

**SPENCER BUTTE
RECREATIONAL IMPACT STUDY**



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Report Prepared by
Environmental Studies Service Learning Program
University of Oregon

Project Manager
Steve Mital

Project Team
Christer LaBrecque
Noella Nelson
Ted Presberg
Bethany Shetterly

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I. PROBLEM STATEMENT:

Spencer Butte is an important biological and recreational site in the Willamette Valley. Because it is located close to Eugene - the third most populated city in the state of Oregon- it is a popular hiking destination. Thousands of people visit the park every year.

The open area at the summit, which we call the rocky outcrop, is the main focus of our study. The rocky outcrop is home to numerous native plant species, many of which are difficult to find elsewhere in the Willamette Valley. The summit is also an important site for butterfly migration and ground nesting birds.

The rocky outcrop has experienced excessive trampling in certain areas. This is due to the confusing network of trails and the relatively low number of natural barriers to off-trail hiking such as trees and shrubs. Visitors and their dogs wander all over the rocky outcrop in search of solitude, views of the surrounding landscape and the trails they have lost track of.

Unfortunately, so much off-trail hiking concentrated in a relatively small area is having an adverse affect on the native plants and animals that live on the fragile rocky outcrop. For



example, lichens and mosses have been scoured from rocks by foot traffic. Off-trail hikers and their dogs not only trample vegetation, they are vehicles for the spreading of invasive species. Through foot traffic invasive species are dispersed all over Spencer Butte. These non-native species often out-compete the native vegetation, making it impossible for native vegetation to survive.

II. SPENCER BUTTE IMPACT STUDY:

The Spencer Butte Team has been working to provide the City of Eugene, Parks and Open Space with useful information regarding the recreational use of Spencer Butte and options to reduce the adverse recreational impacts. The impact study began in December 2001 and continued until mid May 2002.

Several methods of data collection were employed. We collected automobile traffic data to get a rough idea of the daily number of visitors the park receives. We observed hundreds of visitors to understand where they go and what they do at Spencer Butte. We surveyed visitors to find out what people know about the flora and fauna of Spencer Butte and how willing they are to protect it. With the help of several local experts, we mapped the trails and sensitive vegetation areas of the rocky outcrop. Finally, we researched how other parks that have experienced similar problems have handled their situations. Below is a more detailed explanation of each of the major components of the study.

Traffic Data:

A sensory device was placed at the main entrance of the Spencer Butte parking lot to determine how many people come to Spencer Butte each day and what times are the most popular. The device recorded every time a car would enter and leave the parking lot. Data was collected from 12/11-16/01 and 1/8-13/02. With these results, our team was able to gauge when to come out and conduct formal observations and surveys. Data was also cross-referenced to archived weather conditions to find out if weather had any affect on when visitors come to Spencer Butte.

Observations:

The purpose of the observation tool was to record aspects of use, such as destination, ascent and descent routes, activity while at the summit, time spent at the summit, age and whether users brought dogs. The observation sheet was designed to keep track of each group of visitors observed.

Surveys:

The survey tool was designed to discover what users thought about Spencer Butte. We asked how often the individual visited the Butte, why they enjoyed spending time at Spencer Butte, if they were aware of the threatened plant community at the summit and if they would be willing to limit their activity to designated trails.

Expert Feedback:

On May 9, 2002, the Spencer Butte team met with local experts at Spencer Butte. We hiked along the rocky outcrop for a 3.5 hours and received feedback on our progress to date, developed a greater understanding of the Spencer Butte ecosystems, and learned what the local experts saw as the problems and potential solutions.

Mapping:

The City of Eugene Parks and Open Space Division provided an aerial photograph of the rocky outcrop to which we added all trails, visitor destinations, hotspots, (places where trails become

confusing), and recommended locations for signage (such as preventative signage, reassurance markers, and educational kiosks).

Case Studies:

We gathered pertinent information on Craggy Pinnacle, North Carolina and Smith Rock, Oregon. These two locations were chosen because the problems that were experienced there are similar to the problems that we identified at Spencer Butte.

Craggy Pinnacle:

Craggy Pinnacle is located twenty miles northeast of Asheville, North Carolina. With an elevation at 5,892 feet, Craggy Pinnacle is the highest peak in the area, offering a rare 360° panorama view, making it one of the most popular hiking spots. Since Spencer Butte is also the highest place, and one of the most popular hiking spots in its area, this case study will be vital for comparisons because of the similar summit ecosystems and adverse visitor impacts which occur at both sites.

Both sites are areas which contain rare plant species that are experiencing similar problems due to visitor usage. The study of Craggy Pinnacle is the expression of a larger problem concerning the vulnerability of a specific habitat to visitor impacts. A look at the mitigation strategies employed at Craggy Pinnacle is therefore useful when considering potential mitigation options for Spencer Butte.

Smith Rock Case Study:

Smith Rock State Park is located in Central Oregon, approximately six miles northeast of Redmond. Smith Rock is a geological oddity in an area of dry plateau. Smith Rock hovers around 3000 feet in elevation. The park draws recreationalists from around the world because of its broad range of offered activities. Visitors are able to go rock climbing, hiking, horseback riding, camping and more. Some of the most challenging rock walls in the world are found at Smith Rock. While Spencer Butte does not draw nearly as many types of recreationalists, it is quite a popular hiking area for Eugene-Springfield residents.

Smith Rock, like Spencer Butte, was experiencing trail erosion and off-trail hiking, largely due to hikers' confusion. In 1997, a team of four Oregon State University forestry students conducted an assessment of Smith Rock's trail system. Their recommendations, from small "No Trail" signs to removal of trails, and the successes/failures of these recommendations provide useful insights into what will and will not work at Spencer Butte.

III. SPENCER BUTTE BACKGROUND

History: (summarized from an essay entitled “Spencer Butte Park” by W. Patrick Workman)

Spencer Butte was named in the early 1800’s for an adventurous member of the Hudson Bay Company. This young Englishman, by the name of Spencer, had been traveling west as a fur trapper. Spencer left his group to hike the unnamed Butte and was apparently scalped by Indians.

In the 1850’s settlers built a road near the Butte, which is presently Willamette Street.

In January of 1930 the Eugene Park Commission met to discuss the potential purchase of Spencer Butte. Members of the community realized the importance of Spencer Butte and decided they wanted to protect the area for future use. Lizzie Church and Ida Giese owned two hundred and forty acres and another forty acres was part of Alice M. Morse’s estate. The Church-Giese party decided that they would sell the land for \$30 an acre and the Morse estate would sell for a flat rate of \$1100. After a failed attempt to obtain a bank loan the committee decided to fundraise the amount through a “buy a piece” of the Butte campaign. Local newspapers were a large part of the success of this campaign approach. After numerous forms of raising funds to purchase the Butte and the generosity of the Church-Giese party to lower the amount by \$500, the contract to purchase Spencer Butte was signed in February of that same year.

Between 1972-74 twenty acres of land on the northwest side of Spencer Butte was purchased from Charles Emery and Mildred Ruby Pruett for \$75,000. In May of 1976 the “Better the Butte” drive was set in place under the encouragement from Mayor Les Anderson. This volunteer drive was set up to lay a stone path leading up the 3168-foot path to the summit. Volunteers included groups from Boy Scouts, Amazon Kiwanis Club, Hodads, Lore Ladies Outdoor Club, and the Spencer Butte Improvement Association.

Landscape architecture students from the University of Oregon conducted a study in 1973 involving the ecology of the Spencer Butte. The students determined that most visitors were unaware that this landmark was particularly fragile.

In 1978-1979 bathrooms were installed and teams continued to do trail work.

Additional land was donated in 1991 by Derek Jaros and in 2000 by the Brolin Company.

Spencer Butte Management:

Spencer Butte is currently a 310-acre city park that is managed by the Parks and Open Space Division of the City of Eugene. The Parks and Open Space Division’s missions is to “provide stewardship for the preservation and enhancement of the City parks and open space, and to create safe recreational and educational opportunities for the well-being and enjoyment of the public.” (City of Eugene Parks and Open Space website <http://www.ci.eugene.or.us/pw/parks/>)

Proximity to Eugene

Spencer Butte is just outside the Eugene urban growth boundary. The Eugene and Springfield area combined have a population of approximately 200,000 residents.

Spencer Butte is a popular destination for many outdoor enthusiasts. According to information in W. Patrick Workman's essay, more than 20,000 visitors were logged in 1976.

Our own survey work conducted during the winter of 2002 showed that under ideal winter weather conditions as many as 550 people visit the Butte over one weekend. However, under adverse conditions as few as 40 people visit the Butte in a weekend.



IV. TRAFFIC DATA AND ANALYSIS

Introduction:

The City of Eugene, Parks and Open Space Division, placed a traffic sensory device at the entrance of the Spencer Butte parking lot. The Spencer Butte team requested the device in order to determine: when people were coming to Spencer Butte, a rough number of how many people use Spencer Butte, and to ascertain the effect weather was having on visitor use. After the traffic data was analyzed, the Spencer Butte team was able to determine the best times to observe and survey visitor behaviors.

Methods:

A traffic sensory device was placed at the entrance of the Spencer Butte parking lot from 12/11-16/01 and from 1/8-13/02. This device measured the total number of vehicles entering the parking lot. These time periods began on Tuesday and ended on Sunday. No data was acquired for Mondays.

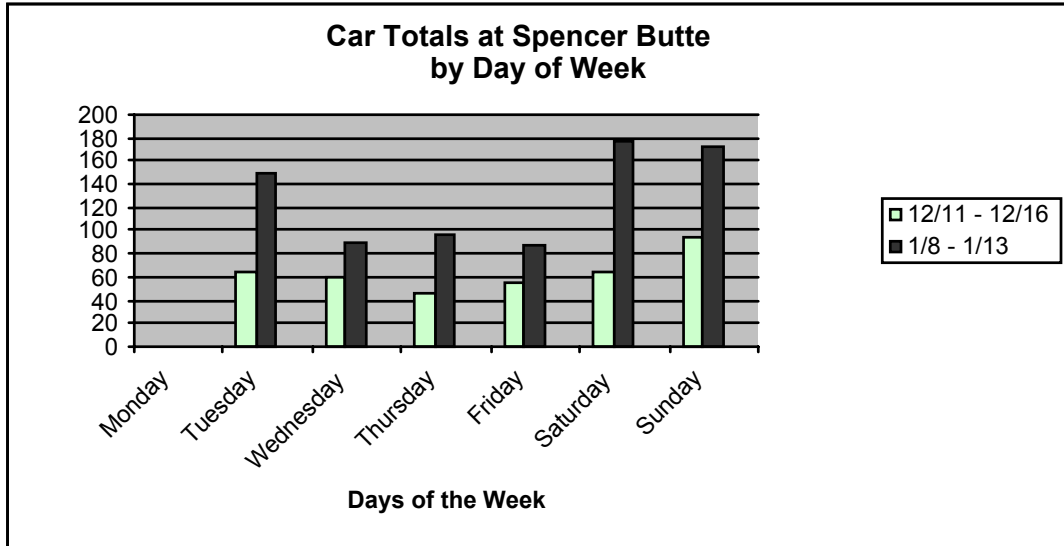
The patterns of traffic data at Spencer Butte was compared to weather data to determine what effect weather had on people coming to Spencer Butte. Weather data were found at the Weather Underground Incorporated website (www.wunderground.com). The archives included hourly weather conditions that often contained more frequent entries when an event such as rain would occur. Archived observations included: wind speed, temperature, visibility, precipitation, and descriptions on cloud cover. The weather data was taken from the “Fairmont” station in Eugene.

Data:

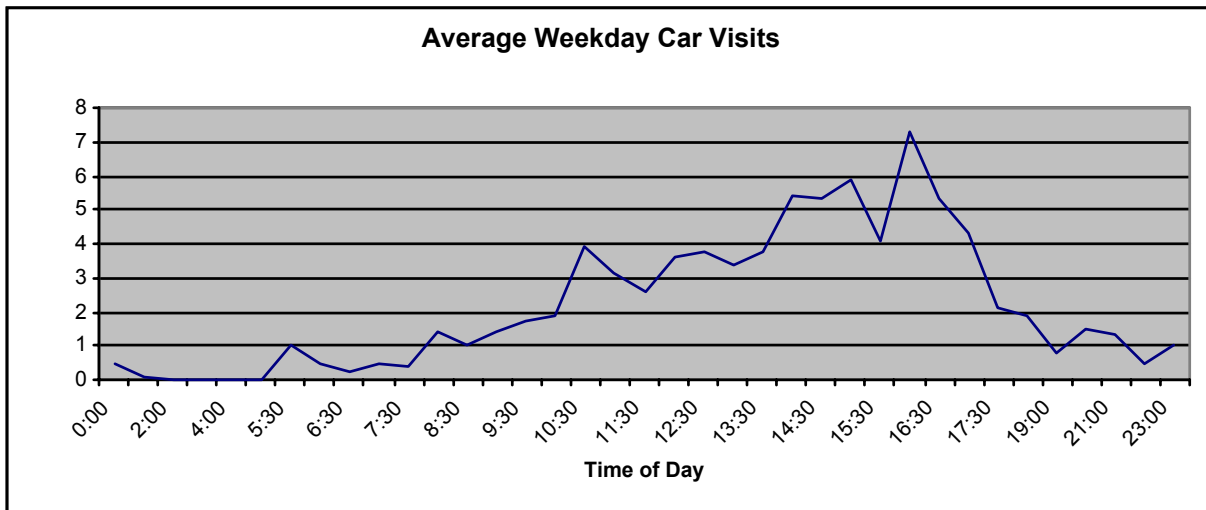
For purposes of accuracy in this traffic data analysis it is important to note that sometimes people do not get out of their cars while in the parking lot. A small portion of visitors at Spencer Butte hang out in their cars and do not hike the trails. Also, sometimes cars are not parked, but rather people just use the lot to turn around in. There are also a number of visitors each day who do not even reach the rocky outcrops at the summit.

First, some quick observations:

- Weekends have higher usage than weekdays
- 11:00 A.M. to sunset is when Spencer Butte is mostly populated
- Daily peaks of visitors occur anywhere from 1:00 P.M. to a half-hour before the sunset
- There is a “morning crowd” on weekdays that averages 3-5 vehicles from 5:00 - 7:30 A.M.
- 75% of the users come during the P.M. while 25% come during the A.M.
- People visit Spencer Butte during all types of weather
- Heavy rains for long periods, reduces the number of visitors at Spencer Butte
- Sunny days are when Spencer Butte is the most populated

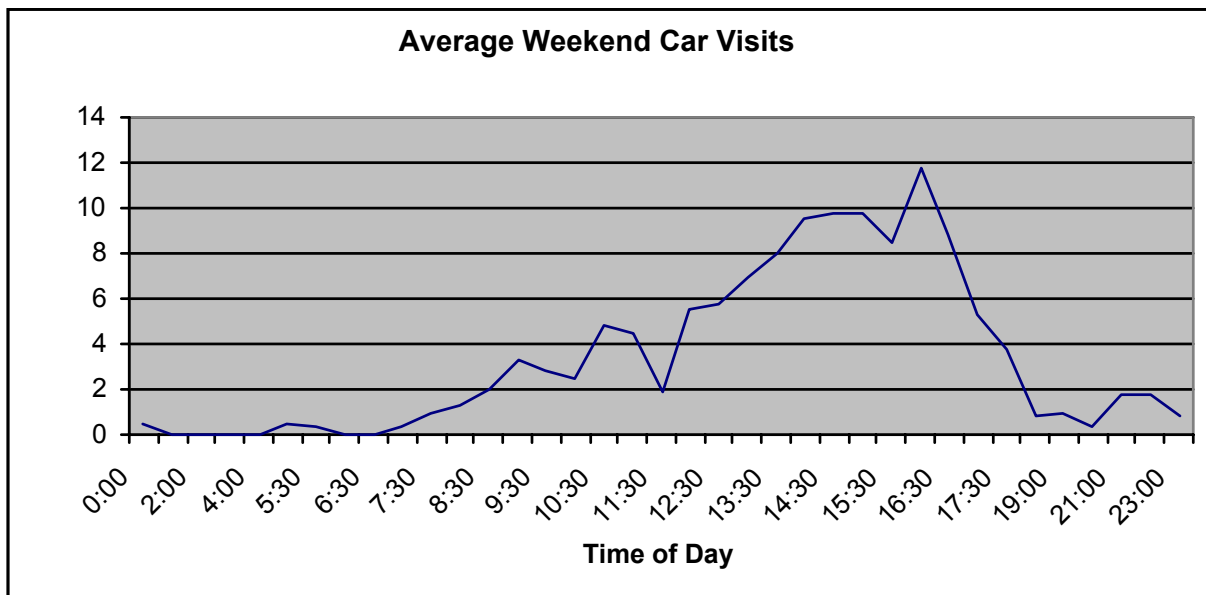


The graph entitled, “*Car Totals at Spencer Butte by Day of the Week,*” indicates that weekend usage is higher than on weekday visits. It is also very noticeable, that the data from 1/8 – 1/13 has much higher numbers than the data from 12/11 – 12/16. Over 700 more cars came during the busier week. Weather data shows that there was not a significant difference between the two weeks in terms of temperature, rain and other conditions. Possibly this large difference in data is a result of “Winter Break” at the University of Oregon, when thousands of students vacate Eugene to go home for the holidays.



From the collected data, patterns of visitor use emerged for both weekdays and weekend days. An average weekday at Spencer Butte is shown on the graph entitled, “*Average weekday Car Visits.*” First, there is a small “morning crowd” that comes in from 5:00 – 7:30 on weekdays.

Then as the day progresses, visitor use increases at 11:00. The peak of visitors comes usually during the late afternoon, often before the sunset.



An average weekend at Spencer Butte is represented by the graph entitled, “Average Weekend Car Visits.” Weekend days during the traffic survey typically did not have a “morning crowd.” Here, once again, visitor use picked up around 11:00 and peaked somewhere in the late afternoon.

Additional observations:

During the two weeks of data collection, the effects of temperature and cloud cover did not have a strong influence on visitor use. For one, temperatures did not vary significantly from day to day. Therefore, differences in temperature could not be linked to the volume of visitor use. It is likely, however, that visitor use is greater in the warmer months. Also, for the two weeks of data, there was not one day that was mostly sunny. It is possible that sunny days will have the greatest influence on visitor use at Spencer Butte. While there were several days that were nicer than others, the traffic data did not represent any correlations between that and visitor use.

Rainy days are thought to reduce visitor use. Of the two weeks of data there were only a few days that were predominantly rainy. The traffic data for these days were not significantly different from other days (comparing weekend days to weekend days and weekdays to weekdays). It is important to document that visitors summit Spencer Butte during all types of weather and in such events as snow, 30-mph winds, and freezing rains. While visitors still come to Spencer Butte during these times, these weather events do reduce the number of people who come to Spencer Butte.

V. VISITOR OBSERVATIONS AND SURVEYS DATA AND ANALYSIS:

Over one hundred and fifty hours of surveys and observations were conducted. The surveys and observations were collected independently of one another. An initial attempt was made to gather survey data from those who had been observed, but this proved to be too difficult to manage.

Observations took place at the summit. Observers did not initiate any personal contact with visitors. Surveys were conducted at the parking lot. Visitors who were returning to their vehicles were asked if they had a moment to participate in a survey concerning the time that they had just spent on Spencer Butte.

Observations:

For each group of visitors we observed, we recorded the following information:

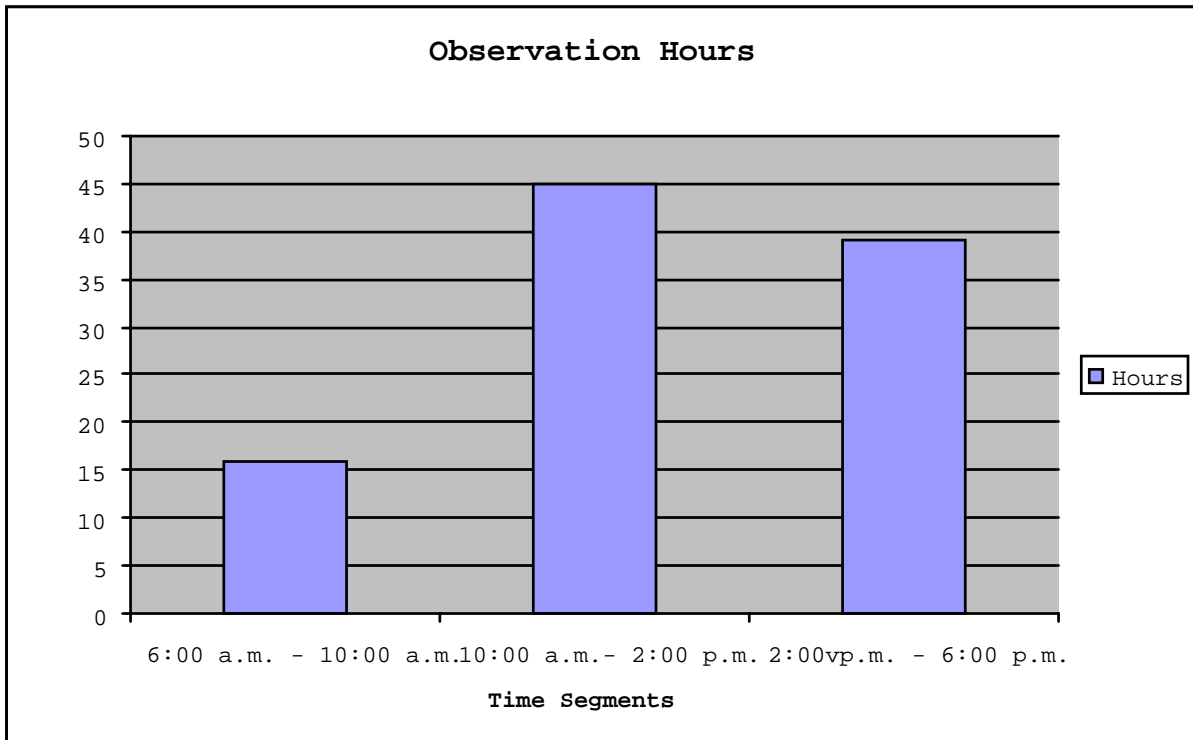
- Temperature
- Weather
- Wind conditions
- Time of day
- Number of people in group
- Age estimate of people in group
- Number of pets on/off leash
- Activity
- Time spent at summit
- Destination
- Ascent route
- Descent route

Temperature: Temperature was recorded after the observations took place by accessing wunderground.com and recording the weather recorded at the Eugene airport. The temperature during the winter months of our observations ranged from 30.2 to 54 degree Fahrenheit. Temperature did not seem to play a major role in the amount of visitors to the summit.

Weather: We defined eight categories of weather: (1) Clear, (2) Partly Cloudy, (3) Overcast, (4) Foggy, (5) Drizzle, (6) Rain, (7) Heavy Rain and (8) Snow. It often occurred that more than one category of weather was marked for an individual record because the weather changed during the observation. Weather did not have as great of an effect on users as we expected. Visitors, though fewer in number were still present at the Butte regardless of weather conditions.

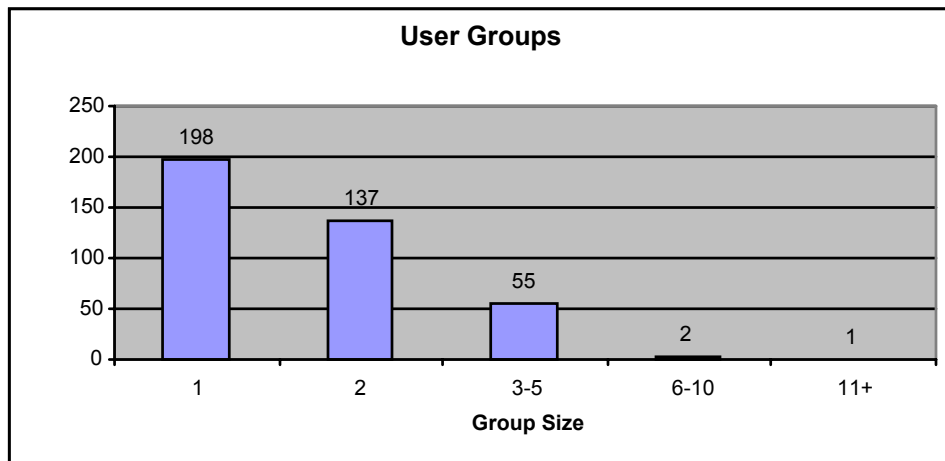
Wind: We identified four categories of wind: (1) No Wind (0-5 mph), (2) Light Wind (6-10 mph), (3) Medium Wind (11-20 mph), (4) Heavy Wind (above 20 mph). We did not have an anemometer with us during our observations, so we estimated wind speed. Wind, like temperature and weather, had little effect on visitor use.

Figure 1: Time of day when data was collected



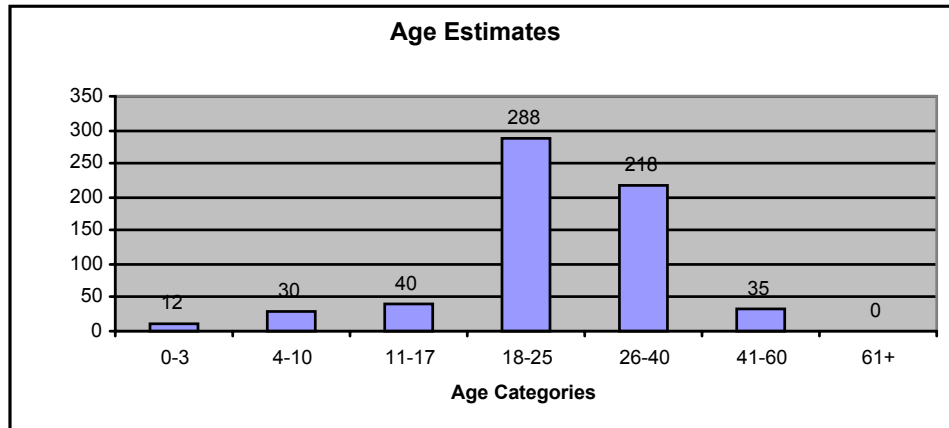
We collected most of our data between 2:00 p.m. – 3:00 p.m. The above graph reflects not only the increase in visitors during these hours, but the availability of the Spencer Butte team to conduct observations. Because of personal schedule conflicts, it was not possible to evenly distribute observation hours.

Figure 2: Group size



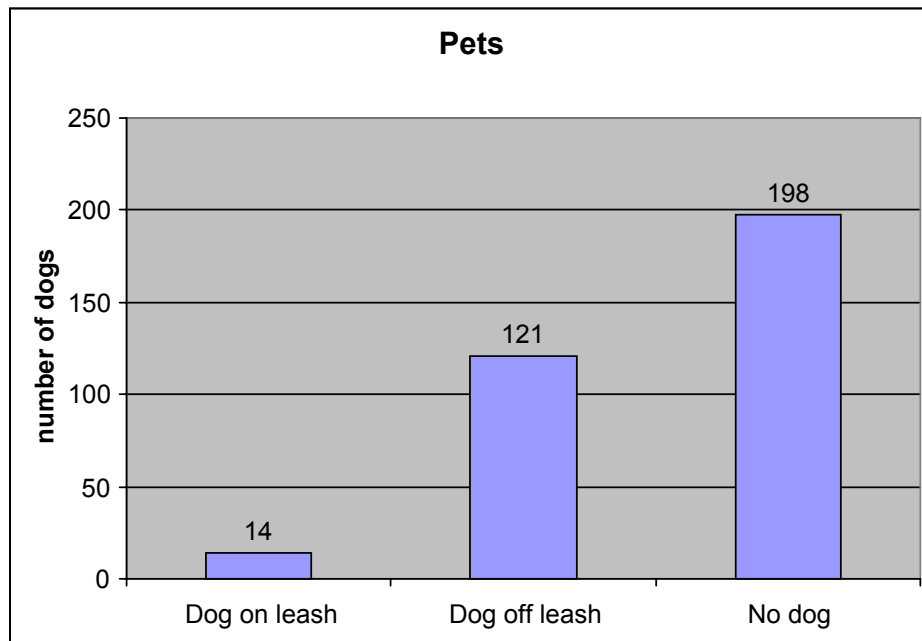
The majority of users visit alone. Large groups were extremely rare, although this may have been in part due to winter weather conditions- outdoor group activities are not as popular during winter months as they are during other seasons.

Figure 3: Estimates of User's age



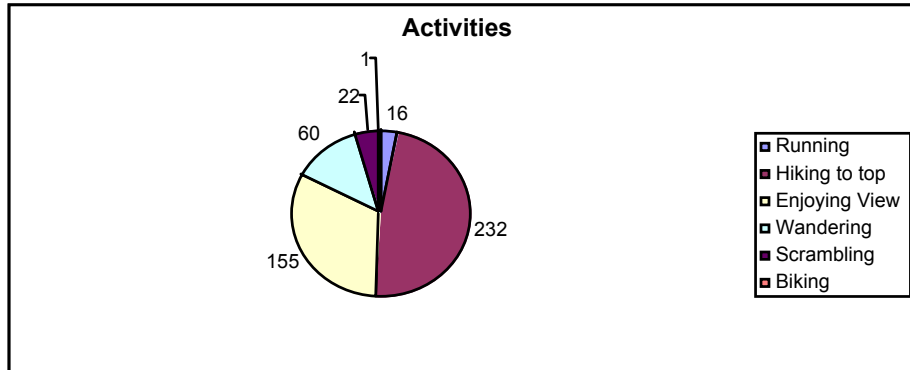
The age range of each user was estimated to establish basic demographics. The results show that Spencer Butte is used mostly by people between ages 18 – 40. (It is interesting to note that other studies have shown that males, ages 18-25 are the most likely to roam off trail.)

Figure 4: Dogs



There is no sign at Spencer Butte that says pets are required to be on leash. However, several local experts worry that off-leash dogs pose a major threat to the fragile rocky outcrop. This is of particular concern to us because dogs tend to wander and scramble all over the summit, often times requiring their owner to follow. Nearly half of the users bring their dog(s) and 90% percent of these dogs are not leashed.

Figure 5: Activities

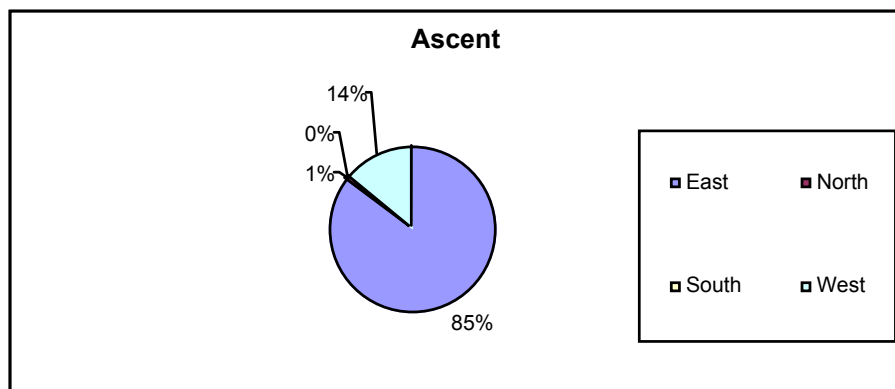


Six activities were chosen to be monitored. These included (1) Running/Jogging, (2) Hiking to the top, (3) Sitting/Enjoying the View, (4) Wandering, (5) Scrambling and (6) Biking. Our records on activities occurring at the summit is subjective, as each observer had to decide, for example, what movements were “scrambling” and which were “wandering”. Also, the “Hiking to the top” category is skewed because some observers felt that all users who were at the summit had hiked to the top, while other observers reserved the “Hiking to the top” label for users who came and left without participating in other activities. It should be noted as well that users typically did participate in more than one activity, so that a record might show an individual who (1) hiked to the top, (2) sat and enjoyed the view, (3) wandered.

Time Spent at Summit:

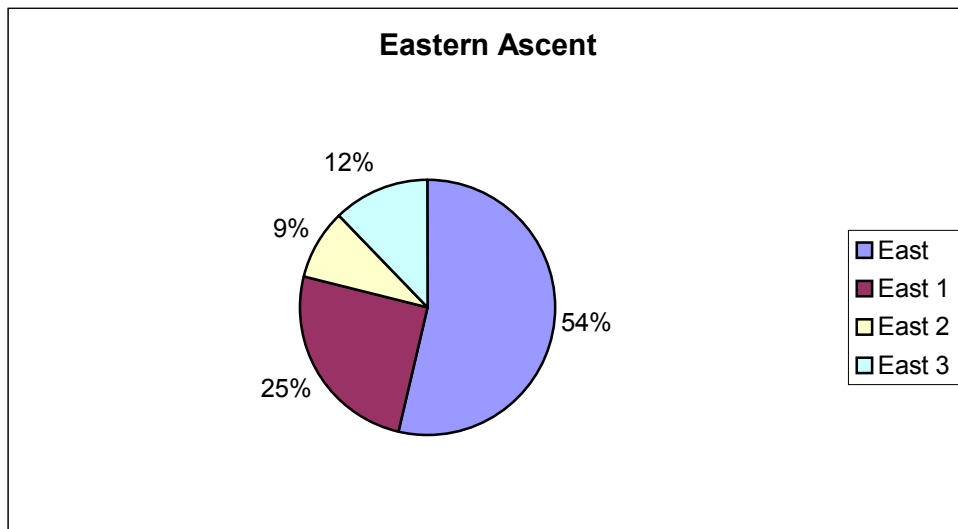
40% of users spent five to fifteen minutes at the summit, followed closely by 34% of users who spent fifteen to thirty minutes at the summit. Weather and wind were factors in the length of time spent at the top.

Figure 6: Direction of Ascent



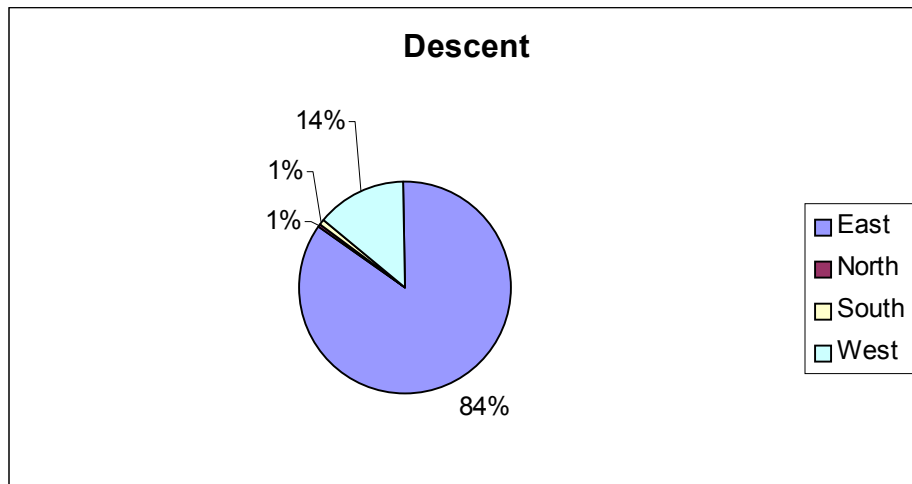
Ascent and descent were key interests in our observations. The current trail network is confusing. By recording the most popular ascent and descent trails we have been able to conclude which trails receive the greatest use. The West trail is the steeper of the two trails that leads to the summit. The East trails are the extension of the longer Butte trail that wraps around the butte before emerging at the tree line. The East trail is by far the most popular trail. After a couple weeks of observation, we realized that we would need to further divide the East category. We decided upon three divisions, East 1, the lowest eastern trail, East 2, the middle eastern trail and East 3, the upper, somewhat southeastern trail.

Figure 7: Usage of Eastern trail routes upon ascent



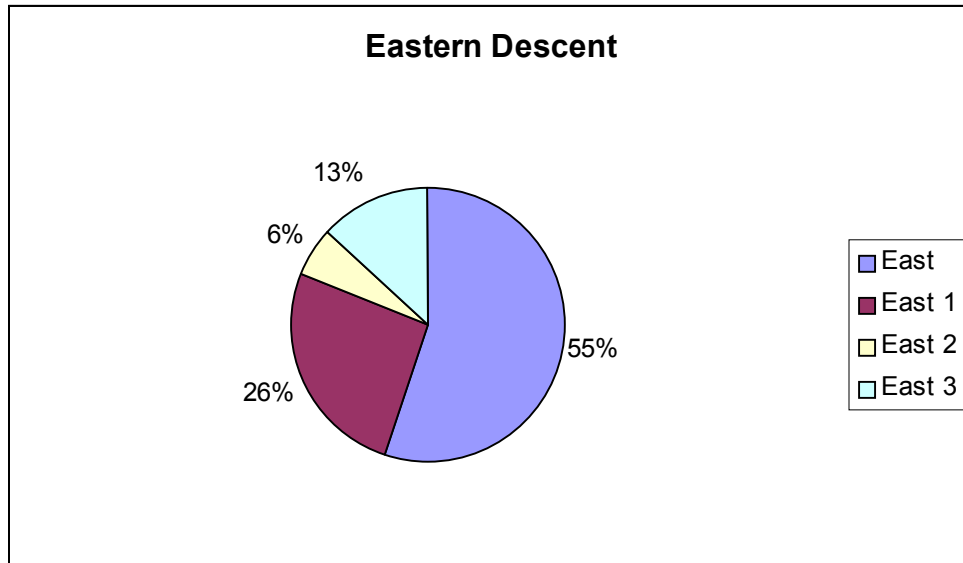
As mentioned above, we did not discover until a few weeks into our research the necessity for further division of the East trail. For this reason, and because when we were unsure of the specific eastern trail a user followed we marked East, the data shows just East as the most frequently used trail. East 2 receives the least amount of traffic and is the most pristine of the three eastern routes to the summit.

Figure 8: Direction of Descent



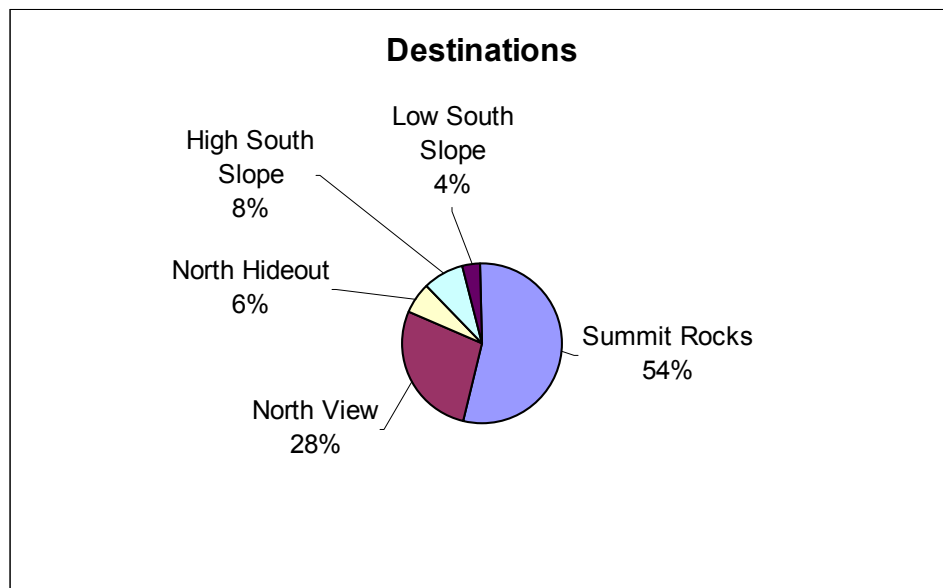
Again the Eastern trail is the most popular. Visitors who ascended from a particular direction, tended to choose the same direction to descend. The Descent data in regard to eastern trails is similar to the Ascent data.

Figure 9: Usage of Eastern trail routes upon descent



Once again the East 1 trail is the most popular and East 2 the least. We have decided to recommend the closure of East 2 in part because it receives the least amount of use. Also it acts as a distraction for many users who may temporarily lose their way while on East 1 or East 3. Confused users see a clear portion of East 2 just above or below them and cut off trail to reach what appears to be a more defined route, and unwittingly causing further degradation to the plant community.

Figure 10: Popular destinations



As we had done previously, we designated categories prior to beginning our observations as ‘destinations’. These places were chosen based on our individual past experiences at Spencer Butte. As with the “Activities” observers were free to mark several destinations if the users traveled to more than one location. The closure of East 2 will not limit access to any of these popular destinations.

Surveys:

How often do you hike Spencer Butte?

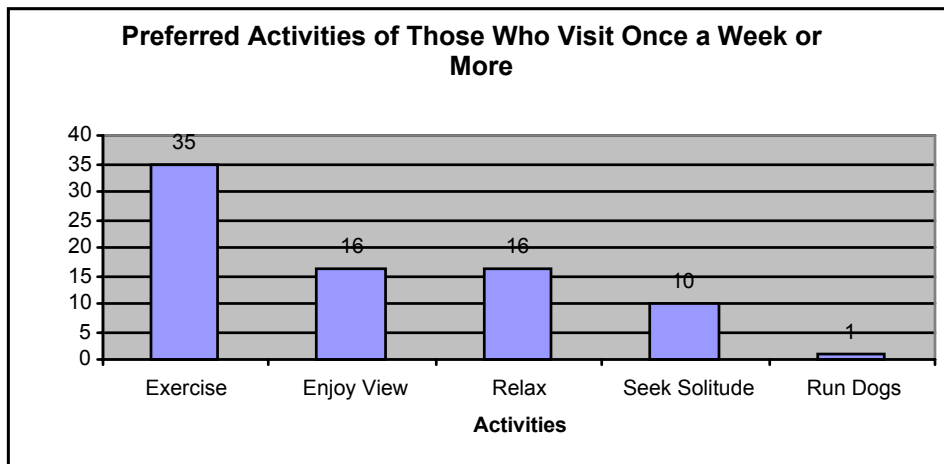
The majority of users visit the Butte somewhere between once per week to two to three times per year.

Figure 11: Why do you hike at Spencer Butte?

Exercise	33%
View	33%
To Relax	18%
Solitude	11%
Good place for dogs	3%

Individuals taking the survey were allowed to mark more than one answer if it applied to them. They were also able to write in answers if they felt that their motivation for visiting Spencer Butte was not addressed.

Figure 12: A variety of activities draw users to Spencer Butte every week



The users who visit once per week or more tend to have routines that take them to the same locations over and over.

Figure 13: What do you like about Spencer Butte?

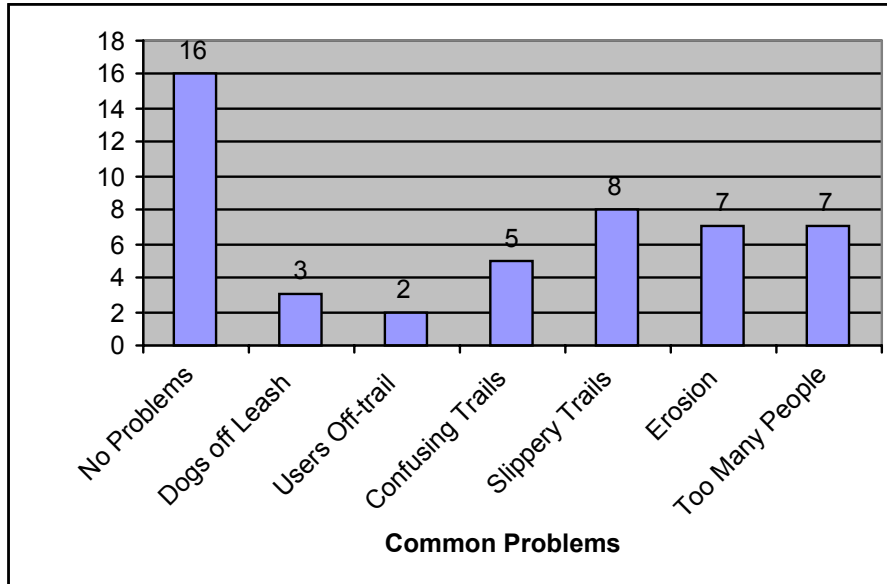
Proximity to Eugene	20%
Being Outdoors/scenery/view	59%
Exercise	13%
Accessible Trails	5%
Free	2%
Family recreation	1%

Figure 14: Did you notice any problems?

None	24%
Dogs off leash	3%
People going off-trail	8%
Confusing trails	17%
Slippery trail conditions	20%
Erosion	17%
Too many people	8%
Illegal Activity	0.50%

Given the season, it is not surprising that Slippery Trails and Erosion were key concerns. During the analysis stage we noticed a problem with this question. We listed “Confusing Trails” as a possible problem visitors may have noticed, but we did not specify whether these confusing trails were under the tree canopy or above the tree line on the summit. Had we been clearer, perhaps these results would have been different.

Figure 15: Problems perceived by visitors who use the park at least once per week



As mentioned above, we felt that users who visited at least once per week were more aware of the changes and problems that were occurring on Spencer Butte. For this reason we took special note of the issues that they identified as problematic. By and large these individuals did not find many problems.

Where did you go?

95% of users went to the top.

Did you follow a trail to your destination?

83% of users did follow a trail to their destination. And though most off-trail users were a bit reluctant to admit it, 17% did not consistently follow a trail.

Figure 16:

Number of times visitor comes to Spencer Butte	Are you aware of fragile habitat at the summit?		Are you willing to limit your activity to protect habitat?		Is mitigation necessary to protect the rocky outcrop at Spencer Butte?		
	YES	NO	YES	NO	YES	NO	MAYBE
First Time	1	10	11	0	8	1	1
Once per Year	2	6	8	0	6	1	1
2-3 Times per Year	5	34	38	2	32	6	2
Once per Month	9	33	34	7	30	9	2
Once per Week	16	24	38	1	31	8	1
Greater than Once per Week	5	4	8	1	6	3	0
TOTAL	38	111	137	11	113	28	7

These last three questions are especially pertinent to our work. The column on the far left is concerned with how often users visit Spencer Butte. The vast majority of users were unaware that the summit is home to a rare plant community and 93% of those questioned were willing to limit their usage of the summit in order to restore health to the fragile ecosystem. This is strong evidence for the need of a community education program. The high percentage of people who were willing to limit their activity after learning about the endangered summit region suggests that an education plan would go a long way in preventing further degradation of the area. Most individuals questioned felt that mitigation was a necessary step. Those who did not often made statements to the effect that he/she did not want to be told what to do.



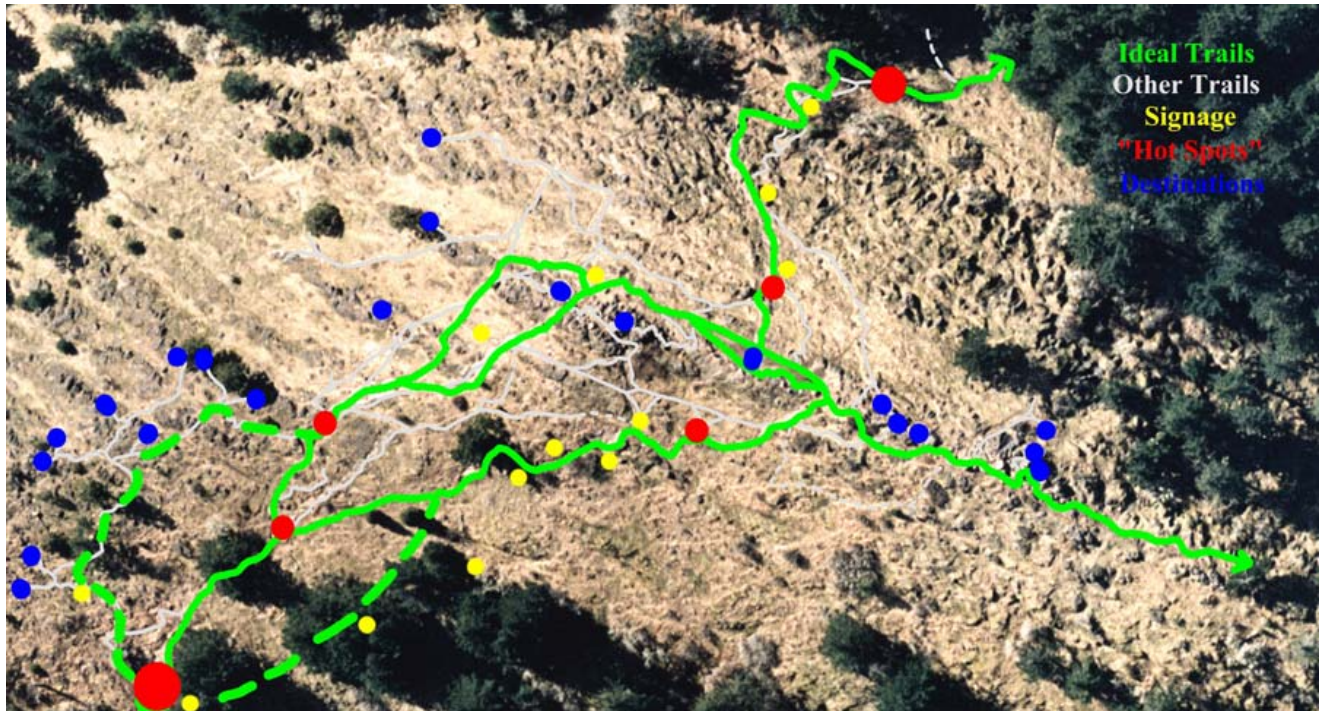
VI. MAPS

Trail Identification and Classification:

This map depicts the trails as they are labeled and classified by the Spencer Butte Team. The classification process began by labeling the major trail. The main trails are numbered in orange. The trails were finally narrowed down to the ideal trails - West, East 1, and East 3. These are labeled in red.

Destinations, Hotspots, and Proposed Signage:

This map includes the documented destinations hikers use, the identified “hot spots”, all existing trails, as well as locations for proposed signage.



Pristine:

This map depicts the regions of Spencer Butte that would remain pristine if all mitigation techniques were adopted. In other words, the shaded regions do not have official trails and would therefore remain in pristine condition (or regenerate themselves to pristine condition).



Signage:

This map depicts the numbering system of the potential locations of mitigation efforts such as preventative signage, reassurance markers, and a kiosk. The following section details each location.



VII. TRAIL MITIGATION RECOMMENDATIONS:

Introduction:

The following consists of descriptions of each of the locations of (a) preventative signage, (b) reassurance markers, and (c) a kiosk on Spencer Butte. Each of the 14 locations of suggested mitigation options is accompanied by an image or images depicting the signage or marker. For example, steps are shown as red lines, preventative signage by orange signs, and reassurance markers by red arrows. The depicted coloration and/or size of these things might not be the same as they actually might be on Spencer Butte. This is so that the images are easily understood and the restoration techniques are clearly visible.

There are two general types of signage that will be discussed. (a) *Preventative Signage* is the first type. These are upright signs, usually with a brief preventative message on them. They sometimes use a reassurance arrow in conjunction with the preventative message. The other type of trail improvement is the (b) *Reassurance Marker*. These are visible arrows, either painted or fastened to rock, tree or other visible object. The goal of these unobtrusive markers is simply to reassure hikers that they are on the right track or that they are still on the trail. These markers are typically used in wide-open regions where trails become hard to follow or in areas with very elaborate trail networks, just as Spencer Butte has. Besides these types of signs, there is also (c) an *informational kiosk* being proposed for the Low East Hot Spot.

There are several options given for some of the locations of signage. These options are given so that the ultimate decision-makers can decipher for themselves exactly what types of mitigation they approve of the most. For example, the “Low East Hot Spot”, (not actually shown on the aerial photograph maps because it occurs too low on the East slope), has at least two options to choose from. Similarly, the “East 9 Hot Spot” depicts a region with confusing, braided trails at which the potential for signage and reassurance is very great. This is another example of a location that might have several options to choose from.

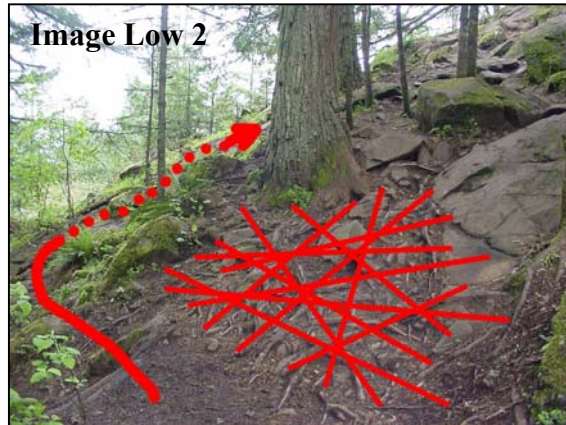
Low East Hot Spot:



and the vegetation that surrounds them. Third, this is the optimal location of information pertaining to the experience Spencer Butte’s users will have on and around the unique rock outcrop habitat.

The Low East Hot Spot is essentially the place at which hikers are faced with a crucial decision. They must either turn right (north), heading to the East 1 trail, go straight (west), heading up the confusing network located around the East 2 trail, or head up the East 3 trail that rises from the south slope. This is a particularly important mitigation location because it can serve multiple purposes. First, it can tell hikers which way is the best ascent route and where to find this trail. Second, a kiosk can inform hikers about the trail system

Images *Low 1* and *Low 2* show the two best options for directing people to the East 1 trail, the ideal ascent trail. The first option, or *Low 1*, shows steps that rise over the exposed roots of a tree. These steps would guide hikers easily over the roots and toward the kiosk that would send them either onto the East 3 or the East 1 ascent trails. The second option, or *Low 2*, blocks the roots with brushings and directs hikers to the south, around the steep rocky section. This diversion would also lead up to the kiosk but would be slightly longer and less steep than the first option. The *Low 2* option would require some fairly extensive trail work to ensure the stability of this segment of trail.



The Low East educational kiosk, depicted in image *Low Kiosk*, is meant to be an informative guide for hikers. The Kiosk would not only be visible from the forested part of the trail, but would also serve as reassurance that hikers were about to enter the rock outcrop area of Spencer Butte. A description and diagram of the Kiosk are located _____.



East # 1:

The East 1 trail is potentially an ideal ascent route. It runs low on the eastern slope and is well-worn and would be easily recognizable with a few improvements. There are at least two separate



mitigation actions to be taken here. The first, depicted in image *1.1*, shows the potential for steps running across the ridge of the main rock section of the trail. Easily recognizable steps would

effectively channel hikers onto the main East 1 trail and divert them from East 2, depicted in image 1.3.

Another option to divert hikers from the East 2 trail and onto the East 1 trail is to remove the young Douglas fir to the east of the rocks and send hikers around and back up to the main trail. Image 1.2 shows this option by representing the ideal route as a red line and the tree to be removed as an opaque red box. This option would be substantially more expensive due to the removal of a tree, but would likely serve as a more lasting and recognizable section of trail.



Image 1.3 shows the location at which hikers stray from East 1, the ideal ascent route, onto East 2, a more fragile trail with more potential confusion areas, or “hot spots”. Brushings, potentially in conjunction with preventative signage, could effectively keep people off of this trail and, when combined with steps and possible a reassurance marker, would divert hikers onto the main East 1 trail. The reassurance marker, shown as a red arrow, could be located either on the tree (as it is shown in image 1.3) or on the rocks below. It would direct hikers to the north, onto the main East 1 trail.

East # 2:



East 2 is a well-worn cut-off from the East 1 trail back down to the forested East trail. Brushings across this trail, shown in image 2, would make it more difficult for hikers to try and work their way over or through the brushings than it would be to stay on the trail that switchbacks to the east trail in the forest. This mitigation option is designed mainly to assist descending hikers in making their way down the trail. Upon reaching this point in a descent route, hikers can easily become confused and head down this steep cutoff instead of continuing down the main trail.

East # 3:

East 3 is another, but more main cutoff hikers can take to the forested main East trail. The preventative signage should explain to hikers that the trail they are about to take is not an official trail and that they would cause harm to the fragile plants if they were to use this unofficial trail. (It could read: “Please Stay on Trail / Fragile Native Habitat”). This mitigation would be directed to those using the East 1 trail as their descent route. As a result of less traffic on this cutoff, native vegetation would slowly return under optimal circumstances. This positive feedback is possible anywhere trampling pressure is reduced. Hopefully, native plants would move in to previously disturbed areas before invasive species could take hold. Image 3 shows the location of this sign.



East # 4:



The East 4 Hot Spot is of extreme importance to both ascent as well as descent routes. Up to four unofficial trails converge at this point, making it extremely easy for hikers to become confused. Image 4.1 shows the ascent route reassurance marker as a red arrow. The arrow clearly shows hikers the direction of the official trail. Image 4.2 is another option for ascent reassurance. A rock (the rock pictured in Image 7, for example) could be moved so that a reassurance arrow could be located on it and made more visible than it would be either on a sign or on the ground itself. The rock

mentioned will be potentially removed as a series of steps are constructed in Image 7.

Image 4.3 shows the descent route mitigation effort. This should be a preventative sign, explaining to hikers the fragility of the flora they would be trampling if they stray from the official trail. (It could read: “Please Stay on Trail / Fragile Native Habitat”). Currently, hikers have shown the tendency to continue south, onto a confusing network of more pristine trails, also known as the East 2 trails.

East # 5:

The East 5 Hot Spot is a descent reassurance marker. An arrow that directs hikers away from the unofficial trails and onto the ideal trail: East 1. The benefits of this marker are that an unobtrusive arrow could effectively keep many hikers off of the elaborate and confusing network of trails that blanket the east slope of Spencer Butte. Image 5 depicts the marker as an arrow on a small orange sign. Based on the responses of hikers to Survey questions we suspect that the majority of Spencer Butte’s users would respond positively to reassurance. As a result, hikers would be willing to limit where they walked or ran as long as the suggested trails were clearly marked. The reassurance shown in image 5 would help descending hikers stay on East 1 and off of the rest of the fragile eastern slope of Spencer Butte.



An additional measure could be taken at this location to reduce the volume of hikers that leave the ideal East 1 route. Revegetation of the East 2 trail could make it even more apparent to hikers that East 1 is the main trail. This revegetation could either be accomplished via propagation of native plants or simply by allowing the region to revegetate itself.

East # 6:



The East 6 Hot Spot is a place that many hikers, on their ascent route, cut off a chunk of the official trail because the summit rocks are clearly visible. There are actually two or three various routes to the summit rocks from this point but one reassurance marker would keep most of these off-trail hikers on the right track. The official trail reaches the summit rocks very soon and this is visible once hikers notice the official trail’s route. This is made clear by the insertion of a reassurance marker pointing in the direction of the East 1 trail. Image 6 depicts the location of an arrow pointing north, toward the ideal

ascent route. Fragile moss mats and lichen habitat are vulnerable to trampling pressure when hikers go off-trail and cut directly up toward the summit rocks.

Preventative signage is another option at this location. (Signage could read: “Fragile Habitat / Please Stay on Trail”).

East # 7:



Image 7

East 7 is a potential location of steps. The rock pictured in image 7 is a relatively large drop, making the degree of difficulty on this portion of trail much greater than it needs to be. Steps would accomplish two things. First, they would make the summit of Spencer Butte accessible to beginners. Second, steps would serve as reassurance markers. Once hikers see steps, it becomes very obvious that they are on the right track. Although this mitigation option is relatively expensive, it would be very effective in keeping hikers from excessively trampling fragile

vegetation. Quality construction would also last a very long time.

There is also the possibility of removing some of the rock that blocks the trail. As mentioned in East # 4 description, a relatively small boulder could be moved from where the steps might go down the East 1 trail to become the location of a reassurance marker assisting ascending hikers.

East # 8:

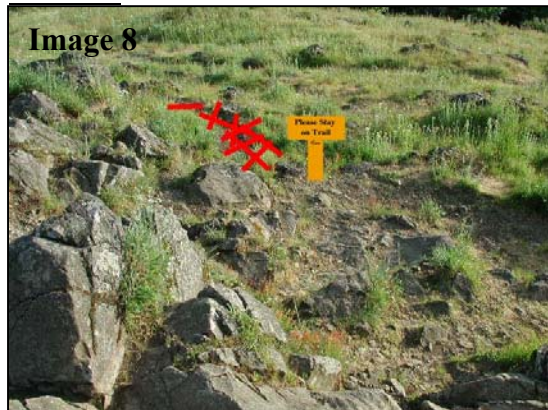


Image 8

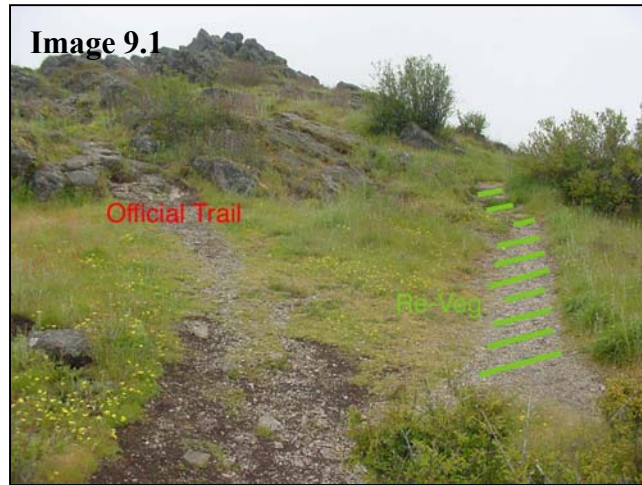
The East 8 Hot Spot is particularly important because it is the juncture at which hikers begin their descent. By encouraging hikers to cross the north-south running main spine of rock, the upper south slope is protected. With patches of rare castilea grass and fragile moss mats and lichen habitat, the upper south slope is an especially pristine region that could potentially be kept that way. This region is also potential habitat for migrating butterfly populations. Preventative signage showing hikers the point at which they should head over the spine of rocks to the

East 3 trail should also briefly explain the consequences on vegetation their off-trail hiking has. (The sign could read: “Extremely Fragile Habitat for Native Plants and Migrating Butterflies / Please Stay on Trail”). It should be accompanied by a reassurance arrow pointing east over the rocky spine.

If East 8 is effective in directing hikers onto the East 3 trail system, then the East # 9 Hot Spot will be increasingly significant. In other words, if we can get hikers to follow the trail over the rocky spine, the importance of the next mitigation measures will be greater due to the increased hiker traffic there. The result of hikers following the East trails over the rocks instead of down

the side of the extremely steep cross-sloped south slope is a reduction in trampling of some very fragile habitat.

East # 9 Hot Spot:



This is another extremely critical area of Spencer Butte. For hikers making their ascent to the summit, there are at least two unofficial trails they might end up on. Image 9.1 depicts this confusion and shows which trail should be made official so as to lead hikers over the rocky spine or to the south side of the summit rocks. This diversion can only be successful with revegetation and preventative signage. Coconut husk-fiber mats to facilitate the re-generation of topsoil and an active revegetation regime would be effective in the re-establishment of native flora. The regions that should be revegetated

are shown in image 9.1 in green.



Brushings might also help in the short-term to prevent hikers from heading north on the unofficial trails. Image 9.2 depicts these brushings. Complimenting the revegetation efforts would be two signs. One temporary sign would inform and make obvious the revegetation efforts. (Sign could read: "Active Revegetation of Native Plants / Please Keep Out"). The second permanent sign would direct hikers away from the confusing network of trails that head parallel to the rocky spine and run north. This sign should also explain to hikers the fragility of the habitat

they would be trampling if they go off-trail. (Sign could read: "Fragile Native Habitat / Please Stay on Trail").

Image 9.3 shows, from the summit rocks, the braided trail network located at East # 9. This image shows the ideal route hikers should take in red. The mitigation described for images 9.1 and 9.2 would enable this route to become the main route.



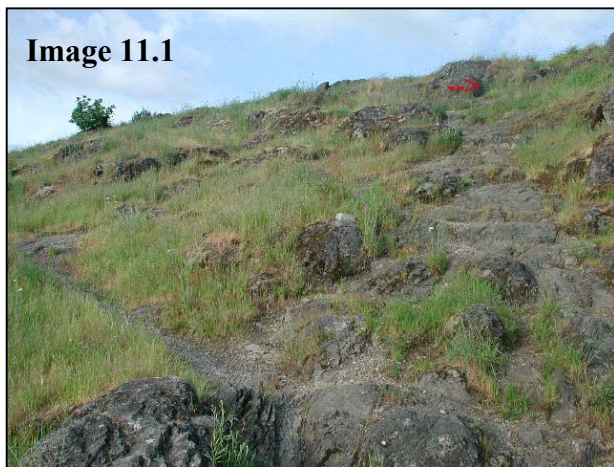
East # 10:



The East 10 reassurance marker, shown as a red arrow, would serve to help ascending hikers locate the trail from relatively far away. For example, a hiker coming out of the Low East Hot Spot might find it difficult to locate the trail. If this hiker were able to see a reassurance arrow from relatively low on their ascent route, he or she would most likely make his or her way toward it. Once they reach this point, it would be easier to locate the rest of the trail. The lower sections of the East 3 trail are the most confusing in terms of identification. In other words, once hikers find the

trails, hikers are more likely to stay on the trails. Image 10 depicts the reassurance marker as seen from the point at which hikers emerge from the forested Low East Hot Spot.

West #11:



West 11 is a location at which ascending hikers could use reassurance regarding the direction they should head. There is a large rock that makes for a good reference point. A reassurance marker here would make a big difference in channeling hikers straight to the gravel area and away from the fragile and steep moss mats and wildflower beds of the rest of the west slope.



West # 12:

West 12 is a reassurance marker just as hikers ascend past the badly scoured rocks on the steepest segment of the West trail. The purpose of this marker is to show hikers the best route to the gravel area at the summit. Currently, it is very hard to discern at which

point the trailheads toward the summit. A simple reassurance arrow would be helpful and effective in directing hikers away from the sensitive mossy regions of the North Hideout and directly up to the summit area.

West #13:



Image 13 depicts a reassurance marker meant to be seen by ascending hikers. It simply shows them that the trail heads north, up the already scoured rocks, not south, toward a fragile moss mat and lichen habitat.

VIII. APPENDICES

Appendix A: Notes from Expert Hike on May 9, 2002

Introduction:

On May 9, 2002, the five members of the Spencer Butte team met with local plant expert Bruce Newhouse, City of Eugene Natural Resources Operations Coordinator Trevor Taylor, and professor of landscape architecture at the University of Oregon Bart Johnson (who designed restoration strategies on Craggy Pinnacle). The group met at the Spencer Butte parking lot and spent three hours at the site. The three hours was evenly divided between discussing trail redesign issues and identifying sensitive habitat areas. The Spencer Butte team prepared maps that contained information regarding trail redesign, as well as ideas for signs, educational kiosks, and recommendations for a future study. Copies of the items were presented to the experts and feedback was received.

First Meadow:

On our ascent, using the eastern trail system of Spencer Butte, we stopped at the first meadow, which is below the summit. At this meadow:

- Several plant species were identified
- It was discussed that certain native plant species could thrive if the meadow was mowed on a regular basis
- Discussion ensued about how to rid invasive plants without the use of chemicals (the Northwest Coalition for Alternatives to Pesticides was mentioned as a valuable resource for related information)

Main Hotspot:

At the tree line of the summit, the hiking party stopped and identified the area as a major hotspot (SHOW PIC). This area was identified as a major hotspot because there are several trail options that emerge at this area. Some of the trail options lead visitors into more critical areas than others. Managerial efforts at this hotspot are crucial for restoring Spencer Butte. At this hotspot:

- It was recognized that this area would be an ideal candidate for educational signage
 - Educational signage at this hotspot could benefit Spencer Butte by:
 - Guiding visitors to designated trails
 - Identifying the fragile habitat
 - Requesting for visitors to stay on the trail
 - A kiosk was identified as a potential option for an educational sign at this hotspot
 - The main suggestions that came from the experts were the kiosk should only contain a map of the summit trails (that would help keep visitors on the trail) and have a few bulleted points
 - Johnson recommended to emphasize that visitors were about to, “enter a portal to a special place” in order for people to respect the fragile habitat

General placement of signs was discussed as well as the idea for small arrows (reassurance markers) to direct hikers to the summit by using designated trails. All experts agreed with these ideas, but were concerned about keeping the number of signs on Spencer Butte to a low number. The building of stairs in certain spots on the trails was also discussed as an idea that could

benefit Spencer Butte. Not only would it reinforce the use of designated trails, it could also assist some hikers to the summit and help prevent erosion.

Ascent of Main Trail E1:

A proposal for keeping two perimeter trails (E1 and E3) was acknowledged as a good idea (SEE MAP). While hiking the E1 trail all agreed that it is an official trail because of the trail's width and the large amount of erosion and rock scouring found along the trail. Some of the most intact summit habitat is located near this trail (see map?) Fortunately, because of steepness there are not any unofficial trails that lead to this area. The E3 trail was also identified as an official trail because of the number of visitors who use the trail and the desire of visitors to use this trail to reach the South Slope rock outcrops. It was agreed that these two perimeter trails, if properly managed, would limit visitor use in between the two trails (SEE MAP). All unofficial trails would need to be closed down, blocked off, and possibly revegetated. Directing hikers to stay on the official perimeter trails is an important component as well.

Summit:

Other important information that came from this hike is information about the Fauna on Spencer Butte such as:

- Bruce Newhouse identified Spencer Butte as an important migratory resting spot for butterflies during the months of April to June
- Butterflies sun themselves on the south facing rock outcrops of Spencer Butte
- Spencer Butte contains several host plants for butterflies (such as the mustards and violets)
- Spencer Butte was also identified as ecologically valuable for bird migration
- Some of the birds that use Spencer Butte are ground nesters.
 - Off-trail use by people and dogs can deter their populations
- Gophers and ground squirrels are creating holes in the ground, which make it easier for non-native plants to invade
 - The lack of rattlesnakes, which once live on Spencer Butte, is the main cause for the increase in gopher and squirrel populations.
- There are several reptile species on Spencer Butte such as the alligator lizard and some types of salamanders

Descent on Main Trail E3:

The South Slope of Spencer Butte is home to the rare, fragile plant communities and a network of braided, unofficial trails. Managerial efforts are therefore crucial around this area and the E3 trail. Some ideas to keep hikers on the trail are as follows:

- Planting Ocean spray (a large shrub) at unofficial trail junctions
- Educational signs explaining the habitat
- Coconut fiber can be placed on restoration plots to aid soil development and deter hikers from using closed down trails

Appendix B: Smith Rock Case Study

I. Introduction

Smith Rock is a world-renowned State Park located approximately seven miles northeast of Redmond in Central Oregon and contains land in Deschutes, Jefferson and Crook counties. Smith Rock is a grouping of welded tuff (compressed volcanic ash) which reaches a height of up to 550 feet, although the park itself is surrounded by characteristically flat Central Oregon plateau. The picnic and campground areas sit on top of the rimrock, which is made up of columnar basalt. The unique geological composition of Smith Rock resulted from the meeting of lava flows from the south and the Ochoco Mountain foothills in the north. The Crooked River also runs through the park.

The park encompasses 651 acres on the Oregon high desert plateau, which hovers around 3000 feet in elevation. The region typically experiences only 8.7 inches of precipitation per year making the park accessible nearly every day, but fall and spring are definitely the preferred seasons due to extremes in temperatures during the summer and winter months. Native vegetation of the Redmond area consists of Idaho fescue, bluebunch wheatgrass, antelope bitterbrush, mountain big sagebrush, and western juniper.

The park provides amazing rock climbing adventures for beginners to professionals. But Smith Rock is also a terrific place to go hiking, horseback riding, mountain biking, four-wheeling and camping. Estimated use of the park is in excess of 400,000 visitors per year, largely because of the variety of activities available.

II. Problem

In 1997, Smith Rock State Park identified several problems in their trail systems. These broad problems were identified specifically in the 1990 Master Plan as:

1. Currently trail use is a mix of hikers, climbers and horseback riders. Heavy use has resulted in erosion and some user conflicts. Trail use is expected to increase drastically in the future. There is also a lack of sanitary facilities for trail users.
2. There is a need for rehabilitation, upgrading and stabilization of existing heavily used trails, as well as a need for expanded trails both along the rim top and for various user groups. Separate loop trail routing and special trail construction for horses would lessen user conflicts and environmental damage.
3. Separate trail connections from the new bivouac area to the climbing area would also lessen user conflicts.
4. Expansion of the rim trail and connection to the valley floor would provide a loop route of interest to day use hikers and the additions of a second bridge would be needed to complete a loop.
5. Unauthorized or “outlaw” trails should be discouraged through planting earthwork and signage to control erosion and damage to vegetation.
6. Sanitary facilities are needed at the bridge, at the climbing area and eventually at the far side of the part.

In the spring of 1994, four Oregon State University seniors in the School of Forestry, created a study of the Smith Rock trail system, their main objective being “the development of a trail management plan for the Smith Rock recreational area”.

III. Approach to Problem

Research

As mentioned, the Oregon State University team’s goal was to create a comprehensive, up-to-date trail management plan for Smith Rock, as it was rapidly becoming more and more popular with outdoor enthusiasts. The Oregon State University forestry crew spent five weekends on location. Their three major methods of data collection were (1) the use of a global positioning system (GPS) (2) on-site data collection and field observations (3) personal interviews.

The GPS units were used to create an accurate (within 15 feet) trail map of Smith Rock. The GPS data was then overlaid onto three 7.5-minute topographic maps.

The field observations took note of the trails and the campground area. In assessing the trail, the Oregon State team evaluated the use impact level, the difficulty of individual trails, and the suitability of use for each trail as well. This information allowed them to discern problem areas concerning the park and associated areas.

Interviews were conducted with James Sippel, BLM park ranger, Doug Crispin, Smith Rock State Park Manager, Dan Carlson, owner of Redpoint Climbers’ Supply and with recreational users of Smith Rock park.

Design

In order to accomplish the goal of an adequate new trail system in light of the growing popularity of Smith Rock, the Oregon State team made a number of recommendations. Thirteen specific problems were identified, those being:

1. Trail braiding and duplication
2. Trail degradation and erosion
3. Trail diversity
4. Trail loop development
5. Skull Hollow camping area
6. Grey Butte Trail
7. Access to the area
8. Barrier free use
9. Camping
10. Directional signs
11. Parking facilities
12. Sanitation
13. User education

1. Trail braiding and duplication

Many of the trails at Smith Rock led to the same place, this was an issue because it is aesthetically distasteful and causes unnecessary erosion and vegetation damage. Three sections of the park were identified as having excessive trail braiding and duplication. A summary of their recommendations for the three locations suggests that “real” trails must be

built and maintained, “No Trail” signs should be posted and re-vegetation efforts should be made.

2. Trail degradation and erosion

Too many trails were experiencing excessively heavy recreational use, which was causing extreme degradation and erosion. Their suggestions here included installing risers in steep areas, placement of small “No Trail” signs to prevent off-trail use, installation of stabilizing structures to specifically halt erosion problem areas, improved drainage and trail monitoring.

3. Trail diversity

Smith Rock had a very small percentage of “moderate” trails. Nearly 70% of the trails were categorized as “easy” and nearly 30% as “most difficult”. The major suggestion in solving this dilemma was to create various “loop” trails at an intermediate level.

4. Trail loop development

As mentioned above, the development of loop trails would allow for a wider variety of users in the park. The new loop trails would also create opportunities for general exploration and enjoyment. Specifically, four loops were recommended and some, like Skull Hollow – Grey Butte Loop were designated for certain users only, in this case horseback riders and mountain bikers.

5. Skull Hollow camping area

Skull Hollow is approximately six miles northeast of Smith Rock and it’s proximity makes it an ideal camp ground for park visitors. The Skull Hollow camping area was identified as a current campsite that needed improvement in the way of better facilities and more visible signage to camping area. The team also felt, however, that the campsites at the far end of the camping area, where it was possible to hook-up primitive RV’s, should not be developed further in order to maintain the status quo regarding the variety of campers.

6. Grey Butte Trail

At the time of the Oregon State team’s Smith Rock assessment, a new trail, the Grey Butte trail, was just beginning construction. Grey Butte trail was to connect McCoin Orchard and the northern part of Smith Rock. The trail was to be approximately six miles. The Oregon State team pointed out some issues of concern regarding Grey Butte Trail. McCoin Orchard is not a popular recreational destination and Grey Butte did not provide a looped trail. Once the Skull Hollow junctions had been passed, the OSU team felt that the Grey Butte Trail would receive little use. This trail was not built, and information as to why is not readily available, but may have had something to do with the recommendations of the Oregon State team.

7. Access to the area

In 1992, the North Unit Main Canal Bridge was closed to motor vehicles. This action reduced the accessibility to recreational areas on State Park and BLM land, and consequently a high number of trespassing incidents were occurring. Re-establishment of motor vehicle use was advised in the hopes of reducing frequent illegal travel through both public and private land to the north of Smith Rock. In regard to the lands around the North Unit Main

Canal Bridge, several land exchanges were advised. The land exchanges would open up “a number of excellent possibilities for recreation development, provision of alternative sites for recreational use or access route along the west side of the Park, if desired.”

8. Barrier free use

The term “barrier free” is used to mean “accessible to all” including the physically disabled. Smith Rock at the time of Oregon State’s assessment had relatively few barrier free trails. Three problems in particular were addressed. A recently constructed trail that was meant to be barrier free, in fact, used gravel, which is not wheel chair friendly. Correction of this problem through compaction or different tread surface was advised. The second problem identified dealt with the construction of a handicap bathroom. Lastly, the team felt that trails along the river in the East Canyon could easily be upgraded to barrier free standards if access could be found.

9. Camping

Smith Rock Bivouac camping grounds are located just over 150 feet from the park. It is the only campground specifically managed for users of the Smith Rock area. Currently, it costs \$4 per person to stay overnight, in addition to a \$3 parking ticket. Showers are available for non-campers at a cost of \$2. The OSU team created several options to ease the overcrowding issues the campground was experiencing in 1994. Those options included: increasing overnight fees, expanding the bivouac area, redirecting campers to the Skull Hollow campground and creating additional camp sites in the undeveloped area adjacent to the north-end parking loop.

10. Directional signs

In 1994, Smith Rock had few directional signs about the park. This general lack of information was thought to be a large factor in the establishment of trails and spurs, which were extraneous to user needs. More informational signs were advised. The recommendations for these signs included information on trails such as where the trails were located on a map, how long each trail was and a difficulty rating. A trail map sign was advised at the day use area entrance.

11. Parking facilities

The parking facilities at Smith Rock were inadequate given the quickly rising usage of Smith Rock. Expansion of the parking area was advised in several locations.

12. Sanitation

Restrooms were a recent addition to the park in 1994 and though new, they were still below par considering the rapid increase of visitors. The Oregon State team recommended removal of chemical toilets, which were located to the East of the footbridge, to be replaced with vault toilets that were unisex and barrier free. At the time of the assessment, the State Parks had recognized the need for sanitation expansion and were moving toward that augmentation.

13. User Education

In relation to the lack of signage discussed above, the users of Smith Rock were uneducated concerning their recreational playground. Appropriate use, park rules and general

information was not easily to find. Recommendations for educational signs that were accessible to physically challenged and foreign visitors were recommended. Brochures, though they existed at the time the assessment, were addressed as important educational tools for the public.

IV. Implementation and Evaluation

1. Trail braiding and duplication

Recommendation: Build 'official' trails and post small "No Trail" signs

This issue has been the focus of trail projects for the past three years and will continue to be the point of emphasis for trail projects scheduled to begin in October 2002. Oregon Parks and Recreation Department has identified what will be the parks primary loop trail system and is concentrating trail work, signage, and restoration efforts on better establishing the central trail structure at the park. Numerous "no trail" signs have been installed but they have been found to be of limited value in preventing users from straying of the trails. Oregon Parks and Recreation Department has recently completed an interpretive plan for the park that includes a variety of projects to improve way-finding and better inform users of the sensitivity of the area they are visiting.

2. Trail degradation and erosion

Recommendation: Install risers in steep areas, place small "No Trail" signs where necessary; install stabilizing structures, improve drainage and increase trail monitoring

Risers were installed where necessary on the entire Misery Ridge trail route. Additional work was completed to address drainage. While there has been no increase in the number of park staff available to monitor, Oregon Parks and Recreation Department has recently started an "Adopt-a-trail" program which we hope can improve stewardship of the trail system.

3. Trail diversity

Recommendations: Create Loop trail with a greater variety in levels of difficulty

This concept is central to the work completed in the last three years and will continue to be the focus of Oregon Parks and Recreation Department's efforts for the next 2 - 3 years.

4. Trail loop development

Recommendations: Create four loop trails for North Ridge Trail, Smith Butte, Skull Hollow - Grey Butte and Canyon

Oregon Parks and Recreation Department have defined an alternate loop trail system that is intended to achieve the same objectives.

5. Skull Hollow camping area

Recommendations: Needs improvement overall; prevent further development of RV accommodation

This is a Bureau of Land Management facility that has received some improvements in the last few years.

6. Grey Butte Trail

Recommendations: Do not develop Grey Butte Trail to the extent that it connects with McCoin orchard.

This trail has not been developed and is not currently planned for improvement in the next phase of trail work.

7. Access to the area

Recommendations: Re-establish motor vehicle accesses to the North Unit Main Canal Bridge; negotiate land exchanges

Has not been done.

8. Barrier free use

Recommendations: Alter trails so that certain trails were more accessible to individuals with physical disabilities

Smith Rock continues to need upgrades to the accessible trail system. This is a project Oregon Parks and Recreation Department hopes to undertake in the near future.

9. Camping

Recommendations: Increase overnight fees to prevent overcrowding; expand bivouac area; redirect more campers to Skull Hollow campground and create additional camp sites in undeveloped area near north-end parking loop.

Due to Deschutes County land use requirements, the bivouac area at Smith Rock is probably at maximum size. Oregon Parks and Recreation Department continues to work with other agencies, including the US Forest Service and Bureau of Land Management, on the development or expansion of other opportunities.

10. Directional signage

Recommendations: Increase number of informational signs- include information such as maps, lengths of trails and difficulty level; place trail map sign at day use area entrances.

Way-finding was a specific objective of Oregon Parks and Recreation Department's recent interpretive plan for the park. OPRD will be fabricating and installing new orientation panels and directional signage in the next 2 years.

11. Parking facilities

Parking lots have not been expanded and OPRD does not currently have plans to expand parking.

12. Sanitation

Recommendations: Remove chemical toilets- replace with vault toilets (for restrooms E of footbridge)

New toilets have been installed at the main parking area, bivouac area, and trails. An additional composting toilet is planned for installation this summer near the bridge over Crooked River.

13. User Education

Recommendations: Make information on appropriate park use, park rules and general information easily accessible; make signs/brochures that include foreign languages

Education is the focus of the recently completed interpretive plan for the park. This plan will be implemented over the next few years.

Appendix C: Craggy Pinnacle Case Study

A Summary on: “Mitigation of Visitor Impacts on High Montane Rare Plant Habitat: Habitat Protection Through an Integrated Strategy of Design, Interpretation, and Restoration, Craggy Gardens, Blue Ridge Parkway, North Carolina,” by Bart Reinholdt Johnson; and an interview with Bart Johnson.

Introduction:

The summit of Craggy Pinnacle is very similar to that of Spencer Butte. Both sites are treeless, rocky outcrop summits that contain rare plant species experiencing similar threats due to visitor usage. Craggy Pinnacle involves the vulnerability of a specific habitat to visitor impacts¹. A look at the mitigation strategies employed at Craggy Pinnacle is therefore very useful when considering potential mitigation options for Spencer Butte.

The greatest diversity of plant communities in the Appalachian Mountains is found on top of Craggy Pinnacle and the surrounding areas. The summit of Craggy Pinnacle, in particular, has rocky outcrops that contain six rare and endangered plant species and three endemic plant species. These are the dominant vascular plants found on the outcrops. There is also a rare lichen species and eleven types of endemic mosses found on the Craggy Pinnacle summit.

Craggy Pinnacle is located twenty miles northeast of Asheville, North Carolina. Found along the Blue Ridge Parkway, it is the most popular hiking spot in the area. With an elevation at 5,892 feet, Craggy Pinnacle is highest peak in the area, offering a rare 360°- panorama view². Since Spencer Butte is also the highest place, and one of the most popular hiking spots in its area, this case study will be vital for comparisons.

Problem Statement:

Disturbance by visitors is the greatest threat to the rare plant communities on the Craggy Pinnacle summit. The same outcrops where rare, fragile species live are also where visitors like to go off trail and climb around on, to reach unobstructed views in solitude. The biological structure of this high montane ecosystem is prone to degradation. Harsh climatic conditions create soils and vegetations that are vulnerable and sensitive to trampling³. Most of the flora found on the summit recovers slowly from disturbances (on timescales of hundreds to thousands of years). The goal of Johnson’s work is therefore to control visitor behaviors while at the same time enhancing their enjoyment.

Approach to Problem:

Since disturbance by visitors was deemed the most serious threat to rare plant species on the Craggy Pinnacle summit, an initial visitor-use study was conducted. The purpose of the study was to examine the relationship between visitor activities and the disturbance to plants. Johnson

¹ Johnson, Bart Reinholdt: “Mitigation of Visitor Impacts on High Montane Rare Plant Habitat: Habitat Protection Through an Integrated Strategy of Design, Interpretation, and Restoration, Craggy Gardens, Blue Ridge Parkway, North Carolina.” 1992. Page 8.

² Johnson, 3

³ Johnson, 1

declares that any strategies that are, “attuned to the visitor use of the site are more likely to gain the desired compliance than those that simply attempt to thwart objectionable visitor practices.”⁴ In addition, an experimental management study tested the use of physical barriers and explanatory signs as deterrents to off-trail activities. Specifically, the study tested whether the addition of interpretive signing improved the effectiveness of “brushings.” As a result of the first two studies, a management plan was created which involved the designing of an overlook wall at the summit, trail rerouting, sign implementation; and a microhabitat assessment that determined the distribution of rare plant species and locations of experimental restoration plots. To conclude, some monitoring and evaluations were made as well.

Visitor Use Study

Before the visitor-use study was performed, initial pre-survey observations were undertaken to determine what information was most important to record, and how to gather it. From initial observations, a monitoring form (the “tool” to record specified data) and rules on how to collect the data were created that adhered to the goals of the project. As stated in Johnson’s thesis, the visitor use study was set out to, “record both quantitative and qualitative data (that would help) pinpoint the sources of problems, reveal the driving forces behind visitor impacts, and develop sound management responses.”⁵ Therefore, for the formal observations, the data that was collected includes:

- The number of individuals in each hiking group and their gender
- Estimates of age class for each individual
- Routes and destinations
- Activities
- The amount of time spent at each stop

As a result of pre-survey observations, it was decided that formal observations would be conducted on weekends. This was decided because the greatest habitat damage was most likely to occur on weekends due to the larger number of visitors during the weekends. Four full weekend days of formal observations were conducted in the summer, and two weekend days were done in fall, at the peak of foliage colors.

Two observers, one at the peak and one at the lower overlook could gather all information pertinent to the study. The results of the recorded data fostered a lot of important information that was used to describe patterns of visitor use on Craggy Pinnacle. The following is a summary of the most important results and conclusions:

- Visitation on fall color weekends was nearly five times that of summer weekends (it estimated that during the four fall color weeks visitor visitation exceeds that of the entire summer)
- Informal observations indicate that weekday use is far less than weekend use
- Other times when use may be high are during rhododendron bloom in early June, and Fourth of July and Labor Day weekends
- Visitors are evenly divided between male and females, and range in age from very young to senior citizens

⁴ Johnson, 8.

⁵ Johnson, 58.

- The most common group size was two, but more than half the total number visitors arrived in groups of four or larger
- Trail usage patterns (routes) varied between the two seasons
- The summit was the center of visitor activities as well as major destination
- Two-thirds of the visitors who went to the peak, also went out to the rocky outcrops for viewing and seating
- Most bushwhackers were unsupervised young male adults
- The main unofficial trail is found at the visitor center—often visitors take this trail because they have not reached the Dome View parking lot which has access to the official Craggy Pinnacle trail, because it is further down the road
- Off trail use stems from:
 - Lack of adequate signing to direct visitors to the official trail
 - Lack of knowledge about the rare plant habitat and its fragility
 - Confusion about trail locations and destinations
 - Desires to rock climb, explore, and find solitude
 - Blueberry picking

Brushing and Signing Study:

Observations in Johnson's work, as well as others, indicate that most park visitors do not wish to damage park ecosystems. When helped to see and understand the need for preserving ecosystems and the associated changes with certain visitor activities, most visitors generally comply with requests to change their behaviors⁶. Accordingly, Johnson designed a study that tested the effects of educational signage on visitor cooperation with protective management efforts. More specifically, the study compared the efficacy of explanatory signs placed on natural, physical barriers as deterrents to off-trail activities.

In 1987, brushings (natural, dense vegetation barriers) were placed at fourteen locations on Craggy Pinnacle. The preferred locations of brushings were at the junction of an unofficial trail with a bushwhack trail—or rather at “hotspots”. To determine the effectiveness of the brushings, a monitoring system recorded such measurements of height, width, depth, visual permeability and a rating of passability for each brushing. In 1988, the brushings were built in the same areas, to the same initial rating and dimensions. A temporary sign with the words: “Fragile Habitat—Area Closed,” was displayed at each brushing.

The results of the two studies show that brushings with signs were more successful in preventing off-trail use during the 1988 season, as compared to the rapid destruction of brushings without signs in 1987. Off-trail activities were dramatically reduced as a result of brushings that had signing of the fragile habitat. Hence, the use of interpretation as a management tool to protect fragile habitats from visitor impacts is a strong option to utilize in the park managerial role.

While the majority of bushwhackers were young male adults (junior high to college age), hiking without adult supervision, this group is perhaps the least likely to respect and read signs. While the construction of barriers alone is inadequate to stop their destructive behaviors, visitors should be given the information about why the barriers are in place. Johnson states, “It is unrealistic to

⁶ Johnson, 59

expect them to acquiesce to barriers and obstructions with no understanding of why they are there. Signs that educate and request compliance, backed up with a barrier or other protective device that does not detract from the character of the site... is likely to offer better results than any single strategy.”⁷

Management Plan:

The results/recommendations of the visitor use study and the brushing and signing study have been combined into a visitor management plan. This plan can be summarized as follows:

- Trail system design
 - Close down the main unofficial trail (visitor center trail)
 - This was decided because most bushwhacking was a result of visitor center trail users taking a shortcut
 - Place signs at the visitor center trailhead which redirect hikers to the official trail
- Summit Overlook
 - Qualitative observations of how and why visitors use the outcrops inspired a stone-wall overlook at the summit
 - The stone-walled overlook will protect the habitat and satisfy visitor desires for viewing and seating
 - Consideration will be concentrated on providing visitors with the same amenities and experiences that visitors seek on the outcrops while leading them away from the rare plant habitat
 - Informing the visitors of the purpose of the overlook will gain cooperation
 - Replant shrubs outside the wall where paths give access to rocky outcrops
- Interpretative and Explanatory Signs
 - Incorporate signs that interpret the rare plant habitat in the overlook design
 - Install a permanent sign at the major trail junction which informs visitors that they are entering a fragile habitat area and requests that they stay on official trails
 - Install small signs that read “Fragile Habitat—Area Closed” in front of brushings
 - Install signs at certain places which direct visitors to the official trail and to the summit
 - All signs should be unobtrusive
 - A brochure that describes the area can be valuable (it could discuss plant succession, identify plants, talk of natural and human disturbances)
 - A site map and display at the trail head could alleviate uncertainties about which trails to take
- Restore Vegetation
 - Maintain the ecological character of the community in terms of species diversity and distribution (determined by a microhabitat assessment)
- Management Activities
 - Maintain trails for higher volumes of foot traffic (due to trail closures and also to ensure proper trail use)

⁷ Johnson, 72

- Continue brushing unofficial trails in conjunction with signings
- Transplant native plants behind signs and on trails to promote permanent closure of unofficial trails
- Patrol the area during the weekends of highest use
 - A ranger can come out and interpret the fragile habitat to users as well as issue written requests to stay on the main trail
- Perform periodic monitoring to check the effectiveness of strategies

Project Implementation:

A complete management plan was presented to the National Park Service and to other stakeholders. After much discussion, it was decided that Johnson would: construct a rock wall on the summit of Craggy Pinnacle, extend the rock wall at the lower summit, close the visitor center trail, and conduct several other activities that would discourage off trail use. The total funding that was needed for this project was around \$55,000. It was thought that this project would take less than a year to complete, but because of certain contingencies, funds from the National Park Service were often allocated elsewhere. As a result, the project's completion (implementation of the management plan) transpired a few years after the initial study was completed.

Most of the funding was used for hauling up materials by hand for the rock walls. Since the summit habitat was identified as the most vulnerable to human disturbances, a stoned-wall overlook was constructed to protect the habitat and satisfy visitor desires for viewing and seating. There was also a rock wall at the lower summit that was already in place before the study began. This wall was present to provide safety by keeping people from falling off a cliff. The lower summit wall was extended to prevent people from accessing the visitor center trail from midway up the mountain. The visitor center trail was also closed at the beginning of its trailhead. Signing was placed there to direct visitors to the official trail.

Once main trails were identified, other trails were brushed and/or revegetated. Small, unobtrusive educational signs were placed on brushings and at key junctions. At main hotspots, more information was given to the users to help "establish a map in their minds" and explain to them the difference between trails. A sign that described the fragile habitat was also placed right before users entered the actual habitat area.

Monitoring/Evaluation:

Shortly after the management plan was implemented, Johnson conducted a small study that tested the effectiveness of the summit rock wall. The results of this study are that total percentage of visitors who use the summit rock outcrops had declined from 65% to 3% since the wall's construction. Another study was conducted to test the effectiveness of placing signage along the rock wall. Once temporary, small signs, which requested visitors to stay off the outcrops, were placed along the rock wall, the percentage of visitors who used the rock outcrops declined from 3% to 1.2%.

Conclusion (Lessons learned applicable to Spencer Butte)

All design strategies do not only have the potential to preserve, but they can even a site such as Spencer Butte. While Spencer Butte it is a park, not independent from human influences.

Johnson asserts that, “precisely because humans are entering and utilizing this landscape, design must be sensitive to their needs, just as it must be sensitive to the natural ecosystem. To do otherwise is likely to create a situation in which visitors will attempt to meet their needs outside the areas and routes established for them.”⁸

Minimizing the physical alteration of a site is important, yet there are times when major design changes are required. Physical alteration does not need to imply a disruption of a site’s character, but rather an integration of design that molds into the landscape. Alterations to a site must aesthetically complement the site itself. When design is attuned to both the natural forms of the landscape, and the behaviors of its visitors, it holds the possibility of creating a deeper relationship between visitors and the site⁹.

A microhabitat assessment and the replanting of native vegetation on unofficial trails and scoured rock faces can be very beneficial to Spencer Butte. Of all of the methods that Johnson employed to mitigate the problem on Craggy Pinnacle, a deeper look into his microhabitat assessment and revegetation of unofficial trails is useful for Spencer Butte. Any mitigation options that are engaged (i.e. closing down trails and replanting) need to be accompanied by an explanatory sign where possible. Reinforcement should also be sought from natural, physical barriers.

For our purposes on Spencer Butte, it is important to note, that identifying the location of rare plants may increase the risk of plant poaching. Johnson says that at Craggy Pinnacle this is not of a concern because most of the rare plant species are inconspicuous. In addition, describing just the habitat itself should be enough. Identifying individual plant species on Spencer Butte, without any physical barriers on the site, may bring plant poaching. With a rock wall and proper signage in place to protect the habitat, it is likely that more visitors will refrain from using the outcrops. Conversely a rock wall is not a likely candidate for the summit of Spencer Butte.

⁸ Johnson, 84

⁹ Johnson, 86

Appendix D: Observation Record

Temp: 43.3F

Weather:

Clear	32%	Partly Cloudy	21%
Overcast	9%	Foggy	10%
Drizzle	5%	Rain	9%
Heavy Rain	3%	Snow	5%

Wind:

No Wind (0-5 mph)	38%	Light wind (6-10 mph)	35%
Medium wind (11-20 mph)	20%	Heavy wind (above 20 mph)	3%

Time: 2:00 PM – Most popular hour

Group Size:

1	50%
2	39%
3-5	14%
6-10	5%
11+	.02%

Age Estimation:

0-3	2%
4-10	4%
11-17	6%
18-25	46%
26-40	35%
41-60	5%
61+	0%

Pets:

Dog with leash	4%	Dog without leash	36%
No Dog	59%		

Activity:

Running/jogging	3%	Hike to top	48%
Sit/enjoy view	32%	Wandering	12%
Scrambling	5%	Bike	0%

Time at Summit (in minutes):

0-5 minutes	18%	5-15 minutes	40%
15-30 minutes	34%	30-60 minutes	5%
60+ minutes	1%		

Ascent:

East	84%	West	14%
North	1%	South	0%

Descent:

East	84%	West	14%
North	1%	South	1%

Destination:

Summit Rocks	54%	North View	28%
North Hideout	6%	High South Slope	8%
Low South Slope	4%		

Appendix E: Survey Record

1. How often do you hike Spencer Butte? (N=150)

First time	7%	Once/year	5%	2-3 times/year	26%
Once/month	28%	Once/week	26%	More than once/week	6%

2. Why do you hike at Spencer Butte? (N= 257)

Exercise	33%	View	33%	Good place to bring dogs	3%
To relax	18%	Solitude	11%		

3. What do you like about Spencer Butte? (N=167)

Proximity	20%	Being outdoors/scenery/view	59%
Good Exercise	13%	Free	2%
Accessible Trails	5%	Family Recreation	1%

4. Did you notice any problems or issues that concern you while you were at Spencer Butte today? (N=174)

Dogs off leash	3%	People going off-trail	8%	Confusing Trails	17%
Slippery trails	20%	Erosion	17%	Too many people	8%
Illegal Activity	.05%				

Where did you go? (N=135)

Top	95%	Halfway	1%	Quarter of the way	2%
Picnic Tables	.07%				

Did you follow a trail to your destination? (N=143)

Yes 83% No 12% Somewhat 5%

Was it clear where to go? (N=133)

Yes 57% No 29% Somewhat 14%

5. Were you aware that the top portion of Spencer Butte contains numerous rare and native plant communities that are threatened by trampling pressure? (N=143)

Yes 23% No 77%

6.1 The city of Eugene is considering establishing one or more distinct trails to the summit to limit trampling pressure on the top portion of Spencer Butte. Would you be willing

to limit and observe where you walk and stick to the designated trails in order to help preserve the habitat for native and rare plants? (N=142)

Yes 93% No 7%

6.2 Do you think this is necessary? (N=143)

Yes 77% No 17% Maybe 5%

APPENDIX F: Trails Inventory

Trail 1 (East 1)

Trail system 1 is characterized mainly by loose gravel, dirt and grass clumps that are easily damaged by off-trail trampling. The obstacles that can be found on 1 consist of this loose gravel, some slick rocks, and a couple of places with vertical inclines that require the use of one's hands, making it a Level 3 trail. Most of trail 1 is not very steep; it traverses the south-east slopes of Spencer Butte. This trail is also referred to as East 1, an ideal trail that will be discussed in detail later.

Trail 1 is generally characterized by firm ground and either very eroded or somewhat eroded features. Vegetation is mixed and varies from rocky to vegetated.

Trail 1 is easily lost toward the lower sections (such as 1c and 1d). Trails 5 and 6 are easily picked up due to confusion in these lower sections. Trails 5 and 6 are both unofficial trails that tend to parallel the treeline but are blocked off by green erosion mitigation fences. These trails are extremely difficult to follow, as they generally fizzle out along the north-east grassy slope.

There are some destinations along the upper reaches of trail 1, but the trail is most often simply the best route to the summit. The Summit Rocks are highly visible from most sections of trail 1, making it one of the most accessible and easily traveled trails on the Butte.

Trail 2 is easily accessible by use of sections 1.2 or 1.3. These sections are quite steep with very fragile habitat. Mitigation is needed to close off these shortcuts. This is also the location of a "hot spot" and will be discussed later, in the Signage section of the report.

The main problem associated with trail 1 is the confusion on the lower reaches and the related ease with which trails 5 and 6 are switched to. Thus, mitigation to keep hikers from losing trail 1 for trails 2, 5, or 6 is the most important finding.

Trail 2

Trail system 2 is characterized by obstacles such as loose gravel, slick surfaces, and steep rock faces. Hikers will notice there are flat sections (such as 2b and 2c) as well as steep sections (such as 2.1). This makes classifying steepness difficult. It ranges from Level 1 to Level 3. Trail 2 is made up of four sections connecting trail 1 with the summit in a direct, generally confusing manner.

Trail 2 is mostly firm and has rocky or gravelly ground features. The lichen and moss cover is generally very eroded on the trail corridors.

There are a couple places at which hikers might be tempted to veer west off of sections 2a and 2b to head up toward the summit. These hikers will no doubt encounter patches of poison oak, creating a potentially useful natural barrier.

There are some nice views to the east, but mostly hikers will be using trail 2 to reach the summit, where views are panoramically striking.

Trail 3 (East 3)*

The features of trail segment 3 are generally steep, rocky, quite fragile, and very confusing. This is one of the most heavily traveled segments of trail system of the Butte and is therefore one of the most important to analyze. This trail, referred to as the East 3 trail will ultimately be one of the ideal routes to try to keep hikers on.

Trail 3 is mostly hard to firm but has some soft sections, such as 3a – 3c, which are also characterized by having muddy or loose soil and are subsequently prone to erosion (or have already been severely eroded).

Loose gravel and dirt can be found on trail 3, but the majority of obstacles are the rock outcrops associated with the entire south slope of the Butte. Several “veins” of rock jut out toward the south, making the whole south slope very popular for those seeking more quiet, secluded spots with good views of the south and parts of the east and west.

There are some inclines classified as Level 4 (such as 3a, 3b, 3.1 and 3.3). These sections typically require the use of a hikers’ hands for stabilization. Most of the rest of trail 3 are classified as Level 2. Hikers are also subjected to slippery conditions during wetter times of year, making the obstacles increase in volume.

Destinations abound trail 3 because of the numerous rock outcrops and associated secluded spots for hikers to sit and enjoy the view from seats of rock. It is important to take note of the fact that this segment of the trail system is potentially one of the segments worth trying to keep people to. The section 3c is a main section and should be considered as being less harmful to the landscape than the current official section (3.2).

The views and destination spots located throughout trail segment 3 are too highly prized by hikers to close off. This phenomenon suggests that we find ways to make 3 more easily located and the “hot spots” be more accurately identified for hikers. This is a very important trail and should be treated as such when making decisions about where to place signs or other mitigation measures.

Trail 4 (West)*

Trail 4 is a favorite of many of the Butte’s hikers. It rises the 800 feet from the Willamette St. parking lot in a short burst only 2/3 of a mile long. This fact alone makes the trail appealing to many in seek of exercise or simply a quick and tiring hike to the summit. Trail 4 features obstacles such as extremely steep, slippery sections (such as 4c, 4d, 4e, 4f and 4g as well as unofficial sections between 4.1 and 4.31). These steep sections require the use of hikers’ hands for stabilization and are characterized by rock faces or naturally occurring “steps”. These sections are all classified as Level 3 or 4+ in both obstacles and steepness.

Trail 4 is rocky and is therefore hard to firm. Only the lower and extremely upper reaches of the trail can be considered less than hard because they feature either loose mud and soil or gravel. Vegetation is extremely scoured on the rocky stretches of trail, making it seem like a good candidate to remain the official trail, as the damage will get no worse here and will remain easy to follow.

There are a couple locations at which confusion is rampant and, consequently, numerous shortcuts have been created. Two routes from section 4f to the summit seem reasonably official (they are 4.6 and 4g). The bottom and top sections of 4 are characterized by a muddy gravelly surface, making slippage common and erosion potentially harmful. There are fragile moss mats and lichen-rich rocks on the upper northern reaches of this trail. Mitigation efforts to keep hikers from heading out to these segments will be discussed later.

Trail segment 4 is very important to the trail system of Spencer Butte because of its difficulty, steepness and its length. Measures must be taken to limit hiking to the official sections. Limiting where hikers go on trail 4 is potentially much easier than other segments because it is a steep rock face and is really the best route to the summit. There are only small deviancies from the official trail and these locations are fairly easily identifiable. Mitigation to keep hikers on the official trail must be installed at section 4a, the end of 4b, and the split between 4g and 4.6 near the top. This trail will be referred to as the West trail and is one of the ideal routes.

Trail 5 (Ridgeline Trail)

Trail 5 is characterized by an extremely steep and obstacle-filled lower section leading out from the ridgeline trail to the north and very loose, erosion-prone surfaces toward the sections on the east side. As the trail comes out of the forest to the north, hikers are met with very steep rock faces and dirt sections. They pass the North View and North Hideout without much confusion. This trail is also part of the ideal system, as it is basically the only route to the first Willamette Street parking lot.

Trail 5 is firm with mostly rocky / gravelly features. There are some vegetated areas associated with muddy and loose soil features. Trail 5 is very eroded in some places, such as sections 5a – 5c, and not very eroded in some sections, such as 5.21 – 5.23. Erosion corresponds to the type of vegetation or natural features present. Loose soils and muddy regions tend to be much more impacted by erosion and trampling.

This segment is comparatively free of confusing “hot spots”. The main problem associated with segment 5 is the ease with which hikers veer from 5 to the very harmful reaches of trail 6, which parallels official segment 1. These sections (they are 5.2 through 5.23) are hard to portray as one trail in any one place – they are more accurately described as the whole northeast slope. This slope is very fragile, as it doesn’t see much use. The slope is covered in vegetation and is prone to erosion and associated damage from trampling.

Trail 5 is classified as Level 3 on the lower sections and Level 1 on the upper reaches. The trail levels out a great deal once it reaches the gravel area near the summit.

Trail 6

As previously mentioned, trail segment 6 is more of an connection between segments 1 and 5 on the east slope. Segment 6 is very steep in places and has loose gravel and dirt. The steepness is classified as Level 3 for all sections.

The problem with trail 6 is that it is easily confused for an official trail. It follows the treeline and parallels trail 1. Hikers should be shown where trail 1 is so that trail 6 might more often be avoided. Signage needs to be placed within visible range of trail 6. This might better divert traffic away from this fragile north-east trail system.

Trail 6 is soft to hard. Vegetation is scattered among rocky areas. Trail 6 is very eroded in sections 6a and 6.1 and is somewhat eroded in section 6.2. Fragile grassy and mossy regions appear near the connection between Trails 5 and 6.

Trail 7 (East 3)

Trail 7 is characterized by networks of interconnected rock outcrops, most of which lead to the ridges on the “low south slope”. There are many popular secluded destinations on this part of the Butte. Trail segment 7 shares the same features as trail segment 3. There are some very slippery steep sections that usually lead to spots to sit and enjoy the views to the south and southeast. Some of trail 7 is also referred to as the East 3 system.

Mitigation efforts will likely not be able to close segments of system 7 but rather should focus on diverting hikers from the numerous connector sections to a central, easily recognizable trail. This trail will need to lead hikers to destinations while simultaneously keeping off-trail scrambling to a minimum.

Trail 7 is generally hard rocky ground but there are numerous places where it turns to loose soil and mossy mats. This makes this stretch of trail extremely vulnerable to trampling pressure. This section is a key trail closure to ensure the health of plant communities. The loose soils and mats of moss are easily disturbed and could be as easily kept safe through the closure of this section of trail.

Steepness is generally Level 2, but there are a couple segments that become Level 3. There are several good secluded destinations associated with this trail network.

Trail 8

Trail system 8 is characterized by unofficial trails leading down toward the southwest. When followed all the way down, these systems lead to the lower rock outcrop / meadow located along the west side. This entire region is characterized by native grasses and wildflowers. This slope is also potential migratory butterfly habitat and should be avoided at all costs. The mitigation detailed later will show how this entire region can remain pristine if properly implemented.

Obstacles include very loose gravel and dirt clumps with drops that require the use of hikers’ hands. There are several connected trail sections (between 8.2 and 8.41) near the lower portion of trail 8.

The main problem associated with trail 8 is that it offers a more rugged, trailblazing type environment to more adventurous hikers. Signage near the top warning hikers about the potential damage should keep use to a minimum and send potential users a bit further north to the 4 segment.

Trail 8 is mossy and loose soils at the beginning of it, such as in sections 8a, but turns firm and rocky throughout the rest of the trail. It is mostly rocks and gravel and is somewhat eroded.