

**United States Department Of The Interior
Bureau Of Land Management
Klamath Falls Resource Area**

**Finding Of No Significant Impact
Salt Caves Management Plan**

Background:

The Klamath Falls Resource Area of the Lakeview District, Bureau of Land Management, completed an environmental assessment (EA) for the proposed Salt Caves Management Plan. The management plan covers Salt Caves, which are located adjacent to the Klamath River on BLM administered lands approximately 20 miles southwest of Klamath Falls, Oregon. This proposed management plan is directed under the Federal Cave Resources Protection Act of 1988 and Federal Register Vol. 58, No. 189, October 1, 1993. The caves have several values, which qualify as “significant” under the Federal Cave Protection Act including wildlife, cultural, geologic, and mineralogic.

The proposed management plan will contribute to meeting the goals of protection from vandalism and disturbance to the caves and their resources under the Federal Cave Resources Protection Act. The plan would provide a framework for monitoring and identifies appropriate management actions for protecting the wildlife, cultural, and other significant values of Salt Caves.

Salt Caves serve as one of three known maternity sites for Townsend’s big-eared bats in south-central Oregon. The Townsend’s big-eared bat is listed as “Bureau Sensitive” by the Bureau of Land Management. This designation includes species restricted in range which have natural or human-caused threats to their survival and which could easily become endangered or extinct in a state. This species is also listed as “Critical” by the State of Oregon. The status of Oregon “Critical” means that listing as threatened or endangered, may be needed, or is pending.

The Klamath River provides recreational white-water boating opportunities. Due to the correlation between the peak season of white-water boating use, with the maternity season of the bats, there is a need to ensure that the maternity colony is protected from disturbance. Due to the vulnerability of this species to disturbance, even limited human visitation can result in population declines of these bats. Implementation of this management plan would provide for monitoring steps to track the number of human disturbance events at Salt Caves, disturbance to the significant values, and tracking of the numbers and type of use of Salt Caves by Townsend’s big-eared bats. This monitoring would provide information to take appropriate management actions for continued protection of the caves and associated resources.

Determination:

On the basis of the information contained in the Environmental Assessment (EA), and all other information available to me, it is my determination that implementation of the proposed action or alternatives will not have significant environmental impacts beyond those already addressed in the Record of Decision (ROD) for Amendments to Forest Service and Bureau of Land

Management Planning Documents (April 1994), and the Klamath Falls Resources Area Record of Decision and Resource Management Plan (June 1995). This EA is in conformance with the Klamath Falls Resource Area Resource Management Plan, and does not constitute a major federal action having significant effect of the human environment. Therefore, an Environmental Impact Statement, or a supplement to the existing RMP or Environmental Impact Statement, is not necessary and will not be prepared.

Teresa A. Raml

Teresa A. Raml

Field Manager, Klamath Falls Resource Area

3/6/02

Date

ENVIRONMENTAL ASSESSMENT (EA)

For the

SALT CAVES MANAGEMENT PLAN

(EA# OR-014-01-07)

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKEVIEW DISTRICT
KLAMATH FALLS RESOURCE AREA

March 2002

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT
LAKEVIEW DISTRICT
EA COVER SHEET

RESOURCE AREA: Klamath Falls FY & EA #: OR-014-01-07

ACTION/TITLE: *Salt Caves Management Plan*

LOCATION: Klamath Falls Resource Area, Lakeview District, Oregon

FOR FURTHER INFORMATION CONTACT:

Patty Buettner
Klamath Falls Resource Area, BLM
2795 Anderson Ave. Bldg #25
Klamath Falls, Oregon 97603
(541) 883-6916

FREEDOM OF INFORMATION ACT AND RESPONDENT'S PERSONAL PRIVACY

INTERESTS: The Bureau of Land Management is soliciting comments on this Environmental Assessment. Comments, including names and street addresses of respondents, will be available for public review at the above address during regular business hours. Individual respondents may request confidentiality. If you wish to withhold your name or street address from public review or from disclosure under the Freedom of Information Act, you must state this prominently at the beginning of your written comment. Such requests will be honored to the extent allowed by law. All submissions from organizations or businesses, and from individuals identifying themselves as representatives or officials of organizations or businesses, will be made available for public inspection in their entirety.

TABLE OF CONTENTS

	Page
CHAPTER I - INTRODUCTION.....	1
Background.....	1
Location.....	2
Purpose and Need for Action.....	2
Authority.....	4
Issues.....	5
Issue #1: Recreation/Visitor Use.....	5
Issue #2: Wildlife Management - Townsend’s big-eared bat.....	5
Issue #3: Cultural Resources.....	6
Past Management Actions.....	6
 CHAPTER II - AFFECTED ENVIRONMENT.....	 7
Physical Description of Cave Resources.....	7
Significant Biota.....	8
SC-I.....	8
SC-II.....	8
Other Relevant Roost Sites in the Klamath River Canyon.....	9
Threatened or Endangered Species.....	9
Other Fish & Wildlife.....	10
Other Fauna.....	10
Special Status Plant Species.....	10
Survey and Manage Species.....	11
Noxious Weeds.....	11
Cultural Resources.....	11
Other Resources.....	12
 CHAPTER III - ALTERNATIVES INCLUDING THE PROPOSED ACTION..	 12
Introduction.....	12
Management Actions and Monitoring Common to All Action Alternatives.....	15
Alternative 1 - Proposed Action.....	18
Alternative 2.....	19
Alternative 3.....	20
No Action Alternative.....	21
Alternatives Considered But Eliminated From Detailed Analysis.....	21
 CHAPTER IV - ENVIRONMENTAL CONSEQUENCES.....	 23
Environmental Consequences Common to All Action Alternatives.....	23
Alternative 1 - Proposed Action.....	29
Alternative 2.....	33
Alternative 3.....	36

No Action Alternative.....	38
CONFORMANCE WITH EXISTING LAND USE PLANS.....	39
CHAPTER V - CONSULTATION AND PUBLIC INPUT.....	39
CHAPTER VI - LIST OF PREPARERS.....	40
REFERENCES.....	49

LIST OF TABLES

Table 1.....	14
--------------	----

LIST OF FIGURES

Figure 1.....	3
---------------	---

LIST OF APPENDICES

APPENDIX A - Past Management Actions.....	41
APPENDIX B - Results of Visitor Use Monitoring of Salt Caves.....	44
APPENDIX C - Other Townsend's Big-eared Bat Sites in South-Central Oregon.....	46
APPENDIX D - Population Monitoring Trials at Salt Caves Using "Non-invasive" Techniques.....	47
APPENDIX E - Rrecreational Guide Books with Reference to Salt Caves.....	48

Management Planning Documents (April 1994), and the Klamath Falls Resources Area Record of Decision and Resource Management Plan (June 1995). This EA is in conformance with the Klamath Falls Resource Area Resource Management Plan, and does not constitute a major federal action having significant effect of the human environment. Therefore, an Environmental Impact Statement, or a supplement to the existing RMP or Environmental Impact Statement, is not necessary and will not be prepared.

Teresa A. Raml
Field Manager, Klamath Falls Resource Area

Date

CHAPTER I - INTRODUCTION

Background

The Klamath Falls Resource Area of the Bureau of Land Management manages both recreational white-water boating and natural resources in the Upper Klamath River Canyon. An eleven-mile section of the Klamath River is classified as Scenic under the Wild and Scenic Rivers Act of 1968. Wildlife has been identified as an “Outstandingly Remarkable Value” under the Act. An important wildlife resource within the river canyon occurs at Salt Caves, which serves as one of three known sites of Townsend’s big-eared bats (*Corynorhinus townsendii*) in south-central Oregon (Cross 1998). More information on the other two sites is included in Appendix C.

The heaviest summer recreational use period in the Klamath River Canyon overlaps with use of Salt Caves as a maternity site by Townsend’s big-eared bats. The period of white-water boating use occurs May through September. The sensitive maternity season of the Townsend’s big-eared bat, the primary season of use of the cave, is from May through August. The peak season of both river use by boaters and of Salt Caves by Townsend’s big-eared bats is during July and August.

Human disturbance at *C. townsendii* maternity sites is of major concern due to this species’ high vulnerability to disturbance, high degree of roost site fidelity, low reproductive capability, and degree of longevity. The cave-dwelling habit of this species is also a limiting factor to its distribution and abundance, and often results in more exposure to disturbance than other species of bats. This bat species is one of the most intolerant to human disturbance and will often abandon preferred maternity and roost sites, increasing the potential for decreased reproductive success and mortality in the population. If the bats abandon the preferred roost site they are forced to find alternate sites, which may be sub-optimal. Several maternity colonies of *C. townsendii* in Oregon have been extirpated and other populations of this species have declined by as much as 53 percent (Pierson et al 1999). Human disturbance has been documented as one of the main factors in this species’ decline. Recent counts indicate total numbers for the state are between 2,500-3,000 individuals (Pierson et al 1999). Historically, this species was widely distributed in Oregon (Maser and Cross, 1981) and western North America (Hall, 1981).

Salt Caves is also an important site to the Shasta Nation and the Klamath Tribes for its cultural and traditional significance. Salt Caves was originally recorded as an archaeological site in the early 1960's and assigned Smithsonian Trinomial 35KL24. Limited test excavations were conducted at Salt Caves in 1961 and 1962. Prehistoric and historic artifacts were recovered. Nearby sites indicate a human presence within the Klamath River Canyon that spans the past 7,000 years.

Salt Caves are thought to have formed through erosion of the Klamath River when it was at a higher elevation. The caves occur within a lava flow laid down by volcanoes within the Cascade Range. The presence of these caves within a cliff face formed by a volcanic formation adjacent to a river is an unusual geologic formation for the area. Inside the largest cave, a crystalline deposit of various salts and a small pool of water are present. It is thought these salts account for the name of the caves.

Due to the importance of Salt Caves to *C. townsendii* as a maternity site, and as a cultural site, it was designated as a “Significant Cave” on January 5, 2000, under the authority of the Federal Cave Resources Protection Act of 1988 (16 U.S.C. 4300-4309, 102 Stat. 4546). Other values contributing to its significance include geologic, mineralogic, hydrologic, and scientific.

Preparation of this Environmental Assessment will result in a “Decision Record” on the Alternative to be implemented as a “Cave Management Plan”. This “Cave Management Plan” will provide specific management prescriptions for Salt Caves. Until management plans for significant caves are completed, Bureau of Land Management “Interim Management Policy for Caves” (IM No. OR-95-021) directs management for the protection of significant caves. In addition, policy under “Closures and Restrictions: Oregon and Washington” published in Federal Register Vol. 60, No. 72, April 14, 1995, pg. 19077, authorizes management restrictions to protect caves and their resources. The Salt Caves Management Plan will replace the interim management guidance and restrictions.

The Klamath Falls Resource Area Record of Decision and Resource Management Plan (KFRA ROD/RMP) provides general guidance for Salt Caves but no specific monitoring or management direction. It provides for the continuance of a seasonal closure of Salt Caves, restriction of management activities within ¼ mile of sites occupied by the Townsend’s big-eared bat, and potential acquisition of lands important to this species of bat. The “Cave Management Plan” will provide specific management actions for the site.

Location

Salt Caves include two caves of significance located close to the riverbank in the Upper Klamath River Canyon, Klamath County, Oregon. A map showing the general location of Salt Caves along the river in relation to the Oregon/California state line is presented in Figure 1.

Purpose and Need for Action

The Townsend’s big-eared bat is listed as “Bureau Sensitive” by the Bureau of Land Management. This designation includes species restricted in range which have natural or human-caused threats to their survival and which could easily become endangered or extinct in a state. This species is also listed as “Critical” by the Oregon Department of Fish and Wildlife. The status of Oregon “Critical” means listing as threatened or endangered may be needed or is pending.

The sensitivity of the Townsend’s big-eared bat, the location of Salt Caves in the “Scenic” section of the Upper Klamath River, the importance of the site to the tribes, and the history of recreational use of the area has prompted the need to develop a Cave Management Plan.

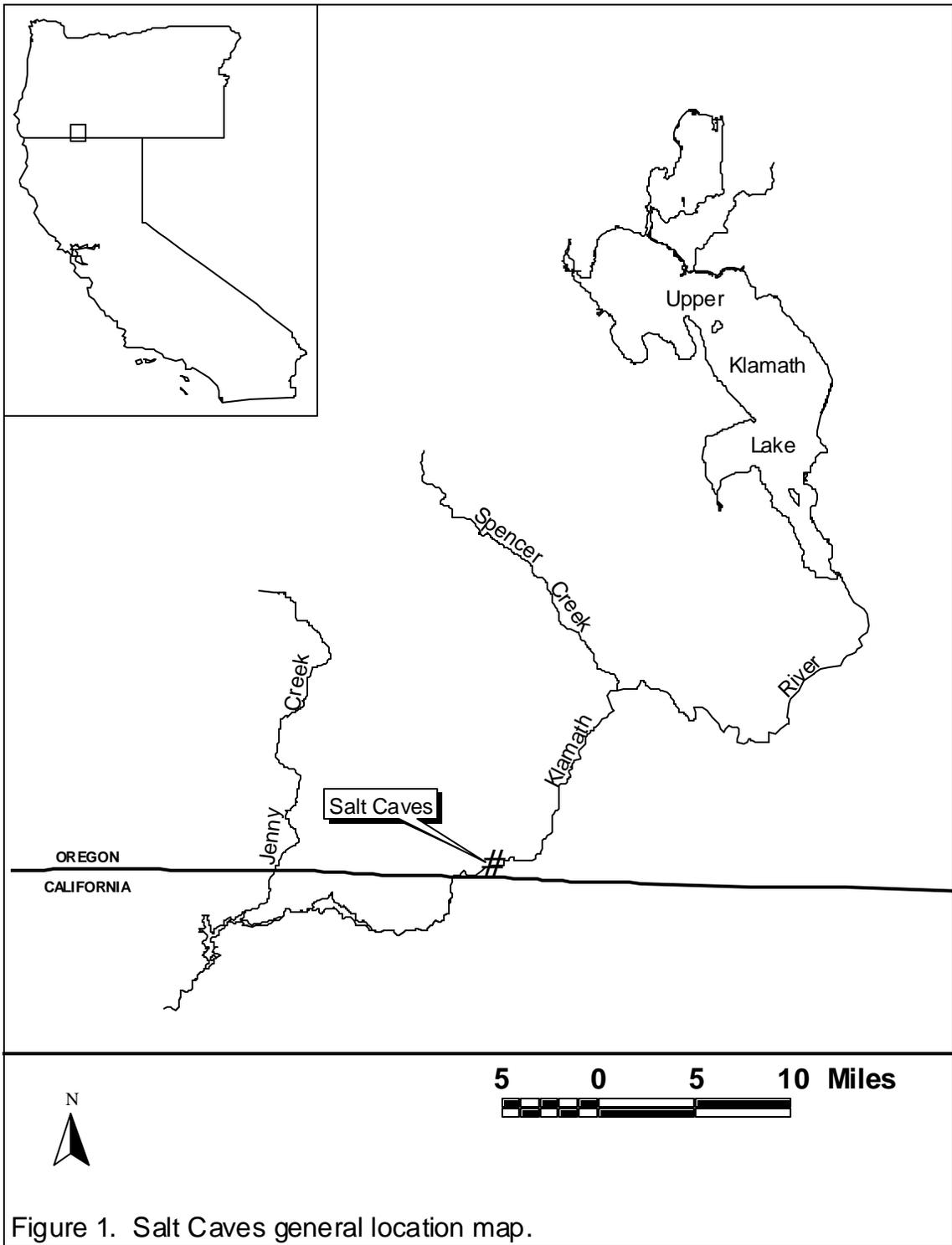


Figure 1. Salt Caves general location map.

The purpose of this Environmental Assessment is for preparation of a Salt Caves Management Plan intended to provide a framework for monitoring and protecting the wildlife, cultural, geologic, mineralogic, hydrologic, and scientific resources at Salt Caves. Management actions implemented to date, which are discussed later in this document, are believed to have been quite effective in curtailing the majority of human use of the caves.

Authority

Caves are recognized as an important resource on Bureau of Land Management (BLM) lands. The Federal Cave Resources Protection Act of 1988 (16 U.S.C. 4300-4309, 102 Stat. 4546) became law on November 18, 1988. The purpose of the Act is to secure, protect, and preserve significant caves on federal lands, and to foster increased cooperation and exchange of information between government authorities and those who use caves located on federal lands for scientific, educational, or recreational purposes. The Act states that it is the policy of the United States that federal lands be managed in a manner, which protects and maintains, to the extent practical, significant caves.

Under the Final Rule for Cave Management (43 CFR Part 37), a cave must possess one or more of six criteria to be considered for nomination as a significant cave; these criteria are as follows: 1) biota, 2) cultural, 3) geologic/mineralogic/paleontologic, 4) hydrologic, 5) recreational, and 6) educational or scientific. It has been determined by the Klamath Falls Resource Area (KFRA) of the Bureau of Land Management that Salt Caves is significant, meeting the criteria of biota, cultural, geologic/mineralogic, hydrologic, and scientific as per guidelines in 43 CFR Part 37. Use of the caves as a maternity site for BLM listed "Sensitive" Townsend's big-eared bats, the presence of prehistoric archaeological sign, and assignment of the caves as an archaeological site (Smithsonian Trinomial 35KL24), form the basis for meeting the initial criteria for designation as a significant cave. The nomination process for Salt Caves was completed with signature by the KFRA Field Manager on January 5, 2000. An amendment to the original nomination was made during the fall of 2001 to include the significance criteria of geologic/mineralogic, hydrologic, and scientific.

Due to insufficient information, it is unknown if Salt Caves meet the significance criteria for paleontologic resources, or if they possess deposits of sediments or features useful for evaluating past events.

Salt Caves do not meet the significance criteria of recreational or educational. The caves are shallow and do not provide the characteristics typically of interest to recreationists. Use of the caves for recreation would be in direct conflict with preservation of the biotic values present. Interest in the caves by rafters in the early 1990s was primarily the result of the commercial rafting companies using the beach in front of the caves as a lunch spot. Use of the caves for educational field trips would also be in conflict with preservation of the biotic values of the caves. No such activities have occurred to date.

Issues

The development of proposed management actions for Salt Caves is based on several issues including the history of recreation use in the Klamath River Canyon and visitor use of the caves; use of the caves as maternity and transitory roost sites for Townsend's big-eared bats; and the potential for disturbance of the cultural resources within the caves. The issues are discussed in detail below.

Issue #1: Recreation/Visitor Use

Visitation of Salt Caves by recreationists has a negative impact upon the population of the Townsend's big-eared bat.

In 1988, it was documented by qualified bat biologists from Southern Oregon University that the Townsend's big-eared bat utilized Salt Caves. Also in the late 1980s, groups of people on rafting trips were seen entering the larger of the two Salt Caves. An eddy in front of the cave provides a convenient place for boaters to eat lunch. Some boaters took the opportunity to explore the caves. It is not known how many rafters would stop at this eddy and explore the caves.

In addition to rafters, hikers can access Salt Caves via an undeveloped trail from a road along the bench of the canyon upslope of the caves. It is not known when the trail was formed but was probably created by individuals following a logical route to the river. Although the amount of human use this trail receives is unknown, it is not believed to be excessive based upon the wear of the trail and amount of vegetative growth. The trail is steep and its beginning at the top of the canyon is not obvious.

It may also be possible to access the caves during low river flows via a primitive road that leads down to the river on the side opposite of the caves.

Due to the likelihood of negative consequences of human disturbance to the population of Townsend's big-eared bats, actions were taken to curtail human use of Salt Caves. These actions are summarized under the section titled "Past Management Actions".

Issue #2: Wildlife Management - Townsend's big-eared bat

Human disturbance at *C. townsendii* maternity sites is of major concern due to this species' high vulnerability to disturbance. This factor has made designing non-invasive monitoring techniques difficult.

The difficulty in designing non-invasive monitoring techniques has been complicated by the physical characteristics of the Salt Cave opening, which houses the maternity colony. Appendix D describes some of the non-invasive monitoring trials conducted to date. Monitoring techniques to accurately assess the numbers, age composition, and trends in the population of the Townsend's big-eared bats at Salt Caves are needed to evaluate

BLM's management activities. In order to properly assess the health of the population, disturbance factors from monitoring need to be separated from other disturbance factors. It is believed that the presence of humans during monitoring can, and has, impacted the use of Salt Caves by the bats (Donna Howell, U.S. Department of Defense, personal communication, 1995). According to Nieland (1998), "when surveying for bat use, protection of the colony is of utmost priority. Surveys must be done at the correct time of year, and should emphasize non-invasive techniques". Most bat species are highly sensitive to disturbance, particularly at maternity sites. A single disturbance at a maternity site, if the females feel threatened, can cause abandonment of the roost and loss of that year's reproduction. This problem makes it difficult to monitor the use of the cave as a maternity site over time and to separate the effects of different disturbance factors, weather variables, and to determine an overall population trend. According to data presented by Cross (1992), another factor which could influence the timing and duration of the use of Salt Caves is the weather conditions both during and prior to arrival of the bats. Presence of the maternity colony of big-eared bats at Salt Caves may also be dependent upon the availability of suitable winter hibernacula in the nearby area (Cross and Savory 1990). All of these factors would make it difficult to directly correlate the bats' activity type and numbers at Salt Caves, with BLM's management actions.

Issue #3: Cultural Resources

The caves are important to the Shasta Nation and Klamath Tribes. Human visitation to Salt Caves puts cultural resources at risk. Impacts can be unintentional and associated with recreational activities, or intentional such as vandalism and theft of artifacts. Although sites are protected from vandalism and theft by the Archeological Resources Protection Act (ARPA), the Federal Register Closure at Salt Caves limits human visitation to the area during the bats' maternity season and further protects the site from unintentional impacts associated with recreational activities. In addition, a large amount of rock debris, which has fallen from the roof helps to protect archaeological deposits located below. Continued restrictions on human entry into the caves will help to prevent significant impacts to cultural resources located within Salt Caves.

Past Management Actions

Due to the vulnerability of the Townsend's big-eared bat population to disturbance, the high amount of boating use of the canyon, and documented visitation of Salt Caves by boaters, several actions were taken in the late 1980s and early 1990s to curtail human visitation to the caves. Commercial and private boaters were notified of the presence of Townsend's big-eared bats in Salt Caves and BLM asked for their voluntary avoidance of the caves. A seasonal closure period of May 1 through September 15 was established in 1990 and signs were placed near the entrances to the caves indicating the area was closed to foot traffic. The closure period was published in the Federal Register in August of 1991 and imposed a penalty for entry of the caves. Letters were written to the commercial rafting outfitters to inform them of the official closure. The Klamath Falls Resource Management Plan of 1995 directed the BLM to continue the Salt Caves seasonal habitat closure. In June of 1998, a new Federal Register Notice was published to

correct errors in the previous notice.

Different monitoring studies were carried out during the 1990s to test the effectiveness of the Federal Register Notice closure, obtain documentation on the degree and timing of human visitation to the caves, and evaluate the effectiveness of the public education efforts. In summary, it was determined that the management actions implemented have been effective in curtailing at least the majority of human use of the caves. Since monitoring was periodic, it was not possible to detect all potential human entries to the caves; however, the high amount of vegetative re-growth along trails leading to the caves helps support the conclusion.

For a complete description of the past management actions taken to resolve human use issues, please see Appendix A. A description of visitor use monitoring methods and results are described in Appendix B.

CHAPTER II - AFFECTED ENVIRONMENT

Physical Description of Cave Resources

There are two main caves in a large rock outcrop adjacent to the Klamath River. These caves are referred to as Salt Caves. There is also a collapsed cave and other small openings in the rock outcrop. According to McDonald (1966), the geological formations along the Klamath River in the area of the caves are a result of lava flows from nearby volcanoes in the Cascade Range. Erosion of the rock is the most likely reason for the formation of these caves. Within the interior of the largest cave, a small seasonal pool and a crystalline deposit comprised of various salts are present. The name "Salt Caves" is associated with this crystalline deposit.

Salt Cave I (SC-I) is located at the base of a large rock outcrop approximately 40 meters from the edge of the river, about 5 meters above water level. It is an irregularly shaped cavern approximately 20 meters deep and 29 meters wide. The entrance of the cave is roughly 15 meters wide by 10 meters high. The level of the cave floor is highly irregular as a result of breakdown of the ceiling. This cave is the larger of the two caves.

Salt Cave II (SC-II) is located 50 meters upriver from the opening of SC-I. It is located 35 meters from the river edge at close to high water level. The cave and its opening are much smaller than SC-I. The dimensions of the opening are approximately .5 meters high by 1.5 meters wide.

Detailed descriptions and maps of the caves are provided in the Phase I and II Final Reports on the Study of Townsend's Big-Eared Bat at Salt Caves, Klamath River Canyon, Klamath County, Oregon (Cross and Savory 1990, Cross 1991). These reports also provide information on the temperature and humidity of the caves.

Significant Biota

Salt Caves is one of three sites in south-central Oregon that provide roosting habitat for *C. townsendii*. The presence of this species at Salt Caves was documented by qualified bat biologists from Southern Oregon University during the summer of 1988. The other two sites used by *C. townsendii* are Poverty Flat and Hoover Ranch. Information on these sites is provided in Appendix C.

Dr. Steve Cross of Southern Oregon University initiated studies of Townsend's big-eared bat use of Salt Caves and vicinity in the late summer of 1989. Studies were initiated because this species was a Federal Category 2 Candidate for listing as threatened or endangered, there were a limited number of known roost sites, and baseline information was needed on the population status of this species at Salt Caves. Initial efforts focused on the determination of seasonal use patterns, identification of basic life history patterns, and monitoring population size at Salt Caves. A description of the value and use of SC-I, SC-II, and areas in the Klamath River Canyon by the Townsend's big-eared bat follows.

SC-I

According to studies by Cross from 1989 through 1991, SC-I was believed to be used for the bearing and rearing of young by up to 50 female *C. townsendii*. Season of use of Salt Caves by these bats is primarily during the period from May through August (Cross 1993). Young-of-the-year were documented in the cave in August of 1991 (Cross 1992).

Results from studies in 1992 indicated a decrease in the number of bats using the large Salt Cave during the maternity season and that the bats vacated the cave earlier than in previous years. The conclusion for the 1992 study was that use of Salt Caves as a maternity site had diminished since 1989.

Additional studies (using non-invasive techniques during which counts were conducted from the exterior of the cave) during the reproductive season of 1997 indicated the cave did not appear to support a stable maternity colony due to the erratic patterns of use. It is inconclusive as to whether this cave is currently used as a maternity site or as a temporary roost site for congregations of males and non-reproductive females (Cross 1998). The use of non-invasive survey methods limited the certainty of the results (see Appendix D for a summary of non-invasive monitoring methods used). It is known, however, that the cave is an important roost site for the species and it has been documented as an important maternity site in the past.

SC-II

The small Salt Cave (SC-II) is used as a transitory roost by Townsend's big-eared bats during intermittent periods near the beginning and end of the maternity season (April/May and August/September, Cross 1993) and as a night roost during the maternity season. Data collected and presented by Cross (1992) on the number of bats observed in

SC-I and SC-II in 1989 indicate a shift of use from SC-I to SC-II in late August by approximately 38 percent of the *C. townsendii*. In 1991, observations indicated that 75 percent of the numbers originally present in SC-I shifted to SC-II in early September. In early September 1997, 28 bats were observed emerging from SC-II. In 1992, when no bats were present in SC-I on either of two visits in April and May, between 25 and 35 bats were found in SC-II. It appears that SC-II is an important roosting site for *C. townsendii* (Cross 1998). Both SC-I and SC-II appear to be used by a small number of this bat species for hibernation during the winter (Cross 1992).

Other Relevant Roost Sites in the Klamath River Canyon

In 1990 and 1991, attempts were made to locate alternate roost sites of the Salt Caves population of Townsend's big-eared bat. No sites of large congregations were found.

Studies in 1992 included the development of radio-tracking techniques for finding alternate roosting sites of the Townsend's big-eared bats that use the Oregon section of the Klamath River Canyon. Radio tracking revealed that most of the roost sites for individuals radio-tagged at Salt Caves were small cavities formed by piles of large boulders, all within the canyon. Most of these roost sites were within two miles of Salt Caves, while one bat utilized a site seven miles away. The only location in the canyon where more than one individual was located was in the abandoned house at Hoover Ranch on PacifiCorp land. The bats were documented roosting at the Hoover Ranch house on 8 different days.

Threatened or Endangered Species

A bald eagle territory occurs within one half mile of Salt Caves. The bald eagle is federally listed under the Endangered Species Act (ESA) as threatened. The foraging territory of this nesting pair has not been studied but likely includes areas near the caves. No other federally threatened or endangered wildlife species use the immediate area around the caves.

Although peregrine falcons have been delisted, they will remain under careful consideration for a minimum of five years subsequent to their delisting. The rock outcrop/cliff at Salt Caves has been identified by Peregrine Falcon Specialist, Joel Pagel, as a site with high potential for peregrine falcon nesting (Pagel 1999). A historic nesting site for this species is present in the Klamath River Canyon, and it is possible that the cliff site at Salt Caves could be used by peregrines at some time in the future. Other small openings, which occur in the face of the rock out-crop, are currently used by a pair of prairie falcons.

Lost River and shortnose suckers, listed as Endangered under the ESA, as amended, use the affected reach of river. Shortnose sucker presence within the river reach consists primarily of larval and juvenile fish moving downstream from the Upper Klamath Basin to rearing habitat within the Copco and Iron Gate Reservoirs. Lost River suckers are rarely found in the Klamath River system downstream of Upper Klamath Lake.

Other Fish and Wildlife

Rainbow/redband trout are the primary game fish inhabiting the Klamath River adjacent to Salt Caves. The Klamath River from the Keno Dam downstream to the stateline was designated in 1978 as a wild rainbow trout stream by the Oregon Department of Fish and Wildlife. From stateline to the slack waters of Copco Reservoir is a wild rainbow trout area, designated in 1974, and is managed by the California Department of Fish and Game. Other native species that are known to occur in the affected reach include speckled dace, largescale sucker, smallscale sucker, tui chub, blue chub, sculpin species, and lamprey species. Approximately twelve exotic fish species are also known or suspected to occur within the river reach.

From JC Boyle powerhouse down to stateline, the affected reach, is located in a deep canyon characterized by steep gradient (Oregon Department of Fish and Wildlife 1997). This reach experiences daily peaking flows from the J.C. Boyle Powerhouse believed to affect the quality of aquatic habitat. Large portions of the river channel that would provide substrate for primary production and habitat for aquatic species, such as aquatic invertebrates and trout, are typically exposed on a daily basis. Daily flow fluctuations limit access to vegetated edges, which are important for juvenile fish rearing habitat. Daily flow fluctuations also limit development of the riparian vegetation to a narrow band adjacent to the active channel, typically reed canary grass. Due to the limited extent and diversity of riparian vegetation in the affected reach, the edge habitats of the Klamath River are at higher than average risk to disturbance from actions occurring within the riparian vegetation band.

The portion of the Klamath River Canyon near Salt Caves and the adjacent lands above the canyon rim are critical big game winter range.

Other bat species documented by Dr. Steve Cross to use Salt Caves during the summer and early fall are the California myotis (*Myotis californicus*), Yuma myotis (*Myotis yumanensis*), little brown bat (*Myotis lucifugus*), and big-brown bat (*Eptesicus fuscus*) (Cross and Savory 1990). Some of these species also use the caves during the winter for hibernation (Cross 1992).

Other Fauna

Insects, such as beetles, millipedes, and mites utilize bat guano as a source of food and are an important part of the food web of caves. The species diversity of these organisms in a given cave depends upon micro-habitat and light conditions. No studies have been conducted of these organisms at Salt Caves to determine which species are present.

Special Status Plant Species

There are no documented sites of federally listed threatened or endangered plants in the vicinity of Salt Caves. Although limited surveys have been conducted, no systematic surveys covering the entire Klamath River Canyon have been conducted. Species which have been documented to occur in the canyon area include the mountain lady slipper orchid (*Cypripedium montanum*), Greene's mariposa lily (*Calochortus greenei*), Bolander's sunflower (*Helianthus bolanderi*), red-

root yampah (*Perideridia erythrorhiza*), Howell's false-caraway (*Perideridia howellii*), and Lemmon's catchfly (*Silene lemmonii*). Several other special status plant species occur nearby and may potentially be found in the area. Several populations of Bellinger's meadow foam (*Limnanthes floccosa* ssp. *bellingermana*), a Bureau sensitive species, have been found within the Pokegama area, which is adjacent to the west rim of the upper canyon. Numerous populations of a Bureau tracking species, the pygmy monkey-flower (*Mimulus pygmaeus*), have also been found at many sites within the Pokegama area. Short-podded thelypody (*Thelypodium brachycarpum*), a Bureau assessment species, is a forb that historically has been found on the Klamath River near the town of Keno (Abrams 1944), and, therefore, may occur in the area.

Survey and Manage Species

The diverse collection of plant communities and habitats in the Klamath River Canyon potentially support populations of organisms classified as "Survey and Manage" under the Northwest Forest Plan. These include fungi, lichens, bryophytes (mosses and liverworts), terrestrial and aquatic mollusks, and vascular plants which are considered rare or uncommon. The only survey and manage plant documented to occur in the Klamath River Canyon is the mountain lady slipper orchid (*Cypripedium montanum*).

The great gray owl is the only wildlife species designated as "Survey and Manage" under the Northwest Forest Plan which could occur within portions of the canyon near Salt Caves. Several cavity nesting bird species which do occur in the Klamath River Canyon, have management recommendations described under the Northwest Forest Plan.

Noxious Weeds

No noxious weed populations are known to occur in the immediate area of Salt Caves; however, no systematic surveys of the Klamath River canyon have been completed. Noxious weed species known to occur in the Klamath Canyon include yellow star thistle (*Centuaria solstitialis*), scotch broom (*Cystisus scoparius*), St. John's wort (*Hypericum perforatum*), and poison hemlock (*Conium maculatum*).

Cultural Resources

Numerous pre-historic sites within the Upper Klamath River Canyon have been excavated over the past four decades. Continuing research demonstrates the significance of archaeological data recovered from these excavations. The Upper Klamath River Canyon is under consideration for nomination to the National Register as an archaeological district. Salt Caves is considered to be a "contributing property" to the archaeological district and significant under Criterion D of the National Register for its potential to yield information important to prehistory.

Salt Caves was originally recorded as an archaeological site in the early 1960's and assigned Smithsonian Trinomial 35KL24. Limited test excavations were conducted at Salt Caves in 1961 and 1962. Prehistoric and historic artifacts were recovered. Studies of nearby sites indicate a human presence within the Klamath River Canyon that spans the past 7,000 years.

Salt Caves lies on the fringes of Klamath, Modoc, Shasta, and Takelma tribal territories and probably was used at various times by these groups in the past. Salt Caves continues to retain cultural and traditional significance for the Shasta Nation and the Klamath Tribes.

The Klamath River Canyon holds great spiritual and religious significance for the Klamath Tribes and Shasta Nation. It has been and still is a place where Native Americans come for spiritual activities. Many of the special or sacred places within the canyon are topographic features. The Klamath River Canyon Ethnology Study identified the Salt Cave as an ethnographic feature (Theodoratus et al. 1990:21).

Other Resources

The following resources are not present or would not be impacted by any of the action alternatives: Wilderness or Wilderness Study Areas, prime and unique farmlands, mining claims, roadless areas, Research Natural Areas, wild horses or burros, land tenure or rights of way, rangelands, minority or low income populations, forestry resources, or hazardous or solid wastes.

No direct or indirect environmental effects to floodplains, wetland resources, water quality, or air quality are expected to result from implementation of the proposed action or the alternatives.

The above listed resources will not be considered any further in this Environmental Assessment.

CHAPTER III - ALTERNATIVES INCLUDING THE PROPOSED ACTION

Introduction

The alternatives consist of a combination of monitoring steps and management actions. Many of the same management actions are included in Alternatives 1 (Proposed Action), 2, and 3. Differences in the alternatives pertain mainly to the cave gating options, which are summarized in Table 1.

The objectives for management of Salt Caves are as follows:

- 1) Continue to limit human visitation to Salt Caves during the closure period of spring, summer, and fall, in order to provide optimal conditions for the population of Townsend's big-eared bats during their birthing, rearing, and transitional use periods.
- 2) Continue to inform the public of the cave closure through the posting of signs and letters to commercial rafting permittees.
- 3) Continue monitoring of human visitation/impacts to ensure the effectiveness of public education and the cave closure published in the Federal Register, and to assess whether additional management actions are necessary in order to prevent human entry to either cave (gated or ungated) during the spring, summer, and fall.

4) Monitor the population of Townsend's big-eared bats at Salt Caves in a non-invasive manner while determining the approximate numbers of bats, the roost type(s) Salt Caves serve as, and any major changes in use of the caves.

5) Monitor for disturbance and/or potential theft of cultural resources.

6) Monitor for disturbance or disfiguration of the physical cave resources and the environment adjacent to the caves.

TABLE 1. COMPARISON OF MANAGEMENT ACTIONS, BY ALTERNATIVE. MANAGEMENT ACTIONS COMMON TO ALL ALTERNATIVES ARE NOT LISTED.

ALTERNATIVE	CAVE SC-I (LARGE CAVE)	CAVE SC-II (SMALL CAVE)	OTHER ACTIONS
1	-Monitor human entry to cave to determine if a gate is needed; -Gate if monitoring determines the need.	-Monitor human entry to cave to determine if a gate is needed; -Gate if monitoring determines the need.	-Monitor human entry to SC-I & SC-II for 3-5 consecutive years using video or photo technology -Establish vegetation photo-points and monitor on an annual basis -Provide seasonal visitor use permits if unauthorized visitation becomes excessive
2	-Monitor human entry to cave to determine if a gate is needed; -Gate if monitoring determines the need.	-Gate immediately	-Monitor human entry to SC-I for 3-5 years using video or photo technology -Conduct video or photo surveillance for 2 years to detect vandalism of gate at SC-II -Establish vegetation photo-points and monitor on an annual basis -Provide seasonal visitor use permits if unauthorized visitation becomes excessive
3	-Gate immediately	-Gate immediately	-Conduct video or photo surveillance for 2 years to detect potential vandalism of gates
No Action	-Do not place a gate	-Do not place a gate	-Some monitoring of human use & bats on an opportunistic basis only -Continue current cave closure period of 5/1-9/15 -Update signs to incorporate corrected federal register notice -Continue informing rafting permittees of the Salt Caves closure period and updated information

Management Actions and Monitoring Common to All Action Alternatives

The following management actions and monitoring activities 1-16 are recommended under Alternatives 1-3. They are categorized according to the issue they are addressing.

Proposed Actions Addressing Recreation/Visitor Use

1) Increase the Buffer Area - Increase the buffer area around the rock outcrop where the caves occur, to encompass the zone from the base of the entire length of the rock outcrop to the shoreline of the river, to the top of the rock out-crop, and trail access points near these zones. Signs informing visitors of the closure area would be posted at trail access points at the edges of the buffer zone. This buffer zone would apply to use by the public. BLM employees or their contractors would be allowed administrative access to conduct monitoring and research in the area.

The proposed increase in distance is based upon recommendations for protection of maternity colonies of bats by Nieland (2000). This change would require a new Federal Register Notice. Campfires would be prohibited in the caves and within the cave buffer area throughout the year.

2) Extend the Salt Caves Closure Period - Extend the closure period of Salt Caves to include the transitional use period of the smaller cave (SC-II) by the Townsend's big-eared bat. The new closure period would be from April 1 through October 1 and would apply to the entire buffer area. The purpose of the closure during this time period would be to help protect the area from disturbance during and after the transition of use from SC-I to SC-II. This change would require a new Federal Register Notice.

3) Closure Signs - Update the information on the closure signs to include the increased buffer area and extended closure period. The Federal Register Notice number and penalty for entry would also be posted. Have the revised signs in place no later than March 31st, subsequent to the publication of the Federal Register Notice. Closure signs would be installed on trail access areas around the rock outcrop and in front of the caves. On an annual basis and prior to the cave closure period, check the condition of the cave closure signs and replace if necessary.

4) Permanent Closure of Primitive Access Road - Permanently close the primitive road located on the hillside on the opposite side of the river from Salt Caves. Rehabilitate the portion of the roadbed susceptible to erosion, and seed with native species if needed. The "Best Management Practices" in the Klamath Falls Resource Area Record of Decision and Resource Management Plan, would be followed for this road closure.

5) River Ranger Patrol - Continue periodic summer (weekly) river patrols conducted by the River Ranger for observations of white water boating use/traffic of the eddy in front of Salt Caves.

6) Revise Information Sent to Rafting Permittees - Information on the closure of Salt Caves is currently provided to the rafting permittees on an annual basis. Additional changes will be made to these documents as needed to reflect new information or status of the situation. Rafting permittees will be notified of any changes prior to each rafting season.

7) Request Recreational Guide Book Revisions - Contact guide book authors (See Appendix E for a list of books appropriate to the area) to request changes regarding reference to Salt Caves in future editions of their books. Ask them to drop any reference to the Salt Caves area, or include information regarding the new closure time periods and penalties for violating the rules in the Federal Register Notices.

8) Monitor for Physical Changes to the Cave Resource - Implement the “Visual Impact Evaluation System” for changes to the physical resources associated with the caves. Under this system, physical disturbance in the form of trails, trash, graffiti, other human sign and modification of geologic, mineralogic, and hydrologic formations would be included as criteria for monitoring. In addition, evidence of any dead wildlife would be noted. Implementation of this system would take place on an annual basis.

9) Removal of Modern Human Sign - If trash, graffiti, fire rings, or other human sign become a problem inside the caves or within the buffer area of the caves, remove evidence as soon as possible. Trash, graffiti, fire rings, or other human sign outside the cave would be removed soon after discovery as long as the action would not disturb the bats. Removal of sign within the caves would occur when the bats are not present.

10) Environmental Education - Educational information on Townsend’s big-eared bats that would emphasize the need to minimize disturbance and inform visitors of life history information would be placed at the raft/boat launch area on the Klamath River. To protect the cultural values, there would be no mention of the cultural resources present in any published material.

Proposed Actions Addressing Wildlife Management Issues

11) Bat Population Monitoring –

A) Non-invasive Monitoring: Monitoring of Townsend’s big-eared bats at Salt Caves should be implemented in a non-invasive manner while determining the approximate numbers of bats, the roost type(s) Salt Caves serve as, and any major changes in use of the caves. Because monitoring methods utilized to date are either too disruptive to the bats or are inconclusive, different monitoring techniques need to be tested. At a minimum, techniques that minimize disturbance while tracking trends in numbers of individuals should be implemented. Numbers of individuals would be counted prior to birthing and after the young have begun to fly, within a set time frame each year for three to

five consecutive years. After a five-year period of no monitoring, monitoring during consecutive years would be reinitiated. Methods used to count the bats have not been refined at this point in time but could include the use of a non-motor driven infrared or low-light camera with a remote trigger, estimation of bat cluster area through visual observations from the exterior of the cave, or thermal imaging. Standard techniques used to minimize disturbance to the bats by the surveyor(s) would be implemented. Bat experts would be consulted to develop effective monitoring methods that are non-invasive, and which meet the objectives.

B) Invasive Monitoring: If non-invasive bat monitoring techniques are not practical to implement at Salt Caves, monitoring would only take place once every five years. This type of monitoring would involve one or two brief visits during key time windows to determine if the caves are still functioning as a maternity roost for the Townsend's big-eared bat. Methods would involve closer proximity of the observers to the bats in order to conduct counts and observe young.

If it is determined that other information on these bats is critical to its management and survival, accepted scientific methodology to meet other study objectives may occur. Methodology could include invasive techniques such as radio-telemetry and mist netting.

C) Incidental Information: If other wildlife, including other bat species, are identified using the caves or the general vicinity, this information would be recorded.

12) Vegetation Management - Vegetation management may take place within the area of the caves to meet a variety of resource objectives identified in the KFRA ROD/RMP. Management may include oak, juniper, and mixed conifer forest thinning in order to manage fuels, provide structural characteristics desirable for a range of wildlife species, maintain native shrub communities, and improve foraging habitat for *C. townsendii*.

13) Monitor for Peregrine Falcons - Monitor the cliff face at Salt Caves for peregrine falcons according to the protocol by Pagel 1999.

Proposed Actions Addressing Cultural Resource Issues

The management recommendations for monitoring human visitation to the caves should be effective in addressing related effects to both biota and cultural values. Potential disturbance within and along the entrance to both caves would require additional monitoring as follows:

14) Monitor for Digging at SC-I and SC-II - Once a year, after the closure period has ended, inspect the cave floors and general vicinity for signs of illegal digging.

General Proposed Actions

15) Implement Bureau of Land Management's Cave Safety Standards – Cave safety standards directed in Instruction Memorandum No. 96-104, Change 1 would be implemented for BLM employees who enter Salt Caves as part of their duties.

16) Updates - Update the Salt Caves Management Plan (SCMP) as new information triggers the need.

Alternative 1 - Proposed Action

The proposed action consists of numerous measures to protect Salt Caves. These would be incorporated into a management plan for the caves. This plan would include several monitoring steps to track the level of human disturbance at Salt Caves and the numbers and type of use of Salt Caves by Townsend's big-eared bats. If results of monitoring SC-I (large cave) and SC-II (small cave) indicate the level of human use of one or both Salt Caves could cause harm to the Townsend's big-eared bats, the cave(s) with unacceptable use levels would be gated.

Management Actions

The following management actions and monitoring activities 1-4 are recommended under the proposed action. They are categorized according to the issue they are addressing.

Proposed Actions Addressing Recreation/Visitor Use

1) Monitor Human Entry to SC-I and SC-II - Conduct video surveillance (or other method which would give desired results) of both caves in order to monitor human entry. This monitoring would take place for three to five consecutive years. The timing of the monitoring would correspond with the bat monitoring. For SC-II, other methods, such as the use of trail counters, could be used as an alternative to video technology.

2) Seasonal Visitor Use Permits - If the timing and numbers of visitors to Salt Caves is determined through monitoring to be in excess of acceptable limits, establish a permitting system for visitation of the caves during controlled periods of the non-closure period. The public would be notified of the permitting system through signing at the caves and other standard public notification procedures.

3) Based on Results of Monitoring, Gate SC-I and SC-II if Determined Necessary – If results of the monitoring indicate the level of human use of Salt Caves could cause harm in the form of abandonment of the caves by the bats &/or death of juvenile or adult Townsend's big-eared bats, the largest cave (SC-I) would be gated across an inner opening back from the cliff face. This gate location would encompass the zone of occupancy by the Townsend's big-eared bats. The gate would be designed to allow human access for administrative purposes. Construction design for the gate would be

based on the most current guidelines and information from consultation with bat experts. If the cave is gated, conduct video surveillance (or other method which would give desired results) of the cave gate to detect any vandalism for a period of two years after installation of the gate. If no vandalism is found after two years, conduct visual checks before and after the closure period each year.

4) Vegetation Photo-points - Establish photographic points in the vicinity of the river eddy and caves to document the condition of vegetation and wear of the trail leading to the caves. The photographs should be taken annually during the following periods: 1) After the vegetation has fully leafed out and before the peak-rafting season, and 2) In the fall after the rafting season has ended.

For other management actions, see the section above, titled “Management Actions Common to All Alternatives”.

Alternative 2

This alternative would include monitoring steps to track the level of human disturbance at SC-I (large cave) and the numbers and type of use of Salt Caves by Townsend’s big-eared bats. If results of monitoring SC-I indicate the level of human use could cause harm to the Townsend’s big-eared bats, the cave would be gated. Under this alternative, SC-II (small cave) would be gated immediately.

Proposed Actions Addressing Recreation/Visitor Use

1) Monitor Human Entry to SC-I - Conduct video or photo surveillance (or other method which would give desired results) of the largest cave in order to monitor human entry. This monitoring would take place for three to five consecutive years. The timing of the monitoring would correspond with the bat monitoring.

2) Seasonal Visitor Use Permits - If the timing and numbers of visitors to Salt Caves is determined through monitoring to be in excess of acceptable limits, establish a permitting system for visitation of the caves during controlled periods of the non-closure period. The public would be notified of the permitting system through signing at the caves and other standard public notification procedures.

3) Based on Results of Monitoring, Gate SC-I if Determined Necessary – If results of the monitoring indicate the level of human use of Salt Caves could cause harm in the form of abandonment of the cave by the bats &/or death of juvenile or adult Townsend’s big-eared bats, the largest cave (SC-I) would be gated across an inner opening back from the cliff face. This gate location would encompass the zone of occupancy by the Townsend’s big-eared bats. The gate would be designed to allow human access for administrative purposes. Construction design for the gate would be based on the most current guidelines and information from consultation with bat experts.

If the cave is gated, conduct video surveillance (or other method which would give desired results) of the cave gate to detect any vandalism for a period of two years after installation of the gate. If no vandalism is found after two years, conduct visual checks before and after the closure period each year.

4) Gate SC-II - Gate the small cave using the latest guidelines and information from consultation with cave gating experts.

5) Monitor for Vandalism to Gate on SC-II – Conduct video surveillance (or other method which would give desired results) of the cave gate to detect any vandalism for a period of two years after installation of the gate. If no vandalism is found after two years, conduct visual checks before and after the closure period each year.

6) Vegetation Photo-points - Establish photographic points in the vicinity of the river eddy and caves to document the condition of vegetation and wear of the trail leading to the caves. The photographs should be taken annually during the following periods: 1) After the vegetation has fully leafed out and before the peak-rafting season, and 2) In the fall after the rafting season has ended.

For other management actions, see the section above, titled “Management Actions Common to All Alternatives”.

Alternative 3

Under this alternative, the large cave (SC-I) would be gated in addition to the smaller cave (SC-II). Both caves would be gated without additional monitoring prior to their placement.

Proposed Actions Addressing Recreation/Visitor Use

1) Gate SC-I - Place a gate across an inner opening of the cave, back from the cliff face. This gate location would encompass the zone of occupancy by the Townsend’s big-eared bats. The gate would be designed to allow human access for administrative purposes. Construction design for the gate would be based on the most current guidelines and information from consultation with cave gating and bat experts.

2) Gate SC-II - Gate the small cave using the most current guidelines and information from consultation with cave gating and bat experts.

3) Monitor for Vandalism to Gates on SC-I and SC-II – Conduct video surveillance (or other method which would give desired results) of the cave gates to detect any vandalism for a period of two years after installation of the gates. If no vandalism is found after two years, conduct visual checks before and after the closure period each year.

For other management actions, see the section above, titled “Management Actions Common to All Alternatives”.

No Action Alternative

1) Monitoring Activities - Under the no action alternative, no specific monitoring methods or schedule would be implemented to track evidence of human visitation to the caves or the bat population using the caves. Passive methods, which have been used to date, including checking for human tracks and noting wear of the trail and vegetation condition would continue. Monitoring of visitor use and conditions of existing closure signs would be checked on an opportunistic basis as time allows. Monitoring of the bat population using non-invasive techniques could occur, but on no set schedule.

2) Current Cave Closure - The timing of the existing cave closure would remain in effect as per the KFRA RMP.

Other management actions, some of which would be implemented under the action alternatives are as follows:

3) River Ranger Patrol - Continue periodic summer (weekly) river patrols conducted by the River Ranger for observations of white water boating use/traffic of the eddy in front of Salt Caves.

4) Revise Information Sent to Rafting Permittees - Information on the closure of Salt Caves is currently provided to the rafting permittees on an annual basis. Additional changes will be made to these documents as needed to reflect new information or status of the situation. Rafting permittees would be notified of any changes prior to each rafting season.

5) Update Signs to Correct Federal Register Information - The original Federal Register Notice for the closure of the caves was revised in 1998 due to errors in the original notice. As a result of this correction, the penalty for entry to the caves was changed. This change needs to be properly indicated on the closure signs; therefore new signs would be made and posted.

6) Klamath Falls Resource Area ROD/RMP Buffer - Under the direction of the KFRA ROD/RMP, activities are restricted within 100 feet of cliffs and talus slopes. Restricted activities include recreation.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED ANALYSIS

The following management actions were previously proposed but are no longer being considered. If continued monitoring indicates conditions have changed, one or more of these management recommendations may be reconsidered and/or new management actions may be recommended.

1) Eddy Blockage Using Boulders - An eddy is present along the Klamath River immediately adjacent to Salt Caves. This eddy presented a problem in the late 80's and early 90's because it provided a convenient raft "take-out" place for boaters to eat lunch.

Some boaters took the opportunity to explore the caves. In the early 1990s, a proposal was developed to place boulders in the eddy to discourage boaters from stopping there. The feasibility of this proposal was questionable due to the extremely steep slope and lack of road access on the Salt Caves side of the river. The movement of boulders to the project site would have required the use of either a sky crane, or crossing the river during a 48-hour window of low flows, which take place during PacifiCorp's maintenance period. According to the District Hydrologist, the minimum size of boulders needed for this project would be three to five feet in diameter. Considering the topography of the canyon and the size of boulders that would need to be moved, the use of a sky-crane posed safety concerns. The use of heavy equipment to move boulders across the river also posed safety concerns due to the large size of the substrate. Crossing the river over this large substrate could cause instability of the heavy equipment. Other factors in association with this proposal included the high expense of the operation and the current low use of the eddy by boaters. As indicated in the monitoring section, results of public education efforts and the official cave closure have had a positive impact on the degree of boater use of the eddy.

If this proposal were to be reconsidered, a Section 404 permit under the Clean Water Act would need to be obtained from the Army Corps of Engineers. In addition, Section 7 Analysis and Determination as required under the Wild and Scenic Rivers Act, and Section 7 Consultation under the Endangered Species Act, would need to be completed.

2) Eddy Blockage Using a Log Boom - A second proposal for blocking access to the eddy consisted of placing a series of logs in the eddy. These logs would be linked using cables that would be anchored into the existing boulders along the shore of the river. The Klamath Falls Resource Area engineer believed the logs would come loose under high flows and that the loose cables and logs would pose a safety hazard to river users. Peak flows in the river reach 6,000 to 8,000 CFS. In addition, the Lakeview District Hydrologist believed this design would result in a continual maintenance problem due to the level of peak flows.

Under the Wild and Scenic Rivers Act, structures are allowed to be placed in the river for fish and wildlife enhancement if they meet certain criteria. One of the criteria is that the structures do not create unusual hazards to recreationists using the river. Section 7 Analysis and Determination as required under the Wild and Scenic Rivers Act would need to be completed to address compliance with these criteria. In addition, a Section 404 permit under the Clean Water Act and Section 7 Consultation under the Endangered Species Act would be required. Considering the peak flows in the river and the potential safety hazard, this alternative was dropped from further analysis.

3) Fencing - Fencing the area around the caves was considered. Dr. Steve Cross was consulted as well as BLM staff familiar with the guidelines associated with the Wild and Scenic River Act. Fencing could reduce human use of the caves. The main concern with the use of a fence is that it would draw attention to the caves and would probably attract rather than deter humans. Fencing would also affect use of the area by wildlife species

other than bats. In addition, the presence of a fence in a “Wild and Scenic River” corridor would degrade the scenic quality standards for this reach of river.

4) Gating the Outer Opening of SC-I - The entrance of the largest cave (SC-I) is quite large (approximately 15 x 10 meters). The large size, combined with the inaccessibility of the area, were considered in the early 1990’s when options were being developed to curtail human use of the cave during the maternity season of the bats. Gating of the large cave was considered too expensive and logistically difficult. Gating of the outer (and largest) opening of the cave would also be visible from several vantage points because of its height and the lack of vegetative coverage. Due to this visibility, the scenic qualities of the “Wild and Scenic River” would be degraded.

CHAPTER IV - ENVIRONMENTAL CONSEQUENCES

Environmental Consequences Common to All Action Alternatives

Increase Buffer Area:

An increase of the buffer area around the caves may help with enforcement of keeping people out of the caves. The presence of signs on trail access points near the caves would be far enough from the parking area that their presence would not entice visitors to enter the area. Individuals already heading down the trail toward the river would be the only public individuals to see the signs. Signs would not be placed along the river because they could attract rather than deter people from the area.

Prohibit Campfires:

Campfires in or near the cave could result in smoke in the cave and the potential for an escaped fire, which could destroy foraging habitat used by the bats. To date, there is some evidence of an old fire ring and some charred sticks in the large cave. It is unknown how old this evidence is and what time of year it occurred. The use of campfires in the cave or within the general vicinity of the cave do not appear to be a significant issue at this time. However, a few bats do utilize the caves during the non-closure period, and if there were a campfire these bats would be put at the risk of mortality.

Fire restrictions currently in place by the Oregon Department of Forestry prohibit campfires during the fire season. After the fire season, the chance of a campfire escaping and destroying vegetation are relatively small.

Extension of Closure Period:

Extension of the Salt Caves closure period of 4 weeks in the spring (from May 1 to April 1) and 2 weeks in the fall (from September 15 to October 1) would help protect the bats using SC-II as a transition site before and after the maternity season. It is believed the same bats are using both SC-I and SC-II because studies have shown that as the numbers of *C. townsendii* drop in SC-I at

the end of the maternity season there is a corresponding increase in the number of bats in SC-II. There is a similar shift in use from SC-II to SC-I in the spring. For this reason SC-II is believed to be an important interim roost for the pregnant bats. Such interim or transitional roosts are used in the spring before the young are born and in the fall before moving to hibernating sites (Pearson et al 1952, Handley 1959, and Barbour and Davis 1969 as cited in Pierson et al. 1999). The current closure period does not include the entire period of peak use of SC-II by the bats. Deterring human use would help ensure protection of the continued use of both caves by Townsend's big-eared bats, but would not prevent human entry entirely.

Closure Signs:

Installation of new closure signs with the revised Federal Register Notice information will properly inform the public of the penalties associated with entering the caves and/or the buffer areas during the closure period. This awareness could help decrease noise levels in the vicinity of the caves. This closure period would also help reduce disturbance to the nesting prairie falcons using the cliff.

Permanent Closure of Primitive Access Road:

Permanent closure of the primitive access road, located on the opposite side of the river to Salt Caves, to motorized OHV use would create a minor hardship to those who desire to access the river. Although the road would be permanently rehabilitated, it would be available for non-motorized access. Closure of this road would lessen the potential for access to the caves by individuals who might otherwise not be interested in hiking down a steep hill to reach the caves. In addition, closure of this road would lessen the potential for access by the public who could create disturbance in the form of noise, shooting, etc.

Closure of this road would help meet several KFRA ROD/RMP management objectives. It would contribute toward the goal of reducing road density to 1.5 miles per square mile. Its closure could help reduce disturbance to a variety of wildlife species. Closure of the road would also help meet the goals of the Aquatic Conservation Strategy under the Northwest Forest Plan. Rehabilitation of the road would help reduce erosion.

River Ranger Patrols:

Periodic (weekly) summer river patrols by BLM River Rangers have a coincidental chance of detecting individuals near the shoreline area of Salt Caves. As one of the many monitoring tools, these patrols play a valuable role in helping enforce the Federal Register and in informing boaters of the rules.

Notification to Rafting Permittees and Recreational Guide Book Authors:

Updated information will be sent to all commercial rafting permittees regarding revised rules, Federal Register Notices, changes in management, and other pertinent information. Notification through this method will help ensure that boaters stay well informed of the issues and help

spread the word to private boaters.

Making changes in future editions of Recreation Guide Books, which would include either dropping reference to Salt Caves and/or include information on the closures and penalties for violation of rules in the Federal Register Notices, would help prevent curiosity and interest in the site by individuals not already aware of the caves, or make them informed of the issues. Once on the river, the caves are not very visible to boaters due to the tall vegetation.

Monitor for Physical Changes to the Cave Resource:

Monitoring of visual and physical impacts to Salt Caves and the immediate area around the caves will provide documentation for tracking the degree of impact and when it occurs. It will provide an opportunity for curtailing the disturbance before it becomes uncontrollable.

Removal of Human Sign:

The presence of trash, graffiti, and other human sign has not been a problem to date. Should it become an issue in the future, prompt removal could discourage others from perpetuating the problem.

Environmental Education:

Providing educational information on Townsend's big-eared bats at the raft boat launch on the Klamath River would help inform visitors of the importance of the Klamath River Canyon to this species and its sensitivity.

Implement Bureau of Land Management's Cave Safety Standards:

Implementation of cave safety standards, which include cave safety guidelines, a job hazard analysis, and search and rescue procedures, will help ensure employees are prepared and informed of the potential dangers that may exist at Salt Caves. Implementation of these standards will help prevent accidents.

Bat Monitoring:

Noninvasive:

Provided non-invasive bat monitoring techniques are developed which are effective, monitoring the numbers of Townsend's big-eared bats should give an indication of the type of use and changes in the numbers of bats using the caves over time. Any major changes in use of the caves by these bats will help BLM measure the effectiveness of its management and may help correlate relationships between disturbance events and bat use. Because of factors including weather, availability of suitable winter hibernacula in the vicinity, potential changes in the annual availability of prey, and other unknown factors which could influence use of the site, it may be difficult to make direct

correlations between disturbance and numbers of bats using the caves during any given year.

In order to help sort out bat use patterns of Salt Caves, concurrent monitoring at Hoover Ranch on PacifiCorp land using the same techniques, would be helpful. Monitoring at this site has taken place concurrently with Salt Caves in the past; however, there is no certainty this would continue.

The cost for equipment to monitor the bat population could cost up to \$13,000 (cost of thermal imaging camera), depending upon the type of technology used. Personnel time for planning and implementing the monitoring is estimated at \$3,000 for the first year and \$1,000 per year thereafter.

New information collected through monitoring would be used to evaluate management actions and would help ensure appropriate actions are taken to protect the Townsend's big-eared bats and their cave resource.

Invasive:

Monitoring or scientific studies that could include mist netting, banding, radio telemetry or other disturbance to the maternity colony would likely have negative impacts to the bats. Activities during the maternity season, particularly before the young are weaned and are able to fly, can result in death of the young. Death of the young would result if the following were to occur: 1) the adult females abandon the roost, leaving the young to die of starvation, and/or 2) the young detach from the ceiling and fall to the cave floor. The female will not recover a young that has fallen (Noel 1993 as cited in Nieland 2000). Due to the low reproductive potential of *C. townsendii* (one/female/year) and a 50 percent survivorship of the young (Pearson et al (1952), additional impacts through disturbance can have serious effects.

Research activities can depress, scatter, or extirpate populations of *C. townsendii* (Pearson et al. 1952, Humphrey and Kunz 1976, Kunz and Martin 1982, Perkins and Schommer 1991 as cited in Pierson et al. 1999). The sensitivity of *C. townsendii* to human disturbance of roost sites is well documented. Sampling at maternity roosts has been correlated with decreases in the size of colonies and with delayed recovery and threatened survival of the populations.

Vegetation Management:

Vegetation management occurring within the foraging range distance of the bats from Salt Caves would be designed to be compatible with protecting the habitat characteristics necessary for *C. townsendii*'s main prey base of moths. Any vegetation management activities within a 400-meter radius of Salt Caves would be timed to occur during the non-closure period and to avoid winter when a small number of several bat species could be using the caves for hibernation. Vegetation, which could affect the microclimate of the caves, would be maintained.

Herbicide spraying to treat competing vegetation within conifer tree plantations does occur on BLM administered lands. This action would destroy brush species that could be used by the moths that comprise the diet of *C. townsendii*. Due to the dominance of oak woodland in the Klamath River Canyon, there are currently no conifer tree plantations. If a stand replacing wildfire occurred, tree plantations could be planted in some areas and these plantations could be treated to destroy competing vegetation. This could have an impact upon the bat's prey base.

Peregrine Falcon Monitoring:

Monitoring for peregrine falcons would be conducted from the opposite side of the river using a spotting scope. This activity would not cause disturbance to the bats using Salt Caves. Monitoring for peregrines would provide important information to determine nesting success, population trend, and an evaluation of the self-sustainability of the population. The Endangered Species Act of 1973 requires that Federally delisted species be monitored for not less than five years. The peregrine falcon was removed from the Federal List of Endangered and Threatened Species on August 25, 1999.

Cultural Disturbance Monitoring:

Monitoring of the cave floors and general vicinity of SC-I and SC-II for digging would provide a set schedule for monitoring of potential disturbance to cultural sites. Although such disturbance has not been a threat in the past, such monitoring would detect potential threats, should they become a reality in the future.

Native American Religious Concerns:

Nominating the cave as a significant cave under the Federal Cave Protection Act of 1988 would have no effect on the tribal cultural significance of the cave. The Klamath Tribes' Culture and Heritage Director, Dino Herrera, was contacted in 1999 concerning this issue and he agreed (personal comm. 12/21/99).

The Klamath Tribes were contacted on 2/6/02 regarding the potential effects of erecting a gate at the mouth of one or both caves on the Native American religious concerns and cultural significance of the cave. The BLM is waiting for a reply from the tribes on this issue.

Areas of Critical Environmental Concern:

Salt Caves is within the existing Klamath Canyon Area of Critical Environmental Concern (ACEC). Wildlife populations and their diverse habitat were identified as relevant and important values in the evaluation of the area for ACEC designation. The area was designated by the ROD for the KFRA RMP in 1995. The maternity colony of Townsend's big-eared bats was specifically identified as one of the wildlife populations meeting the eligibility criteria of relevant and important. All of the action alternatives include measures to help improve conditions for these bats. No effects to any of the other resources identified as relevant and

important would result from any of the action alternatives.

Threatened or Endangered Species:

Although peregrine falcons have been delisted, actions would be taken by BLM to protect any known nest sites from disturbance during the reproductive season. If peregrine falcons were to establish a nesting territory at the cliff site at Salt Caves, appropriate measures would be taken to avoid disturbance to the site. If cave gates are determined to be necessary, their placement would take place during the fall to minimize disturbance to the maternity colony of bats. This timing would correspond with the non-reproductive period for peregrine falcons.

The timing of potential placement of gates on SC-I or SC-II would not correspond with the reproductive period for bald eagles, therefore no impacts to the reproductive success of these eagles should occur. The timing of cave gating construction would be incorporated into “Project Design Features” to avoid the daily peak foraging periods of bald eagles.

Impacts to federally endangered Lost River and shortnose suckers are not anticipated to occur. The monitoring actions and the proposed construction of cave gates (if gates are determined to be necessary) would not be directly associated with the river and riparian band. Proposed actions would not be expected to introduce sediment into the river system. Potential beneficial reductions in sediment may occur as a result of closing, or decommissioning, of the road on the west slope of the river opposite the Salt Caves.

Other Fish and Wildlife:

Impacts to native fish populations and aquatic habitats are not anticipated to occur as a result of the proposed alternatives. The monitoring actions and the proposed construction of cave gates (if gates are determined to be necessary) would not be directly associated with the river and riparian band. Proposed actions would not be expected to introduce sediment into the river system. Potential beneficial reductions in sediment may occur as a result of closing, or decommissioning, of the west slope road opposite the Salt Caves.

Special Status Plants and Survey and Manage Species:

Site-specific surveys for special status plants and survey and manage species would be conducted prior to any ground disturbing activities associated with construction of gates at Salt Caves. These surveys would be conducted according to protocol and would include staging areas for construction materials, the helicopter landing site, and the area in front of the caves. If cave gate(s) are determined to be necessary, construction would occur outside the reproductive season of the great gray owl, therefore no disturbance would occur to potential nesting sites located within the ¼ mile protection zones required for known nest sites (as defined by the FSEIS, 2000). The Salt Caves Management Plan meets the intent of the standards and guidelines and management recommendations under the Northwest Forest Plan for protection of important roost sites for bats. Standards and guidelines under the Northwest Forest Plan for cavity nesting birds apply to timber management and the maintenance of adequate numbers of snags. These

mitigation standards and guidelines would be applied under all vegetation management implemented under this plan.

Noxious Weeds:

Transport of materials for potential construction of the cave gates could bring in noxious weeds to the helicopter-landing site and to the river and its banks in the vicinity of Salt Caves. Implementation of standard weed prevention measures approved by BLM would reduce the potential for the establishment and/or spread of noxious weeds.

Wild and Scenic Rivers:

Salt Caves is within the “Scenic” portion of the Klamath River. No long-term adverse affects to the “Scenic” quality of the river would occur under any of the alternatives. More details of the potential impacts are described under the environmental consequences of gating SC-I and SC-II under Alternatives 1, 2, and 3.

Paleontological Resources:

It is unknown if paleontological resources occur in the caves since no surveys have been conducted. Shallow excavation of the cave floors could occur if gates are placed in the caves. Approximately three-fourths of the cave floor of SC-I is covered with rock fall from the roof of the cave. The estimated depth of this layer of rock is five meters. Excavation needed for the placement of a gate at SC-I would not extend beneath this rockfall to the level of the cave floor. A portion of the cave floor where no roof fall occurs could be excavated to a depth of approximately one meter. At the SC-II cave, shallow excavations into the cave floor would be necessary. Excavations of test pits by the archaeologist Joanne Mack indicate that the guano is at least 42 cm thick. Although no paleontological resources were discovered during these archaeological excavations, there is potential that excavations could affect potential paleontological resources in the caves.

Alternative 1 - Proposed Action

Monitoring of Human Use to Determine Appropriate Management Action:

Monitoring of both caves to further evaluate the actual numbers of human disturbance events would help document the current threat to the bats before proceeding further with management actions which could be costly and which could inadvertently attract humans to the site. Monitoring would help determine if spending thousands of dollars is necessary to protect the bats through gating.

During the monitoring period, additional disturbance events by unauthorized visitors may occur and impact how the bats utilize Salt Caves. *C. townsendii* maternity roosts that experience increased visitation rates during their critical periods of use experience associated losses in colony populations. Graham (1966) as cited in Pierson et al. 1999, blamed the abandonment of

several maternity sites in California on the repeated visits by people. Pierson and Raney (1996) as cited in Pierson et al. 1999, have shown that those colonies with the greatest population declines also experience frequent disturbance. This is not of a major concern at Salt Caves at this time due to the results of the public education efforts that have occurred to date.

Monitoring of human entry into SC-I through the use of video (or similar) technology would indicate the level of disturbance. Actual counts of the number of disturbance events would help determine changes in the level of human disturbance over time. The decision on whether or not to gate this cave would be made based upon indications of unacceptable human use levels of SC-I. According to Senger and Crawford 1984, as cited by Nieland 2000, the installation of cave gates should be used as a last resort after all other efforts fail. Due to this fact, it is believed quantitative monitoring is warranted prior to making a decision to gate the cave. If monitoring indicates a gate is needed, cave-gating experts would be consulted regarding design and proper installation procedures.

The cost of the video/photo equipment is approximately \$5,000 to \$10,000. Additional costs in personnel time to change the batteries and check the system would be approximately \$2,200 per year.

Seasonal Visitor Use Permits:

Providing an opportunity to interested publics to visit Salt Caves during the non-closure period could discourage people from visiting the site during the prohibited closure period. Permitted visits with researchers and/or BLM personnel would contribute toward education of the public and quench curiosity. First hand experience of the cave and notification of the importance of the resource could help spread the desire to protect the cave.

The non-closure period for the caves extends from fall through early spring. A small number of bats do use the caves for hibernation during the winter. Although the timing of permitted visits to the caves would be controlled to avoid the peak periods of use for hibernation by bats, disturbance to the bats could occur depending upon weather variations. In general, *C. townsendii* begin to arrive at hibernacula in October (Kunz and Martin 1982). Visits would not be allowed until at least October 1 due to the closure period for the maternity season. If hibernating bats are present, people visiting the caves during this period could cause the bats to come out of hibernation and to utilize valuable fat reserves needed to survive until the arrival of spring. Arousal of bats by humans during winter hibernation can cause bats to expend from 10 to 30 days of their body fat reserves (Tuttle 1991 as cited in Pierson et al 1999). Bats subjected to excessive disturbance during the winter months often run out of energy reserves and die of starvation (Pierson et al. 1999).

Visits to the caves during the non-closure period could also have impacts to other wildlife. The area is critical winter range for big game. Travel into the area between December 1 and April 15 could cause stress to these animals at a time when energy conservation is very important.

Another potential impact would be damage to the roads which are often muddy during the late

fall and spring.

Gating of SC-I if Monitoring of Human Use Indicates the Need:

Gating of SC-I would help ensure that the maternity colony of Townsend's big-eared bats would remain undisturbed during the critical time needed for birthing and rearing of the young. Over the long term, single disturbance episodes, which could cause the maternity colony to abandon the site, would be minimized. On the other hand, placement of a gate on SC-I could inadvertently attract vandals to the site and potentially increase the amount and frequency of disturbance to the bats (see discussion below). At this point in time, it is unknown if disturbance to the site has resulted in changes of use of the caves by the Townsend's big-eared bats. In general, the presence of a gate can slow the flight of bats as they pass through the structure. This slower flight can increase the bats' susceptibility to predation if the gate is not placed within the dark zone of the cave. If properly designed and installed, a cave gate on SC-I should not affect the ingress and egress of bats, or increase their susceptibility to predators.

SC-I is relatively inaccessible and logistics of gating the cave would be expensive and pose some human safety issues. Due to the large size of the cave opening and the feasibility of gating such a large space, the gate would be installed further back in the cave where the cross section is smaller. This would place the gate much closer to the roosting area of the bats and they could be more vulnerable to disturbance than if the gate were placed across the larger portion of the opening; however, up to this point in time it appears there has been no disturbance in the form of shooting or direct harm to the bats. No shot gun or rifle shells have been noted in the area over the past decade during bat population monitoring efforts, or during visits by BLM personnel to the site.

The cost of planning, construction, and installation of a gate across the opening of SC-I is estimated at approximately \$30,000 to \$35,000.

The actual construction of a gate at SC-I would likely result in disturbance to the vegetation in front of the cave, which currently shields a portion of the cave from view. It would also result in a well-worn trail from the shoreline of the river to the cave. In the short term, impacts to the vegetation and the trail would result in higher visibility of the newly constructed gate. The disturbance to the site and increased visibility could generate more human interest in the caves and more disturbance as a consequence.

Over the long term, placement of the gate across the smaller portion of the cave opening would not likely be visually obtrusive from the vantage point of the river. Vegetation between the shoreline and the cave opening would recover and block the view of this portion of the cave. The coloration of the steel used would be chosen to blend into the background of the cave as much as possible. The gate would be visible from the opposite bank of the river, and may be visible from the canyon rim in the late afternoon when the cliff face is in the sunlight. If gating of SC-I is determined to be necessary, a "Visual Contrast Rating" assessment would be conducted to ensure that visual impacts to the scenic resources of the "Scenic River" are minimized through mitigation measures.

Placement of a gate on SC-I could attract rather than deter human visitors and result in greater disturbance to the bats; however, the majority of river users (boaters) are already aware of the existing closure and have complied cooperatively. In addition, after recovery of the vegetation, the gate would not be visible from the river. The gate would be visible from the road on the opposite side of the river; however, this road would be closed. Generally, the inaccessibility of Salt Caves would probably preclude any major vandalism to the gate or disturbance to the site; however, this is not certain.

Gating of SC-II if Monitoring of Human Use Indicates the Need:

Gating of the small cave (SC-II) would help ensure continued use of both caves by Townsend's big-eared bats through protection of what appears to be an important transition site. It is known that human entry to SC-II occurred at least once in 2000 or 2001, although this could have occurred during the non-closure period. Although the number of human visits to SC-II may be limited, the potential for disturbance to the bats utilizing this cave is very high due to the confined size of the cave. Upon entering the cave, a human is essentially face to face with bats roosting in the cave. Because of this level of proximity between humans and bats, the potential for abandonment of the cave by the bats is highly likely. Because SC-II is used as a transition site, disturbance of this cave could also affect the use of the larger cave during the maternity season.

The cost of planning, construction, and installation of a gate at SC-II is estimated at up to \$10,000.

In general, the presence of a gate can slow the flight of bats as they pass through the structure. This slower flight can increase the bats' susceptibility to predation if the gate is not placed within the dark zone of the cave. If properly designed and installed, a cave gate on SC-II should not affect the ingress and egress of bats, or increase their susceptibility to predators.

Due to the size and location of SC-II, it is unlikely that the general public would be aware that the cave was gated. It is not believed that the mere presence of the gate would attract vandals to the site.

The cave opening of SC-II is not visible from the river or from the opposite riverbank or canyon rim. As a result, installation of a gate would not have an impact upon the visual qualities within the "Scenic River" corridor.

Vegetation Monitoring Photo-points:

Establishment of photo-points for monitoring of vegetation leading to the caves would provide photographic documentation of the changes in the vegetation from year to year. In the past, general trend in the growth of vegetation and amount of trail use was noted on an opportunistic basis, but no visual documentation was made.

Alternative 2 - Monitoring of Human Entry to SC-I and Gating SC-II

Monitoring of Human Use at SC-I:

Monitoring of human entry into SC-I through the use of video (or similar) technology would indicate the level of disturbance. Actual counts of the number of disturbance events would help determine changes in the level of human disturbance over time. The decision on whether or not to gate this cave would be made based upon indications of unacceptable human use levels of SC-I. According to Senger and Crawford 1984, as cited by Nieland 2000, the installation of cave gates should be used as a last resort after all other efforts fail. Due to this fact, it is believed quantitative monitoring is warranted prior to making a decision to gate the cave. If monitoring indicates a gate is needed, cave-gating experts would be consulted regarding design and proper installation procedures.

The cost of the video/photo equipment is approximately \$5,000 to \$10,000. Additional costs in personnel time to change the batteries and check the system would be approximately \$2,200 per year.

Seasonal Visitor Use Permits:

Providing an opportunity to interested publics to visit Salt Caves during the non-closure period could discourage people from visiting the site during the prohibited closure period. Permitted visits with researchers and/or BLM personnel would contribute toward education of the public and quench curiosity. First hand experience of the cave and notification of the importance of the resource could help spread the desire to protect the cave.

The non-closure period for the caves extends from fall through early spring. A small number of bats do use the caves for hibernation during the winter. Although the timing of permitted visits to the caves would be controlled to avoid the peak periods of use for hibernation by bats, disturbance to the bats could occur depending upon weather variations. In general, *C. townsendii* begin to arrive at hibernacula in October (Kunz and Martin 1982). Visits would not be allowed until at least October 1 due to the closure period for the maternity season. If hibernating bats are present, people visiting the caves during this period would cause the bats to come out of hibernation and to utilize valuable fat reserves needed to survive until the arrival of spring. Arousal of bats by humans during winter hibernation can cause bats to expend from 10 to 30 days of their body fat reserves (Tuttle 1991 as cited in Pierson et al 1999). Bats subjected to excessive disturbance during the winter months often run out of energy reserves and die of starvation (Pierson et al. 1999).

Visits to the caves during the non-closure period could also have impacts to other wildlife. The area is critical winter range for big game. Travel into the area between December 1 and April 15 could cause stress to these animals at a time when energy conservation is very important.

Another potential impact would be damage to the roads which are often muddy during the late fall and spring.

Gating of SC-I if Monitoring of Human Use Indicates the Need:

Gating of SC-I would help ensure that the maternity colony of Townsend's big-eared bats would remain undisturbed during the critical time needed for birthing and rearing of the young. Over the long term, single disturbance episodes, which could cause the maternity colony to abandon the site, would be minimized. On the other hand, placement of a gate on SC-I could inadvertently attract vandals to the site and potentially increase the amount and frequency of disturbance to the bats (see discussion below). At this point in time, it is unknown if disturbance to the site has resulted in changes of use of the caves by the Townsend's big-eared bats. In general, the presence of a gate can slow the flight of bats as they pass through the structure. This slower flight can increase the bats' susceptibility to predation if the gate is not placed within the dark zone of the cave. If properly designed and installed, a cave gate on SC-I should not affect the ingress and egress of bats, or increase their susceptibility to predators.

SC-I is relatively inaccessible and logistics of gating the cave would be expensive and pose some human safety issues. Due to the large size of the cave opening and the feasibility of gating such a large space, the gate would be installed further back in the cave where the cross section is smaller. This would place the gate much closer to the roosting area of the bats and they could be more vulnerable to disturbance than if the gate were placed across the larger portion of the opening; however, up to this point in time it appears there has been no disturbance in the form of shooting or direct harm to the bats. No shot gun or rifle shells have been noted in the area over the past decade during bat population monitoring efforts, or during visits by BLM personnel to the site.

The cost of planning, construction, and installation of a gate across the opening of SC-I is estimated at approximately \$30,000 to \$35,000.

The actual construction of a gate at SC-I would likely result in disturbance to the vegetation in front of the cave, which currently shields a portion of the cave from view. It would also result in a well-worn trail from the shoreline of the river to the cave. In the short term, impacts to the vegetation and the trail would result in higher visibility of the newly constructed gate. The disturbance to the site and increased visibility could generate more human interest in the caves and more disturbance as a consequence.

Over the long term, placement of the gate across the smaller portion of the cave opening would not likely be visually obtrusive from the vantage point of the river. Vegetation between the shoreline and the cave opening would recover and block the view of this portion of the cave. The coloration of the steel used would be chosen to blend into the background of the cave as much as possible. The gate would be visible from the opposite bank of the river, and may be visible from the canyon rim in the late afternoon when the cliff face is in the sunlight. If gating of SC-I is determined to be necessary, a "Visual Contrast Rating" assessment would be conducted to ensure that visual impacts to the scenic resources of the "Scenic River" are minimized through mitigation measures.

Placement of a gate on SC-I could attract rather than deter human visitors and result in greater disturbance to the bats; however, the majority of river users (boaters) are already aware of the existing closure and have complied cooperatively. In addition, after recovery of the vegetation, the gate would not be visible from the river. The gate would be visible from the road on the opposite side of the river; however, this road would be closed. Generally, the inaccessibility of Salt Caves would probably preclude any major vandalism to the gate or disturbance to the site; however, this is not certain.

Gating SC-II:

Gating of the small cave (SC-II) immediately would help ensure protection of continued use of both caves by Townsend's big-eared bats through protection of what appears to be an important transition site. It is known that human entry to SC-II occurred at least once in 2000 or 2001, although this could have occurred during the non-closure period. Although the number of human visits to SC-II may be limited, the potential for disturbance to the bats utilizing this cave is very high due to the confined size of the cave. Upon entering the cave, a human is essentially face to face with bats roosting in the cave. Because of this level of proximity between humans and bats, the potential for abandonment of the cave by the bats is highly likely. Because SC-II is used as a transition site, disturbance of this cave could also affect the use of the larger cave during the maternity season.

The cost of planning, construction, and installation of a gate at SC-II is estimated at up to \$10,000.

In general, the presence of a gate can slow the flight of bats as they pass through the structure. This slower flight can increase the bats' susceptibility to predation if the gate is not placed within the dark zone of the cave. If properly designed and installed, a cave gate on SC-II should not affect the ingress and egress of bats, or increase their susceptibility to predators.

Due to the size and location of SC-II, it is unlikely that the general public would be aware that the cave was gated. It is not believed that the mere presence of the gate would attract vandals to the site.

The cave opening of SC-II is not visible from the river or from the opposite riverbank or canyon rim. As a result, installation of a gate would not have an impact upon the visual qualities within the Wild and Scenic River corridor.

Monitor for Vandalism of Gate at SC-II:

The same video equipment used to monitor human activity at SC-I would be used to monitor for vandalism of the gate at SC-II. The cost of the video/photo equipment is approximately \$5,000 to \$10,000. Additional costs in personnel time to change the batteries and check the system would be approximately \$2,200 per year.

Set-up of the video equipment would take place outside the timeframes of the closure dates, and

operation of the system would be designed to eliminate any disturbance to the bats.

Vegetation Monitoring Photo-points:

Establishment of photo-points for monitoring of vegetation leading to the caves would provide photographic documentation of the changes in the vegetation from year to year. In the past, general trend in the growth of vegetation and amount of trail use was noted on an opportunistic basis, but no visual documentation was made.

Alternative 3 - Gating of SC-I and SC-II

Gating SC-I and SC-II:

Gating of SC-I and SC-II would help ensure that the maternity colony of Townsend's big-eared bats would remain undisturbed during the critical time needed for birthing and rearing of the young. Over the long term, single disturbance episodes, which could cause the maternity colony to abandon the site, would be minimized. On the other hand, placement gates could inadvertently attract vandals to the site and potentially increase the amount and frequency of disturbance to the bats (see discussion below). At this point in time, it is unknown if disturbance to the site has resulted in changes of use of the caves by the Townsend's big-eared bats. In general, the presence of a gate can slow the flight of bats as they pass through the structure. This slower flight can increase the bats' susceptibility to predation if the gate is not placed within the dark zone of the cave. If properly designed and installed, cave gates on SC-I and SC-II should not affect the ingress and egress of bats, or increase their susceptibility to predators.

Gating SC-I:

SC-I is relatively inaccessible and logistics of gating the cave would be expensive and pose some human safety issues. Due to the large size of the cave opening and the feasibility of gating such a large space, the gate would be installed further back in the cave where the cross section is smaller. This would place the gate much closer to the roosting area of the bats and they could be more vulnerable to disturbance than if the gate were placed across the larger portion of the opening; however, up to this point in time it appears there has been no disturbance in the form of shooting or direct harm to the bats. No shot gun or rifle shells have been noted in the area over the past decade during bat population monitoring efforts, or during visits by BLM personnel to the site.

The cost of planning, construction, and installation of a gate across the opening of SC-I is estimated at approximately \$30,000 to \$35,000.

The actual construction of a gate at SC-I would likely result in disturbance to the vegetation in front of the cave, which currently shields a portion of the cave from view. It would also result in a well-worn trail from the shoreline of the river to the cave. In the short term, impacts to the vegetation and the trail would result in higher visibility of the newly constructed gate. The disturbance to the site and increased visibility could generate more human interest in the caves

and more disturbance as a consequence.

Over the long term, placement of the gate across the smaller portion of the cave opening would not likely be visually obtrusive from the vantage point of the river. Vegetation between the shoreline and the cave opening should recover and block the view of this portion of the cave. The coloration of the steel used would be chosen to blend into the background of the cave as much as possible. The gate would be visible from the opposite bank of the river, and may be visible from the canyon rim in the late afternoon when the cliff face is in the sunlight. If gating of SC-I is determined to be necessary, a “Visual Contrast Rating” assessment would be conducted to ensure that visual impacts to the scenic resources of the “Scenic River” are minimized through mitigation measures.

Placement of a gate on SC-I could attract rather than deter human visitors and result in greater disturbance to the bats; however, the majority of river users (boaters) are already aware of the existing closure and have complied cooperatively. In addition, after recovery of the vegetation, the gate would not be visible from the river. The gate would be visible from the road on the opposite side of the river; however, this road would be closed. Generally, the inaccessibility of Salt Caves would probably preclude any major vandalism to the gate or disturbance to the site; however, this is not certain.

Some individuals may want to visit the cave during the non-closure period. Gating of SC-I would preclude these types of opportunistic visits by law-abiding citizens. There is a chance the action of gating this cave could create tension and result in vandalism to the structure and the site.

Gating SC-II:

Gating of the small cave (SC-II) immediately would help ensure protection of continued use of both caves by Townsend’s big-eared bats through protection of what appears to be an important transition site. It is known that human entry to SC-II occurred at least once in 2000 or 2001, although this could have occurred during the non-closure period. Although the number of human visits to SC-II may be limited, the potential for disturbance to the bats utilizing this cave is very high due to the confined size of the cave. Upon entering the cave, a human is essentially face to face with bats roosting in the cave. Because of this level of proximity between humans and bats, the potential for abandonment of the cave by the bats is highly likely. Because SC-II is used as a transition site, disturbance of this cave could also affect the use of the larger cave during the maternity season.

The cost of planning, construction, and installation of a gate at SC-II is estimated at up to \$10,000.

In general, the presence of a gate can slow the flight of bats as they pass through the structure. This slower flight can increase the bats’ susceptibility to predation if the gate is not placed within the dark zone of the cave. Precautions would be taken to place the gate within the dark zone.

Due to the size and location of SC-II, it is unlikely that the general public would be aware that

the cave was gated. It is not believed that the mere presence of the gate would attract vandals to the site.

The cave opening of SC-II is not visible from the river or from the opposite riverbank or canyon rim. As a result, installation of a gate would not have an impact upon the visual qualities within the Wild and Scenic River corridor.

Monitor for Vandalism of Gate at SC-II:

Photographic equipment would be used to monitor for vandalism of the gates on SC-I and SC-II. The cost of the video/photo equipment is approximately \$5,000 to \$10,000. Additional costs in personnel time to change the batteries and check the system would be approximately \$2,200 per year.

Set-up of the video/photo equipment would take place outside the timeframes of the closure dates, and operation of the system would be designed to eliminate any disturbance to the bats.

No Action Alternative

Monitoring Activities:

Under the No Action Alternative, both SC-I and SC-II would remain un-gated, and no quantitative monitoring (only random visual checks) would be in place to determine any changes in human disturbance levels at the site. The site would be checked on an opportunistic basis only. Detection of potential increases in the level of human disturbance at the site would either be delayed or not detected. To date, it has been determined from monitoring efforts during the 1990s that management actions to inform the public of the closure have been effective in curtailing the majority of human use of the caves. Although it appears the number of visits to the caves is low, the actual number of visits and the potential effects upon the use of the caves by the Townsend's big-eared bat are unknown. Under the No Action Alternative, this would remain the status quo. The River Ranger Patrols of the area would continue.

Use of the caves by Townsend's big-eared bats would probably occur about every five years. The use of non-invasive monitoring techniques would be encouraged.

Current Closure Period:

The current closure period of May 1 through September 15 of each year would remain in effect and the rafting permittees would be reminded of this closure on an annual basis along with their permits to run commercial rafting operations on the river. The presence and condition of the closure signs would be checked on an opportunistic basis only, as has been the case in the past. Reproductive Townsend's big-eared bats using SC-II would be vulnerable to disturbance during peak transitional use periods of this cave.

Environmental Education:

Guidebook authors would not be notified to request removal of any reference to Salt Caves in future editions of their recreation guides.

CONFORMANCE WITH EXISTING LAND USE PLANS

The proposed management recommendations for Salt Caves are in conformance with the following Law, Plans and Environmental Impact Statements:

- The Federal Cave Protection Act of 1988
- Final Klamath Falls Resource Area Management Plan and Environmental Impact Statement (FEIS) (Sept. 1994) (KFRA FEIS).
- The Klamath Falls Resource Area Record of Decision (ROD) and Resource Management Plan (RMP) (June 2, 1995) (KFRA ROD/RMP).
- Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl (Feb. 1994) Also known as the Northwest Forest Plan (NFP).
- Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines (Jan. 2001).
- Wild and Scenic Rivers Act of 1968
- Archaeological Resources Protection Act of 1979
- National Historic Preservation Act of 1966 as amended in 1992.
- Upper Klamath River Management Plan/Environmental Impact Statement (in progress)

CHAPTER V - CONSULTATION AND PUBLIC INPUT

Endangered Species Act Consultation

Appropriate U.S. Fish and Wildlife Service personnel have been kept informed throughout the development of this plan. They will continue to be involved as monitoring techniques are refined and as decisions are made regarding planning for cave gating. At present, Bureau of Land Management biologists believe this plan constitutes a “No Effect” to federally threatened and endangered species. If new species are listed or if new information on effects are identified, the U.S. Fish and Wildlife Service will be contacted. If appropriate,

documents required under Section 7 of the Endangered Species Act would be prepared.

Interagency Coordination

Several biologists specializing in bat biology and/or cave gating were contacted regarding the feasibility of gating the caves and/or monitoring methods. In addition, contacts were made regarding management policy for “Significant Caves”. Following is a list of those contacted and their affiliation:

James Ramakka - Wildlife Biologist, BLM, Roseburg Resource Area
Steve Langenstein - Wildlife Biologist, BLM, Coos Bay Resource Area
Cliff Oakley - Wildlife Biologist, U.S. Fish and Wildlife Service, Yreka, CA
Jim Nieland - Cave Management Specialist, U.S. Forest Service, Region 6
Dr. Steve Cross - Southern Oregon University Biology Professor, Ashland, OR
Kelly Fuhrmann - Resource Management Specialist, Lava Beds National Monument
Dave Harmon - Wilderness Planner, BLM, Oregon State Office
James Goodbar - Senior Cave & Karst Resources Specialist, BLM, Washington Office

Native American Consultation

The Klamath Tribes= Culture and Heritage Director, Dino Herrera, was contacted on December 17, 1999 concerning the nomination of the Salt Caves as a significant cave as per the Federal Cave Protection Act of 1988. At that time, the Director commented on the significant cultural values of the cave, but indicated that the listing would not present any foreseeable concerns for the Tribes.

The Director was contacted again concerning the Salt Cave EA at a Coordination Meeting between the Klamath Tribes and the BLM on February 6, 2002. At the meeting, the Director was given a copy of the alternatives and asked if the installation of a gate would interfere with the cultural values of the caves. The Director responded that the Tribes prefer that things are left natural, so they do not usually approve of gates. However, he asked for some time to read about the alternatives and consult with other Tribal members. The BLM is presently waiting for a reply.

CHAPTER VI - LIST OF PREPARERS

Patty Buettner - Wildlife Biologist

Grant Weidenbach - River Ranger

Michelle Durant - Archaeologist

APPENDIX A

Past Management Actions

Due to the vulnerability of the Townsend's big-eared bat population to disturbance, the high amount of boating use of the canyon, and documented visitation of Salt Caves by boaters, several actions were taken to curtail human visitation to the caves. These actions are described below.

Notification of Townsend's Big-eared Bat Presence and Request for Voluntary Avoidance of Salt Caves (1988 & 1989):

Summer of 1988 - A BLM biologist spoke with the Klamath Chapter of the Northwest Rafters Association to notify members of the presence of Townsend's big-eared bats at Salt Caves and to ask for their voluntary compliance with avoidance of the caves. This organization is comprised of individual private boaters from the Klamath Falls, Oregon area.

Spring of 1989 - A BLM biologist attended the annual coordination meeting held between BLM and the Upper Klamath River commercial rafting permittees to inform them of the presence of the bats and to ask that they voluntarily avoid entering Salt Caves with their rafting tour groups.

December of 1989 - During a meeting between the BLM, PacifiCorp, and the Upper Klamath River rafting outfitters permitted to use the river, the BLM asked for voluntary cooperation from the outfitters to avoid stopping at the Salt Caves landing site. They were informed that the reason was to protect sensitive bat species from disturbance. The outfitters were also informed that the BLM would be placing signs on trails leading to the caves indicating the area is closed to foot traffic. The signs would not be visible from the river.

November of 1990 - At a meeting between the BLM, PacifiCorp, and commercial rafting permittees, the permittees were given two handouts on the Townsend's big-eared bat. The handouts included information which described the sensitivity of the bats to disturbance and the associated negative impacts which could occur to the population, described why Salt Caves is critical to this species, and encouraged the permittees to inform other white-water boaters of the issue and appropriate actions.

Seasonal Closure Signs Placed (1990):

Based upon the maternity season for *C. townsendii*, the overlap with the period of human use along the Klamath River, and the high degree of the bats' sensitivity to human disturbance, the Klamath Falls Resource Area made the decision in November of 1989 to impose an official seasonal restriction to human entry of the caves. Signs were placed near entrances to the caves in 1990. Signs were not placed at the beginning of the trail or along the river because these locations could draw undue attention to the caves.

Federal Register Closure (8/91 & 6/98):

A Federal Register Notice published in August of 1991 officially closed Salt Caves to entry by humans during the period of May 1 through September 15 of each year. The closure applies specifically to the caves and extends 25 feet in front of the entrance area. Under the original notice, the penalty for entry of the caves was subject to a maximum fine of \$1,000 and/or imprisonment not to exceed 12 months.

The Federal Register Notice published in August of 1991 had been written incorrectly; therefore a new notice was published in June of 1998 to correct the previous errors. Under the new notice, the penalty for entry to Salt Caves is punishable by a fine not to exceed \$5,000 and/or imprisonment not to exceed 6 months.

Letters to Upper Klamath River Commercial Rafting Company Permittees (1991 to Present):

In July of 1991, commercial rafting permittees were notified in writing of the official Salt Caves closure and associated fines for violation of the closure. Beginning in 1992, letters sent to all Upper Klamath River commercial rafting company permittees, with their commercial permit stipulations, included information notifying them of the official closure period for Salt Caves that was published in the Federal Register. In addition, contents of the enclosure encourage rafters to inform fellow white-water boaters of the closure and to immediately report anyone at the Salt Caves site to the BLM. This information is sent out to the commercial permittees on an annual basis.

Klamath Falls Resource Management Plan (1995):

The Klamath Falls Resource Area Management Plan directs BLM to “continue the Salt Caves seasonal habitat closure from May 1 through September 15”.

Evaluation of Visitor Use and Management Actions Through Monitoring (1990 to Present):

As a result of the visitor use issues at Salt Caves and use of the caves by the Townsend’s big-eared bat, documentation of the degree and timing of human visitation to the caves was initiated. In addition, an evaluation of the effectiveness of the public education efforts and the official cave closure was needed.

A trail counter was used for a period in 1990 to document the amount of human use on the trail leading from the river to the Salt Caves. The results obtained were inconclusive because an improbably large number of passes were recorded. It is suspected that deer and/or the movement of branches by the wind may have accounted for the high numbers.

In 1991, 1996, and 1997, observers monitored rafting traffic as it passed by the Salt

Caves area to note any stopping or visitation of the caves. The results of this monitoring showed that in two cases rafts stopped at the eddy in front of the caves. There were no observations of individuals entering the caves throughout this entire monitoring period.

The area has been monitored by river patrols conducted seasonally by river rangers since 1990. On average, rangers do one weekly raft patrol trip, usually on weekends when recreational use of the river canyon is highest during mid-June to mid-September. During this monitoring no boats were observed parked at the eddy in front of Salt Caves and no individuals were seen walking to or from the caves. Periodically, the condition of the signs and vegetation along the trail are checked.

More information on the amount of visitor use and monitoring results is included in Appendix B.

APPENDIX B

Results of Visitor Use Monitoring of Salt Caves

Several methods were used to monitor the degree of human visitation to Salt Caves. These methods and results are presented below.

Trail Counters

Monitoring human use of a trail leading from the shore of the Klamath River to Salt Caves was initiated in July of 1990 with the use of a trail counter. Monitoring took place from late July through the third week in September 1990. In 1991, the trail counter was in operation from late July through August.

Results obtained from the trail counters were inconclusive. According to the 1991 season report by Dr. Steve Cross, the numbers of passes recorded seemed exceptionally high and may have been the result of wild animals, especially deer. In addition, the counter was often not working or it recorded multiple events with a single passage.

Boating Traffic

In order to monitor the effectiveness of the seasonal closure and river user education efforts, monitoring of the boater traffic was initiated. On Labor Day Weekend of 1991, Dr. Steve Cross (SOU) monitored rafters one day of the weekend and noted eleven boats with a total of 40 people passed the cave without stopping.

During the peak-rafting season of 1996, and on days throughout the rafting season in 1997, BLM personnel monitored boating traffic passing Salt Caves from the opposite side of the river. Monitoring took place on days during the period of high flows used by the boaters and the timing and duration of observations were intended to account for the majority of boats on the river. In 1996, the river was monitored for 8 days from August 10 through September 7. A total of 240 rafts and kayaks were seen on the river and none stopped at Salt Caves. In 1997, monitoring was conducted for a total of five days during which time 149 rafts and kayaks, and two hikers were observed. During this monitoring, no one was observed entering Salt Caves. On July 5th, two hikers were observed walking to the front of the cave but did not enter it. On August 22, two different parties of 5 rafts each stopped at the eddy in front of Salt Caves. Neither group left the shoreline area. Results of the 1996 and 1997 monitoring are presented in Table 1.

River Ranger Patrol

Coincident with the discovery of the Townsend's big-eared bat at Salt Caves in 1988, the BLM River Ranger began patrolling use of the eddy by boaters on a weekly basis during the rafting season of June through September. General observations of the condition of the vegetation in the area of the cave are also made during these patrols.

Closure Signs/Vegetative Growth

The presence and condition of the cave closure signs are checked periodically and replaced if necessary. In the spring of 1996, the signs were found to be absent and were replaced before the closure period for the cave. The condition of the vegetation along the trail was also checked. The shrubs were beginning to grow over the trail. On July 12, 1999, the condition of the signs and vegetation were checked for evidence of human use and/or disturbance. The signs were present and the trail, eddy, and entrance area were overgrown with vegetation, indicating that little to no human use has occurred.

Table 1. Results from monitoring boaters in the Klamath River Canyon near Salt Caves during the summer of 1996 and 1997.

Date	Day of Week	Observ. Time Beg-End	Total # of Rafts	Total # of Kayaks	# of Boats Which Stopped at Eddy	# of Hikers Obser.	Type of Activity on Shore	# of Ind. Stopping at Cave Entrances SCI or SCII	# of Ind. Who Entered Caves SCI or SCII
8/10/96	Saturday	1025-1430	29	4	0	0	None	0	0
8/11/96	Sunday	1130-1530	31	3	0	0	None	0	0
8/17/96	Saturday	1105-1610	37	0	0	0	None	0	0
8/18/96	Sunday	1135-1603	35	3	1-100 yrds upstream of eddy	0	No one got out of the boat (4 min. at shore)	0	0
8/24/96	Saturday	1040-1630	35	3	0	0	None	0	0
8/31/96	Saturday	1100-1600	35	5	0	0	None	0	0
9/2/96	Monday	1100-1400	1	0	0	0	None	0	0
9/7/96	Saturday	1100-1600	17	2	0	0	None	0	0
1996 Subtotal	8		220	20	0	0		0	0
5/31/97	Saturday	1200-1530	6	0	0	0	None	0	0
6/21/97	Saturday	1130-1625	32	2	0	0	None	0	0
7/4/97	Friday	1125-1535	15	4	0	0	None	0	0
7/5/97	Saturday	1030-1545	50	1	0	2	Swimming in River	2 at Both Caves	0
8/22/97	Friday	1115-1530	38	1	10	0	1 repaired raft; others stayed in rafts	0	0
1997 Subtotal	5		141	8	10	2		2	0
Total	13		361	28	10	2		2	0

APPENDIX C
Other Townsend's Big-eared Bat Sites
in South-Central Oregon

Three sites in south-central Oregon provide roosting habitat for *C. townsendii*. In addition to Salt Caves, Poverty Flat and Hoover Ranch provide habitat for this species. These sites are described below.

Poverty Flat

Poverty Flat is a natural cave located along the Butte Falls Highway in Jackson County, Oregon. This cave supports a relatively stable maternity colony of *C. townsendii*. In 1997, an adult population of approximately 190 *C. townsendii* was documented. A peak of 335 individuals was found in late July 1997. The increase in numbers likely represent the young-of-the-year (Cross 1998).

Hoover Ranch

Hoover Ranch is approximately three miles down river from Salt Caves and is owned by PacifiCorp. The attic of an abandoned house at Hoover Ranch appears to serve as a roost site for a small group of *C. townsendii* (as many as 30 individuals), at least for a short period during the reproductive season (Cross 1998). The sex and age composition of this colony is not known, but juvenile *C. townsendii* were found on July 22, 1997, indicating the site may serve as a rearing site for a relatively small colony. Data collected at SC-I in 1997 indicate the possibility that individuals from this cave may have moved to Hoover Ranch for a period of time during the reproductive season. A radio tracking study (Cross 1993) of the colony of bats at SC-I indicated that *C. townsendii* from Salt Caves do use Hoover Ranch and the surrounding area. According to Cross (1998), the warm temperature conditions in the attic are conducive to serving as a maternity site; however, further deterioration of the house could change those conditions through alteration of air flow.

APPENDIX D

Population Monitoring Trials at Salt Caves Using “Non-invasive” Techniques

Current “non-invasive” bat monitoring methods include unaided and night-vision equipment, assisted direct observation, echolocation recording, still photography, motion picture, and videotaping. Some of these methods were used at Salt Caves in 1997 in order to minimize disturbance to the Townsend’s big-eared bat while attempting to obtain data on the population status of this species at this site. A description of the methods used and associated issues are summarized below.

1997 Study of Townsend’s Big-eared Bats at Salt Caves

In an effort to reassess the status of the population of Townsend’s big-eared bats using Salt Caves, monitoring was conducted during the summer of 1997. The monitoring method used was intended to be unobtrusive to the bats. Counts of bats exiting and entering the caves were made from observation platforms outside the two caves. The monitoring included the use of night vision goggles and unaided vision. On some observation nights, bat detectors and/or a video camera were also used as part of a study by Blankenship (1998) (discussion below). Due to the aspect of the cave and resultant lighting and the large size of the opening of SC-I, this method did not prove very successful for an accurate assessment of the use of SC-I by the maternity colony of Townsend’s big-eared bats.

Use of Video Tape Recorders

From June through September of 1997, outflights of bats at three roost sites in southwest Oregon were videotaped. One of these three sites was Salt Caves. The objective of the study was to determine whether video recording could be used to reduce disturbance to bats while monitoring, as well as to improve the accuracy of data obtained. The methods involved using two types of video recorders and an Anabat II sonar detector. The video recorder ran for approximately 55 minutes during each monitoring period. The methods and equipment used resulted in many unforeseen problems including inadequate light, low image quality, and a small field of vision. Because the length of bat emergence often exceeded the amount of time viewable video could be recorded, precise estimates of roost populations could not be made. At Salt Caves, visibility was poor throughout the monitoring season and at no time was the video clear for a full 30 minutes (Blankenship 1998) as it was for the other two sites. The use of artificial light to enhance video recordings was not considered acceptable due to the amount of disturbance it could cause. Video images were not in synchrony with the audio recordings from the bat detectors and were not of sufficient quality to determine species when recorded on videotape. Some data, however, can be obtained from using these methods. Echolocation calls may be used to establish presence of bats and possibly to determine species present, although it cannot be used to precisely estimate population and/or eliminate the possibility of bat presence in an area. Video might be used to identify species through the use of more experienced personnel than was utilized in this study (Blankenship 1988).

APPENDIX E
Recreational Guide Books with Reference to Salt Caves

- Cassady, Jim and Fryar Calhoun. 1995. California Whitewater: A Guide to the Rivers. Fieldston Co. 298 pp.
- Garren, John. 1991. Oregon River Tours. Garren Publishing. 270 pp.
- Holbeck, Lars and Chuck Stanley. 1998. The Best Whitewater in California. Watershed Books. 346 pp.
- Keller, Robb. 1998. Paddling Oregon. Falcon Publishing. 472 pp.
- Quinn, James W. and James M. King. 1993. The Klamath River Canyon. Frank Amato Publications. 180 pp.
- Willamette Kayak and Canoe Club. 1994. Soggy Sneakers. Mountaineers Books. 303 pp.

REFERENCES

- Cross, S.P. 1991. Study of Townsend's big-eared bat at Salt Caves, Klamath River Canyon, Klamath County, Oregon. Phase II Final Report. Southern Oregon State College. 26 pp.
- Cross, S.P. 1992. Studies of Townsend's big-eared bat at Salt Caves, Klamath River Canyon, Klamath County, Oregon. Final Report-1991. Southern Oregon State College. 22 pp.
- Cross, S.P. 1993. Studies of Townsend's big-eared bat at Salt Caves, Klamath River Canyon, Klamath County, Oregon. Final Report-1992. 26 pp.
- Cross, S.P, and D. Savory. 1990. Study of Townsend's big-eared bat at Salt Caves, Klamath River Canyon, Klamath County, Oregon. Phase I Final Report-1990. Southern Oregon State College. 19 pp.
- Cross, S.P., Lauchstedt, H., and M. Blankenship. 1998. Numerical status of Townsend's big-eared bats at Salt Caves in the Klamath River Canyon and other selected sites in Southern Oregon, 1997. Southern Oregon University. 39 pp.
- Gehr, Elliot. 1985. Application for License: Salt Caves Hydroelectric Project, Volume V: Supplement No. 1. Submitted to the Federal Energy Regulatory Commission by the City of Klamath Falls.
- Hall, E.R. 1981. The mammals of North America. Second Ed. John Wiley and Sons, New York, 1:1-600 + 90.
- Maser, C., and S.P. Cross. 1981. Notes on the distribution of Oregon bats. Res. Note, PNW- 379. 31 pp.
- Nieland, J. 1998. Cave Gating Manual, Great Smoky Mountains National Park. American Cave Conservation Association.
- Nieland, J. 2000. Effects of humans on bats and bat caves. Wildlife Society of Oregon.
- Pagel, J.E. 1999. Habitat analysis of some lands in south-central and southeastern Oregon for peregrine falcons: Lakeview District, Bureau of Land Management including Lakeview Resource and Klamath Falls Resource Areas. U.S. Forest Service, Medford. 92 pp.
- Pierson, E.D., M.C. Wackenhut, J.S. Altenback, P. Bradley, P. Call, D.L. Genter, C.E. Harris, B.L. Keller, B. Lengus, L. Lewis, B. Luce, K.W. Navo, J.M. Perkins, S. Smith, and L. Welch. 1999. Species conservation assessment and strategy for Townsend's big-eared bat (*Corynorhinus townsendii townsendii* and *Corynorhinus townsendii pallescens*). Idaho Conservation Effort, Idaho Department of Fish and Game, Boise, Idaho.

Senger, C.M. and R.L. Crawford. 1984. Biological inventory, Mount St. Helens Cave Basalt Flow Area. Unpublished Final Report. Gifford Pinchot National Forest. St. Helens Ranger District, Amboy, WA.

Theodoratus, D.J., M.M. Ashman, H. McCarthy, and D.L. Genetti. 1990. Klamath River Canyon Ethnology Study, Cultural Resource Series No. 8.

Blankenship, M.C. 1998. Efficacy of monitoring bats emerging from roost sites with commercial grade video tape recorders. Senior Project. Environmental Studies, Biology, Southern Oregon University.