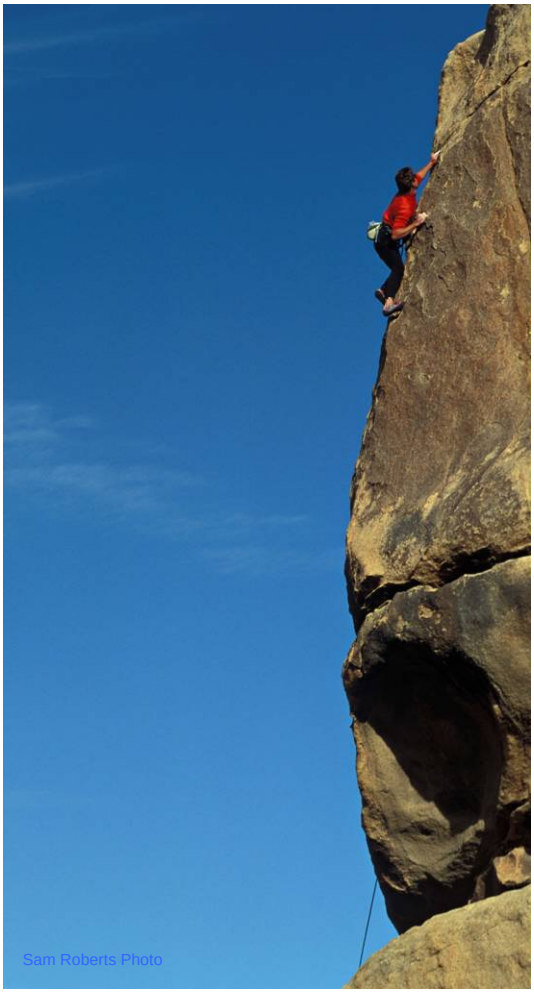
Joshua Tree National Park Wilderness Rock Climbing Study

Final Report



Erik Murdock
Joshua Tree National Park
August 20, 2004

ABSTRACT

Joshua Tree National Park (JTNP) has the highest concentration of rock climbing routes in the world and an estimated 250,000 people visit JTNP each year to rock climb. Although less than 2% of rock climbers visit the designated wilderness areas, a steady increase in the number of climbers has focused attention on managing wilderness climbing resources to retain wilderness character. The main controversy centers on rock climbers placing fixed anchors, or bolts, while establishing new climbing routes. Park staff believes that continued unregulated placement of bolts in JTNP's wilderness leads to greater impacts and is unsustainable. This study examines wilderness climbing resources and wilderness visitors in order to influence the creation of streamlined management plans that are site-specific and efficient instead of over-regulatory and cumbersome. Analysis of data collected during two years of fieldwork considers factors such as travel networks, climbing route attributes, sensitive resources, fixed anchor distribution, and climber preferences. Results indicate that climbing route difficulty, quality and location are the most important factors when predicting climber destination choice. At JTNP, fixed anchors are not significant climbing resource attractors. Cartographic modeling, based on climber behavior, visitor counts, and a climbing resource inventory, illustrates the perimeters of high, moderate, and low-use areas. This comprehensive understanding of recreation flow allows fixed anchor regulations and wilderness climbing management to address site-specific issues.

ACKNOWLEDGEMENTS

I thank the NPS for recognizing the need to understand wilderness and climbing. The NPS hired me for about two years to approach research questions from a unique perspective. They took a risk, and I thank Pat Suddath, Judy Bartzatt, and Dan Messaros for their continued support. Special thanks go to Pat who fought hard to get this project off the ground.

I thank the Access Fund for financial support and for being an excellent clearinghouse for all things climbing.

Prof. Randy Gimblett, my research advisor, convinced me to pursue this study in the fall of 2000 and politely listened to hours of ideas and theories. Prof. Phil Guertin helped with conceptual concerns, statistics, and field work (one week of GPS work in June!). He also has become a trusted climbing partner. Prof. Terry Daniel helped with the survey and turned me into an environmental psychologist (sort of). Prof. Krys Stave was great for discussing methods, results and publishing. She also became a good climbing partner in the process.

My volunteers were a motley bunch of climbers, hikers, wilderness advocates, economists, family members, and folks of questionable origins and intentions. Special thanks to Bill Souder, my most qualified volunteer (aerospace engineer), for maintaining equipment and providing reliable field observations. Sal Wilson, Bob Jensen, Jeremy Murdock, and Dan Walsh withstood tough, hot conditions during the early Wonderland of Rocks resource inventory (many others helped out for a day or two). Dino Banco provided a lot of the Split Rock resource inventory. Maggie Lucas and Shawn Matusewicz were spirited survey administrators who collected 90% of the surveys. Eric Rhicard created all the survey images. Scott Fischer, NPS climbing ranger, was instrumental during many phases of the project. James Hilger, an economist at UC Berkeley, was of great assistance during a full two-day statistics session in Berkeley. He too became a climber partner. Many other volunteers helped out in various ways, and I thank them all.

I thank Lisa Schwartz for putting up with all this madness.

I also greatly appreciate the donations from the outdoor industry. These donations made the survey more successful and provided extra incentive to volunteers. Industry supporters include Chessler Books, Metolius, Nike ACG, Patagonia, Sterling Rope, Summit Hut and Voodoo.

Thanks to all,

Erik Murdock
August 3, 2004
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INTRODUCTION

Understanding the relationships between resource impacts, visitor experience and visitor flow is a fundamental issue addressed by Joshua Tree National Park (JTNP) wilderness managers. Over one million people visit JTNP each year due to its proximity to three major metropolitan areas and international acclaim. Nearly 80% of JTNP is designated as wilderness and is thereby managed according to the Wilderness Act of 1964. The Wilderness Act (Section 2[c]) states that wilderness should afford "solitude" and "untrammeled" landscapes.

JTNP is world renowned for the quality of its rock climbing and boasts the highest concentration of rock climbing routes in the world. The number of new climbing routes has dramatically increased since the 1940's, with the most significant period of route development between the early 1970's and present day. There are more than 5,000 published rock climbing routes, and there are hundreds, if not thousands, of unpublished, established rock climbing routes. Approximately 35% of the climbing routes are located within the JTNP wilderness boundary that currently encompasses 593,490 acres of the park (figure 1). An estimated 250,000 people visit JTNP each year to rock climb. A steady increase in the number of climbers, and climbing routes, has focused attention on managing wilderness climbing resources to retain environmental integrity and wilderness character.

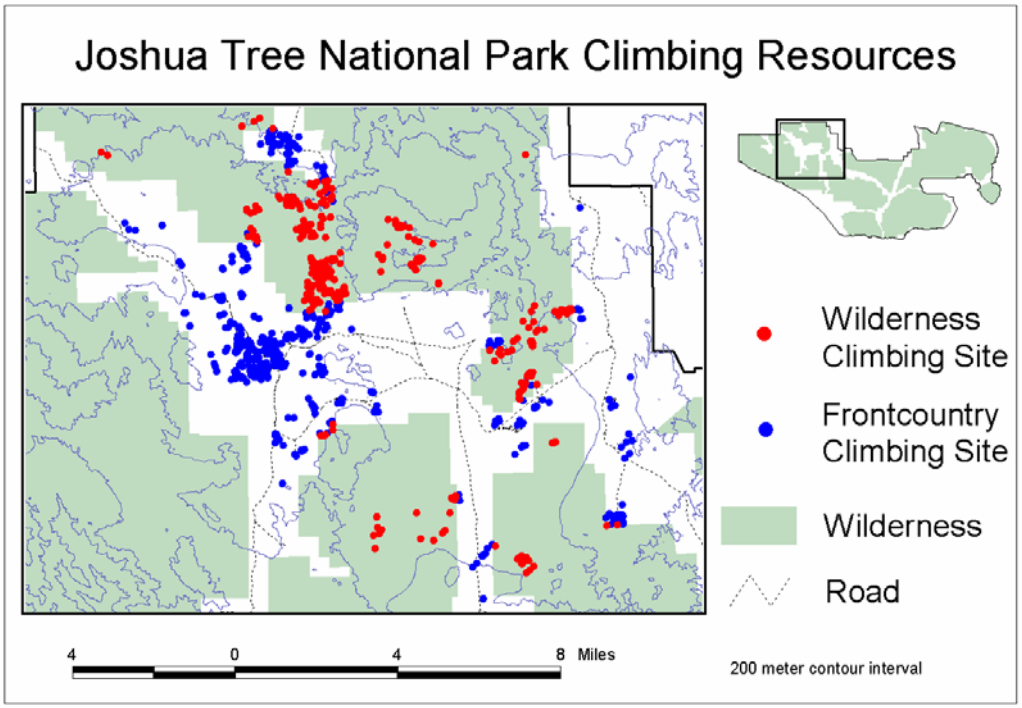

Figure 1. JTNP climbing resource locations.

JTNP wilderness climbing resources are located in the Mojave Desert within a complex and rugged landscape dominated by large (up to 300 feet tall) quartz-monzonite formations. There are relatively few designated trails to the climbing sites, and climbers

can begin their approaches from 17 different locations. Approach times vary from five minutes to three hours. Day-use wilderness permits are not required. The majority of climbers gain information about climbing routes from published climbing guidebooks. Landscape vastness and complexity, limited established trail networks, and the typically solitary nature of wilderness climbing dictate the study design.

Some of the climbing routes follow cracks that allow the climber to use removable protection, although many routes necessitate fixed anchors in order to safely (relative to no protection) ascend and/or descend. Fixed anchors are defined as any piece of climbing protection that is left in place to facilitate a safe ascent or rappel. Typically, fixed anchors are bolts (1/4"-1/2" diameter and 1/2"-3" long) equipped with small steel hangers.

The main controversy regarding climbing in wilderness centers on rock climbers placing fixed anchors, or bolts, while establishing new climbing routes in designated wilderness (see Appendix 1 for a detailed history of the fixed anchor controversy in the United States). Since February 1993, JTNP has prohibited the placement of fixed anchors in wilderness until it understands the potential environmental and social impacts associated with rock climbing and fixed anchors. Environmental impacts may include the proliferation of social trails and the degradation of cliff and cliff-base ecosystems. In addition, some environmental groups believe that fixed anchors are not acceptable according to their interpretation of the Wilderness Act of 1964. The majority of climbers, on the other hand, believe that fixed anchors are an insignificant impact on wilderness (Waldrup and McEwen 1994, Schuster et al. 2001). The 1998 JTNP Wilderness Management Plan states that rock climbing is an appropriate wilderness activity. However, park staff believes that continued unregulated placement of bolts in JTNP's wilderness leads to greater impacts and is unsustainable. Therefore JTNP must determine a management action that allows for wilderness rock climbing, including new climbing route development, and protects the finite wilderness resource.

OBJECTIVES

The main objectives of this study were to:

1. Evaluate the temporal and spatial distribution of wilderness climbers with regard to specific climbing sites, fixed anchors and sensitive wilderness resources.
2. Understand wilderness climber preferences and behavior patterns.
3. Identify the wilderness climbing resource attributes that are most responsible for attracting heavy use at climbing sites.
4. Recommend potential fixed anchor regulations and/or permitting processes.
5. Identify wilderness locations in need of mitigation, attention, and further study.

STUDY DESIGN

To understand the relationships between the activity of wilderness climbing and fixed anchors, biological resources, cultural resources and wilderness attributes, such as

solitude, one must examine the entire wilderness climbing resource system. The wilderness climbing resource system is composed of climbing sites, travel networks, and wilderness climbers. This study combined a climbing resource inventory, wilderness visitor monitoring data, and wilderness climber behavior profiles to achieve the objectives listed in the previous section.

Erik Murdock, a National Park Service researcher and University of Arizona doctoral student, coordinated the study. Fieldwork began in February 2002 and was completed in March 2004. Twenty eight volunteers were used to administer surveys, collect climbing resource data, and maintain monitoring equipment.

Climbing Resource Inventory

The climbing resource inventory catalogs established wilderness climbing formations, routes, and non-designated climbing access trails. Attempts were made to find all wilderness climbing routes using published guidebooks, unpublished route lists, websites, personal communication with local climbers and luck. However, the complex landscape, multitude of climbing routes, and continuous proliferation of new climbing routes made a comprehensive inventory impossible. Climbing guidebook authors spend years trying to document all the established climbing routes and still cannot include every climbing route. Therefore, the climbing resource inventory represents a conservative estimate of the number of climbing routes and associated climbing resources. There are over 1800 climbing routes on an estimated 300 climbing formations in JTNP wilderness (figure 1). The location of each formation was recorded in a GIS (geographic information system) database.

For each climbing route on every formation, the location, difficulty, number of fixed anchors, number of fixed anchors at the belays or lowering stations, quality, approach time, and cliff-base environmental condition were recorded. The cursory assessment of the cliff-base of each climbing route, also called the staging area or belay area, was conducted using base condition categories listed in table 1.

Base ID	***Description***
1	Belay area is entirely rock with no vegetation, soil or sand
2	Belay area is mostly rock, having more than 50% rock with less than 50% vegetation
3	Belay area is entirely soil with little vegetation
4	Belay area is highly vegetated (more than 85%); includes shrubs, grass, trees, and cactus.
5	Belay area is moderately vegetated, having more than 50% vegetation with less than 50% rock.
6	Belay area is mostly sand with less than 20% rock

Table 1. Base condition category table

The Yosemite Decimal System (YDS), an open-ended interval scale starting with 0, was used to measure difficulty. The easiest climbing route at JTNP is graded 5.0 and the most difficult to date is graded 5.14 (figure 2). The "5" represents the class of climbing that necessitates ropes and other technical climbing equipment. Difficulty levels above 5.9 use a more descriptive scale that includes the suffixes "a", "b", "c", or "d". For example a 5.10a is slightly easier than a 5.10b. Quality is an interval scaled assessment of a climbing route's aesthetics that considers rock quality, route length,

protection, sustained nature, and climbing style. Quality ratings at JTNP range from 0 to 5 (although Bartlett guides use a 0-3 rating system). A quality rating of 5 denotes an outstanding climbing route and is reserved for routes of unique character. Published JTNP climbing guidebooks list quality ratings next to difficulty grades. Difficulty and quality measurements were based on published information (Bartlett 1995, Bartlett 1998, Vogel 1992), climbing experience, and best judgments. In addition, the safety of the fixed anchors, presence of litter, cliff-base vegetation, and other notable route characteristics were recorded. Staging area size was not measured due to time constraints. However, a smaller scale study of high-use staging areas was conducted during spring 2004 (Appendix 2). A Microsoft Access database was used to link climbing route data to formation locations. In this way, the spatial distribution of climbing opportunities can be mapped, as each formation affords a unique opportunity with regard to variances in route difficulty, quality, and fixed anchor availability.

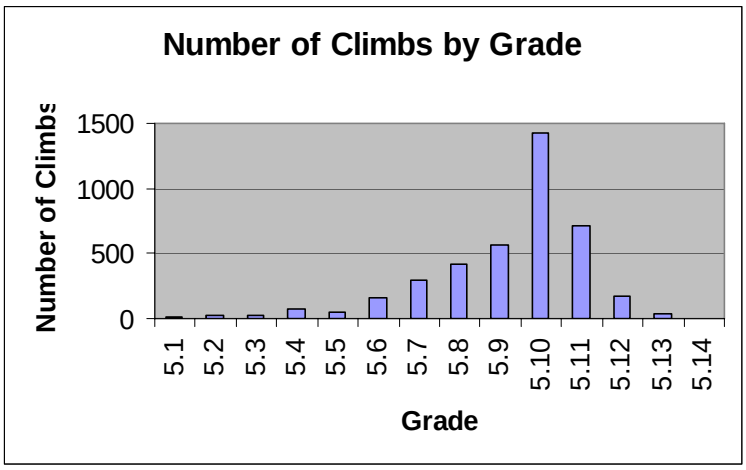

Figure 2. Number of climbs at JTNP by YDS grade.

Select wilderness climbing resource access trails were mapped using GPS (Global Positioning System). Although other wilderness users, such as equestrians and hikers, use wilderness trails, the trails serve as the transportation network to climbing sites. Trails were classified according to width, use level, and character according to a 5 level classification system (table 2).

Class	***Description***
1	Heavily used discrete single trail devoid of vegetation. Trail is characterized by hard packed soil, lack of vegetation, damaged vegetation near trail, and noticeable footprints. Greater than four feet wide. Class 1 trails are typically associated with smaller, spur trails.
2	Heavily used trail area greater than 10 feet wide. Typically characterized by well-used braided trails that separate and reconnect and are 2-5 feet wide. Braided trails are characterized by hard packed soil or sand, lack of vegetation, damaged vegetation near trail, and noticeable footprints. Trail may drop into washes and reappear on banks. Class 2 trails are typically associated with smaller, spur trails.
3	Moderately used discrete single-track trail that is less than four feet wide. Characterized by hard packed soil or sand, little vegetation, damaged vegetation, and noticeable footprints. Class 3 trails may drop into washes and reappear on banks. Class 3 trails may include indistinct sections on rock with short sections of boulder hopping.
4	Low use vague single-track trail. Characterized by intermittent sections of hard packed soil or sand, damaged vegetation, and some footprints. Less than 2 feet wide. Class 4 trails may be unnoticeable for up to 50 feet and included long sections of boulder hopping.
5	Dispersed use area. No distinct trail. Characterized by some footprints and short, intermittent Class 4 trail sections.

Table 2. Wilderness climbing approach trail classification system.

Conditions at various points along trails were photo-documented and recorded using highly accurate (less than 0.5 meters) GPS techniques so that future studies can return to those locations to monitor conditions. Many of the trails do not deposit climbers at the bases of formations, and therefore climbers typically scramble through boulders or bushwhack short distances. In these situations, travel path locations were estimated and recorded as non-existent. Modeling requirements necessitated that the travel network connect to all destinations. This baseline data is critical not only to modeling, but also because the park plans to monitor both climbing resources and wilderness access trails in order to understand whether the ecological integrity of wilderness resources is being degraded.

The principal researcher and volunteers spent approximately seven months cataloging, documenting and field checking wilderness climbing routes and access trails. Despite this effort, the Sheep Pass and Geology Tour wilderness climbing areas were not comprehensively field checked. Information on these areas was derived from published and unpublished climbing guidebooks, websites, and personal communication.

Wilderness Visitor Monitoring

Wilderness visitors were monitored to determine the use levels for specific wilderness access trails, the percentage of visitors that are climbers and the temporal distribution of use. A combination of people-counting devices, visual observation, and time-lapse cameras was used to collect data.

Infrared counters and pressure sensitive pads were placed at wilderness access locations to record the time and date of every wilderness entry (figure 3). Monitoring equipment was placed as close to the designated wilderness boundary as possible. Passive infrared counters, that sense motion and heat differences in an approximately thirty foot square area, were used at low-use wilderness access locations that do not have a discrete trail. The main drawback of the passive infrared counter is that it records one event for each group that passes through the monitoring zone. Active infrared counters, that transmit a pulsing infrared beam across a trail, were used in high-use areas with well-used trails and record an event for each person who passes through the monitoring zone. Pressure sensitive pads, that are triggered when the pad is weighted, were used on high-use trails in open areas that preclude above ground monitoring equipment. Monitoring devices were left in place for nine months to two years (depending on wilderness access location) so that seasonal variations and anomalous periods were identified.

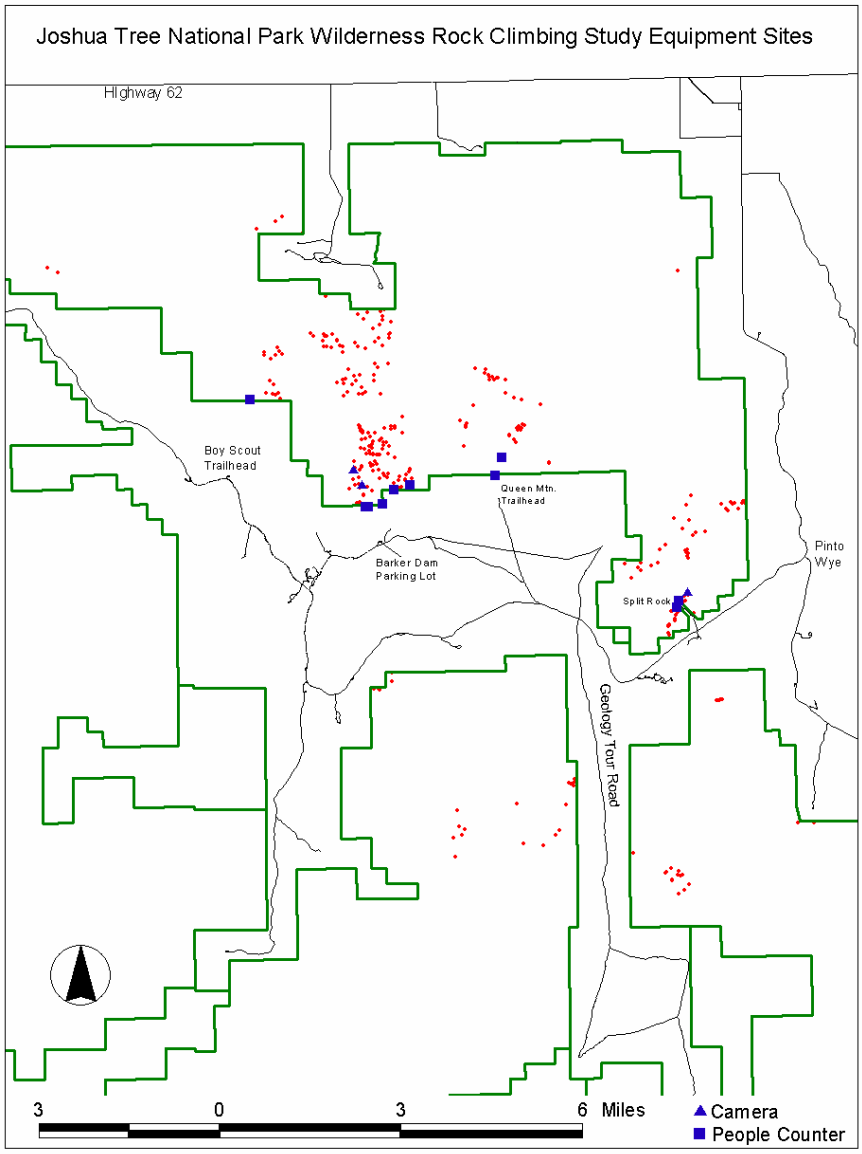

Figure 3. Monitoring equipment locations

Visual observers were positioned at wilderness access locations to record the percentage of wilderness users that are climbers and to validate the people counting devices. Visual observers also recorded group size. Random observations were scheduled to sample approximately 15% of the year and were stratified according to day of week and season (Watson et al. 2000).

Time-lapse cameras recorded use patterns at select high-use wilderness climbing formations (table 3). Cameras were placed at formations that offer a variety of climbing experiences, in effect creating a series of revealed choice experiments. For example, a camera was placed at the Future Games Wall that has high-quality climbing routes ranging from 5.8 to 5.12 that are both equipped with fixed anchors and naturally protected. Chosen formations were initially observed to determine the typical amount of time needed to ascend and descend climbing routes. Individual climbers could not be

identified using the photographs although the resolution was high enough to identify the climbing routes they climbed. Camera timers were set to expose film during daylight hours at an interval suited to the specific climbing routes so that each climber would be photographed during either his or her ascent or descent. Formations were photographed twelve times (2 days at a time) over approximately six months according to a random, stratified sampling plan. Equipment failure, vandalism, and staffing constraints resulted in minor deviations from the aforementioned sampling design.

Climbing Formation	***Observation Period***
Future Games Wall	10/15/03 to 5/29/04
Lenticular Dome	10/8/2002 to 4/18/2003
North and South Astro Domes	7/12/2002 to 3/19/2003

Table 3. Time lapse camera locations

The purpose of the time-lapse photography was twofold. First, it identified the types of climbs that are commonly ascended. Formations that afford a variety of climbing route types insure that climbers can freely choose the difficulty, fixed anchor availability, and quality without being restricted by availability. Second, the photographs recorded the use levels at popular climbing formations. The photograph logs were compared to the wilderness access location monitoring data to determine the percentage of climbers who visit high-use climbing resources relative to the percentage of climbers that disperse throughout the wilderness. The result of this detailed monitoring program is a complete picture, in terms of both space and time, of wilderness climbing resource use. This data also provides JTNP with important baseline trend information.

Wilderness Climber Survey

Climber behavior profiles are used to predict destination choice. Mitchell (1983) describes a climber's decision to visit a specific destination as an opportunity to achieve flow, a euphoric state that occurs during activities that are freely entered into and freely chosen. Climbers seeking flow must successfully match desire, preferences, skill level, and social influences (individual attributes) with an appropriate climbing destination. Studies show that individual attributes, such as experience level, frequency of participation and locus of control, are useful to classify adventure recreation participants and are related to destination attributes such as difficulty, solitude and risk (Fesenmaier 1988, Ewert and Hollenhorst 1989). Ewert (1985) found that more experienced climbers will tend to seek climbing routes that are more rugged, less crowded, and less controlled. However, other researchers found that experience level is related to the perceived detail and specificity of an activity setting and is not correlated to destination attributes (Shreyer and Beaulieu 1986). In other words, dissimilar participants may seek different experiences from the same destination.

JTNP's wilderness climbing resources provide an ideal laboratory to test the relationship between climber's individual attributes and destination choice. Within a relatively small geographic area, JTNP contains thousands of choices that represent every combination of destination setting attributes. A combination of survey techniques was implemented to determine the described relationship (Appendix 3).

The JTNP wilderness climbing survey was designed to collect information on experience level, skill level, frequency of participation, and locus of control. The composite of these attributes describes each climber's level of engagement (Ewert and Hollenhorst 1989). Climbers were also asked to state their preferences, using a Likert scale, on the importance of the following destination attributes: solitude, risk, fixed anchors, difficulty, quality, and approach distances. In addition, they were asked to report all of the climbing routes that they visited that day, revealing their preferences for specific destinations. Finally, each survey participant completed a discrete choice tool that asked climbers to choose preferred destinations from a set of hypothetical choices. Discrete choice analysis determines mathematical relationships between physical attributes of the landscape and perceptual judgments of wilderness visitors. The analysis inductively calculates importance values for each attribute (Louviere 1988, Haider et al. 1998). It elegantly applies to climber behavior profiles because many of the attributes, such as difficulty and quality, are already quantified. The majority of wilderness climbers is familiar with standard rating systems, and tends to perceive the wilderness resource in quantifiable terms.

The survey was administered at various locations within JTNP including wilderness access locations, campgrounds, picnic areas, and parking lots. Adult climbers were asked to participate in the survey upon exiting the wilderness or at the end of their climbing day. Survey refusals were recorded to identify non-response bias. Scheduled survey days at each location were stratified according to the day of week and the relative climbing use levels at each location. Preliminary visitor flow models showed that more than 50% of wilderness climbing occurs on weekends and that the majority of wilderness climbers approach wilderness climbing resources from two access locations. During busy periods, up to 60 visitors (climbers and non-climbers) per day use popular wilderness access locations.

RESULTS

Wilderness Climbing Resource Inventory

A comprehensive JTNP wilderness climbing resource inventory was conducted between February 2002 and November 2003. Field work priority was given to the Wonderland of Rocks, Split Rocks and Queen Mountain areas as they represent 80% (239 of 300 formations) of the wilderness climbing resources and attract the majority of wilderness climbers. Information on the remaining 20% of the wilderness climbing resources was derived from a combination of random field visits, guidebook listings, internet postings, and local expertise. The Wonderland of Rocks area represents 53% of the wilderness climbing formations and in many ways was the focus of this study because it attracts the greatest number of wilderness climbers and is by far the largest contiguous wilderness climbing area. However three types of data were compiled for every wilderness climbing formation in JTNP. They are:

1. location
2. number of fixed anchors
3. attraction index (based on a composite of quality, difficulty and location)

The location of every wilderness climbing formation was entered into a GIS database (appendix 4). Figure 1 (Introduction) displays the spatial distribution of wilderness climbing formations. Formation locations for the Wonderland of Rocks, Queen Mountain, and Split Rock areas were field mapped by project volunteers and validated by local experts. Formation locations for the rest of the wilderness climbing areas were randomly field-validated by Erik Murdock and cross-checked using aerial photos.

The Wonderland of Rocks is a representative sample of wilderness climbing resources. Table 4 is an example of the climbing route database for the Wonderland of Rocks area.

Climb ID	*Rock ID*	*Climb*	*Difficulty*	*Pitches*	*Bolts*	*Anchors*	*Quality*	*Hike Time*	*Base ID*	*Comment*
70	40	Wren's Nest	11	1	0	0	0	30	1	
71	40	Red Eye	8	1	0	0	0	30	1	
72	40	Jah Loo	10.5	1	0	0	0	30	1	
74	43	Sine Wave	9	1	1	0.5	0	90	1	
75	43	Gravity Waves	12	2	5	0.5	5	90	2	4 bad, rusty bolts.
76	43	Gravity Works	11.75	2	1	0	0	90	2	1 fixed nut
77	43	Offshoot	10.5	2	0	0	0	90	2	
78	43	Polytechnics	10.75	1	3	0.5	3	90	1	fat chains and 3/8 anchor bolts
79	43	Psychokenesis	11.25	1	0	0	3	90	2	aka Missing In Action
80	44	Famous Potatoes	11.5	1	2	0.5	1	90	1	rusty 1/4 bolts, 1 on anchor
81	46	Nuclear Arms	12	1	4	1	3	60	1	new bolts drilled next to old ones
82	46	Atom Ant	11.5	1	3	0.5	2	60	1	

Table 4. Example of climbing route database

Table 5 lists select climbing resource inventory results for the Wonderland of Rocks. The complete wilderness climbing resource inventory is included in Appendix 4.

Number of climbing routes	560
Number of climbing formations	160
Number of rappel anchors	172
Number of fixed anchors (on route)	992
Average number of fixed anchors per route	1.77
Average difficulty of routes (YDS)	9.64
Number of routes with durable (rock) staging areas	323 (58%)

Table 5. Select Wonderland of Rocks inventory results

The number and location of fixed anchors in wilderness is critical to an understanding of wilderness climbing resources. In total, 1894 fixed anchors (not including rappel anchors) were counted in the wilderness. This number is considered a minimum, or conservative, as it is assumed that some routes and formations were not located. Nevertheless, it is a good estimate that can be used to describe the extent of fixed anchors in the wilderness. A better way to illustrate the extent of fixed anchors is to map the density. A map showing the density of fixed anchors, according to formation, illustrates the distribution of fixed anchors in JTNP's wilderness (figure 4). It is important to note that some formations have one climbing route while others can have as

many as twenty five. Some climbing routes have fixed anchors while many do not. Figure 4 represents formations that have fixed anchors and should not be interpreted as an indication of route density.

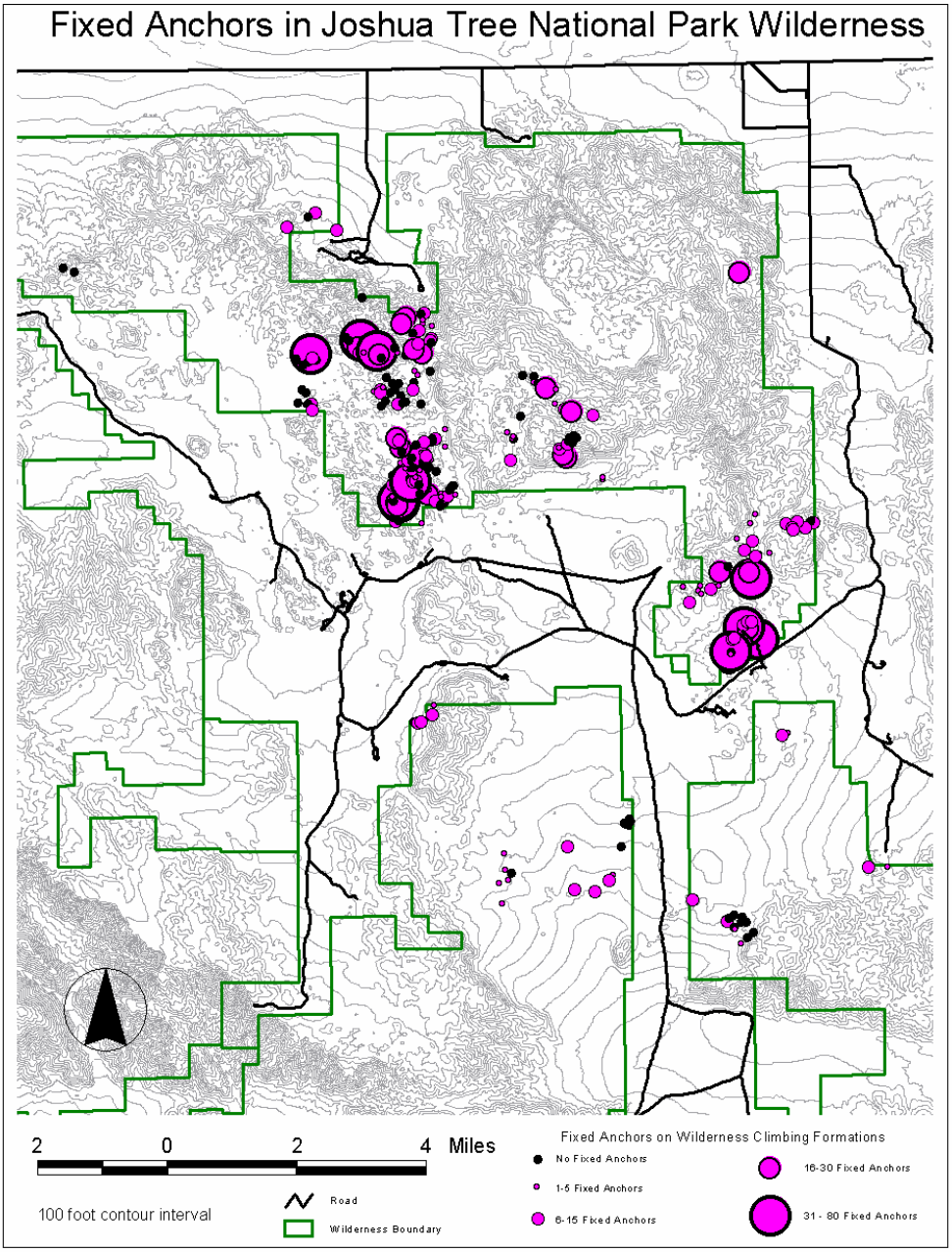

Figure 4. Map of fixed anchor distribution and density

Counting and mapping fixed anchors has limited use. Fixed anchor density maps cannot be used to predict climbing impacts, visitation levels or social trail locations. Fixed anchors are not necessarily associated with anything other than an individual route. In fact, each fixed anchor has a unique attraction to a climber depending on its location, condition and relationship to a given climbing route. However, fixed anchor density

maps give park staff an idea of the spatial extent of fixed anchors and climbing route development in the wilderness.

Wilderness climbing resource approach trails were mapped to identify the pattern of trails relative to climbing formations and fixed anchors. Trails were mapped in the South Wonderland of Rocks, Queen Mountain and Split Rock areas. Detailed mapping was conducted in the South Wonderland of Rock because the area was also the focus of a Wilderness Committee collaborative project to examine the cultural, biological and recreation resources (Hinton 2004; Thompson and Longshore 2004).

The mapping exercise highlighted one obvious trend. Narrow, intermittent paths to specific climbing formations branch off from distinct, high-use trails through landscapes corridors such as large washes. Hikers, climbers and equestrians use the high-use trails, whereas the less obvious paths to climbing formations are typically used by only climbers. South Wonderland of Rocks illustrates this typical pattern (figure 5). Refer to table 2 for trail classification definitions. Digital shapefiles of all the mapped wilderness climbing approach trails are included on the attached CD-ROM.

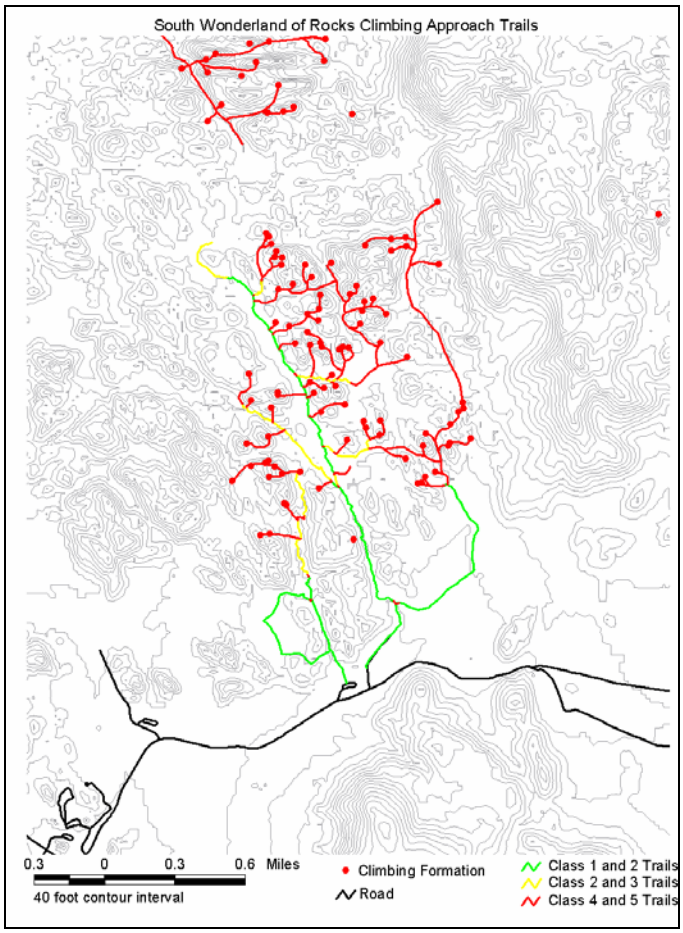

Figure 5. South Wonderland of Rocks climbing approach trails

Wilderness Visitor Monitoring

Select wilderness access locations were monitored to measure the number of visitors that use the wilderness (table 6). See figure 3 for monitoring equipment locations. Monitoring periods and results varied due to sampling design, staffing constraints, equipment limitations, and equipment failure. Despite setbacks, wilderness visitor monitoring provided excellent wilderness use-level estimates. The six wilderness access locations were chosen because they are the portals to approximately 76% of the wilderness climbing resources. They are also located at drastically different distances from Hidden Valley Campground, the epicenter of JTNP climbing. It is theorized that the distance from Hidden Valley Campground plays a significant role in determining use levels at climbing resources, whether they are in wilderness or not.

Wilderness Access	***Monitoring Period***	***Distance from Hidden Valley Campground (on established roads)***	***Number of Formations Accessible from Access***
Uncle Willy's -- aka Wall Street (en route to Wonderland Wash)	9/30/2002 to 4/20/2004	1.54 miles	89 (same as below)
Barker Dam (en route to Wonderland Wash)	9/19/2002 to 3/27/2004	1.35 miles	89 (same as above)
Boy Scout Trailhead	7/18/2003 to	2.41 miles	71
Queen Mountain Trailhead	7/18/2003 to 1/23/2004	4.52 miles	35
Split Rock (northern area)	11/13/2003 to 3/22/2004	10.36 miles	22
Split Rock (southern area)	12/19/2003 to 7/19/2004	10.36 miles	12

Table 6. Wilderness monitoring location information

Data collected by monitoring equipment was filtered for errors. The only data that was disregarded were data that represented impossible visitation values. For example, infrared equipment sometimes recorded thousands of events in a day due to high winds, anomalous weather or unexpected vegetation growth. These episodes resulted in data gaps. Counter pads also experienced failure and resulted in large data gaps during monitoring periods. The most significant failure of this type was at the Queen Mountain access. Data was managed and analyzed to determine daily use patterns although data could also be analyzed at a finer scale (minutes). Daily use graphs produced for 5 of the 6 wilderness access locations reflect the temporal distribution of wilderness visitors (figures 6-10). Note that x and y axis scales vary.

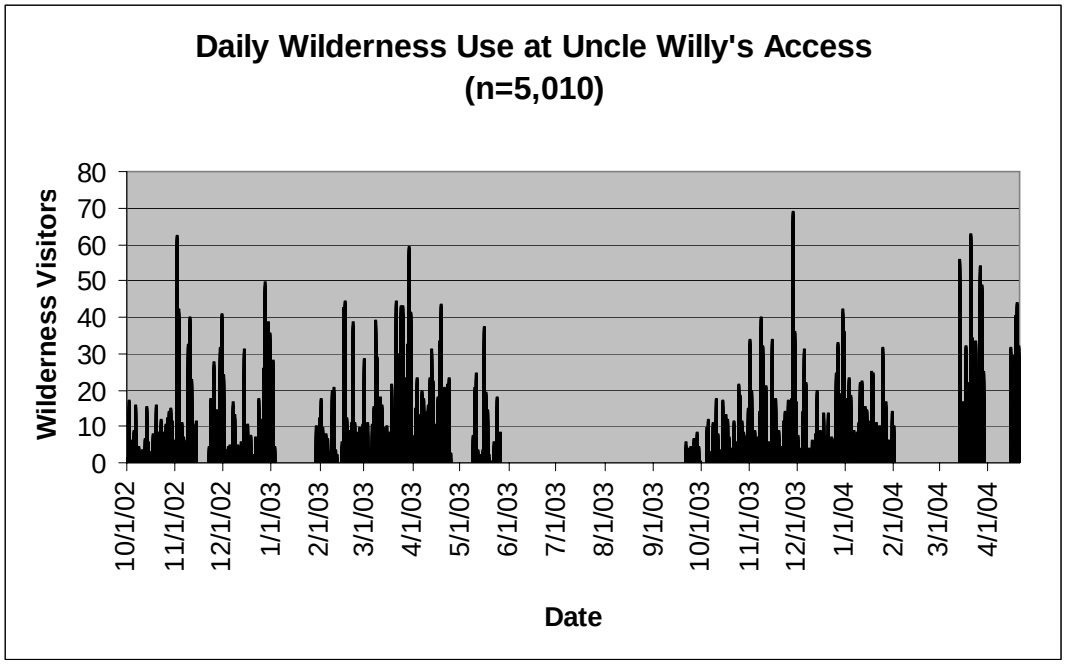

Figure 6. Daily use at Uncle Willy's Access

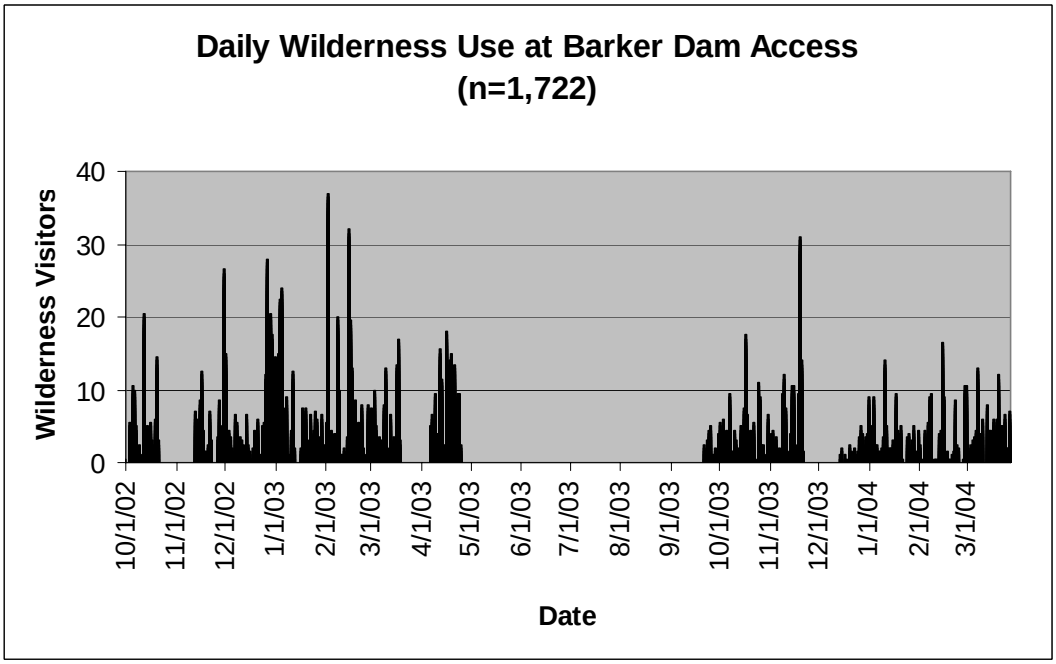

Figure 7. Daily use at Barker Dam Access

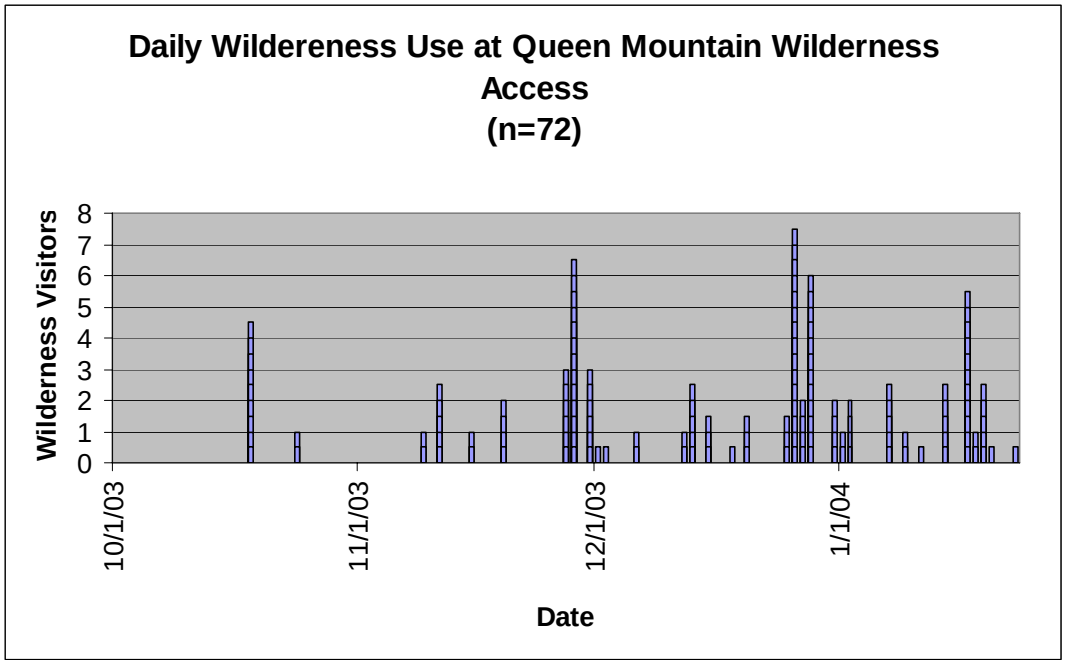

Figure 8. Daily use at Queen Mountain Access

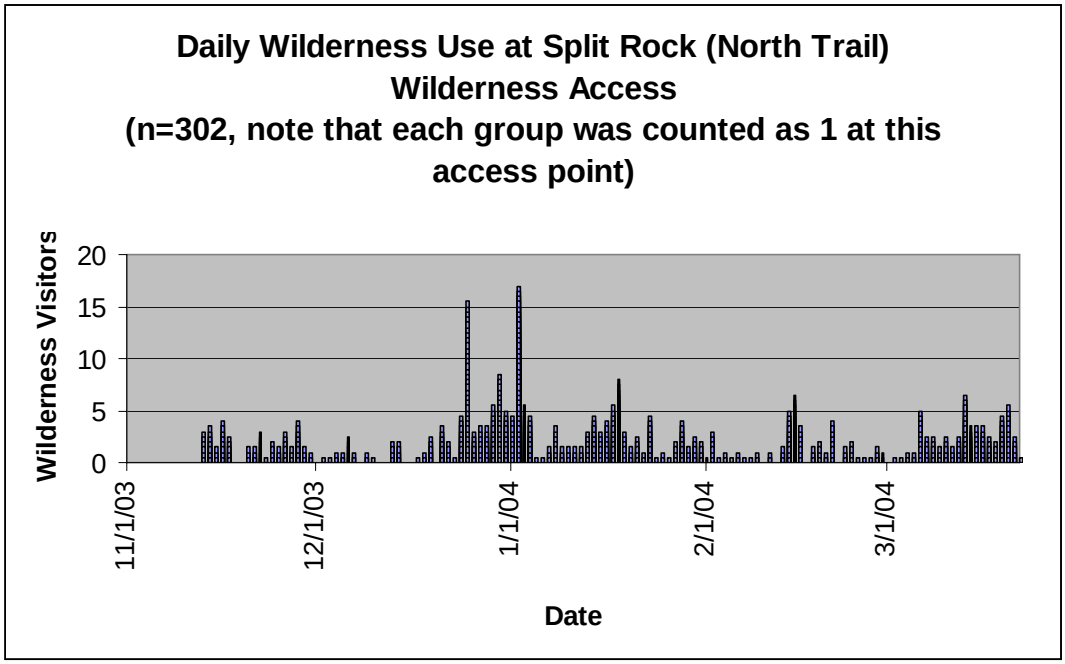

Figure 9. Daily use at northern Split Rock Access

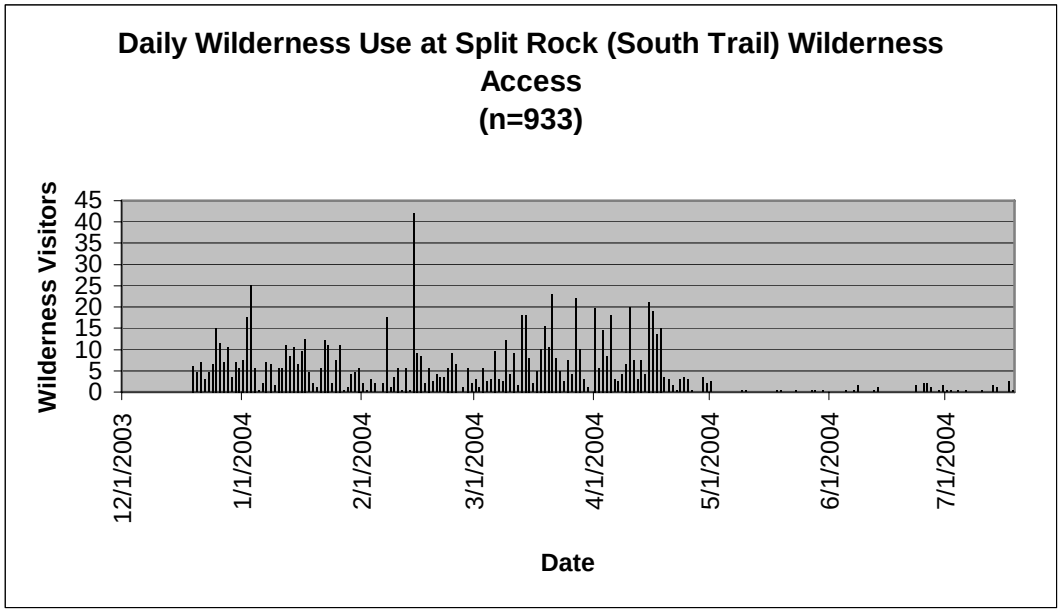

Figure 10. Daily use at southern Split Rock Access

Monitoring equipment recorded gross use at wilderness access locations. It is estimated that 6,000 people per year use the monitored wilderness access locations. Monitoring equipment did not differentiate between user types. Visual observers stationed at wilderness access locations recorded the activity types of wilderness visitors. Visual observation was scheduled according to a random, stratified sampling plan although staffing constraints often dictated observation periods. Efforts were made to observe each wilderness access location at least once a month for at least six months. However, the Split Rocks and Queen Mountain access locations were not sampled enough to warrant statistical confidence. In addition to wilderness access locations, observations were conducted from a topographic high point near Wonderland Wash in order to record the destinations of climbers in the most frequented portion of the wilderness. A complete list of visual observation records is included as Appendix 5.

The percentage of wilderness visitors that are climbers is site dependent. Certain wilderness access locations are portals to landscapes more suited to rock climbing than hiking, whereas other wilderness access locations attract high percentages of picnickers and day hikers (table 7). Out of the estimated 6,000 people per year that use the monitored wilderness access locations, approximately 3,100 are rock climbers. This estimate is important for two reasons. First, it indicates how many rock climbers are using wilderness climbing resources, and second, it shows that a small percentage (1-2%) of the previously estimated 250,000 rock climbers that enter JTNP visit the wilderness.

Wilderness Access	***Percentage Climbers***
Uncle Willy's -- aka Wall Street (en route to Wonderland Wash)	56%
Barker Dam (en route to Wonderland Wash)	57%
Boy Scout Trailhead	4%
Queen Mountain Trailhead	81%
Split Rock (northern area)	10%
Split Rock (southern area)	16%

Table 7. Percentage of wilderness visitors that are climbers by wilderness access location

Time-lapse camera data confirmed the hypothesis that climbing route difficulty and quality were dominant factors in controlling wilderness climber destination choice and verified assumptions regarding high-use climbing sites. There were 38 climbing route choices on the four climbing sites that were photographed (table 8). The complete time-lapse camera data set is included as Appendix 6.

Number of climbing route choices	38
Number of bolt protected climbing routes	6
Number of mixed protection climbing routes	21
Number of traditional climbing routes	11
Difficulty range of climbing routes	5.7 to 5.13
Quality range of climbing routes	0 to 5

Table 8. Overview of climbing route choices

In total, 148 climbers were photographed. Interestingly, only 11 climbing routes out of 38 choices were climbed. The chosen climbing routes had two similarities. All the chosen climbing routes rank at least 2 on the 0-5 quality scale, and the great majority are between 5.7 and 5.9 on the difficulty scale (figures 11 and 12).

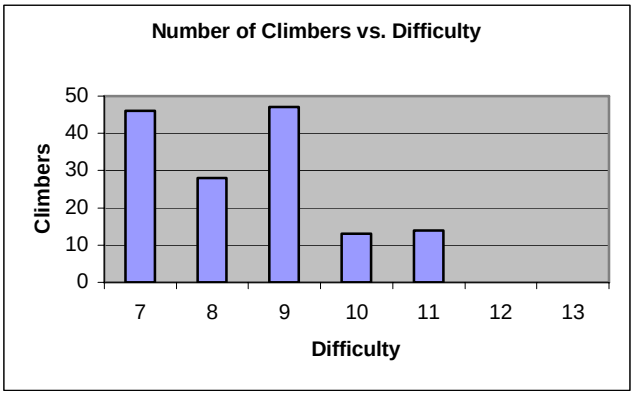

Figure 11. Difficulty vs. visitation at photographed climbing sites.

Figure 12. Quality vs. visitation at photographed climbing sites.

A mixture of bolts and removable protection protected 58% of the chosen climbing routes. Climbing routes protected by only bolts represented only 19% of the chosen climbing routes. This result, when compared to difficulty and quality

distributions, supports the assertion that bolts are not a relatively significant factor with respect to a climber's destination choice (figure 14).

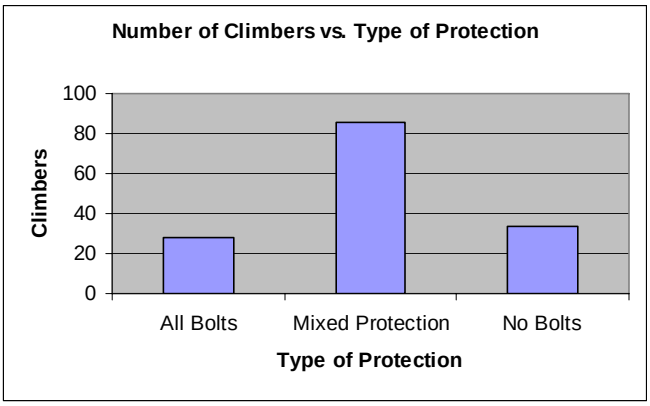

Figure 13. Type of protection vs. visitation at photographed climbing sites.

Wilderness Climber Survey

Four hundred and thirty surveys were administered between September 15, 2003 and February 8, 2004. The survey compliance rate was 87% and was not biased according to sex or age. The results of the wilderness climber survey can be separated into two categories. One category combines answers to questions about climber attributes (such as experience) and the other category lists reported destination choices. Attempts were made to correlate individual attributes to chosen climbing sites. A complete list of survey results is included as Appendix 7.

As mentioned earlier, engagement levels describe the intensity of participation in the activity of climbing. Answers to questions about experience, frequency of participation, activity style, owned equipment and risk were combined to calculate engagement levels. Engagement levels are used as a composite index in order to compare climbers to each other and to destination attributes. The Climber Model, based on the tested Adventure Model, predicts destination attributes from individual attributes (figure 14, Ewert and Hollenhorst 1989).

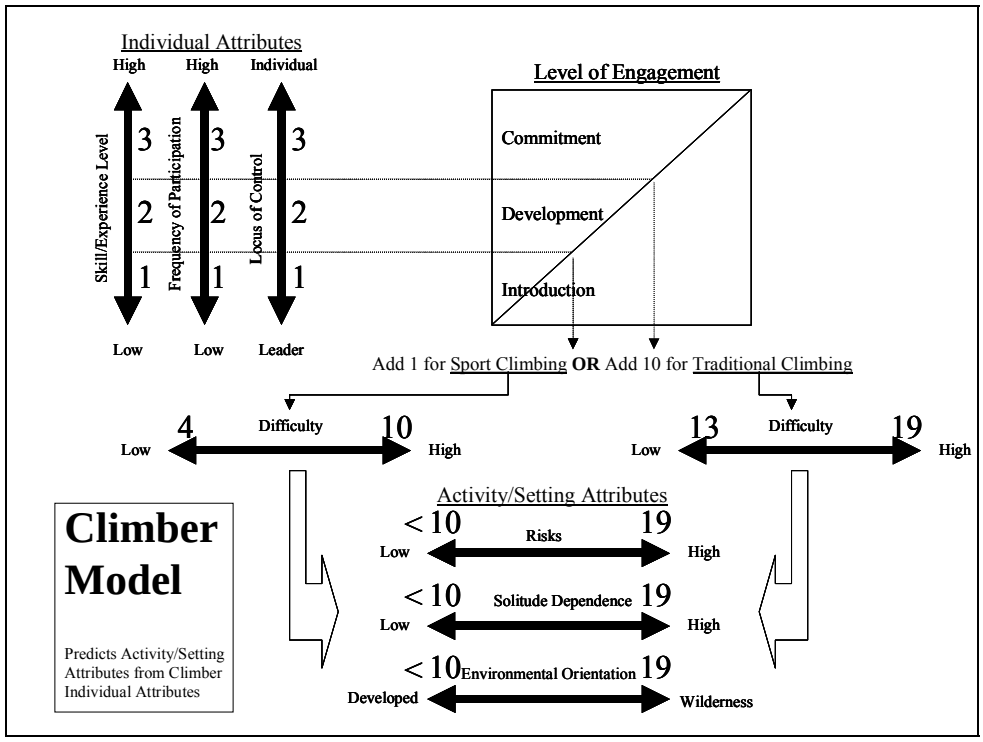

Figure 14. Climber Model

The engagement levels for most JTNP climbers are relatively high (figure 15). High engagement scores could mean that those climbers have a greater propensity to visit more remote areas that afford greater risk and more difficult objectives.

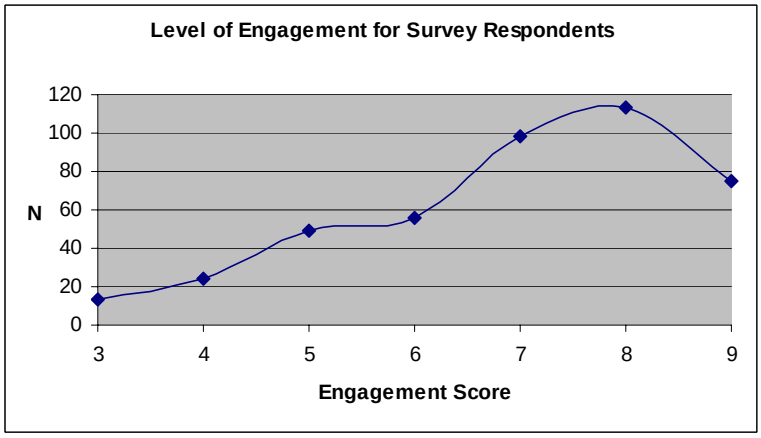

Figure 15. Engagement scores for survey respondents.

However, the average level of engagement ranking only slightly increases the further away from roads and parking lots (table 9). Climbing routes were separated according to hiking approach times. Category 1 includes approaches between 0 and 5 minutes, category 2 includes approaches between 5 and 30 minutes and category 3 includes approaches that are 30 minutes and greater (typically wilderness). Chi-square analysis shows that level of engagement and hiking approach time are related although hiking approach times are more closely correlated for lower levels of engagement. In other words, climbers with lower levels of engagement are constrained to lesser approach

times, whereas climbers with a greater level of engagement are likely to climb anywhere. When considering the entire population of climbers at JTNP, climbers with a greater level of engagement have a higher probability of exploring wilderness areas. Although the relationship is weak, these results support the findings of Ewert and Hollenhorst (1989), though this study shows that less experienced climbers have greater tendencies to stay out of the wilderness than experienced climbers have of visiting the wilderness.

Approach Category	*Average Level of Engagement*	*Standard Error*
1 (0-5 minutes)	6.95	0.12
2 (5-30 minutes)	7.08	0.15
3 (over 30 minutes)	7.12	0.18

Table 9. Average level of engagement by hiking approach time category.

The correlation between level of engagement and climbing route difficulty is moderate (correlation coefficient = 0.35). The average difficulty level increases with level of engagement (figure 16). Interestingly, the variance for difficulty is high and relatively the same for all engagement levels. This means that climbers are willing to climb many climbing routes well below their upper difficulty limits. This is an important result for park managers to consider because it means that climbers will visit a wide variety of activity settings. This behavior is less evident in the wilderness where climbers are more particular with their destination choices.

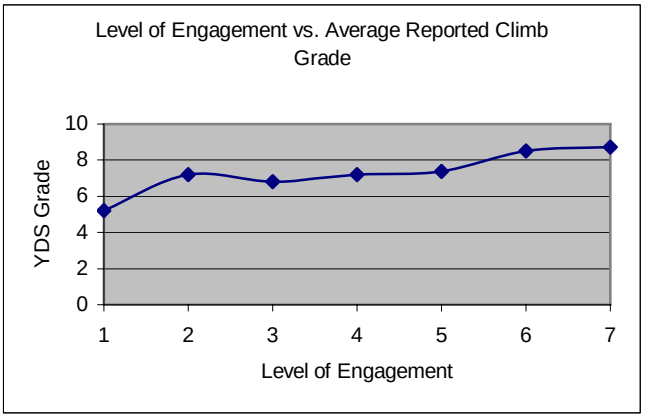

Figure 16. Level of engagement vs. average reported climb difficulty grade (YDS).

Nevertheless, climbers are not randomly choosing climbing destinations. Thirty four percent of the reported wilderness climbs and 25% of the total reported climbs have a difficulty grade of 7, whereas grade 7 climbing routes only constitute 7% of the total available climbs. Seventy six percent of the reported wilderness climbs have difficulty grades between 7 and 10. These results are in sharp contrast to the distribution of total available climbing routes. Climbing route difficulty is a major factor in a climber's decision-making process. Figure 17 shows the percentage of available and reported climbing routes at JTNP according to climbing route difficulty.

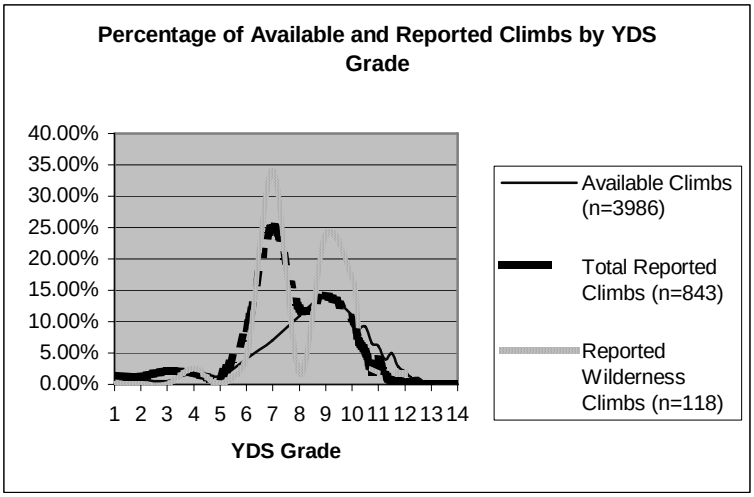

Figure 17. Normalized distribution of available and reported climbs.

Table 10 lists the five most often reported wilderness climbing routes. These five routes attract 55% of the total wilderness climbing visits. All five routes have difficulty grades between 7 and 10b. However JTNP's wilderness offers hundreds of routes in that grade range. The other attributes that these route share are quality and approach distance.

Name	*Grade*	*Bolts*	*Quality*	*Approach*
Solid Gold	10	Some	4	0.98 miles
Figures on a Landscape	10.25	Some	5	0.98 miles
Hex Marks the Poot	7	None	3	0.96 miles
Dazed and Confused	9	All	3	1.25 miles
Mental Physics	7	Some	4	1.25 miles

Table 10. Top 5 reported wilderness climbing routes.

Published JTNP climbing guidebooks list quality ratings next to difficulty grades. Eighty five percent of JTNP climber's own climbing guidebooks and most all climbers are aware of route difficulty and quality prior to visiting climbing destinations. All of the top five reported wilderness climbing routes have a quality rating between 3 and 5. These routes are considered exceptional although there are other, though not many, exceptional climbing routes in the wilderness that have similar difficulty grades and quality ratings.

Approach distance from parking lots is another significant factor when explaining destination choice. The top five reported wilderness climbing routes are all within 1.25 miles from a parking lot. Hiking times to these climbing routes vary between 30 and 45 minutes. Out of the 843 reported climbing trips (in and out of designated wilderness), not one trip involved more than a 50 minutes approach hike. For perspective, there are over 85 climbing formations, and hundreds of associated climbing routes, that necessitate more than 50 minutes of approach hiking. Figure 13 shows that wilderness climbing trips are more concentrated, relative to overall reported climbing trips, to specific destinations. Revealed preference data (reported climbing routes, time-lapse photography and visual observation) show that climbers are seeking a high return, in experience, for their hiking

investment in the wilderness. Climbers choose less specific objectives when less energy is expended.

Fixed anchors did not prove to be an important factor in attracting climbers to specific climbing destination as well as JTNP. For example, in the Wonderland on Rocks wilderness area, 59% of the climbing formations have fixed anchors although visitation was observed and/or reported on only 12% of the climbing formations. In addition, survey results show that only one of the six most reported wilderness climbing routes is completely equipped with fixed anchors. The other five are either entirely naturally protected or are only partially protected by fixed anchors. Forty eight percent of the total reported wilderness climbing routes are entirely naturally protected, 48% are partially protected by fixed anchors, and only 2% are completely protected by fixed anchors. These results lend evidence to the argument that climbers do not visit JTNP to exclusively climb fixed anchor protected climbing routes. Fifty percent of the survey respondents ranked traditional (mostly naturally protected) climbing as their top activity whereas only 15% ranked fixed anchor protected climbing as their preferred activity. Not surprisingly, 73% of the survey respondents visit JTNP equipped with a complete set of climbing hardware for naturally protected climbing routes. Visual observation, climbing resource inventory, and survey results agree that fixed anchors are not the most significant climbing resource attractor in JTNP's wilderness.

The survey shows that JTNP climbers that visit the wilderness tend to seek similar destinations and are, with respect to engagement level, similar themselves. For most climbers, difficulty, quality and hiking approach distance are the climbing resource attributes most responsible for determining destination choice.

ANALYSIS

This study conclusively demonstrates that the distribution of climbing formations and fixed anchors does not necessarily indicate the distribution of visitor use. It highlights formations that afford specific opportunities in specific locations as high-use recreation destinations. Observations, counts and surveys corroborate this assertion. However, formations are essentially represented as points. Although the climbing formation is the ultimate destination and the focal point of this study, the area around the formation, as well as the formation itself, is vulnerable to impact and is therefore the focus of policy.

Wilderness managers strive to protect resources and limit social encounters to an acceptable level. The negative relationship between encounters and experiential quality is considered weak-to-moderate (Stewart and Cole 2001, Manning 2003). However, in a fragile desert with few designated trails, such as JTNP, crowding in the wilderness not only affects solitude, but also creates long standing environmental impacts. Therefore, managers and researchers need to recognize the geographic extent of high-use areas in order to focus management actions and research studies. In this instance, wilderness fixed anchor regulations could range from continuing the existing moratorium to regulating fixed anchors at specific, high-use locations. Modeling allows wilderness

managers to see the geographic area that proposed wilderness regulations could affect, and explore the cascading consequences of management plans prior to field implementation.

What is a high-use destination and how is a high-use area defined geographically? A high-use destination is relative to low-use destinations. For this study, it is defined as any destination that has a high probability of attracting more than 80 climbers per month (data provided a natural break at 80 visitors). High-use areas surround high-use destinations that display significant and measurable impacts (large staging areas, high concentration of social trails, trash etc). They have high quality climbing routes that are within the desirable difficulty range and do not have too far of an approach hike. The number of climbers predicted to use high-use areas was determined through visitor counts, observations and survey results. The visitor counts at specific trailheads were multiplied by the percentage of visitors who were climbers during each month. The total number of climbers who used each trailhead was compared to the number of climbers that preferred the attributes of specific destinations (this value was calculated from time-lapse photography and survey results). In this way, monthly estimates for the number of climbers who visited specific destinations were calculated. The same logic was used to determine the number of climbers at less attractive climbing destinations. Less attractive destinations were separated into three other categories. One category includes formations that afford desirable climbs that are of lesser quality and another category includes formations that lack quality and are not in desirable locations. A fourth category includes formations that attract too few climbers to calculate visitation levels. There are only 7 high-use destinations. High-use destinations afford the type of opportunities that a majority of climbers seek. They attract a range of visitation levels depending on the time of year, but all match the criteria for an extremely desirable wilderness climbing destination.

The boundaries of high-use climbing areas can be described in many different ways. The way a high-use area is defined has serious implications for environmental policy. More restrictive definitions may protect larger areas of land, but may also alienate stakeholders and unnecessarily restrict activities that might be appropriate. Less restrictive definitions risk leaving land that needs to be protected open to impact. Definitions need to fit numerous situations, conditions and landscapes while at the same time be site specific and focused. They need to do what they are supposed to, and nothing more.

High-use climbing areas can be defined by the perimeters of high-use climbing formations. High-use areas can be defined by a viewshed that encompasses the high-use portion of climbing formations and areas within a pre-determined distance that are within view from each high-use climbing formation. And high-use areas can be defined as the area within a buffer zone around formations or even trailheads and parking lots equal to the farthest distance to a high-use climbing formation. A cartographic model illustrates these concepts (figure 18).

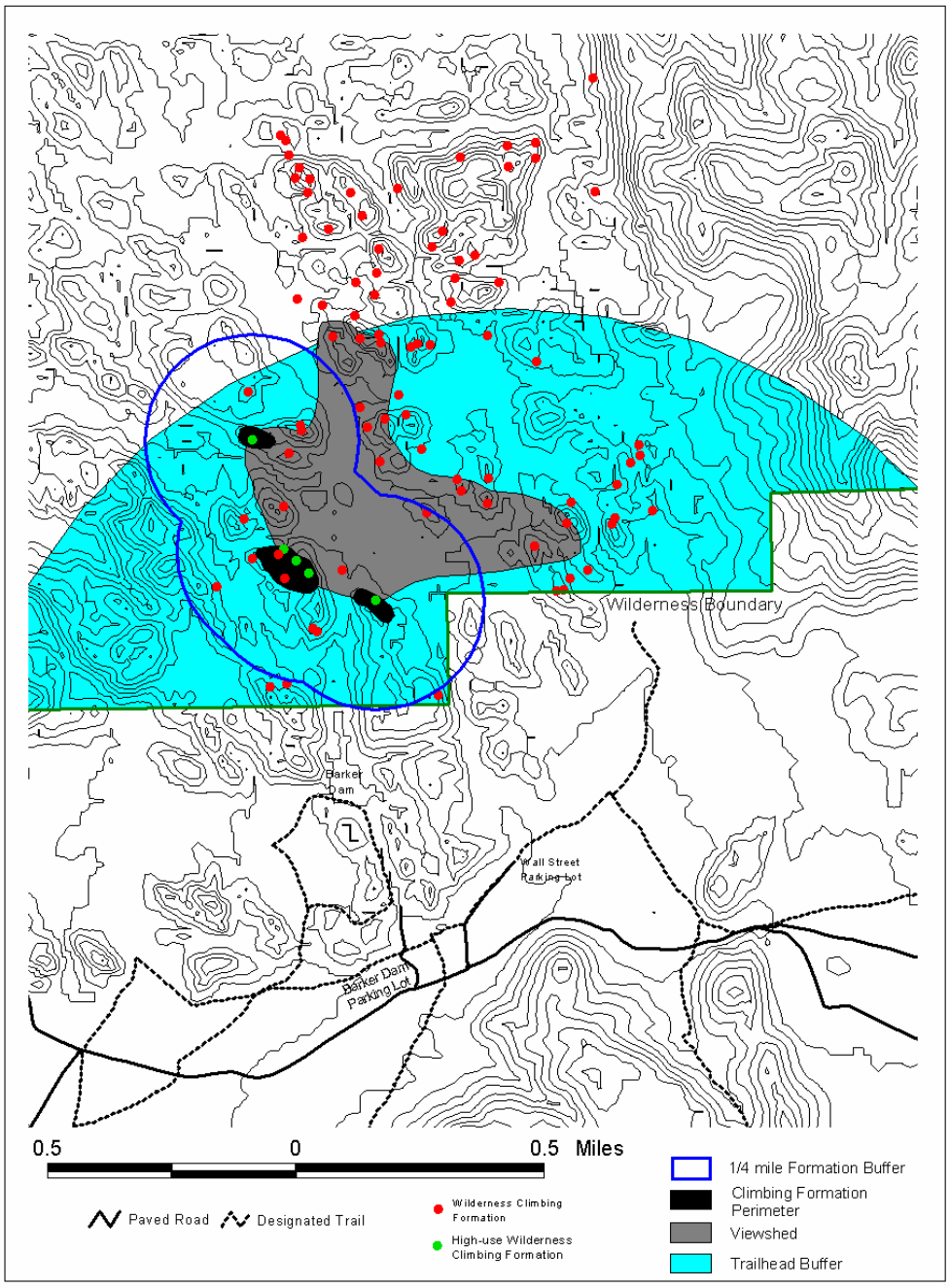

Figure 18. Cartographic model of high-use climbing area definitions

Each definition has its advantages and disadvantages. Table 11 lists the strengths and weaknesses of each high-use area definition.

Definition	Description	Strength	Weakness
Climbing Formation Perimeter	High-use area is defined as the actual topographic perimeter of the base of the climbing formation.	Focuses on the destination. Considers crowding, staging area impacts and cliff-side impacts.	Does not include associated social trails, social encounters associated with a busy destination and other impacts that may radiate from high-use points of interest.
Climbing Formation Viewshed	High-use area is defined as the climbing formation perimeter plus the area that can be seen from the climbs themselves. Topography and distance constrains the viewshed.	Focuses on the destination. Considers crowding, staging area impacts, cliff-side impacts as well as social conflicts and visual impacts.	Does not include associated social trails. This definition is based on social parameters, such as crowding, and does not comprehensively consider impacts to the environment.
Trailhead Buffer	High-use area is defined as the area around wilderness trailheads equal to the distance to the furthest high-use destination (approximately 1.3 miles).	Considers the entire area around trailheads that may be yield environmental impacts and social conflicts. Encompasses the largest possible area for the "worst case scenario".	Although this definition includes all possible areas of impact, it also includes many areas that are not high-use. This is especially evident in areas that have a low concentration of climbing formations. It is simplistic although effective if environmental impact is the only consideration.
Climbing Formation Buffer	High-use area is defined as the area within a 0.25 miles buffer around high-use destinations.	Considers area around high-use destinations to protect the cliff, the staging area, and the area around the cliff that is use for approach hiking. The 0.25 miles buffer fits rugged topography and includes area that may be affected if visitors approach the formation from any direction.	The 0.25 miles buffer may not fit all landscapes and may include area that does not need to be regulated depending on the specifics of the site.

Table 11. Strengths and weaknesses of high-use area definitions

The climbing formation buffer definition was chosen as the basis for visitation level maps because it most closely matches JTNP wilderness management goals. It is detailed enough to not over estimate high-use areas and general enough to be applied to all JTNP wilderness climbing resources. Buffering formations takes into account environmental and social considerations.

A map of JTNP wilderness climbing use levels combines all of the data collected during the course of this study (figure 19). It plots all of the climbing formations and separates them into attraction categories that represent the opportunities that they afford. It combines the desirable hiking approach distance with the attraction categories to determine high-use areas (more than 80 climbers per month). The moderately attractive destinations within the desirable hiking approach distance are buffered also. These areas represent moderate use levels (10-19 climbers per month). Buffered areas around moderately attractive sites that are located outside the desirable hiking approach distance represent low-use areas (less than 10 climbers per month). The rest of the wilderness attracts visitation levels too low to be significant or calculated.

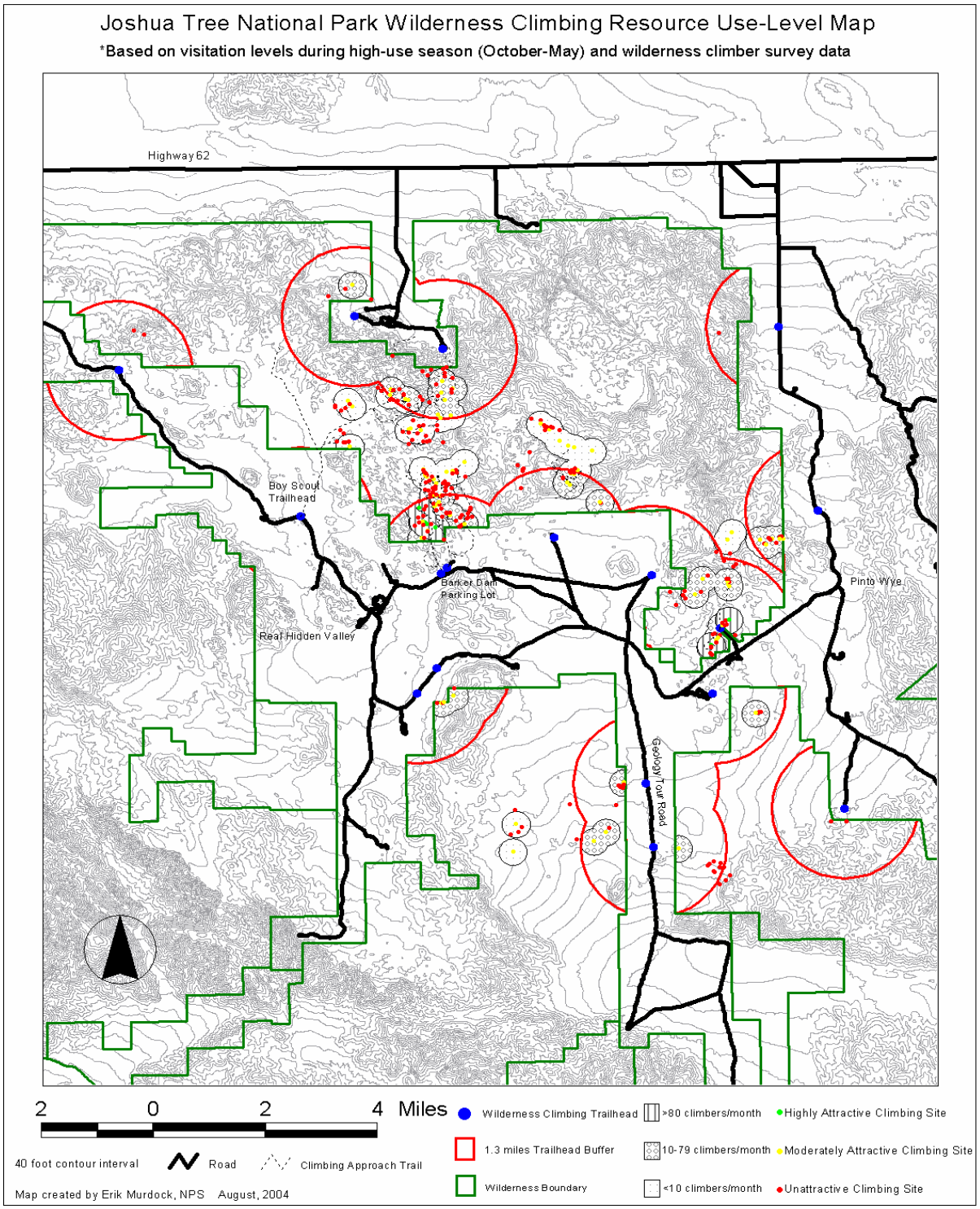

Figure 19. JTNP wilderness climbing resource level map

DISCUSSION

This study uses social science methods to measure the importance of fixed anchors to visitor flow and destination choice. It concludes that fixed anchors are relatively insignificant to visitor flow patterns and that there are several other factors that can be used to predict where climbers will visit. From a geography perspective, fixed anchors play a minor role in use level models. Environmental Assessments (such as USDA Forest Service, Granite Mountain Wilderness, Arizona and NPS, City of Rocks, Idaho) have concluded that fixed anchors have no significant environmental impact. JTNP has determined that the amount of rock displaced in order to install a fixed anchor is also insignificant. From these vantages, the fixed anchor is benign.

In actuality, the fixed anchor is not benign. When placed in wilderness, the fixed anchor challenges interpretations of the Wilderness Act and forces land managers to rethink the philosophical boundaries of wilderness management. Decisions regarding fixed anchors will undoubtedly affect future wilderness management decisions on issues and recreational activities that have yet to be conceived. A decision regarding the "insignificant" fixed anchor will help define the limits of what is allowed, or regulated, in wilderness. Managing fixed anchors has less to do with climbing management than wilderness management.

In spite of the limitations associated with fixed anchor regulation, wilderness advocacy group pressures and NPS policies identify a need to manage wilderness activities that leave a trace. This analysis of wilderness climbing resources and use-levels provides a sensible backdrop for a fixed anchor permit system. It identifies areas that attract high-use levels and already have social trail networks and measurable resource impacts. These areas can absorb new, high quality, fixed anchor equipped climbing routes without creating additional climbing related impacts. Wilderness managers can use the Climbing Resource Use-Level map to evaluate fixed anchor applications. New fixed anchor equipped climbing routes that have the potential to increase the size of high-use areas (due to location, quality and difficulty attributes) should be examined closely.

Every JTNP sponsored climbing study and report (Camp 1995, Camp and Knight 1998, Wallace and Trench 1996, Overlin et al. 1999, 1992 JTNP Climbing Management Plan) has reached similar conclusions: To mitigate climbing related impacts, a combination of education, trail design and sensitive resource closures is necessary. This study is unique in its focus on wilderness climbing resources and its ability to highlight, and justify, specific wilderness locations in need of mitigation. However, its recommendations are reminiscent of the prior climbing studies.

RECOMMENDATIONS

Education

Most impacts to cultural and biological resources are not malicious. A climbing brochure (currently being drafted) should be distributed to all climbers entering the park. The brochure should indicate wilderness boundaries, identify resource issues that

climbers should be aware of and recommend ways to minimize impact. Similar information, and the brochure itself, should be available at Hidden Valley Campground, the Visitor Center, and each entrance station.

Trails

Wilderness management dictates the use of the minimum tool required. Although there are over 300 climbing formations in JTNP wilderness, this study highlights 7 that attract enough visitation to warrant designated trails. These high-use formations are located in the South Wonderland and the Split Rock areas.

South Wonderland: One trail leading off the Barker Dam Nature Trail and another from the Wall Street Mill parking lot should join near the base of the Astro Domes. This trail could then extend to the most frequented wilderness climbing formation: Lenticular Dome. There are numerous social trails in the South Wonderland, and it the most heavily used of the wilderness climbing resources. Hikers and climbers would benefit from a well-defined trail through Wonderland Wash. This trail was also proposed in the recommendation section of the Vertical Vegetation report and is the study area for a collaborative Wilderness Committee project.

Split Rock: The Split Rock area attracts steady visitation during the high season. Large numbers of hikers wander south and north of the Split Rock parking lot. At one time, a designated trail headed north. However, this trail is in disrepair and the only remnants that remain are fallen 4x4 posts and brief sections of eroded trail. This trail needs to be repaired and a spur trail to the Future Games Wall should be developed. Another trail that follows the pronounced social trail to the south, and eventually to the Isles of the Sky, should be designated.

During the last two decades, many climbing approach trails have been developed. Climbing rangers and community activists have posted carsonite signs marking preferred approach paths to climbing formations. However, when these trails are revisited 3 to 5 years later, they are in need of serious maintenance. In addition, new social trails proliferate. For example, the trails constructed north of Hidden Valley Campground during the Vertical Vegetation project in 1999 are in a state of disrepair. This holds true for trails in the Hall of Horrors, Cap Rock, Real Hidden Valley and many other areas. JTNP can learn something from those short-lived results. Simple fixes do not last at JTNP due to large number of visitors combined with the ease of off-trail travel. Designated climbing approach trails need to be obvious, well constructed and well signed (with formation names). Unnecessary social trails need to be erased in order to promote the use of new designated trails. The construction of the two aforementioned wilderness climbing approach trails should be the first priority for mitigating wilderness climbing resource impacts. They are necessary to handle the 80 to 280 climbers per month that visit those areas.

Climbing Management Plan

JTNP, one of the most highly visited climbing areas in the world, deserves a climbing management plan. Many other public lands with less developed climbing

resources have climbing management plans. With four major studies conducted on topics ranging from vegetation to birds to visitor experience to climber preferences to wilderness visitor flow, JTNP is ready to produce a holistic climbing management plan. The plan would ensure that the recommendations of JTNP sponsored and funded studies are implemented. It would give JTNP climbing management direction and push projects toward completion despite staff attrition.

Future Study

This study has established baseline data for wilderness climbing resource visitation. Continued monitoring would allow JTNP to establish wilderness visitation trends in order to adapt management to site specific needs. Monitoring equipment purchased for this study should be kept in place and maintained on a regular basis. Visitor counts are critical for comparative studies such as the South Wonderland soil crust study and the park wide USGS Desert bighorn study are currently being conducted (Thompson and Longshore 2004).

Less than 5,000 climbers per year visit the wilderness. It is estimated that almost 50 times more climbers use front country climbing resources. The climbing impacts near the roads are far more pronounced than in the wilderness. A front country visitor flow study could identify specific areas of concern and allow park managers to prioritize mitigation strategies according to need. A front country climbing resource trail system is essential to minimizing visual and resource impacts. The Vertical Veg study recommended the establishment of new access trails during the highway construction project in 2003-2004 (Overlin et al. 1999). None of the recommendations have been implemented to date. Currently, this may be the most critical resource issue in the park.

A future study that may prove useful is a desert landscape trample study. This study would determine how many people create measurable social trail impacts and would be extremely useful for predicting where designated trails would be most important. Trample studies have been conducted in mountain landscapes however, to date, none have been conducted in a desert environment.

In addition, measuring the success of the proposed fixed anchor permit system would be useful to JTNP as well as other public lands considering similar options. Designing the process with measurements of success would be necessary to substantiate achievements.

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Appendix 1 – Overview of Fixed Anchor History

History of Fixed Anchors in Wilderness Areas

by

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Introduction

Since the days of John Muir in the late nineteenth century, rock climbing has been considered a legitimate form of recreation in wilderness areas throughout the United States. Climbers, using a variety of techniques, have ascended mountains and cliffs on public and private lands for adventure, solitude, spiritual growth, and ego. The Wilderness Act of 1964 established a "National Wilderness Preservation System [NWPS] for the permanent good of the whole people, and for other purposes.". After 1964, some historic, established climbing areas and many yet-to-be wilderness climbing areas were located within the NWPS. The previously self-regulated climbing community had to acquiesce to the federal regulations governing wilderness.

This is not to say that climbers were not wilderness advocates. On the contrary, *Mountaineering: The Freedom of the Hills,* the quintessential textbook for traditional climbers, states; "While we tread softly in the mountains, it's also time to speak loudly back in town for support of wilderness preservation and sensitive use of our wild lands. As mountaineers, we need to be activists as well as climbers if we want our children to be able to enjoy what we take for granted.".[2] In fact, a few climbers, such as Jon Muir and David Brower, were forerunners of wilderness preservation ideology and legislaiton. For them, climbing was the only way to experience the remote rock and ice of the NWPS.

To safely ascend or descend a mountain or cliff, climbers protect themselves with a variety of gear that is sometimes left in place. The in situ gear is called fixed anchors. Since 1988, fixed anchors in the NWPS have become a source of conflict. The fixed anchor issue has forced the climbing community into a legal battle with the United States Forest Service and wilderness advocates. Wilderness purists have pitted themselves against climbers, claiming that fixed anchors are not allowable according to the Wilderness Act of 1964. Historically, the climbing community has sided with wilderness advocates, but on the issue of fixed anchors, the tables have turned. Does the Wilderness Act prohibit the use of fixed anchors, or are fixed anchors viable within the framework of the National Wilderness Preservation System? The implications of the resolution are large because fixed anchors are so small.

Fixed Anchors

What is a fixed anchor?

A fixed anchor is a piece of climbing protection that is left in place to facilitate a rappel or safe ascent. Fixed anchors can be bolts (1/4"-3/8" diameter, ½"-3" long),

pitons, slings, nuts, or any other "protection" a climber choices to leave behind (cut off stove legs, 2x4 wood pieces, and automobile medallions have been used as improvised protection). The first ascent party will typically decide if an anchor is to be fixed. In wilderness areas, climbers have historically left as few fixed anchors as possible. The scarcity of fixed anchors in wilderness areas has upheld a bold and style, and therefore has deterred many modern day climbers from embarking on remote, backcountry climbs.

Fixed anchor history

The use of fixed anchors in the past and present is crucial to understanding the debate over fixed anchors in the NWPS. The evolution of the climbing anchor has paralleled the fluctuations in social and environmental values. The following overview describes the evolution of climbing in America with special attention given to the use of anchors. Interestingly, the progression of climbing anchor technology follows the changes in mainstream social values, despite the fact that until recently climbers have been viewed as a fringe group.

In the early 1930's European climbing safety techniques were introduced to America. Climbers began fixing anchors on climbs to secure themselves or their ropes to the rock in order to enable a modicum of safety on more difficult and exposed terrain. These early anchors were mainly primitive pitons. Pitons were the primary anchor of choice until the beginning of the environmental era of the 1960's and 1970's.

It is argued that Rachel Carson's book *Silent Spring* published in 1962, raised America's awareness about the environment and instigated the environmental era.[3] Although damaging rock through the use of pitons cannot be compared to spraying DDT over entire communities, some well respected climbers embraced the environmental ethic of the 1960's and argued for a more environmentally sensitive climbing style. Because the repetitive insertion and retraction of the metal pitons was scarring the rock, climbers began to look for "cleaner" protection. Climbers adopted a method of using chocks (metal wedges of various sizes slung with cordage) that was developed in England. Chocks were placed in cracks without the use of a hammer by the lead climber and removed by the second climber. The major proponents of this new method were two of the fathers of America's Golden Era of Climbing; Royal Robbins and Yvon Chouinard. Many climbers embraced the new "clean climbing " ethic and began the first intra-climber ethical debate.

An historic example of the disagreement between the two climbing ideologies of the early 1970's is the first and second ascents of the Dawn Wall, El Capitan, Yosemite, California. In 1970, Warren Harding led the first ascent of the Dawn Wall. During this ascent, Harding placed hundred of bolts and rivets in order to span vast expanses of featureless granite. Interestingly, the wilderness designation starts 400 feet from the base of El Capitan. In January of 1971, Royal Robbins embarked on the second ascent of the Dawn Wall in order to erase the route as he climbed. After climbing and erasing the first four pitches of the Dawn Wall, Robbins was inspired by the climb and decided not to pull

the rest of the bolts. Nevertheless, Robbins' effort during the most historic bolt-chopping incident illustrates the intensity of the clean climbing constituency.

The ethic of the clean-climbing community was formalized when the1972 Chouinard Equipment Catalog published an article by Doug Robinson called "The Whole Natural Art of Protection".[4] It was a groundbreaking move for Chouinard, a highly respected manufacturer of pitons, to publish an article preaching the advantages of chocks (also called nuts, wedges, rocks, and later wired nuts). The convincing article pushed for an all-clean ethic and thereby a minimization of fixed anchors. Later in Chouinard's career, he made other "poor business decisions" that supported the environment. He criticized the use of the very gear he manufactured, and most recently, he downsized Patagonia because he felt that a 300 million dollar company was too large to support grassroots environmental efforts.[5]

These examples show the environmental integrity of the founders of modern rock climbing technique. They also show the capacity of the climbing community to manage itself. Robbins was the first to recognize the importance of intra-climber conflict resolution. In his 1973 book Advanced Rockcraft Robbins, probably eluding to the Dawn Wall incident, writes, "Creations on rock are different from creations on canvas in that the medium is limited and belongs to everyone. And although anyone has a "right" to make a first ascent by placing bolts up blank walls, the same right must be granted in terms of removing bolts.".[6] Robbins believed in self-regulation while at the same time recognized that individuals have the right to self expression. "After all, a renegade sport without renegades would be a dying thing".[7]

Until the late 1970's, clean protection consisted of nuts and slings and there was no protection that suited parallel sided cracks. While spending time in Yosemite, an aerospace engineer named Ray Jardine developed a removable anchor that made clean climbing easier.[8] He designed a spring loaded camming device that could contract and expand to fit a wide range of crack sizes and shapes. Many climbers thought the devices, also known as Friends, gave an unfair advantage. This shortsighted view was soon forgotten as Friends became the most widely used, and in many ways the most environmentally sensitive form of crack protection. With the advent of Friends, climbers pushed the technical limits of crack climbing, and for the time being, sought out climbs that required few fixed anchors.

During the early 1980's there was a marked decrease in America's interest in the environment due to high inflation, high unemployment, and high interest rates.[9] The change in social consciousness was reflected in the changes within the climbing community. For the first time, climbing standards in Europe surpassed the standards in America. The Golden Era of climbing in America, characterized by climbers such as Robbins and Chouinard, was over and some climbers were searching for a new identity. In order to match the performances overseas, a constituency of climbers decided to utilize the same technique as the Europeans. This technique is now termed rap-bolting.

While rap-bolting, a climber rappels down the cliff while cleaning and bolting the desired route. It is a technique that enables climbers to climb difficult faces that could not accept clean protection due to the lack of cracks. The advent of Friends allowed climbers to quickly climb most of the difficult cracks in the late 1970's and early 1980's. Frustrated climbers looking for greater difficulty noticed that face climbing opportunities abounded, and started to implement rap-bolting. The 1980's brought designer jeans, expensive sneakers, MTV, and Ronald Reagan. Rap-bolting followed suit. Rap-bolting was about individual success, a sharp contrast to the social consciousness of the 1960's and 1970's.

This phenomenon created another faction within the climbing community: sport climbing. The proliferation of sport climbing caused the second major intra-climber conflict between sport climbers and the group now referred to as traditional climbers. It is important to note that "traditional" climbing is in sharp contrast to "sport" climbing. Sport climbing focuses on movement and difficulty, not adventure, and therefore uses many fixed anchors (bolts), typically installed with power drills, to protect steep, technical climbs.

By the mid-1980's the rift between sport and traditional climbers was large. The practice of chopping bolts created a strong resentment between the two factions. In 1986 the American Alpine Club attempted to address the widespread divisiveness in the climbing community in a meeting called "The Great Debate: Is 5.14 Really Worth It?". America's most influential climbers were invited to express their opinions. They were asked to discuss ethics and the future of climbing, but as expected, bolting was the focus.[10] There was no consensus among the panelists, although the climbers agreed to respect the traditions of different areas. Alan Watts, one of the original American sport climbers said, "change is inevitable. [It] is what tradition in climbing is about".[12] Surprisingly, two out of the four climbers that represented traditional climbing in the Great Debate of 1986 now sport climb.[13]

With the proliferation of sport climbing in the late 1980's and the 1990's came disputes with land owners and managers about access. As opposed to traditional climbers who disappeared into the backcountry to climb, sport climbers were highly visible. Cliffs close to parking were popular and lines of bolts with chalked holds were highly visible. More people started to climb because of the relative safety of bolted sport climbs. The combination of more climbers and high visual impact climbing caused land owners and managers to take a look at the sport more closely. In addition, the resurgence of environmental values due to the increased environmental sensitivity of the Clinton Administration set the climate for environmental regulation. Throughout the 1990's, climbing areas around the country were closed or highly restricted due to the perceived impacts. The public had lumped all climbers together, not seeing the difference between the clean climbing traditionalists and the bolt intensive sport climbers.

Currently, the majority of climbers in America, as well as the Access Fund, believe that designated wilderness areas should not be sport climbing arenas, and the use of motorized drills in wilderness areas should be prohibited. This designation is

important because it highlights the fact that a fixed anchor ban in wilderness areas would effect traditional climbers. Traditional climbers typically place as few fixed anchors as possible and have been, even when compared to the climbing community at large, fervent wilderness advocates.

Part 2, Fixed Anchors in Designated Wilderness Areas

There are thousands of climbing routes equipped with fixed anchors located within NWPS.[13] The Access Fund estimates that there are climbing opportunities in 40 out of the over 650 (and growing) wilderness areas. As much as 7% of the users in some wilderness areas (e.g. Desolation Wilderness, CA) are rock climbers (Ewert and Hollenhorst, 1998). The climbing routes date back to the early twentieth century and are considered to be historic, unique, and unreplaceable. Although the climbing community has separated itself into different factions with different environmental values, the traditional climbers who use wilderness areas have retained a low impact, environmental ethic. Not surprisingly, the federal government's concerns about fixed anchors in wilderness areas were nearly synchronous with the general public's concerns about sport climbing impacts.

There has never been a policy on fixed anchors in designated Wilderness areas. For the most part, until 1998, the Forest Service let climbers manage themselves, thus postponing an inevitable showdown.[14] Forest Service officials stepped in only when motorized power drills were used in wilderness areas. The infringement of this rule created increased tension between Forest Service rangers and climbers.

Kurt Smith and Scott Cosgrove's 1994 ascent of the Muir Wall, El Capitan, Yosemite, CA is the classic example of this conflict.[15] The Muir Wall is an historic aid route with many old, dangerous fixed anchors in need of replacement. The two climbers attempted to free climb the route and replace the rusted bolts. Because there were so many old bolts, the climbers felt the only way to safely and quickly (synonymous in climbing) replace the bolts, was to use a battery powered drill. Rangers watched the two climbers with a telescope while they pulled old bolts and drilled wider, deeper holes for the new stainless steel anchors. The climbers believed they were doing a necessary public service in the only way possible. Undercover rangers were waiting for Scott Cosgrove and Kurt Smith when they reached the top of El Capitan after days of climbing. The rangers seized the drills and fined each climber 500 dollars.

This public incident increased the rift between climbers and the Forest Service. Although the Access Fund and the American Alpine Club publicly denounced the practices of Kurt Smith and Scott Cosgrove, this incident caused some climbers to believe that the Forest Service was not interested in their safety. It was clear that motorized drills were prohibited in wilderness areas, but because anchors can be drilled by hand, there was a gray area surrounding the issue of fixed anchors. A series of events involving wilderness advocacy groups, private individuals, and the climbing advocacy group, the Access Fund, forced the Forest Service to make a decision.

The conflict begins

The first major conflict over fixed anchors in wilderness occurred in 1988, in the Superstition Mountains Wilderness of Arizona. A photographer hiked off the well-traveled Peralta trail near Weaver's Needle and wandered into an area call Zonerland. There, he saw sparsely bolted spires and chalked holds.[16] After complaining to the Tonto National Forest administration, rangers posted a sign at the trailhead banning bolts. The original citations threatened were for littering and defacement. Soon thereafter the Forest Service convened a National Task Group on Fixed Anchors in Wilderness that crafted a Limits of Acceptable Change procedure. After a three month investigation, the Task Group recommended that fixed anchors be allowed but that that the placement of fixed anchors could be curtailed if deemed excessive by the Forest Service.[17] Meanwhile, the Department of Agriculture's Office of General Counsel wrote an internal opinion that fixed anchors are inconsistent with the Wilderness Act of 1964. In 1990, the Washington D.C. office shelved the Task Group's recommendations and as per the Office of General Council, prohibited fixed anchor placement and replacement in the Superstition Mountains Wilderness.

Throughout the early 1990's, various national forests, including Daniel Boone in Kentucky and Prescott in Arizona, developed restrictive fixed anchor policies.[18] The Access Fund continually appealed the regulations with the argument that local managers were overstepping boundaries because there was no national policy or precedent. Local managers, as well as the Access Fund, asked the Forest Service for a national fixed anchor policy to alleviate further conflict.[19]

Legal battle ensues

On May 27, 1998 the Forest Service announced a national fixed anchor policy that prohibited fixed anchors in wilderness areas. The policy regarded fixed anchors as "installations" that are prohibited by Section 4(c) of the Wilderness Act.[20]

The specific case leading to the May 27, 1998 decision began in 1996, in the Sawtooth Wilderness in Idaho. It should be noted that the Sawtooth Bill that created the Sawtooth Wilderness area is more restrictive than the Wilderness Act itself. The bill provides limited condemnation authority for the Secretary of Agriculture, which unlike the Wilderness act, prohibits mineral prospecting, leasing and operations (Haight, 1974). Therefore, the Sawtooth Wilderness is not representative of the NWPS.

A routine wilderness policy review of the Sawtooth Wilderness identified 10 major items to consider. One of the items, "Social Conflicts", contained several sub-topics, one of which was fixed anchors. Normally, a topic with such buried status would get little attention. But due to the efforts of Steve Wolper, the sole climber on the Forest Service task force studying the plan, the fixed anchor issue became paramount. A sport climbing area was being developed on non-wilderness area land near the Sawtooth Wilderness and Wolper wanted to make sure that there would be no fixed anchor intensive climbing in the wilderness. Wolper advised Bill LeVere, the Sawtooth Forest

Supervisor, to restrict fixed anchors. LeVere, a climber himself, studied the impacts of fixed anchors and the Office of General Counsel recommendations. He concluded that fixed anchors impact the environment "on a much smaller scale than campfires".[21] This conclusion agrees with current wilderness management studies. The dominant recreation-related problem perceived by resource managers is the environmental impact on trails and campsites.[22] In fact, fixed anchors were never mentioned in a study done for the Forest Service on wilderness recreation management that "suggested a number of issues that warrant further research and management attention.".[23]

Nevertheless, in September 1997, LeVere approved a plan that prohibited the installation of any new fixed anchor and required permits to replace any existing anchor. Holders of such permits would have to pay for liability insurance and would have to maintain the anchors and the insurance indefinitely. In the eyes of climbers, the permit procedure seemed ridiculous. They questioned how a climber could possibly maintain an anchor indefinitely, and how a traveling climber could keep track of individual anchors around the country. The liability insurance mandate attacked the core of climber ideology; climb at your own risk. In the eyes of the wilderness-advocacy group, Wilderness Watch, the policy was unfair. They believed that anything short of absolute prohibition was not commiserate with the Wilderness Act.[24] Needless to say, both the Wilderness Watch and the Access Fund appealed.

The Access Fund appealed in October 1997, arguing that the Wilderness Act does not prohibit fixed anchors, and that LeVere's decision does not correspond with his conclusion that fixed anchors do not impact the environment. The Wilderness Watch, led by spokesman George Nickas, appealed shortly thereafter, demanding that fixed anchors be prohibited based on a textual interpretation of the Wilderness Act.

Wilderness Watch had strong legal ground to stand on. Four years earlier, Wilderness Watch sued the Forest Service on April 16, 1993 over the authorization of permanent structures and installations for use by commercial outfitters and guides operating in the Frank Church-River of No Return Wilderness. The court found that such structures "directly conflict with express provisions of the Wilderness Act because they are not necessary to meet minimum requirements for the administration of the area, and they do not appear to be temporary in nature.".[25] The court adopted a plan to prohibit permanent structures except for limited exceptions when native material structures were built to protect the wilderness resource. Wilderness Watch hoped that the Forest Service would apply a similar interpretation of "installation" to fixed anchors. If fixed anchors (previously deteremined to have no environmental impact) were prohibited in wilderness areas, a precedent could be set to prohibit most any human trace in a wilderness resource. This was the type of case Wilderness Watch needed to set wilderness area standards.

In the spring of 1998, the Deputy Regional Forester Jack Troyer agreed with the Access Fund saying " there had been no discussion of current or future management needs for fixed anchors to provide for the minimal health and safety needs for climbers or to protect the wilderness resource.".[26] This decision was inconsequential because the national office of the USFS had been simultaneously reviewing the case and came to its

own conclusion. In a letter written on May 27, 1998 from the Reviewing Officer for the Chief, Darrel Kenops, to George Nickas of Wilderness Watch, Kenops writes "The Wilderness Act prohibits the use of installations 'except as necessary to meet minimum requirements for the administration of the area for the purpose of this Act'. It is my opinion that fixed anchors qualify as installations and are not necessary to meet the minimum requirements for the administration of the area for the purpose of the Act. Consequently, I believe that the use of fixed anchors is prohibited within wilderness areas. Therefore, the Regional Forester's April 13, 1998, decision which among other things, directed the Forest Supervisor to 'complete an analysis of the management need for fixed anchors to protect the wilderness resource' is reversed. No such analysis is necessary because fixed anchors are prohibited under the Wilderness Act.".[27] The Wilderness Watch won its appeal and the installation, replacement, and use of fixed anchors in wilderness areas nationwide was prohibited.

The fixed anchor prohibition lasted from May 27, 1998 until October 9, 1998. It is conceivable that during that period, the Forest Service realized their inability to enforce the prohibition. This, combined with the multitude of letters from climbers demanding a reversal of the policy, may have influenced the Secretary of Agriculture, Dan Glickman, to intervene. The Acting Deputy Chief for National Forest System, Gloria Manning, reversed the order to prohibit fixed anchors in wilderness areas nationwide saying, "This decision settled the challenges raised in the Sawtooth Wilderness planning process. However, this decision does not constitute national policy. In order for the public to have the opportunity to be involved in formulating national policy on this issue, the Forest Service is now beginning the process of negotiated rulemaking.".[28] Placement of fixed anchors in the Sawtooth Wilderness was still prohibited, but the nationwide prohibition was overruled until a formal national policy could be constructed.

Part 3, Fixed Anchors and The Wilderness Act of 1964

As it is important to know the history of fixed anchors to understand the fixed anchors in wilderness conflict, it is equally important to understand the history of the Wilderness Act because interpretations of the Wilderness Act are the basis of the fixed anchors debate. Study of the history of the Wilderness Act lends insight into the ambiguous nature of the act. Scholarly interpretations of the Wilderness Act set the foundation for future decisions. Some of the Forest Service decisions on whether to allow fixed anchors in wilderness areas seem to ignore the Wilderness Act mandate. The following section describes the history and some relevant interpretations of the Wilderness Act to set the backdrop for a critical analysis of the fixed anchor debate.

History of the Wilderness Act

When early Europeans first explored North America they viewed wilderness as an inexhaustible impediment to progress. The pre-Civil War era was characterized by terrestrial expansion, rapid economic growth, and westward migration. Although most Americans did not acknowledge the eventual scarcity of natural resources, in the 1830's George Caitlin had the foresight to believe that the prevention of an environmental

catastrophe lay in the creation of a preservationist park (Allin, 1982). But by the 1860's, conditions were conducive to environmental preservation. The combination of wealth, wholesale destruction of wilderness, and the abuses of industrial capitalism caused Americans to value wilderness in its own right. In 1864 Congress passed a bill, drafted by Senator Conness of California, to preserve Yosemite, California. Yellowstone National Park was created in 1872. By the end of the 1800's, the Sierra Club, founded by John Muir, and the American Civic Association had successfully lobbied for the creation of the National Park System.

The creation of the National Park System did little to preserve America's wilderness. The major threats to wilderness included the advancement of agricultural land, timber harvesting, the Mineral Leasing Act of 1920, the Pacific Railway Act of 1862, and the Federal Aid Road Act of 1916 (Allin, page 57, 1982). Between 1850 and 1870 9% of the continental United States land surface was owned by railroad companies (Dana, ?).

In 1922, District 3 Forester Frank Pooler acted on Aldo Leopold's recommendation to create the Gila National Forest Wilderness Preservation Area in New Mexico. The following year, the Boundary Waters Canoe Area was the first wilderness preserve in a National Forest to be created by a cabinet level decision (Allin, page 69, 1982). Despite this progress, in 1935 disenfranchised Forest Service employees such as Aldo Leopold, Robert Sterling Yard, and Bob Marshall formed the Wilderness Society to speed up the preservation movement. The Wilderness Society pressed Congress to revise Regulation L-20 to prohibit timber harvesting and fire roads in designated primitive areas.

Wartime during the 1940's reduced America's interest in wilderness preservation. During this time many wilderness areas were mined for tungsten, molybdenum, and other metals. James Gilligan's 1954 dissertation, "The development of policy and administration of Forest Service primitive and wilderness areas in the western United States", was the next major step for wilderness preservation. It was the first appraisal of wilderness preservation that recognized that although legislation protected nearly 13 million acres, the land was actually being gradually managed for multiple uses (Allin page 102, 1982). In 1955 the Wilderness Society's executive secretary, Howard Zahniser, gave a speech at the National citizen's Planning Conference on Parks and Open Spaces titled "The need for wilderness areas". This speech was the impetus for Senator Hubert Humphrey of Minnesota to publicly state his intention to submit wilderness legislation to Congress.

The first wilderness bill, S. 4013, was introduced to the Senate by Humphrey on June 7, 1956. A similar bill, H.R. 11703, was introduced at the same time to the House by Representative John Saylor of Pennsylvania. S. 4013 was drafted in cooperation with the Wilderness Society, the National Parks Association, the Izaak Walton League, the Council of Conservationists, the Wildlife Management Institute, the Citizens Committee on Natural Resources, and the Federation of Western Outdoor Clubs. Communication and cooperation among the preservationist groups was facilitated by there being a few

individuals that occupied a host of offices in several of the organizations (Allin, page 106). Howard Zahniser, David Brower, and Ira Gabrielson were the critical players in drafting the legislation. It should be noted with respect to the fixed anchors in wilderness debate that David Brower was one of the leading rock climbers in the country during the 1940's and early 1950's. Interestingly, in 1939 David Brower placed the first fixed anchors, 4 bolts, in American climbing history during the first ascent of Shiprock, New Mexico (Rock and Ice 106, pages 58-65).

The first version of the Wilderness Act mandated the creation of a Wilderness Preservation System consisting of untouched areas of federal land in National Forests, National Parks, National Monuments, wildlife refuges, and Indian reservations. It prohibited farming, logging, grazing, mining, mineral prospecting, and motorized equipment (Allin page 106, 1982). There was strong opposition to wilderness legislation from the Interior Department, the Department of Agriculture, members of Congress, mining interests, stockmen, highway construction interests, water resource interests, timber interests, and others (McArdle, 1975).

It took about four years for Congress to agree on a satisfactory definition of wilderness and eight years for Congress to review nearly sixty versions of the bill. Over this time period the language became more general and less dogmatic in order to appease economic interest groups. For example, a section in one of Humphrey's bills that said that wilderness areas " preservation shall be paramount" was changed to "shall be so protected and administered as to preserve their wilderness character" (Allin, page 119, 1982). Mention of Indian reservations and a National Wilderness Preservation Council was deleted, and a stipulation that after a fifteen year period only Congress could make additions to the NWPS was added.

In 1961, a bill by Senator Clinton Anderson of New Mexico was passed in the Senate. During the seventh wilderness Conference in 1961 Representative Saylor pleaded with the opponents of Anderson's bill. He sited solitude, quietude, remoteness, adventure, and primeval beauty as five of the reasons to pass the bill (Saylor, in Wilderness). It wasn't until 1964, after many debates and amendments, did the House finally pass the bill (Allin, page 135, 1982). On September 3, 1964, President Lyndon Johnson signed the Wilderness Act.

Inconsistencies of the Wilderness Act of 1964

The Wilderness Act was not meant to be a comprehensive guide to managing wilderness areas (Hendee, page 106). Each agency has developed its own management techniques to implement the congressional mandate to administer wilderness (Allin, page 165). The act leaves room for interpretation, and for this reason, legal battles over the Wilderness Act are common.

The parts of the act which have spawned the most litigation are Sections 3 and 4 (Haight page 289). Section 3 addresses the structure and expansion of the NWPS and Section 4 outlines the uses of wilderness areas. The Wilderness Act's self contradictory

nature invites debate over these issues. For example, the act establishes wilderness areas "for the use and enjoyment of the American people in such manner as will leave them unimpaired for future use and enjoyment" (Section 2a) while at the same time allowing "the use of the land for mineral location and development and exploration, drilling, and production, and use of land for transmission lines, waterlines, telephones lines, or facilities necessary in exploring, drilling producing, mining, and processing operations…" for valid claims issued before December 31, 1983 (Section 4, d3).

A similar contradiction was the subject of the 1973 law suit, Minnesota Public Interest Research group vs. Butz, over mineral extraction in the Boundary Waters Canoe Area (BWCA). The Wilderness Act allows holders of mineral patents the "right to cut and use such of the mature timber therefrom as may be needed in the extraction, removal, and beneficiation of the mineral deposits, if the timber is not otherwise reasonably available" (Section 4, d3). Butz, the defendant, interpreted the Wilderness Act to allow for timber harvesting in the BWCA to support mineral extraction. Judge Lord decided against Butz saying, "Where there is a conflict between maintaining the primitive character of the BWCA and allowing logging or some other uses, the former must be supreme." (Haight page 298)

In 1985, a House Committee on Interior and Insular Affairs, issued a report that maintains a distinctively different interpretation of wilderness use. Designated wilderness areas in Michigan "will continue to have motorboat use as well as pit toilets, camping facilities, and 1,900 acres of private land" (Nelson, 1985). The committee deviated from the existing "purity concept in wilderness designation"(Nelson, 1985). Forest Service Assistant Secretary Rupert Cutler's 1977 statement partly explains enigmatic management plans such as the one in Michigan: "Our policies are meant to be applied uniformly; however, each wilderness requires its own management direction. This is contained in the wilderness management plan for each area. These plans are developed locally with intensive public participation." (Cutler, 1997).

The obvious inconsistencies inherent to the Wilderness Act are compounded by the general and ambiguous definition of wilderness. The Wilderness Act uses descriptors such as "primeval character", "untrammeled", and "substantially unnoticeable development", and therefore leaves room for a spectrum of interpretations depending on the interpreters interests. As mentioned earlier, the act allows for uses of wilderness areas that intrinsically alter the land. Judge Lord's decision in Minnesota clearly considers the inherent meaning of the act to favor preservation over other uses. His ruling is consistent with Raoul Berger of Harvard Law School who maintains that " it is well… settled that if the congressional intention is plainly discernible in the legislative history, it will override the 'inconsistent' terms of the statutes…" (Haight p 297). But is the intention of the Wilderness Act discernible?

If one can consider the history of wilderness preservation, the evolution of the passage of the Wilderness Act, and the authors and organizations that collaborated to draft the act, it may be possible to recognize the act's primary intent. As discussed earlier, the preservation movement that eventually drafted the first version of the

Wilderness Act wanted absolute protection of roadless, wild areas. After many iterations of the act, it evolved to integrate uses that are in obvious conflict with the goal of preservation. Richard McArdle, the chief of the Forest Service from 1952 to 1962, recognized that compromises to the original version of the Wilderness Act will forever cause interpretational disputes. He says that the dangers to wilderness areas are "mineral exploitation, reservoir sites, and ingress and egress to privately owned land or to mining or water impoundment operations" and that "[w]ilderness preservation has degenerated into too much of a squabble between those who want everything preserved as wilderness… and those who are opposed to all wilderness preservation" (McArdle, 1975). The squabbling does not consider the primary concern of the Wilderness act. On this, McArdle says, "[w]e need wilderness to renew our sense of balance and to keep our spiritual fabric in good condition. Forget about the dollar value of wilderness. Maybe there isn't any. It doesn't matter; it is worth whatever it costs." (McArdle, 1975).

Wilderness Act Interpretations with regard to Fixed Anchors

A federally mandated decision on the issue of fixed anchors in wilderness areas could affect the future of wilderness management. The Wilderness Act notes that lands are designated as wilderness in order to protect the natural environment as well as "to secure for the American people of present and future generations the benefits of an enduring resource of wilderness" (section 2a). The decision to prohibit fixed anchors would be straight forward if fixed anchors were found to have an environmental impact or found to impede the recreational opportunities of the American people. However, studies show that fixed anchors have no environmental impact, and in some cases even reduce the erosion on trails that would be used by climbers if they didn't rappel from fixed anchors (Access Fund Website sites studies in Granite Mountain Wilderness Area). Therefore, the debate over fixed anchors is not based on quantifiable factors. Instead, it is based on an ideological interpretation of the Wilderness Act's intent.

A study of climber's attitudes toward wilderness regulations found that most climbers "continue to support the idea of wilderness preservation. However, in most cases, they do not view their activities to be in conflict with management of these areas for wilderness values." (Waldrup, 1994). Wilderness advocates argue that fixed anchors are "installations". Although the supposed "installations" have no physical impact, wilderness advocates maintain that they have an ideological impact on the wilderness experience. Therefore, they contend that the existence of fixed anchors affects the wilderness experience that is mandated by the Wilderness Act. The argument revolves around the concept of wilderness purity.

In 1963, Congressman John Saylor noted that the act first describes "wilderness as an ideal concept, but then goes on to discuss wilderness as it is to be considered for the purposes of the act" (Handee, 108). Senator Frank Church believes that "agencies are applying provisions of the Wilderness Act too strictly,. and thus misconstruing the intent of Congress as to how these areas should be managed… Congress fully intended that wilderness should be managed to allow its use by a wide spectrum of Americans." (Church, 1977). Church would probably consider fixed anchors to be allowed because

they cause no environmental impact and are crucial for rock climbing. Shortly before his death, David Brower said that it is hard for him to believe that the Forest Service is so concerned with fixed anchors when they are removing wilderness designation from a million acres of land each year (Climbing 191, 2000).

Many wilderness advocates feel otherwise. Because bolts allow a safer and less committing passage through wilderness, they are essentially an aid to exploration and travel. For some, wilderness areas are interpreted to be refuges for wild adventure. Andsel Adams said "We wither have wild places or we don't" (Backpacker, 2000). Naturalist Garrett Harding writes, "I think we would do well to tear down some of the fences that now deprive people of the possibility of danger. A wilderness without rescue services would contribute to the stability of society." (Hardin, 1969). Even David Brower, a climbing advocate, said that wilderness areas do not have to be accessible to the public if accessibility compromises the wilderness experience (McPhee, 1971).

The Wilderness Act is one of the first major laws mandating public involvement in natural resource management (Handee, page 189). Perhaps while drafting the Wilderness Act Congress recognized the potential for differing interpretations and mandated a fair and equitable process for resolution. After over a decade of conflict regarding fixed anchors, the Forest Service decided to involve the pubic in the decision making process.

Part 4, Negotiations

Employment of negotiated rulemaking

On October 29, 1999, the Secretary of Agriculture announced a Notice of Intent to establish an advisory committee to develop recommendations for a proposed rulemaking for the "placement, use, and removal of fixed anchors used for recreational rock climbing purposes in congressionally designated wilderness areas administered by the Forest Service".[29] The committee, called the Fixed Anchors in Wilderness Negotiated Rulemaking Advisory Committee (FAWNRAC), was to consist of individuals representing a broad cross section of interests with a definitive stake in the outcome of the process. The committee would be established according to the Federal Advisory Committee Act and would engage in the negations pursuant to the provisions of the Negotiated Rulemaking Act of 1990.[30]

The decision to employ the Negotiated Rulemaking Act was based on a recommendation from Phil Harter of the Mediation Institute. Mr. Harter issued a report on January 26, 1999 noting that with respect to fixed anchors, the criteria established by the Negotiated Rulemaking Act were satisfied.[31] The criteria Mr. Harter mentioned were: 1) There is a need for a rule; 2) there is a limited number of identifiable interests that would be significantly affected by the rule; 3) there is a likelihood that a committee can be established with a balanced representation of interested parties who would be willing to negotiate in good faith to reach consensus; 4) there is a reasonable likelihood that the committee would be able to reach consensus; 5) the negotiated rulemaking procedure will not unreasonably delay the promulgating of a fixed anchor rule; 6) the

agency has adequate resources to finance the committee operations; and 7) to the extent practicable, the agency will use the consensus of the committee as the basis for a proposed rule.[32]

The FAWNRAC responsibilities were to determine what information and data is necessary for the committee to make a reasoned decision, to develop the means for acquiring the information, to analyze the information, to examine the legal issues involved in regulation, and to reach a consensus recommendation. Each participating interest had veto power in that consensus must be reached in order for the recommendation to be used by the federal agency. The resulting consensus is actually more than a recommendation because a member of the agency sits on the FAWNRAC and thereby endorses it during deliberations.[33] If consensus is not reached, the federal agency can choose to use or not use any of the recommendations of the negotiated rulemaking committee.

The questions considered for negotiation were the following. What type of rock climbing equipment should be allowed in wilderness areas under what circumstances? What process should be used to decide whether the placement or removal of a fixed anchor should occur? Who is responsible for placement and removal? What is the impact on the Forest Service, climbing community, and climbing industry if the agency assumes an active role in regulating fixed anchors?[34]

Negotiated rulemaking advisory committee selection

The arduous process of selecting FAWNRAC was highly disputed. It was crucial to the committee proceedings that FAWNRAC members could compromise and reach consensus. One member could monkeywrench the entire process. It was also crucial that all interested groups were represented. Therefore, the public was given 30 days to nominate FAWNRAC members and comment on the process in general. After 30 days, 1,318 written comments were received and analyzed by the Forest Service. On April 25, 2000, Agriculture Secretary Dan Glickman appointed 23 members to FAWNRAC.[35] FAWNRAC consisted of representatives from wilderness interest groups, climbing advocacy groups, commercial guiding operations, and private individuals with vested interests.

Negotiations

The Forest Service decided that FAWNRAC would convene during three two-day meetings. At the first meeting, on June 27, 2000, Phil Harter explained to FAWNRAC that the legal opinion of the Office of General Council is not binding. For this reason FAWNRAC was established to work out differences rather than relying on a court decision that may not provide an acceptable resolution. Because FAWNRAC needed to reach consensus, the first task was to find out if there was any member that would not compromise on the fixed anchor issue. There is a continuum of responses to the fixed anchor issue ranging from “prohibition” to “no restrictions”. FAWNRAC agreed that the end member responses were not viable; therefore, the negotiations continued.

FAWNRAC members arguing for near-prohibitive restrictions of fixed anchors agreed with the Office of General Council interpretation of the Wilderness Act. Section 4(c) of act states, "except as necessary to meet minimum requirements for the administration of the area for purposes of this Act, there shall be no… installation within any such area.". These FAWNRAC members believe that fixed anchors are only to be permitted in cases of emergencies involving the health and safety of persons within wilderness areas. They argue that fixed anchors should not be placed for the ascent or descent of a cliff, and that the Forest Service should consider the removal of dangerous existing anchors.

Other members of FAWNRAC interpreted the Wilderness Act differently. Some argued that "purpose" in Section 4 (c) includes "the use and enjoyment of the American people" as long as the wilderness character is left "unimpaired for future use and enjoyment as wilderness".[36] Under this interpretation, limited use of fixed anchors is acceptable. This was the same interpretation the court adopted in the Wilderness Watch v. Robertson case. Even though the commercial outfitter structures were ruled to be installations and thereby removed, the court said, "The statue clearly directs the Forest Service to administer the Wilderness with an eye not only toward strict conservation, but also to ensure the 'use and enjoyment of the American people".[37] In this court's view, the impact of fixed anchors needs to be seriously considered before a prohibitive or regulatory policy is created.

In addition, if the intentions of the author's of the Wilderness Act were to be considered, one might consider the authors themselves. David Brower and Dick Leonard, both contributors to the Wilderness Act, were avid mountaineers and climbers when the Act was passed. They used fixed anchors, campaigned for wilderness, and believed that climbing was an appropriate wilderness activity. The climbers in FAWNRAC used this argument to stress the history and legitimacy of climbing in wilderness areas.[38]

With two interpretations of the Wilderness Act on the table, FAWNRAC discussed the details of a potential fixed anchor policy. Some members proposed a limit on the amount of bolts allowed on a cliff, or a climb, or a single pitch of a climb. Others could not accept any new bolts claiming liability, wilderness protection, and the Wilderness Act as rational. On the issue of replacing old and dangerous bolts the same argument ensued. FAWNRAC discussed rappel anchors, slings, and emergencies, but could not agree on any issue except that climbing was a legitimate activity, and that chipping holds and motorized drills are not appropriate in wilderness areas. FAWNRAC was in agreement about these issues prior to meeting. Essentially, after three two-day meetings, there was deadlock. As Lloyd Athearn, a member of FAWNRAC representing the American Alpine Club, said, "It appears that the engine blew apart and the tires flew off the car.".[39] In October 2000, Richard Harter conceded that the committee could not reach consensus and consequently dismissed FAWNRAC.

Part 5, Analysis and Implications for the Future

What happened?

Simply put, the negotiations failed because the two opposing sides could not compromise. The word "could" is used instead of "would" because the interests of the climbers and the wilderness-advocates were intrinsically tied to their personal identities. Compromising on the issue of fixed anchors in wilderness was equal to compromising their ideals. Research has shown that the major factors behind outdoor recreation conflicts are; 1) activity style, 2) resource specificity, 3) mode of experience, and 4) lifestyle tolerance.[40] The conflict between climbers and wilderness advocates epitomized these factors.

Activity style refers to the personal meaning assigned to an activity. Both climbers and wilderness advocates ascribe deep personal meaning to their respective activities. Resource specificity is the significance attached to using a specific recreation resource for a given experience. Traditional climbers need remote cliffs and wilderness advocates need untrammeled wilderness. Mode of experience is interpreted as the way the natural environment is perceived. For climbers, nature is perceived from the tops of spires, mountains, and sides of steep cliffs. They need that experience to value nature. Wilderness advocates, on the other hand, need to know that wilderness is clean of any human trace. The last factor, lifestyle tolerance, is less clear-cut. Historically, climbers have been stewards of the wilderness. Therefore, it is reasonable to believe that they can appreciate, although disagree with, the plight of the strict wilderness advocate. The wilderness advocates might also respect the climbers, but are intolerant of any impact on wilderness areas.

The fixed anchor issue hit both groups at their cores. It is said that "recreation presents one's values and lifestyle for others' inspection".[41] Members of both interest groups were emotionally charged, and unwilling to compromise their values, and more importantly, their identities.

Implications

Outsiders to the fixed anchor issue often ask, why focus on fixed anchors when there are so many other issues?[42] After 12 years of conflict, there needs to be a policy. More importantly though, the decision on fixed anchors would have a precedential effect on other recreational matters. The implications for other recreational activities were not considered during these negotiations. But, it was clear that small metal anchors hidden 500 feet off the ground were inconsequential when compared to the impact of the ruling on the future of wilderness recreation and wilderness management. The Negotiated Rulemaking Act is intended to be applied to conflicts with small parameters and fixed variables. Therefore, FAWNRAC was supposed to focus on the relatively short-sighted issue of anchors, not the future of wilderness areas. It was impossible for FAWNRAC to negotiate the future of wilderness under the guise of the comparatively irrelevant fixed

anchor issue. Perhaps FAWNRAC realized this, and were not prepared to make such a decision.

Since the 1960's, America's environmental policy has been reactive, not preventative. The government has postponed the creation of environmental policy until problems have become dangerous or public pressure cannot be ignored. The fixed anchors in wilderness issue is no exception. The Forest Service recognized a conflict between user groups in the 1980's. They also realized the ambiguous wording in the Wilderness Act, and the importance of clarifying the reference to an "installation". If the agency would have started analyzing the issue with bolt inventories, climber impact assessments, and monitored climber use of wilderness areas, they would have had data on which to base a decision. By waiting for a conflict to surmount between wilderness advocacy group and climbers, the Forest Service was forced to react to the conflict instead of preventing it. As evidenced, the negotiated rulemaking process was too little, too late. Negotiations were emotional and lacked the necessary data to back either side.

Sometime in 2004, the Forest Service will decide if fixed anchors are prohibited, regulated (and to what degree), or unrestricted in wilderness areas. The agency does not have to base its decision on the negotiated rulemaking committee meetings. It can combine the legal interpretations from court rulings and the Office of General Counsel for the Forest Service, or ignore them completely. Whatever the decision, there will be most likely be appeals and legal battles. Backpackers, mountain bikers, paragliders, base jumpers, and other controversial recreational pursuits will be severely affected by a restrictive wilderness policy. In many ways, foreseeable and unforeseeable, the conflict has just begun.

Notes

1. For the purpose of this paper, "wilderness" refers to designated wilderness areas according to the Wilderness Preservation System.

2. *Mountaineering: The Freedom of the Hills 5th Edition*. 1992. Don Graydon, ed., The Mountaineers, Seattle, WA: page 14.

3. Carson, Rachel. 1962. *Silent Spring.* Houghton Mifflin Co., Boston.

4. Robinson, Doug. 1972. *The Whole Natural Art of Protection.* Chouinard Equipment Catalog, California.

5. According to Patagonia alpine climbing ambassador Dean Potter.

6. Robbins, Royal. 1973. *Advanced Rockcraft*. La Siesta Press, Glendale, California: page 79.

7. Vetter, Craig. 1987. *Ethics on the Rocks*. Outside Magazine, Volume XII, No. 5.: pp 83-105.

8. Knapp, Fred. 1997. *The Whole Natural Art*. Rock and Ice, No. 81, pp 50-60.

9. deSteiguer, J.E. 1997. *Age of Environmentalism*. McGraw-Hill, New York.

10. Vetter, Craig. 1987. *Ethics on the Rocks*. Outside Magazine, Volume XII, No. 5.: pp 83-105.

11. Knapp, Fred. 1997. *The Whole Natural Art*. Rock and Ice, No. 81, pp 50-60.

12. Ron Kauk and Lynn Hill competed in the first climbing competition in Snowbird, Utah. Both have rap-bolted and climbed many hard sport climbs.

13. Data from Access Fund web page *Climbing and Wilderness Areas*. June 10, 1998. www.accessfund.org.

14. Achey, Jeff. 1998. *Access Denied*. Climbing, No. 180, pp 74-80, 140-145.

15. Smith, Kurt. 1994. *Muir Wall Arrest*. Climbing, No. 146.

16. U.S. Dept. of Agriculture, Forest Service. 2000. *Convening Report for The Potential for a Negotiated Rulemaking on Fixed Anchors for Climbing in Wilderness Areas Administered by the Forest Service.*

17. *Ibid*.

18. Achey, Jeff. 1998. *Access Denied*. Climbing, No. 180, pp 74-80, 140-145.

19. *Ibid*.

20. U.S. Dept. of Agriculture, Forest Service. January 26, 1999. *Convening Report for The Potential for a Negotiated Rulemaking on Fixed Anchors for Climbing in Wilderness Areas Administered by the Forest Service.*

21. Achey, Jeff. 1998. *Access Denied*. Climbing, No. 180, pp 74-80, 140-145.

22. Manning, R.E. and D.W. Lime. 2000. *Defining and Managing the Quality of Wilderness Recreation Experiences*. USDA Forest Service Proceedings, RMRS-P-15, Vol 4.

23. *Ibid*.

24. Achey, Jeff. 1998. *Access Denied*. Climbing, No. 180, pp 74-80, 140-145.

25. Wilderness Watch v. Robertson, No, 92-0740, Apr.,16, 1993, D. D.C.

26. Achey, Jeff. 1998. *Access Denied*. Climbing, No. 180, pp 74-80, 140-145.

27. Kenops, Darrell. May 1998. Letter regarding the *Discretionary Review of April 13, 1998, Appeal Decision on Sawtooth Wilderness Management Direction*. Dept. of Agriculture, Washington Office.

28. Manning, Gloria. October 9, 1998. Letter concerning *Fixed Anchors in Wilderness Areas* to all Regional Foresters. Dept. of Agriculture, Washington Office.

29. U.S. Dept. of Agriculture, Forest Service. *Summary of Comments made in Response to Negotiated Rulemaking Advisory Committee: Fixed Anchors in Wilderness: Notice of intent to establish.* Federal Register: October 29, 1999, Vol. 64, Number 209.

30. Negotiated Rulemaking Act, 5 U.S.C. § 561 et seq.

31. U.S. Dept. of Agriculture, Forest Service. *Summary of Comments made in Response to Negotiated Rulemaking Advisory Committee: Fixed Anchors in Wilderness: Notice of intent to establish.* Federal Register: October 29, 1999, Vol. 64, Number 209.

32. U.S. Dept. of Agriculture, Forest Service. January 26, 1999. *Convening Report for The Potential for a Negotiated Rulemaking on Fixed Anchors for Climbing in Wilderness Areas Administered by the Forest Service.*

33. *Ibid.*

34. U.S. Dept. of Agriculture, Forest Service. *Summary of Comments made in Response to Negotiated Rulemaking Advisory Committee: Fixed Anchors in Wilderness: Notice of intent to establish.* Federal Register: October 29, 1999, Vol. 64, Number 209.

35. Forest Service memo: *Committee Named to Study Fixed Climbing Anchor Issue*. Keven Kennedy, April 25, 2000.

36. Section 2(a) of the Wilderness Act, 16 U.S.C. § 1131 (a).

37. Wilderness Watch v. Robertson, No, 92-0740, Apr.,16, 1993, D. D.C.

38. Young, Wills. December 2000. *Deadlock, Fixed-anchor decision goes back to Forest Service*. Rock and Ice, Volume 105.

39. *Ibid*.

40. Jacob, Gerald R. and Richard Schreyer. 1980. *Conflict in Outdoor Recreation: A Theoretical Perspective*. Journal of Leisure Research, Fourth Quarter.

41. *Ibid*.

42. U.S. Dept. of Agriculture, Forest Service. January 26, 1999. *Convening Report for The Potential for a Negotiated Rulemaking on Fixed Anchors for Climbing in Wilderness Areas Administered by the Forest Service.*

Appendix 2 – Staging Area Study

Memorandum

Date: June 4, 2004
To: Wilderness Fixed Anchor EA Team
From: Erik Murdock
Re: Staging Areas

Questions regarding how to measure the impacts associated with climbing were raised during the last EA meeting in May, 2004. Quantifying social trail impact is complex due to numerous variables such as existing trails, topography, vegetation, soil type, slope, distance from roads, and many others. Staging areas, the zones at the base of rock climbs where climbers gear up and belay, are easier to consider. Staging areas are constrained to the base of climbs and generally have a reasonably predictable shape and size. When staging areas are on rock or gravel they generally do not create any significant impact to resources. However, climbers staging on vegetated surfaces have a tendency to denude vegetation.

Staging areas are similar to campsites. When the staging area is located on fragile surfaces, the initial use creates the majority of the impact. The definition of "initial" has not been examined, however staging area impacts probably follow the same curve that campsite studies have thoroughly documented (Figure 1). Staging areas do not continue to grow with prolonged use. Instead, they reach a critical size and stabilize.

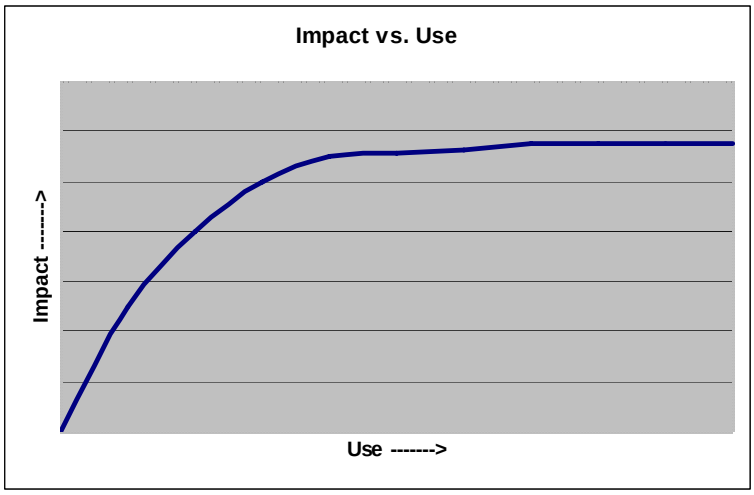

Figure 1. Typical impact vs. use curve.

This study estimates the maximum size for staging areas. The estimate is a quantification of the worst-case scenario: large group size, fragile (vegetated) surface, and repeated use over many years. Field observations show that group sizes in the wilderness are typically smaller than in the front country. Wilderness climbing groups rarely exceed four people, whereas front country group size is commonly in excess of six or eight people. This difference is significant in that each person, and their gear, occupies space at the base of a cliff and therefore larger group sizes tend to create larger staging areas if the ground surface is fragile. This study quantifies the maximum area that a high-use climbing destination could exhibit. It is important to note that many staging areas are durable and that a large percentage (especially in the Wonderland of Rocks) of staging areas are located on rock surfaces. The intent of this study is to estimate the maximum area at the

base of a climbing route that needs to be assessed by resource specialists prior to approving a permit for fixed anchor placements in the wilderness.

The study was conducted by Erik Murdock and Scott Fischer during three field days in May, 2004. May, 2004 was a particularly good month to measure staging areas because of the abundant, although transient, vegetation that clearly outlined the impact zones. An initial list of 20 high-use climbing routes to measure was based on a climbing survey conducted between September, 2003 and February, 2004. Staging areas composed of more than 20% durable surfaces were excluded from the survey. Other popular climbing routes with well-defined staging areas replaced the excluded climbing routes on the list. In total, twenty five staging areas were measured. The climbing routes ranged in difficulty from 5.6 to 5.12 although all are considered high quality and exhibited fully developed staging areas from at least ten years of high-use.

Two measurements were taken for each staging area (Figure 2). The maximum width of the staging area is the maximum distance of the observable (denuded vegetation) impact associated with the climbing route parallel to the cliff face. The maximum depth of the staging area is the maximum distance of the observable impact associated with the climbing route perpendicular to the cliff face. Photos were taken of each staging area.

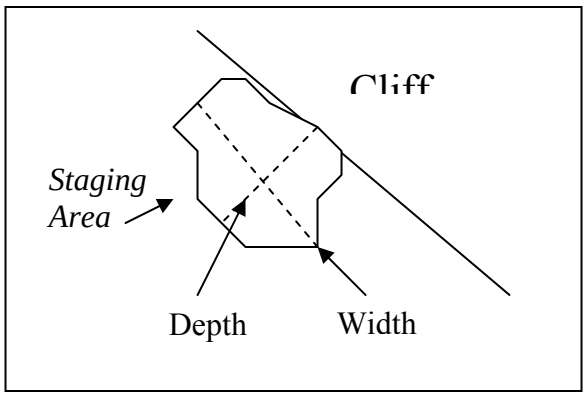

Figure 2. Staging Area Measurements

The staging area measurements are listed below.

	Climbing Staging Area Measurements							
ID	**Climb**	**Area**	**Grade**	**Quality**	**Bolts**	**Max Width (inches)**	**Max Depth (inches)**	**Area (square ft)**
1	Dandelion	Old Woman	10a	2	1	107	92	68.36
2	Diamond Dogs	Hall of Horrors	10a	3	2	220	88	134.44
3	Dogleg	Old Woman	8	3	0	92	45	28.75
4	Double Cross	Old Woman	7	4	0	254	84	148.17
5	Fote Hog	Sentinel	6	3	0	92	95	60.69
6	Right Ski Track	Intersection	10c	3	1	122	108	91.50
7	Mike's Book	Intersection	6	2	0	128	118	104.89
8	Right Peyote Crack	Peyote	9	2	0	152	108	114.00
9	Sidewinder	Steve's Canyon	10b	3	2	80	72	40.00
10	Stichter Quits	Echo Rock	7	4	4	136	86	81.22
11	The Flake	Intersection	8	3	2	60	112	46.67
12	West Chimney	Intersection	6	1	0	104	68	49.11
13	No Calculators Allowed	Thin Wall	10a	2	0	280	38	73.89
14	Clean and Jerk	Sports Challenge	10c	4	0	110	103	78.68
15	Leave it to Beaver	Sports Challenge	12a	4	0	170	128	151.11
16	The Orc	Steve's Canyon	10a	2	0	132	64	58.67
17	Double Dip	Echo Rock	6	2	2	112	84	65.33
18	Middle Peyote Crack	Peyote	9	2	0	132	85	77.92
19	Left Peyote Crack	Peyote	10	2	0	101	125	87.67
20	Lickety Splits	Hall of Horrors	7	1	0	132	176	161.33
21	Search For Klingons	Hall of Horrors	7	0	1	132	153	140.25
22	Buckets to Burbank	Hall of Horrors	8	2	1	107	160	118.89
23	Ledges to Laundale	Hall of Horrors	10	2	2	224	165	256.67
24	Trashman Roof	Hall of Horrors	9	2	0	102	91	64.46
25	Janes Addiction	Hall of Horrors	11b	3	4	115	74	59.10
				Average		135.84	100.88	94.47
				Standard Dev.		54.30	35.53	50.23
	.							

Staging area depths have less variance than staging area widths (Figure 3). One of the reasons for this may be the blending of staging areas due to adjacent climbs and the tendency for climbers to walk along the base of cliffs to get from one climb to another. Large groups appear to spread out, not back, from the cliff.

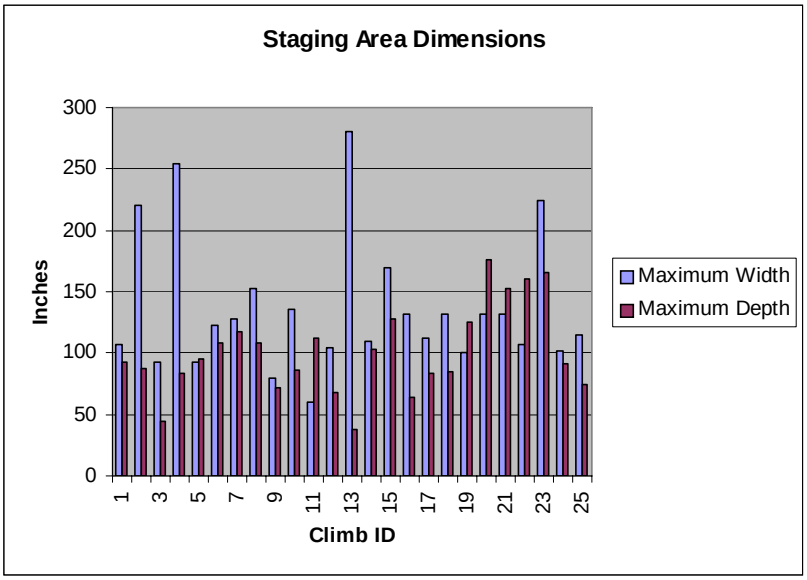

Figure 3. Staging area dimensions for 25 samples.

High-use staging areas varied from 28 to 256 square feet. The average staging area is 94 square feet (Figure 4). It is important to note that the calculated area is a simple estimate based on only the maximum width and depth. Most of the staging areas are not rectangles and therefore the area estimates are exaggerated. The estimates do provide an idea of staging area size, but should be considered as maximum estimates for the most heavily used climbing sites.

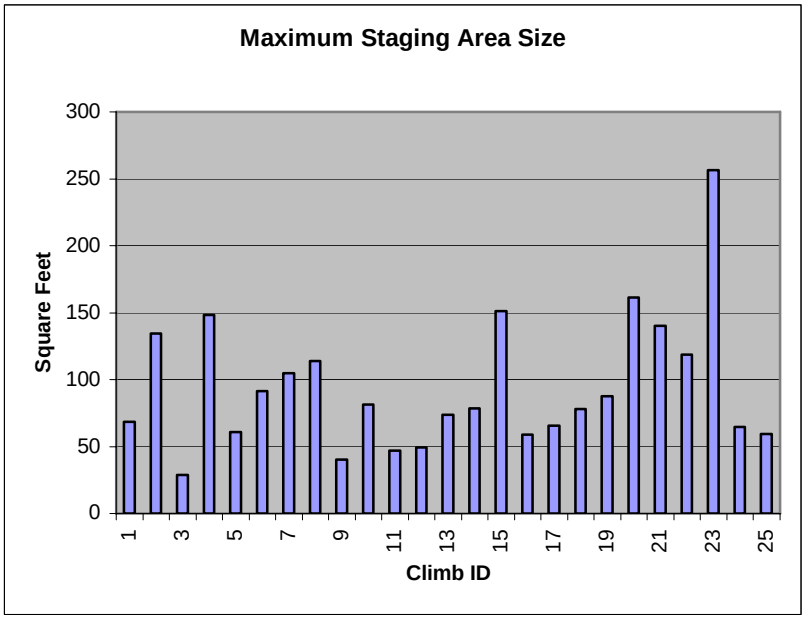

Figure 4. Maximum staging area estimates

Appendix 3 – Wilderness Climbing Survey

Joshua Tree National Park Wilderness Climbing Survey

Date:_____ Surveyor:_____

Time:_____Location:_____ Weather:_____

PRIVACY ACT and PAPERWORK REDUCTION ACT statement:
16 U.S.C. 1a-7 authorizes collection of this information. This information will be used by park managers to better serve the public. Response to this request is voluntary. No action may be taken against you for refusing to supply the information requested. Permanent data will be anonymous. Data collected through public surveys may be disclosed to the Department of Justice when relevant to litigation or anticipated litigation, or to appropriate Federal, State, local or foreign agencies responsible for investigating or prosecuting a violation of law. An agency may not conduct or sponsor, and a person is not required to respond to, a collection of information unless it displays a currently valid OMB control number.

Burden estimate statement: Public reporting for this form is estimated to average 10 minutes per response. Direct comments regarding the burden estimate or any other aspect of this form to the Information Collection Clearance Officer, WASO Administrative Program Center, National Park Service, 1849 C Street, NW, Washington, D.C. 20240.

---

1. Where are you from? Country _____
   If from USA, list zip code _____

2. During the past 12 months, how many days have you spent at Joshua Tree National Park? ___

3. How many days are you climbing during this visit to Joshua Tree National Park? ___

The next questions relate to your general climbing experience.

4. How many years have you been climbing?
   ڤ 1-2 years ڤ 6-9 years
   ڤ 3-5 years ڤ >10 years

5. During the past 12 months, on average, how many days out of a month do you typically climb?
   ڤ 0-2 days ڤ 6-12 days
   ڤ 3-5 days ڤ 13-30 days

6. Rank the activities you participate in from 1 (most often) through 4 (least often). Do not use the same number twice.
   Bolt protected climbing ___
   Gear protected climbing ___
   Toproping ___
   Bouldering ___

7. How do you rate your skill level at Joshua Tree? Choose one.

ڤ Less than 5.6 ڤ 5.10b to 5.11a
ڤ 5.6 to 5.8 ڤ 5.11b to 5.12a
ڤ 5.9 to 5.10a ڤ Greater than 5.12b

8. Have you ever placed a bolt on a climbing route? ڤ Yes ڤ No

9. Do you own a guidebook to a climbing area? ڤ Yes ڤ No
If Yes, how many? ____

10. Do you own a complete rack of traditional climbing gear? ڤ Yes ڤ No

11. Do you lead climb? ڤ Yes ڤ No

12. If yes, approximately what percentage of the routes that you climb do you lead?

ڤ 1-15% ڤ 31-60%
ڤ 16-30% ڤ 61-100%

13. How important are each of the following factors when choosing a site to climb at? Please answer based on your personal experiences and preferences. Circle one number for each factor.

	Very Important	Important	Neutral	Unimportant	Very Unimportant	Don't Know
Difficulty of routes	1	2	3	4	5	DK
Number of routes within your ability	1	2	3	4	5	DK
Availability of information on routes	1	2	3	4	5	DK
Quality of routes	1	2	3	4	5	DK
Approach distance from car	1	2	3	4	5	DK
Length of routes	1	2	3	4	5	DK
Sport climbing availability	1	2	3	4	5	DK
Traditional climbing availability	1	2	3	4	5	DK
Availability of good protection	1	2	3	4	5	DK
Solitude	1	2	3	4	5	DK

14. List the names and difficulties of the routes you climbed today. Refer to the available guidebook if you are unsure. Continue below if necessary.

Route Name	*Difficulty*
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

15. Please refer to the Climbing Topo Booklet. The first page explains the climbing topo symbols. Each following page displays a set of two climbing route topos. The numbers on the bottom corners of each page correspond to the numbers on the chart below. For each set of topos, select which climbing route you would prefer to climb by circling "A" or "B". If you would prefer to not climb either route circle "Neither". Consider all of the information listed at the bottom of each route topo. Information includes route difficulty, route length, approach time, available protection, and encounters at the base of the climb.

1	A	B	Neither
2	A	B	Neither
3	A	B	Neither
4	A	B	Neither
5	A	B	Neither
6	A	B	Neither
7	A	B	Neither
8	A	B	Neither
9	A	B	Neither
10	A	B	Neither
11	A	B	Neither
12	A	B	Neither
13	A	B	Neither
14	A	B	Neither
15	A	B	Neither
16	A	B	Neither
17	A	B	Neither
18	A	B	Neither
19	A	B	Neither
20	A	B	Neither
21	A	B	Neither
22	A	B	Neither
23	A	B	Neither
24	A	B	Neither
25	A	B	Neither
26	A	B	Neither
27	A	B	Neither
28	A	B	Neither

Appendix 4 – Wilderness Climbing Resource Inventory

Wilderness Climbing Formations

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
1	Central Formation	570433	3772335	0	3
2	East Formation	570719	3772212	0	3
36	El Dorado	576259	3769003	0	3
37	Clean Crack Formation	576253	3769141	0	3
38	Pernicious Dome	576606	3769003	10	3
39	Skin Graft	576456	3768983	2	3
40	Wane's Wall	576518	3768961	0	3
41	Techulator	576641	3768849	13	2
43	Timbuktu Towers	577823	3770527	33	2
44	Ivory Tower - East Face	577824	3770553	40	3
45	Ivory Tower - West Face	577817	3770568	0	2
46	Atom Smasher Boulders	577870	3770490	21	2
47	Yearly Rock	577879	3770534	0	3
48	Hooter Rocks	577798	3770254	6	3
50	Disappointment Dome	578018	3770214	0	3
51	Lost Rock	578046	3770569	0	3
52	Fish Rock	578170	3770433	0	3
53	Supercollider Rock	578168	3770404	0	3
54	Super Dome	578240	3770280	32	2
55	Super Block	578307	3770246	16	2
56	Lemon Dome	578720	3770254	4	3
57	Lime Dome	578922	3770187	0	3
58	Dunce Cap	579322	3770253	1	2
59	Suicide Horn Rock	579241	3769700	1	2
60	Stepping Stones	579623	3770418	0	2
61	Cactus Cooler Aretes	579143	3769496	0	3
62	Lazy Dome	578156	3769290	3	3
63	Grey Giant - South Face	578324	3769357	14	2
64	Tombstone	578333	3769264	15	3
744	Book of Brilliant Things	578820	3769174	0	3
66	Honestead Wall	578745	3768990	12	3
67	Guardhouse	579134	3769345	7	3
68	Fortress	578666	3769334	0	2
69	Flying Fortress, South	578719	3769470	0	3
70	Flying Fortress, Right side	578755	3769481	0	3
71	Grey Giant - North Face	578388	3769393	2	2
72	Castle	578335	3768927	0	3
73	Crystal Quarry	578429	3769043	0	3
299	Escape Rock	578698	3766084	8	2
300	Toad Rock	578500	3766458	0	3
307	Room To Shroom	578859	3766304	5	2

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
308	Grain Pile Rocks	578760	3766096	0	3
314	Fire Me A Burger Rock	579329	3766054	4	3
318	Foolproof Tower	579096	3766406	13	1
319	Nomad Dome - West Face	579510	3766771	16	2
320	Mesopotamia Dome	579516	3766868	4	3
321	Ob/GynDome	579687	3766613	13	3
322	Don Juan Boulder	578969	3766522	14	3
323	Rodeo Rock	578876	3766295	5	3
324	South Astro Dome - East Face	578844	3766510	9	1
325	South Astro Dome - Northeast Face	578795	3766558	79	1
326	North Astro Dome - Northeast	578750	3766598	45	1
327	North Astro Dome - West Face	578731	3766582	24	2
328	South Astro Dome - West Face	578755	3766488	17	3
329	Get It Together Rock	578632	3766563	0	3
330	Moonstone, Northeast Face	578599	3766713	5	3
331	Perry Masonary	578749	3766759	3	3
332	Lenticular Dome	578630	3767010	14	1
333	Sanctuary	578618	3767194	0	3
334	Old A Hotie Rock	578769	3766961	3	3
335	Punk Rock - Southwest Face	578816	3767048	11	3
336	Disaster Dome	578813	3767065	2	3
337	Surprise Rock - West Face	579111	3766929	10	3
338	Unforseen Dome - West Face	579264	3766974	5	3
339	Mirage Rock	579306	3766870	1	3
340	Freak Brothers Domes - West Face	579064	3767058	32	2
341	Weenie	579037	3767135	0	3
342	Fat Freddie's Cat	579132	3767091	10	2
343	Pea Brain	579208	3767106	15	3
344	Red Obelisk	579180	3767182	2	2
345	Snake Pit	579230	3767360	5	3
346	Thrutcher Dome	579116	3767378	15	2
347	Disneyland Dome	579038	3767393	0	2
348	Duckwaddle Domes	578934	3767400	4	3
349	Pringle Rock	578896	3767518	1	3
350	Mind Body Rock	578799	3767542	1	3
351	Disneyland Dome - North Face	579018	3767479	4	3
352	Thrutcher Dome - North Face	579108	3767407	0	3
353	Training Ground	579019	3767604	7	3
354	Dumb Dome	579091	3767558	0	3
355	Butler Corridor	579254	3767374	0	2

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
356	Gumby Dome	578918	3767805	0	3
357	Inauguron dome	579108	3767732	13	2
358	Elephant Arches	579046	3767857	2	2
359	Hard Rock	579002	3767942	0	3
360	Diarrhea Dome	578838	3767924	22	2
361	Owl Pinnacle	578870	3767952	8	3
362	Bighorn Mating Grotto	578793	3767996	5	2
363	Bighorn Terrace	578793	3768046	0	3
364	North Tower	578737	3768160	17	2
365	South Tower	578757	3768137	0	3
366	Bighorn Dome - North Face	579556	3767604	4	3
367	Hidden Wall	579306	3767740	30	3
368	Red Bluffs	579348	3767797	5	3
369	Don Genero Cliffs	580146	3767804	5	3
370	Tres Amigos Cliff	579692	3768071	0	3
371	Cornerstone	579690	3768129	12	3
372	Poodle Smasher Area	579587	3768119	0	2
373	Wavecrest Rock	579590	3768041	0	3
374	Lost In The Wonderland Slab	579411	3768075	9	2
375	Refrigerator	579908	3768375	4	2
380	Senile Dome	579770	3766444	2	3
381	Senile Dome - Nancy Reagan's Face	579798	3766446	0	3
382	Senile Dome - Northeast Face	579820	3766489	0	3
386	Worth Bagley Memorial Dome	579889	3766523	0	2
387	Iguana Dome	579978	3766694	10	3
388	Hook And Ladder Area	579826	3766778	1	3
389	West World	579990	3766717	12	3
390	Way Gone Dome	580133	3767185	2	3
391	Low Motivation Dome	580140	3767420	3	3
393	Cockroach Crags	581520	3767605	7	3
394	Kate's Crag	581572	3768105	0	3
395	Frontier Spires	581563	3768148	4	3
396	Frontier Wall	581594	3768195	3	3
397	Cactus Flower Towers	581423	3768289	4	3
398	Katchina Walls	581764	3768676	0	3
399	Throne Of The Monkey King	581818	3769677	0	3
400	Throne Of The Matriarch	582091	3769645	0	3
401	Dreamscape Dome	582085	3769534	4	2
402	41-Minute Dome	582177	3769485	0	3
403	Rim Rock	582208	3769437	3	3
404	Melon	582202	3769352	0	3

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
405	Shark Fin	582336	3769359	3	2
406	Valley Of The Dolls	582272	3769444	2	3
407	Tower Of Power	582390	3769427	2	3
408	Olympic Dome	582422	3769406	27	3
409	Tower Rocks	582640	3769352	4	3
410	Slab Dome	582621	3769009	4	2
411	Cirque Of The Climbables - Right End	582917	3767693	21	2
412	Cirque Of The Climbables - Left	582846	3767769	16	2
413	Spy Tower	582732	3767884	10	3
414	Big Lie Rock	582721	3767908	3	3
415	Pearls	582952	3768025	15	2
416	G-Spot	582921	3768075	1	3
417	Wizz Site	582955	3768068	0	3
418	Watcha Call It Pillar	582977	3768136	0	3
419	Cactus Slump	583044	3768016	0	2
420	Top Block	583057	3768069	0	3
421	Pastry Pile	583146	3768144	0	2
422	Green Wall	583073	3768175	0	3
423	Lower Walt's Rock	582868	3768876	10	2
424	Upper Walt's Rocks	583046	3768825	26	2
425	Humpty Dumpty	583573	3768718	14	2
426	White Cliffs	583800	3767143	4	3
427	Sun Proof Wall	583794	3767173	2	2
444	Conrad Rock	579144	3761148	0	3
445	Split Personality Rock	579271	3761159	13	2
446	Scary Rock	579301	3761142	0	3
447	Agent Orange Rock	579329	3761185	7	2
454	Saddle Rocks - South Face (upper summit)	579635	3761590	1	3
455	Cowboy Crags	579614	3761360	6	2
480	Reef Rock	584470	3758762	0	2
481	Gravity Rock	584480	3758694	0	3
483	Lava Dome	584455	3758591	2	3
484	Cave Rock - West Face	584422	3758629	0	3
485	Cave Rock - North Face	584430	3758639	0	3
486	Sunlight Rock	584373	3758626	0	3
487	Friable Rock	584326	3758662	0	3
488	Rocky Marciano	584247	3758073	0	3
489	Island In The Stream	582933	3758093	12	3
490	Boredome Rock	581348	3757933	3	3
491	Tortuga	581387	3757509	2	2

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
492	Iguana	581539	3757421	0	3
493	Finch Dome	581461	3757264	3	3
494	Evolution rock	581238	3757192	3	3
495	Darwin Dome	581299	3756679	2	2
496	Skyscraper Rock	584057	3757391	4	3
497	Jerry's Quarry	583967	3757273	7	2
498	Harry's Quarry	583626	3756989	8	2
499	Lost Pencil	583113	3757045	8	3
506	Perpetual Motion Wall	586043	3756779	8	2
509	Hone Dome	586897	3756250	11	3
510	Virgin Pile	586932	3756297	0	3
511	Pinon Point	587048	3756380	0	3
512	Tom Sawyer's Island	587247	3756320	0	3
513	Titanic	587224	3756209	0	3
514	Snorkle Dome	587304	3756195	3	3
515	Dental Dome	587361	3756203	0	3
516	Pac Man Rock	587529	3755962	0	3
517	Orient Rock	587395	3755815	0	3
518	Desert Island	587063	3756084	0	3
519	Cat Pinnacle	587077	3756050	4	3
520	That Little Doodad Boulder Unit	587241	3755694	2	3
526	Double Cross Rocks	585798	3764485	3	3
527	Mother Lode Wall	585985	3764107	6	3
530	Roman Rocks	586229	3764516	2	3
531	Piledriver Boulders	586169	3764385	2	3
532	Dike Rock	586249	3764311	4	3
533	Desert Queen Dome	586509	3764434	8	2
537	Fraggle Rock	586737	3764860	22	2
538	Grope Rock	586897	3764969	0	3
550	Tar And Feathers Boulder	588346	3760867	3	3
551	Epperson Boulder	588366	3760890	5	3
552	Chicken Boulder	588398	3760892	5	3
553	Rooster Boulder	588304	3760865	2	3
554	Hen Pecked Boulder	588265	3760847	6	2
561	Wedge	587003	3762595	3	3
562	False Moosedog Tower	586960	3762641	23	3
571	Split Rocks Area	587663	3763185	32	3
574	Split Dome	587298	3763486	32	2
575	Split Dome - East Face	587374	3763483	5	3
576	West Tiers	587434	3763502	18	3
577	Scud Boulder	587302	3763569	6	3
578	Frigid Tower	587410	3763643	10	3

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
579	Future Games Rock	587499	3763662	11	1
580	Grand Canyon - West Face	587220	3763195	9	3
581	Grand Canyon - East Face	587182	3763130	17	2
582	Rubicon Formation	587138	3763035	11	2
583	Snake Pit	587138	3762974	6	3
584	Isles In The Sky	586994	3762885	32	1
585	Isles Corridor - Left (West) Side	586976	3762850	4	2
586	Isles Corridor - Right (East) Side	586990	3762856	0	3
587	Hidden Corridor	586977	3762834	3	3
588	Cling Or Fling Corridor	587043	3763225	15	3
589	Brit Corridor	587071	3763238	14	3
590	Morongo Man Cliffs	586684	3764507	3	3
591	Tiger Rocks	587470	3764701	10	2
592	Bond Boulders	587493	3764655	36	2
593	Vector Rock	587499	3764774	0	3
594	Crocodile Rock	587459	3764799	3	2
595	Workout Rock	587419	3764857	0	3
596	Lost Rock	587465	3764863	17	3
597	Bandana Rock	587699	3765301	3	3
598	Beak Boulder Rocks	587621	3765231	7	3
599	Loveland North	587341	3765402	10	3
600	Valley Of The Kings	587132	3765666	4	3
601	Firefly Rock	587946	3765322	2	3
629	Big Ass Boulder	590866	3757595	0	0
637	Endangered Species Dome	590424	3757589	0	0
643	Munchkinland Crag	589043	3766069	7	2
644	Scarecrow Rock	589006	3766145	0	0
645	Toto Boulder	588961	3766122	0	0
646	Dorothy's Crag	588945	3766077	0	0
647	Emasculation Rock	588851	3765942	0	0
648	Hawk Hatchery	588732	3766076	1	2
649	Patina Rock	588680	3766050	0	0
650	Kansas Cliffs	588637	3766102	8	3
651	Poppie Field Boulders	588379	3766052	7	2
652	Oz Towers	588508	3765934	9	3
653	Emerald City	588549	3765891	15	2
654	Zsa Zsa Gabor Memorial Boulder	587584	3766272	4	2
655	Miracle Mile Boulders	587452	3766035	3	2
656	Hollywood	587532	3765618	11	3
658	Indian Head	587212	3772258	18	3
667	Big Top	576708	3773718	10	2
668	Defender Block	576509	3773585	0	3

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
669	Gossip Column	576009	3773368	15	3
672	Grain Central Station	577250	3773279	7	3
709	Afro Awareness Week	577860	3771589	0	3
717	Upper Dodge City	578966	3771151	18	3
718	Cactus City	578716	3771102	0	3
719	Mini Mall	579419	3771235	14	3
720	Rattlesnake Forks	579310	3771192	0	3
721	Margaret Thatcher Spire	579367	3770961	2	3
722	Bulkhead	579593	3770907	4	3
723	Slatanic Area	579584	3770601	12	2
724	Rattlesnake Buttress	579358	3770780	10	2
725	Rattlesnake Forks Boulders	579367	3771055	5	3
726	Commissioner's Buttress	579120	3770717	0	3
727	Pyramid	578865	3770986	22	3
734	Winnebago Rock	579287	3771249	0	3
733	Greenhouse	579040	3770911	0	3
735	Roundup Rock	578785	3771180	5	3
736	Comet Rock	579189	3767172	0	3
737	Little Bighorn Dome	579209	3766932	1	3
738	Sheepbuggers Wall	579219	3766932	0	3
739	Window Rock	579295	3767726	0	3
741	Monolith	579312	3767816	0	3
740	Mushroom Rock	579325	3767882	5	3
742	Wind Tunnel	579610	3767500	0	3
743	Leopard Spots	579970	3767038	0	3
729	Super Slab	580003	3767148	0	3
730	Arresting Rock	579970	3767121	0	3
731	Thrilling Rock	580003	3767148	0	3
732	No Name	578239	3770287	0	3
745	Grinch	578773	3761990	4	3
746	Coffee Dome	578571	3770539	0	3
747	Yeti Dome	577808	3770870	0	3
748	The Foot	577808	3770718	0	3
750	Project Boulder	577454	3770718	0	3
749	The Boot	577374	3770802	6	3
753	North Boulder Canyon	579018	3767833	0	0
752	North Lost in Wonderland	579433	3767599	8	3
751	Drought Dome	579384	3767901	0	3
752	Hell Area	579097	3768151	9	3
728	Outer Mongolia Area	578691	3768277	58	2
760	Arrowhead	579283	3770559	16	2
761	Helmet	579092	3770559	19	3

ID	Name	Easting	Northing	Bolts	Target Class Based on location, difficulty (5.7-5.10b) and quality (at least 2). 1 is most attractive, 3 is least attractive
762	Lynch Crag	579190	3770680	10	2
763	Hershey Rock	578378	3769832	?	3
764	Rope Drag Rock	578487	3769435	?	3
765	Blonde Lust Rock	578487	3769176	?	3
766	Featherless Peacock Crag	579477	3770680	?	3
767	Mistaken Rock	576273	3769521	?	3
768	Black Tower	576130	3770278	?	3
769	Fuzz Bumper Crag	576131	3770213	?	3
770	Asian Fever Buttress	576302	3770116	0	3
771	Al's Crag	576433	3770207	0	3
772	Siberia	576621	3770319	0	2
773	Siberian Corridor	576550	3770319	0	0

Wonderland of Rocks Climbing Route Inventory

Climb ID	Rock ID	Climb	Difficulty	Pitches	Bolts	Anchors	Quality	Approach Time	Base ID	Comment
70	40	Wren's Nest	11	1	0	0	0	30	1	
71	40	Red Eye	8	1	0	0	0	30	1	
72	40	Jah Loo	10.5	1	0	0	0	30	1	
74	43	Sine Wave	9	1	1	0.5	0	90	1	
75	43	Gravity Waves	12	2	5	0.5	5	90	2	4 bad, rusty bolts. Last bolt is good and anchor is good.
76	43	Gravity Works	11.75	2	1	0	0	90	2	1 fixed nut
77	43	Offshoot	10.5	2	0	0	0	90	2	
78	43	Polytechnics	10.75	1	3	0.5	3	90	1	Fat chains and 3/8 anchor bolts
79	43	Psychokenesis	11.25	1	0	0	3	90	2	aka Missing In Action
80	44	Famous Potatoes	11.5	1	2	0.5	1	90	1	rusty 1/4 bolts, 1 on anchor
81	46	Nuclear Arms	12	1	4	1	3	60	1	new bolts drilled next to new ones
82	46	Atom Ant	11.5	1	3	0.5	2	60	1	
83	46	Gumshoe	11	1	4	0.5	2	60	1	
84	46	Ionic Strength	12	1	4	1	4	60	1	3/8 steel bolts
85	46	Shin Bashers	11.5	1	1	0.33	1	60	1	1/4 rusty bolt
86	46	Quantum Mechanics	11.25	1	2	0.33	2	60	1	1/4 rusty bolt
87	46	Isotope	9	1	2	0.33	2	60	1	3/8 anodized bolts
88	54	Cole-Lewis, The	10.5	2	6	0	3	90	4	1/4 rusty Leeper
89	54	Great Unknown, The	10.5	2	3	0	3	90	4	1/4 rusty bolts. Leeper hangers.
90	54	Last Unicorn, The	11	2	8	0	5	90	1	1/4 rusty bolts. Leeper hangers. 1 pin on route.
91	54	Bleed Proof	7	1	0	0	0	90	1	
92	54	Mohawk, The	12.5	2	5	1	3	90	1	bad anchor bolts. 3 pins and 2 1/4 bolts on route.
93	54	Chief Crazy Horse	12	2	1	0	3	90	1	1/4 and 3/8 steel bolts for anchor. One fixed bashie on climb.
94	62	Common Law Marriage	10.5	1	3	0	1	90	2	3 bad 1/4 bolts with Leeper hangers.
95	63	Illusion	7	1	0	0	0	105	2	
96	63	Transfusion	12	2	0	0	2	105	2	
97	63	Listening Wind								
98	63	Hyperion	11.75	2	0	0.5	5	105	2	bad 1/4 bolts
99	63	Janus	10.75	1	0	0.5	1	105	2	bad 1/4 bolts
100	63	Vortex	10	1	0	0.5	0	105	2	bad 1/4 bolts
101	63	DMB, The	8	1	3	0.33	1	105	2	bad 1/4 bolts
102	63	Dimorphism	7	1	1	0.33	0	105	2	bad 1/4 bolts
103	63	Dawn Yawn	11.75	1	0	0	2	105	2	
104	64	Cinnamon Girl	10.75	2	0	1	2	105	1	tree anchor
105	64	Tombstone, The	11.5	3	7	1.33	2	105	1	1 midway bad 1/4 anchor, 4 bad bashies, 3 1/4 bolts on route.
106	64	S Cracker, The	11	1	1	0.33	3	105	1	very bad 1/4 bolt.
107	64	Heaven Can Wait	10.75	1	0	0.33	3	105	2	
108	64	Rope Drag	10.5	1	0	0	0	105	2	
109	0	Book Of Brilliant Things								
124	69	No San Francisco	11	1	0	0	1	105	1	leadable

125	69	No Self Control	12.5	1	0	1	4	105	1	bad anchors	
126	69	No Sefl Respect	10.5	1	0	0.33	3	105	2	share sling anchor	
127	69	No Self Confidence	10.5	1	0	0.33	3	105	2	share sling anchor	
128	69	42N8	10	1	0	0.33	0	105	2	share sling anchor	
129	70	Hyperventilation	10.75	1	0	0	0	105	2	downclimb right	
130	70	New Day Yesterday	10	1	0	0.33	1	105	2	share tree achor/rappel	
131	70	Thumbs Up	10	1	0	0.33	1	105	2	share tree achor/rappel	
132	70	Troglodyte Crack	8	1	0	0.33	1	105	2	share tree achor/rappel	
134	71	Drop A Frog	9	2	2	0.5	1	105	1	tree anchor	
135	71	5 Crying Cowboys	12.25	1	0	1	2	105	1	shit bolt anchor	
136	72	Warrior Eagle	12.25	1	0	0	3	105	1	short	
137	72	Knight In Shining Armor, The	11.25	1	0	0	4	105	1	sick splitter for 30 feet	
796	299	Exit Stage Right	9	1	3	0.5	2	25	1	homemade hangars and button heads	
797	299	Psoriasis	9	1	3	0.5	1	25	1	slings on tree for anchor	
798	299	Ballbearings Under Foot	10	1	2	1	0	25	1	sling anchor	
799	300	Toad Crack	9	1	0	0	0	30	1		
813	307	Room To Shroom	9	1	0	0.25	4	15	2	share sling/tree anchor	
814	307	Chemical Warefare	9	1	0	0.25	3	15	1	share sling/tree anchor	
820	314	Red Headed Stranger	11.25	1	4	0	2	20	1		
821	314	Ho Man!	11.25	1	0	0	0	20	1		
822	314	It Don't Mean A Thing If It Ain't Got That Swing	12.25	1	0	0	3	20	1		
823	314	Solstice	11	1	0	0	1	20	1		
828	318	High Strung	9	1	0	0.5	3	20	2		
829	318	Rice Cake Roof	10.5	2	0	0	1	20	2		
830	318	Yogi The Overbear	10	1	0	0	0	20	2		
831	319	Ben	10.5	2	4	1.33	2	30	4	homemade hangars and visible webbing	
832	319	Last Angry Arab	6	2	0	0.33	1	30	4		
833	319	Willard	7	2	5	0.8	1	30	2		
834	319	Ricochet	5	1	0	1	1	30	2		
835	320	Mesopotamia	10.5	1	4	0	1	35	1		
836	323	Serious Fashion	10	1	5	0	0	20	1	buttonhead and SMC hangars	
837	323	Beverly Drive	10	1	0	0	1	20	1		
838	324	Primal Flake	9	1	3	0	0	25	5		
839	324	Hex Marks The Poot	7	1	0	0	3	25	5		
840	324	Strike It Rich	10	2	3	2	1	25	5	large trees and yucca at base	
841	325	Bolt Heaven	10	1	3	0	0	25	1	bolt ladder not visible from ground	
842	325	My Laundry	9	2	3	0.8	3	25	1		
843	325	Solid Gold	10	2	7	0.8	4	25	6		
844	325	Middle Age Crazy	11.25	2	6	1	2	25	5	shares bolts with neighboring route	
845	325	Such A Savage	11	1	11	1	4	25	5	exposed tree roots at base	
846	325	Walking Pneumonia	11.25	2	4	0	1	25	5	exposed tree root at base	
847	325	Breakfast Of Champions	8	2	3	1.5	2	25	5	good bolts, widely spaced	
848	325	Piggle Pugg	10.5	1	0	0.5	3	25	5	large tree with exposed roots at base	

849	326	Throat Warbler Mangrove	9	1	0	0.33	0	30	1			
850	326	Zion Train	10	1	0	0	2	30	1			
852	326	Figures On A Landscape	10.5	3	6	3	5	30	1			
853	326	Unknown Route, The	10	1	2	1	2	30	1			
854	327	Lead Us Not Into Temptation	9	1	6	1	3	30	1			
855	327	Deliver Us From Evil	8	1	4	0.5	1	30	1			
856	327	Hush Puppies	6	1	0	0.5	0	30	1			
857	328	Bozo Buttress	1	1	2	0	0	35	1			
858	328	Aqua Tarkus	9	1	3	0	1	35	1			
859	329	I Got It	9	0	0	0	25	1	1			
860	330	Cosmic Debris	10	1	1	0	1	25	1	1/4 inch bolt		
861	332	Unconscious obscenity	9	1	5	1	1	25	1			
862	332	Hand Wobler Delight	9	1	0	0.5	0	25	1			
863	332	Dazed And Confused	9	2	5	2	3	25	1			
864	332	Mental Physics	7	2	2	1	4	25	1			
865	334	Laid Back And Doing It	10.5	1	0	0	0	30	1			
866	334	Nihilistic Pillar	11.5	1	0	0	2	25	2			
867	335	Punked Out Porpoise	8	2	0	0	2	30	1			
868	335	Scar Wars	11.25	1	0	0	0	30	6			
869	337	Trembling Toes	9	1	1	0.5	1	20	4	highly impacted belay area		
870	337	Dirty Surprise	9	1	9	0.5	1	20	4			
871	340	I Can't Believe It's A Girdle	10	4	14	2	4	20	1	bail sling as of 5/2/02		
872	340	Sound Of One Hand Slapping, The	11.5	1	4	0.5	1	20	2			
873	340	Safe Muffins	8	2	2	0.5	0	20	2			
874	340	Fat Freddie's Escape	8	1	0	0	0	20	2			
875	340	Zap #4	6	1	0	0	0	20	2			
876	342	North Face, The (aka The fields of laughter)	5	1	0	0	0	20	1			
878	342	Early Bird	9	2	0	1	2	20	4	fixed static cord at first belay		
879	342	Lust In The Wonderland	9	1	0	0	1	20	1			
880	343	Joan Jetson	9	1	2	0.33	1	20	1	share bad anchors		
881	344	Boogers On A Lampshade	10.5	1	2	1	1	20	4	new bolts on route and at belay		
887	348	Innervisions	9	2	0	0	1	40	1	simul rap		
890	354	Monument Manor	8	1	0	0	1	35	1			
891	356	Gumby Goes To Washington	8	1	0	0	0	35	1			
892	356	Pokie's Big Chance	4	1	0	0	0	35	2			
893	357	Inauguron,The	11	2	2	0	2	45	1			
894	357	Yardy-Hoo And Away	10	3	5	1	2	45	1	variations at top of second pitch		
895	357	White Bread Fever	11	2	2	0	2	45	2	Leeper hangars, tatty slings, button heads		

896	358	True Democracy	9	1	0	0	1	45	5			
897	358	Vice President	10	1	0	0	1	45	5	heavily vegetated around belay area		
898	358	Black President	11	1	2	1	4	45	5			
900	359	Solar Wind	8	1	0	0	1	45	1			
901	359	Hawk Wind	10	1	0	0	2	45	1			
902	360	Big Brown Eye	10	1	1	0.5	3	45	5			
903	362	Take Two They're Small	9	1	0	0	1	60	5	One new bolt and 3" piece anchor		
904	362	Dangling Woo Li Master	10.5	1	0	0.5	4	60	5	One new bolt and 3" piece anchor		
905	362	Book Of Changes	10.5	1	5	0.33	3	60	5	retrobolted with 3/8 bolts		
906	362	Morning Thunder	10.5	1	0	0.33	3	60	5			
907	362	Caught Outside On A Big Set	10.5	1	0	0.33	5	60	5	2 new 3/8 bolts with tatty slings		
908	361	Owl	8	1	0	0.33	1	60	1			
909	366	Tube, The	10.5	1	0	0	0	60	1			
910	366	Poaching Bighorn	11.25	1	0	0.5	3	60	5	slings at anchors		
911	366	Greenhorn Dihedral	10.5	1	0	0.5	1	60	1			
912	366	Rusty Pipes	2	1	0	0	0	60	1			
913	368	Slip Skrig	10	1	0	0	1	60	1			
914	369	Hotpants	13	1	5	0.33	4	60	1			
915	371	As The Crags Turn	7	1	0	0	0	50	1	loose flakes on route		
916	371	General Hospital	9	1	0	0	1	50	1			
917	371	One Move Leads To Another	10	1	2	0	1	50	1			
918	372	Poodle Smasher, The	11	1	0	0	2	55	1			
919	372	In Elke's Absence	10	1	0	0	0	55	5			
920	372	Mental Siege Tactics	10	1	0	0	1	55	1	nasty chimney start		
921	372	Defoliation	9	1	0	0	2	55	1	beautiful route		
922	374	Eyes Without A Face	10	1	2	0.5	2	75	1	old bolts and tatty sling anchor		
923	374	Desert Delirium (aka Lost In The Wonderland)	10	2	7	0.5	2	75	1			
924	381	Ronnie's Rump	7	1	0	0.5	0	20	1			
925	380	Naked Reagan	11	1	0	0	3	20	2	large yuccas at base		
926	382	Bivo Sham	8	1	0	0	0	35	1	long walk off		
929	388	City H	8	1	0	0	1	35	1			
930	388	Poodle Boy	10.5	1	0	0	0	35	5			
931	388	Hook And Ladder	11	1	0	0	3	35	5	steel ladder at base		
932	388	Fishing Trip	9	1	0	0	0	35	5			
933	390	Crystal Voyager	10	1	1	0	0	35	1			
1783	43	Bates Motel, The	12.25	2	6	0	3	90	2	3/8 steel bolts		
1784	43	Psychotechnics	11.25	1	1	0	2	90	1	2nd pitch variation to last route. 3/8 steel bolts.		
1785	44	Powers That Be, The	13	1	5	1	5	90	1	6 bad 1/4 bolts		
1786	44	Chain Of Addiction	13.5	1	9	1	5	90	1			
1787	44	La Machine	13.75	1	6	1	5	90	1			
1788	44	Pumping Hate	13	1	5	1	3	90	1			
1789	54	Warpath	12.5	2	10	2	5	90	2	3/8 bolts		
1791	55	Sitting Bull	10.5	1	0	0.5	3	90	2			

1792	57	Lemon Slicer, The	11	0	0	0	1	90	1	short but sweet.	
1793	64	Fugitive, The	10.75	1	4	1	2	105	2		
1841	326	Repo Man	12	1	4	1	3	30	1		
1842	327	Life's A Pitch	12	1	8	0.5	2	30	1		
1843	327	Chute To Kill	10.5	1	6	0.5	1	30	1		
1844	340	Girdle Crossing	10.75	1	8	1	3	20	2		
1845	357	Morality Test	11	2	4	0	2	45	1		
1846	360	Manly Dike, The	12	2	12	1.5	4	45	1	bad bolts	
1847	360	Svapada	11	1	8	1	2	45	1	1/4 Leepers and a RURP?	
1848	362	Euphrates	11.5	1	0	0.5	3	60	5	One new bolt and 3" piece anchor	
1850	387	Iguana masters	10.5	1	6	0	0	35	4		
1851	389	Stingray	13	1	0	0.5	4	25	1	good anchor although shiny	
1999	36	Yet Another Cilley Toprope	11.5	1	0	0	0	20	1		
2000	36	Mary Decker	11	1	0	0	0	20	1		
2001	36	Zola Budd	10.75	1	0	0	0	20	1		
2002	36	Rob'N The Cradle	10.5	1	0	0	0	20	1		
2003	36	Wide World Of Sports	10.5	1	0	0	0	20	1		
2004	36	Agony Of Defeet	8	1	0	0	0	20	1		
2005	37	Clean Crack	10.5	1	0	0	0	20	1		
2006	38	Undercling Bypass	8	1	0	0	1	30	2	looks good	
2007	38	Tail Gunner	11.25	1	7	0	4	30	2	5 3/8 steel bolts, 2 angles	
2008	38	Little Bit Of Magic, A	10.5	1	0	0	1	30	1		
2009	38	Dreams Of Red Rocks	7	1	0	0	0	30	2		
2010	38	Friendly Fists	9	1	0	0	0	30	2		
2011	39	Tanning Salon	7	1	0	0	0	30	1	looks good	
2012	40	Now We Know	6	1	0	0	0	30	1		
2014	40	Alexander's Salamander	10.75	1	0	0	1	30	1		
2015	41	Short But Flared	10.5	1	0	0	1	30	2	left of tech face summit	
2016	41	Muffin Bandits	10.5	1	0	0.33	2	30	1		
2017	41	Slow Mutants	11	1	4	0.33	2	30	1	4 3/8 steel bolts, 2 bolt anchor	
2018	41	Spire Route	5	1	1	1	0	30	1	good bolts	
2019	41	Tchalk Is Cheap	10.75	1	1	0	0	30	2	rusty bolt	
2020	41	Garden Path	10	1	0	0	0	30	3		
2021	41	Chute To Kill	11	1	3	0	2	30	3	3/8 steel bolts	
2022	41	Under A Raging Moon	10.5	1	0	0	0	30	1	super short route	
2023	41	Too Thin For Poodles	10.5	1	2	0	1	30	2	2 1/4 rusty bolts	
2024	41	Pillar Of Dawn	10	1	0	0.5	0	30	1	1/4 inch rusty anchor bolt	
2028	43	Nuclear Waste	10	1	0	0	3	90	2	bad sling anchor	
2029	43	Psycho	10.75	1	3	0	2	90	2	bad, rusty 1/4 Leeper hangar	
2030	43	Shower Scene	10.5	1	2	0	2	90	2	bad, rusty 1/4 Leeper	
2031	44	This Spuds For You	10.5	1	6	0.5	1	90	1		
2032	47	Year After Year	9	1	0	0	0	105	2		
2033	48	Crow's Nest, The	11.75	1	0	0	1	45	1	Grungy climb	
2034	44	Ocean Of Doubt	13.5	1	7	1	5	90	1		
2035	48	Hooterville Trolley	11	1	1	1	2	45	2	One bolt anchor- 3/8 steel	

2036	48	KP Corner	10	1	0	0	0	45	2			
2044	51	Two Lost Soles	8	1	0	0	0	90	1			
2045	52	Living In A Fishbowl	10.5	1	0	0	0	90	4	short route		
2046	53	Supercollider	8	1	0	0.33	1	90	2			
2047	53	Spanking	11.5	1	0	0.33	1	90	2	toprope		
2048	54	Stone Hinge	11.25	1	0	0	1	90	1	Flake on separate face below.		
2049	55	Sideburn	12	1	4	1	3	90	1			
2050	55	Hydra	13.5	1	9	1	5	90	1			
2051	55	Lion's Share	10.5	1	3	0.5	3	90	1	Anodized good bolts		
2052	56	Lemon Head, The	10.5	1	4	0	1	90	1	4 bad rust 1/4 bolts with Leeper hangers.		
2053	57	Lemon Lemon	10	1	0	0	0	90	1	many potential short cracks nearby		
2054	58	Dunce Cap, The	10.5	1	1	0	2	105	2	1/4 Leeper. Abandoned route?		
2055	59	Bighorn Dihedral	10.5	1	0	0	3	105	1	Beautiful		
2056	59	Compact Physical	11.5	1	0	0	2	105	1			
2057	59	Rock Lypso	10	1	1	0	0	105		bad bolt, bad rock		
2058	60	Stepping Out Of Babylon	9	1	0	0	1	120	2			
2059	60	Stepping Razor	10.5	2	0	0	2	120	2			
2060	60	Steps Ahead	10.5	2	0	0	1	120	2	shwaggle		
2061	60	First Steps	8	1	0	0	0	120	5			
2062	61	Arete #1	10	1	0	0.5	1	105	6	TR		
2063	61	Arete #2	11.25	1	0	0.5	1	105	6	TR		
2064	61	Arete #3	11	1	0	1	1	105	6	TR		
2065	61	Arete #4	11	1	0	1	1	105	6	TR		
2066	61	Honorable Hersheys								Can't find		
2069	64	Turtle Days	8	1	3	0	0	90	1			
2072	66	Mercy Road	11	1	5	0	1	120	1	3/8 steel SMC hangers		
2073	66	Looking For Mercy	11	1	3	0	1	120	1			
2074	66	Empty Street	10.5	1	4	0	1	120	1	4 steel bolts with Leeper hangers		
2075	66	Moonstruck	10.5	1	0	0	0	120	1			
2076	67	Dihedralman	13	1	3	1	3	120	2	good bolts		
2077	67	Avante Guard-Dog	11.75	1	4	1	2	120	2	2 pins, 2 3/8 bolts.		
2078	67	Lusting CLH	8	0	0	0	0	120	2			
2079	67	Blonde Eyebrow Fetish	10.5	0	0	0	0	120	2			
2084	69	Boogs' Route	10.5	1	0	0	2	105	2			
2085	71	Coliseum, The	10.5	2	0	0	2	105	1	walk off		
2086	71	Drop Your Drawers	10.5	2	0	0.5	2	105	1	tree anchor		
2087	73	Sack In The Wash	10.5	1	0	0.33	0	105	1	3/8 steel anchor (shared)		
2088	73	Hands Of Fire	11.5	1	0	0.33	0	105	1	3/8 steel anchor (shared)		
2089	73	Crystal Deva	10	1	0	0.33	0	105	2	3/8 steel anchor (shared)		
2123	44	Telekinesis	10.5	1	0	0	0	90	2			
2755	299	Escape From Planet Earth	10	1	0	1	2	25	5	sling around tree anchor		
2756	300	Fissure Todd	8	1	0	0	0	30	1			
2775	307	Mud Dog	10	1	0	0.25	0	15	1	share sling/tree anchor		
2776	308	Frankie Lee	7	1	0	0	0	15	1			
2777	308	Quest For The Golden Hubris	9	0	0	0	0	15	1			

2794	318	Buford's House Of Liver	11	1	9	0.5	0	20	2	shiny bolts		
2795	318	Animal Magnetism	11	1	3	0	1	20	2			
2796	321	Burn Bush	9	1	4	0	0	30	4			
2797	321	New Decayed	7	1	3	0	0	30	2			
2798	321	Speculum Scrapings	11.5	1	6	0	2	30	1	good camo bolts		
2799	321	Mr. Bunny's Petri Dish	9	1	0	0	0	30	1			
2800	322	Aid Route	0	1	8	0.5	0	25	6			
2801	322	Duke, The	0	1	6	0.5	0	25	6	old leeper hangars		
2802	324	If You Really Loved Me, You'd Buy Me A Turkey	10.5	1	3	0	0	25	5			
2803	325	Mamunia	13	2	13	2	3	25	3	vegetated base		
2804	325	Stone Idol	11.75	1	6	1	4	25	1			
2805	325	Crimping Lessons	11.25	1	5	0.4	3	25	6			
2806	325	Shooting Star	11	2	6	1	2	25	5			
2807	325	Boogie Woogie Blues, The	11.5	1	3	0	0	25	1	second pitch variation		
2808	326	In Search Of Hush Puppies	8	1	0	0.33	0	30	2	tree and some soil at base		
2809	326	Gunslinger, The	12	4	15	3	4	30	1			
2810	326	Unknown Soldier	11.25	2	9	1	4	30	1			
2811	328	Mr. Lizard Meets Flintstone	6	1	5	0	0	35	1			
2812	328	Didn't Your Mama Ever Tell You About A Stranger's	9	1	3	0	0	35	1			
2813	328	Air Voyager	11.25	1	2	0	0	35	1	tatty webbing on 2nd bolt		
2814	328	It Seams Possible	10.5	1	2	0	0	35	1			
2815	328	Bozo's Raindance	11.5	1	0.5	1	1	35	1			
2816	330	Anty Matter	10	1	2	0	0	25	1	1/4 inch bolt		
2817	330	One Small Step	6	1	0	0	0	25	1			
2818	330	Moonwalk, The	6	1	0	0	0	25	1			
2819	331	Trowel And Error	9	1	0	0.17	1	25	1			
2820	331	Sakreteligious	9	1	0	0.17	0	25	1	tatty webbing at anchors		
2821	331	Mortarfied	10.5	1	3	0.17	1	25	1	leeper hangars		
2822	331	Cementary	8	1	0	0.17	1	25	1			
2823	331	Another Brick In The Wall	9	1	0	0.17	0	25	1			
2824	332	Booglesby	9	1	2	0.5	1	25	1	bad 1/4 inch bolts		
2832	334	Existential Decay	12.75	1	3	0	2	25	2			
2833	334	Endless Summer	9	1	0	0	0	25	2			
2834	335	Bombs Over Libya	12	1	3	1	2	30	1			
2835	335	Top Guns	11.5	1	6	0.5	0	30	1			
2836	335	Slaves Of Fashion	12.25	1	1	0	1	30	2	bad leeper hangar		
2837	335	Cole-Gordon Offwidth	10.5	1	0	0.5	0	30	1			
2838	336	Towering Inferno, The	11.5	1	0	1	1	30	2			
2839	336	Poseidon Adventure	11.25	1	1	0.5	1	30	2			
2840	336	Plantismal	9	1	0	0.5	0	30	2			
2841	336	Panty Shield, The	10.5	1	0	1	0	30	1	NW facing climb, 100 yds from Disaster Dome		

2842	338	One Whole Chicken In A Can	10.5	1	0	0	0	25	1			
2843	338	Eat What You Secrete	7	1	0	0	0	25	1			
2844	338	Red Hot Chili Peppers	11	1	5	0	0	25	4			
2845	338	Fissure Of Fish	9	1	0	0	0	25	4			
2846	339	Tell Me I'm Not Dreaming	9	1	1	0	1	25	1			
2847	340	I Can't Believe It's A Sandbag	8	1	1	0	0	20	1			
2848	341	Weenie Roast	11	1	0	1	1	20	1			
2849	342	Bookman Pitman	7	1	0	0	1	20	1			
2850	342	Time Avenger	11	1	7	0	2	20	1	rusty 1/4 bolts		
2851	342	Broken Bits	9	1	3	0	1	20	1			
2852	343	Cactus Dog	10	1	5	0.33	1	20	1	share bad anchors		
2853	343	Spacely Sprockets	9	1	4	0.33	0	20	1	share bad anchors		
2854	345	Smoke And Mirrors	11.75	1	5	1	0	30	1	bright slings at belay, noticeable from ground		
2856	355	Viper, The	10.5	1	0	0.33	1	35	4	slings at belay		
2857	346	Scud Missle	11	1	3	0	1	30	1			
2858	346	Thrutcher	7	1	0	0	0	30	1			
2859	346	Invasion Of My Fantasy	7	1	0	0	0	30	1			
2860	346	Desert Storm	10.5	1	3	1	1	30	2			
2861	346	Life Without Principle	11.25	1	9	1	0	30	1			
2862	346	Whales On Ice	10	1	0	0	0	30	2			
2872	348	Squeeze Play	8	1	0	0	0	40	1	simul rap		
2873	348	Artificial Ingredients	8	1	0	0	0	40	2			
2874	340	Tigers On Vaseline	9	1	3	0.25	0	40	3	bad bolts		
2875	350	Mind Body Problem	12	1	1	0	1	40	1			
2876	350	Anecdotes Of Power	11	1	0	0	1	40	1	on separate formation than Mind Body Problem		
2879	352	Ground Ron	10	1	0	0	0	40	1	not worth the walk through cactus		
2880	352	Feeding Frenzy	10	1	0	0	0	40	1	not worth the walk through cactus		
2881	353	Underwear Bandit, The	10	1	0	0.33	1	35	1			
2882	354	South Face Direct	7	1	0	0	0	35	1			
2883	355	Mother Butler	10	1	0	0.33	1	35	4			
2884	355	Secret Of Mother Butler, The	10.5	1	0	0.33	2	35	4			
2885	357	Beafcake	10	1	0	0	0	45	2			
2886	357	Wheat Beri-Beri	11	1	0	0	1	45	2			
2887	358	Pom Pom Dancer	9	1	0	0	0	45	3			
2888	358	Milk The Dog	10	1	0	0	0	45	3	girdle traverse		
2889	360	Truly Snooty Furniture	10	1	0	1	0	45	1			
2890	361	Broken Wing	10.5	1	3	0.33	0	60	1			
2891	361	Talon, The	12.5	1	5	0.33	1	60	1	last bolt is rusty Leeper		
2892	363	Dominatrix	11	1	0	0	0	90	1			
2893	363	Whips And Grains	9	1	0	0	3	90	1			
2898	366	Love Goat, The	10.5	2	0	0.5	1	60	5			
2899	366	Aliens Ate My Buick	10.5	2	3	0.5	1	60	1			

2900	366	Zorba	11	1	1	0	1	60	1			
2901	366	Cut To The Bone	10.5	1	0	0	1	60	5			
2905	366	Jack In The Crack	10.5	1	0	0	1	60	1			
2906	366	Get The Boot										
2907	367	Skintight Mousehouse	11	1	6	1	2	60	2			
2908	367	Adder Dance	12	1	2	0	3	60	1	chopped		
2909	367	Puff Adder	13	1	9	1	4	60	4			
2910	367	Copperhead	11	1	0	0	1	60	4			
2911	367	Mojave Green	12	1	0	0	3	60	2	chopped		
2912	367	Crowded Mental Hospital	13	1	4	1	3	60	4			
2913	367	Mongoose	13	1	0	0	4	60	4	chopped		
2914	367	Automatic Venom Sprinkler	13	1	0	0	3	60	4	chopped		
2915	367	Pit Viper	13	1	0	1	4	60	1	chopped		
2916	367	Viper	13	1	1	1	3	60	2	chopped		
2917	367	Rubber Boa	13	1	5	1	3	60	1			
2918	367	Garter Snake	10	1	3	1	1	60	1	one hole without bolt		
2919	368	Red Red	10	1	0	0	1	60	1			
2920	368	Red Rain	13	1	5	1	3	60	1	way hard		
2921	369	What Is The Question?	0	1	0	0.33	1	60	1	Aid line with cheat stone for first move		
2922	370	Three Amigos, The	8	1	0	1	0	50	5	Sling on tree anchor. Formation part of Cornerstone.		
2923	371	Rope Opera	11	1	2	1	1	50	1	slings in American triangle anchor		
2924	371	All My Children	9	1	0	0	1	50	1			
2925	371	Tomato Amnesia	10	1	0	0	1	50	1			
2929	375	Refrigerator - Left Side	10	1	4	0.5	2	60	1			
2930	375	Refrigerator - Right Side	11	1	0	0.5	0	60	1	toprope		
2950	380	Wayword Hayward	10	1	1	0	0	20	6			
2951	381	Naked Nancy	10	1	0	0.5	0	20	1			
2958	386	Worth Bagley Dihedral	10	1	0	0	2	20	1	sketchy start over chasm		
2959	386	Squid Of My Desire	10	1	0	0	0	20	1	sketchy start		
2960	387	DHIP	10.75	1	2	1	1	35	4	tatty pink (visible) slings at anchor		
2961	387	Angione Crack	7	1	0	0	0	35	1			
2962	387	Mohave Green	8	1	2	0	0	35	1			
2963	388	Pink Thing	10	1	1	0	1	35	1	good 3/8 bolt		
2964	389	Soul Kitchen	10.5	1	2	1	0	25	1	no hangar on one anchor bolt		
2965	389	Boot Hill	10	1	2	0.5	0	25	1			
2967	389	Fear Is Never Boring	12	2	8	0.5	1	25	1	rusty bolts on second pitch		
2968	390	Air Crack	6	1	1	0	0	35	1			
2969	390	Beta Zoid	11	1	0	0	0	35	6			
2970	391	Head, Abdomen, Thorax	9	1	3	1	0	35	5	old bolt and fixed piece		
4101	0	Bourbon On Ice										
4102	0	Slightly Out Of Our Minds										
4103	0	Boortemus										
4134	717	String 'Em Up	11.25	1	5	1	3	45	6			

4135	717	Lynch Mob	11	1	4	1	2	45	1			
4136	717	Spaghetti Western	11.75	1	8	1	4	45	1	really good		
4139	719	Return To Hell	11.25	1	3	1	2	20	1	bail biner on 5/20/02		
4140	719	Cool Thing	12.25	1	3	1	3	20	1	missing hangar on anchor bolt		
4141	719	Women And Money	12.25	1	0	1	2	20	1	toprope		
4142	719	Desert Whale	11.5	1	3	0	3	20	1	tatty slings on anchor		
4143	720	Nitty Gritty	9	1	0	0	0	20	1			
4144	721	Iron Lady	8	1	2	1	0	30	6	tatty slings and bolts at anchor		
4145	722	Exiled In Sweden	10.5	1	3	0	0	35	1	bail biner on 5/20/02		
4146	722	Bulkhead Arete	10.75	1	1	0	3	35	1			
4149	724	Approach Pitch	8	1	0	0	0	30	1			
4150	724	Taken For Granite	8	1	0	0	3	30	6			
4151	724	200 Motels	8	1	0	0	3	30	6			
4152	724	Cactus Cooler	10	1	0	0	2	30	5			
4153	724	Scream Of The Butterfly	10	1	3	0	0	30	1	bad bolts		
4154	724	Roy's Route	11	2	7	2	3	30	5			
4155	724	Test Pilot	10	1	0	0	0	30	1			
4156	725	Around The Corner	8	1	2	0	0	25	5	1/4 Leepers		
4157	725	Love Comes In Spurts	10.75	1	3	1	0	30	6	some Leepers and slings at anchor		
4158	726	Great Commission	11	1	0	0	2	30	1			
4159	727	Pyramid Power	9	2	0	0	0	30	1			
4160	727	Shake, Rattle And Roll	11	2	9	1.5	2	30	1	tatty slings		
4161	727	High Tops	10	2	0	0.5	1	30	1	Leeper at anchor, slings		
4162	727	Snakeye Pillar	7	1	5	0.5	2	30	1	Leeper at anchor, slings		
4163	727	Wrap That Rascal	10	1	0	0	1	30	1			
4167	63	Lithophiliac	11.25	2	0	1	2	105	2	bad 1/4 anchor bolts		
4322	46	Ain't This Boogie A Mess?										
4323	46	Parliament										
4324	46	Oven Mitt, The										
4325	46	Never Mind										
4326	46	Funkadelic										
4327	46	George Clinton Funked Me										
4471	38	Little Brown Jug	7	1	0	0	0	30	2			
4472	38	38a	10	1	0	0	0	30	2			
4473	38	38b	4	1	3	1	0	30	1	Spire with fat anchor bolts and 3 3/8 steel bolts		
4474	39	Melanoma	4	1	0	0	0	30	1			
4475	39	Mission Bells	7	1	2	0	0	30	2			
4476	39	Etiquette Rex Well Mannered Dog	8	1	0	0	0	30	1			
4477	40	The Human Mold	10.5	1	0	0	1	30	1			
4478	40	Two Bull Dykes in a Fist Fight over the priveledge	9	1	0	0	1	30	1			
4479	40	Cubiks Molecule	11.25	1	0	0	1	30	1			
4480	41	Alcoholic Single Mothers	10.75	1	0	0.5	0	30	1			
4481	41	EB Bon Homme	9	1	0	0	1	30	0			
4482	41	Science Experiments You	10	1	2	0.33	0	30	1	good bolts		

		Can Eat										
4483	41	Hair Line	5	1	0	0	1	30	2			
4484	41	Friendly Fists	9	1	0	0	0	30	1			
4485	43	43a	10	1	0	0	0	90	2	fixed nut		
4486	43	Pumping Hate	13	1	5	0	3	90	1	good bolts, no anchor		
4487	43	Psychotechnics	11.25	1	1	0	2	90	1			
4488	43	Latex Arete	10	1	1	0.5	0	90	2			
4489	43	43b	11	1	2	0	0	90	1	perhaps unfinished, 2 3/8 bolts		
4490	43	Atomic Poodle Crack	10.5	1	0	0	2	90	1			
4491	43	43c	10	1	2	0	0	90	1	good bolts		
4493	46	Wings of Wrath	11.75	3	1	1	60	1	0	on separate brown pillar 250 feet NE from Atom Smashers. Good bolts.		
4494	48	Fake Foot	6	2	1	1	0	45	2	3/8 steel SMC hangers		
4495	48	Earth and Sky	10.75	1	4	1	2	45	2	good anchor, good bolts		
4496	53	53a	8	1	0.33	0	90	2	0	bad bolt		
4497	54	54a	8	2	0	0	0	90	2	All crack		
4498	56	56a	6	1	0	0	0	90	1			
4499	56	56b	6	1	0	0	0	90	1			
4500	56	56c	8	1	0	0	0	90	0			
4501	56	56d	11.75	1	0	0	0	90	0	1 fixed pin		
4502	60	60a	10.75	1	0	0	4	120	2	Obvious lightning bolt crack on right buttress		
4503	62	62a	11	1	0	0	0	90	4	face to crack in left facing corner		
4504	62	62b	11	1	0	0	0	90	4	traverse crack for left, pull roof		
4505	62	62c	7	1	0	0	0	90	2	short wide crack		
4506	62	62d	9	1	0	0	0	90	1	wide crack in corner		
4507	62	62e	10	1	0	0	0	90	1	crack to face with 2 removed bolts.		
4508	63	Transversal	9	2	0	0	1	105	2			
4509	63	Two Left Feet	9	1	2	0.33	2	105	2	bad 1/4 bolts		
4510	63	Jewel of Denial	9	1	3	0.5	1	105	2	bad 1/4 bolts		
4511	63	Hawy Meadow	10	1	5	0.5	0	105	2	bad 1/4 bolts		
4512	66	Mistake, The	9	1	0	0	0	120	2			
4513	66	Bloodsucker	10.5	1	0	0	0	120	2			
4514	66	66a	11	1	0	0	0	120	2			
4515	69	No Pain No Grain	10.5	1	0	0	1	105	0			
4516	307	307a	10	1	5	0.25	0	15	1	share sling/tree anchor		
4517	318	318a	11.75	1	1	0	0	20	1			
4518	319	Final Furious Farsi	6	1	7	0.5	0	30	2	new bolts		
4519	320	I am 100% not guilty	10.5	1	0	0	1	35	0			
4520	321	Great White Way	1	1	0	0	1	30	2	good camo bolts		
4521	321	Heavis and Chucklehead	9	1	0	0	0	30	1			
4522	325	Middle aged savage	12.25	2	9	1	5	25	5			
4523	325	325b	10	2	10	0	1	25	4	large trees at base		
4524	326	A bolt a sling just do that thing	10.5	1	1	0.33	0	30	1			
4525	326	326project	0	0	2	0	0	30	1	project next to unknown soldier		
4526	329	Walk in the park	4	1	0	1	0	25	1	tree rappel anchor		
4527	330	330a	0	1	2	1	0	25	2			

4528	331	Deli Lama	10.5	1	0	0.17	0	25	1			
4529	334	Lifes a bitch then it swallows you	6	1	0	0	0	30	1			
4530	334	Tank girl	10.5	1	0	0	1	30	1			
4531	335	Junkyard Dog	10.5	1	1	0	0	30	1			
4532	139	139a	0	1	1	0	0	20	1	unfinished project, sling on bolt		
4533	139	139b	0	1	3	0.5	0	20	2			
4534	342	Kitty Krunchies	7	2	0	0	1	20	1			
4535	342	Ravenswood	8	2	0	0	0	20	1			
4536	343	Dihedron	14	1	4	1	5	20	1	4 pins, a copper head, a fixed nut, good anchors/chains		
4537	348	Trilby	7	1	0	0.5	0	40	1			
4538	348	The boob tube	6	2	0	0.5	0	40	1			
4539	348	Bridge it Bardot	10	1	4	0	1	40	1			
4540	349	Hobbes	9	1	1	0.25	0	40	3	bad bolts		
4541	349	Red Wine and Shake	10	1	0	0.25	0	40	1	bad bolts		
4542	349	Dodge Ball Cracks	10	1	0	0.25	0	40	1	bad bolts		
4543	351	Wheel of Fortune	11	1	4	0.25	3	35	1	bolts need replacement		
4544	351	Grain and Bear It	9	1	0	0.25	0	35	1	needs chains		
4545	351	Main Street	10	1	0	0.25	0	35	3	needs chains		
4546	351	Weak Force	10	2	0	0.25	0	35	2	needs chains		
4547	353	Rangers Revenge	6	1	0	0.33	0	35	1			
4548	353	Where Rangers Dare	10	1	3	0.33	0	35	0	no hangars on bolts		
4549	353	353a	0	1	4	0	0	35	0	abandoned project		
4550	357	Laidlers dunking	6	1	0	0	0	45	1			
4551	360	360a	0	1	1	0	0	45	5	1 1/4 Leeper. Bad route.		
4552	363	Leper Colony	10.5	1	0	0	0	90	1			
4554	364	Karma	12	1	7	1	4	60	2	must do		
4555	364	Podium, The	10	1	4	0.33	3	60	1	must do		
4557	364	Zen	12	1	4	0.33	3	60	1	must do		
4558	364	North Side	11	1	2	0.33	2	60	1	must do		
4559	366	Summit Fever	10	1	0	0	0	60	1			
4560	366	Praying Mantis	10	1	0	0	0	60	1			
4561	369	Mexican Hat of Josh	11	1	0	0.33	1	60	6			
4562	371	Tsunami	10	1	8	1	1	50	1	nice looking route		
4563	374	Pissant, The	9	1	0	0	0	75	1			
4564	380	Lorenz' Dry Dock	10	1	0	0	0	20	6	rusty buttonhead with 4 washers behind hangar, dicey		
4565	380	380a	0	1	1	0	0	20	6	unfinished route		
4566	389	Pale Rider	11	1	0	0.5	1	25	1			
4567	391	Mr. Hard Gets Happy	9	1	0	0.33	0	35	5			
4568	391	Mr. Happy Gets Hard	10.5	1	0	0.33	0	35	5			
4569	391	Ear, Nose and Throat	9	1	0	0.33	1	35	5			
4570	391	Fake Hair, Plastic Tits, Penis Enlargement	8	2	0	0	0	35	2			
4571	717	Hoosgow, The	10	1	1	0	1	45	1			
4572	717	No Noose Is Good Noose	9	1	0	0	0	45	1			

4573	717	Lucky's Raw Paws	11	1	0	0	0	45	1			
4574	719	719a	0	1	5	0	0	45	1	unfinished		
4575	727	Sebomen	8	2	0	0	0	30	1			
4576	727	727a	10	1	8	0.5	1	30	1			
4577	729	729a	9	1	4	1	0	90	5	good 3/8 bolts and rings		
4578	729	729b	10.75	1	5	1	0	90	5			
4579	729	729c	10.75	1	5	1	0	90	5	chains at anchor		
4580	729	Coyote Corner	9	1	0	1	1	90	5	tree anchor		
4581	730	Base Arrest	10.5	1	0	0	0	120	1			
4582	730	Bailey's Foster	10.5	1	0	0	0	120	1			
4583	731	5 Crying Sport Climbers	10.5	1	0	1	2	120	2	tree rap anchor		
4584	731	Thrill of Desire	12.5	1	3	0	4	120	1	3 3/3 bolts, killer line		
4585	732	732a	10	1	0	0	0	90	2	right leaning crack on right side of face		
4586	732	732b	9	1	0	0	0	90	2	crack left of 732a		
4587	732	732c	8	1	0	0	0	90	1	left side of south face		
4588	733	Edge Trimmer	10	1	0	0	0	25	1			
4589	733	Garden Weasel	7	1	0	0	0	25	1	fixed cam		
4590	733	Solid Mold	7	1	0	0	0	25	1			
4591	733	Chia Pet	4	1	0	0	0	25	1			
4592	733	Eye of Horrors	7	1	0	0	0	25	1	west side of cliff face		
4593	734	Have Toilet, Will Travel	7	1	0	0.5	0	30	2			
4594	734	You're Following An Aristocrat	10	1	0	0.5	0	30	2			
4595	735	Crack of Dark	10	1	0	0.33	0	45	1			
4596	735	Picasso Kokopelli	11	1	4	0.33	3	45	1	2 bolt anchor with static rope		
4597	735	The Roundup	11	1	1	0.33	1	45	1	rusty bolt and slings		
4598	736	Comet	8	1	0	1	1	45	5	anchor slings not visible from ground		
4599	737	Time To Take Out The Garbage	10	1	0	0.5	0	40	2	tatty slings on bolt anchor		
4600	737	Automatic Tiger	11	1	1	0.5	1	40	1	tatty slings on bolt anchor		
4601	737	Hard Rock Café	10.75	2	0	0	1	40	1			
4602	738	Beyond Comprehension	9	1	0	0	0	60	1			
4603	738	Black Pudding	8	1	0	0	0	60	1			
4604	738	No Earthly Idea	8	1	0	0	0	60	1			
4605	738	So?	5	1	0	0	0	60	1			
4606	738	Obviously	2	1	0	0	0	60	1			
4607	738	Wiggles	8	1	0	0	0	60	1			
4608	738	Drop Zone	11	1	0	0	1	60	1			
4609	738	Mutton Chops	10	1	0	0	0	60	1			
4610	738	Sheep Shank	7	1	0	0	0	60	1			
4611	738	Sheep Thrills	8	1	0	0	0	60	1			
4612	738	Sheep Dip	9	1	0	0	1	60	1			
4613	739	Turnbuckle	8	1	0	0	0	50	1	back of Garrett's Arch		
4614	740	Seargent, The	11	1	2	0.5	1	25	1			
4615	740	Recruit, The	10	1	3	0.5	1	25	1	short and steep		
4616	740	40 Foot Famine	12	1	0	0	0	25	2			
4617	740	Shroomin	7	1	0	0	0	25	1			
4618	740	Boomin	9	1	0	0	0	25	1	bouldery start right		

4619	741	741a	11	1	0	0	0	30	1	toprope		
4620	741	741b	11	1	0	0	0	30	1	toprope		
4621	741	741c	12	1	0	0	0	30	1	toprope		
4622	741	741d	12	1	0	0	0	30	1	toprope		

Appendix 5 – Visual Observation Records

Split Rock					
Date	**Obs. Period**	**Total Obs.Users**	**Climbers**	**% Climber**	
10/24/2003	900-1300	2	2	100	
10/28/2003	830-1400	2	0	0	
11/22/2003	1030-1400	43	0	0	
2/3/2004	1000-1400	0	0	0	
3/9/2004	900-1330	5	0	0	
4/14/2004	1000-1500	9	4	44.44	
	Total	61	6	0.10	
Queen Mountain					
Date	**Obs. Period**	**Total Obs.Users**	**Climbers**	**% Climber**	
11/14/2002	930-1430	2	2	100.00	
11/16/2002	900-1530	5	3	60.00	
11/23/2002	830-1500	6	4	66.67	
12/3/2002	830-1430	3	3	100.00	
12/5/2002	830-1500	6	6	100.00	
12/28/2002	830-1500	10	8	80.00	
10/18/2003	800-1600	0	0	0.00	
	Total	32	26	0.81	
Uncle Willy's					
Date	**Obs. Period**	**Total Obs. Users**	**Climbers**	**% Climber**	
6/13/2002	800-1400	0	0	0.00	
7/25/2002	800-1345	0	0	0.00	
5/18/2002	800-1400	4	2	50.00	
5/18/2002	730-1400	4	2	50.00	
9/28/2002	800-1400	2	2	100.00	
9/29/2002	800-1300	2	2	100.00	
10/12/2002	900-1200	6	3	50.00	
10/19/2002	900-1300	21	17	80.95	
11/1/2002	1030-1430	3	3	100.00	
11/18/2002	1000-1400	15	4	26.67	
12/4/2002	1130-1400	5	4	80.00	
12/28/2002	1300-1530	34	21	61.76	
1/12/2003	1100-1430	3	2	66.67	
4/6/2003	1100-1450	15	8	53.33	
2/2/2003	1000-1430	10	0	0.00	
		Total	124	70	0.56

Barker Dam					
Date	**Obs. Period**	**Total Obs. Users**	**Climbers**	**% Climber**	
5/22/2002	800-1500	0	0	0.00	
5/22/2002	730-1400	0	0	0.00	
6/22/2002	800-1400	6	0	0.00	
7/22/2002	800-1400	6	0	0.00	
8/6/2002	800-1400	1	0	0.00	
9/28/2002	900-1300	4	0	0.00	
9/29/2002	1000-1300	0	0	0.00	
12/11/2002	1120-1500	0	0	0.00	
11/1/2002	1030-1430	10	8	80.00	
11/22/2002	930-1410	12	9	75.00	
10/12/2002	900-1230	5	5	100.00	
1/16/2003	1140-1450	3	2	66.67	
4/16/2003	1100-1400	6	6	100.00	
10/25/2003	1000-1400	9	6	66.67	
10/26/2003	1300-1700	10	5	50.00	
	Total	72	41	0.57	
Boy Scout					
Date	**Obs. Period**	**Total Obs. Users**	**Climbers**	**% Climber**	
6/2/2002	800-1400	9	0	0.00	
6/2/2002	800-1400	9	0	0.00	
6/13/2002	800-1300	0	0	0.00	
7/3/2002	800-1400	0	0	0.00	
8/21/2002	800-1130	0	0	0.00	
9/29/2002	930-1300	6	2	33.33	
10/13/2002	800-1400	14	0	0.00	
11/25/2002	1100-1600	13	0	0.00	
12/27/2002	1040-1520	26	0	0.00	
3/31/2003	1030-1430	6	0	0.00	
5/8/2003	100-1430	2	0	0.00	
5/26/2003	1000-1430	10	2	20.00	
10/12/2003	1000-1430	15	0	0.00	
	Total	110	4	0.04	

Climbing Sites			
Date	**Period**	**Climbers**	**Notes**
6/1/2002	800-1300	0	
9/15/2002	1200-1800	0	
9/16/2002	1200-1800	0	
9/17/2002	800-1800	0	
9/28/2002	1100-1800	0	
9/29/2002	800-1800	0	
9/30/2002	800-1800	0	2 dogs, and heard tap tap of hand drill, 3 at Mental Physics
10/4/2002	800-1800	0	2 at Mental Physics
10/12/2002	800-1800	5	2 on Figures and Solid Gold, Also climbers at HighStrung,
10/13/2002	800-1800	4	Sheepbuggers, High Strung, and Disneyland Dome.
10/14/2002	900-1800	0	
10/15/2002	800-1800	0	
10/16/2002	800-1300	2	Solid Gold
10/18/2002	800-1800	2	Solid Gold
10/19/2002	930-1230	6	Solid Gold and Figures, One bail sling left on Solid Gold
10/21/2002	800-1800	0	
10/22/2002	800-1800	0	
10/27/2002	800-1800	0	
10/28/2002	800-1800	0	
11/1/2002	1100-1500	8	6 on Solid Gold, My Laundary, and Crimping Lessons. 2 on Figures .
11/2/2002	800-1600	6	Solid Gold
11/8/2002	800-1600	3	Solid Gold
11/9/2002	800-1600	7	2 on Such a Savage, 2 on Middle Age Crazy, 3 onSolid Gold
11/10/2002	800-1200	2	2 on Solid Gold
11/15/2002	900-1330	3	3 on Solid Gold
11/18/2002	1000-1400	4	2 on Solid Gold, 2 on Figures on a Landscape
11/19/2002	800-1800	2	Solid Gold
11/20/2002	800-1800	7	5 on Solid Gold, 2 on Breakfast of Champions
11/21/2002	800-1800	2	2 on Breakfast of Champions
11/22/2002	800-1600	6	4 on Breakfast of Champions, 2 on Figure on a Landscape
11/23/2002	800-1200	0	Landscape, 2 on Hex Marks the Poot, 2 on Worth Bagley .
12/3/2002	1000-1600	0	2 on High Strung, 4 at Bighorn Mating Grotto
12/28/2002	1300-1530	21	4 on Mental Physics, 2 on Freak Bros, 2 on Figures on a
1/12/2003	1100-1400	0	
10/17/2003	900-1400	2	Figures on a Landscape
10/25/2003	900-1400	2	2 on Solid Gold

Appendix 6 – Time Lapse Camera Data

Future Games Time-Lapse Data					
Date	# Climbers	Continuum	Invisibility Lessons	10b Inv. Lessons Variation	Bendix Claws
10/15/2003	6	4	2	0	0
10/16/2003	2	0	0	0	2
10/30/2003	0	0	0	0	0
10/31/2003	0	0	0	0	0
12/8/2003	0	0	0	0	0
12/9/2003	0	0	0	0	0
11/16/2003	0	0	0	0	0
11/17/2003	0	0	0	0	0
3/21/2004	0	0	0	0	0
3/22/2004	0	0	0	0	0
2/16/2004	0	0	0	0	0
2/17/2004	0	0	0	0	0
3/26/2004	6	2	2	0	2
3/27/2004	2	2	0	0	0
4/12/2004	4	0	0	2	2
4/12/2004	0	0	0	0	0
1/7/2004	0	0	0	0	0
1/8/2004	0	0	0	0	0
4/28/2004	4	2	2	0	0
4/29/2004	20	8	6	2	4
Totals	44	18	12	4	10

Lenticular Dome Time-Lapse Data			
Date	# Climbers	Mental Physics	Dazed and Confused
10/8/2002	0	0	0
10/9/2002	4	2	2
10/25/2002	0	0	0
10/25/2002	0	0	0
11/10/2002	0	0	0
11/11/2002	0	0	0
11/23/2002	0	0	0
11/24/2002	0	0	0
12/7/2002	0	0	0
12/8/2002	4	2	2
12/27/2002	8	6	2
12/28/2002	6	4	2
1/15/2003	6	4	2
1/16/2003	8	4	4
2/9/2003	8	4	4
2/10/2003	0	0	0
3/17/2003	2	2	0
3/18/2003	4	2	2
3/29/2003	4	4	0
3/30/2003	4	2	2
4/17/2003	12	8	4
4/18/2003	4	2	2
Totals	74	46	28

South Astro Dome Time-Lapse Data						
Date	# Climbers	Solid Gold	Such a Savage	My Laundry	Breakfast of Champions	Piggle Pug
7/12/2002	0	0	0	0	0	0
7/13/2002	0	0	0	0	0	0
8/8/2002	0	0	0	0	0	0
8/9/2002	0	0	0	0	0	0
9/15/2002	0	0	0	0	0	0
9/16/2002	0	0	0	0	0	0
10/3/2002	0	0	0	0	0	0
10/4/2002	0	0	0	0	0	0
11/30/2002	2	0	2	0	0	0
12/1/2002	0	0	0	0	0	0
12/15/2002	0	0	0	0	0	0
12/16/2002	0	0	0	0	0	0
11/12/2002	4	0	0	0	2	2
11/13/2002	0	0	0	0	0	0
1/9/2003	0	0	0	0	0	0
1/10/2003	0	0	0	0	0	0
2/8/2003	2	0	0	0	2	0
2/9/2003	0	0	0	0	0	0
3/18/2003	16	7	2	4	3	0
3/19/2003	6	0	0	3	3	0
Totals	30	7	4	7	10	2

Appendix 7 – Wilderness Climber Survey Data

Wilderness Climber Survey Overview Statistics

	n	Percentage
Question 4: years experience		
1 to 2	97	22.61
3 to 5	117	27.27
6 to 9	77	17.95
10 and up	137	31.93
Question 5: climb days per month		
0-2 days	59	13.79
3-5 days	91	21.26
6-12 days	156	36.45
13-30 days	121	28.27
Question 6: top activity		
Bolts	66	15.42
Trad	216	50.47
TR	55	12.85
Boulder	56	13.08
Question 7: reported skill level		
less than 6	10	2.34
6 to 8	123	28.74
9 to 10a	148	34.58
10b to 11a	103	24.07
11b to 12a	32	7.48
12b and up	6	1.40
Question 8: placed a bolt?		
No	343	80.14
Yes	84	19.63
Question 9: own guidebook		
Yes	367	85.55
No	61	14.22
Question 10: own complete rack		
Yes	313	73.13
No	113	26.40
Question 11: lead climb		
Yes	371	86.68
No	54	12.62
Question 12: percentage lead		
1-15%	52	12.15
16-30%	40	9.35
31-60%	128	29.91
61-100%	155	36.21
Important or Very Important Solitude		
V. Important	82	19.16
Important	190	44.39

The first table lists the answers to questions 1-9 of the Wilderness Climber Survey. The answers were coded. For example, the activity ranking (bolt climbing, traditional climbing, bouldering, toproping) question was converted to a binary code. 1 means top choice, 0 means less than top choice. The second table lists answers to the rest of the survey questions. The IDs listed in both tables represent the same respondents. Reported climbs are not included in this data set. They are listed in the complete database included on the accompanying CD-ROM.

ID	Weekend	Loccode	American	days	clmdays	yearexp	dayspmnth	boltrnk	gearrnk	trrnk	boulderrnk	skill	bolter	guide	numguide
1	0	6	1	2	3	2	2	0	1	0	0	2	2	2	0
2	0	6	1	9	9	3	3	0	1	0	0	3	2	1	8
3	0	6	1	8	3	3	3	0	0	0	0	4	1	1	20
4	1	2	1	9	3	4	1	0	0	0	0	2	1	1	4
5	1	2	1	6	6	4	2	1	0	0	0	3	2	1	6
6	1	2	1	7	7	4	1	0	1	0	0	2	2	1	6
7	0	2	1	30	25	4	4	0	0	0	0	4	1	1	11
8	0	2	1	50	1	2	3	0	1	0	0	3	2	1	10
9	0	2	1	50	2	4	3	0	0	0	0	4	1	1	
10	0	2	1	20	4	4	4	0	1	0	0	5	1	1	20
11	0	2	1	40	20	3	4	0	0	0	0	4	2	2	
12	0	2	0	3	3	4	3	1	0	0	0	3	2	1	1
13	0	2	0	3	3	3	4	1	0	0	0	2	1	1	20
14	0	2	0	1	3	4	3	1	0	0	0	5	1	1	15
15	0	2	1	3	3	2	1	0	1	0	0	2	2	1	2
16	0	2	1	10	9	4	2	0	1	0	0	3	2	1	2
17	0	5	1	4	4	1	3	0	0	1	0	3	2	1	1
18	0	5	1	5	5	2	4	1	0	0	0	4	2	1	3
19	0	2	1	20	10	4	4	0	0	0	1	4	2	1	20
20	0	2	1	3	3	4	1	0	0	1	0	2	2	1	7
21	0	2	0	5	21	4	4	0	1	0	0	3	2	1	12
22	0	2	1	2	3	2	1	0	1	0	0	2	2	1	7
23	0	2	1	3	3	2	1	1	0	0	0	3	2	2	
24	0	2	1	20	20	4	3	0	1	0	0	4	2	1	20
25	0	2	1	4	1	1	4	0	0	0	1	3	2	1	5
26	0	2	1	15	15	4	2	0	1	0	0	3	2	1	8
27	0	2	1	30	25	2	3	0	1	0	0	3	2	1	5
28	0	2	1	4	3	3	3	1	0	0	0	3	2	1	15
29	0	2	1	3	3	3	3	0	0	1	0	3	2	1	2
30	0	2	0	1	3	3	4	0	0	0	0	3	2	1	4
31	0	2	0	1	3	4	3	0	0	0	1	3	2	1	5
32	0	2	0	1	3	4	3	1	0	0	0	4	1	1	2
33	0	2	1	7	5	2	3	0	0	1	0	3	2	1	2
34	0	2	1	5	5	1	2	0	0	0	0	3	2	1	1
35	0	6	1	2	2	2	1	1	0	0	0	2	2	1	3
36	0	6	1	2	3	3	2	0	1	0	0	2	2	1	1

37	0	1	1	10	10	4	3	0	0	0	0	3	2	1	6
38	0	1	1	7	4	4	1	0	1	0	0	3	2	1	6
39	0	2	1	4	5	4	4	0	1	0	0	3	2	1	8
40	0	2	0	2	14	2	2	1	0	0	0	3	2	1	4
41	0	2	0	2	14	4	3	0	1	0	0	2	2	1	35
42	0	2	1	25	6	2	1	1	0	0	0	2	2	1	3
43	0	2	1	6	7	1	3	0	0	0	1	5	2	1	4
44	0	2	1	20	20	3	3	0	1	0	0	2	2	1	4
45	0	2	0	2	14	4	2	1	0	0	0	3	1	1	20
46	0	2	0	2	14	2	1	0	1	0	0	2	2	1	2
47	1	6	1	35	3	4	4	0	1	0	0	5	2	1	20
48	1	6	1	60	3	3	4	0	0	0	0	4	2	2	2
49	1	6	1	90	6	3	3	1	0	0	0	4	2	1	10
50	1	6	1	3	6	3	3	1	0	0	0	4	2	1	10
51	1	2	1	40	2	2	3	0	0	0	0	3	2	1	1
52	1	2	1	2	2	2	4	0	1	0	0	4	2	1	6
53	1	2	1	15	2	1	2	0	1	0	0	4	2	1	8
54	1	2	0	50	2	4	4	0	1	0	0	6	2	1	15
55	1	2	1	35	35	2	3	0	1	0	0	4	1	1	20
56	1	2	1	12	2	4	4	0	1	0	0	5	1	1	30
57	1	2	0	10	2	2	1	1	0	0	0	3	2	1	1
58	1	2	1	7	2	4	4	0	1	0	0	5	1	1	20
59	1	2	1	1	1	1	1	0	1	0	0	1	2	1	1
60	1	2	1	6	10	4	2	0	1	0	0	4	2	1	3
61	1	2	1	7	14	2	3	0	1	0	0	3	2	1	3
62	1	2	1	30	20	2	3	0	1	0	0	2	2	1	6
63	1	2	1	4	10	4	1	0	1	0	0	2	2	1	8
64	1	2	1	12	1	4	1	0	0	0	0	2	2	1	12
65	1	2	1	8	8	4	1	0	1	0	0	3	2	1	10
66	1	2	1	5	1	4	1	1	0	0	0	2	1	1	5
67	1	2	1	100	100	4	3	0	1	0	0	4	1	1	4
68	1	2	1	7	3	1	3	0	1	0	0	2	2	1	4
69	1	2	1	12	1	2	2	0	1	0	0	3	2	1	6
70	0	4	1	1	2	1	3	0	0	0	1	3	2	2	0
71	0	4	1	1	2	4	1	1	0	0	0	3	2	1	1
72	0	4	1	1	2	2	2	0	1	0	0	3	1	1	5
73	0	6	1	14	2	2	2	0	1	0	0	3	2	1	4
74	0	6	1	15	3	2	4	0	1	0	0	3	2	1	5
75	0	6	1	30	3	3	3	0	0	1	0	3	2	1	2
76	0	6	1	45	4	4	3	0	1	0	0	4	2	1	
77	0	6	1	2	2	3	2	1	0	0	0	2	2	1	4
78	0	6	1	2	2	4	3	1	0	0	0	4	1	1	20
79	0	6	1	8	8	1	2	0	0	1	0	2	2	2	2
80	0	6	1	12	3	4	2	0	1	0	0	5	2	1	10
81	0	6	1	10	10	2	4	0	0	1	0	3	2	1	10
82	0	6	1	12	3	3	2	0	0	1	0	3	2	1	8

83	0	6	1	4	2	4	1	0	1	0	0	3	1	1	30
84	0	6	1	4	2	4	1	1	0	0	0	2	2	1	10
85	0	2	1	18	5	4	1	0	1	0	0	4	2	1	6
86	0	2	1	5	3	1	1	0	0	0	0	1	2	2	2
87	0	2	1	8	3	3	1	0	0	1	0	2	2	1	1
88	0	2	1	1	4	3	3	0	1	0	0	3	2	1	5
89	0	2	1	1	3	3	3	0	0	1	0	2	2	1	2
90	0	2	1	3	3	3	3	0	1	0	0	3	2	1	2
91	0	2	1	6	3	1	1	1	0	0	0	2	2	1	1
92	0	2	1	3	3	4	4	0	1	0	0	5	1	1	15
93	0	2	1	4	3	2	3	0	0	0	1	4	2	1	3
94	0	2	1	1	1	2	3	0	0	0	1	3	2	1	1
95	0	2	1	4	4	2	4	0	0	0	1	4	2	1	4
96	0	2	1	4	4	1	4	0	0	0	1	3	2	1	3
97	1	6	1	15	8	4	2	0	1	0	0	2	2	1	5
98	1	6	1	14	6	2	3	0	1	0	0	3	2	1	2
99	1	6	1	3	3	1	2	0	0	0	0	3	2	2	0
100	1	6	1	2.5	2.5	4	3	0	0	0	1	4	2	1	10
101	1	2	1	18	15	2	4	0	1	0	0	5	2	1	4
102	1	2	1	12	0	4	1	0	0	1	0	2	2	1	2
103	1	2	1	50	1	4	2	0	0	0	0	4	1	1	10
104	1	2	1	6	10	2	3	1	0	0	0	3	2	1	3
105	1	2	1	4	1	1	3	0	1	0	0	2	2	1	
106	1	2	1	10	3	1	3	0	1	0	0	2	2	1	5
107	1	2	0	20	20	4	3	0	1	0	0	3	2	1	2
108	1	2	1	15	21	4	4	0	1	0	0	3	2	1	10
109	1	2	1	12	12	2	3	0	1	0	0	4	2	1	3
110	1	2	1	14	12	1	2	0	0	1	0	2	2	2	
111	1	2	1	6	7	2	2	0	0	1	0	2	2	2	0
112	1	2	1	10	0	3	1	0	0	0	1	1	2	1	1
113	1	2	1	20	10	2	3	0	1	0	0	3	2	1	10
114	1	2	1	6	6	1	2	0	0	1	0	3	2	2	
115	1	2	1	10	10	3	4	0	1	0	0	3	2	1	10
116	1	2	1	3	3	2	3	0	0	1	0	2	2	1	
117	1	2	1	40	10	4	3	0	1	0	0	4	2	1	15
118	1	2	1	45	14	3	3	0	1	0	0	4	2	1	20
119	1	2	1	40	1	4	3	1	0	0	0	4	2	1	6
120	1	2	1	45	1	4	2	0	1	0	0	6	1	1	600
121	1	2	1	11	1	4	4	0	0	0	0	3	2	1	1
122	1	2	1	28	20	2	2	0	1	0	0	4	2	1	5
123	1	2	0	14	10	3	3	0	1	0	0	2	2	1	6
124	1	2	1	12	10	1	1	0	1	0	0	1	2	2	
125	1	2	1	8	4	2	3	0	0	0	1	3	2	1	15
126	1	2	1	15	1.5	1	2	0	0	0	0	2	2	1	1
127	1	2	1	10	0	1	2	1	0	0	0	3	2	1	4
128	1	2	1	9	4	1	3	1	0	0	0	2	2	1	16

129	0	6	1	4	2	4	4	0	0	0	1	3	2	1	4
130	0	6	1	10	10	4	4	0	0	0	0	2	2	1	4
131	0	2	1	30	5	2	3	0	1	0	0	4	2	1	10
132	0	2	1	14	3	2	2	0	1	0	0	4	2	1	5
133	0	2	1	4	2	3	4	1	0	0	0	2	2	1	4
134	0	2	1	15	2	2	3	0	1	0	0	3	2	1	
135	0	2	1	25	2	3	4	0	1	0	0	5	2	1	8
136	0	2	1	1	2	1	3	1	0	0	0	4	2	1	15
137	0	2	1	20	2	2	4	0	1	0	0	4	2	1	12
138	0	2	1	2	1	1	1	0	1	0	0	1	2	2	
139	0	2	1	20	2	4	4	0	0	1	0	4	1	1	
140	0	2	1	72	3	4	3	0	1	0	0	4	1	1	30
141	0	2	1	4	2	4	4	1	0	0	0	2	2	1	10
142	0	2	1	3	2	1	1	0	1	0	0	2	2	1	7
143	0	2	0	3	2	3	2	1	0	0	0	2	1	1	3
144	0	2	0	5	2	2	2	0	0	0	0	2	2	1	6
145	0	2	1	30	2	2	3	0	0	0	1	3	2	1	20
146	0	2	1	10	2	4	1	0	0	0	1	2	2	1	
147	0	2	1	40	2	1	3	0	1	0	0	3	2	1	6
148	0	2	1	15	1	2	3	0	0	0	0	4	2	2	
149	0	2	0	1	2	4	2	0	1	0	0	3	2	1	30
150	0	2	1	20	2	1	4	0	1	0	0	4	2	1	12
151	0	6	1	1	6	1	3	0	1	0	0	2	2	1	1
152	0	6	1	50	10	4	4	0	1	0	0	4	1	1	4
153	0	6	1	25	2	3	3	0	1	0	0	3	2	1	50
154	0	6	0	4	14	4	3	0	1	0	0	2	1	1	1
155	0	6	1	13	12	4	2	0	1	0	0	3	2	2	0
156	0	6	0	4	14	4	4	0	1	0	0	3	1	1	10
157	0	6	0	9	18	1	2	0	1	0	0	2	2	1	5
158	0	6	0	0	4	1	2	1	0	0	0	2	2	2	2
159	0	6	1	6	7	2	3	0	1	0	0	3	2	1	20
160	0	6	1	20	2	1	2	0	1	0	0	3	2	1	30
161	0	6	1	2	2	1	2	0	1	0	0	2	2	1	2
162	0	6	1	8	8	2	2	0	0	0	0	4	2	1	5
163	0	6	1	8	8	1	4	0	1	0	0	4	2	1	6
164	0	6	1	1	1	1	1	0	0	0	1	1	2	1	2
165	0	6	1	2	5	3	4	0	1	0	0	3	2	1	20
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414	1	3	1	5	3	4	2	0	1	0	0	3	2	1	10
415	1	3	1	3	3	3	1	1	1	0	0	2	2	1	6
416	1	3	1	24		2	2	0	1	0	0	4	2	1	3
417	1	2	0	15	1	4	2	0	1	0	0	4	1	1	19
418	1	2	0	1	9	1	2	0	1	0	0	2	2	1	3
419	1	3	1	6	2	1	2	0	1	0	0	2	2	1	6
420	1	3	0	10	2	2	1	0	0	0	1	2	2	1	5
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422	1	2	1	22	20	1	3	0	1	0	0	4	2	1	15
423	1	2	1	15	15	3	2	0	1	0	0	2	2	1	17
424	1	2	1	15	4	3	2	0	1	0	0	2	2	1	5
425	1	3	1	1	1	4	1	0	1	0	0	3	1	1	5
426	0	3	1	12	8	2	4	0	1	0	0	3	2	1	5
427	0	3	1	16	8	2	3	0	0	0	1	3	2	1	9
428	1	3	1	10	10	4	1	0	1	0	0	3	2	1	10

ID	rack	lead	leadperc	13diff	13numb	13inf	13qual	13appro	13length	13spt	13trad	13pro	13sol	loc
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