Indicators and Standards for Quality Visitor Experiences at City of Fort Collins Foothills Natural Areas

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Executive Summary

The City of Fort Collins conducted visitor surveys (n = 584) at the Foothills Natural Area during 2017 and 2018. Respondents were randomly selected throughout the year on both weekdays and weekends. Interviews were conducted in four shifts (i.e., 8 am to 9:30 am, 10 am to 11:30 am, and 12 pm to 1:30 pm, 2:00 pm- 3:30 pm). Given the population of Fort Collins, the sample size, and the random selection procedures, the findings reported here have a 95% confidence interval, $\pm$ 4%. Table 1 summarizes this data collection effort. [1]

This report compares respondents at four locations: Coyote Ridge (n = 177), Maxwell (n = 145), Pineridge (n = 123), and Reservoir Ridge (n = 148). Results focus on indicators and standards of quality for visitor satisfaction, perceived conflict, and perceived crowding.

Demographics (Tables 1 – 4)

- Slightly higher percentages of males were surveyed at Coyote Ridge (56%) and Maxwell (52%), while more females were surveyed at Pineridge (55%) and Reservoir Ridge (56%). The differences in these distributions were not statistically significant (Table 2).
- Respondents mean ages ranged from 42.66 (Maxwell) to 47.33 (Pineridge); the four distributions did not differ statistically.
- Nearly all respondents were not Hispanic or Latino (93% +) and the predominant race was white (86% +). There were no statistical differences among respondents in terms of race.
- Respondents at all four locations were highly educated. For example, over three-quarters (77%) of the respondents at Coyote Ridge had completed a bachelor's degree (47%) or masters / Ph.D. (30%). Comparable numbers were observed for the other three locations: Maxwell (89%), Pineridge (85%), and Reservoir Ridge (75%).
- Forty percent plus of respondents at each location reported an income of $100,000 or more.
- Nearly all respondents were residents of Larimer County: Coyote Ridge (98%), Maxwell (99%), Pineridge (97%), and Reservoir Ridge (96%) (Table 3).
- Coyote Ridge respondents had lived in the county an average of 11.75 years, Maxwell visitors averaged 13.45 years, Pineridge respondents averaged 16.31 years, and Reservoir Ridge visitors averaged 15.37 years.

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[1] *A primer on statistics*:
In this report, two types of statistics are presented: (a) Chi-square (χ^2) and (b) F-values.
The choice of statistic depends on how the dependent variable was coded, for example:
if the dependent variable was dichotomous (e.g., male vs. female) or categorical (level of education), χ^2 was used.
if the dependent variable was continuous (e.g., number of people in a group), F was used.
The independent variable was always categorical (e.g., location of the interview).
If the p-value for a given statistic is $\leq$ .05, the groups being compared differ statistically.
The χ^2 and F-values highlight when differences exist, but do not indicate the strength of the relationship.
The latter is convey via two effect size measures: (a) Cramer's V (or simply V) for χ^2 and (b) eta (η) for F-values.
The cutpoints for these two effect sizes are:
for V: .1 = a minimal relationship, .3 = a typical relationship, and .5 = a substantial relationship
for η: .1 = a minimal relationship, .243 = a typical relationship, and .371 = a substantial relationship.

- Over three quarters of the Maxwell (82%), Pineridge (77%), and Reservoir Ridge (80%) respondents were from Fort Collins. About half (54%) of the Coyote Ridge visitors were from Fort Collins, with another quarter (26%) residing in Loveland (Table 4).

Visitation (Tables 5 – 14)

- In the past 12 months, respondents visited Coyote Ridge an average of 12.79 times; visitors to the other areas had visited, on average, more frequently: Maxwell (*M* = 38.59), Pineridge (*M* = 41.00) and Reservoir Ridge (*M* = 25.00) (Table 5).
- The number of visits varied by residents (*M* = 30.90) and non-residents (*M* = 1.62) (Table 6).
- Across all four locations, 39% were hikers, 31% were trail runners, 19% were mountain bikers, and 11% were wildlife viewers (Table 7).
- Mountain bikers (*M* = 42.96 visits) and trail runners (*M* = 37.02) visited more frequently than wildlife viewers (*M* = 23.05) and hikers (*M* = 16.13) (Table 8).
- Hiking was popular at Coyote Ridge (64%), Pineridge (72%), and Reservoir Ridge (69%). At Maxwell, the two most popular activities were trail running (48%) and hiking (44%) (Table 9).
- At Coyote Ridge, Pineridge and Reservoir Ridge, the primary activity was hiking (42%, 44%, 42%, respectively). At Maxwell, respondents listed their primary activities as trail running (39%), mountain biking (30%), and hiking (28%) (Table 10).
- Respondent's reported primary activities varied by weekdays (Table 11) and weekends (Table 12). For example, at Coyote Ridge, only 8% listed mountain biking as their primary activity on weekdays, while 17% reported mountain biking as their primary activity on weekends. At Maxwell, 41% indicated hiking was their primary activity on weekdays, compared to 25% on weekends.
- Nearly two-thirds (62%) of the Pineridge respondents and 57% of the Reservoir Ridge visited alone (Table 13). At the other two locations (Coyote Ridge and Pineridge) visitation was approximately 50% alone versus 50% in groups.
- At all four locations, over 80% of the respondents visited in groups of one or two. Over 85% did not visit with children.
- About half (48%) of the hikers were with a group. Over 40% of the trail runners were alone (Table 14).

Visitation at Other City of Fort Collins Natural Areas (Tables 15 – 18)

- In the past 12 months, Coyote Ridge respondents had also visited Bobcat Ridge (53%), Pineridge (40%) and Fossil Creek (37%). Maxwell respondents also visited Pineridge (69%), Coyote Ridge (64%) and Bobcat Ridge (50%). Pineridge visitors were also attracted to Coyote Ridge (57%), and Maxwell (53%). Over half of the Reservoir Ridge visitors had also visited Coyote Ridge, Maxwell, and Pineridge (Table 14).
- Reservoir Ridge was the most frequently listed "other" natural area visited (*n* = 17), followed by Soapstone Prairie (*n* = 16), and River Bend Ponds (*n* = 8) (Table 15).
- Respondents were asked if they visited this natural area because it is less crowded: 59% of the Reservoir Ridge visitors said yes, compared to 44% of the Pineridge visitors, 40% of Coyote Ridge visitors, and 30% of the Maxwell visitors (Table 16).
- Over 90% of visitors to all locations do not avoid particular City of Fort Collins natural areas (Table 17).
- Specific natural areas and reasons for no longer visiting that location are shown in Table 18. Maxwell was listed seven times. Reasons for not visiting included crowding and lack of parking.

Visitor Satisfaction (Tables 19 – 23)

- Based on the literature, the standard of quality for visitor satisfaction was set at 80% or more of the visitors should be satisfied with their experiences at City of Fort Collins natural areas.
- Between 73% and 97% of visitors to the four locations rated all specific facilities (e.g., restrooms, parking lots, trails) as "good" or "very good" (Table 19). The standard of quality was met or exceeded for facilities with only three exceptions. All three exceptions were at Coyote Ridge: restrooms (77%), picnic areas (77%), and trash receptacles (73%).
- In an open-ended question asking individuals to explain their perceived quality ratings, 86 said "the trails are in great shape and well maintained." Another 44 people commented that the facilities were well-maintained. Thirty-two respondents thought that the natural areas had great scenery (Table 16).
- Nearly all respondents rated the perceived quality of their experience as "excellent:" Coyote Ridge (100%), Maxwell (98%), Pineridge (98%), and Reservoir (99%) (Table 21). The 80% standard was also achieved for the overall perceived quality of the experience.
- Respondents' reasons for their overall evaluations included natural beauty (n = 88), well managed trails (n = 59), accessible (n = 43) and well maintained (n = 37) (Table 22).

Perceived Conflict (Tables 24 – 32)

- Eighty percent or more of all respondents "never" *observed* hikers, mountain bikers or equestrian riders behaving unsafely or discourteously (Table 24). For many of the variables in Table 24, these percentages are over 90%.
- Most respondents at all four locations "never" *perceived a problem* with hikers, mountain bikers or equestrian riders behaving unsafely or discourteously (Table 25).
- Few respondents listed any specific problems with *safety concerns*. For example, four individuals indicated that dogs off leash was a problem (Table 26). Written complaints about mountain bikers included riding too fast (n = 22), not giving a warning when passing (n = 13), and not yielding the right of way (n = 10) (Table 27). Horse waste on the trail was noted by three individuals as a problem (Table 28).
- Recreation conflict was operationalized by combining the frequency (observed vs. not observed) of seeing different events with corresponding perceived problem (problem vs. not a problem) variables (Figure 1). Individuals who have not observed a given event, or who have observed it yet do not perceive it to be a problem, are considered a no conflict group (either in terms of interpersonal or social values conflicts). Those who have never seen a particular event, but believe a problem exists for that event, are expressing a conflict in social values. Conversely, those who witness a particular situation and believe that the event has caused a problem are indicating an interpersonal conflict.

Figure 1. Conflict evaluation figure

		Perceived Problem	
		No	Yes
Observed	No	No Conflict	Social Values Conflict
	Yes	No Conflict	Interpersonal Conflict

- Given the activities and conditions at the four natural areas, the standard of quality for perceived conflict was set at no more than 25% of the respondents should interpersonal conflict.

- Across all four locations, over two thirds of respondents reported no conflict regarding safety issues with hikers or equestrian riders (Table 32). Between 17% and 23% expressed social values conflict and less than 10% noted interpersonal safety conflicts with hikers and horseback riders.

- Interpersonal conflicts with safety were more evident with mountain bikers (Table 32). Between 13% (Pineridge) and 20% (Coyote Ridge) noted this type of conflict. Social values conflict regarding safety ranged from 23% (Coyote Ridge) to 41% (Maxwell).

- Across all locations, 57% of respondents reported no conflict associated with discourteous behaviors by hikers or equestrian riders (Table 32). For these two activities interpersonal conflict ranged from 1% to 8%. Interpersonal conflict stemming from discourteous behavior by mountain bikers ranged from 12% (Pineridge) to 19% (Coyote Ridge).

- All of the percentages were lower than the standard of no more than 25% perceiving interpersonal conflict.

Encounters with others and Perceived Crowding (Tables 33 – 35)

- Traditional crowding models assume that as the number of encounters with other visitors increases, crowding will increase. Crowding is defined as a negative evaluation of density and involves a value judgment that the density or number of encounters with other visitors is too many. Heberlein and Vaske (1977) developed a relatively simple measure of perceived crowding that asks people to indicate how crowded the area was at the time of their visit. Responses are shown in Figure 2.

  How crowded did you feel by the number of visitors? (Circle one number)

1	2	3	4	5	6	7	8	9
Not at all Crowded		Slightly Crowded			Moderately Crowded			Extremely Crowded

  Figure 2. Example of crowding response scale.

- The average number of reported encounters with hikers at the trailhead ranged from 3.05 (Pineridge) to 7.62 (Coyote Ridge) (Table 33). The average number of encounters with mountain bikers at the trailhead was lower and ranged from 0.48 (Reservoir Ridge) to 3.05 (Coyote Ridge). Average encounters with equestrian riders at the trailhead was consistently less than one.

- On the trail, encounters with hikers ranged from a mean of 7.80 at Reservoir Ridge to 13.79 at Coyote Ridge (Table 33). Encounters with mountain bikers on the trail averaged 2.26 at Reservoir Ridge to slightly over six at Coyote Ridge and Maxwell. Encounters with horseback riders on the trail again averaged less than one.

- The perceived crowding literature has suggested a standard of $\leq$ 35% of visitors should feel any level of crowding (i.e., scale points 3 thru 9 on the crowding scale).

- This report examined this standard for 38 City of Fort Collins evaluation contexts (Table 35). An example evaluation context might refer to mountain bikers' evaluations of hikers on the trail at Coyote Ridge, or hikers' evaluations of mountain bikers at the trailhead at Pineridge.

- The $\leq$ 35% standard was met or exceed 34 of the 38 contexts. The four exceptions were:

	Evaluation context		
Study site	Evaluation by:	Evaluation for:	Crowding Scale 3-9 %
Maxwell	Mountain bikers	Hikers on trail	58
Maxwell	Mountain bikers	Mountain bikers on trail	49
Reservoir Ridge	Mountain bikers	Hikers on trail	41
Maxwell	Mountain bikers	Hikers at trailhead	37

- To put the crowding scores in perspective, Appendix A ranks perceived crowding scores from 82 studies / evaluation contexts in Colorado.

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Introduction

Natural resource management agencies strive to provide high quality recreation experiences (Decker, Brown & Siemer, 2001). Not all visitors, however, share the same set of preferences for setting attributes, facilities, and services offered. Some individuals, for example, may desire nothing more than the opportunity to enjoy nature, hike, and watch wildlife; activities that require only a natural setting with minimal agency provided facilities or services. Other visitors are more demanding in the services they believe should be offered (Donnelly, Vaske, DeRuiter, & King, 1996).

Recognizing this diversity of desires found among recreationists, researchers and managers have attempted to differentiate users into more homogeneous groups (Bryan, 1977). Segmentation strategies have been developed that evaluate the benefits sought by individuals in a variety of situations or occasions. For example, several studies highlight the importance of segmenting visitors based on geographic location (e.g., Donnelly et al., 1996; Vaske, Beaman, Stanley, & Grenier, 1996). This report compared visitors to four City of Fort Collins natural areas: Coyote Ridge, Maxwell, Pineridge, and Reservoir Ridge.

Study Objectives

This project sought to better understand visitors to City of Fort Collins natural areas. More specifically, the objectives were to describe visitors in terms of their:

1. Demographic characteristics (e.g., sex, age, place of residence)
2. Prior visitation rates and trip characteristics (e.g., trip duration, activity participation)
3. Visitation to other natural areas
4. Visitor satisfaction
5. Perceived conflicts with other visitors
6. Perceived crowding.

The intent is to (a) provide managers with baseline information against which future research results can be compared and (b) to inform management decisions.

Conceptual Distinctions

Most planning frameworks recommend identifying and establishing quantitative impact indicators and standards (e.g., Visitor Impact Management, Graefe, Kuss, & Vaske, 1990; Visitor Experience and Resource Protection, National Park Service, 1997; Limits of Acceptable Change, Stankey, Cole, Lucas, Petersen, & Frissell, 1985). Indicators are specific, measurable variables that reflect the current situation. A standard of quality is the minimum acceptable condition for each indicator. Standards identify conditions that are desirable (e.g., no litter), as well as conditions that managers do not want to exceed (e.g., encounters with other people). Comparing existing conditions against the standards provides a quantitative estimate of whether the experiences provided are within the limits specified by the standard (Vaske, Whittaker, Shelby, & Manfedo, 2002).

This report considers three sets of indicators and standards that have been used extensively in the literature:

1. Visitor satisfaction
2. Perceived conflict
3. Perceived crowding

Satisfaction Indicator and Standard

Satisfaction has been defined as the congruence between expectations and outcomes (Manning, 2011) and is one of the most commonly used indicators of visitor experience / perceived quality of service received (Vaske et al., 2002). Satisfaction from a recreation experience reflects visitor expectations and management goals. People who experience conditions / services in line with what they expected are likely

to be satisfied. From a manager's perspective, providing satisfactory experiences / services to at least X percent of the visiting public reflects a standard for this indicator.

At least two methodologies for investigating satisfaction are evident in the literature. One theory has focused on a multiple satisfactions approach, which assumes that each individual brings his or her own expectations to an experience and these influence the kinds of satisfaction that he or she receives (Hendee, 1974). This framework recognizes the diversity of experiences that visitors seek, and a quality experience for a recreationist involves achieving the particular satisfactions in which he or she is interested or expects (Manfredo, Fix, Teel, Smeltzer, & Kahn, 2004). The concern is with identifying variables that affect satisfaction and that are susceptible to management or manipulation. If such variables can be identified and monitored, the potential for changing circumstances to create better recreation opportunities is enhanced. To facilitate this applied focus, a report card was developed in the late 1970's for tracking visitor satisfaction (LaPage & Bevins, 1981). The instrument included items that could be influenced by management actions (e.g., restrooms, parking areas, trash receptacles) This applied approach was adopted for this study.

Second, researchers (e.g., Vaske, Donnelly, Heberlein, & Shelby, 1982; Vaske & Roemer, 2013) have defined satisfaction as an overall rating of a recreation experience / service as good or bad. Satisfaction is viewed as a composite of the particular expectations and needs, expressed as a single numerical rating. Defined this way, satisfaction has been operationalized with a single question, such as "Overall, how would you rate the quality of the visitor services provided to you and your group?" The percentage of individuals reporting a given level of satisfaction can be calculated for all participants in an activity and the activities can be compared directly.

There are advantages and disadvantages to both multiple-item and single-item indicators of a concept. Multiple-item indicators can contribute to a more sophisticated understanding of concepts and often have good psychometric properties (e.g., reliability, validity). Measurement reliability means that the multiple items measure the same construct (i.e., the items intercorrelate with each other). Measurement validity means that the scale measures what it was intended to measure. Unfortunately, multiple-item indicators also have disadvantages: (a) they increase respondent burden, (b) they challenge comparisons of findings among studies because different items are used, and (c) they do not necessarily yield clear management standards (Vaske, 2008).

Vaske and Roemer (2013) analyzing differences in overall satisfaction by consumptive and nonconsumptive recreationists over a 30-year period. Based on theory and previous research, two hypotheses were advanced: (a) consumptive recreationists will report significantly lower satisfaction than will nonconsumptive recreationists, and (b) this pattern will remain consistent over time. Data were obtained from published and unpublished studies in 57 consumptive (e.g., hunters) and 45 nonconsumptive (e.g., kayakers) recreation contexts. Each study used the same question measuring overall satisfaction (i.e., "overall, how would you rate your day / trip / experience"). Following previous research (Vaske et al., 1982), responses were collapsed into three categories (i.e., "poor / fair," "good / very good," "excellent / perfect"). The independent variables were activity type and year. Consistent with the hypotheses and the previous article, consumptive recreationists reported lower satisfaction than did nonconsumptive recreationists, and this pattern of findings generally remained consistent over time.

Satisfaction Standard. Based on the previous meta-analyses (Vaske & Roemer, 2013; Vaske et al., 1982), the standard for the City of Fort Collins natural areas was set at 80% or more of visitors should be satisfied with their experience or the services they received. Comparing existing satisfaction ratings against the 80% standard provides a quantitative estimate of whether any experiential changes are within the limits specified by the standard (Vaske et al., 2002).

Perceived Conflict Indicator and Standard

Conflict has been a theme in the outdoor recreation literature for decades (e.g., Lucas, 1964). Recreation conflict generally falls into two main categories (Graefe & Thapa, 2004). First, interpersonal conflict (a.k.a., goal-interference) occurs when the physical presence or behavior of an individual or group interferes with the goals of another individual or group (Jacob & Schreyer, 1980). Interpersonal conflict

can occur directly via a face-to-face encounter (e.g., between a backcountry skier and a snowmobiler on a shared route), or indirectly where evidence of one group's behavior is sufficient to cause conflict (e.g., a skier smells the exhaust of a snowmobiler). Different groups may share the same goal (e.g., experiencing untracked snow), but have different means of achieving that goal (e.g., skiing vs. snowmobiling), which can influence goal-interference conflict (Graefe & Thapa, 2004).

Second, social values conflict occurs between groups who may not share similar norms or values about an activity (Vaske, Donnelly, Wittmann, & Laidlaw, 1995). Unlike interpersonal conflict, social values conflict can occur even when there is no direct contact between the groups (Carothers, Vaske, & Donnelly, 2001; Vaske, Needham, & Cline, 2007). For example, although encounters with llama packing trips may be rare, individuals may philosophically disagree about the appropriateness of using these animals in the backcountry (Blahna, Smith, & Anderson, 1995).

Interpersonal Conflict. Research on recreational conflict has traditionally focused on the asymmetrical relationships that occur when different activity groups interact (Kuss, Graefe, & Vaske, 1990). Studies, for example, have shown the presence of a one-way conflict between paddling canoeists and motorboaters (Adelman, Heberlein, & Bonnicksen, 1982). Paddling canoeists disliked motorboaters, but the people using motor-powered craft were not bothered by, and often enjoyed seeing and interacting with paddlers. This one-way type of conflict has also been shown between hikers and mountain bikers, oar-powered and motor-powered whitewater rafters, cross-country skiers and snowmobilers, backpackers and horsepackers, water skiers and anglers, and hunters and non-hunters. In general, the research has shown that for those recreationists for whom the interaction has negative consequences (e.g., disrupts the solitude of the experience, or inhibits one's ability to catch fish or hunt game), conflict increases.

Hikers and mountain bikers differ in their method of experiencing the environment, but the participants share similar characteristics. Research has profiled mountain bikers as "30 something" white males, from a range of income levels, who believe the activity is important to their identity (Chavez, 1999). Similarly, many hikers are over 30, white males, from a range of income levels and who identify with the sport (Wellner, 1997). Individuals in both activities tend to participate frequently (Ruibal, 1996) and many pursue both activities (Chavez, 1999). Such similarities suggest that conflict, to the extent it exists between hikers and mountain bikers, is likely to reflect interpersonal problems rather than differences in social values. Interpersonal conflict between hikers and mountain bikers may be related to speed, lack of courtesy, crowding, or safety concerns (Moore, 1994). Safety issues, for example, have been linked to trail design (blind corners) and the behaviors of some mountain bikers who ride too fast for existing conditions (Hoger & Chavez, 1998).

Social Values Conflict. The importance of social acceptability judgments in conflict management is relatively new to the recreation literature (Blahna et al., 1995). McShea, Wemmer, and Stuwe (1993), for example, describe the social conflicts that erupted between hunters and anti-hunters when the National Zoo's Conservation and Research Center (CRC) attempted to open the area to hunting to reduce the size of a controversial deer herd. The conflict was primarily based on differences in values held by the CRC and animal rights groups. The CRC was concerned with protecting exotic hoofed animals from disease caused by the deer, whereas the animal rights groups advocated a position favoring the rights of individual deer. These findings reflect broader societal value differences toward consumptive versus non-consumptive uses of wildlife.

Social value differences between hikers and mountain bikers may reflect anticipated threats. Existing research (Hoger & Chavez, 1998; Moore, 1994), for example, suggests that some hikers believe mountain bikers increase safety concerns (i.e., riding irresponsibly), degrade the natural resource (i.e., creating informal trails), and lower the quality of the experience (i.e., lack of user etiquette). Similar to the controversy over allowing hunting in certain locations (Vaske et al., 1995), these reactions suggest that, for at least some individuals, mountain biking is not a socially acceptable activity and should not be allowed on trails traditionally used by hikers. Such value judgments are reinforced when mountain bikers are stereotyped as "crazy kids out for an adrenaline rush" (Hoger & Chavez, 1998).

Hiking represents a traditional activity on most trails whereas mountain biking is a relatively new sport. Past research has repeatedly demonstrated that traditional users frequently question the social

acceptability of any non-traditional activity in natural resource settings (Blahna et al., 1995). As the number of individuals participating in non-traditional activities like mountain biking increases (Ruibal, 1996), hikers' tolerance levels for bikers may decrease and the potential for social values conflict can increase.

Interpersonal versus Social Values Conflict. Vaske et al. (1995) examined the magnitude of interpersonal and social values conflict for two general classes of events. Hunting-associated events included seeing an animal being shot, seeing people hunting, and hearing guns being fired. Human-wildlife interaction events were represented by evaluations of people disturbing, harassing, and feeding wildlife. Comparisons were made between hunters and non-hunters and between frequent and infrequent visitors to Mt. Evans, a 14,150-foot mountain located about 70 miles west of Denver. Results indicated that interpersonal conflicts between hunters and non-hunters on Mt. Evans were minimized due to the mountain's natural visual barriers and the Colorado Division of Wildlife's regulations that prohibit hunting near the road where most non-hunters are found. To the extent that conflict existed for hunting associated events, much of the problem was associated with differences in social values held by the non-hunting public. Conflict in social values remained relatively constant across frequency of visitation; findings that supported the argument that a visitor's value orientation is independent of the number of prior visits to an area.

Carothers et al. (2001) examined social values and interpersonal conflict reported by hikers, mountain bikers, and those who participate in both activities. Across all three groups, less conflict was reported for hiking than for mountain biking. To the extent that conflict did exist for hiking, mountain bikers and dual-sport participants were more likely than hikers to report unacceptable behaviors. For evaluations of mountain biking behavior, hikers were more likely than mountain bikers to experience conflict, whereas dual-sport participants fell in between these two extremes. All three groups reported more interpersonal than social values conflict.

Both interpersonal and social values conflict can be influenced by recreationists' lifestyle tolerance; the tendency to accept or reject lifestyles different than one's own (Jacob & Schreyer, 1980). As noted by Ivy, Stewart, and Lue (1992), tolerance is typically associated with beliefs about a particular group, rather than reactions to specific behaviors. When recreationists encounter others, a cognitive processing of information occurs. This action often results in the categorization of others according to some group membership, which helps to simplify and order environmental stimuli. Differences in lifestyles are often communicated via visual cues such as the equipment used by recreationists engaged in different activities (e.g., guns for hunting versus binoculars for wildlife viewing, Vaske et al., 1995). Recreation in-groups and out-groups represent categories an individual establishes on the basis of perceived or imagined lifestyle similarities and differences (Jacob & Schreyer, 1980). Though useful for maintaining a view of the world, it can also lead to unjustified generalizations about other groups (Ramthun, 1995). Those who demonstrate low tolerance for persons with differing lifestyles will be more likely to experience conflict.

Out-group versus in-group lifestyle tolerance differences have been noted for several recreation activities. Research (Vaske, Carothers, Donnelly, & Baird, 2000; Williams, Dossa, & Fulton, 1994), for example, has indicated that skiers and snowboarders have differing views of each other. Skiers felt threatened by the snowboarders' different approach; evaluated the language, clothes, and on-slope behavior of snowboarders as intimidating; and had the perception that snowboarders purposely created conflict situations. Snowboarders, on the other hand, perceived skiers as predictable and showed less concern for their presence on the slopes. Watson, Williams, and Daigle (1991) found that mountain bikers were more likely than hikers to perceive the two groups as similar in terms of socio-demographic characteristics, as well as their relationship to the resource (attitudes about the environment, values of the area). Hikers perceived more differences between the two groups. Other research has shown that hikers view mountain biking as intrusive and are concerned with the impact mountain biking has on the environment and safety issues related to multiple use trails (Hoger & Chavez, 1998).

Simple classifications of individuals into groups (e.g., skier vs. snowboarder, or hiker vs. biker), however, can introduce problems when attempting to understand conflict (Watson, Zaglauer, & Stewart, 1996). Many recreationists participate in multiple activities (i.e., both hiking and biking) and consequently, their

tolerance for others may be altered. Analyses should distinguish these dual sport participants from individuals who pursue only one activity.

There are a variety of ways to operationalize interpersonal versus social values conflict. Vaske et al. (1995) suggests combining the frequency (observed vs. not observed) of seeing different events with corresponding perceived problem (problem vs. not a problem) variables (Figure 1). Individuals who have not observed a given event, or who have observed it (e.g., bikers riding fast) yet do not perceive it to be a problem, are considered a no conflict group (either in terms of interpersonal or social values conflicts). Those who have never seen a particular event, but believe a problem exists for that event, are expressing a conflict in social values. Conversely, those who witness a particular situation and believe that the event has caused a problem are indicating an interpersonal conflict.

Figure 1. Conflict evaluation figure

		Perceived Problem	
		No	Yes
Observed	No	No Conflict	Social Values Conflict
	Yes	No Conflict	Interpersonal Conflict

Source: Vaske et al. 1995

Conflict Standard. Unlike the other indicators and standards considered here (i.e., satisfaction, perceived crowding), standards for acceptable levels conflict are more variable. The existing research suggests that the magnitude of conflict depends on the characteristics of the:

1) activity (e.g., consumptive vs. non-consumptive, traditional vs. non-traditional),
2) visitors (e.g., tolerances for other user groups, perceived similarities between the groups),
3) environment (e.g., unpaved vs. paved trails that allow for faster speeds),
4) management (e.g., zoning to separate potentially incompatible activities).

As a starting point, the researcher recommends that no more than 25% of the respondents should report interpersonal conflict.

Crowding Indicator and Standard

Researchers have recognized the difference between density and crowding, but even scientists sometimes use the word “crowding” inappropriately when referring to high density (Shelby & Heberlein, 1986). Density is a descriptive term that refers to the number of people per unit area. It is measured by counting the number of people and measuring the space they occupy, and it can be determined objectively. Crowding, on the other hand, is a negative evaluation of density; it involves a value judgment that the specified number is too many. The term *perceived crowding* is often used to emphasize the subjective or evaluative nature of the concept.

Heberlein and Vaske (1977) developed a relatively simple measure of perceived crowding that asks people to indicate how crowded the area was at the time of their visit. Responses are given on the scale below:

1	2	3	4	5	6	7	8	9
Not at all Crowded		Slightly Crowded			Moderately Crowded			Extremely Crowded

Figure 2. Example of crowding response scale

In this item, two of the nine scale points label the situation as uncrowded, and the remaining seven points label it as crowded to some degree. The rationale is that people may be reluctant to say an area was

crowded because crowding is an undesirable characteristic in a recreation setting. An item that asked "Did you feel crowded?" might lead most people to say "No." The scale is sensitive enough to pick up even slight degrees of perceived crowding, just as measures of undesirable chemicals (e.g., pollutants or carcinogens) are sensitive to even low levels of these substances.

Crowding Standard. Shelby, Vaske, and Heberlein (1989) developed crowding standards based on this indicator. Their comparative analysis of 59 different settings and activities suggested five distinct categories of standards (suppressed crowding, low normal, high normal, over capacity, and greatly over capacity). When ≤ 35% of the visitors feel crowded, density levels in the area were not a problem. For locations where between 50 and 60% of visitors felt crowded, the setting was approaching its carrying capacity, and visitors started to experience access and displacement problems. Locations and activities where over 65% of the visitors felt crowded were considered over carrying capacity.

A subsequent meta-analysis (Vaske & Shelby, 2008) examined crowding ratings for 615 different settings and activities. These studies were conducted across the United States, Canada, New Zealand, Ecuador, Sweden, and Taiwan. The activities included hunting of many types, fishing of many types, rafting, kayaking, canoeing, floating, boating, rock climbing, mountain climbing, backpacking, day hiking, biking, sailing, photography, and driving for pleasure. The areas studied show considerable diversity, with some showing extremely high density and use impact problems, others showing low densities and no problems, and still others actively utilizing management strategies to control densities and use impacts. In total, 85,451 individuals have been asked the crowding question.

Both meta-analyses (Shelby et al., 1989; Vaske & Shelby, 2008) supported the five distinct categories of standards based on the 9-point perceived crowding scale. The five categories were established based on the percent of visitors reporting any level of crowding (scale points 3 through 9).

For all 615 evaluation contexts, 40% showed suppressed crowding, 18% low normal crowding, 17% high normal crowding, 16% over capacity, and 9% greatly over capacity. In the United States, 40% of the 522 evaluation contexts showed suppressed crowding, whereas 16% were over capacity and 9% were greatly over capacity.

Carrying capacity standards based on levels of perceived crowding [1]

Percent feeling crowded	Capacity judgment	Comment	Total # of contexts (n = 615)	Percent of contexts
0-35%	Suppressed crowding	Crowding is likely limited by management, situational factors, or natural factors may offer unique low-density experiences.	245	40%
36-50%	Low normal	Access, displacement, or crowding problems are not likely to exist at this time. Similar to the above category, may offer unique low-density experiences.	111	18%
51-65%	High normal	These locations or activities probably have not exceeded carrying capacity but may be tending in that direction. Should be studied if increased use is expected, allowing management to anticipate problems.	107	17%
66-80%	Over capacity	These locations or activities are generally known to have overuse problems, and they are likely to be operating at more than their capacity. Studies and management necessary to preserve experiences.	99	16%
81-100%	Greatly over capacity	It is generally necessary to manage for high-density recreation. A crowding problem has typically been identified.	53	9%

1. Source: Vaske and Shelby (2008)

Methods

The City of Fort Collins conducted visitor surveys (n = 584) at the Foothills Natural Areas during 2017 and 2018. Respondents were randomly selected throughout the year on both weekdays and weekends. Given the population of Fort Collins, the sample size, and the random selection procedures, the findings reported here have a 95% confidence interval, $\pm$ 4%. Table 1 summarizes this data collection effort.

This report compares respondents at four locations: Coyote Ridge (n = 177), Maxwell (n = 145), Pineridge (n = 123), and Reservoir (n = 148).

Table 1. City of Fort Collins Foothills exit satisfaction survey data collection effort

	Coyote Ridge (n = 177) %	Maxwell (n = 145) %	Pineridge (n = 123) %	Reservoir Ridge (n = 148) %
Year				
2017	64	50	34	28
2018	36	50	66	72
Month				
January to March	0	9	15	20
April to June	20	26	44	34
July to September	16	15	7	19
October to December	64	50	34	28
Day of Week				
Weekday	15	15	26	21
Weekend	85	85	74	79
Shift				
8:00 – 9:30	19	20	12	25
9:30 – 11:30	15	19	48	39
11:30 – 1:30	49	39	24	27
1:30 – 3:30	17	22	16	10

Data Analysis

In this report, two types of statistics are presented: (a) Chi-square (χ^2) and (b) F-values.
The choice of statistic depends on how the dependent variable was coded, for example:
if the dependent variable was dichotomous (e.g., male vs. female) or categorical (level of education), χ^2 was used.
if the dependent variable was continuous (e.g., number of people in a group), F was used.
The independent variable was always categorical (e.g., location of the interview).
If the p-value for a given statistic is $\leq$ .05, the groups being compared differ statistically.
The χ^2 and F-values highlight when differences exist, but do not indicate the strength of the relationship.
The latter is conveyed via two effect size measures:

(a) Cramer's V (or simply V) for χ^2 and
(b) eta (η) for F-values.
(b) The cutpoints for these two effect sizes are:

for V: .1 = a minimal relationship, .3 = a typical relationship, and .5 = a substantial relationship
for η: .1 = a minimal relationship, .243 = a typical relationship, and .371 = a substantial relationship.

Results

Slightly higher percentages of males were surveyed at Coyote Ridge (56%) and Maxwell (52%), while more females were surveyed at Pineridge (55%) and Reservoir Ridge (56%). The differences in these distributions was not statistically significant (Table 2). Respondents mean ages ranged from 42.66 (Maxwell) to 47.33 (Pineridge); the four distributions did not differ statistically. Nearly all respondents were not Hispanic or Latino (93% +) and the predominant race was white (86% +). There were no statistical differences among respondents in terms of race.

Table 2. Demographic profile of visitors to City of Fort Collins natural areas

	City of Fort Collins Natural Area [1]						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Statistic χ^2 or *F*-value	*p*-value	Effect size *V* or η
Gender					5.29	.152	.095
Male	56	52	45	44			
Female	44	48	55	56			
Age					36.06	.008	.137
< 20	4	2	2	2			
21 to 25	4	7	6	6			
26 to 35	23	26	15	27			
36 to 45	20	23	24	24			
46 to 55	25	26	20	15			
56 to 65	11	15	21	19			
66 +	13	2	13	8			
Mean age	44.81	42.66	47.33	43.79	2.36	.070	.111
Ethnicity							
Hispanic or Latino	7	2	4	3	5.55	.145	.097
Not Hispanic or Latino	93	98	96	97			
Race [2]							
White	86	92	88	93	5.82	.120	.098
Black	1	0	0	1	3.81	.283	.069
Asian	3	2	2	1	2.44	.487	.059
American Indian	0	1	1	0	4.98	.173	.083
Native Hawaiian	0	0	0	0	0.00	1.00	.000
Other	1	2	2	1	1.24	.744	.045
Highest Level of Education					41.72	< .001	.151
Some high school or less	5	1	0	2			
High school	9	4	2	11			
Associate's degree	9	7	14	13			
Bachelor's degree	47	39	42	32			
Masters / Ph.D.	30	50	43	43			
Household Income					14.61	.842	.097
Less than $24,999	6	6	10	9			
$25,000 – $34,999	6	8	8	6			
$35,000 – $49,999	7	6	5	9			
$50,000 – $74,999	22	20	16	18			
$75,000 – $99,999	20	15	15	19			
$100,000 – $149,999	27	21	25	22			
$150,000 – $199,999	6	11	10	9			
$200,000+	7	13	12	9			

1 Cell entries are either percentages or means. 2. Cells entries are the percentage of "yes" responses.

Respondents at all four locations were highly educated (Table 2, previous page). For example, over three-quarters (77%) of the respondents at Coyote Ridge had completed a bachelor's degree (47%) or masters / Ph.D. (30%). Comparable numbers were observed for the other three locations: Maxwell (89%), Pineridge (85%), and Reservoir Ridge (75%). Forty percent plus of respondents at each location reported an income of $100,000 or more.

Nearly all respondents were residents of Larimer County: Coyote Ridge (98%), Maxwell (99%), Pineridge (97%), and Reservoir Ridge (96%) (Table 3). Coyote Ridge respondents had lived in the county an average of 11.75 years, Maxwell visitors averaged 13.45 years, Pineridge respondents averaged 16.31 years, and Reservoir Ridge visitors averaged 15.37 years.

Table 3. Residence of visitors to City of Fort Collins natural areas

	City of Fort Collins Natural Area						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Statistic χ^2 or F value	*p*-value	Effect size *V* or η
Resident of Larimer County					2.79	.425	.067
Yes	98	99	97	96			
No	2	1	3	4			
Years lived in Larimer County					29.92	.049	.134
1 year or less	15	10	11	7			
2 – 3	17	10	8	17			
4 – 5	12	13	7	9			
6 – 10	20	17	15	11			
11 – 20	16	25	27	23			
21 – 30	12	17	18	18			
31+	10	9	16	15			
Range	0 to 55	0 to 45	0 to 55	0 to 55			
Mean	11.75	13.45	16.31	15.37	3.58	.014	.142

Over three quarters of the Maxwell (82%), Pineridge (77%), and Reservoir Ridge (80%) respondents were from Fort Collins. About half (54%) of the Coyote Ridge visitors were from Fort Collins, with another quarter (26%) residing in Loveland (Table 4).

Table 4. Top five specific primary residences of visitors to City of Fort Collins natural areas

	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %
Fort Collins	54	82	77	80
Loveland	26	1	4	3
Greeley	3	2	1	1
Denver	0	1	2	1
Wellington	1	1	1	3

In the past 12 months, respondents visited Coyote Ridge an average of 12.79 times; visitors to the other areas had visited, on average, more frequently: Maxwell (*M* = 38.59), Pineridge (*M* = 41.00) and Reservoir Ridge (*M* = 25.00) (Table 5).

Table 5. Number of visits to City of Fort Collins natural areas in the past 12 months

	City of Fort Collins Natural Area						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Statistic χ^2 or *F* value	*p*-value	Effect Size *V* or η
Visits					73.33	< .001	.206
0 (first visit)	16	6	13	10			
1 – 2	20	7	9	14			
3 – 5	13	11	12	10			
6 – 10	23	8	9	17			
11 – 20	12	19	15	15			
21 – 50	10	30	20	25			
More than 50	6	18	22	9			
Range	0 to 100	0 to 365	0 to 300	0 to 300			
Mean	12.79	38.59	41.00	25.00	12.11	< .001	.248

The number of visits varied by residents (*M* = 30.90) and non-residents (*M* = 1.62) (Table 6).

Table 6. Number of visits to City of Fort Collins natural areas

	Resident of Larimer County				
	Non-Resident %	Resident %	Test statistic χ^2 or *t*-value	*p*-value	Effect Size *V* or η
Visits			28.38	< .001	.267
0 (first visit)	54	8			
1 – 2	23	12			
3 – 5	8	12			
6 – 10	15	15			
11 – 20	0	17			
21 – 50	0	22			
More than 50	0	14			
Range	0 to 6	0 to 365			
Mean	1.62	30.90	12.47	< .001	.094

Across all four locations, 39% were hikers, 31% were trail runners, 19% were mountain bikers, and 11% were wildlife viewers (Table 7).

Table 7. Primary activities at City of Fort Collins natural areas on day of interview

	Number	Percent
Hiking	229	39
Mountain biking	111	19
Trail running	186	31
Wildlife viewing	63	11

Mountain bikers (*M* = 42.96 visits) and trail runners (*M* = 37.02) visited more frequently than wildlife viewers (*M* = 23.05) and hikers (*M* = 16.13) (Table 8).

Table 8. Visitation to City of Fort Collins natural areas by primary activity

	Hiking %	Mountain Biker %	Trail Running %	Wildlife Viewing %
0 (first visit) [a]	20	3	5	10
1 – 2	19	6	5	28
3 – 5	14	8	10	13
6 – 10	17	14	12	16
11 – 20	12	15	21	13
21 – 50	12	34	30	7
More than 50	6	20	17	13
Mean [b]	16.13	42.96	37.02	23.05

a $\chi^2 = 115.01$, $p < .001$, Cramer's $V = 257$.

b $F = 10.71$, $p < .001$, $\eta = .235$

Hiking was popular at Coyote Ridge (64%), Pineridge (72%), and Reservoir Ridge (69%). At Maxwell, the two most popular activities were trail running (48%) and hiking (44%) (Table 9).

Table 9. All activities at City of Fort Collins natural areas on day of interview

	City of Fort Collins Natural Area						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Chi-square	*p*-value	Cramer's *V*
Hiking	64	44	72	69	27.22	< .001	.216
Mountain biking	20	32	22	13	15.90	.001	.164
Trail running	35	48	24	40	16.70	.001	.166
Wildlife viewing	20	10	21	24	12.60	.006	.139
Photography / Art	11	3	10	8	7.22	.065	.103
Family gathering	6	4	7	5	0.78	.852	.036
Picnicking	1	1	3	3	4.52	.201	.085
Horseback riding	0	0	0	1	2.78	.427	.071

1. Cell entries are percentages for "yes."

At Coyote Ridge, Pineridge and Reservoir Ridge, the primary activity was hiking (42%, 44%, 42%, respectively). At Maxwell, respondents listed their primary activities as trail running (39%), mountain biking (30%), and hiking (28%) (Table 10).

Table 10. Primary activity at City of Fort Collins natural areas on day of interview

	City of Fort Collins Natural Area			
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %
Hiking	42	28	44	42
Mountain biking	16	30	19	12
Trail running	30	39	22	33
Wildlife viewing	12	3	15	13

$\chi^2 = 38.98$, $p < .001$, Cramer's $V = .144$.

Respondent's reported primary activities varied by weekdays (Table 11) and weekends (Table 12). For example, at Coyote Ridge, only 8% listed mountain biking as their primary activity on weekdays, while 17% reported mountain biking as their primary activity on weekends. At Maxwell, 41% indicated hiking was their primary activity on weekdays, compared to 25% on weekends.

Table 11. Primary activities on weekdays

	City of Fort Collins Natural Area			
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %
Hiking	46	41	43	39
Mountain biking	8	23	23	10
Trail running	42	36	20	39
Wildlife viewing	4	0	13	13

$\chi^2 = 12.55$, $p = .184$. Cramer's $V = .179$.

Table 12. Primary activities on weekends

	City of Fort Collins Natural Area			
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %
Hiking	41	25	44	43
Mountain biking	17	31	18	12
Trail running	28	40	23	32
Wildlife viewing	13	4	15	13

$\chi^2 = 34.21$, $p < .001$. Cramer's $V = .150$.

Nearly two-thirds (62%) of the Pineridge respondents and 57% of the Reservoir Ridge visited alone (Table 13). At the other two locations (Coyote Ridge and Pineridge) visitation was approximately 50% alone versus 50% in groups. At all four locations, over 80% of the respondents visited in groups of one or two. Over 85% did not visit with children.

Table 13. Group characteristics of visitors to City of Fort Collins natural areas

	City of Fort Collins Natural Area						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Statistic χ^2 or *F* value	*p*-value	Effect size *V* or η
I visited the open space					6.95	.073	.108
Alone	49	62	50	57			
With a group	51	39	50	43			
Number of people in group					31.49	.002	.129
1	49	61	50	57			
2	36	27	33	26			
3	7	5	7	9			
4 – 5	2	3	11	5			
6+	6	3	0	3			
Range	1 to 12	1 to 6	1 to 5	1 to 14			
Mean	1.99	1.64	1.85	1.87	1.52	.208	.088
Number of adults in group					28.10	.005	.123
1	56	64	53	58			
2	39	28	35	29			
3	3	3	5	7			
4 – 5	1	1	7	5			
6+	1	3	0	2			
Range	1 to 12	1 to 6	1 to 5	1 to 14			
Mean	1.58	1.54	1.67	1.73	0.79	.499	.063
Number of children in group					19.58	.021	.109
0	86	94	87	93			
1	5	3	10	3			
2	2	3	2	2			
3+	7	1	2	2			
Range	0 to 7	0 to 3	0 to 3	0 to 5			
Mean	0.43	0.10	0.18	0.15	4.89	.002	.156

About half (48%) of the hikers were with a group. Over 40% of the trail runners were alone (Table 14).

Table 14. Primary activity by visited alone or with a group

	Visited:	
	Alone %	With Group %
Hiking	31	48
Mountain biking	22	15
Trail running	41	21
Wildlife viewing	6	16

$\chi^2 = 50.26$, $p < .001$. Cramer's $V = .289$.

Visitation at Other City of Fort Collins Natural Areas

In the past 12 months, Coyote Ridge respondents had also visited Bobcat Ridge (53%), Pineridge (40%) and Fossil Creek (37%). Maxwell respondents also visited Pineridge (69%), Coyote Ridge (64%) and Bobcat Ridge (50%). Pineridge visitors were also attracted to Coyote Ridge (57%), and Maxwell (53%). Over half of the Reservoir Ridge visitors had also visited Coyote Ridge, Maxwell, and Pineridge (Table 15).

Table 15. Visited other City of Fort Collins natural areas over the past 12 months

	City of Fort Collins Natural Area						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Chi-square	*p*-value	Cramer's *V*
Coyote Ridge	100	64	57	55	64.13	< .001	.309
Fossil Creek	37	35	34	35	0.42	.937	.027
Maxwell	31	100	53	51	73.50	< .001	.344
Pineridge	40	69	100	51	39.94	< .001	.258
Bobcat Ridge	53	50	37	39	11.36	.010	.138
McMurry	8	16	13	20	11.16	.011	.135
Gateway	10	19	18	20	8.90	.031	.118
Salyer	3	12	12	10	14.48	.002	.143
North Shields Ponds	18	21	23	35	13.51	.004	.154
Arapaho Bend	14	19	19	14	2.54	.468	.066
Ross	3	6	8	3	5.13	.162	.095

1 Cell entries are the percentages of visitors to each location that visited other locations.

Reservoir Ridge was the most frequently listed "other" natural area visited (*n* = 17), followed by Soapstone Prairie (*n* = 16), and River Bend Ponds (*n* = 8) (Table 16).

Table 16. Other natural areas respondents visited

	Number of Responses
Reservoir Ridge	17
Soapstone	16
River Bend	8
Cathy Fromme	7
Horsetooth	4
Prospect Ponds	3
Running Deer	2
Twin Silos	1
Spring Creek Trails	1
Red Fox Meadows	1
Lee Martinez	1
Eagles Nest	1
Carter, Lon Hager	1
Blue Sky, Devils Backbone	1

Respondents were asked if they visited this natural area because it is less crowded: 59% of the Reservoir Ridge visitors said yes, compared to 44% of the Pineridge visitors, 40% of Coyote Ridge visitors, and 30% of the Maxwell visitors (Table 17). Over 90% of visitors to all locations do not avoid particular City of Fort Collins natural areas (Table 18). Specific natural areas and reasons for no longer visiting that location are shown in Table 19. Maxwell was listed seven times. Reasons for not visiting included crowding and lack of parking (Table 20).

Table 17. Visit because less crowded

	City of Fort Collins Natural Area			
Do you visit this natural area because it is less crowded?	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %
Yes	40	30	44	59
Not sure	20	20	17	18
No	40	50	39	23

$\chi^2 = 30.40$, $p < .001$, Cramer's $V = .159$.

Table 18. City of Fort Collins natural areas respondents no longer visit

	City of Fort Collins Natural Area			
Do you avoid particular City of Fort Collins natural areas?	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %
No	98	96	93	94
Yes	2	4	7	6

$\chi^2 = 5.67$, $p = .129$. Cramer's $V = .094$.

Table 19. Specific natural areas respondents no longer visit

Natural area	Reason for no longer visiting
Cathy Fromme	Lots of snakes
Cathy Fromme	Because of vandalism signs
Coyote Ridge	Crowded
Coyote Ridge	Lack of facilities makes it hard
Coyote Ridge	Not enough parking
Gateway	Went with son when he was a baby - now we hike more
Gustav Swanson	Homeless people everywhere and dirty
Horsetooth	Crowded
Horsetooth	Not enough parking
Horsetooth	Too busy
Horsetooth	Crowded
Maxwell	Too many bikers
Maxwell	No alternative routes, trail rage!!Need hiking trail and biking trail
Maxwell	Crowded and lots of bikes who dont share the trail well
Maxwell	Need a separate hike vs. bike trail. Too much trail rage
Maxwell	Weekend, afternoons
Maxwell	Crowded, lots of rude people not a lot of space
Maxwell	Lack of parking

Visitor Satisfaction

Between 73% and 97% of visitors to the four locations rated all facilities (e.g., restrooms, parking lots, trails) as “good” or “very good” (Table 20). In an open-ended question asking individuals to explain their perceived quality ratings, 86 said “the trails are in great shape and well maintained.” Another 44 people commented that the facilities were well-maintained. Thirty-two respondents thought that the natural areas had great scenery (Table 21).

Table 20. Perceived quality of facilities at City of Fort Collins natural areas

	City of Fort Collins Natural Area						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Chi-square	*p*-value	Cramer’s *V*
Restrooms	77	80	81	84	0.93	.818	.057
Parking areas	93	88	93	94	3.27	.352	.085
Picnic areas	77	94	88	86	4.05	.256	.170
Trash receptacles	73	89	83	91	8.79	.032	.195
Kiosk information	95	96	87	94	5.58	.134	.133
Trails	95	91	97	95	3.75	.289	.084

1. Cell entries are percentages for “good” and “very good” responses

Table 21. Respondents' reasons for facility ratings

Category	Response	Number of Responses
Trails	Trails are in great shape and well maintained	86
Facilities	Facilities are clean and well maintained	44
Great place	This is a beautiful area with great scenery	32
Parking	Need more parking	30
Trails	Trails show high use/erosion and need maintenance	29
Restrooms	Restroom are usually clean	17
Restrooms	Restrooms are usually dirty and never have hand sanitizer	16
Trash	Need more trash receptacles	16

Nearly all respondents rated the perceived quality of their experience as "excellent:" Coyote Ridge (100%), Maxwell (98%), Pineridge (98%), and Reservoir (99%) (Table 22). Respondents' reasons for their overall evaluations included natural beauty (n = 88), well managed trails (n = 59), accessible (n = 43) and well maintained (n = 37) (Table 23).

Table 22. Overall perceived quality of City of Fort Collins natural areas

	City of Fort Collins Natural Area			
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %
1 Poor	0	0	0	0
2	0	0	0	0
3 Neutral	1	2	3	1
4	31	27	39	32
5 Excellent	69	71	59	67

$\chi^2 = 6.94$, $p = .327$, $V = .076$.

Table 23. Respondents' reasons for overall perceived quality ratings

		Number of Responses
Overall	Natural beauty	88
Trails	Well managed trails	59
Access	Accessible	43
Overall	Well managed and maintained	37
Overall	Cleanliness of area	23
Overall	This is my favorite place	10
Wildlife	Varied habitat	9
Use	Great biking trails	7
Trash	No trash	4
Signage	Good signage	3
Use	Sometimes too busy	3
Use	Too crowded with rude mountain bikers	3
Use	Great for hiking	3
Use	Not very crowded	3
Parking	Great parking	2
Trails	Trails are a little rutted out and muddy	2
Use	Need more trails for mountain biking	2
Wildlife	Lots of wildlife	2
Dogs	Dog waste on trails	1
Dogs	Excellent places to walk with my dog	1
Parking	Parking can sometimes be difficult	1
Restroom	No bathroom	1
Restrooms	Bathroom is well kept, and trash is always picked up	1
Signage	Mile markings would be great	1
Trails	Some graffiti over by reservoir by the cave and along the trail	1
Use	Sometimes too packed with users on the narrower trails.	1
Use	Some crowding with bikes	1
Use	The trails get "wider" every year from use	1
Use	Mountain biking trails need a lot of work	1

Perceived Conflict

Eighty percent or more of all respondents "never" *observed* hikers, mountain bikers or equestrian riders behaving unsafely or discourteously (Table 24). For many of the variables in Table 24, these percentages are over 90%. Most respondents at all four locations "never" *perceived a problem* with hikers, mountain bikers or equestrian riders behaving unsafely or discourteously (Table 25).

Table 24. Unsafe and discourteous behaviors witnessed at City of Fort Collins natural areas [1]

	City of Fort Collins Natural Area Percent who "**never**" observed the behavior						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Chi-square	*p*-value	Phi
Saw hikers behaving unsafely	94	91	93	94	1.19	.756	.046
Saw mountain bikers behaving unsafely	80	83	81	86	3.74	.291	.079
Saw equestrian riders behaving unsafely	100	99	97	98	7.58	.056	.098
Witnessed hikers being discourteous	91	92	94	94	1.41	.704	.049
Witnessed mountain bikers being discourteous	82	84	85	84	0.72	.870	.035
Witnessed equestrian riders being discourteous	100	97	98	97	7.90	.048	.090

1. Percent of respondents who "**never**" observed the behavior

Table 25. Perceived problems with other visitors at City of Fort Collins natural areas [1]

	City of Fort Collins Natural Area Percent who "**never**" experienced the problem behavior						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Chi-square	*p*-value	Phi
Hikers hiking unsafely	76	70	80	77	3.67	.299	.080
Mountain bikers riding unsafely	60	46	56	60	7.66	.053	.115
Equestrian riders riding unsafely	85	83	85	82	0.87	.833	.039
Hikers being discourteous	75	60	77	72	11.64	.009	.144
Mountain bikers being discourteous	61	52	64	63	5.06	.168	.094
Equestrian riders being discourteous	83	82	83	79	1.02	.796	.042

1. Percent of respondents who "**never**" experienced the problem behavior

Few respondents listed any specific problems with *safety concerns*. For example, four individuals indicated that dogs off leash was a problem (Table 26). Written complaints about mountain bikers included riding too fast (n = 22), not giving a warning when passing (n = 13), and not yielding the right of way (n = 10) (Table 27). Horse waste on the trail was noted by three individuals as a problem (Table 28).

Table 26. Respondent explanations for unsafe hiking

	Number of Responses
Dogs off leash	4
Headphones	2
Messing with rattlesnakes	2
Off trail	2
Ear buds are a huge problem	1
Not paying attention to surroundings	1
Dog waste dropped	1
Poor trail etiquette	1
Really fast, no passing warning	1
Spreading out, not yielding to uphill traffic	1
Trail etiquette	1

Table 27. Respondent explanations for unsafe mountain biking

	Number of Responses
Riding too fast	22
No warning	13
Not yielding	10
Riding too fast – Not yielding	5
Trail etiquette	3
No helmets	2
Riding too fast – No passing warning	2
Riding too close to horse	1

Table 28. Respondent explanations for unsafe horseback riding

	Number of Responses
Horse waste on trail	3
Riding out of control	1
Carrying firearms	1

Written complaints regarding *discourteous behaviors* are listed in Tables 29 through 31. Six individuals thought hikers were rude and five people complained about hikers going off trail. Twenty three people were bothered by mountain bikers not yielding, 14 thought bikers ride too fast, and 11 indicated that bikers pass without warning was a problem. Five respondents listed horse waste on the trail was discourteous.

Table 29. Respondent explanations for discourteous hiking

	Number of Responses
Being rude	6
Hiking off trail	5
Playing loud music	4
Not yielding	3
Dogs off leash	2
Leaving dog waste bags	2
Not picking up dog waste	2
Walking multiple people across	2
Yelling at mountain bikers	2
Littering	1
Spray painting rocks	1

Table 30. Respondent explanations for discourteous mountain biking

	Number of Responses
Not yielding	23
Riding too fast	14
Passing without warning	11
Being rude	2

Table 31. Respondent explanations for discourteous horseback riding

	Number of Responses
Leaving horse waste on trail	5
Riding off trail	1
Not yielding	1

Combining the observed behaviors in Table 24 with the corresponding perceived problem behaviors in Table 25 resulted in the distributions shown in Table 32. Across all four locations, over two thirds of respondents reported no conflict regarding safety issues with hikers or equestrian riders. Between 17% and 23% expressed social values conflict and less than 10% noted interpersonal safety conflicts with hikers and horseback riders.

Interpersonal conflicts with safety were more evident with mountain bikers (Table 32). Between 13% (Pineridge) and 20% (Coyote Ridge) noted this type of conflict. Social values conflict regarding safety ranged from 23% (Coyote Ridge) to 41% (Maxwell).

Across all locations, 57% of respondents reported no conflict associated with discourteous behaviors by hikers or equestrian riders (Table 32). For these two activities interpersonal conflict ranged from 1% to 8%. Interpersonal conflict stemming from discourteous behavior by mountain bikers ranged from 12% (Pineridge) to 19% (Coyote Ridge).

Table 32. Perceived conflict at City of Fort Collins natural areas

	City of Fort Collins Natural Area						
	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Chi-square	*p*-value	*V*
Hikers hiking unsafely					7.35	.289	.094
No conflict	73	68	81	74			
Interpersonal conflict	4	9	2	7			
Social values conflict	23	23	17	19			
Mtn. bikers riding unsafely					11.44	.076	.118
No conflict	57	42	57	54			
Interpersonal conflict	20	17	13	14			
Social values conflict	23	41	30	32			
Equestrian riders riding unsafely					4.04	.671	.064
No conflict	83	80	86	80			
Interpersonal conflict	0	1	0	1			
Social values conflict	17	19	14	19			
Hikers being discourteous					10.39	.109	.112
No conflict	71	58	77	67			
Interpersonal conflict	7	8	3	8			
Social values conflict	22	34	19	25			
Mtn. bikers being discourteous					6.97	.324	.094
No conflict	57	48	63	57			
Interpersonal conflict	19	17	12	18			
Social values conflict	24	25	25	25			
Equestrians being discourteous					8.07	.233	.089
No conflict	80	78	84	75			
Interpersonal conflict	0	3	1	3			
Social values conflict	20	19	15	22			

Encounters with others and Perceived Crowding

The average number of reported encounters with hikers at the trailhead ranged from 3.05 (Pineridge) to 7.62 (Coyote Ridge) (Table 33). The average number of encounters with mountain bikers at the trailhead was lower and ranged from 0.48 (Reservoir Ridge) to 3.05 (Coyote Ridge). Average encounters with equestrian riders at the trailhead was consistently less than one.

On the trail, encounters with hikers ranged from a mean of 7.80 at Reservoir Ridge to 13.79 at Coyote Ridge (Table 33). Encounters with mountain bikers on the trail averaged 2.26 at Reservoir Ridge to slightly over six at Coyote Ridge and Maxwell. Encounters with horseback riders on the trail again averaged less than one.

Table 33. Reported number of other visitors seen at City of Fort Collins natural areas

	City of Fort Collins Natural Area [1]						
	Coyote Ridge	Maxwell	Pineridge	Reservoir Ridge	*F*-test	*p*-value	Eta
Number seen at the trailhead							
Hikers	7.62	4.63	3.05	3.29	14.93	< .001	.276
Mountain bikers	3.05	2.47	1.65	.48	10.85	< .001	.243
Horseback riders	0.09	0.05	0.03	0.05	0.74	.526	.065
Number seen on the trail							
Hikers	13.79	11.01	11.00	7.80	10.13	< .001	.230
Mountain bikers	6.39	6.07	5.45	2.26	18.45	< .001	.306
Horseback riders	0.15	0.09	0.14	0.15	0.27	.843	.040

1. Cell entries are means

Given the findings in Table 33, it is not surprising perceptions of crowding were relatively low (Table 34). Less than 25% of respondents at Coyote Ridge, Pineridge, or Reservoir Ridge reported any level crowding (i.e., scale points 3 thru 9 in Figure 2) by hikers at the trailhead or on the trail. Perceptions of crowding from hikers were slightly higher at Maxwell: 28% at trailhead and 40% on the trail. A similar pattern of crowding from mountain bikers occurred at the four locations (Table 34). Less than 25% felt any level of crowding at the trailhead or on the trail at Coyote Ridge, Pineridge or Reservoir Ridge. At Maxwell, 19% felt crowded by mountain bikers at the trailhead and 41% felt crowded on the trail. Across all four locations, 5% or less felt crowded by horseback riders at either the trailhead or on the trail.

Table 34. Perceived crowding at City of Fort Collins natural areas

	City of Fort Collins Natural Area						
Did you feel crowded by:	Coyote Ridge %	Maxwell %	Pineridge %	Reservoir Ridge %	Chi-square	*p*-value	*V*
Hikers							
At the trailhead	14	28	9	12	20.88	< .001	.199
On the trail	23	40	19	22	18.13	< .001	.183
Mountain bikers							
At the trailhead	11	19	10	7	9.56	.023	.134
On the trail	24	41	27	18	19.30	< .001	.188
Horseback riders							
At the trailhead	2	5	2	1	4.57	.206	.090
On the trail	1	3	2	2	1.28	.735	.048

1. % crowded includes scale points 3 thru 9 in Figure 2

Findings from the four City of Fort Collins natural areas were clearly in suppressed crowding category (Table 35). The only exceptions were the first four entries in Table 35

Table 35. Ranking of perceived crowding at City of Fort Collins natural areas

	Evaluation context		
Study site	Evaluation by:	Evaluation for:	Crowding Scale 3-9 %
Maxwell	Mountain bikers	Hikers on trail	58
Maxwell	Mountain bikers	Mountain bikers on trail	49
Reservoir Ridge	Mountain bikers	Hikers on trail	41
Maxwell	Mountain bikers	Hikers at trailhead	37
Coyote Ridge	Mountain bikers	Hikers on trail	33
Maxwell	Hikers	Mountain bikers on trail	30
Pineridge	Mountain bikers	Mountain bikers on trail	30
Coyote Ridge	Mountain bikers	Mountain bikers on trail	26
Maxwell	Hikers	Hikers on trail	25
Pineridge	Hikers	Mountain bikers on trail	25
Pineridge	Mountain bikers	Hikers on trail	25
Maxwell	Mountain bikers	Mountain bikers at trailhead	23
Pineridge	Mountain bikers	Mountain bikers at trailhead	23
Coyote Ridge	Mountain bikers	Hikers at trailhead	21
Coyote Ridge	Hikers	Mountain bikers on trail	20
Reservoir Ridge	Hikers	Mountain bikers on trail	19
Maxwell	Hikers	Hikers at trailhead	18
Reservoir Ridge	Hikers	Hikers on trail	18
Coyote Ridge	Hikers	Hikers on trail	16
Pineridge	Hikers	Hikers on trail	14
Coyote Ridge	Mountain bikers	Mountain bikers at trailhead	14
Pineridge	Mountain bikers	Hikers at trailhead	14
Reservoir Ridge	Mountain bikers	Hikers at trailhead	13
Reservoir Ridge	Mountain bikers	Mountain bikers on trail	12
Reservoir Ridge	Hikers	Hikers at trailhead	11
Maxwell	Hikers	Mountain bikers at trailhead	10
Coyote Ridge	Hikers	Hikers at trailhead	9
Reservoir Ridge	Hikers	Mountain bikers at trailhead	9
Coyote Ridge	Hikers	Mountain bikers at trailhead	7
Pineridge	Hikers	Mountain bikers at trailhead	4
Soapstone	Soapstone visitors	Hikers at trailhead	3
Soapstone	Soapstone visitors	Mountain bikers at trailhead	2
Soapstone	Soapstone visitors	Mountain bikers on trail	2
Pineridge	Hikers	Hikers at trailhead	2
Soapstone	Soapstone visitors	Hikers on trail	1
Soapstone	Soapstone visitors	Horseback riders at trailhead	1
Soapstone	Soapstone visitors	Horseback riders on trail	1
Reservoir Ridge	Mountain bikers	Mountain bikers at trailhead	0

Conclusions

This report summarized the findings from a 2017-2018 survey of visitors to four City of Fort Collins natural areas: Coyote Ridge, Maxwell, Pineridge, and Reservoir Ridge. Visitors were described in terms of their (1) demographic characteristics (e.g., sex, age, place of residence), (2) prior visitation rates and trip characteristics (e.g., trip duration, activity participation), (3) visitation to other natural areas, (4) visitor satisfaction, (5) perceived conflicts with other visitors, and (6) perceived crowding. The intent was to provide managers with baseline information against which future research results can be compared and to inform management decisions.

To facilitate understanding the data, the results were couched in terms of indicators and standards for visitor satisfaction, perceived conflict, and perceived crowding. An indicator is a specific variable that reflects the current situation. A standard of quality is the minimum acceptable condition for each indicator. Standards identify desirable conditions (e.g., no litter), and conditions that managers are trying to achieve. For example, at least X% of visitors should be satisfied with their experience at the natural area, or no more than Y% of recreationist should feel crowded. Selecting values for X and Y has always proven challenging for natural resource managers and researchers. This section (1) summarizes how the indicators and standards for the City of Fort Collins were selected and what the results revealed. (2) presents more general criteria for choosing indicators and standards, and (3) discusses sources for selecting indicator and developing standards.

City of Fort Collins Natural Areas Indicators and Standards

This report was based on indicators and standards for visitor satisfaction, perceived conflict and perceived crowding. The three concepts were selected because they have received the most attention in the natural resource literature and previous research has suggested standards for their application. Meta-analyses of the satisfaction research (e.g., Vaske et al., 1982; Vaske & Roemer, 2013), for example, has consistently found that non-consumptive recreationists (e.g., hiker, mountain bikers) report higher levels of satisfaction than consumptive recreationists (e.g., hunters, anglers). This study focused on non-consumptive visitors. Based on the literature, the standard was set at 80% or more of the visitors should be satisfied with their experiences at City of Fort Collins natural areas. Results for the quality of specific facilities indicated that this standard was met or exceeded for all four natural areas across all six facilities with only three exceptions. All three exceptions were at Coyote Ridge: restrooms (77%), picnic areas (77%), and trash receptacles (73%). The standard was also achieved across all four areas for the overall perceived quality of the experience. Nearly all respondents rated the perceived quality of their experience as “excellent:” Coyote Ridge (100%), Maxwell (98%), Pineridge (98%), and Reservoir (99%).

For perceived conflict, the literature suggested that the magnitude of conflict depends on the characteristics of: (1) the activity (e.g., consumptive vs. non-consumptive, traditional vs. non-traditional), (2) the visitors (e.g., tolerances for other user groups, perceived similarities between the groups), (3) the environment (e.g., unpaved vs. paved trails that allow for faster speeds), and (4) management (e.g., zoning to separate potentially incompatible activities). Given the activities and conditions at the four natural areas, the standard was set at no more than 25% of the respondents should experience interpersonal conflict. This standard was met or exceeded across all areas, activities (hiking, mountain biking, horseback riding) and behaviors (i.e., acting unsafely or discourteous).

The perceived crowding literature (Shelby et al., 1989; Vaske & Shelby, 2008) has suggested a standard of $\leq$ 35% of visitors should feel any level of crowding (i.e., scale points 3 thru 9 on the crowding scale, Figure 2). This report examined this standard for 38 City of Fort Collins evaluation contexts. An example evaluation context might refer to mountain bikers’ evaluations of hikers on the trail at Coyote Ridge, or hikers’ evaluations of mountain bikers at the trailhead at Pineridge. The $\leq$ 35% perceived crowding standard was met or exceed 34 of the 38 contexts. The four exceptions were:

	Evaluation context		
Study site	Evaluation by:	Evaluation for:	Crowding %
Maxwell	Mountain bikers	Hikers on trail	58
Maxwell	Mountain bikers	Mountain bikers on trail	49
Reservoir Ridge	Mountain bikers	Hikers on trail	41
Maxwell	Mountain bikers	Hikers at trailhead	37

Overall, the findings here suggest the standards of quality for visitor satisfaction, perceived conflict, perceived crowding were met or exceeded at the four City of Fort Collins natural areas, with only a few minor exceptions. Should the City wish to expand the research to include other indicators, the following gives some general criteria for choosing indicators and standards.

Criteria for Choosing Indicators

Before standards can be developed, appropriate impact indicators must be selected. As used in other sciences (e.g., medicine, agriculture, forestry), indicators are variables that reflect the "health" of something (Ott, 1978). Indicators identify what conditions will be monitored (e.g., a person's blood pressure), while the standards define when those conditions are acceptable or unacceptable. For example, the American Heart Association defines high blood pressure (an indicator) as greater than or equal to 140 mm HG systolic pressure (a standard) or greater than or equal to 90 mm Hg diastolic pressure (a standard).

Although any number of variables could be monitored, it is important to identify those indicators that are most linked to issues of concern (Graefe et al., 1990). Thus, while a physician could monitor a stroke victim's kidney functions, it is more efficient to focus on the individual's blood pressure. The same logic applies to selecting indicators for natural area recreation opportunities. A manager could count the number of vehicles at trailhead parking lots, but past research suggests that monitoring how individuals distribute themselves in time and space throughout a natural area, or how they interact with other visitors, are better indicators of recreation-opportunity differences (Kuss et al., 1990; Shelby & Heberlein, 1986).

It is also important to recognize that there is no single "best" indicator or set of indicators. The choice of indicators and standards depends on the particular impact under consideration and the specific characteristics of the site. In other words, indicators and standards should be specific to the resource and opportunities provided at the site. The key is to select those impact indicators that matter the most for a given experience. Although indicators and standards are site specific, it is possible to identify criteria for choosing indicators.

Criteria for Choosing Indicators

- Specificity and responsiveness
- Sensitivity
- Measurability
- Integration with management objectives
- Impact importance

Specificity and Responsiveness. Indicators are only useful if they refer to specific conditions created by human use. For example, an overall measure of human density in an area is too vague unless it is linked to the impact conditions associated with that level of use (e.g., encounters with others, loss of solitude-oriented wildlife-viewing opportunities). Specific indicators might focus on the cleanliness of restrooms or trash receptacles.

Indicators should reflect impact changes related to impacts caused by human activity rather than those caused by natural events. Unfortunately, disentangling human from natural impacts is complex. Wall and Wright (1977) suggest four factors that limit ecological studies and introduce difficulties in identifying

human impacts: (1) there are often no baseline data for comparison to natural conditions; (2) it is difficult to disentangle the roles of humans and nature; (3) there are spatial and temporal discontinuities between cause and effect; and (4) in light of complex ecosystem interactions, it is difficult to isolate individual components. Some impacts take the form of naturally occurring processes that have been speeded up by human interference. Even without human activity, however, severe impacts can occur due to natural causes that render the impacts associated with recreational use insignificant.

Sensitivity. The indicator needs to be sensitive to changes in conditions during relatively short time periods; Merigliano (1989) suggests within one year. Such changes may be reflected in biological conditions (e.g., the amount of erosion on a given trail) or the human experience (e.g., the frequency of encounters with others). If the indicator only changes after impacts are substantial or never changes, the variable lacks the early warning signs that allow managers to be proactive.

General measures of overall visitor satisfaction, for example, is often a major management objective and has been one of the most commonly used indicators of recreation quality. If, as traditionally assumed, enjoyment from a recreation experience is inversely correlated with the number of people present, reported overall satisfaction ratings should provide the basis for setting standards. Studies in a variety of settings, however, have consistently found that recreationists are generally satisfied with their experience independent of the use intensities they experienced (Kuss et al., 1990).

A variety of explanations have been offered to account for these findings. For example, to cope with the negative consequences of increasing numbers of visitors (e.g., loss of solitude), some individuals modify their standards for what is acceptable. The end result is a “product shift” or change in the character of the experience at a given area. Other people who are more sensitive to user densities may stop visiting an area all together if adjustments, either attitudinal (product shift) or behavioral (e.g., visiting during off peak times, visiting less frequently), fail to bring about the desired experience. With all of these explanations, the current visitors to a heavily used area may be as satisfied as visitors 5 or 10 years ago when use levels were much lower, but are receiving a different type of experience.

While overall satisfaction measures are not always sensitive to changing use conditions, other measures of recreation quality do show the requisite variation. Perceived crowding, for example, combines the descriptive information (the density or encounter level experienced by the individual) with evaluative information (the individual’s negative evaluation of that density or encounter level). When people evaluate an area as crowded, they have at least implicitly compared the impact they experienced with their perception of a standard. Findings from the comparative analysis of 181 crowding studies and 615 different settings and activities indicated that crowding varied across recreational settings and activities, time or season of use, resource availability, accessibility, or convenience, and management strategies designed to limit visitor numbers (Vaske & Shelby, 2008). This variability has allowed recreation researchers and managers to use crowding as a useful indicator.

Measurability. Indicators should be easily and reliably measurable in the field. When choosing impact indicators, it is important to specify the level of detail at which selected indicators will be measured and evaluated. The scale of measurement may range from sophisticated indices using quantitative measurements to subjective visual rating schemes. The choice of an appropriate level of measurement depends on such factors as the availability of funding and personnel, number of sites that must be evaluated, and frequency of measurement and site evaluation.

To illustrate, early crowding studies employed multiple-item scales (Shelby et al. 1989). While such scales consider a concept from different points of view and provide the data necessary for estimating reliability coefficients, the mathematical calculations involved in combining survey items into a single scale score sometimes make it difficult to compare results and can render the findings less understandable to managers (Vaske & Shelby, 2008). To overcome these problems, the single item crowding indicator discussed here that asks people to indicate how crowded the area was at the time of their visit overcomes these problems.

The crowding measure alone is not a perfect substitute for information about use levels, impacts, and evaluative standards that a more complete study can provide. Nevertheless, one can easily collect data

with a single crowding item, thereby providing considerable insight about a study site. The single-item crowding measure is easy to interpret and compare across studies, and has been widely used in outdoor-recreation research (Shelby et al. 1989; Vaske & Shelby, 2008). The consistency of these findings makes the crowding measure a good indicator for addressing social impacts.

Integration with Management Objectives. Indicators need to be linked to the management objectives that specify the type of experience to be provided. For example, if a management objective is to provide a low-density backcountry experience, the indicators should focus on the number of encounters between visitors, perceptions of crowding, and encounter norm tolerances. Alternatively, if a management objective involves frontcountry opportunities, the indicators might be linked to visitor safety and the cleanliness of facilities.

Useful impact indicators are those that can be treated by management prescriptions. A seemingly eloquent solution to a human-caused impact that cannot be addressed by management actions does not resolve the problem condition. The most useful indicators reflect multiple impact conditions. Because managers typically have small monitoring budgets, indicators that can be used to represent several different impacts allow managers to focus their attention and efforts while being reasonably assured that the overall quality of a given experience is maintained. Crowding or norm tolerances are examples that often reflect several other interaction-type indicators such as encounters with others.

The concept of norms provides a theoretical framework for collecting and organizing information about users' evaluations of conditions and has proven to be sensitive to changing use conditions. As defined by one research tradition, norms are standards that people use to evaluate behavior or the conditions created by behavior as acceptable or unacceptable (see Vaske & Whittaker, 2004 for a review). Norms define what behavior or conditions should be, and can apply to individuals, collective behavior, or management actions designed to constrain collective behavior. This normative approach allows researchers to define social norms, describe a range of acceptable behavior or conditions, explore agreement about the norm, and characterize the type of norm (e.g., no tolerance, single tolerance, or multiple tolerance norms; Whittaker & Shelby, 1988).

Normative concepts in natural-resource settings were initially applied to encounter impacts in backcountry settings (encounter norms measure tolerances for the number of contacts with other users). The focus on encounters in backcountry worked because encounter levels were generally low, survey respondents could count and remember them, and encounters have important effects on the quality of experiences when solitude is a feature. Most studies showed that encounter norms across these backcountry settings were stable and strongly agreed upon, usually averaging about four encounters per day (Vaske. Shelby, Graefe, & Heberlein, 1986).

More recently, norm concepts and methods have been applied to a greater diversity of impacts and settings. Research on encounter norms in higher-density frontcountry settings, for example, has demonstrated more variation in visitors' tolerances for others as well as lower levels of agreement (Donnelly et al., 2000). This led some researchers to examine norms for interaction impacts other than encounters (Vaske & Whittaker, 2004). Norms for recreationist proximity, percentage of time within sight of others, incidents of discourteous behavior, competition for specific resources, and waiting times at access areas have all been examined. These alternative interaction impacts are often more salient than encounters in higher-use settings. Taken together, this work suggests that normative data are sensitive to changing use conditions, can facilitate understanding visitors' evaluations of social and environmental conditions, and have proven helpful to managers.

Normative standards may also provide a gauge for estimating benefits to society. If, for example, a management objective is to enhance the flow of dollars into a community's economy by creating more recreation opportunities, one indicator might be the occupancy rate at local motels. The standard in this situation might be 50% occupancy.

Impact Importance. Finally, and most importantly, indicators should represent important impacts. For example, if managers, stakeholders and visitors are not concerned about a social impact or researchers are not able to show how an impact negatively influences environment, developing standards is difficult to justify. If wildlife viewers are more interested in photographing elk than the number of people standing next to them, frequency of seeing elk becomes a better indicator of quality experiences than social-interaction variables. Alternatively, if visitors consider solitude in viewing experiences as more important than number of animals seen, encounters with other visitors becomes an important quality indicator.

Characteristics of Good Standards

Specific standards are established for each impact indicator and define an acceptable level of impact for each indicator. Just as impact indicators reflect management goals and objectives, standards are quantifiable value judgments concerning what the agency is attempting to achieve. Based on previous work (Graefe et al., 1990), the following discusses several important characteristics of good standards.

- Quantifiable
- Time Bounded
- Attainable
- Output Oriented

Quantifiable. Standards restate management objectives in quantitative terms. A good standard unequivocally states the level of acceptable impact. Such statements define how much is acceptable in quantitative terms. For example, a good standard might specify that visitors should be able to watch wildlife with fewer than 10 other people present. Specifying that there should only be "a few other people present" is not a good standard because it does not define how many constitutes "a few."

Time Bounded. "Time-boundedness" complements the quantifiable component of a good standard. Quantifiable standards only state "how much" is appropriate. Time-bounded standards specify "how much, how often" or "how much by when." This is especially important for impacts that have a seasonal component. Seeing 500 elk in Rocky Mountain National Park (ROMO) is a common occurrence for a fall evening, but a rare event during the summer when the elk are at higher elevations. Such seasonal differences in viewable wildlife often correlate with fluctuations in visitor numbers. The number of day visitors to ROMO who are explicitly interested in viewing and photographing elk, for example, is substantially greater in the fall than other seasons. Time-bounded standards recognize such variation.

Attainable. Management standards need to be reasonably attainable. When standards are too easy, little is accomplished. If they are too difficult to achieve, both managers and visitors are likely to become frustrated. Good objectives and standards should "moderately challenge" the manager and staff.

For each important indicator, standards should be set at levels that reflect management's intent for resource or experiential outcomes in the area. While standards that are difficult to attain are generally undesirable, they may still be necessary. A "no litter" standard, for example, may not be attainable, but is still correct. The cynical excuse for not setting appropriate standards is that managing for some conditions is "too hard." On the other hand, management strategies designed to meet a standard may produce sufficient positive change to warrant the effort. Without standards, it is too easy to do nothing (management by default).

Output Oriented. Standards should be "output" rather than "input" oriented. This distinction suggests that managers should focus on the conditions to be achieved rather than the way the standard is met. For example, a standard that specifies "150 people per day in a wildlife-viewing area" is not a good standard because it refers to an action (use limits) rather than an acceptable impact. "Less than 10 encounters per day" or "no more that 35% of the visitors feeling some level of crowding" are better standards because they emphasize the acceptability of different impact conditions.

Sources for Selecting Indicators/Developing Standards

Identifying characteristics of good standards is a useful exercise, but it does not provide much information about what standards should be (see inset – Different Experiences—Different Indicators and Standards), or where they should come from. Many different management and research efforts have developed or recommended various standards, utilizing a variety of techniques or sources of information. A review of the most common sources and techniques follows.

- Laws and policy mandates
- Manager's professional judgment
- Biological research
- Public involvement
- Visitor or population surveys

Laws and Policy Mandates. Laws and policy mandates may provide guidelines for selecting specific impact indicators and developing appropriate standards for desirable wildlife-viewing experiences. Most laws, however, are written in broad and often vague language. Directives such as "provide high-quality viewing experiences" or "minimize conflict" lack the specificity necessary to set quantitative standards.

Manager's Professional Judgment. Managers often develop standards based on their interpretation of laws and policy mandates, their knowledge of the area, their understanding of the recreation opportunities, and their knowledge of conditions that define those opportunities. By imposing their idea of what is appropriate, or even their own personal values, in the decision-making process, managers have implicitly been setting standards for years. An argument can be made, however, for setting standards more explicitly. First, although management standards have traditionally been based solely on professional judgment and biological expertise, the increasingly political nature of all natural-resource actions implies that decisions made in isolation are likely to generate considerable public scrutiny. Second, although it has been assumed that managers understand the acceptability of different resource and experiential conditions, empirical evidence suggests considerable differences between the views of managers, visitors, and organized interest groups (Magill, 1988; Gill, 1996). By formalizing the process for developing standards and including different points of view, managers gain a greater understanding of their objectives, have more justification for their actions, and are able to be more proactive when potential problem situations arise.

Biological Research. Science-based research has been and always will be an important component in developing standards. Data help clarify what management goals are biologically possible and describe how management actions affect wildlife impacts. Biological research by itself, however, cannot predict which alternatives are more or less desirable. For example, scientists are often assumed to be the most appropriate individuals to set standards for acceptable air- and water-pollution levels. When viewed from the larger societal perspective, however, this assumption is invalid. The scientific data describe the consequences of allowing a certain number of pollutants per volume of air or water (e.g., X number of people will die at contamination level Y). Whether this risk level is considered acceptable depends on legislation or other government functions. Even at extremely low levels of water pollution, some people are likely to become ill. It is impossible to set a standard until the acceptability of various risk levels has been identified.

Public Involvement. Traditional public involvement (e.g., focus groups, public meetings) represent another important strategy for developing standards, especially for social-impact indicators and standards. Recreationists are experts in identifying the characteristics of an experience they find most important. When given the opportunity to communicate their preferences, individuals are typically willing to express their views. Small focus-group meetings with different interest groups, for example, provide a useful starting point for identifying which impacts matter more. Standards can be developed from input provided by participants at larger public meetings, but it is often difficult to focus discussion on specific issues at these meetings. Moreover, individuals who attend public hearings and voice the loudest concerns may not represent all constituents.

Although these traditional techniques for soliciting citizen participation provide useful information, managers are increasingly adopting a stakeholder approach to involving public interests. Approaches such

as transactive planning and co-management bring diverse interests and stakeholders in direct communication with one another and with agency decision makers to fashion collaborative solutions to management challenges. For example, agencies now routinely form citizen task forces, roundtables, advisory councils, and stakeholder planning teams to assist agency personnel with planning tasks and decisions. When multiple stakeholders have a voice in developing standards, polarized views about acceptable conditions and experiences are likely to emerge. Under these conditions, some negotiation and compromise must occur to develop standards that will be supported by the different publics and interest groups.

Visitor or Population Surveys. As this report has tried to demonstrate, perhaps the most useful source for developing standards involves visitor or population surveys. Even the best public-involvement efforts tend to neglect the "general public" in favor of special-interest groups who voice strong opinions on a topic. When surveys adhere to scientific principles (e.g., reliability, validity, representativeness, generalizability), the approach is especially useful for developing standards for social indicators (Vaske, 2008).

First, the survey should include a range of impact conditions and gauge which of those impacts are more important. Managers may ultimately establish standards for only a few key impact indicators. However, because surveys are usually conducted before this decision is made, asking about several different types of impact (e.g., human-interaction impacts) allows some flexibility in choosing different indicators. If respondents are asked to consider the relative importance of different impacts, the survey can facilitate the indicator selection process.

Second, questions about users' personal standards should be direct, involve quantitative response categories, and be easy to understand. As noted previously, extensive research has failed to demonstrate a consistent relationship between impact variables (e.g., encounters with others) and general evaluative measures (e.g., satisfaction). Most researchers recommend focusing on the evaluation of impacts themselves (Shelby & Heberlein, 1986). For example, surveys might ask respondents to report the number of encounters they are willing to have per day or to rate acceptable encounter levels for different experiences. An effective technique used in several studies involves parallel questions about the amount of impact individuals experienced and the amount of impact they are willing to tolerate. Statistical comparisons of such results provide data about where to set standards and allow definition of an impact problem.

Third, when asking about quantitative estimates of acceptable impact levels, respondents should be allowed to specify that "this impact does not matter to me" or that "the impact matters but I cannot give a number" (Hall, Shelby, & Rolloff, 1996; Roggenbuck, Williams, Bange, & Dean, 1991). Some wildlife viewers, especially those with little experience, may not have opinions about acceptable impact levels or may not even be aware of the impact situation (Donnelly et al., 2000).

Finally, analysis of survey data should go beyond simple frequencies or measures of central tendency. Such measures are useful starting points, but closer examination of the response distributions reported by different groups or the level of group agreement are also important for developing standards.

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Appendix A. Ranking of perceived crowding for Colorado resources and evaluation contexts

		Evaluation context		
Study site	Date	Evaluation by:	Evaluation for:	Crowding Scale 3-9 %
Mesa Verde National Park	2001	Visitors at Cliff Palace	Other visitors	76
Rocky Mountain National Park	2001	Tourists	Visitors at Alpine Visitor Center	74
Mt Evans	1994	Deer Hunter	Other Deer Hunters	72
Mt Evans	1994	Tourists	Regional Survey	70
Rocky Mountain National Park	2001	Hikers	Longs Peak Hikers on the Trail	69
Rocky Mountain National Park	2001	Hikers	Longs Peak Hikers at the Summit	69
Rocky Mountain National Park	2001	Tourists	Trails near Bear Lake	68
Mesa Verde National Park	2001	Visitors at Museum	Other visitors - overall	67
Mesa Verde National Park	2001	Visitors at Spruce Tree House	Visitors at Spruce Tree House	67
Mesa Verde National Park	2001	Visitors at Museum	Other visitors at Museum	66
Rocky Mountain National Park	2001	Tourists	Bear Lake by Kiosk	66
Rocky Mountain National Park	2001	Tourists	Trail around Bear Lake	65
Mesa Verde National Park	2001	Visitors at Spruce Tree House	Other visitors - overall	64
Mesa Verde National Park	2001	Visitors at Step House	Other visitors - overall	63
Mt Evans	1994	Tourists	Other Tourist	61
Mesa Verde National Park	2001	Visitors at Cliff Palace	Other visitors - overall	60
City of Fort Collins – Maxwell	**2018**	**Mountain bikers**	**Hikers on trail**	**58**
Vail Pass White River NF	2003	Nonmotorized Users	snowmobilers at trailhead	57
Vail Pass White River NF	2003	Nonmotorized Users	snowmobilers on trail	57
Rocky Mountain National Park	2001	Tourists	Bear Lake Glacier Basin Shuttle Lot	55
City of Fort Collins – Maxwell	**2018**	**Mountain bikers**	**Mountain bikers on trail**	**49**
Mesa Verde National Park	2001	Visitors at Sun Point Overlook	Other visitors	48
Appalachian National Scenic Trail	1999	Non-Thru hiker	Other hikers	47
Gunnison Gorge Natl Conserv Area	2002	Gunnison Gorge Wilderness	All users	47
Gunnison Gorge Natl Conserv Area	2002	Gunnison River non-wilderness	All users	42
City of Fort Collins – Reservoir Ridge	**2018**	**Mountain bikers**	**Hikers on trail**	**41**
Cache la Poudre River	1993	Anglers	Other anglers	40
Colorado Reservoirs	1998	Anglers	Other anglers	39
Gunnison Gorge Natl Conserv. Area	2002	Flat Top & Peach Valley - OHVs	All users	39
Rocky Mountain National Park	2001	Hikers	Longs Peak hikers at trailhead	37
City of Fort Collins – Maxwell	**2018**	**Mountain bikers**	**Hikers at trailhead**	**37**
Colorado Reservoirs	1998	Anglers	South Catamount Reservoir anglers	35

		Evaluation context		
Study site	Date	Evaluation by:	Evaluation for:	Crowding Scale 3-9 %
Wolf Creek Pass	2003	Nonmotorized Users	Snowmobilers at trailhead	35
Cache la Poudre River	1993	Anglers	Evaluations of rafters	34
City of Fort Collins – Coyote Ridge	**2018**	**Mountain bikers**	**Hikers on trail**	**33**
Cache la Poudre River	1993	Kayakers	Rafters at the put-in	31
Vail Pass - White River NF	2003	Motorized Users	skiers/snowboarders at trailhead	31
Jefferson County	1996	Hikers	Bikers	30
Vail Pass - White River NF	2003	Motorized users	snowmobilers at trailhead	30
Horsetooth Mountain Open Space	**2018**	**Visitors**	**Hikers on trail**	**30**
City of Fort Collins – Maxwell	**2018**	**Hikers**	**Mountain bikers on trail**	**30**
City of Fort Collins – Pineridge	**2018**	**Mountain bikers**	**Mountain bikers on trail**	**30**
Cache la Poudre River	1993	Anglers	Kayakers	29
Vail Pass White River NF	2003	Nonmotorized Users	skiers/snowboarders at trailhead	29
Wolf Creek Pass	2003	Nonmotorized Users	snowmobilers on trail	29
Vail Pass White River NF	2003	Nonmotorized Users	skiers/snowboarders on trail	28
Wolf Creek Pass	2003	Nonmotorized Users	skiers/snowboarders on trailhead	27
City of Fort Collins – Coyote Ridge	**2018**	**Mountain bikers**	**Mountain bikers on trail**	**26**
City of Fort Collins – Maxwell	**2018**	**Hikers**	**Hikers on trail**	**25**
City of Fort Collins – Pineridge	**2018**	**Hikers**	**Mountain bikers on trail**	**25**
City of Fort Collins – Pineridge	**2018**	**Mountain bikers**	**Hikers on trail**	**25**
Horsetooth Mountain Open Space	**2018**	**Visitors**	**Hikers at trailhead**	**24**
City of Fort Collins – Maxwell	**2018**	**Mountain bikers**	**Mountain bikers at trailhead**	**23**
City of Fort Collins – Pineridge	**2018**	**Mountain bikers**	**Mountain bikers at trailhead**	**23**
Cache la Poudre River	1993	Rafters	Other rafters at the put-in	22
Jefferson County	1996	Bikers and hikers (Dual sport)	Bikers	22
Cache la Poudre River	1993	Kayakers	Rafters at the take-out	21
City of Fort Collins – Coyote Ridge	**2018**	**Mountain bikers**	**Hikers at trailhead**	**21**
City of Fort Collins – Coyote Ridge	**2018**	**Hikers**	**Mountain bikers on trail**	**20**
Jefferson County	1996	bikers	Other bikers	19
City of Fort Collins – Reservoir Ridge	**2018**	**Hikers**	**Mountain bikers on trail**	**19**
Colorado Reservoirs	1998	Anglers	Crystall Reservoir anglers	18
Vail Pass White River NF	2003	Motorized Users	skiers/snowboarders on trail	18
City of Fort Collins – Maxwell	**2018**	**Hikers**	**Hikers at trailhead**	**18**
City of Fort Collins – Reservoir Ridge	**2018**	**Hikers**	**Hikers on trail**	**18**

		Evaluation context		
Study site	Date	Evaluation by:	Evaluation for:	Crowding Scale 3-9 %
City of Fort Collins – Coyote Ridge	**2018**	**Hikers**	**Hikers on trail**	**16**
City of Fort Collins – Pineridge	**2018**	**Hikers**	**Hikers on trail**	**14**
City of Fort Collins – Coyote Ridge	**2018**	**Mountain bikers**	**Mountain bikers at trailhead**	**14**
City of Fort Collins – Pineridge	**2018**	**Mountain bikers**	**Hikers at trailhead**	**14**
Cache la Poudre River	1993	Rafters	Other rafters on river	13
Cache la Poudre River	1993	Rafters	Other rafters at the take-out	13
Mesa Verde National Park	2001	Visitors at Step House	Other visitors - at Step House	13
Vail Pass White River NF	2003	Motorized Users	snowmobilers on trail	13
Wolf Creek Pass	2003	Motorized Users	snowmobilers at trailhead	13
City of Fort Collins – Reservoir Ridge	**2018**	**Mountain bikers**	**Hikers at trailhead**	**13**
Jefferson County	1996	Bikers	Hikers	12
Jefferson County	1996	Hikers & bikers (Dual-sport)	Hikers	12
Wolf Creek Pass	2003	Nonmotorized Users	skiers/snowboarders on trail	12
Wolf Creek Pass	2003	Motorized Users	skiers/snowboarders on trail	12
City of Fort Collins – Reservoir Ridge	**2018**	**Mountain bikers**	**Mountain bikers on trail**	**12**
Mesa Verde National Park	2001	Visitors at Sun Point Overlook	Visitors at Sun Point Overlook	11
Horsetooth Mountain Open Space	**2018**	**Visitors**	**Mountain bikers on trail**	**11**
City of Fort Collins – Reservoir Ridge	**2018**	**Hikers**	**Hikers at trailhead**	**11**
City of Fort Collins – Maxwell	**2018**	**Hikers**	**Mountain bikers at trailhead**	**10**
Cache la Poudre River	1993	Kayakers	Other kayakers at the take-out	9
Jefferson County	1996	Hikers	Other Hikers	9
Wolf Creek Pass	2003	Motorized Users	Snowmobilers on trail	9
City of Fort Collins – Coyote Ridge	**2018**	**Hikers**	**Hikers at trailhead**	**9**
City of Fort Collins – Reservoir Ridge	**2018**	**Hikers**	**Mountain bikers at trailhead**	**9**
Wolf Creek Pass	2003	Motorized Users	Skiers/snowboarders at trailhead	8
Cache la Poudre River	1993	Kayakers	Kayakers at the put-in	7
Horsetooth Mountain Open Space	**2018**	**Visitors**	**Mountain bikers at trailhead**	**7**
Cache la Poudre River	1993	Rafters	Kayakers on river	**7**
City of Fort Collins – Coyote Ridge	**2018**	**Hikers**	**Mountain bikers at trailhead**	**7**
Cacvhe la Poudre River	1993	Rafters	Kayakers at the put-in	6
Cache la Poudre River	1993	Rafters	Kayakers at the take-out	4
Red Mountain Open Space	**2018**	**Visitors**	**Hikers at trailhead**	**4**
Red Mountain Open Space	**2018**	**Visitors**	**Hikers on trail**	**4**

		Evaluation context		
Study site	Date	Evaluation by:	Evaluation for:	Crowding Scale 3-9 %
City of Fort Collins – Pineridge	**2018**	**Hikers**	**Mountain bikers at trailhead**	**4**
City of Fort Collins	**2018**	**Soapstone visitors**	**Hikers at trailhead**	**3**
Red Mountain Open Space	**2018**	**Visitors**	**Mountain bikers on trail**	**2**
City of Fort Collins	**2018**	**Soapstone visitors**	**Mountain bikers at trailhead**	**2**
City of Fort Collins	**2018**	**Soapstone visitors**	**Mountain bikers on trail**	**2**
City of Fort Collins – Pineridge	**2018**	**Hikers**	**Hikers at trailhead**	**2**
Red Mountain Open Space	**2018**	**Visitors**	**Mountain bikers at trailhead**	**1**
City of Fort Collins	**2018**	**Soapstone visitors**	**Hikers on trail**	**1**
City of Fort Collins	**2018**	**Soapstone visitors**	**Horseback riders at trailhead**	**1**
City of Fort Collins	**2018**	**Soapstone visitors**	**Horseback riders on trail**	**1**
City of Fort Collins – Reservoir Ridge	**2018**	**Mountain bikers**	**Mountain bikers at trailhead**	**0**

Appendix B – Additional comments

Number of Responses	
54	Management - Great place
35	Management - Thank you
2	Management - Ban ear buds
1	Management - Too many headphones and radios
1	Management - Entrance road very rough
1	Management - Keep it free
1	Management - Keep it natural
1	Management - Kiosk empty
1	Management - Need better maintenance and parks
1	Management - Need connection between Pineridge & Horsetooth
1	Management - Need hand sanitizer in restroom
1	Management - Need separate trail for horses like at Gowdy
1	Management - No water diversions or "rail road ties" on trail so dirt has washed away leaving rocks
1	Management - Open a trail from Pineridge to piano keys and a connector along the power line from 38e and Centenial
1	Management - Road into trailhead need maintenance
1	Management - Small stones make it difficult to hike-->they roll
1	Management - Some musk thistle problems
1	Management - Visitors are courteous and respectful
1	Management - More trails and signs explaining trail etiquette,
2	Coyote Ridge - Need more parking
1	Maxwell - dogs off leash is a problem
1	Maxwell - need signs to encourage audible passing
2	Maxwell - Need more trails
1	Maxwell - too many cyclists
1	Displacement - No longer visit Pineridge, Maxwell, Blue Sky or Horsetooth on the weekends
3	Displacement - Visit weekdays to or early to avoid crowds
2	Dogs - Clean up waste
1	Dogs - Need off leash permit
3	Dogs - Need to be on leash
2	Dogs - Need off leash trails
1	Dogs - Require owners to pick up after their dogs
1	Dogs - Waste bags are a problem
1	Horses - Manure on trails is a problem
1	Mountain biking - Allow mountain bikes on DR trail uphill only (Bobcat ridge)
1	Mountain biking - Educate bikers on all trail etiquette
1	Mountain biking - Need better signage for bikers to show difficulty of trail
1	Mountain biking - Need more audible cyclists
2	Mountain biking - Need more trails
1	Mountain biking - Need restrictions
5	Mountain biking - Need to separate hikers and bikers
1	Mountain biking - Too many discourteous bikers

1	Parking - Ample safe parking is a draw for this hike
1	Parking - Don't charge for parking
1	Parking - Too limited
1	Parking - Too much trailer parking
1	Trails - Appreciate trails for multi-use
1	Trails - Don't close trails when it's muddy
1	Trails - Don't spray pesticides on trails
1	Trails - Great
1	Trails - Over to reservoir ridge are in need of maintenance
1	Trails - Well maintained
1	Trails - would like to see more trails go to rocks/cliffs for overlook
1	Trails - Would like to see more trails, better connected-like a direct connector along the frontside to Reservoir Ridge, Michaud. Seems to be a popular area for dog owners.