

El Capitan Cave Management Plan

Abstract

El Capitan Cave is located on north Prince of Wales Island within the Thorne Bay Ranger District, part of the Ketchikan Area of the Tongass National Forest. The Cave is a large, maze-like system with more than one entrance, numerous side passages, many deep pits, tight crawlways and a well-defined main passageway. The total surveyed passage is 11, 885 feet and the cave is 428 feet in depth. There are still some areas of the cave which have not been mapped.

El Capitan Cave has been recognized for its outstanding attributes as a recreational cave and significant for research purposes. Previous visitation and unregulated use has resulted in vandalism and degradation of fragile cave formations, particularly in the first several hundred feet. Areas in remote regions of the cave still remain pristine. In 1993, Thorne Bay Ranger District installed a gate 150 feet within the cave for protection of the remaining pristine portions and for protection of visitors from known dangers, such as flooding and deep pits.

Installation of the gate accomplished the protection criteria needed for the cave but without further management direction, visitation would be restricted to the area before the gate. This plan develops the strategy and defines the criteria for allowing visitation beyond the gate. Commonly used cave management techniques have been employed as well as the Revised Tongass Land Management Plan proposed Karst and Cave Resource Management Standards and Guidelines. Chapter 5 describes the initial policy and procedures for managing El Capitan Cave.

For management purposes, the cave has been divided into four sections:

- 1) The entrance to the gate (150 feet).
- 2) The gate to Hatfield's Pit (600 feet).
- 3) Hatfield's Pit to the Alaska Room (600+ feet).
- 4) The Steam Room (Side Passage at 250 feet).

Note:Side passages not mentioned here are temporarily closed pending further resource evaluation.

Section 1. Available year round for visitation. Permits and/or guides are not required.

Section 2. Available seasonally from the end of May through August for guided groups of 6 through the main passage to Hatfield's Pit. Guided tours are available Wed. - Sun. and last approximately 1 hour and 45 minutes. Tours are available 8am-10am, 10am-12pm, 12pm-1pm closed for lunch, 1pm-3pm, and 3pm-5pm. The seasonal operating period may vary from year to year due to weather. For example, road closures may occur due to early spring storms making access to the site difficult or impossible. Additionally, the seasonal operating period may change due to public demand. In general, a summer season operating period will be implemented.

Section 3 and the numerous side passages mentioned above will be temporarily closed pending further evaluation. Guided visitation to these areas may be available in the future. These areas may be accessible for research and exploration by approved groups or individuals.

Section 4. Limited to administrative entry for research and monitoring purposes. No recreational caving will be allowed.

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Chapter 1.

EL CAPITAN CAVE MANAGEMENT PLAN

1.1 Introduction

El Capitan Cave is one of many nationally and internationally significant caves discovered on Prince of Wales Island. In 1992, Thome Bay Ranger District decided to provide for public visitation in El Capitan Cave. With this decision, a development strategy was implemented which included installation of a gate within the cave approximately 150 feet past the entrance. Plans for surface developments include an improved access trail and parking area, sewage and sanitation facilities, and interpretive displays. Further developments may occur as the need arises.

Cave management techniques used in this plan are commonly used by the Forest Service and National Park Service. Cave managers and specialists employed by these agencies were solicited for examples of plans and procedures already in use. This information was further developed to reflect conditions specific to Southeast Alaska. Additionally, public comment was incorporated in the plan. Public comments and documentation of public meetings are filed at Thome Bay Ranger District.

1.2 Administration

El Capitan Cave is located on the Tongass National Forest and lies within the management jurisdiction of the U.S. Forest Service in the Ketchikan Area of Southeast Alaska. Thome Bay Ranger District is responsible for the development, maintenance, operation and general administration of this cave.

1.3 Purpose and Need

A. Purpose

Tremendous cave resources have developed on, and within the soluble bedrock limestone of Prince of Wales Island. Over three hundred caves have been discovered with projections of hundreds more to be found. In a report prepared by the Ozark Underground Laboratory titled Karst and Cave Resource Significance Assessment, a panel of four karst resource professionals stated that the karst and cave resources of Prince of Wales Island have attributes of international and national-scale significance. El Capitan Cave was recognized for its outstanding attributes as a recreational cave and significant for research purposes.

The purpose of this document is to guide management of El Capitan Cave so that preservation of this significant non-renewable resource will be maintained while allowing recreational caving and research. Increased visitation to El Capitan Cave associated with the recent popularity of caving, as well as a growing scientific interest in the cave has increased the potential for resource damage. This plan is intended to provide consistency in management, protection, use, and development. It identifies management actions, priorities for research, and emergency actions inherent in managing cave resources.

Much of the direction for this plan is found in the Forest Service Manual (Part 2356), Standards and Guidelines in the Tongass Land Management Plan Revision, the Tongass Land Management Plan Amendment (1985-1986) and numerous Federal Laws and regulations. The

Tongass Land Management Plan Revision provides more direction for managing caves than the 1985-86 Amendment. In the Revision, El Capitan Cave is included in a proposed Geologic Special Area. Within this land use designation, resource values are available for study, use, or enjoyment when adequate provisions for protection are available and the resource is suitable for the activity. Additionally, the Revision requires that Cave Management Plans be developed for Class 1: Sensitive Caves, Class 2: Undeveloped Caves and Class 3: Directed Access Caves. El Capitan Cave is being managed as a Class 3 Cave in which the following applies:

Class 3: Caves with directed public access and are developed for public use and enjoyment. These caves are shown on maps or have signs directing visitor access. Regardless of the level of development, public visitation is encouraged. These caves could have improved access, developed trails, artificial lighting, and guided tours. Interpretive materials about these caves may be available. The caves may have sensitive resources that need to be protected. Access may be through a reservation.

B. Need

As mentioned earlier, people are attracted to El Capitan Cave for reasons ranging from scientific study to recreational exploration. Recreationists, school and youth groups, the media, scientists, explorers, international travelers and early man have visited El Capitan Cave in varying degrees. Recently, requests for visitation to the cave have increased. It is an attraction that provides an excellent opportunity to expand recreation and enhance the economy of Prince of Wales Island, however, visitation must be managed to prevent user conflicts and destruction of the cave. Prior to installation of the gate, monitoring has revealed that approximately 75 percent of the formations in the first 600 feet of the cave have been destroyed or damaged. The gate now provides a measure of protection for the remaining resources in the cave but without management direction, the gate prohibits visitation. Consequently, the need to develop a management plan is tied primarily to allowing controlled visitation beyond the gate.

1.4 Existing Condition

El Capitan Cave has no internal developments other than one gate. There have been no changes to the natural appearance of the cave except for slight modifications of the ground at the cave entrance. Ground modification occurred with the development of an access trail. The majority of the known cave has been mapped however, a few segments of the cave have not been completely finished. Previous visitation in the cave has resulted in vandalism and degradation of fragile cave formations. Most vandalism has occurred within the first 600 feet of main passage. Human waste, litter and graffiti have been found. Cigarette smoking and pets in the cave are recognized problems. The passage beyond Hatfield's Pit, and most side passages of the cave (see Appendix A) have pristine qualities with little to no resource damage. The degree of damage in El Capitan Cave may be due to easy accessibility to the main passageway, knowledge of the cave location, and a lack of understanding about the fragile and non-renewable nature of caves. Regardless of the vandalism, El Capitan Cave contains many outstanding resources which are unique and fragile. It is an excellent recreational cave which provides the visitor varying degrees of challenge and aesthetic appeal. Valid research of the cave has been very limited. See Chapter 2 for a more detailed description.

1.5 Desired Future Condition

El Capitan Cave is developed for public use and enjoyment while natural diversity and primitive quality is retained. It is better understood, protected and preserved through research, education, and monitoring. Visitation does not detract from the natural character of the cave.

1.6 Proposed Action

El Capitan Cave is a large, maze-like system with varying degrees of resource and safety concerns. It has a well defined main passageway with numerous horizontal and vertical side passages. Some side passages have not been mapped and a complete inventory is lacking. Installation of a gate at approximately 150 feet past the entrance instituted a fixed division of the cave. Analysis by volunteer cavers and Forest Service Specialists in Recreation and Geology, resulted in the apparent need to divide the cave according to differing resource concerns, recreational uses, and hazards. Portions of the cave cannot be accessed without climbing skills and rope (Section 3). Other sections are relatively safe (Section 1), while all sections contain outstanding resource values. It was also recognized that a control or off-limits area (Section 4) would be advantageous for monitoring resource degradation and comparing areas of variable use. For these reasons and for management purposes at this time, a proposed action to divide the cave into four sections follows:

- 1) The entrance to the gate (150 feet).**
- 2) The gate to Hatfield's Pit (600 feet).**
- 3) Hatfield's Pit to the Alaska Room (600+ feet).**
- 4) The Steam Room (Side Passage at 250 feet).**

Note:Side passages not mentioned here are temporarily closed pending further resource evaluation. See Appendix A for a map of El Capitan Cave.

Section 1 will be available year round for visitation. Permits and/or guides are not required however, visitors will be encouraged to sign a visitor register located at the entrance to the cave.

Section 2 will be available seasonally from May through September for guided groups of 6 through the main passage to Hatfield's Pit. The seasonal operating period may vary from year to year due to weather. For example, road closures may occur due to early spring storms making access to the site difficult or impossible. Additionally, the seasonal operating period may change due to public demand. In general, a summer season operating period will be implemented.

Section 3 and the numerous side passages mentioned above will be temporarily closed pending further evaluation. Guided visitation to these areas may be available in the future. These areas may be accessible for research and exploration by approved groups or individuals.

Section 4 will be limited to administrative entry for research and monitoring purposes. No recreational caving will be allowed.

This is an initial management strategy. Management will likely change as the strategy is fine-tuned and more is learned about El Capitan Cave through monitoring and research. For detailed management policy and procedures see Chapter 5.

1.7 Management Objectives

Cave resources present unusual management challenges because of the nonrenewable nature of cave contents and the sensitivity of cave ecosystems to human visitation. Management of El Capitan Cave focuses on protecting important cave resources while allowing recreational use. Strategies which preserve the cave resources and maintain the recreational opportunities are sought. Strategies may involve winter closures for protection of hibernating bats while maintaining recreation opportunities throughout the remaining year.

Primary Objectives

1. Perpetuate El Capitan Cave in a natural or nearly natural condition. As much as possible, protect and preserve aesthetic values of the cave.
2. Provide opportunities for visitors to enjoy, appreciate, explore, and learn about El Capitan Cave. Encourage and promote organized school visits as a means of educating young people about the fragile nature of caves.
3. Protect fragile biological and geological cave features including cave adapted species and their habitat. Protect archeological, historical and paleontologic sites.
4. Prevent contamination of important water supplies which drain into, issue from, or are contained within El Capitan Cave.

Secondary Objectives

1. Provide opportunities for scientific study of El Capitan Cave which will promote understanding, appreciation, and improved management. Encourage studies of cave ecology, geology, paleontology, archeology, and history which are consistent with the protection objectives listed above, and applicable laws and regulations.
2. Identify and monitor resources in El Capitan Cave to assess the effects of visitation to see if established visitation levels are appropriate.
3. Provide for public health and safety while recognizing that El Capitan Cave can never be completely safe, and that risk-taking is a part of the caving experience.
4. Develop interpretive signs to assist with education and safety.

1.8 Policy

The national policy for managing caves on Forest Service land is found in the Forest Service Manual (FSM) 2356.03 and reads as follows:

1. Manage caves as a nonrenewable resource to maintain their geological, scenic, educational, cultural, biological, hydrological, paleontological, and recreational values.
2. Classify caves containing outstanding values as Geological or Historical Areas (2372).
3. Emphasize wild cave management with few or no facilities to aid or facilitate use.
4. Develop management prescriptions for caves of significant value.
5. Coordinate surface and cave resource management activities.
6. Protect threatened, endangered, proposed, and sensitive, species in accordance with the Endangered Species Act (16 U.S.C. 1531) and FSM 2670.
7. Protect cultural sites and deposits in accordance with FSM 2361.03 and federal laws.
8. Develop and foster communications, cooperation, and volunteerism with interested publics, Federal agencies, and State and local governments.

1.9 Authority

The principal laws affecting management of El Capitan Cave follows.

1. The Organic Administration Act of June 4, 1897. (16 U.S.C. 551).
This Act authorizes the Secretary of Agriculture to regulate occupancy and use of the National Forests. Regulations issued under the Act authorize the protection of cave resources from theft and destruction (36 CFR 261.9a, 9b, 9g, and 9h). Under 36 CFR 294.1, classification is authorized for special interest areas that are managed for recreation use substantially in their natural condition. Special closures are authorized under 36 CFR 261.53 to protect threatened cave resources.
2. Antiquities Act of 1906 (34 Stat. 225; 16 U.S.C. 431 et seq.).
This Act provides for the protection of historic or prehistoric remains or any object of antiquity on Federal land. Criminal sanctions are authorized for destruction or appropriation of antiquities. Scientific investigations of antiquities on Federal lands are permissible subject to permit and regulations. Uniform rules and regulations pursuant to this Act are in FSM 1530.12.
3. Archaeological Resources Protection Act (ARPA) October 31, 1979 (16 U.S.C. 470aa).
This Act clarifies and defines "archaeological resources," prohibits the removal, sale, receipt, and interstate transport of archaeological resources obtained illegally from public lands. The Act authorizes confidentiality of site location information, authorizes permit procedures to enable study and investigation of archaeological resources on public lands by qualified individuals; provides for substantial criminal and civil penalties, forfeiture of equipment used in the crime, and rewards for citizens who report the crime. The Act supplements but does not replace the Antiquities Act of 1906.
4. Endangered Species Act of 1973 (87 Stat. 884, as amended; 16 U.S.C. 1531).
This Act describes the process for determining endangered and threatened species, establishes prohibited acts, prescribes penalties, mandates a recovery plan, and defines interagency and State cooperative relationship requirements.
5. Federal Cave Resources Protection Act of 1988
This act provides specific authority to protect cave resources on federal lands. The Act establishes that "... Federal lands be managed in a manner which protects and maintains, to the extent practical, significant caves." (Section 2(c)). The two purposes of the Act (Section 2(b)) are:
 - to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and
 - to foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, education, or recreational purposes.

Chapter 2.

Background and Description

2.1 Location

El Capitan Cave is located on north Prince of Wales Island in southeast Alaska, USGS Petersburg quad (A-4), T.66S., R.78E., Section 11, CRM. According to the Prince of Wales Island Area Plan, lands on both east and west sides of the project area in Sections 10 and 11 are either privately owned or proposed for state selection. A Forest Service Work Camp is located approximately 1000 feet down a steep slope, west from the cave entrance.

2.2 Discovery

It is unknown who or when El Capitan Cave was first discovered. In September of 1985, Forest Service Geologist, David Hatfield and crew penetrated several difficult and remote regions of the cave and were apparently the first to drop into what is now known as Hatfield's Pit (see map). In August of 1987, Kevin and Carlene Allred, National Speleological Society (N.S.S.) members (Glacier Grotto Branch), were the first cavers to investigate and officially name El Capitan Cave.

Since the Allred's first visit in 1987, cavers continue to inventory and map El Capitan Cave. A Challenge Cost Share Agreement between the Forest Service and the N.S.S. has been in effect since 1987. Under this Agreement, N.S.S. members are requested to inventory and map caves on the Thome Bay Ranger District. Much resource information about El Capitan Cave has been provided by the N.S.S. to the Forest Service.

2.3 General Description

El Capitan Cave is the longest known cave in Alaska with a total 1993 surveyed passage of 11,885.5 feet and 428.6 feet in depth (275.2 feet above the entrance and 153.3 feet below the entrance). Structurally, it is both horizontal and vertical. There are many branching passages, deep side pits, crawlways, and over-hangs. The main passage is mostly horizontal, of walking height or larger, and contains areas of adjoining spongework maze which are generally more vertical and/or smaller; roughly two to three feet in diameter. Many side passages are filled with sediments nearly or completely to the ceiling. It is a phreatic tube with a cobble floor of stones football size or larger. The Cave has three horizontal entrances located on a steep slope above a well defined gully. It is approximately 95 percent pure limestone and has been formed through weathering and dissolution processes, i.e., water containing carbon dioxide derived from rain and soil moves downward and dissolves the limestone. The cave contains a sump located in a large room (roughly, 85 feet wide, 230 feet long, and 116 feet high) in the lower portion of the cave. Dives were taken through the sump in the summer of 1993. On the other side of the sump at approximately 60 feet is a large room 45 feet in diameter and 70 feet high.

Speleothems within the cave consist of soda straws, stalactites, drapery, flowstone, small helictites, small crystals, stalagmites, mud stalagmites or hoo-doo's, conulites, and moonmilk. Notable speleogens are splash cups, boxwork and scallops. Undamaged cave formations become more abundant further into the cave.

Portions of the cave cannot be accessed without specialized caving skills and equipment. There are many deep pits and rises which require climbing skills. Areas of the cave are prone to flooding however, rapid flooding does not occur within the main passage up to approximately 600 feet.

2.4 Cave Weather

As a general rule, a cave's physical environment varies less than the surrounding surface environment. Physical conditions vary over time, between caves and between areas within a cave.

The temperature in El Capitan Cave approximates the mean annual temperature of the region; 40 degrees F. In regions far from the entrances, the temperature scarcely varies at all with greater variations near the entrance. Temperature fluctuations of several degrees has been recorded throughout the main passage. As external temperatures vary from season to season, air currents within the cave change temperatures throughout the system.

Relative humidity rarely falls below 80 percent. The cave is constantly damp and dripping with water. During extended periods of low surface precipitation, cave waters drop, however relative stability is usually the pattern.

2.5 Previous Visitation

Humans visited El Capitan Cave over 3,000 years ago (R. Carlson, 1993). Visitation over the last 100 years is likely to have coincided with other human activity in the area such as mining, logging and fishing. Accurate documentation of visitors per year does not exist. Primary use in the last five years has been by volunteer cavers working for the Forest Service and local residents of Prince of Wales Island. Prince of Wales residents have been visiting the cave for many years. Visitation has increased since 1989 when harvest activity provided easier access and caves became more publicized locally.

2.6 Vandalism

The extent of existing vandalism varies throughout the cave. Severely damaged areas are primarily restricted to the main passage of the cave which is easily accessible to visitors and within the first 500 to 600 feet from the entrance. Extensive vandalism is seen within the first several hundred feet of the cave. Broken formations, littering, and graffiti have been the major forms of vandalism noted in the cave.

2.7 Installation of a Gate

Through internal and external analysis with experienced El Capitan cavers and Forest Service personnel, the need for a gate was apparent. During the summer of 1993, a gate was installed approximately 150 feet from the entrance. Installing a gate was intended to serve two primary purposes; protection of the pristine portions of the cave and protection of visitors from known dangers, such as flooding and deep pits.

The gate has been designed to allow bats safe ingress/egress from the cave. Already, bats have been seen beyond the gate by cavers and Forest Service personnel. The decision to place a gate within the cave, build a trail to the cave and develop interpretive signs was disclosed in an environmental analysis completed January 11, 1993 and meets the requirements of the National Environmental Policy Act.

CHAPTER 3.

INVENTORY, RESOURCE EVALUATION, HAZARD RATING AND CLASSIFICATION

3.1 Introduction

As mentioned in Chapter 1.6 under Proposed Action, El Capitan Cave has been divided into four sections for management purposes. This chapter provides inventory results, evaluates cave resources, rates hazards and classifies the cave according to the following four sections:

- 1) The entrance to the gate (150 feet).
- 2) The gate to Hatfield's Pit (600 feet).
- 3) Hatfield's Pit to the Alaska Room (600+ feet).
- 4) The Steam Room (Side Passage at 250 feet).

3.2 Cave Inventory Procedures

Inventory and evaluation of El Capitan Cave continues. Substantial inventory work has been conducted by volunteers, universities, research facilities such as the Ozark Underground Laboratory, and Forest Service personnel. The first step in the inventory procedure is to create a map of the cave. Specialized survey equipment and computer programs are used to develop the maps. Sketched details of floors, ceilings and other features are included. A standard of "mapping as you go" has been established rather than exploring the cave and then mapping. All persons involved in inventory are made aware of the spectrum and fragility of cave resources and are required to abide by rules which protect and conserve cave resources. Inventory reports which accompany cave maps are required as part of the inventory procedure. Reports provide an initial written commentary on the cave, its condition, and resources. Inventory work is and should continue to be coordinated by Forest Service employees with cave management responsibilities and duties.

3.3 Resource Inventory

This section describes the known values of recreation, visual quality, biology, geology/mineralogy, cultural resources, paleontology and hydrology for El Capitan Cave. This information has been compiled from various inventory reports.

Recreation

El Capitan Cave has outstanding recreational values for experienced cavers, novices and other recreationists. Different challenge levels exist throughout the cave. Climbing and cave diving opportunities are present.

Much of the recreational success for the individual depends upon the kind of experience being sought. The primary experience opportunities include the following:

1. Obtaining privacy, solitude, and tranquility in an underground setting.
2. Experiencing a natural karst ecosystem unmodified by human activity.
3. Gaining a new mental perspective in a dark, fragile environment.
4. Learning more about nature, especially natural processes which form caves, human relationships with nature, and how to live in greater harmony with nature.
5. Self-testing and risk-taking for self-development and sense of accomplishment.

Visual Quality

Visual quality is based upon inherent scenic characteristics of the resource, degree of alteration of the resource, and amount of use of the scenic resource generated by visitation. The over-all inherent scenic quality is high and very diverse. Outstanding feature attractions and distinctive variety in form, line, color and texture or combinations thereof exist throughout the cave.

Numerous formations are present. Visual quality of cave formations increase the farther one goes into the cave. The limestone of El Capitan Cave is as much as 95 to 99 percent pure, making the rock appear whitish or clear. Marble is present and exhibits itself as white striations in the rock. Numerous patterns can be seen in the placement of the rocks. An intricate system of mazes and side passages create a myriad of shapes and form that are both interesting and unique, often resembling statues and other familiar figures and representations.

Moon milk, fans and draperies, soda straws, flow stones, pop corn, hot fudge sundaes, stalactites and stalagmites are some of the formations present. Prehistoric bear claw marks can be found on the walls along with hundreds of fossils of various shapes, sizes, and origins. Most of the formations in the back of the cave are not broken or marred while numerous formations in the first several hundred feet have undergone degradation. Such degradation has resulted in broken stalactites, stalagmites and soda straws and discoloration of flow stones. Some graffiti has occurred but to date, all has been removed. Often, visitors leave trash around the entrance and in the first portions of the cave with the highest volume being cigarette butts which detract from the over-all scenic quality.

Public visitation and subsequent use of the scenic quality has been relatively moderate. Measurements of use are reflected through such mechanisms as return visitation and photography. Approximately 30 to 35% of first time visitors return to El Capitan Cave annually. Often, visitors engage in scenic photography as a main function of their trip. Professional and amateur photographers and writers have come from near and far to take pictures of the cave and document the marvels of El Capitan's underground. Numerous videos have been filmed for local and national television broadcasts.

Biology

Significant populations of invertebrates unique to El Capitan Cave exist in areas ranging from the entrance twilight zone to deep cave zones such as the Alaska Room. Many invertebrate collections are currently being sent to taxonomic specialists to verify their unique identities.

In 1988 approximately 5 fungus gnats (order Diptera, family Mycetophilidae, genus: *Speolepta*) were collected from an area near Hatfield's Pit, some 700 feet within El Capitan Cave. Rod Crawford, Entomologist of the University of Washington identified them as an undetermined species of fungus gnat. They were the first recorded species of fungus gnat found in the state of Alaska.

In May of 1990, a preliminary survey of El Capitan Cave was conducted to help determine the biologic components found within the cave. This survey was conducted for a three week period and does not represent a complete biological survey or inventory, as different life forms may be present at other times and places which were not sampled. (Allred, 1990).

Numerous invertebrates were found during this survey. Beetles, gnats, harvestmen, stone fly nymphs, segmented worms, flat worms, nymph exoskeletons, pupas, mosquitoes, flies, a white millipede, spiders, a sow bug, and a thin centipede were found. Life was most abundant in the twilight zone or cave entrance. Apparently, most of these samples were lost in transit to the University of Connecticut where they were being sent for identification purposes. Consequently, there are no verifiable invertebrate species documented as a result of this study. Vertebrate

collections included the first three bat skulls found and some deer hair. Two of the bat skulls were positively identified by Dr. Fred Grady of the Smithsonian Institution in Washington , D.C., as Myotis californicus.

Other biological investigations have been limited. Kent Carlson, Cave Entomologist from West Virginia, and Doreen Baichtal, graduate student at the University of Fairbanks studying bats, have conducted some surveys in El Capitan Cave. The following is a compilation of their work.

Bats - Myotis bats have been documented in El Capitan Cave. They have been found using the cave in winter. The most bats counted at one time in the cave has been twelve. Myotis lucifugus have been discovered beyond the gate. Whether there is a significant population of bats in El Capitan Cave is unknown. Whether the cave represents a critical resource particular for the bats survival is not known.

Fish - There have been no reports of fish in El Capitan Cave streams. Nearby Salmon Fry Cave, however, does have populations of salmon fry that reside in the cave stream. Sampling of streams with monnow traps in El Capitan (Upper and Lower Rockwell River) has been unsuccessful.

Other Vertebrates - At one time or another, the cave has been shelter for a variety of large mammals (see paleontology). Currently, only rodents inhabit the entrance portions of the cave.

Invertebrates - Numerous collections of terrestrial, aquatic, and aerial invertebrates have been made in many parts of El Capitan Cave by Kent Carlson in July of 1992 and 1993, and February of 1993.

Typical terrestrial fauna collected from El Capitan Cave in July of 1992 include Onychiuran collembolans (Onychiurus ramosus), Entomobryad collembolans (Heteromurus nitidus), Isotomid collembolans (Folsomia ozeana), Rhagid mites (Rhagidia sp.), and Enchytraeidae worms. The collembolans identified above have not as yet been found in surface collections. They are unique to only cave systems on Prince of Wales and Dall Islands. Out of all caves sampled on Prince of Wales Island, two species, Heteromurus nitidus and Folsomia ozeana, are unique to El Capitan Cave. Surface collembola specimens collected at the El Capitan Work Center bear Familia resemblance to those in El Capitan Cave but not Generic or Species similarity. Neither cave nor surface collembolan species have been previously reported from southeast Alaska. One surface species of collembolan found at El Capitan Work Center has only been collected previously from a glacier in Washington State (Mt. Rainier).

Aquatic fauna collected during July of 1992 are representative of epigeal (surface) environments. These include various species of Tricoptera, Plecoptera, and Ephemeroptera insects, as well as Planorbid snails (Mentus sp), Tricladida flatworms (Polycelis sp), and Lumbriculid worms (Rhynchelmis sp). The cave environment probably represents a sheltered environment in which to finish their development (migration into the cave?) or a collection site from specimens washed down from above. It is not known if any species complete their entire cycle in the cave.

Aerial invertebrates collected during July of 1992 are also representative of epigeal environments. These include Diptora (Speleolepta sp and Antocha sp) to name a few. Again it is not known if any species complete their entire cycle in the cave.

Threatened or Endangered Species - No known threatened or endangered vertebrates have been found to date. At present it is unknown whether the invertebrate specimens collected could be considered for federal or state, threatened or endangered species listing.

Geology/Mineralogy

No comprehensive geologic studies have been or currently are being conducted in El Capitan Cave. Most investigations have been informal. No study plans for study in the cave have been received and limited reports are available.

Various types of pristine speleothems have been found in El Capitan Cave. Some of these, (conulites), are relatively rare in southeast Alaska.

Glacial striations have been discovered 50 feet east of the cave's resurgence. Recent erosion of glacial drift (clay, gravel, and cobbles) has exposed incredibly well preserved glacial scouring and plucking features in the pure limestone. The clay has preserved these very old glacial features to a remarkable degree: the scour marks are still white and fresh looking. Glacial movement was westward.

Deposits of light gray banded clay suspected of being from glacial origin have been found in the cave. If these deposits are glacial, high parts of the cave were active at least prior to the last glacial advance. According to Connor and O'Haire in *Roadside Geology of Alaska*, the area has experienced many glacial episodes, at least one being in excess of 3000 feet deep on eastern Prince of Wales Island. Much glacial activity occurred in Alaska during the Pleistocene time of 10,000 years ago.

Cultural Resources

Between September 14 and 30, 1993 all accessible cave passages were inspected to a point approximately 600 feet into the cave. Where sediments were present test pits were excavated to bed rock. This project was directed by Forest Service archaeologists David Johnson and Marty Tagg who have extensive experience in cave archaeology and cave management in the southwest United States. No cultural material was identified by this survey. Additionally, D.Johnson and M.Tagg were asked to make a determination of the eligibility of a previously identified cultural resource site for inclusion to the National Register of Historic Places. The previous archaeological site was found by Ketchikan Area archaeologists and is known as 49-PET-189. A survey and literature search was conducted which resulted in 40-PET-189 being considered an isolated find and "not eligible" for inclusion to the National Register of Historic Places.

Paleontology

During the summer of 1992, a chamber of El Capitan Cave was excavated under the guidance of Dr. Timothy Heaton, Department of Earth Sciences and Physics, University of South Dakota and Dr. Frederick Grady, Department of Paleobiology, Smithsonian Institute.

The excavation yielded the remains of at least three grizzly bears and four black bear. The grizzlies range in age from 12,295 +/- 120 yr. B.P. to 9760 +/- 75 B.P. The black bears dated at 11,565 +/- 115 yr. B.P., 11,540 +/- 110 yr. B.P., 10,745 +/- 75 yr. B.P., and 6,415 +/- 130 yr. B.P. Grizzly bear are no longer present on Prince of Wales Island. Given the dates from the individuals recovered from these deposits, grizzly bears and black bears coexisted on Prince of Wales Island for at least 1,800 years. These discoveries also confirm that by at least 11,500 yr. ago, both grizzly and black bear had migrated into southern Southeast Alaska (J.Baichtal, 1993).

Associated with the grizzly and black bear were the remains of red fox, ermine, bat, otter, and other small mammals. The floor consisted of a thick layer of fish bone thought to be the remains of decomposed otter scat.

Hydrology

El Capitan Cave consists of a complex hydrological system situated in a karst aquifer of Silurian Heceta limestone of marine origin. Three vertical zones can be distinguished: (1) an upper, dry zone (inactive vadose); (2) a periodically flooded zone (active vadose); and, (3) a lower continuously flooded zone (phreatic). The cave had phreatic beginnings with extensive vadose modifications. The water-filled phreatic zone contains ground water which has the sea as its hydrological and erosive base. Characteristic of the vadose zone is the permanent or temporary presence of atmosphere. The limestone has been largely altered by water movement into marbleized breccia (rock composed of sharp-angled fragments cemented in a fine matrix).

Flooding is prevalent in certain areas such as Lower Rockwell River and the Ball Bearing Crawl. There are signs of past violent flooding evidenced by deeply dished-out areas of large football sized cobbles in constricted passages and numerous scallops. The scallops often lack consistency in size and presentation suggesting greatly fluctuating flow rates and patterns. There are many spongework side passages ranging from 100 feet above to 85 feet below the entrance. This gives evidence, along with various fill deposits scattered throughout, of changing flow patterns as certain main water conduits have become clogged, forcing formation of new smaller ones through corrosion and erosion. Much of the lower part of the cave is known to flood with the exception of the main passage to Hatfield's Pit (Section 1 and 2) and higher sections. Flooding may occur throughout the year whenever rainfall is high and/or during snow melt. A hydrological survey was done for El Capitan Cave in May, July, and August of 1990. Results of the survey linked cave flooding and resurgence water flow (CFS) to general weather fluctuations. Inches precipitation and total drainage area were not linked to the study. This limited the surveys' use as a predictive model.

There is a cave resurgence stream known as Rockwell's River, in what is called Lower El Capitan Cave. This river represents a water thoroughfare (and possibly reserve) for the water used in the El Capitan Work Center, a Forest Service field camp located 1500 feet below the cave. (see Vicinity map in Appendix A). The average yearly flow is estimated at 2692 gallons per minute.

The main entrance to El Capitan Cave is 360 feet above sea level. Located high on the mountain above El Capitan Cave is a series of sinkholes, uvalas and small caves. One deep sinkhole located at approximately 1000 feet in elevation is Slate Cave. It has been dye traced to show hydrologic connections with El Capitan Cave.

3.4 Resource Evaluation Rating for El Capitan Cave

A relative system for evaluating resources in El Capitan Cave is presented below. This system has been proposed as Karst and Cave Resource Management Forest-wide direction and standards and guidelines for the Revision of the Tongass Land Management Plan. Table 3.1 at the end of this section gives the rating for El Capitan Cave. Over time, resource ratings may change as new information becomes available. In some cases, one feature or a singular resource aspect may be so unique that it alone determines the rating for that resource. For example, bats, alone, may determine the rating for biological resources.

Recreation

For evaluation purposes, recreation resources are divided into three categories: challenge, social encounter and visual quality.

Challenge

POOR: Requires no experience or skill in caving. Offers little or no degree of challenge or risk. The cave is horizontal in structure. There is a single well-defined passageway < 1000 feet with no lateral passages. No passageways are less than 3 feet in diameter and step-type drops not over 3 feet. There are no loose ceiling rocks and few loose rocks on the cave floor. The cave is accessible, or can easily be made accessible, to pedestrian traffic.

FAIR: Requires no experience or skill in caving. Offers a low degree of challenge and risk. The cave is primarily horizontal in structure. The main passageway is well-defined with only dead-end lateral passages present. No crawlways are less than 2 feet and no step-type drops are over 10 feet. There are no loose ceiling rocks and some loose floor materials. The cave is accessible, or can easily be made accessible, to pedestrian traffic.

GOOD: Special caving expertise and equipment may be required. Offers a moderate degree of challenge and risk. The cave is horizontal and vertical in structure. There may be hazards and other safety concerns. Passageways are multiple with connecting passages. Some crawlways are less than 2 feet and vertical drops are up to 50 feet. Ceilings with loose rocks are over 6 feet high. Floors contain loose materials. The cave may not be easily accessible. Major safety hazards and management concerns are not easily remedied. Rapid flooding may occur. Hypothermia compounds the other risks present.

VERY GOOD: Special caving expertise and equipment are required. Offers a high degree of challenge and risk. The cave is horizontal and vertical in structure. There may be major hazards and other safety concerns. Some passageways may be mazes. Vertical drops may be over 50 feet. Some crawlways are less than 2 feet in diameter. There may be loose materials on ceilings and floors. Rapid flooding may occur. Hypothermia compounds the other risks present.

OUTSTANDING: Special caving expertise and equipment are required. Offers a high degree of challenge and risk. The cave is generally vertical in structure. There may be major hazards and other safety concerns. Passageways, vertical drops, crawlways and loose materials on ceilings and floors are the same as in "GOOD" above. In addition, conditions may be present which require more specialized equipment to protect the caver. Such conditions may include rapid flooding, passages requiring diving, frozen passages, or other extremely hazardous conditions. Hypothermia compounds the other risks present.

Social Encounter

POOR: The opportunity for solitude is not likely. Use is high. Group sizes may range from 2 to over 20. Social encounters with other groups are common.

FAIR: The opportunity for solitude is low. Use is moderate to high. Groups are generally 6 or larger with social encounters of other groups likely.

GOOD: The opportunity for solitude is moderate. Use is moderate. Groups are generally limited to 6 or less with social encounters of 1 to 4 other groups likely.

VERY GOOD: The opportunity for solitude is moderate to high. Use is low. Groups are generally limited to 5 or less with social encounters of 1 to 2 other groups likely.

OUTSTANDING: The opportunity for solitude is high. Use is low or non-existent. Groups are generally limited to 4 or less with the likelihood of other social encounters non-existent.

Visual Quality

POOR: Little or no scenic or other aesthetic appeals. Resources such as formations, animal species, artifacts, water falls, rivers, pools, fossils, etc. within the cave are limited and do not provide much diversity. There is little variety in form, line, color and texture or combinations thereof. There is little photographic appeal. There may be a high degree of alteration.

FAIR: Scenic and other aesthetic appeals are low. Resources may be present but are limited and not very diverse. Some variety in form, line, color and texture may be present. There is limited photographic appeal. There may be a moderate degree of alteration.

GOOD: Scenic and other aesthetic appeals are moderate. Resources are present and moderately diverse. There is a moderate combination of form, line, color and texture present. There is good photographic appeal. There may be a low degree of alteration.

VERY GOOD: Scenic and other aesthetic appeals are high. A wide diversity of resources are present. Form, line, color and texture is appealing. Photographic opportunity is very good. There is no or a very low degree of alteration.

OUTSTANDING: Scenic and other aesthetic appeals are outstanding. A wide variety of diversity is present with resources portraying unusual and unique qualities. The combination of form, color, line and texture is very appealing. This is a cave of regional significance. Photographic opportunity is outstanding. There is no degree of alteration.

Biological Resources

POOR: Biological components are lacking.

FAIR: Biological components are present, of low apparent significance and show low sensitivity to disturbance. Opportunities for scientific study are few.

GOOD: Biological components are present and moderately sensitive to disturbance. Fauna present is common in other sites. There are abundant opportunities for scientific study. These opportunities also exist at other sites in the area.

VERY GOOD: Biological components are numerous and/or very sensitive to disturbance. Fauna present is uncommon in other sites and may include rare, threatened, and endangered species. Habitat found in the cave is also important to these species occurring on a local level. Research opportunities at the site are uncommon in the area and may be regionally significant.

OUTSTANDING: Biological components are very numerous and/or very sensitive to disturbance. Fauna present is limited to few other sites and includes rare, threatened and endangered species. Habitat found in the cave is also critical to these species occurring on a regional level. There are unique opportunities for scientific study. These opportunities are usually significant for the region.

Geologic/Mineral Resources

POOR: Geologic and mineral features are few or lacking. If present, these features cannot be destroyed, further damaged, or removed from the cave without great effort.

FAIR: Geologic and mineral features are present but resistant to disturbance. Some formations have been damaged and there are few opportunities for scientific study.

GOOD: Geologic and mineral features are present and of moderate sensitivity to disturbance. Features are of such size or in a position to be susceptible to breakage and vandalism. Most features are not damaged. Some of the damaged formations can be restored. There are abundant opportunities for scientific study.

VERY GOOD: Geologic and mineral features are numerous and very sensitive to disturbance.

OUTSTANDING: Geologic and mineral features are rare, valuable, numerous and/or of great sensitivity to disturbance. Features may be of regional significance. There is little or no damage. There are unique opportunities for scientific study, which may be of regional significance.

Cultural Resources

POOR: No cultural resources are known and the potential for them being present is low or lacking.

FAIR: Cultural resources are lacking or those found are regionally common. The potential for these resources being present is low or moderate. The possibilities for research are few.

GOOD: Cultural resources are present or implicated by historic records. The site may be eligible for the National Register of Historic Places. There are abundant opportunities for research. These opportunities are also found at other sites in the area.

VERY GOOD: Cultural resources are present and sensitive to disturbance. The site is eligible for the National Register of Historic Places. Research opportunities at the site are uncommon in the area and may have significance on a regional level.

OUTSTANDING: Cultural resources are present and highly sensitive to disturbance. The site is designated or is eligible for the National Register of Historic Places. There are unique opportunities for research. Research possibilities are usually significant on a regional level.

Paleontological Resources

POOR: No paleontological resources are known and the potential for them being present is low or lacking.

FAIR: Paleontological resources are lacking or those found are regionally common. The potential for these resources being present is low or moderate. The possibilities for scientific study are few.

GOOD: Paleontological resources are present or implicated by previous research. There are abundant opportunities for scientific study. These opportunities are also found at other sites in the area.

VERY GOOD: Paleontological resources are present and sensitive to disturbance. Scientific study opportunities at the site are uncommon in the area and may have significance on a regional level.

OUTSTANDING: Paleontological resources are present and highly sensitive to disturbance. There are unique opportunities for scientific study. Research possibilities are usually significant on a regional level.

Hydrological Resources

POOR: There is little or no influence of the water moving into, within, or out of the cave to the resources of the cave or to other features (including ground water) in the watershed.

FAIR: The influence of the water moving into, within, or out of the cave is limited to the cave itself and has no effect on the resources of the cave. Research opportunities are few.

GOOD: There is moderate influence of water moving into, within, or out of the cave to the resources of the cave or to other features (including ground water) in the watershed. Research opportunities are abundant but may be common in the area.

VERY GOOD: The water moving into, within, or out of the cave greatly influences the resources of the cave or other features (including ground water) in the watershed. The possibilities for scientific study are uncommon to the area and may be regionally significant.

OUTSTANDING: In addition to the characters in "GOOD", the influence of water to the cave resources or other features of the watershed are regionally significant. Scientific study opportunities are unique. These opportunities are usually significant on a regional level.

Table 3.1: Resource Rating for El Capitan Cave

	Section 1 Entrance to Gate (150 feet)	Section 2 Gate to Hatfield's Pit (600 feet)	Section 3 Hatfield's Pit to End (600+ Feet)	Section 4 The Steam Room (@ 250 Feet)
Recreation Challenge Encounter Visual Quality	Fair Poor Fair	Fair Fair Good	Very Good Outstanding Outstanding	Fair Good Very Good
Biology	Very Good	Outstanding	Good	Good
Geology	Fair	Good	Outstanding	Good
Cultural	Poor	Fair	Poor	Outstanding
Paleontology	Poor	Poor	Outstanding	Outstanding
Hydrology	Poor	Very Good	Outstanding	Outstanding

3.5 ROS

The Recreation Opportunity Spectrum (ROS) classification system is used extensively for above-ground recreation management on Forest lands, however, the spectrum has application to all lands regardless of ownership or jurisdiction. The ROS is based on three principal components: the activities, the setting, and the experience. ROS classes are identified so that an initial classification can be perpetuated. For example, a cave with a rating of primitive would be managed to perpetuate pristine conditions. The intended output is satisfactory experiences.

The activities, setting and experience components of the ROS include spatial relations (i.e., size of passages), presence and intensity of fragile cave resources, evidence of humans/social interactions and hazards such as pits and flooding.

For management and conceptual convenience, possible mixes or combinations of activities, settings, and probable experience opportunities for above-ground recreation on Forest lands has been divided into six ROS classes arranged along a continuum. For cave recreation management, five classes are used. An entire cave may receive one ROS designation or

portions of the cave may receive different class designations due to differing opportunities and settings.

The following ROS Classes have been proposed as Karst and Cave Resource Management Forest-wide Standards and Guidelines for the Revised Tongass Land Management Plan.

Developed: In general, visual quality and cave resources may range from poor to outstanding. The challenge level is generally poor. Caves in this class are developed to allow access to visitors without special equipment. Hard surface walkways, steps, handrails, and lighting systems have been installed to maximize the comfort of the visitor. Guides usually accompany large groups and social interaction is high. Interpretive brochures and advertising are common, as well as an admission fee. Parking lots and toilets are usually available on the surface.

Developed Natural: In general, visual quality and cave resources may range from fair to outstanding. The challenge level is generally poor to fair. Caves in this class are minimally developed to allow visitors a relatively safe and informative visit, while not detracting greatly from the natural character of the cave. Examples are steps and barriers that use native materials, enlarged passages, and interpretive and directional signs. Brochures containing educational and interpretive information may also be available. There may be some opportunities for visitors to experience some risk and challenge while encountering natural obstacles (such as uneven floor surfaces and low ceilings), although no special caving equipment is required. A host may be stationed at the entrance and may also have lights and helmets to loan to visitors. Social interactions are typically of family or educational groups, and social encounters with other groups are common. Resources are likely to be highly impacted since the character of the cave's natural state is maintained (or restored) to provide maximum interpretation and educational benefits.

Natural: Most cave resources and visual quality range from good to very good. The challenge level may range from fair to good. Caves in this class are not developed. Visitors must provide all necessary equipment required for safe exploration. Usually obstacles within this class of cave will not require technical skills such as rock climbing. Visitor registers may be used to monitor visitation and brief interpretive signs may be placed near the cave entrance. Trail markers and monitoring instruments will be used only when needed to preserve fragile resources or warn of hazardous conditions. In general, however, the cave will be kept as natural appearing as possible. Social interactions are typical of small groups of families or friends, and the chance of encountering other such groups is moderate. Use by experienced recreation cavers will normally represent a minor portion of total visitation.

Primitive: Cave resources and visual quality are good to outstanding. The challenge level ranges from good to very good. Caves in this class are not developed. Visitors must provide all necessary equipment required to safely explore the cave. Technical skills (such as rock climbing) may be required. A visitor has a good chance of experiencing risk and self-sufficiency through the application of caving skills. Visitor registers with conservation messages are likely to be installed just within the entrance, but other management devices will not be installed unless their use is warranted by the presence of fragile resources or extreme hazards. Social interactions are usually between members of a small group of experienced recreational cavers. Social encounters with other groups are very rare because visitation is very low or regulated.

Protected Primitive: Cave resources and visual quality are very good to outstanding. The challenge level may range from good to outstanding. Most, or all, of the formations are not broken or marred. Introduced dust and mud is limited to established travel ways. Traffic patterns have also been limited to reduce floor destruction. Caves in this class are not developed. Visitors must provide all necessary equipment required for safe exploration. Technical skills (such as rock climbing) may be required, and there is usually an opportunity to experience risk and self-sufficiency. Visitor registers with conservation messages are likely to be

installed just within the entrance. Other management devices (such as trails and signs) are used to preserve the pristine character of resources within the cave. Social interactions are typically between members of a small group of experienced cavers. Visitor encounters with other groups are very rare because visitation is low or regulated.

Table 3.2. ROS Classification for El Capitan Cave

	Section 1 Entrance to Gate	Section 2 Gate to Hatfield's Pit	Section 3 Hatfield's Pit to Alaska Room	Section 4 The Steam Room
ROS Class	Developed Natural	Natural	Protected Primitive	Protected Primitive

3.6 Classification System

The following cave classification system has been proposed as Karst and Cave Resource Management Forest-wide Standards and Guidelines for the Revision of the Tongass Land Management Plan. Use of the system helps identify caves needing priority management and facilitates comparisons to other cave resources Forest-wide. Management classes provide direction to protect the cave resource and the public. It should be noted that El Capitan Cave requires multiple classifications for the four divisions of the cave mentioned earlier. Table 3.3 at the end of this section displays the classification rating for El Capitan Cave. Note, any part of El Capitan's cave classification may be changed upon new discoveries in the cave

Improved These caves are managed for public use and enjoyment. They are shown on maps and have signs directing visitor access. Improvements may include hard surfaced trails, handrails, electric lights, sanitation facilities, concession services, and elevators. A variety of media such as electronic self-guided tours, interpretive displays, and guided tours may be used. Most visitors can tour these caves without special clothing, equipment, knowledge or skills. Large numbers of visitors may tour the cave daily.

Guided Minimally developed and managed to provide relatively easy access with minimal modification to the cave's resources. Development normally consists of a designated trail that provides a natural cave experience. Exploration may require crawling and/or vertical work. Visitors are responsible for all necessary equipment and should have minimal caving experience when vertical work is required. Permits may be required and they can only be visited with a guide. Arrangements to visit the cave must be made in advance. The guide will act as interpreter and will insure the cave is left undisturbed for future visitors. Volunteers may be certified as guides. Volunteers will help meet the demand for guides, and will ensure protection of the cave resource. The cave may contain sensitive resources which have undergone resource analysis for protection. Access may be through a reservation system.

Non-guided These caves are undeveloped and are suited for persons who are properly prepared. Permits and trip leaders may be required. Trip leaders must have "in cave" instruction to identify routes, methods of travel, areas of special concern, and monitoring requirements. Individual Cave Management Plans will set background requirements for trip leaders. Resources within the cave are not easily impacted. Sensitive resources must undergo resource analysis for designating protection measures. These caves vary from easy to very difficult and may require crawling or vertical expertise. Visitors are responsible for all necessary equipment. Evidence of incompetence, previous cave abuse, or disregard for Forest regulations constitutes denial for a permit. These caves fulfill the wild caving experience. Access may be through a reservation system.

Temporarily Closed These caves are closed to general use pending further evaluation and designation in another management class. Cave entry is approved for minimum administrative purposes, research and inventory. They are temporarily closed because: 1) they are newly discovered and require further exploration/inventory to evaluate how they should be managed, 2) they have not been sufficiently inventoried, 3) on-going research is being conducted in which visitation may adversely impact, and 4) they have pending resource results. These caves are generally pending reclassification as Improved, Guided or Non-guided.

Limited Entry Are closed to all use except the minimum required for administrative entry. These caves are closed to general use because: 1) their pristine condition, unique and/or fragile resources are difficult to enter without causing irreparable damage, 2) they are of special scientific value, 3) they contain endangered species that could be threatened by visitor use, 4) they contain archaeological and/or paleontological significance, and 5) they are extremely hazardous. These caves are not shown on maps or discussed in publications intended for general public use such as magazines and interpretive brochures. Administrative entry to monitor research activity and impacts upon these caves is allowed, however, even low level visitation may impact these caves. Physical closure through gating may be necessary.

Table 3.3: Classification for El Capitan Cave

	Section 1 Entrance to Gate	Section 2 Gate to Hatfield's Pit	Section 3 Hatfield's Pit to Alaska Room	Section 4 The Steam Room
Management Class	Non-guided	Guided	Temporarily Closed	Limited Entry

3.7 Hazards

El Capitan Cave contains many hazards. These hazards are dangerous to novice cavers as well as experienced southeast Alaska cavers. Numerous pits of varying depths line the main and side passageways. Just beyond the main entrance to the cave, at 15 to 30 feet, a 12 foot pit drops vertically from the main floor. Many large boulders at the entrance form open pockets and small pits, and a low, jagged ceiling makes the first 10 to 15 feet of passage difficult and hazardous. Low ceilings and large boulders present risk of injury..

Flooding is a major concern in the cave when people are present. Unpredictable weather adds to this danger. Cave users may not be aware of torrential rains on the surface. The cave may flood at any time of year depending on rainfall, run-off and snow melt. The main passage and upper side passages to Hatfield's Pit do not flood.

The cold wet conditions and cool temperatures (38-44F) create a high potential for hypothermia, especially if a person is unable to move around such as in when an injury has occurred and rescue is under way.

The cave contains an intricate system of extensive maze passages. These passages branch in every direction within the cave and contain many deep pits. The potential for people getting lost is high.

Loose and falling rocks are a hazard throughout the cave. Rocks from the ceiling may dislodge at any time while loose rocks on the floor make travel difficult.

Tests for radon have been conducted in the cave. Radon is a colorless, radioactive, inert gaseous element which at high levels can be dangerous to humans. High levels considered to be dangerous to humans were detected in the back portion of the cave in 1988. Radon detectors were washed away by flooding before a complete analysis could be done. Further tests are

needed to determine the radon levels in the cave. Since there is good air flow in the cave, radon may not be of high concern.

3.8 Cave Hazard Rating System

The Cave Hazard Rating rates the potential hazard to cavers who practice safe caving techniques. These ratings range from low to extreme. The Cave Hazard Rating evaluates the complexity and size of passages, drops and climbs, stability of floors and ceilings, water hazards, and biological hazards. It should be realized that hypothermia is inherent in all caves in Alaska regardless of the following hazard ratings. This rating system has been proposed as Karst and Cave Management Forest-wide Standards and Guidelines for the Revised Tongass Land Management Plan.

Low These caves are horizontal in structure. Exploration should be conducted by no less than three cavers and the following basic equipment: hard hats, three light sources per person, boots with non-skid soles, and protective clothing.

The following are general low hazard characteristics:

- Single, well defined main passageway, with no lateral passages.
- No passageways less than one meter in diameter.
- No step-type drops over one meter.
- No loose ceiling rocks
- Few loose rocks on floors.

Medium Caves which contain moderate hazards, and are mostly horizontal in structure. Exploration should be conducted by no less than three cavers, one of which is experienced, and the following basic equipment: hard hats, three light sources per person, boots with non-skid soles and protective clothing.

The following are general characteristics of Medium Hazard caves.

- Well defined main passageway, with dead-end lateral passages.
- No crawlways less than 60 centimeters (24 inches).
- No step-type drops over three meters (ten feet).
- No loose ceiling rocks.
- Few loose rocks on floors.
- Not prone to rapid flooding.

Medium-High These caves contain hazards which may relate to horizontal and/or vertical conditions. Exploration should be conducted by no less than three cavers, two of which have moderate caving experience (including vertical descent and climbing), and use the following basic equipment: hard hats, three light sources per person, boots with non-skid soles, vertical ascending and descending gear, and protective clothing. Each caver should have a complete set of climbing equipment.

The following are general characteristics of Medium Hazard caves:

- Multiple passageways, with straight connecting passages.
- Crawlways less than 60 centimeters (24 inches).
- Vertical drops up to 15 meters (50 feet).
- Loose rocks on ceilings over two meters in height.
- No loose rocks in passages less than two meters.
- May be prone to rapid flooding.

High These caves are most hazardous from a vertical standpoint. Exploration should be conducted by no less than four cavers, all of which have considerable caving and vertical experience and use the following basic equipment: hard hats, three light sources per person, boots with non-skid soles, vertical ascending and descending gear, and protective clothing

The following are general characteristics of High Hazard caves:

- Maze type passages.
- Vertical drops over 15 meters.
- Loose ceiling rocks on crawlways under two meters.
- Prone to rapid flooding.

Extreme These caves are extremely hazardous due to characteristics such as air borne diseases, dangerous gases, flooding, unstable entrances, mid-cliff entrances, passages requiring cave diving, and any other hazard which requires special equipment to protect the caver. These caves should only be entered by qualified cavers with special equipment, expertise and training and only if there is a real necessity for information which is deemed valuable in relation to the risk involved. The minimum party should consist of six cavers, with two remaining on the surface or outside of the hazardous area(s). Extra precautions should be taken, and special communications and rescue capabilities available.

Table 3.4: Hazard Rating for El Capitan Cave

	Section 1 Entrance to Gate (150 feet)	Section 2 Gate to Hatfield's Pit (600 feet)	Section 3 Hatfield's Pit to End (600+ Feet)	Section 4 The Steam Room (@ 250 Feet)
Hazard Rating	Medium	Low	Medium High	Medium

CHAPTER 4.

ANTICIPATED USERS AND USE

4.1 Anticipated Users

Experienced Cavers - people with special knowledge and expertise of recreational caving with varying degrees of skill. Generally, they are skilled in climbing and survival. Most are probably not interested in guided trips.

Developed Users - Casual users specifically seeking cave exploration with a relative degree of safety and comfort through development. Generally not skilled in climbing and limited to Sections 1 and 2. Also, considered to be "guided" and "non-guided" publics. See the section below, Use Control and Operations for guided and non-guided Forest Service tours.

Schools and other Youth Groups:- all ages from 1st Grade to College and Universities. May come from lower 48 although not likely. Primarily local youth and school groups from Ketchikan and Prince and Wales Island.

Researchers - may be independent, affiliated with Universities, Institutes and/or Societies such as National Geographic and the Smithsonian, or Forest Service employees from the Forestry Sciences Range and Experiment Stations in Juneau, Alaska, and/or the Pacific Northwest.

Media - could vary from newspaper and magazine to radio and television.

Concessionaires - may include small operators who sell or rent equipment and small souvenirs to larger concessionaires who take on sole operation and maintenance of the cave. Fees are associated with all concession use.

Outfitters and Guides - Mostly local outfitters and guides currently in operation who may or may not be associated with a lodge and overnight accommodations. Lodge outfitters and guides cater primarily to people interested in hunting and fishing, and indicate that caving would offer the minority of clientele something else to do. Some interest from individuals who are not currently permitted as Outfitter or Guides who wish to guide in the cave has been expressed.

Other: People recreating on the island for purposes other than visiting El Capitan Cave; they visit the cave for "something else to do". They may include hunters, hikers and backpackers, sightseers, campers, boaters, fishers, flight seers, photographers, or those employed in the area.

4.2 Anticipated Use

Regardless of the level of development of El Capitan Cave, public visitation and use will occur. Visitations and exploration occur as a day-use activity in which an individual or group may enter the cave one or more times and spend from 30 minutes to 12 hours; no overnight camping requests are anticipated.

Accurate documentation of people entering the cave does not exist. A cave register located at the entrance to the cave has helped to record some use but it is known that many people do not register when entering the cave. The vast majority of use occurs during the summer months. In 1992 and 1993 use dramatically increased and could be correlated with increased media coverage. Numerous articles appeared in local, regional and national newspapers, and

magazines. Radio and Television aired programs about El Capitan Cave. Even with the extensive media coverage of the cave, use remains relatively low especially when compared to such high use caves as Mammoth and Carlsbad Caverns which can have up to 900,000 Recreation Visitor Days (12 visitor hours aggregated continuously, intermittently, or simultaneously by one or more persons) per year. In the years prior to 1992, RVD's at El Capitan Cave are estimated at <150 per year. In 1992 and 1993, estimated RVD's increased to 200 and 300, respectively. In 1994, use is anticipated to go up. A 10 to 15% per year increase is anticipated.

Guided trips and outfitting is anticipated from the private sector. Requests for permits from private sector outfitter and guides in the first 3 to 5 years is estimated at less than 5 on an annual basis. During May to September outfitter and guides are expected to request approximately 10 to 20 days.

School and/or youth groups could be limited to < 5 per year as there are relatively few schools in the area. School and/or youth group visits may occur any time throughout the year.

Researchers may conduct studies throughout the year. Simultaneous research activities may occur. Research may increase over the next few years and with studies lasting from 1 month to an indefinite time in the future.

Media trips ranging from simple interviews to complex videos are anticipated. No more than 5 to 10 media trips per year are expected for the summer months.

A large scale, fully owned and operated concession could occur, however current interest is lacking. A small scale concessions business which sells equipment, food and souvenirs may also formulate.

Cruise ship operators have requested permission for their passengers to visit El Capitan Cave. Some operators may make El Capitan Cave a destination while others include the cave as part of their tour package. Some operators may also request their own cave guide.

CHAPTER 5.

MANAGEMENT STRATEGY

5.1 Introduction

This Chapter describes the initial policy and procedures for managing El Capitan Cave. These policies and procedures include commonly used cave management techniques (see Appendix B), reservation requirements, fees, permitting, user limits, seasonal closures, etc. As with any management strategy of this nature, fine tuning of the policies and procedures may be needed. For all practical purposes, however, this Chapter sets the stage for managing El Capitan Cave.

5.2 The Visitor Register

Currently there is one cave register at the entrance to the cave. A second cave register will be placed in Section 3 at the entrance to the Alaska Room. Both Cave Registers will contain conservation messages about the cave which address such topics as protection of bats, fragile resources, water quality, etc.

5.3 Education/Interpretation

Public education will play an important role in protecting cave resources. The Thorne Bay Ranger District will use education and interpretation to aid the public in understanding the intrinsic value of cave resources. Portable interpretive displays, slide shows, videos, brochures, and lectures will be offered to schools and special interest groups. Cave conservation brochures will be available at Thorne Bay Ranger District and may be included in mailings to interested publics.

Interpretive signs will be developed and displayed at El Capitan Cave. A kiosk board at the entrance to the cave and at the parking area may be used to display signs. Messages and themes will be developed through an interpretive planning process. Informing the public about El Capitan and its non-renewable cave resources by instilling a sense of personal responsibility will be the ultimate goals of interpretation.

5.4 Brochures and Handouts

Interpretive brochures, handouts and freestanding exhibits will be developed for use by the general public addressing archaeology, biology, geology, paleontology, and recreation. They will provide information about the operating period, guided tours, fees, reservation procedures, accessibility, etc. Safety and conservation messages as well as a brief history of El Capitan Cave and amenities available at the site will be included. A map of the cave and directions to get there will also be displayed. Cave maps will not include all areas which require special resource protection, i.e., cultural and paleontological sites.

5.5 Distribution of Information

General inquiries about the operating period, user limits, reservations, etc. will be answered by Support Services personnel (i.e., front desk receptionists). This includes both oral and written requests. An information sheet will be provided. Specialized questions from researchers, media, and experienced cavers should be forwarded to cave managers at Thorne Bay Ranger District. If no one is available, the name and number should be taken so that the call can be returned.

5.6 Publicity and Advertising

Publicity and advertising of El Capitan Cave will be designed to maintain use at appropriate levels for resource protection. Publicity and advertising can cause a high demand for recreational use of the cave. Currently, only one other cave is available for public use. This is known as Cavern Lake Cave. The recreational opportunities at Cavern Lake are quite different than those at El Capitan. Cavern Lake Cave is a much smaller system with one large room and a creek flowing through it. Access to Cavern Lake Cave is by an improved gravel trail which leads to a viewing deck overlooking the cave entrance.

5.7 Cave Trails

No internal trails are currently planned. Cave trails may be developed in the future as monitoring and research provide information. Elaborate boardwalk trails and/or other hardened trails are not likely. Simple trails lined on either or both sides with marking ribbon or other materials could be used to help direct traffic away from fragile areas.

5.8 Permits

The Tongass National Forest, in accordance with the Federal Cave Resources Protection Act of 1988, must: 1) secure, protect and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people; and 2) foster increased cooperation and exchange of information between governmental authorities and those who utilize caves located on Federal lands for scientific, educational and recreational purposes.

To help gather use data, and for establishing guidelines for protection of El Capitan's non-renewable resources during research and inventory work, permits will be required for certain cave related activities in several sections of the cave.

Evidence of incompetence, negligence, disregard for personal safety, previous cave abuse, or non-compliance of Forest Service regulations will be cause for permit denial.

A. Types of Permits

1. **Recreational Entrance Permit** - A cave entrance permit required for recreational use.
2. **Research Permit** (exploration or scientific) - a research permit for exploration or science study including air quality, biology, climatology, cultural, geology, hydrology, mineralogy, paleontology, or recreation.
3. **Dig Permit** A dig or excavation permit for the purpose of discovering hidden passages.
4. **Special Use Permit** Permits for outfitter and guides, filming, concessionairing and other commercial activities. Examples of such use include filming, photography, guiding, teaching, transporting persons, or providing equipment or supplies. For any such use, the person must submit a written request to the District Ranger. If the use is determined to be "commercial", or has the potential to cause resource disturbance or conflict, then a permit will be required.

B. Permit Requirements and Procedures

Research, Dig and Special Use permits are required for research and inventory work in all sections of the cave. No recreational use permits are currently required. If in the future, recreational use is allowed in Section 3 or other side passages of the cave, excluding Section 4,

recreational use permits would be required. All permits will be considered for approval on a case by case basis and require advance notice.

Section 1 -Research, Dig, Special Use Permit required, open to recreational use.

Section 2 -Research, Dig, Special Use Permit required, open to recreational use through a guided tour, 6 person group limit.

Section 3 - Research, Dig, Special Use Permit required, closed to recreational and/or commercial use pending further evaluation. Trip leaders or guides required, 3 person group limit.

Section 4 - Research, Dig, Special Use Permit required, closed to recreational use, limited entry for monitoring purposes, 2 person group limit.

1. Recreational Entrance Permit

As mentioned, recreational permits are not currently required, however, recreational use permits may be available in the future for access to Section 3 and side passages. Specific criteria will be developed when this decision is made. In general, the following criteria would apply:

- a. Requires advance notice and prior approval.
- b. Permits must be carried with permittees while in the cave.
- c. Requires an approved guide or trip leader.
- d. May call or write in advance for permits and subsequent reservations.
- e. A cave calendar will be used for scheduling. The cave calendar will provide available dates. Visitors should list three dates of choice. Dates will be assigned on a first-come, first-served basis. User limits and operating periods apply.
- f. Fees may be required.
- g. Permit requests should be stamped with the date received by Thorne Bay office personnel.
- h. Minors must obtain parental approval prior to entry.
- i. Specilized caving skills and/or equipment may be necessary.

2. Research Permits

Caves can be extremely valuable research tools. The ability of caves to preserve organic and inorganic materials offers a unique opportunity to study past flora, fauna, climates, and geological events. However, collection of cave resources for study can be destructive. Several types of archaeological, paleontological, geological and biological resources occur within El Capitan Cave. Collection of one type of resource, even with the best techniques, can disturb the physical or situational character of the other resources, severely reducing their value to future researchers. Inconsiderate or unaware researchers and recreational cavers can permanently damage valuable cave resources simply by traveling through a sensitive area.

Further research and monitoring of El Capitan Cave is needed however, Thorne Bay Ranger District is not authorized to conduct research and does not receive funding for research activities. All researchers are encouraged to provide their funding through grants, proposals, etc. Assistance from Thorne Bay Ranger District may be available for minor support such as housing and transportation. A priority for research has been established and is based on current knowledge of the cave

Research Priorities:

Air Quality. - Determine if there are gases harmful to humans present in the cave, particularly radon; quantities, and variation of presence. Note: No harmful gases have been detected in Sections 1 and 2.

Water quality - Determine if visitation adversely affects the water quality of the cave. Note: Water originating in a river within the cave is the drinking water supply for a Forest Service administrative camp located below the cave.

Bats - Determine when bats are using the cave; if there are maternal colonies; if bats are roosting or hibernating; what species are present. Initial studies should focus on behavior, population dynamics, and physiology. Taking specimens will be reviewed on a case-by-case basis. Winter visits to areas of El Cap Cave where bats hibernate will be severely restricted; permission must be obtained from the District Ranger to enter the cave in winter. Bat research should be conducted to allow optimum preservation for different studies by different experts.

The criteria for research is as follows:

- a. All research conducted within El Capitan Cave requires prior approval by the District Ranger, a research permit and NEPA review. Approval to conduct research will be made on a case-by-case basis. A proposal or study plan will be required. If collection of specimens is requested, the researcher will be further required to apply for a research collecting permit. In some cases, additional collecting permits are required by other Federal and State agencies.
- b. Permit applications to undertake research studies or collections must be addressed to some over-all guidelines and an overview panel should conduct the initial evaluation of the applications. A two person local panel would include an official responsible for cave management at Thorne Bay Ranger District and someone familiar with the other resources involved (i.e., wildlife for Biology, Archaeology for Cultural Resources, Soil Scientist for Soils, etc.) General guidelines include the following:
 1. Could it be done better outside of caves?
 2. Does it build on previous studies done in caves and in the general discipline involved (e.g. does the applicant show familiarity with the literature, are they experienced, etc.)?
 3. Has such a study been done before locally, elsewhere, in less detail or with a different approach?
 4. Does it overlap or compliment on-going studies by others?
- c. Researchers should use non consumptive research techniques wherever possible. To summarize, multiple use by multiple experts with multiple approaches is the keynote requirement (Poulson, 1975).
- d. A limited number of people will be involved in the actual "in-cave" research which adheres to the capacity limit set for the cave. They may be able to enter the cave at any time during the year as long as prior approval has been made, however, every attempt should be made to conduct research outside the operating period set for public visitation. Researchers will be adequately briefed on cave conservation techniques and should sign the cave register and permit issued to the researcher. The principle investigator will be responsible for the actions of the entire party.
- e. The researcher will be required to assess the impacts through a written environmental analysis on all significant cave resources prior to approval of the permit. The researcher must determine to what extent the research will affect cave biological, geological, recreational, hydrological, mineralogical, archaeological, and paleontological resources.
- f. A report will be required by all investigators regardless of the findings. A copy of all scientific papers submitted to Thorne Bay Ranger District is also required. Should it be necessary for any scientific reports or papers to maintain confidentiality, the researcher is required to use vague locations when submitting papers to anyone other than Thorne Bay Ranger District.
- g. Persons conducting research in El Capitan Cave will not totally deplete any cave resource within the cave. Researchers shall make every possible attempt to leave

studied portions of the cave resource untouched and insitu for future researchers. The researcher will make all possible efforts to maintain the ROS class of a cave. It is felt that future researchers using advanced techniques will be able to learn much more from carefully preserved cave sites.

- h. Cave reconnaissance may not normally be combined with research activities. Researchers may conduct cave reconnaissance as a non-research activity and will be subject to the Management Strategy outlined in this Chapter. No collecting of any kind will be allowed on any trips specifically determined to be cave reconnaissance. Collection of any resources must be a carefully planned activity.
- i. In some situations, conflicts may arise between recreational use and research activities. If a researcher anticipates a conflict, a temporary closure of the cave may be requested for the period during which field research is taking place. Typically, this period shall not exceed 30 days. During this period, only the research group will be given permission to visit the cave (according to capacity). Extensions of the closure exceeding 30 days may be granted, provided progress reports indicate a longer closure is necessary. At the end of the closure, the researcher must insure that no resources within the cave are more vulnerable than they were prior to the research activities (e.g., new trails leading to the cave, publicity about the resources or their location, open excavations within the cave, etc.).
- j. Cave excavation, testing, or removal of archaeological and paleontological resources must be conducted by qualified archaeologists, paleontologists, institutions, organizations and individuals, and will be evaluated and approved by the District Ranger. Permits will be issued in accordance with the Antiquities Act of 1906 (16 U.S.C. 4312 et seq.), The National Historic Preservation Act of 1966 (16 U.S.C. 470 et seq.), and the Archaeological Resources Protection Act of 1979 (16 U.S.C. 470aa). All appropriate NEPA requirements will be completed prior to the approval of the permit.
- k. Prior to touching, moving, or collecting a cave resource, researchers shall map and photograph all cave resources which they will be touching, collecting or moving. A map of the cave showing the locations and photographs of resources in-site shall be submitted to the District Ranger on completion of the field research. Photos and maps should be generated before and after the research activity.
- l. Thorne Bay Ranger District may require that a representative of the District accompany the research trip.
- m. A library of general cave reference and technical books, journal publications, published technical reports, and theses completed at the site will be established by the Thorne Bay Ranger District for visiting scientists, cave managers and interested publics. Copies of slides and topics of talks given to lay audiences by researchers would also be compiled and are very helpful to a researcher interested in starting work in the area. Reference files should be maintained for unpublished material. Reports may need to be separated into confidential material for closed files and material available to qualified investigators in an open research file. In general, the closed file includes correspondence about and reviews of research projects, copies of grant requests, restricted information pertaining to cultural resources, restricted cave locations and summary data. The open file should contain correspondence about identification of specimens and location of natural areas, annual reports of the investigators, and outlines of on-going research projects.
- n. Other specific conditions may be added as necessary to an individual research or collecting permit.

3. Dig Permits

Often cave passages are filled with sediments and cobbles which make passage through these areas impossible without removal of the fill material. Valuable information may be received from exploring these hidden passages however, care should be taken in order to protect fragile resources. For all proposed dig activity, the following criteria will apply:

- a. A written proposal is needed to approve dig permits.
- b. Approval of dig permits will be contingent upon completion of a resource analysis and biological and cultural clearance review.

4. Special Use Permits

Thome Bay Ranger District will evaluate special use requests in accordance with the Special Use Authorization as identified in Forest Service Manual 2750. The definition of a special use permit is "A permit, term permit, temporary permit, lease, or easement, or other written instrument that grants rights or privileges of occupancy and use subject to specified terms and conditions on National System lands." Upon receiving a permit, the holder will be required to have it in their possession during the identified cave activity.

a. Outfitter and Guides

Commercial use of El Capitan Cave may offer opportunities that Forest Service sponsored trips cannot provide. The demand for non-commercial recreational use will be considered along with the demand for commercial activities. Use of the cave for commercial gain will be considered for approval by the District Ranger based on a submitted written request. Written requests will include the nature of the venture, duration, effects on other cave resources, and benefit of services offered to the client. Prior to approval, the District Ranger will determine if the venture is compatible with District policy and cave prescriptions. Appropriate resource specialists will also be consulted, and NEPA documentation may be required. If approved, a special use permit will be issued. A fee, a rehabilitation bond, and insurance may be required as specified in Forest Service Manual 2700.

In general, the criteria for outfitter and guides are as follows:

1. Will be considered after a Special Use Application Report has been received and evaluated.
2. Guides must obtain in-cave orientation, and training in cave ethics and safety.
3. Allocations among different operators will be assessed as applications are received. A prospectus may be needed to determine allocations of use and distribution of availability, i.e., dates of intended operation.
4. Available only 2 days per week on days when Forest Service guided trips are not being offered.
5. Applications must be received in writing 6 months in advance.
6. Currently restricted to Sections 1 and 2.
7. May be required to submit an operating plan, a certification of insurance and a reclamation performance bond.
8. Requires NEPA review.

b. Concessionaires

To date, there has been no documented interest for a concessions operation. Informal requests/conversations from local lodge owners have revealed that there may be some interest, however, during the public scoping process and internal analysis, numerous concerns were raised about concessions at the cave. The possibility of a small concession in which equipment

and souvenirs are sold or rented may be desirous with little to no effect on the cave or the caving experience. Due to these concerns and the apparent lack of interest, this plan does not contain direction for concessionaires. If interest increases, a prospectus can be developed. The prospectus will include restrictions and specific guidelines for use of the cave.

c. Media

Media requests range from television and radio to newspaper and magazines. If the intent of the media coverage is for commercial gain such as in selling articles or promoting a business, permits will be required. In general, the following criteria will apply:

1. One month advance notice in writing.
2. Written request required outlining intent of visit, commercial gain, etc.
3. Copies of all finished media productions are required. Copies will be sent to Thorne Bay Ranger District.
4. Approval by District Ranger.
5. Dependent upon availability of personnel to assist.
6. Requires a Forest Service approved guide.
7. User limits apply.
8. Restricted to Sections 1 and 2 pending further evaluation.

5.9 Fees

Under current direction, no fees will be charged for recreational entrance permits. Fees may be charged in the future for operation and maintenance purposes.

Research Permits and Dig Permits will be developed in accordance with FSH 1509.11. Special Use Permits will be developed in accordance with Forest Service Handbook 2709.11. An appropriate fee will be determined for these uses. Sometimes fees are waived depending on the special use application.

5.10 Reservations

Visitors may explore to the gate (Section 1), without a guide or a reservation, however guided tours will be available for trips beyond the gate, through Sections 1 and 2 (See map Appendix A), while Sections 3, 4 and side passages are temporarily closed except for administrative purposes. Advance reservations are requested for all guided tours, however, there will be opportunities for visitors who have no reservations to accompany already scheduled tours. This may occur only if the established group size is not exceeded, i.e., a group size of 6 visitors plus 1 cave guide. A minimum of 14 days is required to process written reservations. Written requests may be verified over the phone by calling Thorne Bay Ranger District or visitors may wait to receive by mail, a verification notice. Call-in reservations may be processed within 2 days or at the time of the call. Reservations will be made in the order they are received and marked on a cave tour calendar. The reservation system will be administered by front desk personnel responsible for answering phones and processing mail. All written requests should be addressed as follows: Thorne Bay Ranger District, El Cap Tours, P.O. Box 19001, Thorne Bay, Alaska 99919. Three dates should be listed in order of priority in case one of the dates is already reserved. Reservation information will be transmitted to El Cap Work Center via radio and/or personal communication. Dates and user limits will be marked on the calendar. The calendar will provide publics with available dates and disclose when the six person limit is reached. Persons who show up at the cave are given second priority to those who have made reservations. Reservation requests when received at Thorne Bay Ranger District should be stamped with the date received.

Reservations for Special Interest Groups.

School/Youth Groups, garden clubs, Rotary members, and others may make reservations for special tours beyond the gate through Section 1 and 2 only, however group size will be limited to 6 per tour. All minors should be accompanied by group leaders. In general the following criteria will apply:

1. One month advance notice.
2. All visits must be accompanied by a Forest Service and/or approved guide. Pre-approval by the District Ranger for non-Forest Service guides is required.
3. During May to September, groups are offered guided trips which adhere to the established daily and weekly operating period and user limits.
4. During Jan. to April, and October to December, guided trips may be offered to school groups provided 14 day advance notice is received and personnel are available. Pre-approval by the District Ranger is required.
5. Temporarily closed sections of the cave may be available in the future pending further evaluation. Group size limits may vary. 14 day advance notice required. Special caving skills and equipment may be necessary. Guided only with pre-approved guides.
7. Minors must have parental approval prior to entry.

5.11 User Limits/Group Size

User limits are a measure of the maximum number of people who can obtain given kinds of recreation experiences at an established site within the constraints of resource capability. It is a function of how a particular combination of physical and social factors interact to absorb or screen the sights and sounds of human activity and absorb physical use. Lower capacities generally exist where landscapes are fragile or contain little vegetative or geologic screening while higher capacities generally exist where landscapes have more screening and are resistant to physical use. In underground landscapes the physical setting often requires lower capacities.

User limits for El Capitan Cave primarily address group size and have been established for Section 2 only. Further evaluation and monitoring is needed before group size can be established for other sections. Determination of group size in other sections will be established in two years.

Group size is based on local conditions within the cave, the cave management classification system, ROS and public involvement. Establishing a user limit or maximum group size is intended to protect cave resources, reduce conflicts between users such as competition for space and inappropriate behavior or activities, and to protect visitors from hazards. Additionally, the group size should remain relatively small so that everyone can hear and see the guide as well as providing the guide with better control.

Table 5.1. User Limits for Sections 1, 2, 3 and 4.

	Section 1 Entrance to Gate	Section 2 Gate to Hatfiled's Pit	Section 3 Hatfiled's Pit to Alaska Room	Section 4 The Steam Room
ROS Class	Developed Natural	Natural	Protected Primitive	Protected Primitive
Mgt. Class	Non-guided	Guided	Temporarily Closed	Limited Entry
Group Size	To be determined	1 to 6/group	To be determined	To be determined

5.12 Seasonal Closures - An Operating Period.

An operating period is needed for allocating and controlling seasonal use, as well as for protecting and preserving the cave. Establishing an operating period will help reduce user conflicts, protect fragile resources and for safety reasons.

Section 1 of the cave is open year-long. The Operating Period may change in the future. Closures may be needed to protect resources. Research and monitoring will dictate the need for future closures in this section.

Section 2 is guided only and will generally operate on a monthly, weekly, daily and hourly basis as follows:

May through August
Thursday through Sunday
Guided tours:
9 a.m., Noon and 2:30 p.m.

NOTE: Tours last approximately 1 hour and 45 minutes which includes hiking the steep access trail to the cave entrance. The cave is closed from noon to 1pm for lunch.

Changes to this schedule may occur as supply and demand of cave related recreational activities increase or decrease. Changes and/or other closures may be needed for safety concerns, to protect fragile cave resources, research needs and education purposes.

5.13 Guides

Forest Service personnel or volunteers will be used to guide publics through Section 1 and Section 2, and to help monitor resource degradation, educate publics, and for safety reasons.

The Forest Service will offer guided tours beyond the gate and will include interpretation through Sections 1 and 2 and based on the established operating period and group size limit (See Section above). A Forest Service employee or volunteer will be stationed at El Capitan Work Center. During cave operations, the employee/volunteer would be available for cave tours. Guided trips will be offered every other hour except for noon to 1pm for lunch. Guides will be equipped with a Forest Service radio and emergency rescue and first-aid equipment. They would not necessarily need to be trained in rescue but they would be required to have basic CPR and advanced first-aid training provided by the Forest Service. Basic cave orientation and cave ethics training would also be required and provided by Forest Service Cave Specialists/Managers and other cave volunteers. Orientation training would include site specific information on El Capitan Cave, the karst ecosystems of Prince of Wales Island, and Forest Service Cave Management programs. The Guide(s) will keep a daily diary for developing better management of the cave and they will document visitor use. A script will be developed by the El Capitan Cave Manager for guided tours.

Guides and/or the Forest Service will provide hard hats for public use. Visitors are required to have at least one light source per person and warm clothes. Guides are required to have at least three light sources, and a helmet. Guided groups must adhere to the established capacity limit set for the cave, i.e. no more than 6 per group. Slight fluctuations of the capacity limit may occur to accommodate families and groups.

Safety meetings will be held on a regular basis and will address such items as the cave environment, use of cave equipment, prevention of accidents, etc. A minimum of 3 persons will be used on trips into the cave requiring technical rope work.

All personnel involved in cave management will receive comprehensive training so that they can perform their duties in the safest, most efficient manner. Vertical practice, in a tree, rock pit or cliff will be completed before new personnel or gear are used in the vertical sections of the cave.

5.14 Cave Gates

As mentioned, a gate has already been installed within the cave. The primary reasons for installing the gate are for resource protection and safety. It may be necessary to install another gate at the entrance if unacceptable levels of resource damage occur to Section 1. Monitoring and further analysis is needed before this determination can be made.

5.15 Volunteers

The Thorne Bay Ranger District will continue to utilize the volunteer program to its maximum authority as granted in the National Forest Act of 1972 (FSM 18300). Volunteers will be offered the opportunity to assist Thorne Bay Ranger District with the management of El Capitan Cave. The volunteer program will continue to support cave management activities including but not limited to, cave restoration, photo monitoring, gate construction, cave maintenance, mapping, inventory, office work, guiding and public education. Thorne Bay Ranger District will provide supervision and technical training for volunteers assisting in El Capitan Cave management. The Forest Service will utilize individual volunteers, partnerships, Memorandums of Understanding, and Cost Share Agreements. A Volunteer Agreement (FS-1800-7 and/or FS-1800-8) will be used to document volunteer work. Each individual's hours of volunteer work will be recorded. The tracking of this information will be used to complete the yearly Human Resource Programs Accomplishment Report (FS 1800-AR).

5.16 Training and Orientation Program.

The gate is a barrier which if not vandalized, provides a means of controlling use. Those allowed beyond the gate must abide by rules and exhibit proper cave ethics. It is important to provide an orientation to all users about caving ethics and safety. This should be done by Forest Service personnel and approved guides to all groups in all sections of the cave. All guides will practice ethical caving and protect the natural resources found within the cave. In-cave training by qualified Forest Service personnel is required prior to guiding activity. Training will emphasize safety, education of the cave resources and preservation. Videos, and slide shows will be used to help train guides.

5.17 Protection of Sensitive Resources

As mentioned, a gate has been installed to help protect sensitive features and pristine portions of the cave. Strict management controls such as implementing an operating period and limiting the numbers of people allowed in the cave at one time is intended to help protect sensitive features. Known cultural and paleontological resources have been removed. Seasonal closures will help protect hibernating bats in the winter. Other measures used to protect features include establishing criteria for various user groups, including Outfitter and Guides, researchers and media, employing a Forest Service guide for interpretation and education on the fragile nature of caves, training guides and hosts about caving ethics, and providing registers and interpretive signs with conservation messages. Additionally, interpretive programs in the form of slide shows and video hosted talks will be given at local schools, Forest Service districts and throughout southeast Alaska to interested publics.

No rock, mineral formation, stalactites, stalagmites, phenomenon of crystallization, or other natural, historical, archaeological, or paleontological specimen of any kind should be touched, damaged or removed from the cave except if specifically authorized by separate research and collection permits approved by the District Ranger. Cave visitors should consider caves as natural museums and observe, rather than handle, cave resources. Photographs and other non-touching observations which do not harm cave resources are allowed.

Camping, cooking, smoking cigarettes or tobacco products, and open fires (other than carbide lamps) are prohibited within the cave or cave entrance. Due to confined conditions present in the cave, cave resources can be easily damaged by these activities.

Foot traffic should be confined to non-delicate areas. Cave visitors should stay on established foot paths and every attempt should be made to prevent damage to easily trampled cave resources. If it is necessary for safety reasons to cross pristine flowstone floors, cave visitors should remove boots and proceed in stocking feet. If it is necessary to travel through areas with thick silt, mud or delicate speleothems on the floor, cave visitors should proceed in single file and follow in established foot falls, or trails. Destruction of significant features simply for the sake of "pushing new leads" is prohibited.

All equipment, supplies, and other materials taken into the cave by a party should be removed from the cave by that party at the completion of the trip. This includes carbide residue if carbide lamps are used. Users in sections requiring vertical expertise will be required to present experiences exhibiting climbing and survival gear. A portable sanitation bag or bottle is required in all sections of the cave if users are not being guided for recreational purposes. Cave registers and travel aides may be left within caves if approved prior to the trip by the District Ranger. Examples of travel aides which could be approved are bolts and pitons, where safe natural riggings are not available, and plastic surveyor's tape to mark trails through delicate areas. Hand and foot holds should not be created by breaking, blasting or other means unless approved by the Forest Service.

No modification of any feature for the purpose of water collection is allowed. The cleaning of anything or the use of soap or detergent (including biodegradable) in any cave water is also prohibited. Naturally occurring water may be used for drinking if found in sufficient quantity. However, water within rimstone-lined pools should not be used since this may stunt or stop the growth of the rimstone. Purification is recommended for drinking water. Purification treatments should only be added to water containers and not to cave waters.

5.18 Public Safety

It is understood that El Capitan Cave can never be completely safe and that risk-taking is part of the caving experience. The Forest Service is addressing public safety in El Capitan Cave through various means. Strict management controls such as the gate, restricting the group size, establishing an operating period and providing a guide are being employed. A hazard warning sign is currently installed at the entrance to the cave. Other signs may be installed if necessary. for a hazard rating of El Capitan Cave, see Chapter 3.

Cave search and rescue (SAR) operations will be initiated in accordance with the Ketchikan Area Emergency Action Plan and the Forest Service Manual (FSM 1599.03). The Alaska State Troopers maintain the ultimate authority for search and rescue on all lands within Alaska. However, the Forest Service has an obligation to the public and must take an active role to assure immediate and quick response to search and rescue requests and at the same time provide for the protection of forest resources. The Ketchikan Area Safety Officers and the Law Enforcement Program Coordinator are responsible for interagency coordination, developing and maintaining a close working relationship with the Alaska Troopers, and acting as liaisons on search and rescue operations occurring in El Capitan Cave. The Forest Service will be

responsible for the overall management of the search and rescue operations until the Troopers take over. Upon transferring the leadership role to the Troopers, the Forest Service shall assume a supportive role and provide assistance to the fullest extent possible.

Thorne Bay Ranger District has local expertise to help deal with search and rescue. District Cave Specialists and local cavers' knowledge and close proximity to the cave will help to expedite cave rescues. Qualified Cave Specialists and cavers should be involved in cave search and rescue by assisting to locate cave passages, provide initial contact with the victim, provide cave expertise to prevent unnecessary cave resource damage and evaluating the situation.

5.19 Law Enforcement

Regular patrols at El Capitan Cave will be developed utilizing law enforcement, cave specialists, and recreation personnel to establish Forest Service presence. Prevention through education will be a primary law enforcement tool. Educational prevention signs will be erected. All 36 CFR violations involving caves will be immediately reported to the District Law Enforcement Officer.

5.20 Risk and Liability

Civil liability for wrongful death or injury is a complex subject. The duties the Forest Service owes an invitee include the duty to learn of unsafe conditions, the duty to use reasonable care to inspect and discover dangerous conditions, and the duty to take reasonable steps to put the land in safe condition. A simple management plan which includes a policy for limiting use and a means of informing cave users of known dangers is probably the best solution for liability.

5.21 Signage

No signs are currently planned for installation in the interior of the cave. Interior signs may be necessary for directional purposes, and for displaying "off-limits" areas. An "Off Limits Area" sign may be used at side passages which are closed or where resource protection is needed. One or two signs may be developed in Section 2 to interpret cave formations and protection procedures.

5.22 Maintenance

Operation and maintenance of El Capitan Cave is the responsibility of Thorne Bay Ranger District. Maintenance functions will be accomplished through a combination of force account work and contracted or volunteer services.

Estimated Annual Cost of Operation and Maintenance

Administration	7,000
SCA volunteer	6,000
(GS-5 @ 130 days)	17,000
Subsistence for guides	4,200
Site Operations (trails, toilet, parking)	3,000
Vehicles	8,000
Supplies and Safety Equipment	1,000
Total Annual Maintenance Cost	\$46,200

CHAPTER 6.

ACCESS TRAIL, PARKING, SANITATION AND LIGHTING

6.1 Access Road and Parking Area Location

The access road to El Capitan Cave is known as Forest Road 15. It is connected to the main road system on Prince of Wales Island which links vehicle traffic with the Alaska Marine Ferry in Hollis. The parking area is approximately 100 feet off Forest Road 15, directly across from El Capitan Work Center and is 1500 feet from the cave entrance. See Appendix A, Parking and Trail Access Map.

6.2 Access Trail/Accessibility Design

An access trail to the cave has been developed and leads to the entrance of the cave. This trail is rated difficult with a steepness averaging 30 to 60 percent. The tread is a mixture of gravel on the lower end (first 250 feet), and wooden boardwalk trail (550 feet) and wooden stairway (275 feet) on the upper end near the entrance to the cave. The wood portions of the trail are built of locally milled Alaska yellow cedar. The trail head is at the parking area described above. A wooden viewing deck is planned as part of the trail and will be connected to the upper end of the trail, at the cave entrance. Several small platforms are located along the trail and serve as rest spots or viewing areas. The trail provides an excellent view of the ocean area known as El Capitan Passage. The trail width was designed for two-way pedestrian flow. The combination of slope, tread type and trail width makes this trail not accessible to physically challenged individuals (does not meet Challenge Level 1 or 2 in the USDA Design Guide for Accessible Outdoor Recreation).

6.3 Cave Trail Placement and Design

There are currently no plans to install or design a trail within the cave. Monitoring will determine the need for an internal trail. Internal trails may be needed to direct the traffic flow away from fragile areas. If an internal trail is needed, survey and design will be completed prior to development of the trail.

6.4 Sanitation and Sewage Disposal

There are no sanitation and/or sewage disposal stations located within El Capitan Cave. People are required to pack out whatever it is they have packed in. Funding for a two-hole Sweet-Smelling Toilet has been awarded in FY 1994. Installation of the toilet is currently under contract. The toilet will be located at the trailhead and parking area.

6.4 Lighting Design

There are no plans to install any form of lighting in the cave or on the access trail to the cave. The cave has a ROS rating that ranges from natural to protected primitive. These ROS classes require that the cave be kept as natural appearing as possible. Lighting would not be appropriate for the selected ROS classes.

CHAPTER 7. MONITORING

7.1 Introduction

Monitoring will be conducted by Forest Service Specialists for relating visitor use to degradation of cave resources. The impact of various types and intensities of visitor use must be carefully and systematically documented so that acceptable levels of use can be anticipated and altered if necessary. Complete records of monitoring activity will be kept in a file for El Capitan Cave at Thorne Bay Ranger District. A brief description of monitoring activities follows.

7.2 Photo Monitoring

Photos of vulnerable or indicator resources (e.g., actively growing speleothems, narrow trails, stalactites and stalagmites within reach of human contact, and colored flowstone) are taken to determine if these resources are being impacted. These photos provide a comparative record of changes occurring in the cave. Qualitative and quantitative documentation of the cave through photography will document the need for cave restoration, research and inventory projects, the impact of visitation, vandalism, and naturally occurring environmental changes on the cave resources. Caution will be exercised to insure that photo monitoring does not become an impact itself.

7.3 Biological Monitoring

El Capitan Cave is known to have been used by bears, bats, otters, and other small mammals. Systems to determine periods of wildlife use and type of wildlife use will be established. In particular, sites used by bats will be monitored and protected. Wildlife monitoring will not interfere with wildlife use, and will be coordinated through a Forest Service Wildlife Biologist familiar with cave fauna. In addition to bats, rare and unusual species of fauna may dwell within El Capitan Cave. Monitoring may identify their presence and lead to their protection. Identifying management for these types of cave biota will require the expertise of a biologist familiar with cave fauna and technical caving skills.

7.4 Hydrological Monitoring

Hydrological systems within the cave are vulnerable to visitation and surface disturbance. Seemingly minor actions on the surface can cause impacts on the cave below. Changes in water quantity will be monitored to ascertain if there is blocking or changing of natural water percolation due to visitation or surface activity. Monitoring of water flow within the cave will be developed to provide information on flooding and fill rates which may be important to visitor safety, critical mineral growth and/or cave fauna. Turbidity, pH, microorganisms, human waste, temperature, and other parameters that are likely to be altered by human activity will be monitored periodically to quantitatively measure any change within the cave.

7.5 Impact Mapping

Utilizing a detailed map of the cave, an impact map will locate trails, tracking of mud or sediment, pristine areas, visitor impact areas, and sensitive resources. Cave resources that are easily susceptible to disturbance are considered sensitive. Sensitive cave resources include bat roosts, archaeological sites, paleontological sites, and fragile geologic features such as soda

straws, conulites, helictites, pristine flowstone, and moonmilk. The impact maps will delineate areas of the cave's floor, walls, and ceiling which are impacted or non-impacted. To ensure the cave ecosystem can handle the current use, the impact maps will be periodically reviewed, and updated to determine if resources are disappearing or impacted areas are increasing in extent.

7.6 Visitor Use

Visitor use data for Section 2 will be collected by guides. Electronic sensors could be installed at the cave entrance to collect visitor use data in Section 1. Section 3 and 4 visits will be documented by Forest Service personnel. Monitoring activities should be conducted throughout the operating season. Certain activities (e.g. high impact special use permits, outfitter/guides or filming activities) need more frequent monitoring.

7.7 Cave Climate

Temperature, humidity and evaporation rate are critical to cave fauna, mineral growth, preservation of artifacts and paleontological resources. Cave temperature, humidity and evaporation rate should be monitored in the cave. Activities likely to affect cave climate include gating, reducing or enlarging the entrance, timber harvesting near the entrance, surface disturbance, digging additional entrances, operating machinery within the cave, altering water flow through the cave, and excessive visitation.

7.8 Air Quality

Concentrations of radon, hydrogen sulfide, carbon dioxide, methane, and other harmful gases have been known to accumulate in caves. Monitoring of air quality will be implemented. Specifically, radon gas will be monitored periodically to determine the potential health risks to employees who frequently visit the cave.

CHAPTER 8

ALTERING THE PLAN

8.1 Introduction

Managing El Capitan Cave will be continuous. Management strategies established in this plan may undergo slight to extreme changes from year to year. The tasks of gathering and analyzing data, evaluating management objectives and guidelines, and refining the cave management plan may proceed indefinitely. Major changes may include adjustments to visitor use and group size, re-defining the operating period, and reducing or increasing the amount of cave available for recreational use. Changes require the approval of the District Ranger and will be submitted as an amendment to this plan under a new cover sheet. All original plans should be kept in order to document why and when management changes have occurred.

8.2 Limits of Acceptable Change

Elements of the Limits of Acceptable Change (LAC) planning process will be incorporated as a method to structure adjustments to this plan. LAC involves defining a desired future condition that can be measured and managed for. It is a process for establishing acceptable resource and social conditions and prescribing appropriate management actions. The LAC process is becoming institutionalized within the Forest Service but there are no guidelines on where, when, why, and how LAC should be applied. LAC is intended to link consistent management direction between districts, Forests or Regions. Using LAC to manage caves helps focus management attention on impacts/conditions/effects rather than numbers of people. When managing a non-renewable resource, this approach is essential.

LAC requires managers to develop strategies for extensive/intensive public involvement, monitoring, and selection of resource and social condition indicators. Chance for public involvement will be provided through public meetings, visitor response forms and questionnaires.

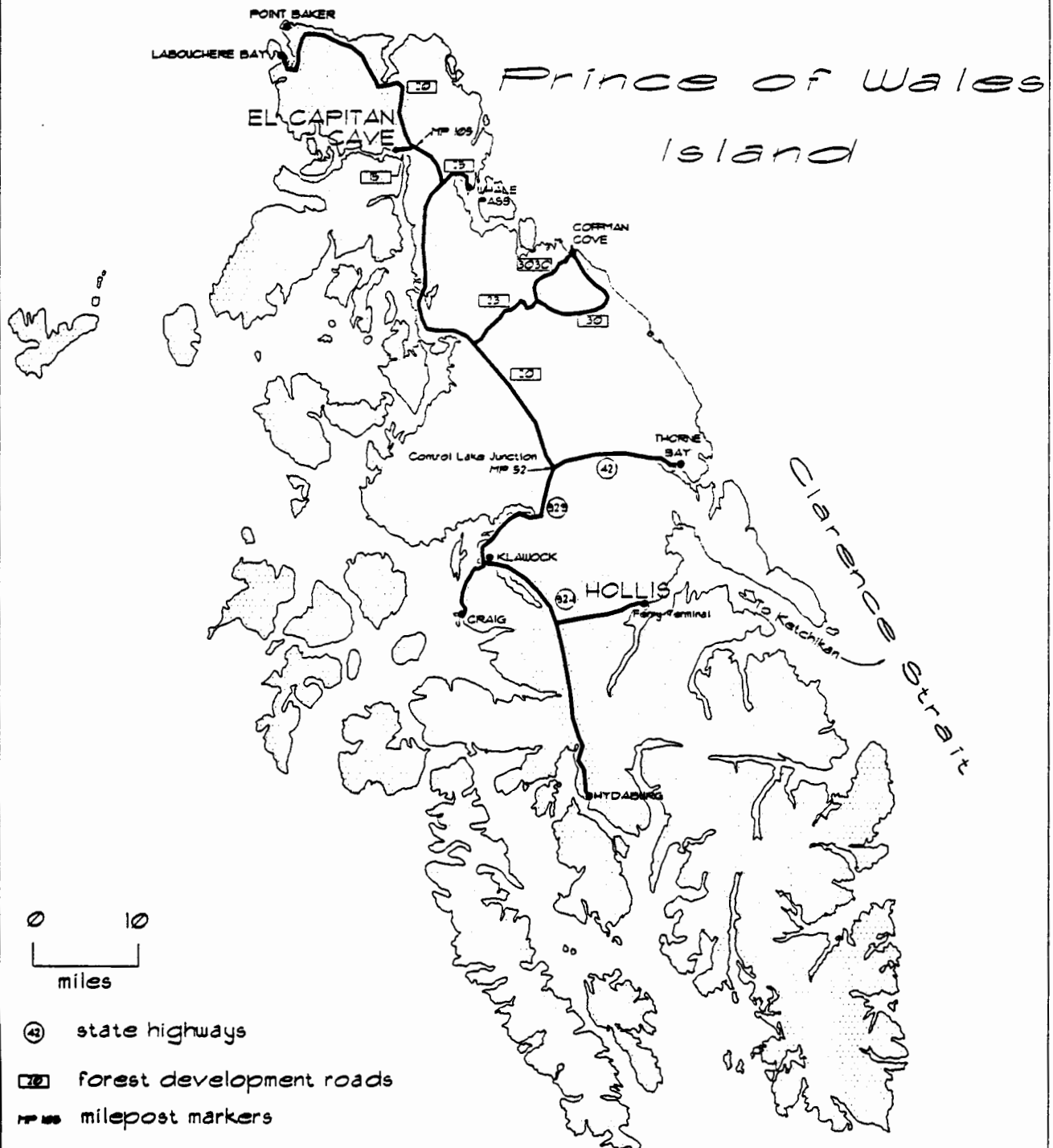
Quantifiable monitoring will help determine if problems really exist and will focus on impacts, conditions and effects. The LAC process will help resolve and identify problems and issues related to monitoring requirements which may be vague or unquantifiable. Good monitoring results may lead to the need for significant changes to the plan. Several years of data may be needed before results prove conclusive.

An indicator is a specific parameter that can be monitored to determine whether management objectives are being met. Indicators should be established in a specific enough manner to be monitored unambiguously. When an indicator reaches a limit of acceptable change, management should be adjusted.

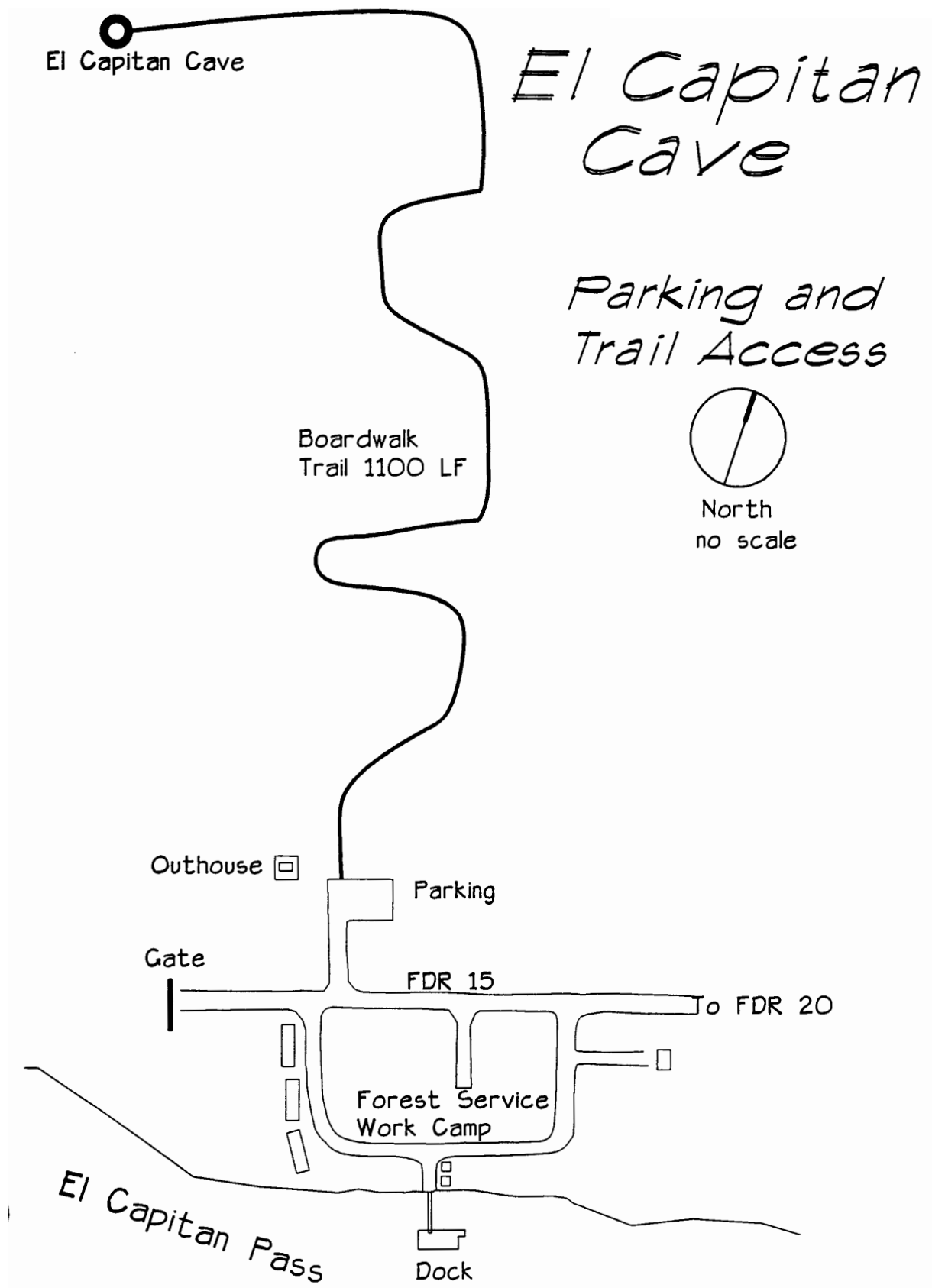
The LAC process of public involvement, monitoring and identification of indicators for El Capitan Cave will be developed over a 2-year period from date of approval of this plan. All LAC results will be compiled in a project folder for El Capitan Cave and maintained at Thorne Bay Ranger District.

VICINITY MAP

Location Map for El Capitan Cave



ACCESS TRAIL MAP



1994 MANAGEMENT ACTIONS TABLE

MANAGEMENT ACTIONS	RESPONSIBILITY	PRIORITY	DONE ✓
1. Photo Monitoring	Rec. Staff	1	✓
2. Develop Cave Calendar	Rec. Staff	1	
3. Info. Sheet of Procedures for Front Desk	Rec. Staff	1	
4. Prepare for Guide(s)	Rec. Staff	1	
5. Training for Guide, in Cave, First-aid, CPR, etc.	Rec. Staff	1	
6. Complete cave mgt. plan	Rec. Staff	1	
7. Create messages in Cave Register	Rec. Staff	2	
8. Develop Brochure	Rec. Staff	1	
9. Install trailhead and parking area signs	Rec. Staff	2	
10. Install SST	Rec. Staff	1	
11. Cave SAR Training	Rec. Staff	2	
12. Establish LAC indicators	Rec. Staff	3	
13. Impact Mapping	Rec. Staff	1	

1995 MANAGEMENT ACTIONS TABLE

MANAGEMENT ACTIONS	RESPONSIBILITY	PRIORITY	DONE ✓
1. Prepare for Guide(s)	Rec. Staff	1	
2. Training for Guide, in Cave, First-aid, CPR, etc.	Rec. Staff	1	
3. Develop Interp. Plan for Signs	Rec. Staff	2	
4. Cave Climate Monitoring	Various	1	
5. Biologic Monitoring	?	4	
6. Hydrological Monitoring	?	4	
7. LAC	Rec. Staff	3	
8. Air quality Monitoring	Rec. Staff	1	
9. Plan Adjustment	Rec. Staff	1	

1996 MANAGEMENT ACTIONS TABLE

MANAGEMENT ACTIONS	RESPONSIBILITY	PRIORITY	DONE ✓
1. Prepare for Guide(s)	Rec. Staff	1	
2. Training for Guide, in Cave, First-aid, CPR, etc.	Rec. Staff	1	
3. Install Interp. Signs	Rec. Staff	2	
4. Cave Climate Monitoring	Various	1	
5. Biologic Monitoring	?	4	
6. Hydrological Monitoring	?	4	
7. LAC	Rec. Staff	3	
8. Air quality Monitoring	Rec. Staff	1	
9. Plan Adjustment	Rec. Staff	1	

COMMONLY USED CAVE MANAGEMENT TECHNIQUES

In order to protect valuable cave resources, a variety of management techniques can be used. These may be used in different combinations or individual techniques may be altered to produce a more desirable management. A description of common management techniques is presented below:

Conservation Messages in the Visitor Register - Conservation messages placed within visitor registers where use of signs would seriously affect the cave's ROS class.

Interpretive Signs Signs may be installed near the entrance or within caves to increase visitor appreciation of cave resources, or suggest appropriate caving techniques which will foster visitor safety and resource protection. Over-use of signs should be avoided so as not to interfere with the natural appearance of the cave.

Brochures and Handouts Brochures and handouts can be distributed to the general public on "highly developed" or "developed natural" caves to increase public awareness of cave resources. Brochures and handouts on caves in other classes should not be distributed to the general public since the information released could increase visitation, change the cave's ROS class and lead to resource impacts. Handouts for "natural" caves could be distributed to persons with specific information requests, and handouts for "semi-primitive" and "primitive" caves could be given out with cave use permits should visitation be regulated.

Cave Trails Installation of cave trails are used to protect fragile resources. Cave trails can be used to restrict damage to pristine floor surfaces or fragile non-renewable deposits (i.e., bones). Cave trails should be visible and easy to follow. Examples of cave trails currently in use include rocks lining either side of the path, plastic surveyor's ribbon strung between stakes lining both sides of the path, reflective tape lining the sides of the trail, and hardening the trail path with gravel, concrete or wood. Cave trails should be biologically inert and only permanently installed in "highly developed" caves.

Permits and User Limits Permits and user limits are primarily set to prevent resource damage and maintain ROS class. Permits limit the frequency of use and the number of people who can use the permit at one time. Group size limits are required where large groups would have difficulty moving through areas with fragile cave resources without causing damage. Usually, only one group at a time receives a permit.

Seasonal Closures Some caves may be closed seasonally to protect visitors from seasonal hazards (i.e., flooding) or conserve sensitive wildlife habitat (i.e., maternal colonies of bats).

Road Closures, Upgrading and New Construction Roads which lead to, or pass near, a cave's entrance may be considered for closure if closure of the road would help protect fragile resources or maintain the cave's ROS class. In general, no new roads (temporary or permanent) should be constructed to or within 300 feet of a cave with a "natural", "semi-primitive", or "primitive" ROS class. Roads leading to or very near these class caves should also, not be upgraded. Such construction or upgrade is likely to alter visitation, affect ROS and may lead to resource destruction.

Cave Gates Cave gates may be required for security of highly developed caves, or to protect sensitive resources and maintain ROS class for "semi-primitive" or "primitive" caves. Gates can detract from the entrance area of a cave, but usually this detracton is off set by the need to preserve very fragile, near pristine resources or keep visitation

within limits consistent with a cave's ROS class. Cave gates should not interfere with wildlife use or restrict air flow into or out of the entrance and should be maintained regularly. A permit system to enter beyond the cave's gate can be implemented when appropriate.

Guides Guides are an integral part of "highly developed" cave management, but can also be used in other classes of caves if the use of a guide does not change the cave's ROS class. Guides are frequently used in "developed natural" or "natural" caves for educational purposes. The guide can greatly enhance the interpretation of the cave. In rare cases, a guide system might be developed for a "primitive" cave should there be no viable alternative to protect fragile cave resources. A guide system for a "semi-primitive" cave would probably affect the ROS class by increasing visitation and should be avoided.

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CAVE & KARST LANDSCAPE **WORD FIND**

WORDS HIDDEN IN THE PUZZLE ON PAGE 62

ALASKA	SKUNK CABBAGE	LADY FERN
CAVE	TONGASS	RIVER OTTER
GUANO	BATS	STALACTITE
MUSKEG	COLUMN	TROGLOPHILE
SITKA SPRUCE	EL CAPITAN	CALCIUM
SWORD FERN	KARST	DEVILS CLUB
WET	RIVER BED	FUN
ARTIFACTS	SODA STRAWS	MITE
CAVERN	TROGLOBITE	SHIELD FORM
EPIKARST	BERRIES	STALAGMITE
HEMLOCK	DEER FERN	TROGLOXENE
RAIN	FLOW STONE	

CAVE & KARST LANDSCAPE **CROSSWORD**

SOLUTION TO THE PUZZLE ON PAGE 63

ACROSS		DOWN	
1. epikarst	25. phototropic	1. El Capitan	21. look
5. bear	26. human	2. Alaska	23. troglobite
6. karst	29. hibernaculum	3. Sitka spruce	24. diamonds
9. plate	32. flowstone	4. Capitan	27. spleenwort
10. guano	34. wet	7. rain	28. drapery
12. hair	35. soda straw	8. troglophile	30. cedar
14. otter	37. nurse log	9. POWI	31. trogloxene
16. stalactite	39. hemlock	11. amphipod	33. stone
19. picture	41. bread	13. column	36. sinkhole
20. puddle	42. mite	15. tongue	38. steam
22. strikeslip	43. headlamp	17. Tongass	40. cave
		18. twinpits	