



*Fern Cave Management Plan*

*February 2006*



View looking southwest towards Mount Shasta from the vicinity of the Fern Cave entrance.

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## Chapter 1 – Fern Cave Resources

### 1.1 Introduction

The mission of the National Park Service in managing Lava Beds National Monument is to protect the area's nationally significant resources in perpetuity, passing them on intact to future generations, and to make them available for the use and enjoyment of visitors from across the country and around the world. In working to achieve these primary objectives, the National Park Service is also committed to cooperation with adjacent public land managers, traditionally associated contemporary tribes, local landowners, and nearby communities (GMP, 1996).

One of the most important nationally significant resources managed at Lava Beds National Monument is the broad array of lava tube caves. These caves are significant due to their geologic features and biological and cultural resources. Fern Cave is one of these caves and is especially remarkable. Fern Cave is listed under the Lava Beds Cave Management Plan as a class 4 cave. This is the highest management class in the plan and is based on the amount of use the cave receives, cave resource impacts and sensitivity, and management concerns. Class 4 special management caves are by virtue of their high resource or scientific values, unusual caves that make long-term management according to Class 1, 2, or 3 guidelines inappropriate or inadequate.

The management objective of class 4 caves is the preservation of cave resources. This objective for Fern Cave will be outlined in this Cave Management Plan by describing the nature of the resources and specific management actions necessary for the preservation of the cave and its resources.

This plan has been prepared in compliance with:

- NPS Organic Act of 1916, which states the NPS will manage resources “to conserve the scenery and the natural and historic objects and wild life therein and to provide for the enjoyment of the same in such a manner and by such a means as will leave them unimpaired for the enjoyment of future generations” (The NPS Organic Act of 1916 – PL 64-235).
- The Archaeological Resources Protection Act of 1979 (ARPA) which protects archeological resources and sites on public lands.<sup>1</sup>
- American Indian Religious Freedom Act of 1979.
- The Native American Graves Protection and Repatriation Act of 1990 (NAGPRA) which requires federal managers to consult with native people regarding the management of human remains, burial objects, and certain other classes of artifacts which are intentionally or inadvertently discovered.
- The Federal Cave Resources Protection Act of 1988 which lists two purposes: (a) to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment and benefit of all people; (b) to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, educational, or recreational purposes.
- NPS Management Policies 2001.
- Lava Beds National Monument Enabling Legislation which was established by presidential proclamation No. 1755 on November 21, 1925 (44 Stat. 2591).
- Lava Beds General Management Plan (1996).
- Lava Beds Resource Management Plan (1999).
- Lava Beds Cave Management Plan (1990)(Draft 2004).
- Executive Order No. 13007: Indian Sacred Sites.

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<sup>1</sup> Throughout this document the word archeology or archeological will only be spelled with an extra “a” when used within referenced material. This follows Federal convention on spelling.

## 1.2 Purpose and Need

Fern Cave has long been recognized as one of the most significant cave resources at Lava Beds National Monument. The cultural and natural resources found at the surface and within the cave are of local, national and international significance.

The purpose of this plan is to provide direction and establish policies and guidelines for the management of Fern Cave and the resources within and surrounding the cave at Lava Beds National Monument. This plan is necessary to protect and perpetuate the delicate and non-renewable Fern Cave resources for future generations.

The specific goals of this plan are to:

- Protect Fern Cave's cultural and natural resources.
- Provide a background on historic management and use of Fern Cave.
- Identify cave management issues unique to Fern Cave.
- Establish policies for the management of Fern Cave.
- Establish guidelines for present and future use of Fern Cave.
- Provide direction on the monitoring of Fern Cave resources.

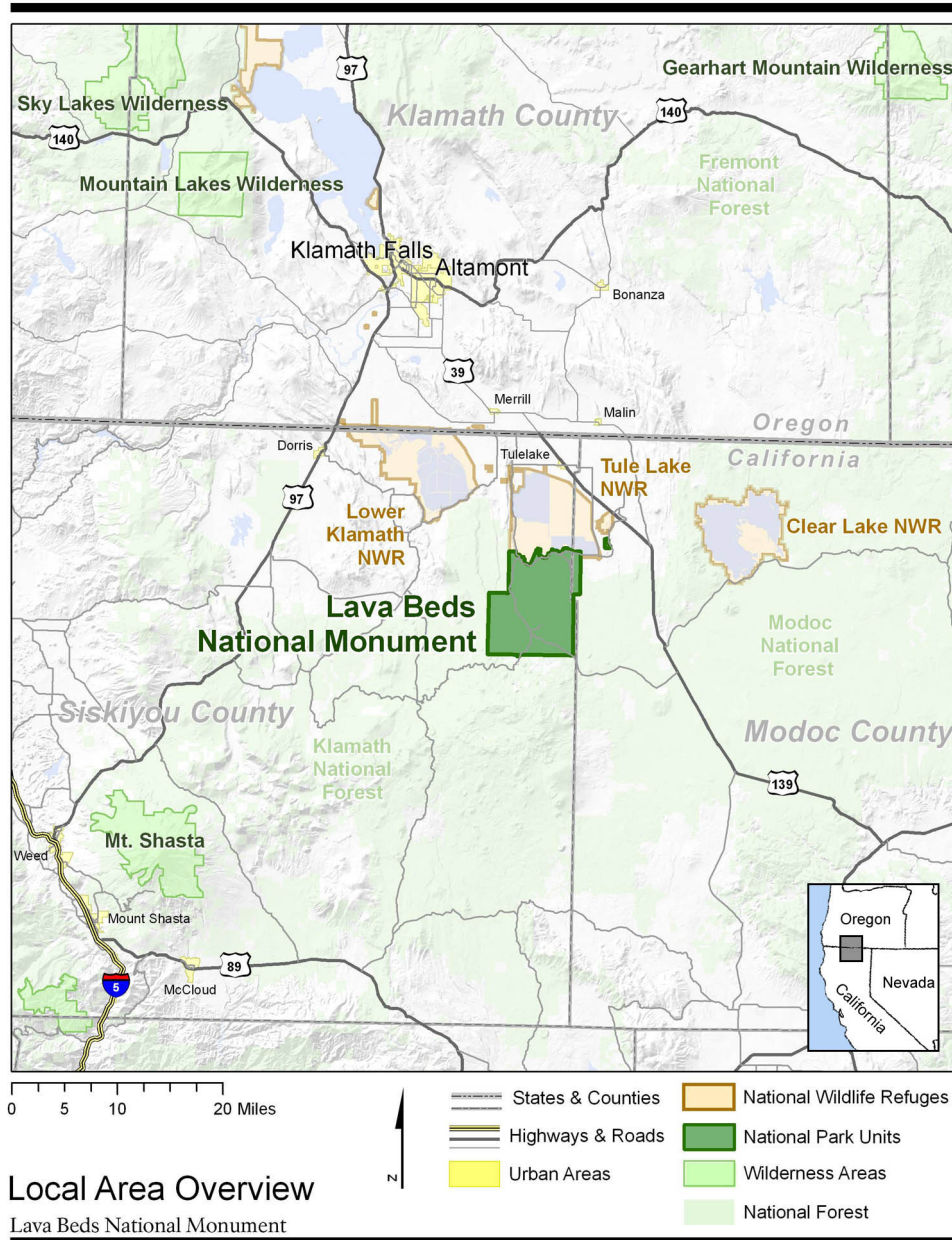
This plan is a stand-alone document to be used in conjunction with the monument's overall management guidelines and policies found in the General Management Plan and the Resources Management Plan, and other guidelines and policies outlined in section 1.1. All cave management actions must be carefully planned and not cause avoidable impacts to cave resources.

## 1.3 Background

Lava Beds National Monument is located in northeastern California, approximately (249 Kilometers) 155 miles northeast of Redding, California, and (72 Kilometers) 45 miles southeast of Klamath Falls, Oregon. Ninety four percent of the monument is located within Siskiyou County and the remaining six percent is in Modoc County, California (See figure 1). The monument lies on the northeast flank of the Medicine Lake shield volcano, the largest volcano in the Cascade Range. The region in and around the monument is unique due to its location at the junction of the Sierra-Klamath, Cascade, and Great Basin physiographic provinces.

Fern Cave is located within the boundaries of Lava Beds National Monument in Northeast California's Modoc County (Township 46 N., Range 5 E., Section 19). It is in close proximity to Lyons Road, which was built in the late 1920s and served as the main park road until the current paved road was constructed closer to the historic lakeshore in 1964. The entrance to Fern Cave is 1.5 miles south of the original shoreline of Tule Lake. Fern Cave is not located within the 1972 designated Schonchin section of Lava Beds National Monument Wilderness.

Figure 1. Location of Lava Beds National Monument in Northeastern California.



Lava Beds National Monument (LBE) was established by presidential proclamation No. 1755 on November 21, 1925 (44 Stat. 2591). The proclamation identifies the significance of the monument's cultural and natural resources: "Whereas, lands of the United States within the area herein described...contain objects of such historic and scientific interest as to justify their reservation and protection as a National Monument..."

On June 10, 1933 the administration of Lava Beds National Monument was transferred from the U.S. Forest Service to the National Park Service (Executive Order No. 6166).

Since that time, Lava Beds National Monument has been working on the protection and management of cave resources. By the beginning of 2004, Lava Beds staff and volunteers had documented 505 caves totaling 28.71 miles of passages. This concentration of lava tube caves is the highest in the



lower 48 states, and represents a variety of cave features, such as levees and gutters, lava cascades, balconies, natural bridges, lava lakes, rafted blocks, and lava stalactites and stalagmites. Caves in Lava Beds National Monument typically were formed during the eruption of basaltic lavas in the late Pleistocene (over 10,000 years ago), a process which has not happened historically in the area, making them a non-renewable geologic resource.

## 1.4 Fern Cave Geology

Fern Cave is part of the Merrill-Skull trench system of caves that originated from Mammoth Crater on the southern boundary of the park.

Fern Cave is entered through a natural skylight that connects the top of the lava tube with the exterior ground level. This entrance is located along the longitudinal north-south axis of the cave floor.

The first base map and geology measured within Fern Cave was completed in 1975 (Waters, et al. 1975). A number of features are described on this map including spiny pahoehoe, lavacicles, pahoehoe pool, dripstone tubelets, peel-off shells, rafted blocks, and small lava stalagmites. The entrance collapse is described as a mound of fern-covered soil, pumice, dust and organic debris which covers and grades into collapse breccia. Many areas of the cave contain narrow lava benches which rise above a pool of smooth pahoehoe along both walls of the cave. The cave also contains "excellent lavacicles and dripstones throughout cave, except above areas of ceiling collapse".

At the entrance to fern cave is a 10-foot vertical drop to the top of a fern-covered mound of loose blocks, humus and soil. The top of this mound is flat and only about 9-10 ft in diameter, but it spreads outward to both walls of the cave (Waters, et al, 1990). This mound of debris spreads downward on all sides to the pahoehoe floor of the cave which is 8 to 10 feet lower than the top of the mound. Seventy-five percent of the floor of fern cave is free of collapse blocks or other debris. Thus, the cave floor, sides and roof are remarkably undamaged for such a large and high lava tube (Waters, et al, 1975).

The cave can be traversed for 1300 feet in a north/south orientation. At each end further access is blocked by lava plugs. At the downstream (north end) the roof lowers gradually until there is only a crawl space between it and the floor over the last 30 to 50 feet of the caves extent. The upstream end, by contrast, is a near vertical semicircular wall about 12 feet high.

The Fern lava tube is large, ranging from 20 feet to places where the passage is over 60 feet wide. Most of the tube is 35 to 40 feet wide. Ceiling heights are mostly between 12 and 20 feet in the upstream 70% of the cave. Downstream from the entrance, as previously noted, the distance between floor and roof decreases. However, one can stand upright in most places until roughly 150 feet from the downstream end (Waters, et al, 1990).

The final events during the waning of volcanism are recorded on the floor in two late flows of lava; each can be traced the full length of the cave. The older flow is seen only near the walls of the cave, the younger one, a thin flow of spiny pahoehoe, occupies the central part of the cave's floor throughout its length. The older lava is a smooth pahoehoe which originally flowed at a higher level long enough to start solidification along its walls, but then drained down and pooled at a level 3 to 5 feet lower than its former flow level. This geologic activity resulted in benches 2 to 4 feet high in the downstream part of the tube where a firm crust had formed. The benches grade gradually into a sloping apron which connected the wall with the lower drained out lava surface over about 2/3rds of the upstream part of the cave. The final flow of spiny pahoehoe covered this smooth pahoehoe floor, but failed to overrun the aprons and downstream benches along the walls. Thus an almost continuous gutter borders the late lobe in the upper 2/3 of the cave. In most places this gutter is 2 to 3 feet deep; its inner wall is formed by the steep edge of the spiny pahoehoe lobe, its outer wall by

the sloping apron. The gutter is narrow in most of the upper tube, but widens to enclose large patches of the pooled floor of the older flow in the downstream part of the tube. The spiny lobe had lost most of its energy in this downstream area; it was too viscous to spread clear to the benches, let alone cover and overwhelm them except at the very downstream end where it clogs the tube to its roof. According to geologists, the bench and gutter features as well as the spiny and smooth pahoehoe floor show that the cave was formed in two related events during the same volcanic episode. The source of the lava which surged through Fern Cave is unknown (Waters, et al, 1990).

In 1990, K. Strassburg and G. Hathaway completed a cave inventory of Fern Cave for the Cave Research Foundation. The length of Fern Cave was recorded at 1300 feet with one level. Maximum depth at the opening to Fern Cave was measured at 15 feet with a maximum opening width of 10 feet. Thickness of overburden (minimum) was measured at 1.5 feet. The length of entrance and twilight zone (drip line to no visible light) was measured at 1200 pm and was found to be 350 feet to the north direction and 330 feet to the south. No hydrologic features were documented during this survey. The length of passage north of the entrance is 420 feet long. The length of passage south of the entrance is 960 feet long (CRF, 1990).

### 1.5 Fern Cave Temperature and Humidity

Monitoring of temperature and humidity in Fern Cave began on November 29<sup>th</sup>, 1983, with the placement of two hygrothermographs within the cave. One of the instruments was placed approximately 20 feet north-northeast of the base of the ladder and the other was placed about 100 feet south of the opening on the west side of the cave (Case Incident Report, #260220, 1983). The hygrothermographs were operated until April 2<sup>nd</sup>, 1984. The average temperature and relative humidity for the instrument located south of the opening was 50.02 degrees Fahrenheit and 95.5 % relative humidity. The average temperature and relative humidity for the instrument located north of the ladder was 50.41 degrees Fahrenheit and 95.9 % relative humidity (Hygrothermograph data, 1984).

On March 13, 1992, resource management staff took readings of temperature and humidity at three locations. Outside of the entrance, on the surface, at 1420 pm, relative humidity was 44 percent, dry bulb temperature was 61 and wet bulb temperature was 49. Inside the cave, in the shade at the fern collapse area, the relative humidity was 94 percent, dry bulb temperature was 53 and wet bulb temperature was 52, at 1430 pm. Inside the cave, on the upstream end, relative humidity was 88 percent, dry bulb was 52 and wet bulb was 50, at 1500 pm.

Resource management staff has continued over the last few years to monitor temperature and humidity within Fern Cave using automated data loggers. Two data loggers were placed in Fern Cave in July of 2001. Temperature and relative humidity were monitored for approximately two years and showed very little fluctuation during this study. Temperature was found to range between 50.38 degrees Fahrenheit and 57.35 degrees. The warmest temperatures occurred in September and the coldest temperatures were documented between the months of February and April. Relative humidity was found to range between 98.2% and 104.3%. The lowest relative humidity levels occurred during the summer months and the highest levels were documented between the months of February and April.

### 1.6 Fern Cave and The Klamath Tribes

Approximately eleven and a half thousand years of human occupation throughout the Klamath Basin has provided an extensive array of cultural resources associated with Lava Beds National Monument. The Modocs and their predecessors subsisted on hunted game and gathered plants. Though fairly mobile, the Modocs lived in semi-permanent villages along the shores of Tule Lake. At numerous sites, they painted pictographs and carved petroglyphs. Hunting forays, vision quests, and other



activities took them into every part of their territory where their routes are marked today by obsidian chips, projective points, and various stone tools (GMP, 1996).

A number of the cultural resources in Lava Beds National Monument, i.e. archeological and historic sites, hold traditional significance for contemporary Modoc who are now primarily affiliated with The Klamath Tribes of Oregon and the Modoc Tribe of Oklahoma. Sites and places within the Monument serve as one of the tangible links for the Modoc with their ethnic heritage. The significant population decline and cultural disruption after historic contact, coupled with dispersal of the remaining Modoc population after the war of 1872-73, led to some fragmentation and dissipation of knowledge of the Modoc culture. Today there is a revitalized interest among Modoc about their traditional culture, and the Modoc Lava Beds District serves as a focus for this interest (GMP, 1996)

Specific sites within the monument that are of importance to the Modoc include Captain Jacks Stronghold and vicinity, Petroglyph Point, and Fern Cave (GMP, 1996). These places are used for spiritual purposes and for the "Return to the Stronghold Gathering" which has been held annually since 1989.

A study completed by John Allison (1994), "The Cultural Landscape of the Klamath, Modoc and Yahooskin Peoples: Spirit, Nature, History", confirmed the importance of Lava Beds National Monument to Modoc people.

Executive Order No. 13007, Indian Sacred Sites, approved May 24, 1996, states in Section 1 (Accommodation of Sacred Sites) that Federal agencies, to the extent practicable, permitted by law, and not clearly inconsistent with essential agency functions, shall (1) accommodate access to and ceremonial use of Indian sacred sites by Indian religious practitioners and (2) avoid adversely affecting the physical integrity of such sacred sites. Where appropriate, agencies shall maintain the confidentiality of sacred sites.

The Modoc Plateau, a high volcanic basin of marsh and lakes has had speakers of the Sahaptin linguistic stock whose language is, appropriately enough, known as Modoc (Whitley, 2000). One of the most distinguishing characteristics for the Modocs that separates them from other Native Californians was subsistence. They lived in an area without acorns, pine nuts and other staples common elsewhere in the state. In contrast The Modoc made use of the rich stands of water lily bulbs, called wokus (*Nuphor polysepalum*), as well as the camas bulb (*Camassia quamash*). These plant foods, combined with the rich fish and fowl of their upland marsh and lakeshore territory, contributed to a stable resource base (Whitley, 2000).

## 1.7 Fern Cave Archeology

Many caves within Lava Beds National Monument are culturally significant. Prehistoric rock art and artifacts in and near the entrances to caves are evidence of early human use of the caves. During the Modoc War of 1872-73, caves played an important role in providing shelter for the Modoc Indians. During the 1930's the Civilian Conservation Corps (CCC) installed trails, steps, rock retaining walls and other developments in approximately thirty of the monument's caves.

Fern Cave has been documented and researched by a number of individuals since the 1920's. This information is found in a number of referenced materials including the National Park Service Archeological Sites Management Information System (ASMIS). The NPS ASMIS is a database that records data on site location, description, significance, condition, threats to, and management requirements for known park archeological sites (ASMIS, 2003). Fern Cave is identified as site number CA-Mod-17 under the Archeological Site Survey Record.

In late 1935 Lava Beds Chief Ranger, J. Carlisle Crouch conducted preliminary archaeological testing in Fern Cave with the hopes of drawing attention from academia to obtain the services of a qualified archaeologist to make a more thorough investigation of the area (Crouch 1936). Crouch excavated

two test trenches in the midden using trowels and screening sediment through a “small mesh wire screen.” Stone tools, mortars, pestles, bits of mats or baskets, bone, and pipe fragments were recovered. Crouch concluded in his 1936 report, based on the trench profiles, that fern cave was occupied at two different time periods but added that the findings were inadequate to determine when the cave was inhabited. The excavations were conducted before radio carbon dating was available. There is a reference in the 1936 report that Luther Cressman at the University of Oregon was contacted for professional input and that the collection was forwarded to him (Wilson, et al, 2003). Recent contact with the University of Oregon Museum of Natural History, concerning the location of this collection, has not been fruitful.

Crouch’s work is notable in that it was conducted in a highly professional manner, was done in consideration of the prevailing archeological understanding of the Klamath Basin, and explored the significance of archeological remains in the monument. It is a study that warrants closer scrutiny and perhaps reanalysis of the artifacts if relocated (Wilson, et al, 2003).

Luther Cressman conducted work in the Lower Klamath Lake basin in 1940 defining the Narrows culture (7,500 to 5000 years BP) and the Lairds Bay Material (4000 to 2000 years BP) but did not venture into the Monument boundaries. While other archaeologists became interested in the area (Robert F. Heizer and his graduate students Robert J. Squire and Gordon L. Grosscup) and worked in parts of the Monument, Fern Cave was noted but not thoroughly investigated. In Squire and Grosscup’s 1952 report it is stated that attempts were made in each cave and rockshelter they visited to determine the depth of deposits. Further work was not conducted at the time, but it may be assumed that Crouch’s previous investigation provided the needed information (Wilson, et al, 2003).

A study titled, “The Pictographs of Fern Cave, Lava Beds National Monument: Agents of Deterioration and Prospects for Conservation” was conducted by Constance S. Silver, an art historian, on August 29, 1981. The purpose of that study was to evaluate and describe the damage to Fern Cave pictographs caused by microflora growth. Part of the research involved treating a 5x5 cm area of microflora covered pictographs to determine the effects of the microflora growths. Silver’s recommendations concentrated on monitoring the growth to insure preservation of pictographs.

The pictographs were formally recorded using standard measurements and drawings in 1988 by Georgia Lee, William Hyder and Arlene Benson. Dates generated from pigment testing was conducted by Ruth Ann Armitage in 1997 to determine if one image represented the Crab Nebula Supernova. Research revealed that there were multiple episodes of painting over the past 1,000 years and that none of the dates coincided with the supernova event (Armitage, et al, 1997).

Detailed descriptive and classificatory archeological information about Fern Cave was synthesized by Janet P. Eidsness and Ann King Smith (1990) while completing the National Register of Historic Places Registration Form for the *Modoc Lava Beds Archaeological District*. In the nomination Eidsness notes that Fern Cave has three “site functions” that include:

- **Subsistence** activity is archeologically identified by remnants associated with food procurement and processing like mortars, pestles, and tools for processing game. While all of these items have been found in the entrance area, Eidsness lists Fern Cave in this category because of the organic materials recovered by Crouch in 1935.
- **Domestic** activity is ascribed to a site if there is a presence of housepits, midden and/or smoke blackened ceiling or walls. Fern Cave is noted as having a smaller inhabited area than other domestic sites along the lakeshore as well as being either a temporary or special purpose site as opposed to a village (Eidsness, 1990, 1992). The 2003 archeological survey noted that there were a few bedrock mortars and numerous hopper mortars as well as a distinctive midden that has proven (Crouch 1936) to be the result of cultural activity and natural phenomenon (Wilson, et al, 2003).

- **Ceremonial** category is identified by rock art and cairn features. The pictographs at Fern Cave are recognized as being the most complex and feature the largest number of design elements. Thus it was defined as a ceremonial space (Eidsness 1990).

Fern Cave was listed on the National Register of Historic Places in 1975 primarily because of the fifteen panels of documented pictographs (Lee, et al. 1988) just south of the entrance.

Fern Cave is a contributing site within the *Modoc Lava Beds Archaeological District* defined by Janet Eidsness (1990) and is, therefore, associated with 207 other recorded sites.

Since the original investigations and research described above, there have been two additional research projects. In 2001, Susan Kerr and Nelson Siefkin reported on a specific site in the north end of the cave.

During the week of March 24, 2003 National Park service staff Doug Wilson, Kirstie Haertel, Robert David (Klamath Tribal Member and Research Assistant with Fort Vancouver NHP), and Nelson Siefkin with Tribal Cultural Resource Technician, Janice Miller, completed a systematic and intensive archaeological survey of the entire length of Fern Cave. As describe below, a report was developed summarizing the activities and findings of the March 2003 survey and follow-up investigation on April 28, 2003 (Wilson, et al, 2003).

## 1.8 Fern Cave Human Remains

In 1999, human skeletal remains were discovered in Fern Cave. This discovery was researched at the time by Nelson Siefkin (Redwood National Park Archeologist). Siefkin confirmed that the discovery in Fern Cave included a pine nut bead and skeletal remains tentatively identified as human. Siefkin returned to the site on October 30, 1999 with Susan Kerr (Biological Archeologist) who has extensive experience in the identification and study of human skeletal remains. Without impact or disturbance to the human remains, Kerr positively identified the skeletal remains as human (Siefkin and Kerr, 2001)

An archeological survey of Fern Cave by employees of the National Park Service and representatives of The Klamath Tribes during March 24-27 and April 28, 2003 was completed to determine the context of human remains discovered in 1999 and to complete a full survey of the entire cave (Wilson, et al, 2003). The survey methods used included transects of a meter or less that traveled between the west and east walls of the cave. In addition to the fragmentary human skeletal remains identified in 1999, a small number of fragmentary human remains were discovered at another location during the 2003 survey.

## 1.9 Fern Cave Pictographs

In 1979, H.K. Crotty described the rock art of the Modoc territory. The concentration of sites along the shores of Tule Lake, together with the archaeological, ethnographic, and linguistic evidence, supports the conclusion that the rock art of the Modoc territory was created by people long settled in that marshy lake environment.

Fern Cave is famous for its extraordinary pictographs. They cover perhaps as much as 800 square feet on the east and west walls of the cave. Fern Cave's pictographs are a complex collection of anthropomorphic, zoomorphic, and geometric forms. A "Modoc" style was proposed by Helen Crotty in 1979 to describe pictographs of northeastern California and to establish the distinction between the style of the Modoc territory and that of the Great Basin. Crotty's paper presented a number of pictograph images from Fern Cave. Circle designs, life forms or possible life forms, and "Two -edged saws" and other typical Modoc elements were drawn by Crotty.

The pictographs are also remarkable for the variety of techniques of execution which have allowed the artist(s) to maximize visual impact from only two pigments, black and white (Silver, 1981). Three techniques of execution are: (1) application of the black and white pigments to the bare rock of the walls, (2) application of a thick white base coat to the rock, much as a mural painter would apply plaster to a wall preparatory to painting it. The west wall has been particularly treated in this manner. Indeed, at the south end of the west wall there are areas that appear to be thick drip marks from a brush that carried white pigment, (3) other areas have been given discrete applications of white to create a base for the black pictographs (Silver, 1981).

Agents of deterioration identified by Silver were growth of moss, development of a white surface accretion, loss of painted surfaces, and past events of overpainted pictographs. Silver concluded her report by stating that the pictographs of Fern Cave were in fairly satisfactory condition. Moss growth was the most serious threat to the pictographs, a conclusion Silver supported by the laboratory analyses of pigments and mosses. In 1984 there were approximately 200 square feet of pictographs covered by moss. The moss was identified to be in the Family Bryaceae, Genus Pohlia.

The pigments in the pictographs of Fern Cave have been studied on two separate occasions. Silver in 1981 identified the white pigment as Clay kaolinite with inclusions of iron oxide. The black pigment was identified as burned vegetal matter. Associated Rock Art Consultants from September 5-10, 1991, conducted an inspection of the pictographs in Fern Cave. A minute sample of black pigment was collected from each side of Fern Cave for testing by the Getty Conservation Institute to determine if it contains charcoal and thus can be dated. According to Dr. David Scott of the Getty Conservation Institute, X-ray fluorescence tests indicate that the black pigments in Fern Cave were produced from manganese and owe their black color to the presence of carbon (Smith, 1991)

The pictographs were formally recorded using standard measurements and drawings in 1988 by Georgia Lee, William Hyder and Arlene Benson. Before that time, very few documented photographs of the cave are known. After Hopson's report in 1949, the next referenced photos of Fern Cave are from a R.E. Connick on September 3, 1955. A Dr. Dale Ritter was also referenced as having fine photographs of Fern Cave, but no dates were provided (Lee, et al, 1988). During the 1988 project, 27 camera stations were set up to photograph the ten panels on the west wall and eight panels on the east wall. The pictographs were also drawn to scale using techniques that caused no contact with the panels (Lee, et al, 1988). During the 1988 project, Arlene Benson conducted a literature review and photographic search for Fern Cave.

During the pictograph work completed by Lee, Hyder and Benson in 1988, the persistent rumor that the white paintings in Fern Cave had been touched up or overpainted by someone making a photo-documentary was reviewed. Lee and Hyder were convinced that the paintings were genuine, but were without proof until a visit from Charles Wistos of Chester, California who entered Fern Cave on January 28<sup>th</sup>, 1926. He revisited the cave in July of 1988 when Lee and Hyder were completing their study and commented that the bright white paintings looked exactly like the first time he saw them 62 years before (Lee, et al, 1988).

On September 30, 1989, Cave Research Foundation visited Fern Cave and photographed the rock art there as well as other volcanic and secondary decoration features (CRF, 1989). Three photographic monitoring sites were established in 1989. Site number 1 monitors the ferns at the entrance. Site number 2 monitors the pictographs on the wall, and site number 3 is of a location where Lava Stalactites are found. The photographic monitoring project at Fern Cave was initiated with the goal of documenting potential changes in fern or moss growth near the entrance (Frantz, 1992). Between 1989 and 1992, Frantz didn't report significant changes in Fern Cave. In the 1992 Frantz report, it was recommended that frequently visited sites be re-photographed every three to five years, less frequently visited sites be monitored more frequently to get early warning of increased visitation, and areas of management concern should be re-photographed as often as needed. Since this study, Fern Cave was photographically monitored in 1999 by Lava Beds Resource Management staff.

Jim Henderson, in early 2002, recorded 18 pictograph panels on the walls of Fern Cave. Faded and overgrown by green moss, Henderson used polarized light to capture the pictograph pigments onto digital media. Thirty-three panel photographs and 48 digital panorama images comprised the work effort. Henderson subsequently digitally enhanced the resulting image files, converted them directly into scaled drawings, and produced panoramas of both the east and west walls. Henderson assessed each pictograph panel that was originally recorded by Georgia Lee in 1988. Green moss has subsequently covered pictographs on both the east and west walls, and it was felt that polarized light could reveal remaining black and white residues. Each of 17 panels was photographed in such a way as to recreate the same field of view in the Lee photographs. A total of thirty-three photographs had to be made, because Henderson was required to avoid areas of cultural sensitivity off the designated trail. During this project it was not possible to find two of the panels documented (Henderson, 2002).

The base rock in Fern Cave consists of porous lava of a dark, reddish color that was a limiting factor for Henderson's project due to its light absorption characteristics. Native Americans used predominantly black paint on the dark walls, although white was found in many pictographs as a secondary pigment. A second factor was thick velvety-green moss growing on the walls of the cave. Henderson did nothing to disturb the rock surface, and relied upon polarized light and digital enhancement to improve the legibility. Although these enhancements played a crucial role in pigment legibility, total restoration was not possible, because the moss stems and leaves were opaque and prevented the light from reaching some pigment. Since 1994, digital processing has made possible image contrast and saturation down to the individual pixel level, a distinct improvement over traditional photographic darkroom techniques. The combination of polarized light and digital enhancement has made possible a supra-additive increase in pictograph legibility. Henderson recovered additional details and restored the appearance of the pictographs on film.

### 1.10 Fern Cave Pictographs and Regional Rock Art Studies

Steward in 1929, described pictographs in the area of Lava Beds as mostly designs of the basin style (curvilinear). Steward described four sites in the Modoc Lava Beds, Modoc County area. Steward also analyzed the component designs and found that the Modoc Lava Beds to be represented heavily by the curvilinear designs (Steward, 1929).

Steward defined Great Basin Curvilinear originally in 1929. In 1962, Heizer and Baumhoff proposed additional theories around Eastern California rock art, with emphasis placed on a hunting-magic hypothesis. Heizer and Baumhoff looked at a stylistic analysis and left confirmation of this hypothesis to future work.

In the extreme northeastern portion of the state of California (Modoc and Siskiyou counties) is an area with a heavy concentration of pictographs. This area was named in 1979 the Northeast [California] Painted style area, with its location in the northwest portion of the Great Basin, a culture area with which it shares a number of archaeological, ethnographic, and art stylistic affinities (Heizer and Clewlow, 1973). During the Heizer and Clewlow project, they documented the element frequencies for pictographs in Modoc County. Elements include human, animal, circle and dot, angular and curvilinear elements. Angular elements represented 30.5% of the Modoc county sample and curvilinear elements represented 64% of the elements from Modoc county. These figures coupled with those on the human, animal, circle and dot, and angular elements, present striking similarity to the percentage figures for the Great Basin style petroglyphs. This would seem to identify a strong connection exists between the two styles.

Heizer and Clewlow stated they are not in possession of any direct information to aid in making an interpretation of the pictographs in the Northeast Painted style area. The Modoc tribe, which formerly inhabited much of the area in which the pictographs occur, was no longer a functional entity

when the first studies of the paintings were made. Thus, no direct ethnographic information could be made available as to the possible significance and meaning of the pictographs for their makers. Some of the larger sites (e.g., Mod-17, Fern Cave) may have been used repeatedly over a period of time in various ceremonies. A number of California pictographs apparently consist of elements added from time to time in connection with ceremonies (Grant, 1964). Whatever the exact case, Heizer and Clewlow felt reasonably sure that the Northeast pictographs are primarily ceremonial in nature.

Heizer and Clewlow described Fern Cave's pictographs as red and yellow in large lava tube cave with vertical entrance. Considerable midden deposit at entrance. Pictographs have been heavily vandalized. (Note: There is some discrepancy with regard to colors at this site. Some records refer to the pictographs as red and yellow, others list them as black and white. "We have chosen red and yellow because these are the colors indicated in our earliest records, and because later records indicate that the pictographs have been damaged by overpainting."

The rock art of the Modoc Plateau is a regional variant of the larger Plateau Tradition, resulting from the occupation of this small portion of California by Sahaptin speaking peoples. Black and white, in further contrast to the general Plateau Tradition pattern, are the dominant colors for the painted motifs, although red is present at some sites. This variation may be due to localized circumstances rather than significant cultural differences: ethnographic data suggest that red pigment was not available on the Modoc Plateau and could be obtained only through trade with Great Basin peoples to the east. In a detailed recording of eight painted sites in Lava Beds National Monument, zigzag patterns constituted 27 percent of the sample of 263 panels and 561 motifs, followed by circle designs (17 percent), U shapes (7 percent), V shapes (6 percent) and anthropomorphs (5 percent); 17 other defined types all contributed less than 5 percent each. The motifs were painted using both wet and dry techniques, that is, a liquid painted on, or powder or chalk applied with the fingers. Wet application was, however, the dominant technique, accounting for 81 percent of the recorded motifs. Black was by far the most common color with only occasional uses of white and, much more rarely, red (Loubser and Whitley, 1999). Although some Modoc variant painted sites are associated with habitations (notably, the well-known Fern Cave), most of the sites that we recorded are not. These are found in lava tubes within the volcanic malpais, or badlands, and are concentrated around the base of Schonchin Butte (Whitley, 2000).

### 1.11 Fern Cave Natural Resources

Fern cave is located at 4,115 feet elevation in a vegetation type known as the cheat grass (*Bromus tectorum*), Thurber Needlegrass (*Achnatherum thurberianum*), and Rubber Rabbitbrush (*Chrysothamnus nauseosus ssp. Albicaulis*) shrub/grassland community (Erhard, 1979). This vegetation community is distributed widely over the northern two-thirds of the Monument. No Western Juniper (*Juniperus occidentalis*) is found around the cave opening, making the area open to long vistas. The shrub component around the cave is dominated by Rubber Rabbitbrush. Other important shrubs present are Common Sagebrush (*Artemisia tridentata ssp. Vaseyana*), Green Rabbitbrush (*Chrysothamnus viscidiflorus*), and Gray Horsebrush (*Tetradymia canescens*). The grass layer is dominated by Cheat Grass and Thurber Needlegrass with average frequencies of 96 and 51 percent, respectively (Erhard, 1979). Bluegrass (*Poa sandbergii*) and Wheatgrass (*Agropyron spicatum*) are also important and consistent components of this layer.

Soils around the Fern Cave area are 30 to 66 centimeters deep with sandy loam textured surface horizons. The soil surface and profile are extremely cobbly and stony, making digging difficult. Litter cover averaged 33 percent followed by bare ground with 28 percent. Rock cover and vegetative cover were 21 and 18 percent, respectively for the Cheat Grass/Thurber Needlegrass/Rubber Rabbitbrush community (Erhard, 1979).

Mammals found on the surface in the surrounding area of Fern Cave include Pronghorn (*Antilocapra Americana*), Coyote (*Canis latrans*), Bobcat (*Lynx rufus*), Badger (*Taxidea taxus*), Black-tailed Jack

Rabbit (*Lepus californicus*), Mountain Cottontail (*Sylvilagus nuttallii*), Kangaroo Rat (*Dipodomys californicus*), and White-footed deer Mouse (*Peromyscus maniculatus*). Mammal presence within Fern Cave is limited to a few mice and wood rat species. In 1989, Crawford documented the presence of *Neotoma* and *Peromyscus* presence within Fern Cave during invertebrate survey work. The Cave Research Foundation also documented White-footed deer Mice within the cave collapse during survey work. Mountain Cottontail is the primary mammal that gets trapped in Fern Cave on rare occasions by falling into the collapse with no ability to exit the 10 foot vertical drop. This nutrient loading from mammal mortality is one important facet of the natural processes in the cave.

Birds found in the environments around Fern Caver are varied. Hobson in 1949, discussed the presence of flocks of Horned Lark (*Eremophila alpestris*) in the area in addition to Northern Harrier and Short-eared Owls. The only confirmed species having used the interior of the cave collapse has been Say's Phoebe (*Sayornis saya*). On April 21, 2005, during a site visit with members of The Klamath Tribes, a Say's Phoebe was observed sitting on a nest on the west wall of the cave entrance collapse. Although not confirmed, it is expected that Bewick's Wren (*Thryomanes bewickii*) and Canyon Wren (*Catherpes mexicanus*) would be found foraging in the collapse of Fern Cave. Historically, Cliff Swallow (*Hirundo pyrrhonota*) may have nested on the interior walls of Fern Cave, but this hasn't been confirmed. Hopson in 1949 also mentions the potential presence of Purple Martin. This species may have used the interior of the cave prior to the placement of the gate. In the habitats surrounding Fern Cave, many bird species that occupy this shrubland include Western Meadowlark (*Sturnella neglecta*), Lark Sparrow (*Chondestes grammacus*), Common Raven (*Corvus corax*), Sage Thrasher (*Oreoscoptes montanus*), and Red-tailed Hawk (*Buteo jamaicensis*). Depending on the season of the year, a large variety of bird species can be found in the area.

Reptiles and amphibians found in the environments around Fern Cave are limited. On the surface, Great Basin Fence Lizard (*Sceloporus occidentalis ssp biseriatus*), Northern Sagebrush Lizard (*Sceloporus graciosus ssp graciosus*), Western Skink (*Eumeces skiltonianus ssp skiltonianus*), Western Yellow-bellied Racer (*Coluber constrictor ssp mormon*), Gopher Snake (*Pituophis melanoleucus*), and Western Rattlesnake (*Crotalus viridis*) can be encountered. In the interior of Fern Cave, Pacific Tree Frog (*Hyla regilla*) can be found amongst the collapsed cave opening and the light zone of the cave. Great Basin Fence Lizard is also observed at times around the base of the collapsed cave opening (Hopson, 1949). Bull snakes have also been reported inside Fern Cave during the summer (Hopson, 1949). Rocky Mountain Rubber Boa (*Carina bottae ssp utahensis*) found often in cave environments would be one snake species expected to occur in the interior of Fern Cave.

No threatened or endangered species of wildlife are known to occur within Fern Cave or in the surrounding shrubland habitat.

Many caves at Lava Beds support bat populations. Currently, there are 15 species of bats that are known to occur within the monument. Brazilian free-tailed bats (*Tadarida brasiliensis*) and Townsend's big-eared bats (*Corynorhinus townsendii*) are two species that management staff at Lava Beds monitors for population estimates. In 1989, Cave Research Foundation and resource staff at Lava Beds initiated a protocol to count bats in the winter during hibernation, otherwise known as winter hibernacula counts. During late November, 1989, Fern Cave was surveyed with no bats being encountered. In 1998 and 2000, similar results occurred with no bats detected.

Ferns flourish within the circle of light from a small (8 by 10 ft) entrance hole in the cave's roof (Waters, et al, 1990). Hopson in 1949 described wood ferns that "were two and one-half feet long". In her document, Hopson also stated that Applegate had visited Fern Cave ten years earlier, during his vegetation survey, and was unable to find any ferns. Applegate reported only *Cystopteris fragilis* (Brittle Fern) and *Gymnogramme triangularis* (Gold Fern) in the monument, with no reference to Fern Cave vegetation (Applegate, 1938). In June of 1992, a Dr. Alan R. Smith completed a survey of fern species within Fern Cave. During his survey he documented *Dryopteris expansa* (Wood Fern). Dr. Smith wrote that this "beautiful wood-fern is otherwise found in California along the northern coast in the heavily forested redwood zone a few miles from the ocean....here it was more than 120



miles inland from the nearest known populations.” Dr. Smith stated “plants were largest just below the five-foot diameter opening to the cave and became progressively smaller toward the fringes of the population, until the outermost plants were mere sporelings”. Dr. Smith described the Wood Fern population at Fern Cave as consisting of “Hundreds of plants of this species covering the floor, with the largest plants being nearly five feet tall and fully fertile” (Smith, 1993b). The temperature at the bottom of the cave was a cool and relatively constant 50-60 degrees Fahrenheit (Smith, 1993). During this survey, three specimens of *Dryopteris expansa* were collected on the breakdown and housed in the resources collection at Lava Beds.

An extensive research project in 1992 and 1993 focused on creating an inventory of the fern species found at cave-entrance and collapse-structure microhabitats in Lava Beds. This study included a full inventory of the fern species found in Fern Cave and concluded that *Polystichum munitum*, a species that was previously collected in the cave, had been extirpated (Richard, et al, 1994). Extirpation of this species from Fern Cave is partially attributed to the activities of monument visitors, shortly after Lyons Road was constructed in the early 1930's. Visitors were taking ferns from the midden and impacting resources within the cave. Another contributing factor to the loss of *Polystichum munitum* could have been related to drought conditions. The other fern species found in Fern Cave include *Dryopteris expansa* and *Pentagramma triangularis*. These species are well outside their expected range in the coastal areas of northern California and southern Oregon. One additional species of fern found in the cave was *Woodsia oregana*, which is found in a number of collapses and cave opening within the monument. In 1938, when Elmer Applegate published *Plants of the Lava Beds National Monument, California*, there were no wood ferns documented in Fern Cave. When Hopson visited the cave in 1948, she commented that “in ten years the ferns have returned in abundance”. Hopson continued to state that the wood ferns return was directly related to the closing of the cave entrance by the National Park Service.

Additional research in Fern Cave by the Cave Research Foundation (CRF) includes a geological and biological resource inventory completed in 1990. A cave invertebrate inventory study was also conducted in Fern Cave by Rodney Crawford, a CRF researcher, in 1989. Mr. Crawford set 3 baited pitfall traps and collected invertebrate specimens from the cave on November 22, 1989 (CRF, 1989 November Field Trip Report). Information provided in the trip report included the observations of gnats in flight, spiders, crickets, and beetles. Results of the invertebrate inventory received from Crawford in 1998 identified the presence of 294 specimens that were identified to 12 Families of invertebrates, representing a potential total of 26 different species of invertebrates. The most common invertebrates encountered in Fern Cave included springtails, crickets, diplurans in the Genus Haplocampa, flies, and mites. A few spiders and millipeds were found during the survey but were not common. The main collecting procedures conducted by Crawford included hand collecting in twilight, hand collecting in dark zone, pitfall traps, and baited sites.

## 1.12 Fern Cave Protection and Management

The primary concern of the National Park Service pertaining to rock art today is its protection and preservation. Damage and destruction to prehistoric rock art takes a variety of forms and has many ramifications. Weathering, vandalism, and development are the predominant causes of damage that lead to degradation and possible destruction of rock art.

Fern Cave's proximity to Lyons Road led to easy access early in the park's history and resulted in efforts by the park administration to protect the cave by embedding a metal lattice with a trap-style door opening over the cave's entrance in the mid 1930s. In the early 1930s Swarzewski and Superintendent Don Fisher cautioned that the fern population was declining because people coming to Fern Cave were digging up the ferns “..as fast as they grow” and suggested creating an enclosure to keep visitors from vandalizing the cave. The lattice as a protective measure has been updated on a few occasions with more sturdy material. It has helped to keep Fern Cave safe from looters. The gate near the main park road also serves as another measure in keeping casual visitors from driving to the site with tools that could effectively destroy the current re-bar lattice.

At the time the current re-bar gate was installed in 1955, a wire mesh was affixed to the re-bar of the cave gate. The original purpose for this wire mesh material is unknown. Its presence limited the deposition of larger organic material (small mammals, etc.) that could not filter through the wire mesh into the fern midden of the cave. This “chicken wire” mesh was removed on November 29<sup>th</sup>, 1983 (Case Incident Report, #260220), allowing for the free movement of bats, birds, rodents, and lizards. The improved natural resource values of Fern Cave were documented during the 1990 cave inventory by Cave Research Foundation which documented a bird nest, lizards and rodents actively using the interior cave collapse area (CRF, 1990).

In addition to the re-bar gate that covers the entrance to Fern Cave, there is also an aluminum ladder that is located at the opening of the gate for safe access to the midden. The opening is locked for protection and the ladder has become part of the semi-permanent structure currently found at the entrance. This ladder directly connects the midden to the re-bar gate, providing an artificial route for mammals and reptiles to access the cave.

In keeping with the National Park Service mission, Lava Beds National Monument has provided limited guided tours to Fern Cave for the past several decades. In the early 1980’s, Superintendent James Sleznick (Lava Beds Superintendent 1978-86) initiated the first visitor use procedures for Fern Cave. The procedures stated that “Fern Cave tours should not exceed ten (10) visitors at any one time in the cave. Larger numbers may require some waiting on the surface and generally should not be encouraged”. The memorandum by Superintendent Sleznick ended by stating “the spirit of preserving unique ecosystems should be paramount in our use of these and other caves at Lava Beds National Monument”. In July, 1987 and January, 1988, draft Fern Cave visitation guidelines were circulated amongst Monument staff for review. On March 27, 1988, Superintendent Doris Bowen revised the Sleznick document by setting trip limitations, limiting the number of visitors, and setting age restrictions. Trip limitations were set at a maximum of two trips per week with no trips to be scheduled on consecutive days. All trips were led by a trained Lava Beds employee. Visitor sign-up occurred in the visitor center. The limit on the number of visitors was set at no more than 10 people in the cave at one time and no more than 40 people during one week. Children had to be at least 8 years old unless there was one adult to closely supervise each child less than 8 years old. Visitors touching the walls of the cave, stepping on ferns or moss, damaging natural resources, making excessive noise, or not maintaining control of their children were asked to leave the tour. In 1991, Superintendent Bowen revised the visitation guidelines by adding an additional visitor use consideration. Special access considerations were listed in the visitation guidelines for Native Americans...”The Modoc Indian People, who have religious (Spiritual) ties to Fern Cave, are permitted special access to this cave,” subject to the conditions identified in the guidelines (Supt. Memo, Aug. 22, 1991).

On December 9, 1994, a memorandum from Superintendent Craig Dorman emphasized visitor use guidelines for special management caves. Fern Cave was identified as one of the class 4 caves that has a gate that controls visitor access. The memorandum emphasized that until an action plan is written and in place, visitation to this cave must be closely monitored and impacts accurately measured. In 1994, Fern Cave was open for tours year round. All parties entering Fern Cave were required to be accompanied by, and in the immediate supervision of an experienced interpreter or member of the resource management division. Tours were limited to 10 people at one time, but the total maximum people per week in the cave was put at 50 (Supt. Memo, Dec. 9, 1994). The 1994 memorandum placed the resource management division in charge of access into Fern Cave. The review of tour schedules and the tracking of visitation/resource impacts were completed by resource management staff. Information documented from tour leaders included date of tour, length (in hours) and number of participants. From December of 1994 to October of 2001, an average of 42 people entered Fern Cave on a monthly basis. The highest month of visitation documented during this period of time was in June of 1996 with 136 people. The lowest visitation levels occurred in the winter months. The average visitor use level for the month of December between 1994 and 2001 was 14 people per month.

The memorandum of 1994 also stated that traditionally associated Native Americans with religious (Spiritual) ties to Fern Cave, are permitted special access to this cave, subject to the conditions identified above, with one exception. Native Americans must notify the resource management division in advance of a Fern Cave visit. A key would then be checked out to the group leader by the resource management staff. An experienced interpreter or member of the resource management division did not have to supervise the visit. At the end of the visit, the key would be returned to the resource management division and the number of individuals visiting Fern Cave was reported.

The current General Management Plan (GMP) for Lava Beds National Monument was approved in 1996. The GMP provides direction for the management, use, and developments of Lava Beds National Monument. One of the primary Monument issues identified in the GMP for resource management states that “resource management is hampered by the lack of monument wide baseline data on natural resources, and by the lack of staff to implement the program”. The GMP recognizes that many resource management programs including cave management give rise to often divergent perspectives on appropriate use. The 1996 GMP, under the Resource Management section of the preferred alternative, identifies the prescribed treatment and use for National Register properties. Under this description, Fern Cave was identified under the prescribed treatment as “Preservation” and under use the cave was identified as “Guided Interpretive Tours” (GMP, 1996).

During June 12-15, 2001, Lava Beds management staff conducted a workshop with subject matter experts in Archaeology, Cultural Landscapes, Geology/Speleology, Wildlife Ecology and Botany to participate in assessing the condition of the cultural and natural resources in Fern Cave and make recommendations for management of the cave. The Fern Cave Resource Assessment identified resource values, identified resource studies needed and made recommendations for the management of Fern Cave.

On November 13, 2001, Fern Cave was officially closed by Superintendent Dorman to public tours. This closure was implemented “to assess the impacts of public use on the fragile natural and cultural resources of the cave”.

Because of the 1999 discovery of human skeletal remains in the cave, Lava Beds Administrators and The Klamath Tribes Culture and Heritage Staff agreed that a systematic and intensive archaeology survey needed to be conducted to inventory and document cultural material throughout the cave. This survey was completed in April of 2003.

On April 4, 2004 Lava Beds management staff conducted an internal scoping session to identify Fern Cave management alternatives. A total of seven alternatives were identified which are described in Chapter 2.

## Chapter 2 – Alternatives

This chapter describes the preferred alternative and the full range of alternatives considered but rejected for the management of Fern Cave. A scoping session to develop a full range of alternatives took place on April 23, 2004. A total of seven alternatives were developed during the April 2004 meeting. On April 21, 2005, a meeting was held with The Klamath Tribes to receive their comments and discuss the full range of potential alternatives for Fern Cave management. Input was also requested and considered from regional subject matter experts. On July 27, 2005, a final meeting was held to select the preferred alternative and fully define the alternative. Selection was made after careful consideration of all alternatives, evaluation of all input and development of numerous mitigation measures.

Under the preferred alternative, Fern Cave will be monitored electronically at the surface for resource protection and internally to detect illegal entry into archeologically sensitive areas. Strict access into Fern Cave will be controlled by the NPS.

### 2.1 Fern Cave Desired Future Conditions

The natural and cultural resources found within Fern Cave need to be maintained and protected. The rare flora and fauna of the cave and the cultural history of the cave are significant national resources and a major part of the significant cultural history for which the park was established.

There is a need to interpret the long human history and occupation of the Lava Beds by the Modoc people. Fern Cave is significant because it holds spiritual and cultural importance for the contemporary Klamath Tribes.

### 2.2 Fern Cave Management Statements

- Fern Cave is a core part of the overall history and interpretation of the monument.
- The cave embodies important links to virtually every aspect of the monument in a single location.
- The cave represents the Monument's and Service's efforts to meet the park's core mission as defined in the 1916 Organic Act and its establishing proclamation.

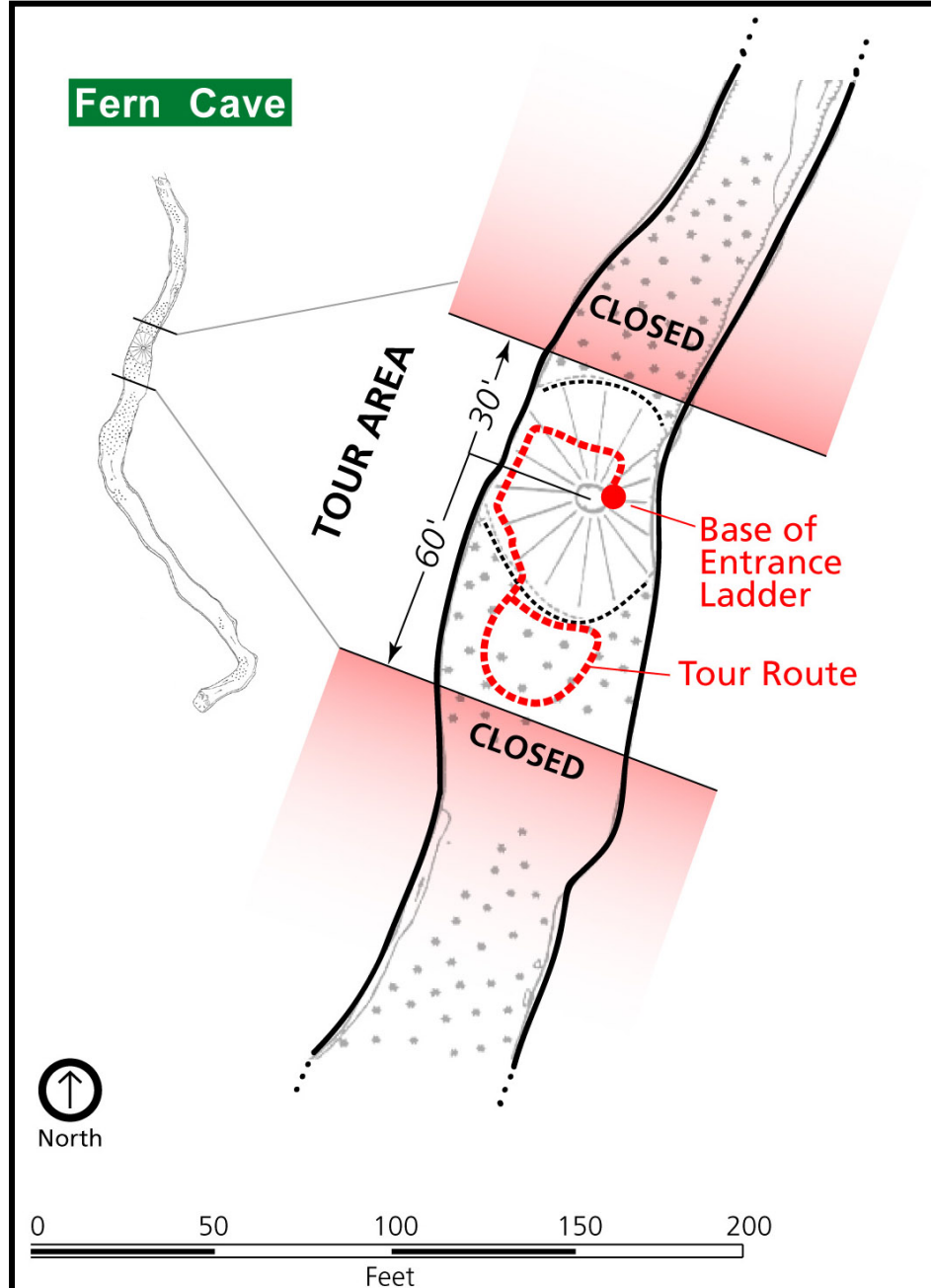
### 2.3 Preferred Management Alternative for Fern Cave

The preferred alternative selected under this plan for the management of Fern Cave is "open Fern Cave to controlled limited access to all visitors". This alternative also provides for continued use by Native Americans for spiritual and traditional uses. This alternative is the preferred alternative, because it substantially reduces the level of visitation into the cave, protects historic and prehistoric cultural resources and the natural resources in and above the cave.

Between 1994 and 2001, tours were set at 10 people at one time, with the total maximum people per week in the cave put at 50 (Supt. Memo, Dec. 9, 1994). The preferred alternative would allow visitors to enter Fern Cave in group sizes ranging up to seven people. This group size would include one guide and would be limited to a small area of the cave to prevent degradation of resources. The tour would be limited to 1 hour visits. Access into the cave would be allowed only for visitors 12 years and older and persons physically able to traverse the tour route safely. Once a month, trips would be allowed to total 10 participants and would be accompanied by 2 trained tour guides. The number of tours in Fern Cave would be limited to a maximum of one per week. All tours would be by reservation only. Tour access inside Fern Cave would be restricted to the general area outlined in figure 2. Guides who enter Fern Cave will be National Park Service experienced interpreters trained in visitor management and will receive training on the proper visitor access route into the cave.

Sensors will be fixed outside of the cave to detect and send a signal to Park Rangers when persons are approaching the cave. An additional sensor will be located in the cave that will detect and signal if any person deviates from the approved tour area. The sensors will be monitored 24 hours a day.

Figure 2. Original Fern Cave visitor tour showing entrance, tour route, and closed areas.



The preferred alternative would provide access for members of contemporary tribes who are traditionally associated with Lava Beds. Members of contemporary tribes who enter Fern Cave will not need a National Park Service guide. The protocol for tribal access will follow the 1994 memorandum used by management staff of Lava Beds National Monument. The memorandum states that members of contemporary tribes who have religious (Spiritual) ties to Fern Cave, are permitted special access to this cave, and will not be restricted to use limits identified for public

tours. The Resource Management Division of Lava Beds will need to be notified in advance of an expected tribal visit to Fern Cave so that access can be arranged and to avoid overlapping visits with another group.

This alternative would require following seasonal patterns of weather to protect road conditions and flora and fauna considerations inside and outside of the cave. Fern Cave would be open for tours from May 15 to November 30, each year, and would be dependent upon weather conditions. Wet road conditions in the spring and snow in the fall would restrict vehicle access down the main access road to Fern Cave. The primary reason based on reducing the rutting of the dirt road by vehicle tires. Only National Park Service vehicles will be allowed down the main access road to the parking area. All visitors with reservations will either meet at the main visitor center or the parking lot located next to route-10 on Lyons road and be transported to Fern Cave via the park interpretive van.

A monitoring program will continue to be managed for Fern Cave by the Resource Management Division under this preferred alternative. The 1994 Superintendent memorandum placed the resource management division in charge of tracking visitation and monitoring resource impacts. This will not change under this preferred alternative. Park administrative access will occur under this alternative to implement the monitoring program and maintain sensor protection of cave resources. All park administrative access and access requests beyond tours are to be requested through the Superintendent for approval. Park employees will have to adhere to visitation rules as described above. Park employees, in general, will only be able to access the cave through public tours.

On going consultation will occur with The Klamath Tribes on the management of Fern Cave. Lava Beds National Monument staff will work proactively to seek input on interpretive programming and content for all tours conducted within Fern Cave.

The development of a monitoring plan that provides protocols on measuring change over time and detecting potential visitor use impacts will be developed and added to this plan as an addendum. The Superintendent will approve the monitoring plan once it is developed and reviewed by The Klamath Tribes and cave specialists. Protection standards will be added to this plan as an addendum. The Superintendent will approve the protection standards once developed. One protection standard that has been in effect since the 1980's has been the prohibition of fires within the cave. Additional protection standards will be developed that focus on limiting impacts from visitor use.

## 2.4 Alternatives Considered but Rejected

A total of seven alternatives (including the Preferred Alternative described in the previous section) were developed by the staff at Lava Beds in response to the identified purpose and need, management plan goals, and relevant impact topics. The development and analysis of the alternatives were conducted in consultation with subject matter experts.

The six alternatives considered but rejected are described in the following section, including the listing of the preferred alternative. The order and numbering of alternatives has been maintained to be consistent with comments received from The Klamath Tribes (See Appendix A).

### 2.4.1 Alternative 1 - (No Action) – Manage Fern Cave for Visitor Use

Fern Cave would be managed for visitor use all year long. Tours would be limited to 10 people at one time, 2 to 3 times a week, with total maximum people per week set at 50. All tours entering Fern Cave would be required to be accompanied by an NPS employee.

This alternative would provide access for members of contemporary tribes who are traditionally associated with Lava Beds. No direct supervision of visits by tribal members would occur under this

alternative. There would be a requirement under this alternative for tribal members to document their use levels and check out a key for access from NPS administration.

This alternative was rejected due to the negative impacts on terrestrial and cave resources created from this level of visitor use throughout the year. Access into the cave would be difficult during wet months due to the primary road being constructed of dirt. In winter, rutting of the road and visitor safety would be an issue. Access into Fern Cave during winter and early spring would also have a potential negative impact on the annual growth of ferns found on the cave entrance collapse.

#### 2.4.2 Alternative 2 – Complete Closure of Fern Cave

Fern Cave would be closed to all visitors. Natural and cultural resources would be fully protected. Limited access into Fern Cave would only occur by NPS staff monitoring resource conditions.

This alternative was rejected due to the negative impacts on visitor experience. The park purpose of Lava Beds is to preserve and protect the significant natural and cultural resources and provide for the public understanding, education and enjoyment of these resources. Under this alternative, the park purpose would not be accomplished and members of contemporary tribes who are traditionally associated with Lava Beds would not be allowed into Fern Cave.

#### 2.4.3 Alternative 3 – Tribal Access Only

Fern Cave will only be available for visitation by tribal members of contemporary tribes who are traditionally associated with Lava Beds. No public access will be allowed. Under this alternative, only tribal spiritual use would occur. Strict access would be dictated by the NPS.

This alternative was rejected due to the potential for violating the Federal Cave Protection Act of 1988 (16 U.S.C. 4300-4309, 102 Stat. 4546). The purpose of the Act is to secure, protect, and preserve significant caves on federal lands for the perpetual use, enjoyment, and benefit of all people. This alternative was also rejected due to its limitation on access of park visitors. The park purpose of Lava Beds is to preserve and protect the significant natural and cultural resources and provide for the public understanding, education and enjoyment of these resources. Under this alternative, the park purpose would not be accomplished.

#### 2.4.4 Alternative 4 – Open Fern Cave to Controlled Limited Access to all Visitors including Tribal Access – Preferred Alternative (Described in detail in Section 2.3)

This alternative would allow visitors to enter Fern Cave in group sizes ranging from five to eight people. This group size would include 1 to 2 guides, be limited to a small area of the cave to prevent degradation of resources, and also be limited to 1 hour visits. The range of visits would be on a scale of 1 to 4 visits a month by reservation.

This alternative would provide access for members of contemporary tribes who are traditionally associated with Lava Beds.

This alternative would require following seasonal patterns of weather to protect road conditions and flora and fauna considerations inside and outside of the cave.

#### 2.4.5 Alternative 5 – Concession or Tribal Management

Under this alternative, concession (contract) management/or tribal management of Fern Cave for public use under a permit system would be initiated. This alternative would be for fee through public concession or with The Klamath Tribes. The National Park Service would be responsible for management and protection of the cave with cooperation from the concession or tribe. Oversight



would be provided by NPS to conform to contract/legal compliance requirements. Strict access into the cave would be controlled by the NPS.

This alternative was rejected due to an initial cost-benefit analysis that showed a low value result for a concession (contract) management or tribal management alternative. Visitation levels would be kept to the level as described in the preferred alternative, in order to reduce impacts to cultural and natural resources. These levels would not make a concession (contract) management or tribal management program feasible. Contracting costs under this alternative would also be prohibitive, since this cave will be managed for low visitor use levels.

#### 2.4.6 Alternative 6 – Unlimited Access to Fern Cave

This alternative would look at two scenarios. Scenario 1 would have the cave open for only part of the year (summer months). Scenario 2 would provide for access all year long. This alternative would turn Fern Cave from a Class 4 cave (highest level of protection) into a Class 1 Cave scenario that contains developments and full access by the visiting public without supervision. All visitors would have to access the cave by walking.

This alternative was rejected due to the significant negative impacts that could occur to the natural and cultural resources within Fern Cave. Protection of sensitive ferns and archeological resources would not be possible under this alternative. The potential for permanent damage to pictographs and loss of flora and fauna from the cave makes this alternative unacceptable.

#### 2.4.7 Alternative 7 – Special Use Permit

This alternative would manage Fern Cave by special use permit (SUP) with strict access through NPS control. Under this alternative, there would be potential costs to the user, size of group would be variable in addition to the duration of time spent in the cave. This alternative would allow for organized activities and groups (accommodate varying sizes), but would not accommodate the public in general. There would be no access allowed for individuals or groups who have not arranged for a SUP. A fee system, criteria for entry into the cave, and monitoring process to detect impacts to the cave resources would be used under this alternative. This alternative would provide access for members of contemporary tribes who are traditionally associated with Lava Beds.

This alternative was rejected due to the negative impacts that would develop from varying sizes of groups who enter the cave. The ability of park staff to manage special use permits also makes this alternative unfeasible. Lava Beds low staffing levels would not be able to provide complete coverage for this system of management within the cave. The public would also be excluded as a whole from the cave, limiting the ability of Lava Beds to accomplish one of its core goals of providing for the public understanding, education and enjoyment of these resources .

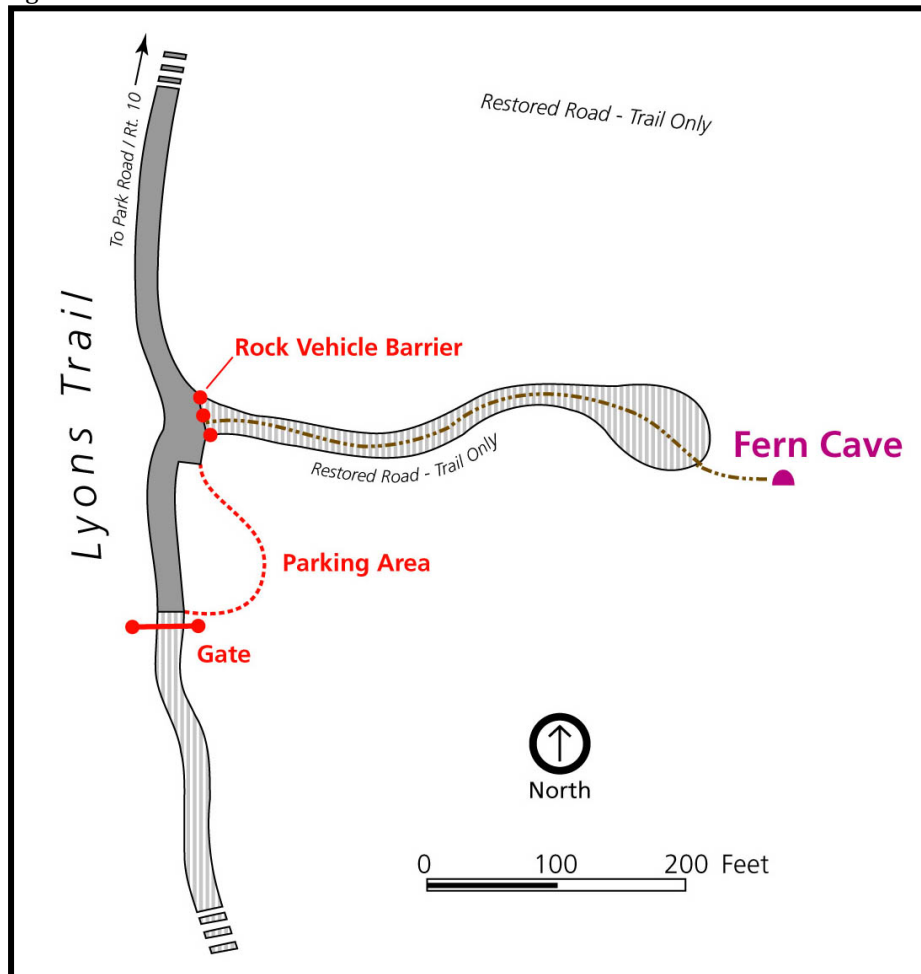
### 2.5 Mitigation Measures for the Preferred Alternative

- The preferred alternative will require that all National Park Service tour guides who lead visits into Fern Cave receive formal training from The Klamath Tribes and resource management and protection staff at Lava Beds. This mitigation measure would have all tour guides learn about tribal perspectives and NPS policies on the cave's management. This mitigation measure would also look into having Klamath tribal members provide and participate in NPS interpretive training. A priority would also be placed on hiring tribal members to lead tours into Fern Cave.
- Under the preferred alternative, sensors will be placed in the cave and on the surface to monitor for illegal entry. The placement of sensors, in the cave, will occur at the limits of the tour route, as identified in figure 2 by the closed areas. These sensors will be used to

document any visitor and/or guide who ventures outside of the identified tour route into the restricted areas. Anyone documented leaving the tour route will be removed from their duties as a guide.

- Under the preferred alternative, a total of 33 visitors, including guides, will be allowed to enter Fern Cave each month. Visitation will occur only between April 1<sup>st</sup> and October 31<sup>st</sup>, totaling 198 visitors possible per year. Between 1994 and 2001, visitation levels were set at 50 per month during the whole year, totaling 600 visitors possible per year. This significant reduction in visitor use levels for the preferred alternative will provide for a sustainable use level for the public while protecting sensitive resources.
- The preferred alternative will require that the National Park Service develop a Fern Cave monitoring plan for resource conditions (natural and cultural) that can detect change over time and assist in identifying impacts. The plan will focus primarily on the natural and cultural resources found around the identified tour route outlined in figure 2. This plan will be peer reviewed by The Klamath Tribes and natural and cultural specialists.
- The preferred alternative will require the National Park Service to analyze and review the current infrastructure used for visitor access into Fern Cave. An infrastructure plan will be developed that can mitigate impacts on the visitor experience and the flora and fauna of the cave. This plan will review the current ladder, entrance gate, and potential for trail platforms to reduce compaction and impacts to the fern populations. This plan will be peer reviewed by The Klamath Tribes and natural and cultural specialists, and cave specialists with experience in gate and ladder construction.
- Under the preferred alternative a tour path will be established. No variance from that path will be allowed during tours. The path will not be marked, but guides will be instructed on the proper route to take during all tours. This path will be reviewed under the infrastructure plan to consider the possibility of placing trail platforms to reduce visitor impacts on the ferns found at the cave entrance.
- Under the preferred alternative the last 400 feet of road accessing Fern Cave will be closed to all vehicle access and restored to a 3 foot wide foot trail. This mitigation measure will remove the parking turn around located at the entrance to Fern Cave and will improve the visitor experience found at the cave entrance. This mitigation measure is being taken to remove the potential for vehicle contamination of the area, improved soundscape and vistas, reduced chance for exotic plant dispersal into the area, and reduced dust levels. See figure 3 for details on this mitigation measure.

Figure 3. Fern Cave road restoration.



## Chapter 3 – Fern Cave Planning and Compliance Process

The Fern Cave archeological survey completed in April of 2003 and subsequent conversations on the survey results with The Klamath Tribes, were the final steps taken in initiating the development of this Fern Cave Management Plan. The survey provided valuable information on all archeological resources within the cave. Scoping sessions in preparation of this plan evaluated and considered all relevant information and input.

Since the completion of the survey, Lava Beds National Monument staff have completed two internal scoping sessions and one external scoping session with The Klamath Tribes. These meetings were completed to identify a full array of potential alternatives for the management of Fern Cave. As described above in previous sections, the preferred alternative selected for the management of Fern Cave is to open Fern Cave to controlled limited access to all visitors and continue access for Native Americans. Access requests for spiritual uses of Fern Cave by other Native American groups will be presented to The Klamath Tribes for their review before being approved.

Lava Beds National Monument has completed an Environmental Screening Form for the preferred alternative, which analyzes possible measurable impacts on physical, natural and cultural resources. It has been determined that the preferred alternative will not cause negative impacts to the historic, prehistoric, physical or natural resources of Fern Cave and that consultation and comment from the affiliated tribes has been actively sought and written and verbal comment has been considered in the development and selection of this alternative (See Appendix A).

The Fern Cave Management Plan has been categorically excluded from the NEPA process under Directors Order #12, section 3.4, (B) 8, which states that “land protection plans that propose changes to existing land or visitor use when the changes have no potential for environmental impact” may be categorically excluded. An Environmental Assessment for this plan will not be completed, since there will be no negative impacts to natural and cultural resources and it is a continuation, with additional restrictions on visitor use, of an existing program that has been in practice for almost fifty years.

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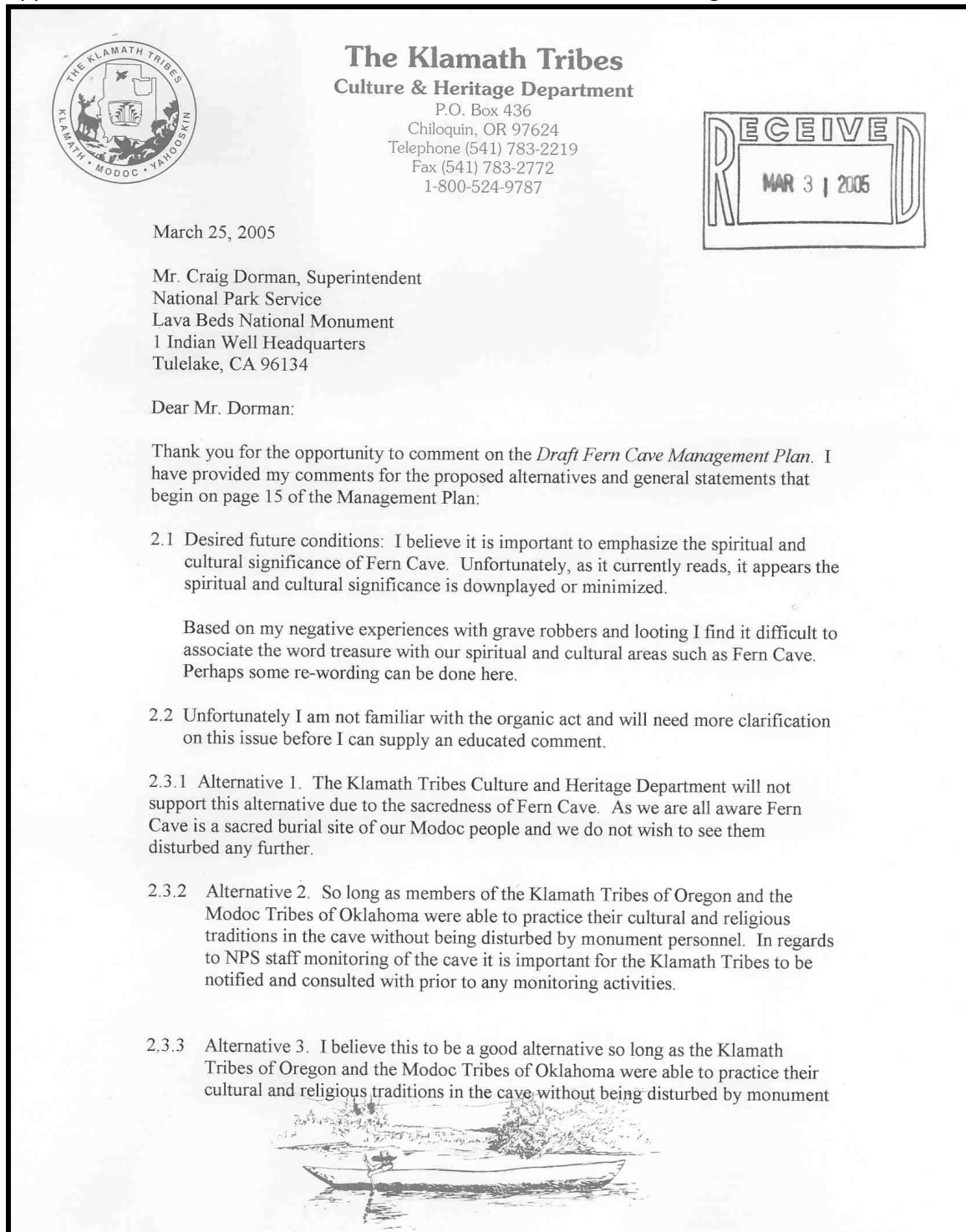
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Appendix A. The Klamath Tribes comments on the *Fern Cave Management Plan*.



Appendix A Continued.

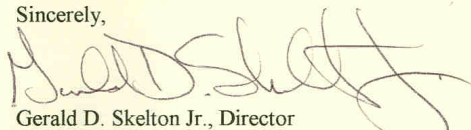
personnel. Again, it is important for the Klamath Tribes to be notified and consulted with prior to any activities taking place within Fern Cave.

- 2.3.4 Alternative 4. The Klamath Tribes Culture and Heritage Department will not support this alternative due to the sacredness of Fern Cave. As we are all aware Fern Cave is a sacred burial site of our Modoc people and we do not wish to see them disturbed any further. We firmly believe Fern Cave is protected under the NAGPRA Act.
- 2.3.5 Alternative 5. At the moment we cannot give support or objection to this proposed alternative. More detailed discussion will need to be held on this alternative with monument personnel.
- 2.3.6 Alternative 6. The Klamath Tribes will not support this alternative due to the sacredness of Fern Cave. As we are all aware Fern Cave is a sacred burial site of our Modoc people and we do not wish to see them disturbed any further. We firmly believe Fern Cave is protected under the NAGPRA Act.
- 2.3.7 Alternative 7. The Klamath Tribes will not support this alternative as it is presented. This is due to the sacredness of Fern Cave. As we are all aware Fern Cave is a sacred burial site of our Modoc people and we do not wish to see them disturbed any further. We firmly believe Fern Cave is protected under the NAGPRA Act.

More discussion on section 2.4 Mitigation Measures will have to be held between monument and tribal staff in order to develop measures that are inclusive of tribal needs and goals.

We look forward to discussing this draft plan and the future protection of Fern Cave with monument staff in the near future. I will contact you to arrange possible meeting dates. In the meantime please feel free to contact me with any questions you may have regarding this document.

Sincerely,



Gerald D. Skelton Jr., Director  
The Klamath Tribes Culture and Heritage Department