the survey.

Table D4. Just knowing dogs or bicycles are in SBL area is a problem by activity group with dog guardian included as an activity group

Activity Group	Dogs are Problem	
	No	Yes
Cyclist (n=507)	94.7%	5.3%
Hiker (n=118)	97.5%	2.5%
Runner (n=91)	92.3%	7.7%
Dog guardian (n=21)	100.0%	0.0%
Equestrian (n=4)	100.0%	0.0%

Activity Group	Bicycles are Problem	
	No	Yes
Cyclist (n=501)	98.8%	1.2%
Hiker (n=118)	88.1%	11.9%
Runner (n=93)	94.6%	5.4%
Dog guardian (n=21)	76.2%	23.8%
Equestrian (n=4)	100.0%	0.0%

Table D5. SBL management success by activity group with dog guardian included as an activity group

Activity Group	Response		
	No	Somewhat	Yes
Cyclist (n=501)	0.2%	5.8%	94.0%
Hiker (n=115)	0.9%	20.9%	78.3%
Runner (n=93)	0.0%	6.5%	93.5%
Dog guardian (n=21)	9.5%	9.5%	81.0%
Equestrian (n=3)	0.0%	0.0%	100.0%

## Appendix E: Conflict Severity Ratings for each Source of Conflict and Themed Conflict Descriptions

Table E1. SBL conflict severity ratings for each source of conflict on the day of the survey (n=57)

Source of Conflict	Severity of Conflict	No. of Respondents Reporting Each Severity Category	Percent of Responses in Each Severity Category for a Given Source of Conflict
Cyclist	Minor Problem	14	56.0%
	Moderate Problem	8	32.0%
	Serious Problem	3	12.0%
<b>Total</b>		<b>25</b>	<b>100%</b>
Dog/dog guardian	Minor Problem	8	72.7%
	Moderate Problem	3	27.3%
	Serious Problem	0	0.0%
<b>Total</b>		<b>11</b>	<b>100%</b>
Equestrian	Minor Problem	7	87.5%
	Moderate Problem	0	0.0%
	Serious Problem	1	12.5%
<b>Total</b>		<b>8</b>	<b>100%</b>
Hiker	Minor Problem	5	83.3%
	Moderate Problem	1	16.7%
	Serious Problem	0	0.0%
<b>Total</b>		<b>6</b>	<b>100%</b>
Runner	Minor Problem	5	83.3%
	Moderate Problem	1	16.7%
	Serious Problem	0	0.0%
<b>Total</b>		<b>6</b>	<b>100%</b>
Other	Minor Problem	1	100.0%
	Moderate Problem	0	0.0%
	Serious Problem	0	0.0%
<b>Total</b>		<b>1</b>	<b>100%</b>

Table E2. SBL conflict severity ratings for each source of conflict during the past six months (n=90)

Source of Conflict	Severity of Conflict	No. of Respondents Reporting Each Severity Category	Percent of Responses in Each Severity Category for a Given Source of Conflict
Cyclist	Minor Problem	19	59.4%
	Moderate Problem	11	34.4%
	Serious Problem	2	6.3%
<b>Total</b>		<b>32</b>	<b>100.0%</b>
Hiker	Minor Problem	12	63.2%
	Moderate Problem	5	26.3%
	Serious Problem	2	10.5%
<b>Total</b>		<b>19</b>	<b>100.0%</b>
Dog/dog guardian	Minor Problem	9	52.9%
	Moderate Problem	7	41.2%
	Serious Problem	1	5.9%
<b>Total</b>		<b>17</b>	<b>100.0%</b>
Equestrian	Minor Problem	7	43.8%
	Moderate Problem	5	31.3%
	Serious Problem	4	25.0%
<b>Total</b>		<b>16</b>	<b>100.0%</b>
Runner	Minor Problem	3	50.0%
	Moderate Problem	3	50.0%
	Serious Problem	0	0.0%
<b>Total</b>		<b>6</b>	<b>100.0%</b>

Table E3. Visitor reported conflict descriptions by theme
• Horse poop/flies
• Horse congestion
• Horse travel after rain damages trail
• Horse reaction unpredictable
• Hiker blocking trail/unwilling to share
• Hiker complaining about bikers
• Hiker getting angry/swearing at others
• Dog blocking trail
• Dog off-leash
• Dog out-of-control
• Dog poop
• Dog jumping on people/horse
• Dog approaching unwanted
• Cyclist not yielding
• Cyclist not warning when approaching
• Cyclist speed too fast
• Cyclist causing others to have to step-off/move over
• Runner blocking trail/unwilling to share
• Runner swearing at others

Table E4. Problem descriptions by theme given to in response to the question: “Does just knowing that dogs are in this area create a problem for you?” (for those who responded “yes”)
• Wildlife gone/reduced
• Unsafe to have dogs/bikes on same trail
• Dog poop
• Unpredictable dog behavior
• Off-leash/not managed
• Tripping runners
• Approaching uninvited/jumping on

Table E5. Problem descriptions by theme given to in response to the question: “Does just knowing that bicycles are in this area create a problem for you?” (for those who responded “yes”)
• Startling/no warning on approach
• Having to move over more than once/constantly
• Traveling too fast
• Narrow trail
• Don’t yield
• Stressful/having to be on look-out
• Damage trail
• Wildlife/plants reduced

## Appendix F: Numeric Visitor Reported Zip Code Responses (n=749)

Boulder County (71%) highlighted in light green and Metro Denver (25%) highlighted in light gray

Reported Zip Code	No. of Respondents	Percent of Respondents	Reported Zip Code	No. of Respondents	Percent of Respondents
80305	134	17.9%	80215	1	0.1%
80027	95	12.7%	80219	1	0.1%
80304	70	9.3%	80223	1	0.1%
80302	64	8.5%	80226	1	0.1%
80303	59	7.9%	80228	1	0.1%
80301	38	5.1%	80230	1	0.1%
80026	34	4.5%	80246	1	0.1%
80020	22	2.9%	80001	1	0.1%
80021	21	2.8%	80002	1	0.1%
80005	16	2.1%	01060	1	0.1%
80403	14	1.9%	03603	1	0.1%
80401	10	1.3%	05464	1	0.1%
80004	9	1.2%	11208	1	0.1%
80023	8	1.1%	17022	1	0.1%
80031	8	1.1%	28643	1	0.1%
80220	7	0.9%	29316	1	0.1%
80025	7	0.9%	37919	1	0.1%
80003	6	0.8%	57769	1	0.1%
80007	5	0.7%	84060	1	0.1%
80516	5	0.7%	91367	1	0.1%
80211	4	0.5%	95060	1	0.1%
80234	4	0.5%	95634	1	0.1%
80241	4	0.5%	98108	1	0.1%
80503	4	0.5%	80121	1	0.1%
80206	3	0.4%	80122	1	0.1%
80210	3	0.4%	80127	1	0.1%
80501	3	0.4%	Australia*	1	0.1%
80504	3	0.4%	Switzerland*	1	0.1%
80128	3	0.4%	80015	1	0.1%
80034	3	0.4%	80044	1	0.1%
80602	3	0.4%	80045	1	0.1%
80481	3	0.4%	80111	1	0.1%
80307	2	0.3%	80112	1	0.1%
80308	2	0.3%	80525	1	0.1%
80203	2	0.3%	80528	1	0.1%
80212	2	0.3%	81620	1	0.1%
80221	2	0.3%	81621	1	0.1%
80233	2	0.3%	80512	1	0.1%
77095	2	0.3%	80104	1	0.1%
80126	2	0.3%	81224	1	0.1%
80033	2	0.3%	81303	1	0.1%
2000 (Australia)	2	0.3%	81632	1	0.1%
80540	2	0.3%	80439	1	0.1%
80466	2	0.3%	81601	1	0.1%
80306	1	0.1%	80130	1	0.1%
80202	1	0.1%	80538	1	0.1%
80207	1	0.1%	80134	1	0.1%
80209	1	0.1%	80471	1	0.1%
			81658	1	0.1%

\*Respondent did not write in a numeric response along with the reported country

## Appendix G: Additional Survey Administration Results

Table G1. SBL number and percent of respondents by day of week (n=766)

Day of Week	No. of Respondents	Percent of Respondents
Friday	56	7.3%
Monday	79	10.3%
Saturday	226	29.5%
Sunday	206	26.9%
Thursday	41	5.4%
Tuesday	91	11.9%
Wednesday	67	8.7%
<b>Total</b>	<b>766</b>	<b>100.0%</b>

Table G2. SBL number and percent of respondents by time period (n=766)

Time Period	No. of Respondents	Percent of Respondents
Morning	508	66.3%
Midday	166	21.7%
Afternoon/evening	92	12.0%
<b>Total</b>	<b>766</b>	<b>100.0%</b>

Table G3. SBL total visitor distribution by activity (n=1224)

Activity	No. of Respondents	No. of Refusals	No. of Passes	No. of Repeats	Total	Percent of Total
Cyclist	513	39	173	84	809	66%
Hiker	138	14	6	10	168	14%
Equestrian	4	4	17	0	25	2%
Runner	98	16	91	17	222	18%
<b>Total</b>	<b>753</b>	<b>73</b>	<b>287</b>	<b>111</b>	<b>1,224</b>	<b>100%</b>

## **Appendix H: Summary of OSMP and Peer Agency Conflict-Related Survey Questions**

### **1999 - A Study of Attitudes of Boulder, Colorado Residents Regarding City Open Space Issues**

Method: City-wide resident telephone survey

Question: “Sometimes different recreational activities in an open space area conflict and result in unpleasant encounters. What specific recreational activities would you say are in conflict with other specific activities?”

Result: 27% bicyclists with others, 26% dogs or their poop with others, 6% horseback riders with others; 13% reported conflicts were minimal, and other categories total 28%.

([http://www.bouldercolorado.gov/files/openspace/pdf\\_research/attitude99.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_research/attitude99.pdf))

### **2004 - City of Boulder Open Space and Mountain Parks Attitudinal Survey**

Method: City-wide resident telephone survey

Question: “Sometimes particular recreational activities in open space and mountain parks areas conflict and result in unpleasant encounters. From what you know or have heard, what specific recreational activities would you say are in conflict with other specific activities?”

Result: 37% bicyclists with others, 23% dogs or their poop with others; 10% reported conflicts were minimal, and other categories total 30%.

([http://www.bouldercolorado.gov/files/openspace/pdf\\_research/04\\_Atitudinal\\_survey\\_results.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_research/04_Atitudinal_survey_results.pdf))

### **2004/2005 - Visitor Characteristics and Beliefs about Boulder Open Space and Mountain Parks**

Method: On-site OSMP visitor survey

Question: “Did you encounter any conflicts or unpleasant experiences today? If yes, could you describe them?”

Result: 96% of the visitors did not experience conflict during their visit that day. Among those who did note conflict, 60% was associated with dogs (49%) and dog feces (11%); 17% with management related concerns (e.g., not enough trails, poor signs), and 15% with inconsiderate visitor behavior (e.g. hikers shouting, cyclists speed).

([http://www.bouldercolorado.gov/files/openspace/pdf\\_osbtmemos/attachment\\_b\\_vaske\\_\\_donnelly\\_-\\_visitor\\_use\\_survey\\_2004-2005\\_-\\_final.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_osbtmemos/attachment_b_vaske__donnelly_-_visitor_use_survey_2004-2005_-_final.pdf))

## **2007 - Perceived Conflict with Off Leash Dogs at Boulder Open Space and Mountain Parks**

Method: On-site OSMP visitor survey

Question: This study used a series of questions to understand visitor perceptions of dog-related conflict on OSMP. Both experienced (in person) and social values conflicts were examined.

Result:

Nearly three-quarters (73%) of the respondents reported some form of conflict (either experienced or social values) with off leash dogs or their guardians at the OSMP locations studied. The most problematic behaviors were owners not picking up after their dog, dogs causing wildlife to flee, dogs jumping on a visitor, dogs pawing a visitor and dogs flushing birds.

([http://www.bouldercolorado.gov/files/openspace/pdf\\_research/conflict-dog.pdf](http://www.bouldercolorado.gov/files/openspace/pdf_research/conflict-dog.pdf))

## **2003 - Boulder County Parks and Open Space (BCPOS) - Recreation Conflict at Six Boulder County Parks and Open Space Properties: a Baseline Study**

Method: On-site BCPOS visitor interview

Question: “Do (hiking, mountain biking, running, equestrian, dog walking) visitors ever interfere with your (insert visitor reported main reason for visit)?” “If Yes, What about them interferes with your (insert main reason)?” This question was asked for both “today” and “ever”.

Result: 2% of visitors noted conflict for the day of the survey and 34% reported having conflict at some point in the past. Of those who noted conflict, 52% was associated with mountain bikers, 16% with dog walkers, 14% with equestrians, 8% with runners, 4% with hikers and 6% others.

([http://www.bouldercounty.org/openspace/recreating/public\\_parks/parks\\_pdfs/userstudy09-10-04.pdf](http://www.bouldercounty.org/openspace/recreating/public_parks/parks_pdfs/userstudy09-10-04.pdf))

## **2005 - Boulder County Parks and Open Space – Five-Year Visitor Study**

Method: On-site BCPOS visitor survey

Question: “Sometimes, visitors can interfere with one another’s goals on the trail, causing an unpleasant experience. This is generally referred to as conflict. Did you experience conflict at this park today?” or “in the past year?” If Yes, Please describe the conflict you experienced.”

Result: 3% of visitors reported conflict during their visit that day and 8% reported conflict for the past year. Summation source of conflict data is not available.

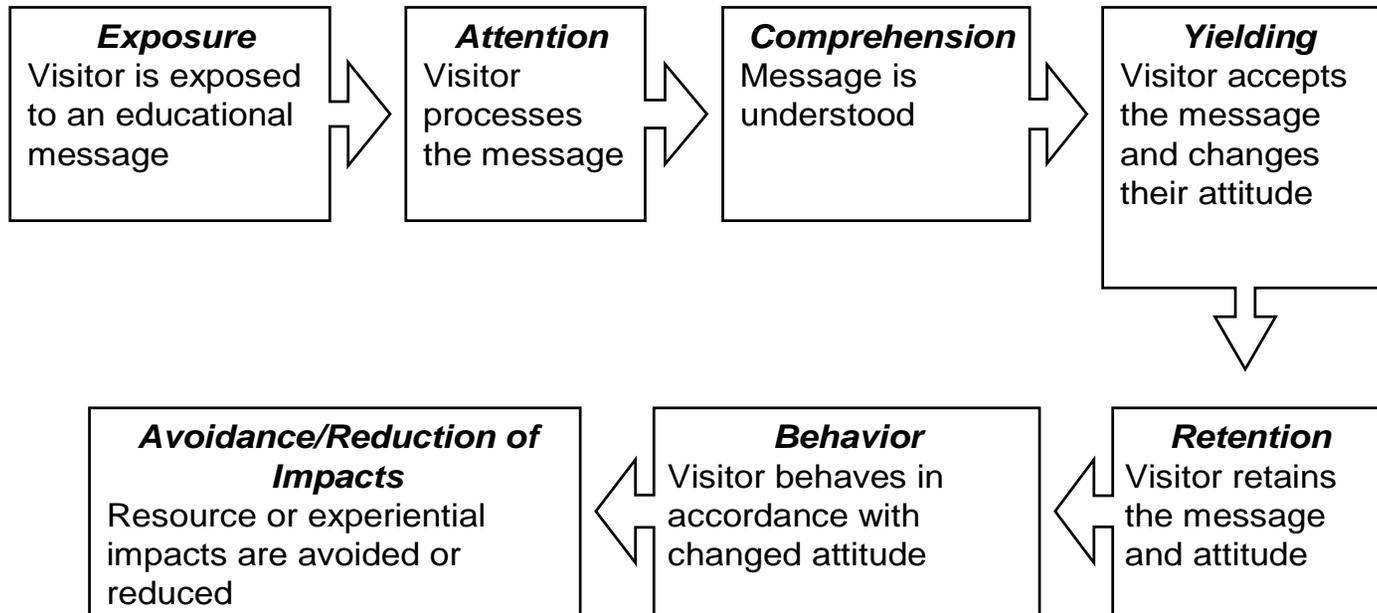
**Jefferson County Open Space Visitor Experience Survey Program (2001 – present)**

Jefferson County has conducted Visitor Experience Surveys annually on a 4-6 park rotation since 2001. The methodology has been consistent and the recreational conflict issue presented in the following manner.

Question: "Sometimes the presence or behavior of others can interfere with your enjoyment. This interference can be the result of discourteous behavior, people not willing to share trails, or by the mere presence of another park visitor. In general, this type of situation is referred to as recreation conflict. Did you experience recreation conflict while using this Jeffco Open Space park today?"

Result: Reported conflict varies per park and it is reported more frequently at our most often visited parks. As of the 2008 findings, most parks surveyed have less than 10% of visitors reporting conflict.

**Appendix I:** Information-Processing Model of Persuasion and Behavioral Change (McGuire, 1985)



Information-processing model of persuasion and behavioral change. (Adapted from McGuire, 1985).

## Appendix J: Twelve Principles for Minimizing Conflict on Shared-Use Trails (Moore, 1994, p. 27)

1. *Recognize Conflict as Goal Interference* -- Recreational conflict can best be understood as "goal interference attributed to another's behavior" (Jacob and Schreyer, 1980). Therefore, trail conflicts are possible among different user groups, among different users within the same user group, and as a result of factors (*e.g.*, lack of tolerance for others) not related to a user's trail activity at all.
2. *Provide Adequate Trail Opportunities* -- Offer adequate trail mileage and provide opportunities for a variety of trail experiences. This will help reduce congestion and allow users to choose the conditions that are best suited to the experiences they desire. As in the Recreation Opportunity Spectrum (ROS), this will require a focus on trail experiences as opposed to trail activities. Opportunities for different trail experiences can be maximized by providing trails that vary in terms of terrain, difficulty, access, remoteness, naturalness, facilities and site management, social encounters, visitor impacts, and visitor management.
3. *Minimize Number of Contacts in Problem Areas* -- Each contact among trail users (as well as contact with evidence of others) has the potential to result in conflict. So, as a general rule, reduce the number of user contacts whenever possible. This is especially true in congested areas and at trailheads. Disperse use and provide separate trails where necessary after careful consideration of the additional environmental impact this may cause. Recognize that separating trail users may limit opportunities for communication, understanding, and eventual cooperation among different user groups.
4. *Involve Users as Early as Possible* -- Identify the present and likely future users of each trail and involve them in the process of avoiding and resolving conflicts as early as possible, preferably before conflicts occur. For proposed trails, possible conflicts and their solutions should be addressed during the planning and design stage with the involvement of prospective users (Ryan, 1993). New and emerging uses should be anticipated and addressed as early as possible with the involvement of participants. Likewise, existing and developing conflicts on present trails need to be faced quickly and addressed with the participation of those affected.
5. *Understand User Needs* -- Determine the motivations, desired experiences, norms, setting preferences, and other needs of the present and likely future users of each trail. This "customer" information is critical for anticipating and managing conflicts. This process must be ongoing and will require time, patience, effort, and sincere, active listening.
6. *Identify the Actual Sources of Conflict* -- Help users to identify the specific tangible causes of any conflicts they are experiencing (*e.g.*, "teenagers partying and littering at Liberty Campground," "horses fouling the water at Peabody Spring," "mountain bikers speeding down the last hill before the Sills Trailhead," etc.). In other words, get beyond emotions and stereotypes as quickly as possible, and get to the roots of any problems that exist.
7. *Work With Affected Users* -- Work with all parties involved to reach mutually agreeable solutions to these specific issues. Users who are not involved as part of the solution are more likely to be part of the problem now and in the future. For example, the Bay Area Ridge Trail Council is considering "full and balanced representation" of key user groups on its county committees as it plans sections of its new trail (Isbill, 1993).

8. *Promote Trail Etiquette* -- Minimize the possibility that any particular trail contact will result in conflict by actively and aggressively promoting responsible trail behavior. Use existing educational materials or modify them to better meet local needs. Target these educational efforts, get the information into users' hands as early as possible, and present it in interesting and understandable ways (Roggenbuck & Ham, 1986).
9. *Encourage Positive Interaction Among Different Users* -- Trail users are usually not as different from one another as they believe. Providing positive interactions both on and off the trail will help break down barriers and stereotypes, and build understanding, good will, and cooperation. This can be accomplished through a variety of strategies such as sponsoring "user swaps," joint trail building or maintenance projects, filming trail-sharing videos, and forming Trail Advisory Councils.
10. *Favor "Light-Handed Management"* -- Use the most "light-handed approaches" that will achieve area objectives (Hendee, Stankey, & Lucas, 1990). This is essential in order to provide the freedom of choice and natural environments that are so important to trail-based recreation. Intrusive design and coercive management are not compatible with high-quality trail experiences.
11. *Plan and Act Locally* -- Whenever possible, address issues regarding multiple-use trails at the local level (Keller, 1990; Kulla, 1991). This allows greater sensitivity to local needs and provides better flexibility for addressing difficult issues on a case-by-case basis. Local action also facilitates involvement of the people who will be most affected by the decisions and most able to assist in their successful implementation.
12. *Monitor Progress* -- Monitor the ongoing effectiveness of the decisions made and programs implemented. It is essential to evaluate the effectiveness of the actions designed to minimize conflicts; provide for safe, high-quality trail experiences; and protect natural resources. Conscious, deliberate monitoring is the only way to determine if conflicts are indeed being reduced and what changes in programs might be needed. This is only possible within the context of clearly understood and agreed-upon objectives for each trail area. Two existing visitor impact management frameworks do consider area objectives and offer great potential for monitoring trail settings and trail use impacts:
  - o *Visitor Impact Management System (VIM)* -- This model, developed for the National Park Service by the National Park and Conservation Association, assists managers in setting objectives, selecting impact indicators, and monitoring impacts against measurable standards set for each area (Graefe, Kuss & Vaske, 1990).
  - o *Limits of Acceptable Change (LAC)* -- This system was developed by and for the USDA Forest Service and operates much like the VIM framework (Stankey, Cole, Lucas, Peterson & Frissell, 1985).