SCOMM
83:9

MEMO

TO: TOM
FROM: ALEXIS

RE: CAVE LEGISLATION

(We have briefly)

NEED TO TALK ABOUT PLAN FOR TOMORROW'S ITT MEETING. CAROL WILSON WITH DNR HAS CONTACTED APPROPRIATE AGENCIES, AS I HAVE DONE AND LET THEM KNOW IT WILL BE TELECONFERENCED.

I SPOKE WITH UAF/GEOLOGICAL SURVEY; DEC; DNR; AVA; FOREST SERVICE AND GLACIER GROTTO FOLKS.

AS I MENTIONED EARLIER, PAULA AT LEG. RESEARCH IS VERY KNOWLEDGEABLE ABOUT THIS TOPIC AND YOU MIGHT WANT TO TOUCH BASE WITH HER. SHE WILL ALSO ATTEND THE MEETING.

WE WILL HAVE TO DRAFT A CS (DNR HAS CHANGES THEY WANT ALREADY). I ASSUMED THAT WE WOULD HAVE A HEARING ON THE TOPIC GENERALLY AND THEN WORK ON CS FOR THE NEXT MEETING SPECIFICALLY.

THINGS TO THINK ABOUT:

1. NEED TO REFER TO MANAGMENT UNDER SECTION 38 (PUBLIC LAND) AND NOT SECTION 41 (PUBLIC RESOURCES) ACCORDING TO DNR.

2. REPORT - FEB. 1, 1998 COMMISSIONER TO REPORT TO LEGISLATURE ON THE MASTER REGISTER OF CAVES. WHY SIX YEARS FROM NOW? SEEMS LIKE THEY SHOULD HAVE A PRELIMINARY REPORT IN TWO YEARS OR THREE YEARS.

3. DNR WANTS WORDING CHANGED TO "COMMISSIONER MAY ADOPT..." DO NOT WANT TIME LINE OR REQUIRED TIME PERIOD AND THEN THEY COULD SPREAD IT OUT OVER A COUPLE OF YEARS. (CAROL'S WORDS) I'M NOT SURE IF I AGREE WITH THIS, BUT IT IS YOUR CALL.

4. HOW WILL WE BALANCE PROTECTION AND CONSERVATION WITH RECREATION AND TOURISM? (EX: KPC WORKING WITH FOREST SERVICE)

5. WHAT ABOUT TOURISM POTENTIAL--IS IT FEASIBLE, LACK OF ACCESSIBILITY, MAJORITY OF CAVES ON FEDERAL LAND--WHAT PERCENTAGE ARE ACTUALLY ON STATE LAND?

6. PERMIT PROCESS - DIFFERENCE BETWEEN FEDERAL LANDS AND STATE LANDS? (INDIANA HAS A PERMIT POLICY AND DISCLAIMER FORM: SEE THE LEG. RESEARCH REPORT ON THIS)

7. WHAT ABOUT STATE LANDS? (WHAT PERCENTAGE IS STATE VS. FEDERAL AND WHAT ABOUT NATIVE LANDS)

A. WITH NATIVE LANDS, IN FEDERAL LAW, THERE IS A DIFFERENCE DENOTED BECAUSE OF SACRED BURIAL SITES. WILL THIS BE A PROBLEM IN ALASKA? don't know

8. PAULA SAID THAT SHE TALKED WITH INDIANA ABOUT LIABILITY PROBLEM THIS--BAD ACCIDENT WITH BAD RESCUE. STATE KNOWS THERE ARE CAVES ON SPECIFIC LANDS AND WHERE THEY ARE AT--STATE LIABILITY QUESTION.

9. WHAT ABOUT BUFFER STRIPS (PG. 2, LINE 20) AROUND CAVES? WILL WE HAVE TO WORK COOPERATIVELY WITH OTHER LOGGING COMPANIES, MINING COMPANIES, ETC., DEPENDING WHERE LAND IS?

NEED TO THINK ABOUT THE NEXT MEETING FOR OUR COMMITTEE. WILL WE WAIT UNTIL NEXT THURSDAY (SHOULD ALMOST CERTAINLY--SINCE WE WILL BE GONE FOR FOUR DAYS), ESPECIALLY IF WE NEED TO DRAFT A CS AFTER OUR MEETING, WHICH WE WILL UNDOUBTEDLY NEED TO DO. BESIDES YOU WILL HAVE TOURED THE CAVES ON P.O.W. ISLAND AND WILL HAVE A BETTER GRASP OF THE SPELEOLOGICAL SITUATION IN SOUTHEAST (SAY THAT THREE TIMES FAST).

7-LS2133\M
Luckhaupt
4/28/92

Changes from original HB 576 & Plus blank CS are underlined or bracketed

CS FOR HOUSE BILL NO. 576 ( )

IN THE LEGISLATURE OF THE STATE OF ALASKA

SEVENTEENTH LEGISLATURE - SECOND SESSION

BY

Offered:
Referred:

Sponsor(s): HOUSE RULES COMMITTEE BY REQUEST OF THE HOUSE SPECIAL COMMITTEE ON INTERNATIONAL TRADE AND TOURISM

A BILL

FOR AN ACT ENTITLED

"An Act providing protection for caves and cave resources."

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF ALASKA:

*** Section 1.** FINDINGS AND POLICY. (a) The legislature finds that caves are uncommon geologic phenomena, shaped by groundwater flow, that contain mineral formations that are rare and often occur in forms of great beauty and are irreplaceable if destroyed or damaged. Other fragile resource values also exist including archeological, cultural, paleontological, hydrological, and biological values.

(b) The legislature declares that

(1) [significant] caves are an invaluable and irreplaceable part of the state's natural heritage and declares it the policy of the state that caves and cave resources are deserving of protection and conservation under state law;

(2) certain [significant] caves and cave resources have education [tremendous], recreation, and tourism potential as long as adequate means of access, appropriate cave management techniques, and safety procedures are in place; and

(3) protection, conservation, and recreation and tourism development of caves [significant] be

[ ] = deleted
____ = new language

conducted in a manner consistent with other resource development.

* Sec. 2. AS 41 is amended by adding a new chapter to read:

CHAPTER 26. PROTECTION OF CAVES AND CAVE RESOURCES.

Sec. 41.26.010. STATEMENT OF POLICY. It is the policy of the state that caves and cave resources be conserved and managed in a manner that protects and maintains these nonrenewable resources.

Sec. 41.26.020. MANAGEMENT ACTIONS. (a) The commissioner shall adopt regulations to carry out the purposes of this chapter. The regulations must include

(1) procedures for the adoption of a management plan governing the use and management of all caves and potentially significant cave sites and locations on state land; the commissioner may adopt a management plan for each cave or potentially significant cave site or location, or a plan for all the caves or potentially significant cave sites or location in a particular geographic area determined by the commissioner;

(2) the adoption of criteria for the identification of significant caves and potentially significant cave sites and locations on state land, and the development and periodic revision of a master register of significant caves and potentially significant cave sites and locations on state land; regulations developed under this paragraph should include a classification system for significant caves and potentially significant cave sites and locations based upon factors that include archeological, cultural, and scientific significance, accessibility, tourism and recreation potential, and safety;

(3) the regulation or restriction of the use of significant caves and cave resources on state land, as appropriate;

(4) circumstances in which, for purposes of protection of caves and cave resources on state land, the commissioner may enter into volunteer management agreements with scientists interested in caves and cave resources and with persons interested in caves and cave resources for recreational purposes;

(5) notwithstanding any other provision of law, for purposes of protection of caves and cave resources on state land, providing for cave protective zones around cave entrances and openings;

(6) for purposes of encouraging the reporting of finds of caves and cave resources, providing a procedure for registering newly discovered unnamed caves and providing a preference

for the naming of the newly discovered unnamed caves according to a name submitted by the discoverer.

(b) In implementing this chapter, including the adoption of regulations under (a) of this section, the commissioner shall make reasonable efforts to foster and promote communication, cooperation, and the exchange of information among state land managers, representatives of the federal government, persons who use caves, including caving and speleological organizations, bona fide educational and research institutions, and the general public.

Sec. 41.26.030. PERMITS FOR COLLECTION AND REMOVAL OF RESOURCES FROM CAVES ON STATE LAND. (a) Under regulations adopted under AS 41.26.020(a)(3), the commissioner may issue permits for the collection and removal of cave resources on state land under the terms and conditions that the commissioner may impose by regulation. The commissioner may issue a permit under this section only if the commissioner determines that the proposed collection or removal activity is for educational, cultural, or scientific purposes and is otherwise consistent with the purposes of this chapter and other applicable provisions of law.

(b) A permit issued under this section must include information concerning the time, scope, location, and specific purpose of the proposed collection or removal, the manner in which the collection or removal may be performed, and the permitted disposition and place of safe-keeping of the cave resource.

(c) The commissioner shall

(1) revoke a permit issued under this section or decline to issue a permit if

(A) the commissioner determines that the permittee has violated a provision of this chapter, or regulations adopted under this chapter, or has failed to comply with a term or condition of the permit;

(B) the commissioner imposes a civil penalty on the permittee under AS 41.26.050; or

(C) the permittee is convicted of a violation of AS 41.26.060;

(2) withhold issuance of a permit under this section if the commissioner finds that the prospective permittee has violated a provision of this chapter or regulations adopted under this chapter or has failed to comply with a term or condition of a previous permit.

(d) A permit issued under this section may not be transferred.

(e) A permit may not authorize action by a permittee that constitutes an offense under

AS 41.26.060, but action by a permittee that has been specifically authorized by a permit issued under this section does not constitute a violation of AS 41.26.060.

Sec. 41.26.040. CONFIDENTIALITY OF INFORMATION REGARDING CAVES. (a) The commissioner may not make information concerning the specific location of a [significant] cave located on state land available to the public until a management plan covering the cave has been adopted under AS 41.26.020 and unless the commissioner determines that disclosure of information about the location of a cave would not create a substantial risk of harm, theft, or destruction of the cave or its resources.

(b) Notwithstanding (a) of this section, upon receipt of a written request, the commissioner may make information about a cave available to the representative of an agency of the federal government or another state agency, to bona fide caving and speleological organizations, such as grottos of the National Speleological Society, or to a bona fide educational or research institution. A written request submitted under this subsection must

(1) describe the specific site or area for which information is sought;

(2) explain the purpose for which the information is sought; and

(3) include assurances satisfactory to the commissioner that adequate safeguards will be taken to protect the confidentiality of the information in order to ensure protection of the cave from destruction by vandalism or from unauthorized use.

Sec. 41.26.050. CIVIL PENALTIES. For the violation of a provision of this chapter on state land, of a regulation adopted under this chapter, or of the provisions of a permit issued under AS 41.26.030, the commissioner may enter an order levying a civil penalty of not more than $10,000 for each offense. Each violation constitutes a separate offense. AS 44.62 (Administrative Procedure Act) governs proceedings under this section.

Sec. 41.26.060. CRIMINAL PENALTIES. (a) A person may not knowingly, without a permit,

(1) destroy, disturb, mar, or harm the surfaces of a cave on state land, natural material found within the cave, or a cave resource;

(2) disturb or alter the natural condition of a cave on state land;

(3) remove, deface, tamper with, disturb, buy, trade, barter, sell, or transport a cave resource or material found within a cave on state land;

(4) burn within a cave on state land a material that produces smoke or gas that

is harmful to an organism in the cave; however, this paragraph does not prohibit acetylene gas emissions generated by a carbide lamp used as a source of light by a person using the cave;

(5) kill, injure, disturb, or otherwise interfere with cave life, or interfere with or obstruct the free movement of cave life into or out of a cave on state land;

(6) deposit or leave litter, as defined in AS 46.06.150, or solid waste, as defined in AS 46.03.900 in a cave on state land; or

(7) enter a cave or cave protective zone on state land carrying an aerosol or other kind of container having paint, stain, or another coloring material.

(b) A person who violates this section is guilty of a class A misdemeanor.

(c) Crimes under this section are in addition to any other crimes provided by law.

(d) This section does not apply to actions taken by the department or an employee or agent of the department, authorized by the commissioner to improve the accessibility of or within a cave, the protection or use of cultural, educational, or scientific features or values, or to provide for the safe use of caves.

Sec. 41.26.070. NONLIABILITY OF STATE. Notwithstanding any other provision of law, the state and its officers, employees, and agents are not liable for an injury suffered by a person as a result of that person's use of a cave on state land whether by permit or otherwise.

Sec. 41.26.080. APPLICABILITY. Nothing in this chapter is intended to repeal, interfere with, or supplant any other state law concerning or regulating (1) fish and game; or (2) water. An activity permitted under this chapter must also meet and comply with other applicable law.

Sec. 41.26.100. DEFINITIONS. In this chapter,

(1) "cave"

(A) means a naturally occurring void, cavity, recess, or system of interconnected passages beneath the surface of the earth or within a cliff or ledge, whether or not accessible by a natural entrance;

(B) includes a lava tube, cavern, and a natural pit, grotto, and rock shelter;

(C) does not include a mine, tunnel, pit, or other manmade underground excavation;

(2) "cave resource" means

(A) life forms that normally occur in, use, visit, or inhabit a cave or

subterranean water system within a cave;

(B) historic, prehistoric, or archaeological resources, as that term is defined by AS 41.35.230, located within the cave; and

(C) a natural mineral formation or deposit occurring in a cave, or a natural subsurface water and drainage system within a cave, and includes

(i) the natural relief features on the walls, ceiling, and floor of a cave, and the structural or geological components of the cave; and

(ii) a natural mineral formation or deposit occurring in a cave, commonly composed of calcite, epsomite, gypsum, aragonite, celestrite, and other similar materials.

Spelling is still wrong celestite

* Sec. 3. AS 44.19.058 is amended by adding a new subsection to read:

(b) In addition to its other duties and powers, the board shall name newly discovered caves after the name provided by the discoverer of the cave as provided in regulations adopted by the commissioner of natural resources under AS 41.26.020.

* Sec. 4. DEVELOPMENT AND ADOPTION OF INITIAL REGULATIONS. The commissioner of natural resources shall adopt the initial regulations under AS 41.26.020 and prepare the initial master register of significant caves under AS 41.26.020(a)(2) no later than two years after the effective date of this Act.

* Sec. 5. REPORT. Before February 1, 1998, the commissioner of natural resources shall report to the Alaska State Legislature on the master register of caves to be compiled under AS 41.26.020, added by sec. 1 of this Act, the extent to which those caves are available for the development of tourism and tourism related activities, and the recommendations of the commissioner concerning future state actions in regard to the protection and development of caves and cave resources in the state.

Tom Sp. 2/18
FYI -

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF GEOLOGICAL & GEOPHYSICAL SURVEYS

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April 7, 1992

Representative Tom Moyer
Chairman - Special Committee for
International Trade and Tourism
Room B; State Capitol Building
Juneau, AK 99811

Dear Representative Moyer:

At your request through the State Geologist, Tom Smith, we've compiled information on solution caverns, lava tube and glacier caves, and karst topography in Alaska. The information summarized below is derived from interviews with Dr. David Hopkins of the Department of Geology at the University of Alaska, Fairbanks (UAF), Steve Lewis and Joe Cook, also of UAF, Jim Baichtal, cave specialist with the U.S. Forest Service in Ketchikan, Robert Ackerman, Professor at Washington State University in Pullman, Washington, and Jay Rockwell, president and newsletter editor of the Glacier Grotto in Anchorage. Included here are notes and observations recorded in reports issued by DGGS during geologic investigations throughout Alaska. Dedicated field work conducted by the Glacier Grotto, an affiliate of the National Speleological Society, contributed substantially to what we know of recent cave discoveries in the Wrangell Mountains and southeastern Alaska.

Formation of Caves in Alaska

The major 'cave type' known in Alaska is the solution cavern, which is formed by the dissolving of $CaCO_3$, the principal component of limestone or marble, by slightly acidic waters. A more uncommon type of "lava tube" cave has been documented from the Imuruk Basin of central Seward Peninsula, and in the Alaska Peninsula region. Glacier caves formed by subsurface cavities near the base of moving glaciers are also explored by the Glacier Grotto, although their life span is frequently limited. Their locations and characterisitcs are not discussed here. Rock overhangs or frost pockets in limestone or calcareous schist have been investigated by archeologists for evidence of human occupancy, but are not considered true caves.

Solution caverns occur in a variety of limestone or marble bearing geologic terranes throughout Alaska, and consist of 1) shallow phreatic passageways; 2) littoral or sea caves along present or ancient marine shorelines; and 3) deeply or vertically dipping chimneys or pits often in association with phreatic caverns. In all cases, slightly acidic waters dissolve limestone or marble along favorable structures such as faults or fault intersections, at the

interface between carbonate rich $CaCO_3$ and non-reactive rock types, or within specific reactive limestone layers.

Most solution caverns in Alaska are of the fossil type; i.e., they do not today contain active water conduits or underground river systems that resulted in their formation. In southeastern Alaska, there are active water conduits or streams superimposed over one or several fossil cave systems. Many researchers such as Ford (1973), Lauriol and others (1989), and D. M. Hopkins (pers. Comm., 1992); (see attached bibliography) relate solution cavern development to periods of warmer climates than that of today and to warm intervals between glacial maximums in the Pleistocene Epoch. Solution caverns also formed in Pre-Pleistocene climates (pre-2.7 million years ago). The climate was too cold during glacial conditions of most of the Pleistocene to form solution caverns.

Karsts are 'solution landscapes' where acidic waters dissolve calcium carbonate (limestone, marble) terranes and cause subsurface cavities to form. Collapse features on the surface usually consist of circular pits, sink holes, long and impressive vertical fissures, labyrinths of elongate troughs, and vertical, isolated tors. In karst terranes, surface waters frequently disappear in upper or headward stream drainages, only to reappear as artesian springs in lower valleys, frequently under impressive water pressure. I've personally observed this phenomena in Devonian limestone at Bornite along the flanks of the southern Brooks Range. Speleothems, flowrock, and stalagmites, all familiar to many cave enthusiasts, have been found in Alaskan and northern Canadian caves.

In southeastern Alaska, entrances to solution caverns have been obscured by vegetation or colluvial fill, but are otherwise 'open' in the form of horizontal and vertical passageways. However, entrances to solution caverns in the interior and in northern Alaska are frequently plugged by ice. In the same fashion, mine portals are quickly plugged by ice shortly after cessation of mineral development. This problem, coupled with solifluction infilling, has probably obscured and prevented discovery of solution caverns in much of interior Alaska.

Known Alaskan Cave Sites

Northern Alaska

I haven't found any references to solution caverns in northern Alaska, although Jay Rockwell of the Glacier Grotto indicates that small phreatic caverns have been found near Anaktuvuk Pass. Pessel (1977) describes extensive karst development in the Jade Mountains of the Kobuk River Valley, which indicates this area would be a good place to look for caves. Additionally, thick units of carbonate such as the Skagit and Lisbourne limestone formations capable of generating caves crop out throughout the Brooks Range.

Seward Peninsula

Much of what is known about Alaskan solution caverns are from important cave discoveries on the Seward Peninsula near Nome. The famous Trail Creek Caves in north central Seward Peninsula are a series of nine shallow phreatic solution caverns that total about 3,700 feet of rooms, chimneys, and passageways about 25 miles southwest of the village of Deering.

Several of the caves were occupied by early Alaskans, and abundant remains of spearpoints, shafts, scrapers, kitchen utensils, fire hearths, and other human remains have been dated to at least 6,000 years before the present. Trail Creek Caves, now in Bering Land Bridge National Monument are, without question, the most important 'early man' caverns yet documented in Alaska. A classic, but rare, report of their excavation and studies was published in Denmark by Larsen (1968). Several periods of human occupation involving complex hunter societies were discovered during exhaustive excavations in the 1950's.

Several lava-tube caves were found by D. M. Hopkins in young Quaternary basalts in the Lost Jim Lava flow of Imuruk Basin, south of Trail Creek caves. The longest individual chamber measured about 300 feet (115 m); this unusual type of cave is documented only in the Alaska Peninsula region and on Seward Peninsula.

Several small phreatic caves have been located on Koko Creek along the south flank of the Kigluaik Mountains, about 30 miles northwest of Nome, on Manila Creek near Mount Distin (about 15 miles north of Nome), and in scattered sites along Sinuk River, also near Nome. Additionally, extensive karst topography and sink holes are developed in limestone between Cape Rodney and Cape Douglas, about 30 miles west of Nome.

West Central Alaska

Karsts are developed in Paleozoic limestone north of Medfra and in the Lime Hills near Lime Village. We (DGGS) have observed sink holes and extensive solution fissures in the headward drainage of Nixon Fork and near White Mountain, both in the Kuskokwim River drainage. Ackerman (1984) discovered a small phreatic solution cavern with a chimney system near Farewell, Alaska that was briefly occupied by human hunters 2,900 years ago.

There is quite a bit of 'hearsay' concerning the existence of caves in the vicinity of Lime Village, including handed-down legends by local Eskimos that seem to indicate human occupancy. We (DNR) are discussing possible ground truthing investigations of these solution cavern prospects with Calista Corporation, using their compiled location data, during our mineral assessment activities of federal lands for the state land selection program this summer.

East Central Alaska

Small phreatic or chimney solution caverns have been briefly investigated in the Tolovana Limestone, particularly in the 'Limestone Jags' area along the upper Beaver Creek in the White Mountains. According to Jay Rockwell, Glenn Juday of the School of Agriculture and Land Resource Management at UAF has worked on these caves and might have more information. I couldn't get a hold of Dr. Juday last week.

Solution caverns of various morphological types occur on both sides of the Alaska-Canada border in the upper Porcupine River drainage. The Blue Fish Caves near Old Crow and Bear Cave, both in Yukon Territory, have been surveyed (Lauriol and others, 1989). Jim Dixon and others in the Archeology Department at UAF have also done some work on caves on the Alaska side, but I don't have any further information on their work.

South Central Alaska - Wrangell Mountains - Alaska Peninsula Region

Much of the earliest cave surveys completed by the Glacier Grotto focused on solution caverns formed in the Chitistone Limestone near Kennecott in Wrangell-St. Elias National Park. Solution caverns of the chimney and phreatic types with up to 1,800 feet of rooms and passages were surveyed in the Star, Bar and Bucklegrind caves; nearly a mile of other workings have been documented by Glacier Grotto in several solution caverns through 1991.

Lava tube caves have been investigated by cavers of the Glacier Grotto on St. Paul Island in the Alaskan Peninsula region. There also have been some reports of lava tube caves on Nunivak Island.

Southeast Alaska

World class cave resources have been only recently documented by the Glacier Grotto and the U.S. Forest Service in southeastern Alaska; and the magnitude of these discoveries has only recently come to light. Caves have been known only in folklore and legend from the Panhandle for many years. Starlight Cave, found in 1987 on northern Prince of Wales Island west of Ketchikan, constituted the first significant cavern discovery. Since then, 95 caves with nearly 10 miles of underground passages and rooms have been surveyed by the Glacier Grotto and U.S. Forest Service, mainly on northern Prince of Wales, Coronation, and Heceta Islands. El Capitan cave alone has about 2 miles of underground passageways thus far documented. The El Capitan and Snow Hill caverns constitute the first (890 feet) and third (580 feet) deepest chimney-pit systems in the United States.

There are about 950 square miles of carbonate rocks (limestone and marble) on Prince of Wales Island; about 20 square miles exhibit extensive labyrinth, tower, and sink-hole karst development. The largest and most spectacular caves are formed where limestone overlies impermeable bedrock (not readily dissolved). Other caverns form where dikes or sills cut limestones, and a few form at the intersections of major faults and shears. In all cases, water percolates down to impermeable layers where $CaCO_3$ dissolves and caverns are formed and progressively enlarged through time. In the biggest caves, impressive paleo-rivers formed along the base of the limestone on impermeable granite or metamorphic rock, sometimes in channels up to 100 feet wide. Flowstone, stalagmites, and many morphological variants of speleothems are found in almost all the caves. Rare forms of flowstone such as "hot fudge sundae" or "palektites" normally found only in tropical environments have been found in several of the caves. Humans have occupied littoral caves along the coast - perhaps during the Pleistocene - which potentially could change or modify theories on how North and South America were populated by early man. A pack of wolves resides in "Wolf's Lair", a littoral cavern along the west coast of Prince of Wales Island. Salmon have been observed to spawn in Cavern Lakes cave. At El Capitan an enormous room roughly the size of a football field, aptly dubbed the "Alaska Room", has been surveyed. Pleistocene fauna, including a probable short-nosed cave bear and a possible polar bear, have been found in caverns. A variety of other vertebrate skeletons of unlucky animals who fell into the vertical shafts and chimneys are frequently discovered during the cavern surveys. It should be emphasized that traversing in karst topography can be hazardous. We avoided areas of extensive karst development in southern Prince of Wales Island, because they were dangerous to walk through.

The importance of these caverns to the fields of archeology and paleontology is just beginning to be understood.

Other Resources Associated with Caves and Karst Development

You asked about other resources that are impacted or associated with cave resources. The U.S. Forest Service has the best data base concerning these issues. This agency manages cave resources under guidelines of the 1988 Federal Cave Resources Protection Act.

Plants grow best on carbonate substrate with lots of active water circulation and nutrients. Hence, the biggest trees and some of the highest quality timber resources grow in the same areas where valuable cave resources reside. Commercial timber harvest practices administered by the U.S. Forest Service have been modified because of the management needs of the newly discovered solution cavern resources.

Water quality is of obvious concern to cave or karst development. In southeastern Alaska, anadromous fish species are the focus of water quality maintenance. The city of Nome in western Alaska obtains part of its water supply from Moonlight Springs northwest of town, which is a karst aquifer. Special management of the water supply is maintained because karst aquifers can be easily polluted by surface run off. (There is no filtrate action in karst water reservoirs since they are in effect open space fillings fed directly from the surface). Many aquifers in the midwestern part of the country (Kansas, Missouri, Illinois) are in karst environments where the aquifers are specifically managed. Many commercial "bottled water" resources worldwide are derived from karst aquifers.

Mineral resources are frequently associated with limestone depositional environments. These occur in three major types: 1) metalliferous skarns derived from hydrothermal fluids originating from a cooling granitic magma; where metal species selectively replace $CaCO_3$; 2) Mississippi Valley type (MVT) sedimentary - exhalitive (SEDEX) lead-zinc-silver-barium resources usually syngenetically or digeneticately formed as a result of metals derived from brines or vents in marine environments; and 3) limestone or marble itself mined for either ornamental-decorative stone or for concrete/agricultural applications. I asked Jim Baichtal, the U.S.F.S. geologist in charge of cave monitoring in the Tongass Forest, about mineral deposits in the cave management areas. The U.S.F.S. has found minor metalliferous skarns in several of the caves but no 'SEDEX' or'MVT" lead-zinc deposits.

The El Capitan Calder area is well known for historical limestone quarries, where about 2.7 million were mined from 1900 to 1941. Ornamental stone quarried near Calder, has been used in 72 buildings throughout the United States (see attachment). For example, the Admissions building of the University of Utah has extensive ornamental stone applications from marble quarries on Prince of Wales Island. Pillars supporting the capital building in Juneau were quarried from Prince of Wales Island solution cavern areas. Decorative stone is again in vogue as a potential building application particularly in Europe and the Pacific Rim.

The USFS standards and guidelines for cave resource management in the Tongass Forest are enclosed. According to Baichtal, the guidelines are intended to promote multiple use of a variety of resources in the Tongass while at the same time protecting valuable cave resources.

Cavern - Karst Literature Available

Below are materials that I've been able to compile that describe solution caverns or karst environments in Alaska, Yukon, and Northwest Territories.

Ackerman, Robert E., 1981, Archeological survey of the central Kuskokwim region - 1982 field season: Final research report to National Geographic Society, p. 43. (DGGS supported Ackerman's efforts with logistics and camp arrangements while examining state interest lands near Farewell; Ackerman found a small chimney cavern occupied by man about 2,900 years B.P.).

Brook, G. A. , and Ford, D. C., 1978, The origin of labyrinth and tower karst and the climatic conditions necessary for their development: Nature, vol. 282, No. 6, p. 4. (Description of karst formation processes in subarctic environments).

Burchard, E. G., 1920, Marble resources of southeastern Alaska: U.S. Geological Survey Bulletin 1682, p. 118. (A classic summary of ornamental stone quality marble in SE Alaska - with some notes on karst topography).

Ford, D. C., 1973, Development of the canyons of the South Nahanni River, N.W.T.: Canadian Journal of Earth Sciences, vol. 10, no. 3, p.366-378. (Contains a lengthy chapter on the formation of more than 100 caves in First and Lafferty Canyons of Nahanni River including age dating and theories of formation).

Ford, D. C., Andrews, J. C., Day, T. E., Harris, S. A., MacPherson, J. B., Orchietti, S., Rannie, W. F., and Slaymaker, H. O., 1984, Symposium Canada: How Many Glaciations?; Canadian Geographer vol. 28, no. 3, p. 205-225. (Advocates that formation of solution caverns in Canada take place during warm interglacial times).

Herreid, Gordon, Bundtzen, T. K., and Turner, D. L., 1978: Geology and geochemistry of the Craig A-2 Quadrangle and vicinity, southeastern Alaska: Alaska Division of Geological and Geophysical Surveys Geologic Report 48, 48 pages; 2 plates at 1:40,000 scale. (Describes extensive karst and sink-hole phenomena in Wales Group marble of Cambrian age - the U.S. Forest Service may use the geologic map as a possible guide to search for solution caverns on southern Prince of Wales Island).

Larsen, Helge, 1968 Trail Creek - Final report on the excavation of two caves on Seward Peninsula, Alaska: Acta Arctica, vol. 15; Arctic Institute, Charlottenlund, Denmark, p. 78, 9 plates and maps. (Classic research summary that describes cave system inhabited by early man continuously from 350 to 6,000 years B.P.).

Lauriol, Bernard, Ford, Derek C., and Cing-Mars, Jacques, 1989, Landscape development from caves and speleothem data - preliminary evidence from northern Yukon, Canada:

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I hope this assembled information will assist in your information gathering efforts. The listed bibliographic materials can be obtained from DGGS on request if you need them.

Sincerely,

Thomas Bundtzen

Thomas K. Bundtzen
Senior Economic Geologist

TKB/pc

Attachment

cc: Thomas E. Smith, Director & State Geologist
Milt Wiltse
Karen Clautice
Bob Shaw
Carol Wilson
Dave Hopkins

Cave Management

'Cave' is legally defined under federal law as: '...any naturally occurring void, cavity, recess, or system of interconnected passages which occurs beneath the surface of the earth or within a cliff or ledge and which is large enough to permit an individual to enter, whether or not the entrance is naturally formed or man-made. Such term shall include any natural pit, sinkhole, or other feature which is an extension of the surface' (Federal Cave Resource Protection Act, 1988). Speleologists use 'cave' to refer to all parts, regardless of size, of an underground system that links openings and chambers and that may connect the system to the surface. The most common type of cave is formed in limestone by dissolution. Included in the term caves are tree molds and lava tubes associated with lave flows, erosional caves, as well as those formed by dissolution of bedrock. The majority of caves on the Tongass were formed as the result of dissolution. The Blue River Lava Flow on the upper end of the Unuk River may very well have extensive lava tube systems. This area is virtually unexplored.

Cave Management Program: CAVE

I. *Management*

A. The Forest shall maintain a cave resource management program to identify, evaluate, preserve and protect caves and their environments which have unique biological, hydrological, geological, mineralogical, paleontological, cultural, educational, recreational, and/or other scientific values.

B. Seek cooperation with interested publics, including caving organizations, scientists, and recreationists in managing cave resources. Promote public education programs to insure an increased understanding of the value of these irreplaceable resources and the need to preserve these unique ecosystems.

C. Coordinate cave management with the management of other surface resources.

II. *Planning*

A. Develop and maintain a cave resource inventory, identifying both existing and potential cave locations and major karst features. Karst is defined as a type of topography that develops in areas underlain by soluable rocks, primarily limestones. Dissolution of the subsurface strata results in areas of well-developed subsurface drainage characterized by sinkholes, collapsed channels, and caves. This inventory will provide resource managers with knowledge of areas where caves and related unique geologic features are likely to exist. Areas where karst topography is known to exist and potential karst areas will be identified. This will allow land managers to better schedules activities, knowing that a cave resource assessment of the planned activity is needed if the planned activity falls within an area where caves can and/or do exist.

B. Manage cave resources using an interdisciplinary approach. Significant caves, as well as those pending evaluation, will be considered in all land use planning decisions that may affect these sites. Include interested publics and the caving community in the public involvement process.

C. Update and maintain the cave resource inventory as our understanding of the formation of karst features on the Forest increases and as new areas are identified.

III. *Inventory/Project Clearance*

A. *Inventory:* Evaluate caves as required by the Federal Cave Resources Protection Act of 1988. The inventory process should document all unique biological, hydrological, geological, mineralogical, paleontological, educational or scientific, cultural, and/or recreational values. Care should be taken to analyze the surface to subsurface interconnection with the ecosystem. The first purpose of the Act is to secure, protect, and preserve significant caves on Federal lands for the perpetual use, enjoyment, and benefit of all people. Under this Act, consider all caves to be significant until proven otherwise. "Significant" has yet to be defined. Consult the National Speleological Society, local Grottos, and experienced cavers in determining significance. Caves determined to be significant under the Act will

From Revised Tongass Land Management Plan (TLMP)

be considered for listing on the National Significant Cave List. Specific locations of Significant Caves are exempt from disclosure to the general public.

B. Continue to work with the local caving community and other interested publics to locate, map, and describe caves. Biological studies will be conducted to determine the presence of threatened and endangered species and to better define the ecosystems present in the karst features. Forest personnel will be responsible for reporting any karst features found in the field. This includes features such as sinkholes, collapsed channels, caves, resurgence streams, and areas where surface drainage becomes subsurface. To aid Forest personnel in identifying these features on the ground, education programs and an inventory reporting system should be developed .

C. A Forest-wide, comprehensive cave management analysis should be completed on known cave resources between now and the next Revision of the Forest Plan. Management Plans should be prepared for caves determined to be significant and for others where hazardous conditions exist. Management plans will include an inventory and mapping of cave resources, research and monitoring programs, and when necessary, a cleanup or restoration program. Management prescriptions will be developed on a cave-by-cave basis. If the analysis determines that cave management or protection is required, the cave should be placed in one of the following classes:

Class 1: Sensitive Caves
These caves considered unsuitable for exploration by the general public either because of their pristine condition, unique resources, or extreme safety hazards. They may contain resources that would be affected by low level visitation. These caves are not shown on maps or discussed in publications intended for general public use such as guides, brochures, and magazines. Scientific studies within these caves will be encouraged.

Class 2: Undeveloped Caves
These caves are undeveloped or contain minimal developments that are suited for persons who are properly prepared. Some of these caves will require technical skills beyond that of the average Forest visitor and could present substantial hazards to the user. In general, these caves are those where it has been determined that recreational use will not substantially degrade the cave's resources or special values. Location of these caves will be available to the public upon request, however, public use will not be directed toward them.

Class 3: Directed Access Caves
These caves are those 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 system.

D. All newly discovered caves will be temporarily managed as Class 1 until an analysis of resource values is completed. Following analysis, each cave will be designated either Class 1, 2, or 3, as appropriate.

E. Caves determined through analysis to have no significant values, and documented as such, will no longer be managed as a cave resource.

F. *Project Clearance.* The Federal Cave Resources Protection Act of 1988 requires that surface management activities assure that caves under consideration for the National Significant Caves List are protected during the period of consideration. Any management activity that can directly or indirectly affect the ecosystem of the cave resource shall not

the project administrator shall halt any work that might potentially damage the cave resource. Work may resume after consultation with the Forest cave management specialist and appropriate mitigation measures, if needed, are applied.

IV. Standards & Guidelines

A. Prior to determination of significance under the 1988 Cave Act, or Forest-wide comprehensive cave management analysis, the following direction is applicable:

1. During the cave inventory process, map the subsurface extent and position of the caves. Care shall be taken to note subsurface drainage patterns, resurgence areas, surface drainage, and drainage basin characteristics. This information is necessary to determine the cave's ecological relation to the surface.
2. Design timber harvest, road construction, and other related management activities above or in the vicinity of a cave, or the course of such a cave, in a way to insure protection of the cave resources.
3. Require retention of vegetation in the vicinity of a cave or cave course to protect the cave's microenvironment. The extent and limits of no harvest buffer surrounding major karst features shall be determined on a case-by-case basis. Topographic breaks and vegetation patterns should be utilized during buffer design and layout. The intent of vegetation retention is to insure the stability of the cave ecosystem, the integrity of the slopes surrounding the cave, and adequate sediment filtration between management activities and cave resources. There will be no ground-disturbing activities on slopes steeper than 30 degrees adjacent to cave entrances. An example of this would be protection of a steep-sided, closed basin in which surface drainage flows into a cave system or on steep slopes immediately adjacent and uphill of a cave opening.
4. Maintain vegetation around all direct drainages into caves. This includes sinkholes, cave collapse areas known to open into a cave's drainage system, and perennial, intermittent, or ephemeral streams flowing into caves. Protect the immediate area surrounding resurgence springs to insure stability of the cave system's ecosystem. The intent of this direction is to insure that additional sediment is not introduced into the cave system, surface flows are not interrupted, and logging slash and debris is not transported into the cave system nor plugs the cave entrance.
5. Avoid alteration of cave entrances, or their use as disposal sites for slash, spoils, or other refuse.
6. Avoid diversion of surface drainage into caves.
7. Design roads and related construction to avoid altering surface drainage into karst features or focusing sediment from road surface and/or drainage into karst features.
8. Design quarry and material sources to insure that location and excavation in no way threaten cave resources.
9. Where timber harvest is occurring in the vicinity of a cave, fall trees directionally away from the cave and its course. Yarding should in no way drag timber across and/or through karst features. Full suspension yarding or other mitigation measures, which will insure the stability of karst slopes, is required in these areas.
10. Limit public access, if required, to prevent damage to the cave resources or if there are safety hazards.
11. Information concerning the specific location of any significant cave may not be made available to the public unless disclosure of such information would further the purposes of the Act and would not create a risk of harm, theft, or destruction of the cave.
12. Scientific or educational use of caves may be authorized by the Forest Supervisor.
13. Foster communication and cooperation between the Forest Service, caving organizations, and recreationists. Exchanged information will not be made public if it could lead to degradation of sensitive caves.
14. Enforce laws protecting caves from illegal relic collectors and vandalism.

News Release

Alaska Legislature
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House of Representatives
Rep. Tom Moyer

For Immediate Release ***April 8, 1992***

CAVES! CAVES! CAVES! EXPLORERS, SCIENTISTS AND TOURISTS NO LONGER HAVE TO GROPE IN THE DARK

JUNEAU--Caves would be protected and promoted for their scientific, cultural, recreational and tourism potential under legislation introduced today. HB 576, introduced by the House Rules Committee at the request of the House Special Committee on International Trade and Tourism (ITT), would establish a cave protection statute for state lands in Alaska similar to federal law.

Representative Tom Moyer (D-Fairbanks), chair of the ITT Committee, believes that caves are essentially a non-renewable resource and deserve some degree of conservation, and that some caves may be appropriate for development for tourists and recreational purposes. Protecting and conserving the uncommon geological formations and other cave resources found in caves is an important aspect of the bill.

-MORE-

"I've spoken with state geologists, Forest Service professionals and spelunkers around the state," Moyer said, "and I feel that this legislation will raise consciousness about caves and make us focus on their legitimate uses.

The many forms of caves--from grottoes to natural rock shelters to caverns--found in Alaska would be protected under this Act and at the same time would be accessible to others who would like to experience the thrill of grappling down a rock cliff, squeezing through an opening, or strolling through an "improved" cave.

"The deepest pit in the U.S. is right here in Alaska, located on Prince of Wales Island--"El Capitan"--it is 598 feet at its surveyed depth. Alaska has the highest vertical drop in the U.S., on Mount St. Elias, the highest mountain, Mount McKinley, and the deepest pit in El Capitan." Moyer said. "The lowest and the highest points in the United States are definite tourism attractions and could be promoted as a package--tourists can travel from one end of the state to the other to view these geological phenomena."

The Forest Service and the Ketchikan Pulp Company have forged a unique cooperative effort that balances conservation with the harvesting of timber on Prince of Wales Island.

Moyer noted, "In preserving this natural heritage we also must preserve the opportunity to extract our resources such as timber and minerals."

While most of the significant caves found so far are in

Southeast, it's likely that others may be found in places with similar geology or topography. Caves have been reported in such diverse places as on the north and south side of the Brooks Range, in the Seward Peninsula, the White Mountains and Lime Hills.

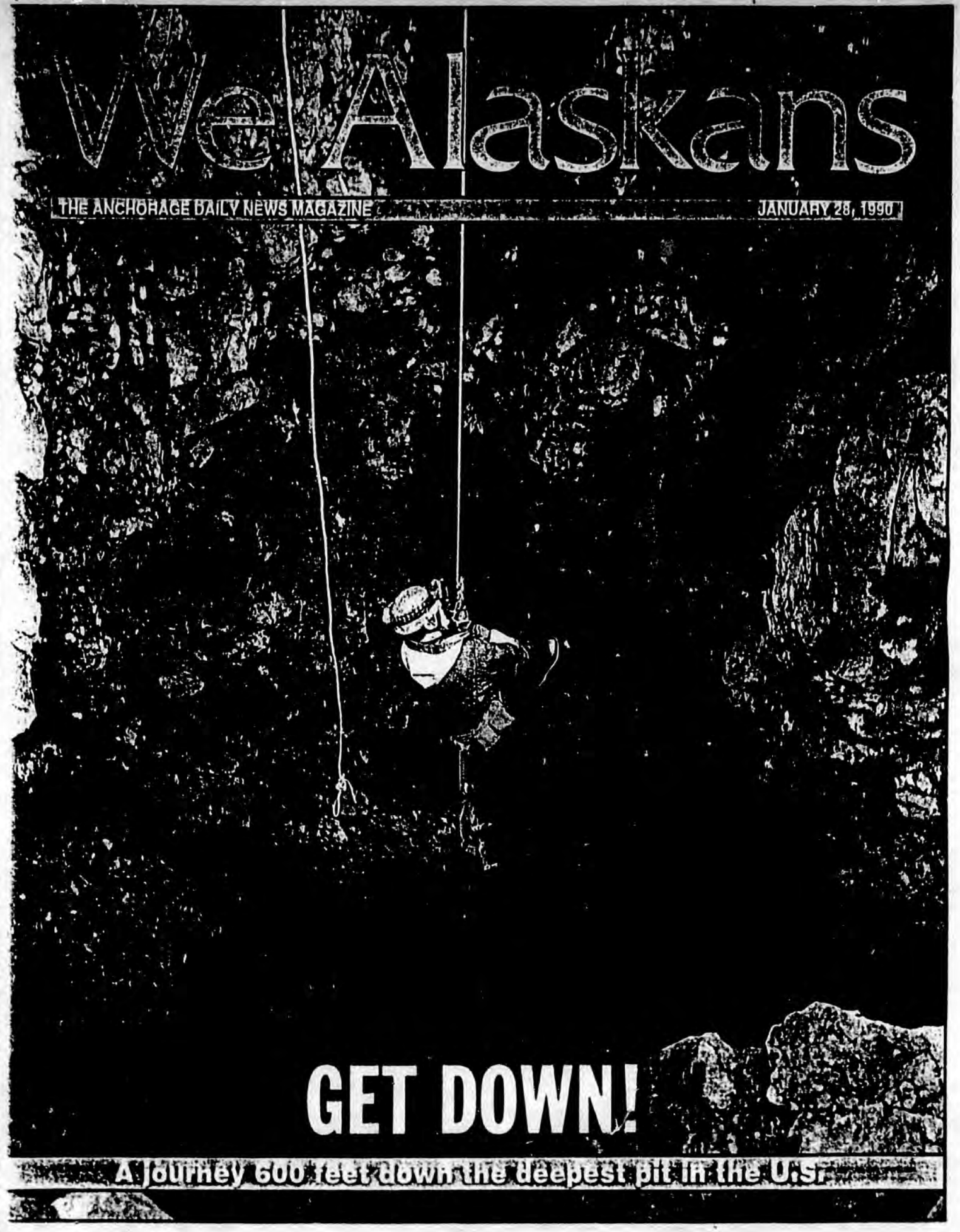
Cave enthusiasts would be required to obtain a permit from the Department of Natural Resources (DNR) before exploring a known cave on state land. Many caves are discovered by spelunkers or by happenstance. To encourage the disclosure of a location and to help DNR keep track of these finds, the bill would allow the finder of a cave to suggest a name for it. There are provisions in the bill to allow the commissioner to keep locations confidential if the cave is at a risk of harm, theft or destruction of cave resources.

The bill also directs DNR to classify caves according to accessibility, tourism potential, safety, and cultural and scientific significance. DNR would also have jurisdiction over what could be taken from a cave, which would guarantee the preservation of archeological, paleontological or scientific artifacts or objects.

-30-

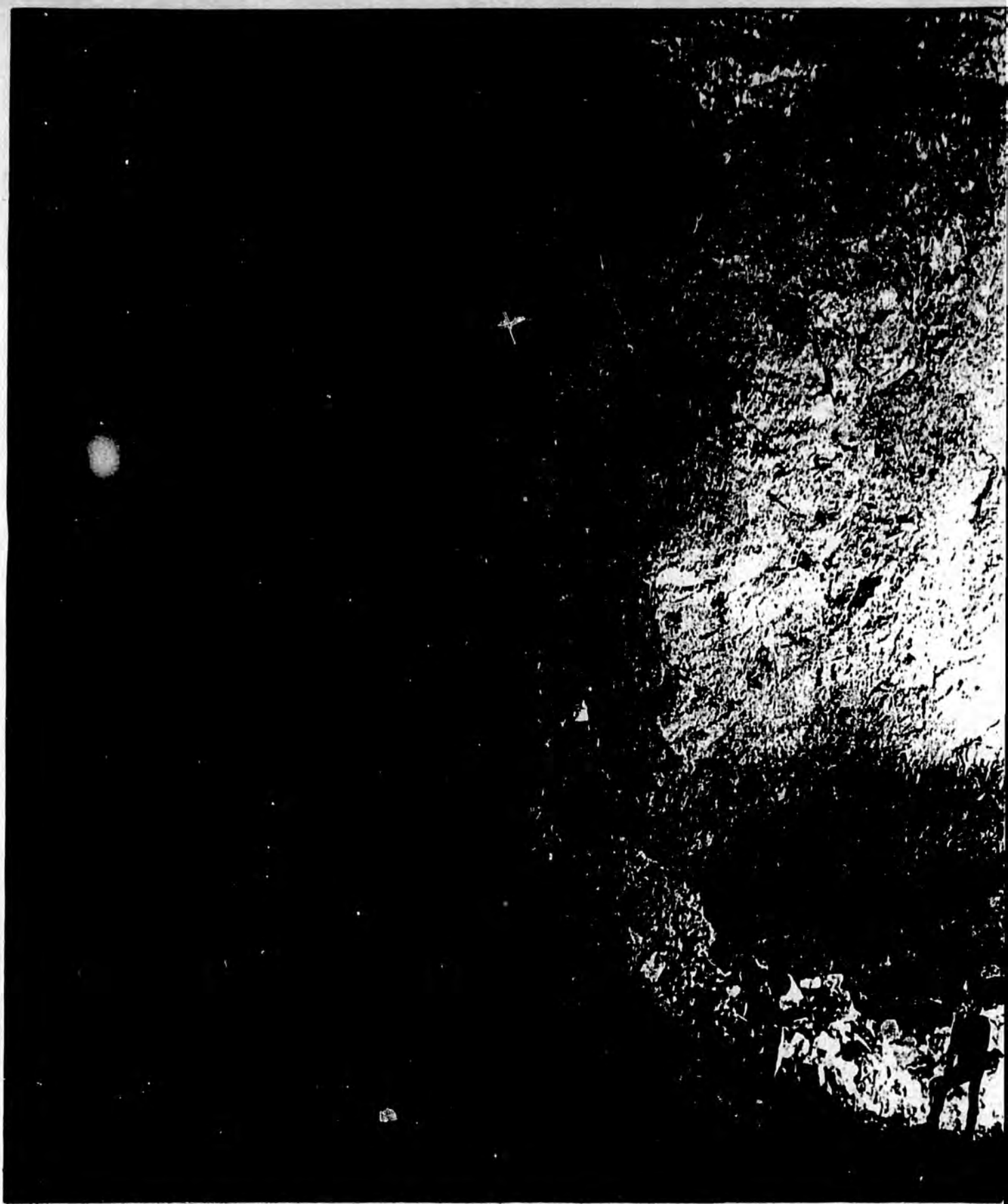
We Alaskans

THE ANCHORAGE DAILY NEWS MAGAZINE JANUARY 28, 1990



GET DOWN!

A journey 600 feet down the deepest pit in the U.S.



Headlamps and strobe lights illuminate "the Alaska room" in El Capitan Cave — Alaska's largest cave — on Prince of Wales Island.

Deep, Deep, Down

The discovery and exploration of the deepest pit in America

By DOUG O'HARRA

Photographs by NORMAN THOMPSON

Not knowing how far he was headed, Kevin Allred inched down the taut rope, deeper and deeper into what seemed a bottomless hole.

Ice-cold water showered him from above, soaking his wool clothes. The light from his headlamp bounced weakly off limestone walls glistening with scallops and grooves.

By the time Allred had dropped about a hundred feet into the pit, which emerges from a mountainside fissure on Prince of Wales Island near Ketchikan, all he could see overhead was a shaft of misty blue light.

He began to feel disoriented.

"It's almost like there's no up or down," he would say later. "Even though it's in the earth, it's *unearthly*."

Continued on next page

DEEPEST PIT

Continued from previous page

Using his feet to bounce off the rough walls, Allred continued to rappel down the hole. When he reached the knot at the end of his 190-foot rope, he tied on another 200 feet and kept going. Since he and others on an expedition had discovered the pit only days before, it was all the rope they had.

Allred continued down the hole, farther and farther. At about 260 feet, he accidentally kicked a grapefruit-size rock out of the wall. The rock crashed down the shaft. Allred continued on — but soon verified his worst fear:

At about 320 feet down the rock had smashed against the rope where it lay across a ledge. It was almost cut in half. Allred could go no farther.

Still clipped into the rope, the 34-year-old caver from Haines crouched tenuously on the 45-degree ledge. His headlight beam was swallowed so completely by the gloom that it might as well have been a flashlight pointed at the night sky. He lifted a rock from the ledge and dropped it into the abyss. The rock glanced off the stone walls for six, seven, eight seconds. Then nothing.

Allred was amazed. He had hundreds of feet to go.

□

That was August 1988. When Allred led another expedition to Prince of Wales Island last summer, he explored El Capitan Pit all the way to its bottom depth of 598 feet.

His group had discovered the deepest natural pit in the United States — 12 feet deeper than Georgia's Fantastic Pit, which held the record for 16 years.

The discovery came during a flurry of cave exploration in southeastern Alaska. For three seasons, spelunking expeditions to Prince of Wales Island have found a region riddled with sinks, caverns and pits. As a result, the U.S. Forest Service and the Alaska "Glacier Grotto" chapter of the National Speleological Society have begun an inventory of the island's caves. The federal agency plans to use the information to write a cave management plan.

So far, spelunkers working on the project have surveyed more than 9,000 feet of passages in El Capitan Cave — Alaska's largest cave — located downhill from El Capitan Pit. They've surveyed the 450-foot-deep Snow Pit (the third deepest in the United States). They've found dozens of other caves and pits, many of them unexplored. In a recent issue of the Alaskan Caver, Allred estimated that the island's limestone could hold up to 500 miles of unexplored passages.

"Alaska really truly is the last frontier, especially when it comes to caving," Allred says. "The caves here — they're hidden away, and you never know what you'll find."

□

It all began with a hunch.

Kevin and Carlene Allred just *knew* there were caves somewhere in Alaska. There had to be.

For the Allreds, exploring caves had always been more than a pastime. After they put their children to bed, they often practiced rappelling down a cliff near their Haines-area cabin. They even met in a cave.

It was the Red Baron, a beautiful and fragile cavern that extends for 2,000 feet into the mountains outside Provo, Utah. Kevin Allred had discovered it with a friend in the mid-1970s.

"When we found this cave, it was so beautiful we kept it completely secret," Allred recalls. "Caves have a way of getting destroyed when people aren't aware of how to take care of them."

But word of Red Baron eventually spread. One day, Allred heard that a group from Brigham Young University had actually advertised a trip to his cave. He confronted the students, including Carlene, inside the cavern and lectured them on the importance of protecting it.

After that meeting, Kevin and Carlene began dating and eventually married. In the early 1980s, they moved to Alaska. They eventually bought 10 acres along the Haines shoreline and built a driftwood log cabin. They live there now with their three children, earning a living through odd jobs — carpentry, fishing, crafts — and fishing.

But the Allreds missed caving. By 1987, they had explored only one cave in Alaska, a 300-foot cavern near Haines. Yet large regions of Alaska are underlain with soluble limestone, the universal raw material of cave creation.

Surely, they thought, with all of southeast Alaska's rainfall, the land must be riddled with caves.

The Allreds visited Juneau and pored over geologic reports and aerial photographs. According to a 1970 study, 20 southeastern Alaska islands contain nearly 350 square miles of a common cave-bearing limestone, nearly one-third of it on Prince of Wales Island alone. The Allreds talked to members of the Glacier Grotto about it.

"Here and there, I started putting pieces together," Kevin says. "Finding out where the best places would be to go."

A geologist told him of a cave on Chichagof Island with a gaping hole that swallowed a stream far up in the mountains. Allred decided he would investigate.

By himself, he motored 50 miles by skiff, then backpacked inland for several days until he reached a canyon that ended in an 80-foot-high cliff. The stream had worn a 50-foot-wide opening. A "wild cave."

Allred put on his caving gear and entered the hole. But within a few hundred feet, he reached the end. No stalagmites, no pits, no extended passages. Just a blunt cavern to nowhere.

A non-caver might have been discouraged. But Allred had already figured out that caving in Alaska required a different attitude than caving in the Lower 48.

"Caving is not really a means to an end," he says. "You shouldn't have to find a cave to enjoy yourself. The important thing is enjoying the country."

When Allred returned home, he and Carlene decided they would go next to the second-best prospect — Prince of Wales Island.

With 2,231 square miles of land, Prince of Wales is the third largest island in the United States, with only Kodiak and Hawaii larger. Its heavily forested mountains have been logged and mined for years. Yet fewer than 2,000 people live there, spread among coastal hamlets such as Craig and Hydaberg. Much of the island's rugged backcountry remains virtually unexplored, even though rumors of caves and deep pits have circulated for years.

"We had heard stories of people going out and disappearing," Allred says. "We heard about two engineers who had never returned."

The Allreds loaded their camping equipment and three kids into their car and took the ferry to the island. They visited the Forest Service district office to study aerial photographs of the island terrain.

"What we saw was these huge depressions where water — instead of flowing over the surface of the ground — flowed under the ground," Allred said. "There were these dish-shaped and funnel-shaped pits."

It was *karst*, land cut by fissures and broken by sinkholes, all signs of prime cave territory.

"We were getting so excited about the features on the aerials, I think (the forest service rangers) thought I was crazy. They were looking at each other like, 'Who are these people?'"

The Allreds picked a hole near El Capitan Mountain on the northern end of the island. It was rumored to be a 500-foot cave. They drove 100 miles over the island's gravel logging roads and reached the site. Setting up camp, they began to explore.

"There were holes all over the place," Allred says. "One you could spit into from the edge of the road."

The ground was so riddled with fissures, many of them choked with brush and logging slash, that they worried for the safety of their children. They even set up a barricade across one hole next to the road.

"One of us would go down for half a day or so and come out," Kevin says, "and then the other one would go down."

By the end of the week, the Allreds had fully mapped Starlight Cave and discovered a huge cave they named El Capitan. In a few days, sharing the baby-sitting of three children, the couple had single-handedly surveyed 1,887 feet of passages — more than doubling the length and depth of Alaska's known caves.

After they returned to Haines, the Allreds contacted members of the Glacier Grotto. Over the course of the year, another expedition was planned with some cavers invited from the Lower 48. Allred expected they'd extend the El Capitan Cave and discover other caves.

Instead, they found the pit.

□

In August 1988, a caving expedition of about 12 people — including the Allred family — set up camp near El Capitan Cave and began to explore. The group eventually mapped nearly 6,000 feet of passages in El Capitan, and fully explored three other caves. But they also began to search the mountainside above the camp.

"There wasn't as much soil up there covering the ground," Allred says. "The holes are not filled so much. Those higher up looked to be much deeper. On the aerials, they dropped like wells."

Allred and two others, an Anchorage-area caver named Harvey Bowers and a geologist named Dave Hatfield, climbed for several hours, reaching an area about 2,000 feet above sea level, a plateau of stunted spruce trees, brush, blueberries. The plateau was honeycombed with pits and fissures.

Crossing it was as dangerous as traveling across a glacier. The pits could be 8 feet deep or 100 feet. The rock — limestone carved by water — was often honed to razor-sharp edges. It took the trio a half-hour to traverse a quarter mile.

Emerging from the brush, they discovered a vast hole. The gap yawned 15 feet across and 30 feet wide. A cliff rose on the far side, with brush and trees overhanging the lip.

"It just looked real deep, even before we threw the first rock," Allred said. "The feeling that we got when we looked at the thing — it just demanded respect."

The three men approached the hole. As Allred stepped closer to the edge, Hatfield suddenly cried out: "No! Don't!"

Gingerly, they inched toward the lip. Allred dropped a rock down the hole. *One second, two seconds, three, four, five.* . . . They started talking — and the rock clinked.

The three men looked at each other. Allred realized they had a deep, deep pit.

They threw rock after rock. They would glance against the sides with sharp tocks that grew fainter until they couldn't be heard. Never did the rock seem to land.

"You could hear the rock wooshing through the air, just like you'd hear a raven flying overhead," Allred said. "And then you could hear a faint echo of it hitting again."

It was, Bowers told them, a world-class pit, perhaps 800 feet deep or more.

"What was incredible was that we had found it so quickly," Allred said. "We thought if we could find this one, we could find another one."

Bowers and Hatfield had to leave the island. But there were reinforcements down below. Julius Rockwell, an Alaska Pacific University professor who serves as president of the Glacier Grotto, arranged to have a Forest Service helicopter drop two lengths of rope and the other supplies on the plateau.

A few days later, Allred was joined by California cavers Bob Bastasz and Kathy Tonnessen. Together they climbed to the plateau, picked up the equipment and walked to the edge of the pit. Tying their 190-foot Bluewater static climbing rope to a tree overhanging the pit's south side, they lowered the line inside. Allred strapped on his rappelling gear — including an extra 200 feet of rope — and was ready to descend.

The three of them exchanged looks. They had wondered whether the pit dropped to sea level, 2,000 feet below. The image of rappelling into a cold, dark underground lake crossed Allred's mind.

"Watch out for the sea monsters," Tonnessen called out.

Allred attached his rappelling hardware to the rope and backed into open space. A wave of reluctance washed over him. He felt a sinking in his stomach, the same feeling he got before he went halibut fishing, which always made him violently seasick.

But the fear vanished as Allred began to observe the pit's eerie beauty. Water had sculpted the rock into bizarre shapes with ripples and grooves. The rugged walls twisted, giving the pit a slight corkscrew shape. Groundwater dripped down the rope.

It was like hanging under a waterfall. By the time Allred reached the knot at the end of his rope, he was saturated with water. Allred tied on the other rope and continued until he knocked loose the rock.

"It didn't take much to knock it loose," Allred said. "The only thing you could do was hope it didn't hurt your rope."

But the rock had nearly severed it, and Allred ended his descent. Using a climber's ascending device, he returned to the surface. Bastasz, an experienced caver from California, took his turn.

Within 10 minutes, Bastasz reached the end of the first rope. He halted at a ledge. At that point, the pit's cross section was kidney shaped, perhaps 50 feet across.

"The walls were fluted, very clean, and showed no signs of pinching out," he wrote later. Bastasz dropped several rocks, listening as Allred had done.

"It wasn't possible to accurately estimate the depth," he wrote.

□

A pit extending hundreds of feet into the earth. Unexplored, wild, virgin.

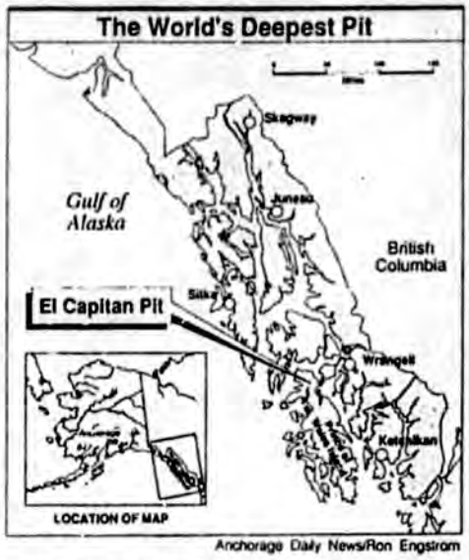
To a spelunker, that sort of prospect is irresistible.

"The term 'virgin cave' is synonymous with buried treasure," says Jim Nicholls, a Fairbanks-area caver who helped explore El Capitan Pit last summer. "It echoes the mountain-climbing term of 'first ascent.'"

The United States is not known for its deep caves and pits. Georgia's Fantastic Pit, at 586 feet, is less than half the depth of the world's deepest pit, a 1,380-footer in Mexico. Canada also has a deeper pit — a 700-footer discovered in 1986.

Still, from the point of view of American spelunkers, the Alaskans were sitting on the caving equivalent of a gold strike.

To reach the bottom of El Capitan, Allred believed he needed the help of more experienced pit explorers from the Lower 48. But what would happen if the word got out?



Anchorage Daily News/Ron Engstrom

"We knew that it could just be overrun," he said. "For all we knew it could be the deepest in the world."

Over the winter, the Allreds joined an expedition to a cave in New Mexico. They *hinted* that they were onto something back in Alaska. A deep pit. A virgin cave.

Gradually, they interested a number of Lower 48 cavers, including Rick Bridges, who custom-designed a rappelling harness for the drop. They secured three 1,000-foot lengths of static cave rope. They packed climbing hardware and surveying equipment.

By last July, they were ready. Twenty-eight adults and six children — the largest caving expedition in Alaska history — journeyed to Prince of Wales Island.

Though the overall purpose of the expedition was to explore and map as many of the Prince of Wales caves as possible, the first few days focused on penetrating El Capitan Pit to the bottom.

Allred and three others — Nicholls, Miles Hecker and Steve Meier — rigged the pit with one of the 1,000-foot ropes. The plan was to prepare the pit for a complete drop on the following day. Allred strapped into the rappelling gear and began a partial descent, aimed at ensuring that the rope hadn't hung up on the rocks.

Dropping steadily into the spray of water and gloom, he wasn't sure when it was that he passed the ledge he had reached the previous year. But eventually his rope caught on a ledge. Allred estimated he was 500 feet down. He freed the rope, then heaved it out and down.

Allred hesitated a moment, gazing into the darkness. He tossed off a rock.

"It sounded to me like it hit the bottom," he said later. "It was more of a dull thud and not a sharp, glancing blow."

Could that be it?

Allred was momentarily tempted to continue to the bottom, but he decided to wait for the planned descent. He would savor the suspense.

The following day, July 27, the four men returned to the pit. Though all of the cavers wanted to be the first — "It's almost like the race to the poles," Allred said — they elected to send Allred because he helped discover it.

"The experience you get in being the first one to go down into such a place — it's the chance of a lifetime," Allred said. "You can't get that feeling any other way."

In comparison to his partial descent the previous summer, Allred this time was equipped with top-of-the-line caving gear. Instead of wool, he wore a dry suit. Instead of mountaineering rope and hardware, he used equipment custom made for caving.

Allred harnessed up and dropped into the pit once more. This time — his third time down — the descent went smoothly. Just as planned. In less than 10 minutes of rappelling, Allred touched down.

The bottom.

It was a wet, pitch-dark chamber, 30 feet by 40 feet.

The floor was covered with pulverized rocks and broken sticks. In the middle lay the skeleton of a deer, its skull and bones long ago shattered by a 600-foot fall.

A shower sprayed the chamber, which later explorers likened to a shower stall. The air was cool for summer — 34 degrees F — and filled with the dank smell of wet clay and earth.

Allred quickly shed his gear and stepped under an overhang out of the rain. Vapor poured off his body in clouds.

For a moment, he was disappointed.

"It *was* kind of anticlimactic," he said later. "It wasn't like stepping on the moon. I had hoped that there was a ledge and it kept on going — or went into a great big cave."

He spotted two passages. The water that fell into the pit collected in a stream that rushed into a fissure to the side. Allred followed it for a ways, stopping when it began to narrow. Later teams found it stretched only a few hundred feet before narrowing into a crack.

Opposite the stream, Allred found a side passage that rose like a chimney. Subsequent teams found that it continued to arc up until it pitched into two chimneys. Where those shafts ended, they never found out.

Miles Hecker, an experienced caver from Wyoming, arrived at the bottom about 15 minutes after Allred. After a brief exploration, the two men soon changed into climbing gear and began their ascent, surveying the shaft with a compass and 300-foot tape measure as they went.

Hecker and Allred determined that the pit was 598 feet deep, with a total length of 603 feet. The bottom was off center from the top by nearly 20 feet. They spotted several side holes on the ascent but couldn't reach them.

Over the next week, another 10 people dropped to the base of El Capitan Pit, including Nicholls, who was the third person down, and Carlene Allred, who later found out she was pregnant at the time with her fourth child.

"That might be the youngest person to ever descend the El Capitan Pit," Kevin said.

Then the Prince of Wales group shifted its attention to exploring caves, mainly El Capitan Cave. There they found the first signs of vandalism. Someone had apparently entered the cave and begun removing some of its delicate formations.

Vandalism is the bane of caving.

"They don't realize they're doing irreplaceable damage," Allred said. "The material they take out of the cave — it's not pretty any more. It's just not the same as it was in the cave, where it's a crown jewel.

"It takes many thousands of years for many of those to grow. (Without the formations), it would be just like a mine. There would be nothing there."

The vandalism generates a sense of urgency and anxiety among members of the Glacier Grotto cavers. Next season they plan to help the Forest Service write a cave management plan for the area. Though no firm plans have been made, a fourth expedition to the region is almost certain.

What will they find? As far as Allred is concerned, they will almost certainly find a deeper pit, a longer cave.

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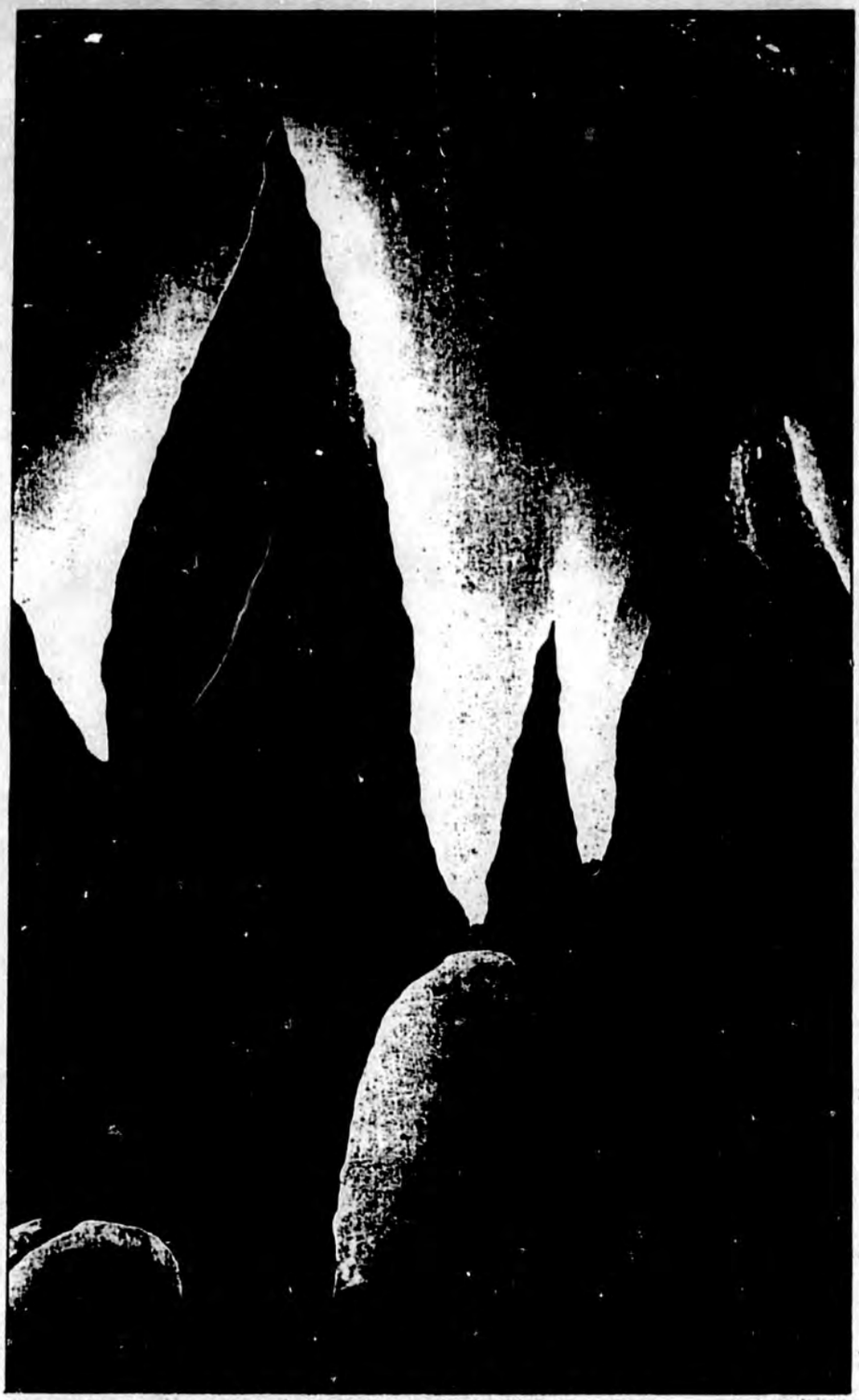

Water drips from a stalactite to a stalagmite in the El Capitan Cave.

DEEPEST PIT

Continued from previous page

That notion came to him during one of his last moments in the El Capitan Pit. As he neared the top on his last ascent, he spied a speck of light off to the side, away from the main entrance.

Another entrance. But where?

Allred searched the entire area. He never found the pit's second entrance, and that fills him with hope.

"If you know that there's a cave entrance in the area and you can't find it, I wonder how many other deeper pits there are."

☐ Doug O'Harra is a staff writer for We Alaskans. Norman Thompson is a photographer and caving enthusiast who lives in Colorado.

Rick Bridges on his ascent from the pit.

Curvin Metzler, left, and Norman Thompson in the El Capitan Cave.

Ketchikan, Alaska, Thursday, March 26, 1992

Logging and caves

Maps help guide KPC activity

By NIKKI MURRAY JONES
Daily News Staff Writer

The cave entrances were hard to see, but they were there, according to the hand-drawn map.

Owen Graham, timber division manager for Ketchikan Pulp Co., Ketchikan Daily News photographer Hall Anderson, and this Daily News reporter had flown with Cliff Kamm by KPC helicopter to Prince of Wales Island. Kamm parked the helicopter on a high road overlooking the logged valley in the Labouchere/Whale Pass area and Graham pointed out the openings.

Caves in the logged area are just one of several types of karst features. Karst is limestone that has been eroded, primarily by acid water that runs off muskegs in Southeast, into channels, cuts, caves and sinkholes.

Protecting POW karst and cave resources has become a matter of federal law. Since the Federal Cave Resource Act passed in 1988, geologists have been identifying caves that should be preserved.

POW has many miles of caves that lie just below timber. In fact, the best old-growth stands tend to be on the limestone. The erosion allows trees to send their roots deep towards water and nutrients, according to Jim Baichtal, U.S. Forest Service geologist and cave management specialist for the Ketchikan area.

In January, Baichtal spoke to KPC officials and touched on the extent and value of POW's caves. He told them he was worried that road-building and logging techniques could damage the valu-

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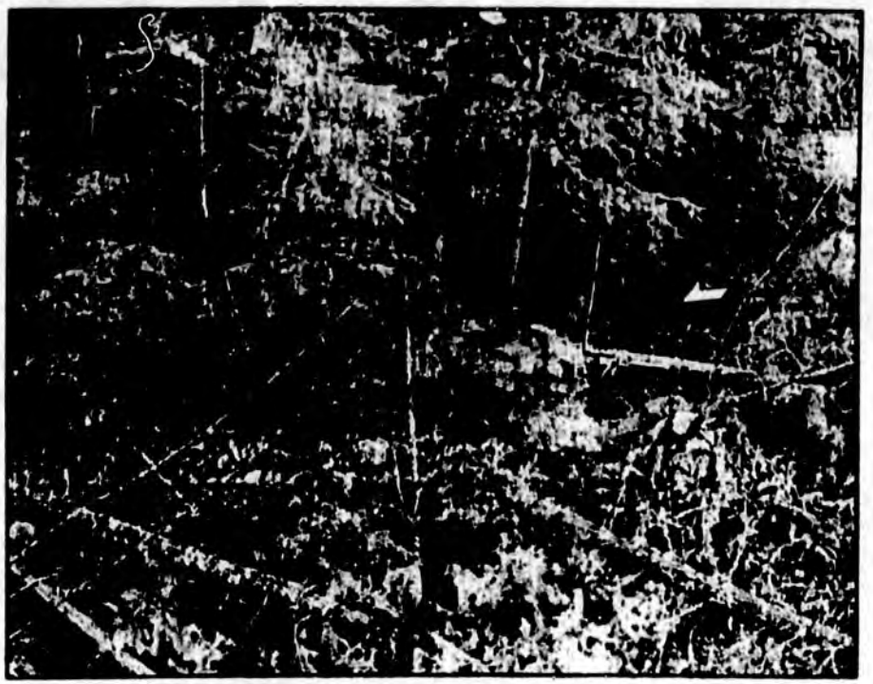

A couple of logging cables cross the vicinity of a cave opening in the El Capitan logging area on Prince of Wales Island

Staff photo by Hall Anderson

Logging and caves

Continued from page A-1

able karst resource. He said his search of caves under timber stands logged in earlier decades shows that damage occurred.

Protection is possible

It is possible to protect cave and karst resources if they are identified ahead of time, said Graham. In the Whale Pass area, the company is leaving a buffer zone around each of three karst features (one cave, two streamsinks) in one location. This helps protect the plant and animal life and geologic features inside the cave system by allowing it to retain the needed delicate balance of water, moisture, light, temperature and other factors, according to Baichtal. The company has removed big trees at Forest Service request near the Whale Pass karst openings for fear they will blow down.

On the Whale Pass logging road overlooking the cut, a yarder was connected by a blue line that was wrapped around a large spruce on the other side of the small valley. The line stretched tight and raised the logs up the slope without dragging them.

Full suspension log removal is required for the sinkhole trough that leads to the caves. Partial suspension is required in another area. Suspension was ordered because when logs are dragged across a sinkhole, they break down the sides. The disruption appears to be permanent because the areas exposed don't grow new plants, even after 15 to 20 years, said Baichtal. Suspending the logs protects the sides

Graham said the logs in the valley of the caves are larger than average, because they are growing on the limestone, he said.

The hazards of blasting

Blasting for road work can cause damage to caves. In his January talk with KPC officials, Baichtal warned against the impact of shock waves and shots that dump debris in the wrong area or knock over trees. He said streamsink dolines (holes in which streams leave the surface and go subsurface) become blocked from woody debris and organic matter that form a dam that catches sediment. The water might still flow, but the atmospheric connection between the outside and the cave or shaft has been broken, he said. Blockage of streamsinks and caves occurs naturally, but some logging techniques accelerate the process. He said he has seen evidence of logging and blasting damage in areas on POW logged before the mid-1980s.

The way to reduce the impact is to blast outside of sensitive areas, said Graham. Most blasting is done to make shot rock for the roads. Occasionally a rock is in the way of the road and must be blasted out, he said.

Baichtal said the Forest Service is trying to balance multiple uses of the forest. He wants to save caves, but still allow logging to take place. The Whale Pass 58-acre old-growth cutting site is the first in which loggers have had a map that marks the caves, sinkholes, and areas where suspension or partial suspension are needed to remove felled logs. The cutting area is surrounded by old growth that won't be logged.

"I think the company is doing a great job," Baichtal said. "They're dedicated, as we are," to protecting the karst. It's important to make everyone involved in the logging operation aware of the caves and the fragility of the karst systems, he said,

The procedure at Whale Pass, in which caves, sinkholes, etc. were identified in areas to be logged, has become standard procedure, said Baichtal. In units to be logged or if caves or other significant karst features are found after logging begins, the company will be given a map of places to be protected and methods to use to guard them.

As a cave management specialist, Baichtal identifies what he calls "significant karst features," such as caves, streamsinks, sinkholes, troughs, and karst plains, that connect to a cave system. He said the Whale Pass area has about 25 caves or other significant karst features that all take in water (insurgent caves) and direct it to another cave from which the water emerges (resurgent cave).

The various karst features would connect easily into a marked trail that would define and explain them, said Baichtal. He has proposed such a trail in the POW long-term recreation plan.

The federal act preserving caves also requires that some be made available for public use. Baichtal's plan to identify signficant caves includes opening some to tours, allowing experienced cavers to explore certain areas, and closing off some caves except to scientific study.

Bear find holds clues to ice age

ANCHORAGE (AP)—The remains of what could be a huge bear extinct for 10,000 years have been found in a cave on Prince of Wales Island in Southeast Alaska, and scientists say the discovery could rewrite theories of the last ice age's effect on that region.

"This bone deposit is the first fossil site along the southern Alaska coast, and its oldest fossils will give a minimum age for the recession of glaciers and the population of coastal islands by terrestrial mammals," said Timothy Heaton, professor of earth science at the University of South Dakota in Vermillion.

Heaton was a member of an expedition that explored the cave last summer. That came after the bones were discovered the previous spring by Keven Allred, an Alaska spelunker.

The fossils eventually will be housed at the University of Alaska Fairbanks, Heaton said.

"We have part of the skull, but not the lower jaw or any of the other bones that would positively identify the remains as those of the extinct giant short-faced bear," Heaton said.

Measurements taken of the bones duplicate those of giant short-faced bear skeletons found in other parts of North America, but Heaton remains cautious.

"If by chance it is a grizzly, it was a very large grizzly," he said.

Results from carbon dating tests are expected later this month.

When Allred moved to Alaska a little over 10 years ago, fellow caver Heaton told him to keep an eye out for bones in caves.

"I wrote back, 'Fat chance,'" Allred said, knowing there were few caves in Alaska and the chance of finding bones was next to nil.

But all that changed while exploring in the honeycomb of caverns discovered on the north end of Prince of Wales Island.

Allred popped into a passageway and followed it to a mound of debris. On top, he found the complete skeleton of a black bear.

Discovery of the black bear bones was "exciting but no big deal," Allred said. In the course of his 25 years of caving, he has delved into many unexplored caverns. He found his first skeleton in a Washington state cave.

"But when I saw the size of the black bear skull, I let my mind wander. Maybe a pre-glacial bear, or perhaps a pre-pleistocene black bear?" If a black bear, it certainly was one for the Boone and Crockett Club record book, he remembers thinking.

But it was the 41/2-inch canine embedded in the floor of the cave that astounded him.

"Wow! This is a big guy," Allred remembers thinking as he picked up the tooth and examined it in the beam of his head lamp. The tooth, obviously from another skeleton, prompted Allred to seek advice from Heaton and Frederick Grady, fossil preparator at the Smithsonian Institution.

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