

Assessing Sustainable Practices among Climbers: A Case Study of Indian Creek, Utah

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PAD 5631 – Advanced Seminar in Public Policy & Management

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12/14/2010

Executive Summary

Since 2004, the internationally renowned rock climbing destination, Indian Creek, has been managed through the collaborative efforts of the Bureau of Land Management (BLM) and a climber advocacy organization known as Friends of Indian Creek (FOIC). These collaborative efforts have been successful, to a degree, in mitigating the environmental impact of an increasing numbers of visiting climbers on the natural landscape of the area. Future management efforts may benefit, however, from knowledge documented in the established body of research examining sustainable use of common pool resources (CPRs) and the institutional arrangements that manage CPR use.

This study assesses Indian Creek management efforts through an application of specific concepts found in CPR literature. Important for the purposes of this study is the identification of different types of rules, and the resulting implications for compliance with management policies. Equally important to the study are seven elements that have been found to account for the enduring success of CPR management systems, known as design principles of robust institutions. Specifically, this study seeks to answer two research questions: (1) To what extent are Indian Creek climbers acting in compliance with current management policies? (2) To what extent do the resource management policies guiding climber behavior in Indian Creek exhibit the design principles of robust institutions?

The findings of the study identify strengths in Indian Creek management efforts by distinguishing the management policies that climbers appear to comply with consistently, as well as the design principles of robust institutions that are evident in management efforts. Areas of possible concern in management efforts are derived from results that show a large disparity in respondent reports. Finally, several potential weaknesses in Indian Creek management practices

are identified by ascertaining which management policies display low levels of climber compliance, and distinguishing which of the design principles of robust institutions appear to absent from management efforts.

Out of the weaknesses identified, the researcher proposes four recommendations for strengthening FOIC efforts in Indian Creek. This application of CPR principles found that FOIC efforts may be strengthened, and ultimately more effective in reducing climber impact, by working to increase climber compliance with policies regarding pets, by clearly defining and marking boundaries between private and public property, encouraging a system of graduated sanctions, and by providing climbers with methods for resolving conflicts.

Introduction

On a fall day in 1976, three climbers made climbing history with the first ascent of a route known today as *Supercrack* (a.k.a. *Luxury Liner*) in Indian Creek, Utah. Without realizing it, the three climbers also changed the nature of that remote desert landscape forever. In the following decades, an increasing number of climbers have ventured from around the world to climb in Indian Creek, known as the “crack climbing capital of the world”. The increase in visitors has taken its toll on the unique and beautiful landscape, and the environmental impact of such a large number of climbers has threatened the nature of climber access to the area.

The growing popularity of climbing and the subsequent increase in the number of climbers visiting natural areas is an issue that many public areas face nation-wide, and even globally. While most public lands address the problem of increased impact due to more recreational users by imposing strict regulations and restricted access, climbers in Indian Creek have been presented with the opportunity to organize and potentially maintain the primitive nature of the area. The current management solution to climber impact in Indian Creek is a cooperative effort between the Bureau of Land Management (BLM), as the agency officially mandated to manage the area, and the climber organization Friends of Indian Creek (FOIC). This effort can only prove successful if climbers are able to effectively self-regulate their behavior. If climbers are unsuccessful in changing their behavior and mitigating their impact in Indian Creek, the BLM will likely respond with measures that would equate to a dramatic change to the historically wild and unregulated nature of the area.

To date, FOIC efforts to educate, organize, and regulate climber behavior have relied largely upon the experience of individuals and have been successful in reducing climber impact in Indian Creek, to an extent. Future efforts, however, may prove more effective if climbers look

to examples of effective resource management to inform their methods of organization and management. An established body of research in community self-regulation of common pool resources (CPRs), which applies the institutional analysis and development (IAD) framework, offers both a conceptual structure through which to examine the Indian Creek situation and identifies approaches to resource management which can strengthen FOIC efforts to reduce climber impact in Indian Creek. Of particular importance are common characteristics of successful CPR self-regulation, outlined by the CPR design principles of robust institutions. Following a brief description of the Indian Creek situation and an overview of relevant CPR literature, this paper seeks to assess the efforts of FOIC in Indian Creek through an application of concepts presented in CPR literature and provides recommendations on how those efforts may be strengthened.

The Indian Creek Situation: A Brief Overview

Physical Attributes of Indian Creek

The area popularly referred to as Indian Creek covers roughly a 96 square mile section of Utah desert 50 miles southwest of the town of Moab. Camping and climbing in Indian Creek is accessed from multiple points along a 14 mile stretch of Highway 211, which runs parallel to the actual Indian Creek, the stream for which the area was named. Historically, Indian Creek was frequented by Native Americans, and the area is rich in artifacts left by early inhabitants. Significant evidence of Native American presence is found at the base of the same Wingate sandstone cliffs that attract climbers, in the form of petroglyphs and ruins.

The physical environment of Indian Creek is a biologically rich, semi-arid section of the Colorado Plateau, consisting of canyon bottoms walled by vertical Wingate sandstone cliffs and talus slopes. The canyon bottoms are fragile desert environments, cut with miles of native

cottonwood- and willow- lined riparian areas. Of particular importance to the biological health of the area is soil quality; much of the loose desert soil is held together by biological soil crust, generally referred to as cryptobiotic soil, formed by living organisms and their by-products. The soil crust serves the important functions of soil stabilization, water infiltration, and soil retention of key nutrients and minerals. Unfortunately, biological soil crust is also incredibly vulnerable to disturbance and is easily damaged and destroyed by livestock grazing and recreational activities such as hiking, biking, and off-road driving (USGS, 2006). While grazing has been taking place in Indian Creek for decades, the recent increase in recreational activity, notably climbing-related activity, has also taken a toll on the soil quality of Indian Creek.

Indian Creek is a patchwork of both public and private property, sections of which have traditionally been used by the Redd family, who until 1996 owned and operated the Dugout Ranch. In 1996 the Dugout Ranch was purchased by The Nature Conservancy (TNC), and although Heidi Redd still operates the ranch, the Redd family no longer has a proprietary claim to the land. Aside from ranch operations, the predominant use of Indian Creek is recreational activity. While Indian Creek is a destination for several recreational user groups, including hikers, bikers, and travelers seeking camping accommodations outside of the several national parks in the surrounding area, climbers make up the majority of the users. A central implication of climbers being the predominant recreational user group in Indian Creek is more uniform utilization of the resource, generally limited to camping and climbing.

Climber Impact, Threats to Access, and the Origins of FOIC

Climbing in Indian Creek began in the late 1970s. By the late 1990s, excessive climber impact to the most popular areas became evident. Camping areas displayed alarming degradation, including erosion and soil depreciation in tent areas, social trails spreading erosion

and poor soil conditions beyond the immediate vicinity of tent sites, human and canine feces found topically throughout the camping and climbing areas, and littered trash such as plastics from food storage. In 2000, the Monticello office of the BLM made it public that they were considering implementation of a new recreational management plan for the Indian Creek corridor (FOIC, 2008). The new recreational plan could require fees for access to popular areas, and perhaps more importantly to climbers, could include recreational development of those areas, changing the primitive nature of Indian Creek.

In 2001, several initial meetings were held between the BLM and other stakeholders – the Access Fund (AF), the Rocky Mountain Field Institute (RMFI), TNC, and the Dugout Ranch (for a description of Indian Creek stakeholder groups, see Appendix 1) – regarding a new management plan. In the winter of 2002, the AF began attempts to organize a local Indian Creek climber advocacy organization and continued to represent the climbing community at BLM stakeholder meetings. For several years, the AF held meetings at Outdoor Retailer shows in Salt Lake City, Utah, and in 2004 successfully began the process of organizing an Indian Creek climber advocacy group, calling the organization Friends of Indian Creek (FOIC). By the summer of 2005, FOIC had become the de facto voice of the climbing community in stakeholder communications with the BLM.

Attempts at Collaborative Management

In 2005, the BLM released its Final Indian Creek Plan, which currently affords climbers free and unrestricted access to the majority of the camping and climbing areas. An informal arrangement is understood between the management officials at the BLM Monticello Field Office and the climbing community: that if the climbing community can curb its impact on the Indian Creek environment and maintain sustainable management of the area, the BLM will

refrain from dramatically developing the area or imposing severe restrictions on access to the area (T. Hedin, personal communication, December 1, 2009). Since the release of the Final Plan, management of Indian Creek has consisted of the efforts of multiple stakeholder groups, notably the BLM, RMFI, and FOIC, with the support of other climber organizations.

Cooperative actions by FOIC and the BLM focus largely on educating visiting climbers of appropriate practices and behaviors while in Indian Creek and mitigating the increasingly salient problem of human waste. FOIC has utilized several funding streams to construct informational kiosks in the most heavily used locations to educate visiting climbers of Indian Creek management policies. With grants from Patagonia (outdoor apparel company), and the AAC, FOIC began what is known as the Wag Bag program. The Wag Bag program established locations at Bridger Jack, Supercrack Buttress, and Creek Pasture for free distribution of human waste collectors (Wag Bags), along with donation vaults to collect contributes for the ongoing funding of the program. The BLM constructed a vault toilet at the entrance to an area called Beef Basin, which has become the most heavily used such facility in the Monticello District. Beginning in the fall of 2006, multiple “service days” were held to solicit climber assisted clean-up efforts. Per an agreement between TNC and FOIC, several campsites in the Bridger Jack area were closed, as they were located on private property (T. Hedin, personal communication, December 1, 2009). During the years 2006 to 2008, clean-up efforts continued, and trails were established in an attempt to eliminate the use of multiple social trails leading to the same destination, largely through the work of the RMFI.

Today, FOIC continues to educate visiting climbers through public meetings, an informational website, and informational kiosks. The organization is currently planning the construction of a composting toilet in the Bridger Jack campground. The BLM recently

constructed a new parking lot in Donnelly canyon, the most popular climbing area. With the aid of an 18,000 dollar contribution from FOIC (with the help of various donors), the BLM also installed toilets at the new parking lot (T. Hedin, personal communication, November 20, 2010). Despite these additions, access to Donnelly Canyon, the parking lot, and the toilets remains free and unrestricted. RMFI continues to contribute through restoration work in severely affected areas within Indian Creek, campground clean-up and restoration, and trail construction to popular climbing destinations. While the efforts of both the BLM and RMFI in providing an infrastructure in service of sustainable recreation in Indian Creek are necessary components for reducing user impact, appropriate climber practices and behavioral changes are also necessary. This component has largely become the responsibility of FOIC. FOIC faces challenges in changing climber behavior that are both varied and entrenched within the culture of the climbing community itself. The efforts of FOIC in implementing a culture of self-regulation in Indian Creek can be informed by the lessons of CPR research, which are addressed in the following review of relevant CPR literature.

Review of Literature

Sustainable use of CPRs has long been an interest for social science academics and practitioners attempting to manage CPR consumption. Scholars historically argued that self-interested individuals fail to contribute to the common good in the absence of coercion or incentives (Olson, 1965). This philosophy was most famously articulated in Garrett Hardin's (1968) *Tragedy of the Commons*. Hardin speculated that in the appropriation of a shared resource, users have an incentive to increase their individual resource use to the point of overconsumption because the cost of resource degradation is shared throughout the community. The tragedy of the commons theory holds that the solution to unsustainable CPR consumption is

best found by establishing either resource property rights or government regulation (Posner, 1977; Terborgh 2000). More recently, a body of authors has established that the tragedy of the commons scenario is not inevitable, referencing many examples which demonstrate that sustainable CPR consumption is possible in self-organized communities (Berkes, 1989; Dolsak & Ostrom, 2003; McCay & Acheson 1987). These studies examined instances in which communities created institutional systems of management that led to “robust” and enduring CPRs – meaning that without extensive government intrusion these communities had devised methods of self-regulation that allow for sustainable use of resources over a long period of time. The common elements across these communities have drawn much attention and are discussed later in the review. While CPR study generally focuses on traditional resources, such as forests, fisheries, and graze-lands, the Indian Creek situation displays all of the characteristics of a CPR facing Hardin’s tragedy of the commons. Indeed, FOIC is attempting to reach an outcome similar to the examples of sustainable CPR consumption that scholars have examined.

The Institutional Analysis and Development Framework

In order to understand and assess a problem, one must have a structure for analyzing the problematic situation that identifies both the important elements of a situation, and the relationship between these elements (Ostrom, 2005). This structure is often referred to as a framework. Elinor Ostrom’s Institutional Analysis and Development (IAD) framework has emerged as a leading framework in the study of CPR consumption. Ostrom and CPR scholars have documented the evolution of the IAD framework and corresponding CPR Theory through several books: *Governing the Commons: The Evolution of Institutions for Collective Action* (1990); *Rules, Games, and Common-Pool Resources* (1994); *The Drama of the Commons* (2002); and *Understanding Institutional Diversity* (2005). Important for the purposes of this

study, the IAD framework identifies categories of important variables which lead to policy outcomes: physical and material conditions, attributes of the community, and institutional rules.

A central concept of the IAD framework, consistent throughout the literature mentioned, is the importance of what IAD scholars refer to as institutional rules, generally labeled in this study as rules, and defined as “shared perceptions . . . that are mutually understood and predictably enforced” (Ostrom, 2007, p. 23). These rules exist on several levels of interaction, from the “day-to-day decisions made by the participants of any setting” (Ostrom, 2007, p. 44) known as operational situations, to the rules that govern the creation and modification of operational rules, found in collective-choice situations. In Indian Creek, communication between the BLM and FOIC, and the resulting policies posted on informational kiosks at popular sites, represents a collective-choice situation. These decisions made at the collective-choice level, and communicated through the informational kiosks, influence decisions and actions made at the operational level. In this instance, climber decisions and behavior while camping or climbing would represent operational situations.

CPR scholars discuss the possibility of a disparity between collective-choice rules and operational rules. This incongruence raises another important element of the IAD framework – the concept of different kinds of rules. Most pertinent to this discussion is Ostrom’s (2007) differentiation between rules-in-form and rules-in-use. Rules-in-form are rules that have been formalized as policies, procedures, regulations, or laws, represented in the Indian Creek situation by the rules set forth by the BLM or FOIC to guide visitor behavior. Rules-in-use are the rules that consistently and practically guide individual behavior – the norms and patterns of behavior that are consistently observed in climber activity. When the rules-in-form and rules-in-use are the same, a high level of user compliance with management policy exists. However, when the

rules-in-use diverge from the rules-in-form, instances where user behavior conflicts with the management policies of the area exist. There could be any number of reasons for a divergence between the rules-in-use from the rules-in-form, but the simple existence of such divergences may indicate weaknesses in the collective management practices of the CPR.

CPR Theories of Collective Action and Robust Institutions

While a framework provides a structure for understanding and analyzing a situation, theories identify which elements within a framework are relevant to specific questions (Ostrom, 2005). In this manner, theories enable one to deduce possible relationships between identifiable causes and effects. Two theories, recognized collectively as CPR theory, are embedded within IAD literature. Edella Schlager's (2004) chapter "Common-Pool Resource Theory" provides a general description of the dual theories. Schlager first presents a theory of collective action which identifies variables that influence whether long-term cooperation will occur among resource users. Schlager's second theory describes long-term cooperation through institutional design, identifying eight variables, known as design principles of robust institutions that are found across examples of robust CPR systems. These eight variables have been found to account for the enduring success of CPR arrangements. As the current study involves the application of these design principles, they are discussed here in greater detail.

Design Principles of Robust Institutions

In her book *Governing the Commons* (1990) Ostrom introduced the eight design principles that were found across examples of enduring CPR communities, identified and defined in the following table. The eighth design principle, "nested enterprises," was found to exist in and be most important across examples of the consumption of large CPR systems (Ostrom, 2005). Because Indian Creek is a relatively small CPR system, and because the eighth design

principle is such a complex concept, “nested enterprises” is considered to lie outside the scope of this analysis and is not applied.

Table 1: Design Principles of Robust Institutions (Ostrom, 1990)	
1. Clearly defined boundaries	The geographical boundaries of the resource, limitations on who may access the resource, and when the resource may be accessed, are clearly defined.
2. Congruence between appropriation and provision rules and local conditions	The rules of appropriation that place restrictions on time, place, technology, and quantity of CPR use are associated with CPR conditions and rules of provision.
3. Collective-choice arrangements	The individuals that are affected by the rules governing user behavior can participate in modifying these rules.
4. Monitoring	Monitors of the CPR conditions and users’ behavior are the users or are accountable to the users.
5. Graduated sanctions	Individuals who violate rules will be assessed graduated sanctions, subject to the seriousness of the violation.
6. Conflict-resolution mechanisms	Access to conflict-resolution between users, or between users and officials, is rapid and low cost.
7. Minimal recognition of rights to organize	The right of users to organize and devise their own institutions is not challenged by outside authorities.
8. Nested enterprises	Management system is organized on multiple levels for a complex resource that is part of a larger system.

Building on prior publications, Ostrom’s conference piece “Design Principles of Robust Property Rights Institutions: What Have We Learned” (2009) addresses criticisms of the design principles that have emerged since their introduction in 1990. This paper focuses on 33 coded research studies that evaluate the effectiveness of the design principles. Important for this study are the results and implications of the coded evaluations. Ostrom reports that, “in general, it looks like the principles are helpful for understanding why some common-property institutions are robust” (2009, p. 36), and that “a group that designs a property rights system that meets most

of the design principles has increased the probability of its surviving many disturbances over time and being robust” (2009, p. 44). Additionally, the conference piece addresses the use of the design principles in practice, and provides a “rough translation of the design principles” (Ostrom, 2009, p. 44) for the practitioner. The strong empirical evidence that serves to validate the design principles has further encouraged researcher use of the design principles as an assessment tool in studies involving CPR consumption.

Application of the Design Principles

Since the introduction of the design principles in 1990, scholars have moved to examine community self-regulation of different CPRs by assessing the level of congruence between community efforts and the design principles. The sheer number of such applications makes an exhaustive list here impossible. Accordingly, a selection of appropriate applications is discussed here, which informs the design of the current study.

The practice of applying the design principles of robust institutions to a community’s efforts in regulating a CPR has proven informative for a variety of CPR types and locations. For example, Tucker (1999) employs the design principles in an examination of common property forests in Honduras; Samakanda, Senzanje, and Mjmba (2002) provide an examination of small irrigation schemes; as do Kamran and Shivakoti (2009); Quinn, Huby, Kiwasila, and Lovett (2007) examine the management of graze land in semi-arid Tanzania, and Haase, Lamers; and Amelung (2009) provide an evaluation of self-regulation efforts among members of the tourist industry in the Antarctic. Because few, if any, applications of the design principles exist that examine recreational areas as CPRs, the aforementioned studies inform the current case study of Indian Creek with a basic design – determining the existence of each design principle and thereby citing “missing” design principles as potential weaknesses in management efforts.

These studies also influence the methods employed in the current study. Many CPR studies, such as Tucker's 1999 study, rely on a long-term relationship between the researcher and the community being examined, and the findings are often based on the observations of the researcher over time. The current study utilizes the methodological approach taken by short-term studies of remote CPRs, such as Amelung's (2009) Antarctic tourism study, in which the author interviewed stakeholders in order to gain in-depth information regarding the CPR. The information gathered, therefore, consists of the perceptions of individuals knowledgeable in the system of CPR use being studied. As addressed in the following methodology section, the reliability of this perceptual data is increased in the current study by interviewing not only explicit stakeholders, but also other individuals with intimate knowledge of the resource.

Assessing CPR Management in Indian Creek

The current study attempts to apply the findings of CPR research in order to assess climber efforts at self-regulation, identify possible weaknesses in these efforts, and provide recommendations on how efforts may be strengthened. Two specific research questions guide this research project:

1. To what extent are Indian Creek climbers acting (rules-in-use) in compliance with current management policies (rules-in-form)?
2. To what extent do the resource management policies guiding climber behavior in Indian Creek exhibit the CPR design principles of robust institutions?

Methodology

This research study employs several methods of data collection, with the intention of developing a more comprehensive analysis of the Indian Creek situation. The methods used include: document review and analysis, site visits, and interviews.

The first stage of data collection consisted of a review of documents pertinent to the Indian Creek situation from four specific entities: the BLM Monticello Field Office, the AF, FOIC, and Northern Arizona University (NAU). Documents reviewed include: “Indian Creek Corridor Plan and Environmental Assessment” (BLM, 2004); AF scoping comment letters to the BLM Monticello Field Office (2003; 2004); a FOIC timeline (2008); and NAU impact assessment documents (2007). The review provided insight into communications between the AF and the BLM, the creation of FOIC, and the nature of climber impact in Indian Creek.

Site visits were performed June 4 through June 6, 2010, in several major Indian Creek camping and climbing areas. Camping areas visited include: the Bridger Jack area, Cottonwood Creek, Creek Pasture, and Super Bowl. Climbing areas visited include: Supercrack Buttress, Battle of the Bulge, Blue Gamma, and Way Rambo. The site visits focused on two observable elements: visible FOIC action in the form of kiosks, signage, Wag Bag dispensers, and donation receptacles; and visible evidence of climber impact such as toilet paper, human waste and trash. The site visits were valuable in both supplementing and validating information collected through other methods.

The most valuable method of data collection undertaken for the research study proved to be interviews. A total of 12 respondents were interviewed for the study. Interview respondents fall into one of three categories: past or present FOIC board members (n=8), members of other stakeholder groups including the BLM (n=1) and RMFI (n=1), and long-time climbers familiar with Indian Creek (n=2). All interviews were semi-structured, following a standard script, varying slightly depending upon the participant in question (See Appendix 5 for a copy of the interview script). Due to a distance of several hundred miles between the researcher and most

interview participants, the interviews were conducted by phone¹. The interviews typically lasted between 60 and 90 minutes and responses were recorded in the form of detailed notes. These notes were then sent electronically to the appropriate participant for verification of accuracy. The interview script consists of four categories of questions: participant background; participant perception of FOIC; climber adherence to Indian Creek management policies; and Indian Creek management congruence with the IAD design principles.

Following organization and grouping of interview responses, two central analyses were performed on the collected data, corresponding with the first two research questions presented in the literature review. The analyses and resultant findings are discussed in the following section.

Results

The results of data collection and analyses are presented here in two parts, grouped according to research question. Implications arising out of these results are addressed in the discussion section.

Climber Compliance with Indian Creek Management Policies

As previously indicated, the extent to which climber behavior in Indian Creek reflects the management policies intended to guide behavior is an important issue. Interview respondents' assigned grades of climber compliance with specific management policies are displayed in Table 2, on the following page. The table provides a numerical representation and the grading mode (grade that was assigned with highest frequency) of climber compliance with each policy (Figure 1 in Appendix 6 provides a visual representation of these results, while individual management policies are expanded in Appendix 4, Table 4). The policies can be organized into three categories based on these results: policies for which climber compliance was consistently graded

¹ One question, pertaining to the second design principle, was asked of interview participants via email following the phone interviews. The question is provided as a note on the Appendix 4 interview script. A total of six interviewees responded to the question.

high, policies for which climber compliance was consistently graded low, and policies for which there was a wide variance in respondents' grading.

Table 2: Climber Compliance Grade Percentage by Policy

	a	b	c	d	f	Mode
<i>Use wag bag</i>	71 %	29 %	-	-	-	a
<i>Carry out wag bag</i>	67	33	-	-	-	a
<i>Use designated camping</i>	44	56	-	-	-	b
<i>Use established trails</i>	36	64	-	-	-	b
<i>Act courteous to cowboys</i>	17	83	-	-	-	b
<i>Pack out other garbage</i>	44	44	12	-	-	a, b
<i>Rock art</i>	64	9	27	-	-	a
<i>Donate to wag bag</i>	17	50	33	-	-	b
<i>Rock wet</i>	56	11	11	11	11	a
<i>Bring firewood</i>	50	17	17	17	-	a
<i>Designated parking</i>	25	38	25	13	-	b
<i>Designated fire site</i>	13	50	25	13	-	b
<i>Durable surfaces</i>	30	30	20	20	-	a, b
<i>Human waste</i>	10	20	50	20	-	c
<i>Wood scavenging</i>	29	14	29	29	-	a, c, d
<i>Pets and cattle</i>	17	17	17	50	-	d
<i>Control pets</i>	-	10	20	50	20	d
<i>Pick up pet waste</i>	-	14	-	29	71	f

Out of the eighteen policies that respondents were asked to grade, six reflect a consensus of relatively high climber compliance (the top six policies presented in Table 2). These policies directs climbers to: take advantage of provided wag bags; dispose of wag bags properly; use designated camp sites; travel on established trails; and act courteously to personnel from the Dugout Ranch. Researcher site visits supported the grades assigned for several of these policies, specifically the policies related to disposing of wag bags properly, using designated camp sites,

traveling on established trails, and packing out garbage. No evidence of abandoned or littered wag bags was evident. In all four campsites visited (Bridger Jack, Cottonwood Creek, Creek Pasture, and Super Bowl), where campsites were designated, little evidence of camping outside these sites was observed. The same was true for established trails: where a trail was established, there was little evidence of off-trail travel. Finally, few instances of littered trash were observed in camping and climbing sites, with the exception of micro-trash such as small wrapper scraps in the most heavily used camp areas.

While the six aforementioned policies displayed a general consensus indicating relatively high climber compliance, compliance with three other policies was graded notably low, as can be seen at the bottom Table 2. All three policies direct climbers in appropriate practices regarding pets, particularly dogs. The first of these policies requires climbers to tie up pets when cattle or horses are nearby. The second policy directs climbers to control pets by preventing them from digging, running off trail, and chewing vegetation. The third policy, a policy that directs climbers to pick up and pack out pet waste, is particularly notable as it received the lowest grade out of the 18 policies tested.

The third category of policies – in which the grades assigned by respondents varied widely – indicating little or no consensus, consists of nine of the 18 policies about which respondents were questioned. Many of these policies were assigned several different grades with similar frequency. For example, compliance with the policy that directs climbers to refrain from scavenging for firewood was assigned a “b” by 14 percent of respondents, while “a”, “c” and “d” were assigned with an equal frequency, each by 29 percent of respondents. Alternately, respondent grades were “split” in a manner that indicates little consensus. One such policy, the policy that directs climbers to not climb where climbing conflicts with rock art or other historic

writings and structures, was graded with an “a” by 64 percent of respondents, and a “c” by 27 percent of respondents. The lack of consensus among respondent grading of these policies results in difficulty in drawing conclusions, and is discussed following a report of results pertaining to the design principles of robust institutions.

Evidence of the Design Principles of Robust Institutions

Due to the complexity of the design principles, all but one of the design principles was divided into two or more elements. Interview responses regarding the extent to which the design principles elements are evident in the Indian Creek situation were coded as either “yes” or “no,” indicating whether the element is evident in Indian Creek management efforts. The number of “yes” responses was then translated into a percentage of the total number of responses for each question, as displayed in Table 3 on the following page. The results for each design principle are presented here individually.

Design Principle 1: Clearly Defined Boundaries

As can be seen on Table 3, the first design principle was divided into four elements. The results of only one element were ambiguous, as 44 percent of respondents answered that the limitations as to who may access the resource are clearly defined, while 56 percent answered that they are not. Seventy-five percent of respondents replied that the physical boundaries of Indian Creek are clearly defined, indicating the presence of this element. The remaining two elements – clearly defined boundaries between public and private property, and clearly defined limitations on when users may access the resource – are indicated to not be present. Researcher site visits supported these findings, as no signage indicating who may or may not access Indian Creek was found, and only one instance of private property signage was observed.

Table 3: Percentage of Interview Responses Indicating the Existence of Design Principle Elements

Design Principle 1	<i>Clearly defined boundaries</i>	75 %
	<i>Clearly defined private/public property boundaries</i>	20
	<i>Limitations on who may access resource</i>	44
	<i>Limitations on when users may access resource</i>	11
Design Principle 2	<i>Rules congruent with conditions</i>	67
Design Principle 3	<i>Able to be involved in the creation and modification of rules</i>	100
	<i>Actually involved in the creation and modification of rules</i>	67
Design Principle 4	<i>Formal monitoring of climber behavior</i>	9
	<i>Informal monitoring among climbers</i>	83
Design Principle 5	<i>Formal sanctions</i>	10
	<i>Informal sanctions</i>	67
	<i>Formal graduated sanctions</i>	10
	<i>Informal graduated sanctions</i>	8
Design Principle 6	<i>Dispute resolution between climbers</i>	8
	<i>Dispute resolution between climbers and other users</i>	36
	<i>Dispute resolution between climbers and BLM</i>	70
Design Principle 7	<i>Obstruction to climber organization</i>	10
	<i>Obstruction to creating own rules</i>	50

Design Principle 2: Rules Congruent with Conditions

As the only design principle with a single element, design principle two is more straightforward than the other design principles. Interview results indicate that the rules that govern visitor behavior in Indian Creek are congruent with the conditions of the area, and document review results support these findings. More specifically, the “Indian Creek Corridor Plan and Environmental Assessment” (BLM, 2004) and AF scoping comments to the BLM Monticello Field Office (2003,2004) indicate that the management rules that guide climber behavior are derived directly from the conditions of Indian Creek.

Design Principle 3: Involvement in the Creation and Modification of the Rules

Results regarding design principle three are particularly notable as respondents were unanimous that climbers have the ability to be involved in the creation and modification of the rules that guide visitor behavior in Indian Creek. While there was less of a consensus with regard to the second element, 67 percent of respondents indicated that climbers are actually involved in the creation and modification of the rules, indicating that both elements of the design principle are evident in the Indian Creek situation.

Design Principle 4: Monitoring

Design principle four, regarding the monitoring of visitor behavior in Indian Creek, was divided into the existence of formal and informal monitoring. Interview results indicate that no formal monitoring exists; however, the results strongly suggest that informal monitoring between climbers of climber behavior is evident in Indian Creek efforts.

Design Principle 5: Sanctions

Design principle five is made up of four elements pertaining to the existence of formal sanctions, formal graduated sanctions, informal sanctions, and informal graduated sanctions. Of the four elements, evidence only of informal sanctions was found, affirming that informal sanctioning of improper behavior is evident in the Indian Creek situation.

Design Principle 6: Dispute Resolution Processes

Dispute resolution was categorized into three different elements, including: dispute resolution between climbers; dispute resolution between climbers and other resource users; and dispute resolution between climbers and the BLM. The latter element yielded convincing results, with 70 percent of respondents contending that dispute resolution processes exist between climbers and the BLM. Results for dispute resolution for disputes between climbers

and other resource users, and between climbers and other climbers indicate that such processes do not exist.

Design Principle 7: Organization

Design principle seven was represented by two elements: the existence of obstructions to climber organization (outside of existing organization), and obstruction to the creation of rules (outside of existing rules). The results for the first element of the design principle are apparent, as only one respondent answered that there exist obstructions to climbers in forming new organizations in Indian Creek. The results for the second element are much less conclusive, as half of the respondents stated obstructions exist to the creation of new rules guiding user behavior in Indian Creek.

On the surface, a determination of the existence (or lack thereof) of design principle elements conveys little practical information in regards to strengthening management efforts in Indian Creek. Within the context of CPR literature, however, the lack of design principle elements may indicate areas of possible weakness in management efforts and opportunities for strengthening the Indian Creek management system. These implications are discussed in the following section.

Discussion

More than being an academic application of CPR principles to the Indian Creek situation, this project seeks to inform the efforts of FOIC with an application of established CPR literature. In essence, the scope of this study includes identifying potential weaknesses in Indian Creek management practices, but falls short of being able to prescribe specific actions to correct these weaknesses. It is the hope of the author that FOIC, and related stakeholders, can use these findings to develop methods that improve Indian Creek management efforts. The results are

discussed in the context of CPR literature while highlighting practical implications for climbers and active FOIC members. Results are presented in three sections: management strengths; management areas for which results were ambiguous and may warrant FOIC attention; and management weaknesses for which recommendations are introduced.

Strengths in Indian Creek Management Efforts

The results of this assessment distinguish several elements of Indian Creek management as areas of success. The first is made up of the management policies that exhibit a high level of climber compliance, perhaps because efforts have been most concentrated on these policies. During researcher site visits, FOIC signage was observed to focus on practices involving waste disposal, camping practices, the use of established trails, packing out garbage, controlling pets, and not climbing near rock art and other historic structures. It may be no coincidence that all but one of the policies that received high grades of climber compliance were clearly communicated via FOIC signs in popular camping and climbing locations. These policies may provide an example for future efforts to successfully encourage climber compliance with other policies.

Specific design principles elements were found to be evident in Indian Creek management efforts, indicating components of a robust system of self regulation. These elements – clearly defined boundaries, management rules that align with environmental conditions, involvement of climbers in the creation and modification of management rules, informal monitoring of climber behavior and sanctioning for improper behavior, and established resolution mechanisms for conflicts between climbers and the BLM – are all components of Indian Creek management efforts that support a more effective management strategy shared by FOIC and the BLM.

Possible Areas of Concern

Some of the findings of this analysis returned ambiguous results, the implications of which are difficult to discern. Among these findings are management policies for which there was a wide variance in respondent's grading of climber compliance. A number of reasons may explain why interviewee responses varied so greatly. Individual respondent understanding of these policies may vary if the policies themselves are vague, poorly understood, or unfamiliar to respondents. Indeed, many respondents expressed ignorance regarding certain policies. For example, several respondents claimed to be unfamiliar with the policy directing climbers to refrain from climbing when the rock is wet, as well as the policy directing climbers to unload gear on durable surfaces. Finally, it is possible that the disparity is due to researcher error; that the wording of interview questions made them difficult to understand, or were inconsistently phrased across respondents

The existence of two design principle elements were divided in respondents' answers as well, including: limitations on who may access Indian Creek, and obstructions to the creation of alternative management rules in Indian Creek. Again, this ambiguity may be due to respondents' lack of knowledge, researcher error, or to possible inconsistency in management methods. While the variance in respondent answers regarding these management policies and design elements deters the formulation of researcher recommendation, these areas may indicate "information vacuums" about which more communication may be necessary in order to build a greater level of awareness and understanding among climbers.

Management Weaknesses and Corresponding Recommendations

Most relevant to FOIC efforts, this application of CPR concepts to the Indian Creek situation identifies potential areas of improvement in current management efforts, represented here by recommendations for FOIC (displayed in Appendix 7).

Recommendation 1: Increase Climber Compliance with Management Policies Regarding Pets

All three policies pertaining to the control of pets indicate the greatest area of weakness in Indian Creek management policies and should be of concern for FOIC. Interviewee comments indicate a central challenge in encouraging climber compliance with these policies – pet owners’ perception that pets have little or no impact on the environment of Indian Creek. As one pet owner commented, “some policies, such as tying up well-behaving dogs do not make practical sense” (Personal communication, May 11, 2010). Conversely, it is clear from the Indian Creek Corridor Management Plan that pet control and impact is a major concern to the BLM, and that many interviewees who are not pet owners contended that even well-behaved pets have a marked impact on the environment of Indian Creek. In the interest of both protecting the environmental health of Indian Creek, as well as promoting a favorable relationship with the BLM, FOIC should work to impress upon climbers the validity and importance of policies pertaining to pets and pet control.

Recommendation 2: Clearly Define and Mark Boundaries between Public and Private Property

Regarding the two elements of the first design principle that were indicated to not be present – clearly defined boundaries between public and private property, and clearly defined limitations on when users may access the resource – interview commentary indicated that the latter element was not pertinent, as user impact on Indian Creek as a resource is generally concentrated during the peak fall and spring seasons. A lack of clearly defined boundaries between public and private property, however, was reported to be a concern. As one respondent commented, “ambiguity regarding boundaries between public and private properties is problematic, as climbers assume they can use private property at will if they believe it to be public...this may have an effect on climber access” (Personal communication, June 2, 2010). In

order to encourage informed and responsible climber behavior and maintain an amicable working relationship with the Dugout Ranch and TNC, FOIC should educate climbers as to, and possibly mark, the boundaries between public and private property within Indian Creek.

Recommendation 3: Encourage a System of Graduated Sanctions

The simple existence of informal monitoring among climbers does not indicate its effectiveness, although it is worth noting that, according to Ostrom such monitoring may prove to be the optimal arrangement – “in robust institutions, monitoring and sanctioning are undertaken not by external authorities but by the participants themselves” (1990, p. 94). Important to the effectiveness of monitoring is the structure of sanctioning for improper behavior. CPR studies indicate that users of a resource are more likely to enforce sanctions against one another if the sanctions are “graduated”; the seriousness of sanctions resulting from a violation is contingent on the type and frequency of violation. The results of this study indicate that informal sanctions exist in Indian Creek (for example, verbal reprimands for improper behavior), but are not graduated. The fact that monitoring and sanctioning of improper behavior in Indian Creek is carried out in an informal manner between climbers makes a system of graduated sanctions difficult to institute, however FOIC may be able to devise and promote a hierarchy of sanctions (with input from the climbing community) that increases the effectiveness of existing monitoring.

Recommendation 4: Provide Climbers with Methods for Resolving Conflicts

In any CPR situation, users of a resource are likely to find themselves in conflict with one another from time-to-time, particularly if users are also monitoring one another’s behavior. In Indian Creek, such conflicts may arise in one of two scenarios. The first scenario involves conflicts among climbers regarding the behavior of an individual or group of climbers. The

second scenario involves conflicts between a group of climbers and another user group (likely to be comprised of individuals from the Dugout Ranch or TNC). Historically, the Access Fund and FOIC have served as liaisons between conflicting groups in response to key events or especially contentious confrontations. Interview comments indicate that while resolutions negotiated by the Access Fund and FOIC have proven to be effective, such dispute resolution mechanisms are not consistently available and only arise out of crisis situations. FOIC may be able to strengthen both relationships and cooperation among climbers, and relationships and cooperation between climbers and other Indian Creek users by providing standardized arenas and processes for resolving conflicts that arise (perhaps preventing crisis-level conflicts altogether).

Conclusion

As argued throughout this paper, CPR research over time provides concepts that may prove valuable to collaborative management efforts in Indian Creek. Through an identification of management weaknesses, one can isolate opportunities for improving management efforts. This application of CPR principles found that FOIC efforts may be strengthened and more effective in reducing climber impact by increasing climber compliance with policies regarding pets, clearly defining and marking boundaries between private and public property, encouraging a system of graduated sanctions, and providing climbers with methods for resolving conflicts.

Several limitations are inherent in this study, and must be addressed. First, the practice of interviewing individuals regarding their perceptions of the Indian Creek situation means that the data collected are only as accurate as the perceptions of those interviewed. Second, the selection of individuals interviewed may have introduced a level of bias into the results. Future studies of Indian Creek would benefit from employing direct observation of climber behavior over time, in addition to interviews, thereby possibly revealing pertinent information absent from this study.

Another important limitation of the study was revealed during the interview process – the study relies on the assumption that collective action is truly occurring between climbers, FOIC, and the BLM in Indian Creek management efforts. Without collective action – the collaboration of not only entities such as FOIC and BLM, but other organizations such as RMFI and individual climbers – an application of CPR concepts is suspect, at best. For example, CPR theory of collective action holds that collective action is more likely to occur if users share a common expectation for the resource (Schlager, 2004). Interview comments, however, revealed a disparity between respondents' expectations for the desired future of Indian Creek. Such comments indicate that this analysis would be more complete if it included an application of Schlager's (2004) theory of collective action, examining the characteristics of Indian Creek and its users that have been shown by CPR scholars to influence whether long-term cooperation exists between resource users. Despite the limitations listed here, the data collected in this study and the recommendations presented in this paper are valuable, and could prove important for the ongoing efforts of FOIC.

The basic approach of this study also introduces its own strengths and weaknesses. CPR theories such as the design principles of robust institutions are based on an abundance of research, and indicate particular elements of a situation that are important and require attention. As argued throughout this paper, CPR concepts highlight integral components of management that may otherwise go unnoticed by the practitioner. An inherent complication of using theory in this manner, however, is that in selecting certain variables for study, other elements are overlooked. The trade-off that is therefore made in utilizing a theoretical application in assessing the Indian Creek situation is the examination of important elements at the cost of potentially discounting pertinent elements that lie outside the theory. Acknowledging this limitation as

important does not reduce the validity of the resulting findings, however, but simply recognizes that a case study reliant on a single theory is not exhaustive in its scope.

The Indian Creek situation, and management of recreational resources in general, provides a unique opportunity for novel application of CPR theory and concepts. As important, an application of established CPR concepts can ideally strengthen collaborative management efforts in Indian Creek. With continued effort, the FOIC example may offer land managers a viable, innovative, and effective management model for future public land management challenges. Research into public lands such as Indian Creek could result in positive gains for land managers, recreational users, and the climbing community as a whole.

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Appendix 1: Indian Creek Stakeholders

Bureau of Land Management (BLM): *Land Manager – BLM Monticello Field Office.* “The BLM are very supportive of the Friends of Indian Creek, and want to ensure the success of the management plan as much as the climbers. The BLM wants to keep Indian Creek “the way it is.” (FOIC, 2010). The BLM authored the Indian Creek Corridor Plan (ICCP).

BLM Objectives (as stated in the 2004 “Indian Creek Corridor Plan and Environmental Assessment”):

- Protect natural resources
- Protect cultural resources
- Provide a variety of safe visitor services to the users of the Indian Creek Corridor

Climbers: As climbers constitute the primary user group in Indian Creek, climber impact is the central cause of environmental degradation. Climber activity, and subsequent impact, can be grouped into two general categories: climbing and camping.

Friends of Indian Creek (FOIC): *Climber Advocacy Group.* Created through the work of the Access Fund specifically to organize climbers in Indian Creek, the FOIC functions with the mission to “promote responsible recreation to ensure the conservation of Indian Creek’s natural resources and primitive character” (FOIC, 2008). The FOIC currently is the unofficial climbing “ambassador” organization to the BLM, and is working closely with the BLM to lessen climber impact in Indian Creek.

Access Fund: *Climber Advocacy Group.* The Access Fund (founded in 1990) is national advocacy organization with the mission of keeping climbing areas open and conserving the climbing environment. The Access Fund was an early and consistent representative for climbing interests in Indian Creek in negotiations with the BLM. The Access Fund initiated the creation of FOIC and continues to provide support to the FOIC in the form of grant funding, and policy advice.

American Alpine Club (AAC): *Climber Advocacy Group.* The AAC has been inconsistent and sporadic in its involvement in the Indian Creek situation. They have provided modest monetary support to FOIC and assisted in efforts to disseminate information. They are not considered major actors, but are consistently recognized as stakeholders.

Rocky Mountain Field Institute (RMFI): RMFI is a Colorado Springs nonprofit organization dedicated to the preservation and restoration of natural areas. RMFI’s stated goal in Indian Creek is “to contribute to the preservation of Indian Creek Canyon through the completion of recreational impact mitigation, restoration, and visitor education and stewardship programs” (RMFI, 2010). Their stated objectives are:

- Identify and develop access trails to popular climbing sites.
- Close and restore social trails and abandoned roadbeds.
- Prepare trailhead information and visitor education materials.
- Assist the Bureau of Land Management and The Nature Conservancy in identifying recreation management, conservation, and restoration programs.

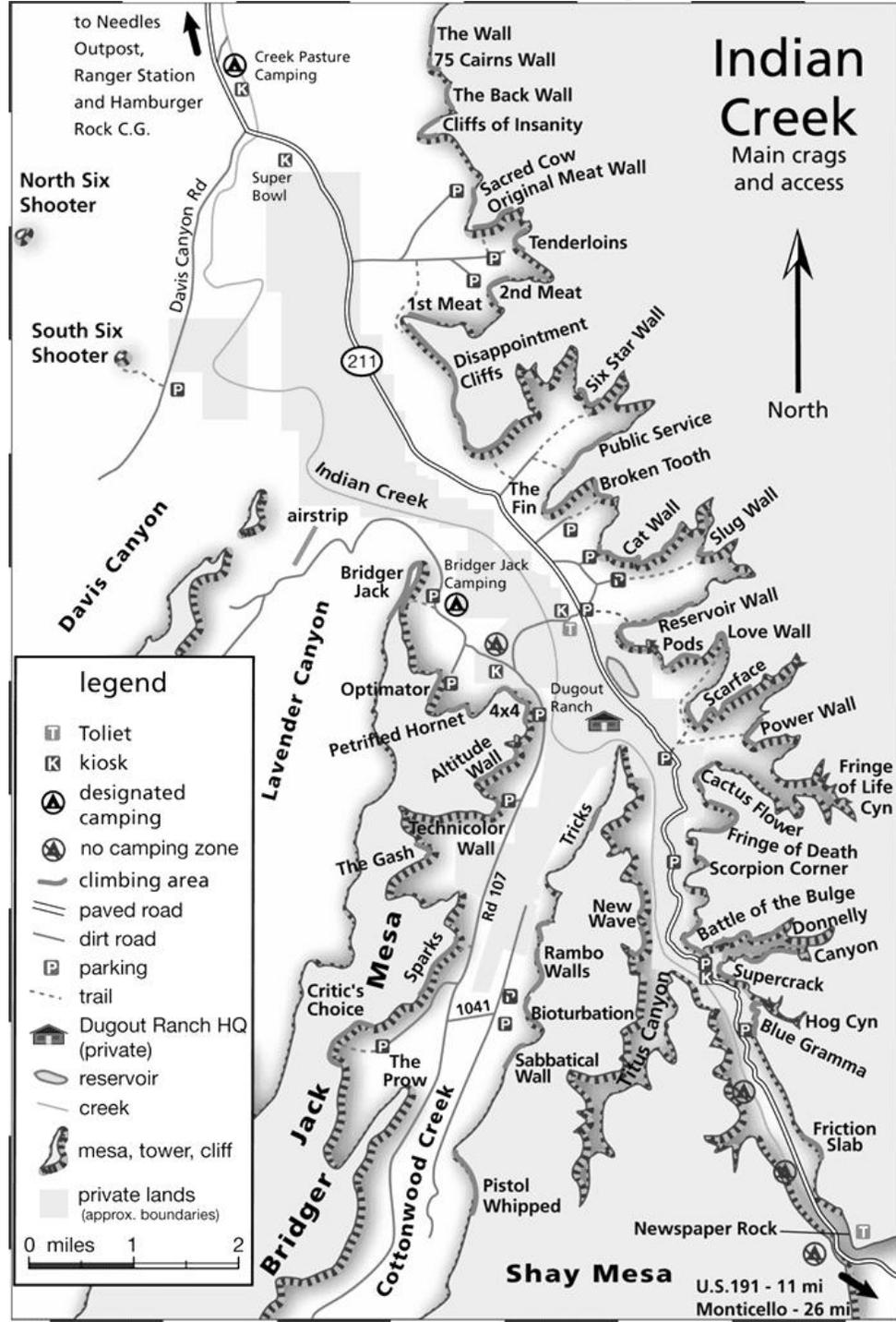
The Nature Conservancy (TNC)/ Dugout Ranch: *Conservation Organization/Working Ranch.* TNC is interested in conserving the environmental landscape of Indian Creek. TNC allows access on some of its private property at Dugout Ranch for recreational purposes, including rock climbing. The Dugout Ranch is a historically significant enterprise in Indian Creek, and is involved as a primary stakeholder as some of the most popular camping and climbing locations (including parts of the Bridger Jack area and Supercrack Buttress) are located on Dugout Ranch property. While TNC currently owns the Dugout Ranch, Heidi Redd, of the Redd family (historical owners of the property) continues to live on and operate the working ranch. The relationship between climbers and the Redd family is complicated, based on both positive and negative encounters between the two groups through the years.

Other Indian Creek Visitors: While climbers constitute the primary user group in Indian Creek, there are a small number of non-climber visitors to Indian Creek. According to the BLM ICCP and Environmental Impact Assessment, most of these visitors are “over flow” from surrounding areas, or visitors to other areas looking for free camping. These visitors include campers, ATV recreators, bikers, and hikers.

Appendix 2

Map of Indian Creek

(FOIC, retrieved from www.friendsofindiancreek.org on December 3, 2009)



Appendix 3: Sample Taken from FOIC Management Policies (FOIC, 2006)



RULES AND CONSIDERATIONS AT INDIAN CREEK |

The BLM's final 2005 Indian Creek Recreation Plan outlines management policy for camping and climbing at Indian Creek and provides an unprecedented opportunity for climber self-management with a no-fee trial period. This Plan seeks to protect the area's fragile resources and prevent unnecessary developments that would forever change Indian Creek's unique primitive character.

CAMPING» Some areas are now closed to camping (notably, the Newspaper Rock Campground and about 10 campsites at the beginning of the Bridger Jack Road), although more than 96% of Indian Creek's 100,000 acres remain open to camping. Campers can continue to use nearly all of their favorite dispersed campsites so long as no new sites are established. The "Bridger Jack" and "Creek Pasture" camping areas (the latter informally designated for group camping) will be open to designated sites only. If you must have a fire only use pre-existing sites, bring in all your own wood and keep the fire small. Although downed trees and shrubs may seem good firewood, the resource is limited and of high nutrient value for future plant and soil development. Never break off limbs from live trees for firewood.

CLIMBING» Actual climbing restrictions in the plan are few. As always, don't climb where it conflicts with rock art or other historic writings and structures. Federal law requires the BLM to protect these cultural sites by managing them so that they are not impaired. Contact the BLM for current information. [435-587-1500] Although there are no seasonally posted restrictions on climbs in Indian Creek, some climbs may also be closed that adversely impact nesting raptors/owls. The establishment of new routes and the placing of anchor bolts remains permitted, but must be camouflaged.

DUGOUT RANCH |

Indian Creek's 5,207-acre Dugout Ranch, with its adjacent 300,000 acres of public grazing lands, encompasses 42 miles of delicate desert streams, several rare wildflower species, and a number of undisturbed natural "relict" areas. The Dugout Ranch has a long ranching tradition dating to at least 1918. For nearly forty years, Heidi Redd has run the Indian Creek Cattle Company and held the Bureau of Land Management grazing leases adjacent to the Ranch. These grazing "allotments" cover significant Indian Creek locations including the popular campsites along the Bridger Jack Road and Superbowl Site, and the fields below Cat Wall. On most days you can see Heidi's cows or horses grazing on these public land allotments.

In 1997, with significant support from the outdoor industry, the Redd Family sold the ranch to The Nature Conservancy with the twin goals of preserving the family's tradition of responsible stewardship while retaining the undeveloped character of the area. Under the agreement, Heidi Redd will reside on a portion of the ranch for the rest of her life, and lease the ranch to managing her cattle operation. The Conservancy and the Redd family request that visitors respect their private property and privacy. For more information, please contact the Moab Project Office of The Nature Conservancy at 435-259-4629.

ACCESS, CLIMBERS, AND COWS AT INDIAN CREEK» Many climbers are drawn to Indian Creek not only for its unique hard-core crack climbing, but also its primitive, wide-open feeling. If the "Creek" doesn't exemplify the Wild West then no place does. Still, what climbers may perceive as public land might actually be private Dugout Ranch property, what now seems like unmanaged use could in the future be closed or restricted.

PRIVATE LAND» Climbers cross private property every time they approach Supercrack Buttress and Scarface Walls, among others, and every time we camp or climb at Bridger Jack. For many years, crossing Dugout land was tolerated because of the positive relationship forged between a few climbers and longtime owner of the Ranch, Heidi Redd. A recent informal compromise restricts camping on the initial portion of the Bridge Jack Road in return for continued climbing access across Dugout property. *This agreement may be reviewed in the future.

PUBLIC LAND» There are real impacts associated with grazing on public lands, and some would rather not see cows grazing at all along the Bridger Jack Road and other public land allotments.

Do not climb when the rock is wet, such as immediately after a rainstorm. Small features or footholds on sandstone will break more easily when the rock is wet. Unload gear and take breaks on large rocks or other durable ground to avoid damaging vegetation. If you are in a group and using top ropes be considerate of other people wanting to access these climbs.

TRAILS, VEHICLES AND PARKING» Use existing access trails whenever possible and never "create" new roads or campsites. A few footsteps off the trail may damage fragile desert plants and soils, accelerate erosion, and spread noxious weeds. If you are hiking in areas without trails follow existing drainages and stable ground. Avoid parking along HWY 211 where posted. Keep vehicles on existing dirt roads and park only in designated sites. Check out the map on the reverse side of this brochure for more information.

DOGS» Pets cause impacts. Particularly around the base of climbs, prevent your dog from digging and chewing vegetation, and chasing wildlife or running off trail. Bring a plastic bag for dog waste and pack it out. Be considerate of other users and control barking.

TOILETS» Currently the only toilet facilities in Indian Creek are those located at Newspaper Rock, Hamburger Rock off the Lockhart Basin Road, and at the Beef Basin turn-off from HWY 211. Where no toilet is available the Indian Creek management plan requires that people use a wag bag or other personal portable sanitation system and pack it out. Don't throw these bags in the toilets, pack them out.

HUMAN WASTE» A trial pack-in/pack-out policy will be enforced for all human waste and garbage at Indian Creek. With financial help from the American Alpine Club, Access Fund and Friends of Indian Creek, new kiosks have been installed at a few key locations that have information on management changes, in particular the new human waste policy. "Wag Bag" dispensers on the kiosks provide campers with free human waste disposal bags (donations are encouraged).

However, Heidi's Indian Creek Cattle Company pays for that right, and has for several decades now. Since she began ranching the land in the mid-1960s, Heidi has been conservation minded. Indian Creek Cattle Company has always run fewer cattle than its predecessors and often fewer than current permits allow.

CLIMBERS AND COWBOYS» In a number of areas at Indian Creek, conflicts have sprouted between climbers and Heidi's cattle operation. Even if you feel you have an absolute right to camp and climb at the Creek, following these few basic guidelines may help keeping you climbing on some of Indian Creek's best crags.

CONTROL YOUR PETS» If you see cattle or horses approaching your camp, or as you drive to your parking area, TIE UP YOUR DOG! Don't assume that your mellow beast won't cause any problems, because even distant barking can aggravate cows and horses. Whether or not your dog has tried to round up some cattle, someone else's dog has—probably recently. Heidi and her cowboys are at the end of their rope, so be proactive and keep the hounds under control.

COURTESY» Be respectful of Heidi and her cowboys if you see them. Remember, The Nature Conservancy owns, and Heidi leases, the private property of Dugout Ranch and they control your access privileges to some of the best crack climbing in the world. More importantly, being friendly is the right thing to do. Consider not climbing at a few key locations that require walking across Dugout property, especially Paragon Prow, New Wall and New Wave Wall, as these areas in particular infringe on the privacy of the Ranch. Don't park anywhere that will get in the way of moving cows.

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The Nature Conservancy | Moab Office | 435-259-4629
The Rocky Mountain Field Institute | 719-471-7736

Appendix 4

Table 4: Indian Creek Management Policies

<i>Use wag bag</i>	Visitors are asked to use “Wag Bag” human waste disposal supplies.
<i>Carry out wag bag</i>	Visitors are banned from leaving “Wag Bags” or other human waste disposal supplies at camping or climbing sites.
<i>Use designated camping</i>	Visitors are directed to limit camping only to designated camp sites.
<i>Use established trails</i>	Visitors are directed to use existing trails and avoiding off-trail travel.
<i>Act courteous to cowboys</i>	Visitors are directed to act courteously when encountering cowboys or other personnel from the Dugout Ranch.
<i>Pack out other garbage</i>	Visitors are directed to pack out all garbage.
<i>Rock art</i>	Climbing is banned where it conflicts with rock art or other historic writings and structures.
<i>Donate to wag bag</i>	Visitors are asked to voluntarily donate money via “Wag Bag” collection locations to support “Wag Bag” program.
<i>Rock wet</i>	Visitors are directed to refrain from climbing when the rock is wet.
<i>Bring firewood</i>	Visitors are directed to bring their own firewood for campfires.
<i>Designated parking</i>	Visitors are directed to park only in designated parking sites.
<i>Designated fire site</i>	Visitors are directed to build fires only in existing fire sites, and not establish new fire pits or rings.
<i>Durable surfaces</i>	Visitors are directed to unload gear and take breaks on durable surfaces.
<i>Human waste</i>	Visitors are directed to pack out human waste.
<i>Wood scavenging</i>	Related to the policy that directs visitors to bring their own firewood, visitors are banned from scavenging firewood from natural vegetation.
<i>Pets and cattle</i>	Visitors are tie up pets when horses or cattle are nearby
<i>Control pets</i>	Visitors are directed to control pets by preventing them from digging, chewing vegetation, chasing wildlife, or running off trail.
<i>Pick up pet waste</i>	Visitors are directed to pick up and pack out pet waste.

Appendix 5: Interview Script

I. Relationship to Indian Creek

1. Are you an (a) FOIC member, (b) climber at Indian Creek, (c) employee of the BLM, or (d) other?
 - a. If other, please describe your relationship to Indian Creek.
2. How long have you been involved with the FOIC, BLM, or Indian Creek?
3. Do you climb in Indian Creek?
4. How long have you been visiting Indian Creek?
5. Approximately how many days in the past five years have you spent at Indian Creek?
6. Approximately how many nights in the past year have you camped at Indian Creek?
7. How frequently did you visit Indian Creek prior to 2005?
8. When you visit Indian Creek, what areas do you typically visit?

II. Indian Creek Characteristics

1. [DP1a] How clearly are the boundaries of Indian Creek defined?
 - a. [DP1b] Are there any limitations to who may access Indian Creek?
 - b. [DP1b] Are there any limitations to when visitors may access Indian Creek?
2. [DP3] To what extent are the individuals who climb at Indian Creek...
 - a. involved in the creation or modification of the rules guiding visitor behavior?
 - b. able to be involved in the creation or modification of such rules if they desire?
3. [DP4] Is there a formal monitoring system, established by an agency or organization with the responsibility of monitoring climber behavior in Indian Creek?
 - a. [DP5] If yes, what kinds of sanctions are imposed for inappropriate or improper behavior?
 - b. [DP5] Are there different levels or kinds of sanctions depending on the seriousness of the infraction?
4. [DP4] Is there informal monitoring between climbers of climber behavior?
 - a. [DP5] If yes, what kinds of sanctions are imposed for inappropriate or improper behavior?
 - b. [DP5] Are there different levels or kinds of sanctions depending on the seriousness of the infraction?
5. [DP6] Is there a process for resolving disputes between climbers regarding improper behavior?
6. [DP6] Is there a process for resolving conflicts between different user groups?
7. [DP6] Is there a process for resolving disputes between climbers and land managers?
8. [DP7] To your knowledge, is there any obstruction to climbers organizing their own groups or organizations related to climbing in Indian Creek?
9. [DP7] To your knowledge, is there any obstruction to climbers creating their own rules guiding behavior in Indian Creek?

III. Involvement with FOIC and Indian Creek Management Policy

1. In what ways (if any) were you involved in the creation of the FOIC organization?
 - a. How did you become involved?
 - b. What motivated you to become involved?

- c. What were you hoping to accomplish through your involvement?
2. In what ways (if any) are you involved with the FOIC today?
3. In what ways (if any) were you involved in the creation of Indian Creek management policy?
 - a. How did you become involved?
 - b. What motivated you to become involved?
 - c. What were you hoping to accomplish through your involvement?

IV. Climber Adherence to Indian Creek Management Policy

1. Based on your observations of climbers at Indian Creek, to what extent do you think that climbers in Indian Creek currently adhere to Indian Creek management policies?
2. I am going to list several Indian Creek management policies. Based on your observations of climbers camping in Indian Creek camping areas, grade climber compliance with each policy as an A, B, C, D, or F, similar to school grades, with an A signifying “excellent” and F signifying “fail”.
 - a. Limiting camping only to designated sites.
 - b. Building fires only in existing sites.
 - c. Bringing their own firewood.
 - d. Adherence to policy banning firewood scavenging.
3. Based on your observations of climbers climbing in the Indian Creek climbing areas, grade climber compliance as an A, B, C, D, or F, regarding each of the following policies:
 - a. Adherence to the climbing ban where it “conflicts with rock art or other historic writings and structures”.
 - b. Adhere to the climbing ban when rock is wet.
 - c. Adherence to policy directing climbers to unload gear and take breaks on durable surfaces.
4. Based on your observations of climbers in Indian Creek grade climber compliance as an A, B, C, D, or F, regarding each of the following policies:
 - a. Use of existing trails and avoiding off-trail travel.
 - b. Parking only in designated sites.
 - c. Controlling pets by preventing them from digging, chewing vegetation, chasing wildlife, or running off trail.
 - d. Picking up and packing out pet waste.
 - e. Tying up pets when horses or cattle are nearby.
 - f. Packing out human waste.
 - g. Packing out other garbage.
 - h. Taking advantage of “Wag Bag” human waste disposal supplies.
 - i. Voluntarily donating money via “Wag Bag” collection locations.
 - j. Leaving “Wag Bags” or other human waste disposal supplies at camping or climbing sites.
 - k. Acting courteously when encountering cowboys or other personnel from the Dugout Ranch?

5. In general, would the grade you assigned for the above policies be different based on the climbing group in question (for example, Moab climbers versus visiting out-of-state climbers)?

VI. Evidence of Climber Impact at Indian Creek

1. In comparing the evidence of climber impact on the environment of Indian Creek five years ago with the evidence of climber impact today...
 - a. Has climber impact changed since FOIC involvement?
 1. If yes, how has impact changed?
 2. Do you attribute such changes to FOIC involvement?
 - a. Why/ Why not?
 - b. What impact by climbers has not changed since FOIC creation?
 1. Why do you think this is?

VII. FOIC Effectiveness

1. What do you perceive to be FOIC's primary role in Indian Creek?
2. To what extent do you think FOIC has been effective in serving the climbing community?
 - a. Why/ Why not?
3. How effective do you see FOIC efforts to be in the near future?

VIII. Wrap Up

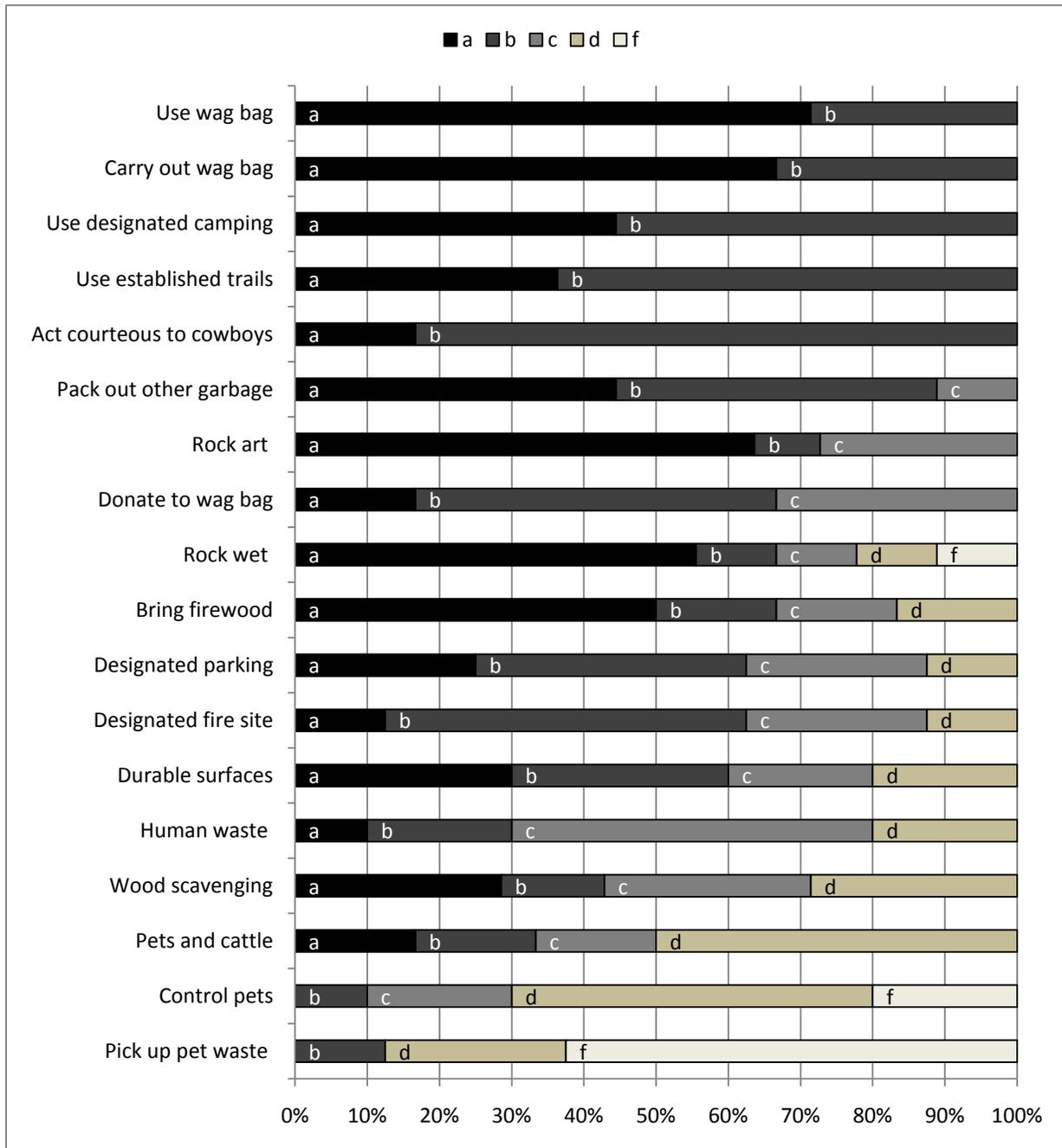
1. Do you have any thoughts regarding climber behavior in Indian Creek or the FOIC that you have not been able to express?
2. Any information about climber efforts in Indian Creek that you feel is important but has not been addressed in this interview?
3. What lessons have you learned through the FOIC efforts that you feel would be informative to others?
4. What components of the FOIC example, or lessons learned from FOIC efforts, do you think can be applied to similar climbing management situations?

NOTE: One question, pertaining to the second design principle, was asked of interview participants via email following the phone interviews. The question was:

“To what extent do you perceive the rules that guide climber behavior in Indian Creek to be congruent (in-line) with conditions in the area?”

Appendix 6: Results

Figure 1: Climber Compliance Grades by Policy



Appendix 7: Recommendations

Recommendation 1: Increase Compliance with Management Policies Regarding Pets

Increase climber compliance with management policies regarding pets by clearly communicating both the need for policies that require pets to be under control at all times and require pet owners to pick up waste. Impose potential consequences if the policies continue to be ignored.

Recommendation 2: Clearly Define and Mark Boundaries between Public and Private Property

Encourage respect for private property among climbers, and help ensure continued access to popular areas of Indian Creek, by more clearly defining boundaries between public and private property (e.g.: placing signs at boundaries notifying climbers that they are accessing private property).

Recommendation 3: Encourage a System of Graduated Sanctions

In order to encourage user monitoring of policy violations, FOIC should encourage and possibly implement a system of graduated sanctions, meaning that minor and first time infractions result in lesser consequences, while major and repetitive infractions result in more serious consequences.

Recommendation 4: Provide Climbers with Methods for Resolving Conflicts

Encourage positive relationships and continued collaboration both among climbers and between different user groups in Indian Creek by establishing standardized, low-cost arenas and procedures for resolving conflicts.