

January 2010

## Alaskan Caver, Volume 30, No. 1, January 2010

Carlene Allred

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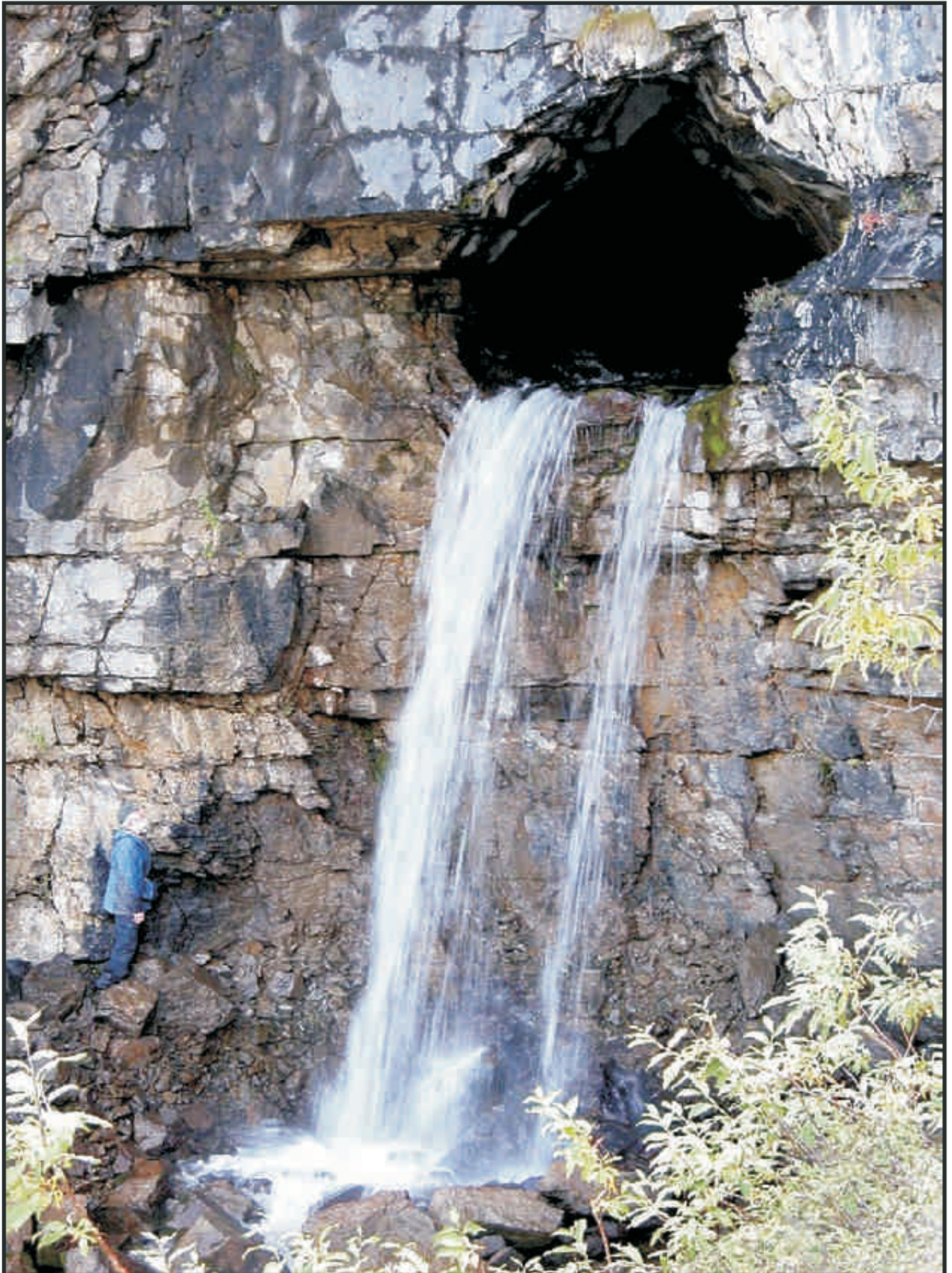
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# THE ALASKAN CAVER





## THE ALASKAN CAVER

EDITOR: Carlene Allred  
General Delivery  
Tenakee Springs, Alaska 99841  
hm: 907 736-2269  
kevin.allred@hotmail.com

-----

## GLACIER GROTTO OFFICERS

PRESIDENT: David Love  
PO Box 240812  
Douglas, AK 99824-0812

VICE PRESIDENT: Kevin Allred  
General Delivery  
Tenakee Springs, Alaska 99841

SECRETARY/TREASURER:  
David Love  
PO Box 240812  
Douglas, AK 99824-0812

CONSERVATION: Steve Lewis  
PO Box 53  
Tenakee Springs, AK 99841  
tenakeetwo@yahoo.com

-----

## TONGASS CAVE PROJECT:

Steve Lewis  
Box 53  
PO Tenakee Springs, AK 99841  
tenakeetwo@yahoo.com

Kevin Allred  
General Delivery  
Tenakee Springs, Alaska 99841  
hm: 907 736-2269  
kevin.allred@hotmail.com

Pete Smith  
waleswood@starband.net

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## OVERVIEW OF ALASKA'S CAVES AND KARST

By Kevin Allred

Reprinted from 2009, *Caves and Karst of the USA*:  
Huntsville, Ala., National Speleological Society\*.

Alaska contains a wide range of landscapes from temperate rain forest to arctic tundra (Figs. 12.1–12.2). Scattered throughout much of this vast state are many exposures of carbonate rocks. Most of its karst areas are extremely remote, and little cave exploration has taken place. Part of the lure of caving in remote Alaska is the adventure of getting there. Travel can involve backpacking, skiing, winter camping, float or ski planes, rock climbing, boating, and dealing with bears. A week is often required to check a single lead. Permafrost and frost shattering have made much of the superficial karst inaccessible, especially in interior Alaska. Despite the efforts of a small number of cavers, most regions are still as unknown as they were in 1970, when William R. Halliday stated that "much of Alaska's limestone has never been viewed by a speleologist."

### Solution Caves and Karst

About 160 km (100 mi) north of the Arctic Circle, the Brooks Range extends east-west for 800 km (500 mi). It contains extensive carbonate rocks and some reported caves, but little has been done speleologically. The Jade Mountains in the northwestern Brooks Range are known to contain sinkholes, springs, and underground streams (Fig. 12.1 #1).

In the Northern part of the Seward Peninsula are extensive limestone exposures totaling almost 400 km<sup>2</sup> (150 mi<sup>2</sup>). Although much of the terrain is covered by deep wind-blown silt, nine culturally important caves have been documented, the longest only 21 m long. This area has not yet been visited by cavers (Fig. 12.1 #2).

The White Mountains have some of the northernmost reported arctic karst terrain (Fig. 12.1 #3). Limestone is exposed over at least 6.7  
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Front cover: *Dark Star Cave in the Wrangell Mountains* (See article beginning on page 2). Photo by Steve Lewis.

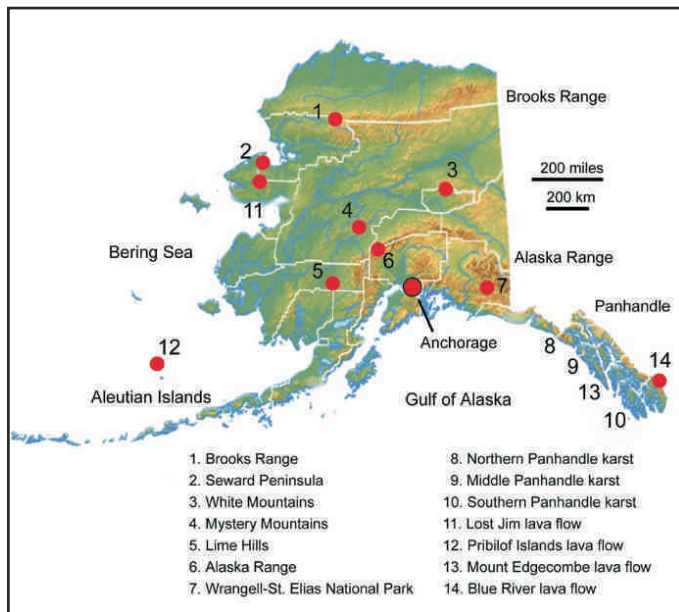


Figure 12.1: Distribution of Alaskan karst areas.

km<sup>2</sup>. Several caves have been documented, including one of the largest known in high-latitude North America (20 m long). The Mystery Mountains are located 80 km northeast of McGrath (Fig. 12.1 #4). About 26 km<sup>2</sup> of limestone contains undocumented pits and caves. Caves are also reported in the Lime Hills (Fig. 12.1 #5), although there have been no speleological investigations. One cultural cave revealed 10,000-year-old evidence of the use of bow and arrows.

The eastern portion of the Alaska Range alone contains at least 275 km<sup>2</sup> (100 mi<sup>2</sup>) of carbonates. Denali National Park and Preserve contains additional Devonian and Silurian-aged limestone. Some large caves have been identified in the Preserve (Fig. 12.1 #6), but again, the area has not been investigated by cavers.

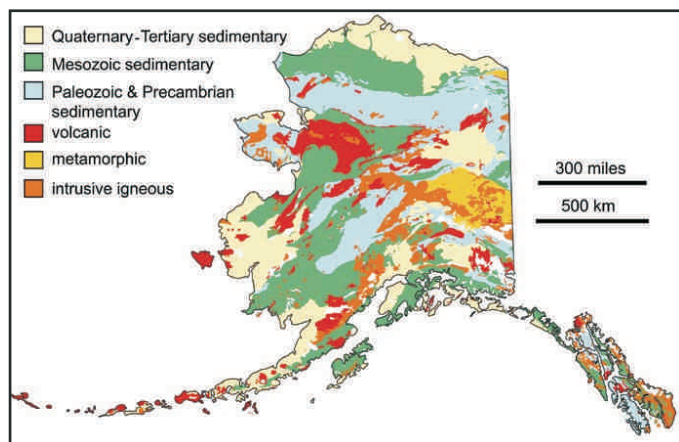


Figure 12.2: Generalized geology of Alaska (based on Werdon et al., 2000). There is no north arrow, because north varies across the width of the map. See also Connors and O'Haire (1988) for further geologic information.

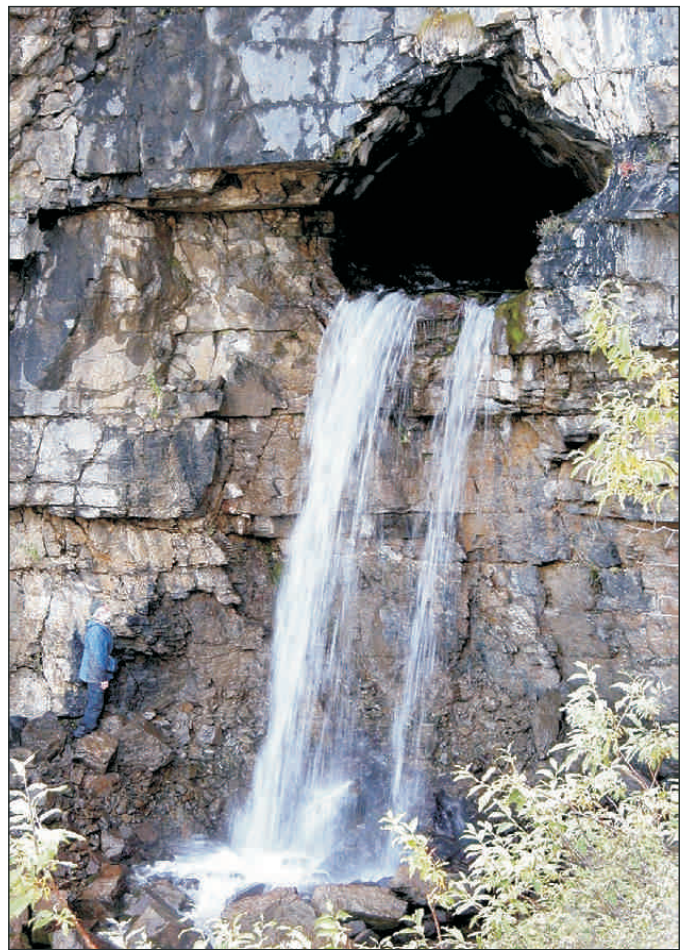


Figure 12.3: Dark Star Cave in the Wrangell-St. Elias National Park. During the summer, glacial water floods this cave. Photo by Steve Lewis.

The Nizina and Chitstone Limestones in remote Wrangell - St. Elias National Park extend for more than 655 km<sup>2</sup> (Fig. 12.1 #7). A small area has been investigated by cavers (Fig. 12.3). Whispering Cave, surveyed to 2.2 km in 1993, is thought to be hydrologically connected to large springs and to glacier drainage up to several kilometers away. Other caves are reported from these limestones. Another limestone exposure of 18 km<sup>2</sup> to the north has not been investigated.

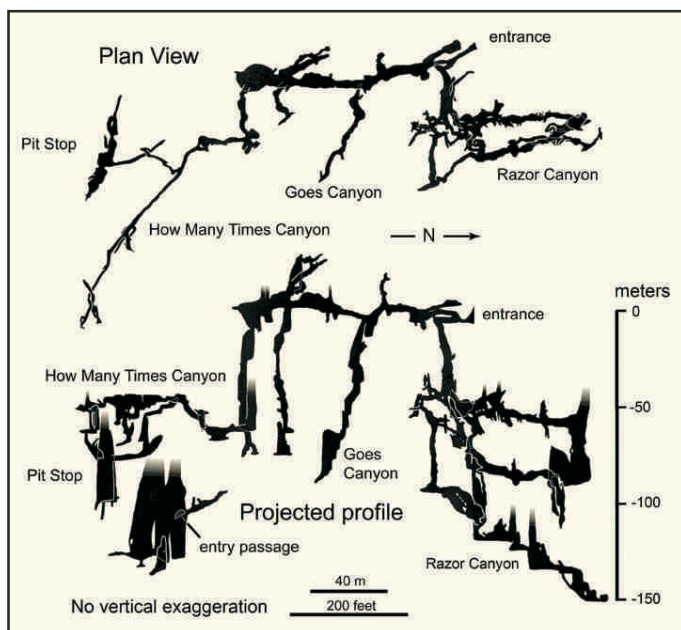
Most Alaskan cave exploration has centered in the Alaskan Panhandle. This area can be divided into three different speleological areas: 1. Northern, to Icy Strait (Fig. 12.1 #8), 2. Middle, which extends to the northern end of Prince of Wales Island (Fig. 12.1 #9), and 3. Southern, which ends at the southern boundary of the State (Fig. 12.1 #10). Caves are generally vertical (Fig. 12.4), wet, and cold, with temperatures below 4°C (40°F). An example is Blowing in the Wind Cave, (continues on next page)



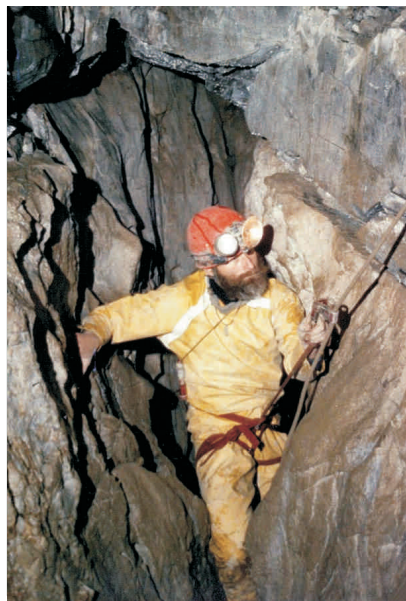


**Figure 12.4:** Entrance drop of Crystal Palace Cave, Prince of Wales Island, in a subalpine setting. Photo by Kevin Allred.

located in a sub-alpine mountain (Figs. 12.5–6). With 1.8 km of surveyed passage, several wet drops have to be negotiated to reach -176 m (-577 ft).



**Figure 12.5:** Map of Blowing in the Wind Cave, El Capitan Peak, Prince of Wales Island. Map by Carlene Allred.



**Figure 12.6:** A short climb near the entrance to Blowing in the Wind Cave, Prince of Wales Island. Photo by Kevin Allred

Yearly precipitation can exceed 5 m (200 in), and some caves are prone to flood entrapment. Rare dry periods are safest for cave exploration. Some of the limestone is massive and pure, with well-developed karst, but impurities inhibit karst development in some areas.

Some terrains are hazardous to traverse, with thick undergrowth covering highly dissected karren fields and pits (Fig. 12.7). Timber harvest has already had a negative impact on much of the forested karstland in unprotected areas throughout (continues on next page)



**Figure 12.7:** Subalpine karst on El Capitan Peak, Prince of Wales Island. Photo by Carlene Allred.



...ALASKA'S CAVES..., continued from page 4

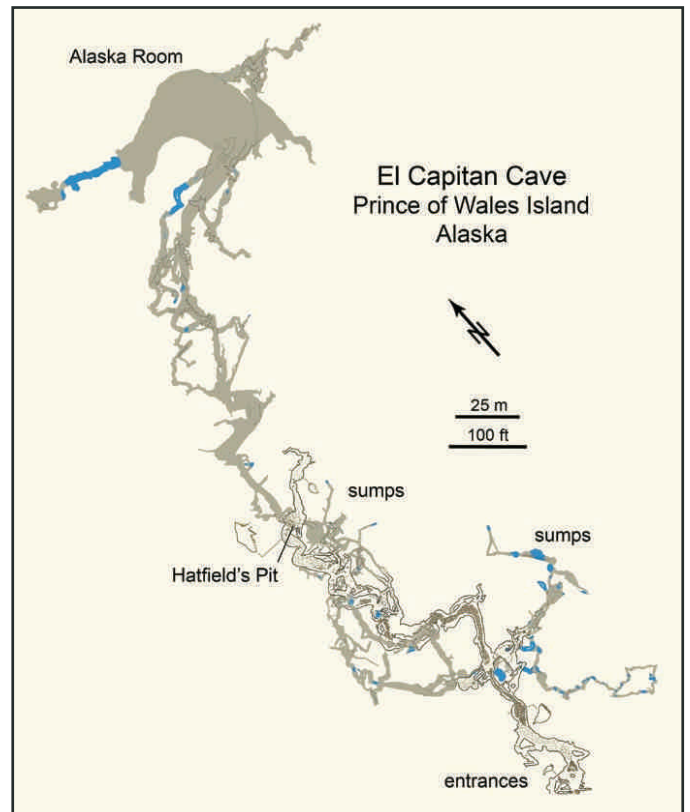
the Panhandle. However, easier access by logging roads compensates for difficult travel through thick second-growth conifers. For example, Starlight Cave (Fig. 12.8) is less than a stone's throw from one of these roads.



**Figure 12.8:** The collapse doline entrance of Starlight Cave, Prince of Wales Island. Note people for scale. Photo by Carlene Allred.

The Northern Panhandle is known to contain 352 km<sup>2</sup> (136 mi<sup>2</sup>) of mapped carbonates and 20 surveyed caves, but there are large regions that have not yet been mapped geologically. There are rumors of caves near Yakutat on the Gulf of Alaska. Huge glacial erratics of marble are found on the beaches, but they have not been traced to their source. They may have come from the area between Yakutat and the glaciated peaks of Mt. St. Elias Range, which tower up to 5500 m (18,000 ft) only 29 km from tidewater. Glacier Bay National Monument has an estimated 77 km<sup>2</sup> of exposed limestone and marble. Less than 10% of the Monument has been traversed by cavers, but they have surveyed 10 caves up to 74 m deep and 85 m long.

The Middle Panhandle contains 554 km<sup>2</sup> (214 mi<sup>2</sup>) of mapped carbonates. Of particular interest is the 41 km<sup>2</sup> Whiting River area, which has never been investigated but contains carbonates with nearly 1200 m (4000 ft) of vertical relief. Also, no speleological



**Figure 12.9:** El Capitan Cave map drafted for the Tongass National Forest service, Prince of Wales Island. Map by Carlene Allred.

investigations have been made in the 140 km<sup>2</sup> carbonates of Admiralty Island.

The most-explored karst areas in Alaska are in the Southern Panhandle, which has an estimated 1300 km<sup>2</sup> (500 mi<sup>2</sup>) of carbonate exposures and more than 500 documented caves. Most exploration has taken place since 1988 and has concentrated on Prince of Wales, Kosciusko, Coronation, Noyes, Dall, and Heceta Islands, as well as the Wrangell area. The caves are generally wet and vertical and average less than 300 m (1000 feet) long. El Capitan Cave is the longest in the state at 3.8 km (12,500 ft) and 131 m (428 ft) deep (Figs. 12.9–12.10). Some of the deepest limestone shafts in the USA are located here. El Capitan Pit is 182 m (598 ft) deep, and Mossy Abyss drops 153 m (505 ft). Although glacial deposits are noted in some caves, many passages are thought to have undergone much of their development since the most recent glacial extreme. Limestone corrosion rates up to 1669 mm/1000 years have been measured at cave swallets (Allred, 2004). Several species of troglobitic insects have been identified, along with extinct mammal bones more than 40,000 years old (Heaton et al., 1996). Human remains dated to 9,200 years BP have been found in one cave on northern Prince of Wales Island (Dixon, 2002).

(continues on next page)





Figure 12.10: The Alaska Room in El Capitan Cave. Photo by Norm Thompson.

### Caves in Volcanic Rock (with additions by William R. Halliday)

Alaska has four known volcanic areas with known or suspected lava caves. The 46 km<sup>2</sup> Lost Jim lava flow, located on the Seward Peninsula, extends 28 km from its vent (Fig. 12.1 #11). A large partially collapsed lava-tube cave has been reported there (Hopkins, 1963), but its extent is unknown. Farther southwest, several lava tubes have been documented on remote St. Paul Island (Fig. 12.1 #12), including 200-m-long Bogoslav (Baltso's) Cave (written communication to Halliday from C.H. Baltso, 1968). There are rumors of lava tubes on Mt. Edgecombe, a composite volcano in the Panhandle (Fig. 12.1 #13). So far, no lava tubes have been reported from the Blue River lava flow (Fig. 12.1 #14). None of these volcanic areas have been investigated by a vulcanospeleologist.

### Sea Caves

The most extensive sea caves (littoral caves) so far investigated are on Noyes Island in the Panhandle. The longest one surveyed is 247-m Puffin Grotto. Others have been documented in a few parts of the state, but



Figure 12.11: Kicking Horse Glacier Cave in the Garrison Glacier near Haines, Alaska, in winter. Photo by Kevin Allred.

with 71,000 km (44,000 mi) of coastline, many more littoral caves are likely to be discovered.

### Glacier Caves

Glacial ice covers 5% of Alaska, or about 78,000 km<sup>2</sup> (30,000 mi<sup>2</sup>). There are more than 100,000 glaciers in the state, the largest of which is the Bering Glacier, at 12,123 km<sup>2</sup>. Virtually every glacier has at least some cave passages, but a relatively small amount of cave exploration has taken place. The most ideal time to explore is during freeze-up in the late fall (Figs. 12.11–12.12), before moulins and other entry points are covered by snow. The flowing ice gradually closes some passages as winter progresses. Most glacier caving has occurred in the easily accessible Byron Glacier near the city of Anchorage.

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Figure 12.12: Disto Inferno – a glacier cave in the Matanuska Glacier, Alaska. Photo by Jason Gullely.



# THE TONGASS'S CAVE INVENTORY

Rebecca Roberts

Geological Society of America Geocorps Intern 2009

Tongass National Forest

With nearly 17 million acres, the Tongass National Forest in Southeast Alaska is the largest national forest. In this region, the limestone underlying a temperate rainforest generates a karst landscape with extensive cave systems. The karst topography is often in dense forest that is difficult to explore, and caves in the area are typically wet and undeveloped. Some of the caves are not visible until you are standing next to the entrance while others have large pit entrances that are 200 feet in diameter. Proper equipment and a cave ethic for maintaining the fragile environments are necessary for cave exploration in the area.



*Dylan Linet records data at the entrance of Conflict Cave,  
photo by Becky Roberts.*

Out of the estimated thousands of caves in the Tongass, local cavers and the Forest Service have inventoried approximately 650, mainly on north Prince of Wales Island. The objective for the summer was to create a GIS Cave Database for Prince of Wales Island. This task involved going into the field and relocating caves that have been discovered in the last 20 years. Additionally, this job entailed strenuous hikes through all types of terrain to capture images of geologic features and complete inventory sheets at each cave entrance.

Once my field partner and fellow Geological Society of America (GSA) Geocorp Intern Dylan Linet and I found the caves - sometimes a difficult



*Becky Roberts emerges from a crawlway,  
photo by Dylan Linet.*

task, we filled out an inventory sheet, which included GPS location, a description of how to reach the cave, a description and sketch of the cave entrance, and any other pertinent comments. Back in the office, we compiled our geological field observations and GPS locations into a master GIS Cave Database.

By starting the project this summer, Dylan and I laid the groundwork for the Cave Database. Nevertheless, we only relocated and completed inventory sheets for close to 100 out of approximately 600 caves on the island. Completing the cave database requires more fieldwork to further relocate and discover caves. The database also serves as a ground for future projects, such as a bioinventory of the caves.

This internship helped to strengthen my life path after college and invigorated my sense of adventure. By figuring out how to solve problems  
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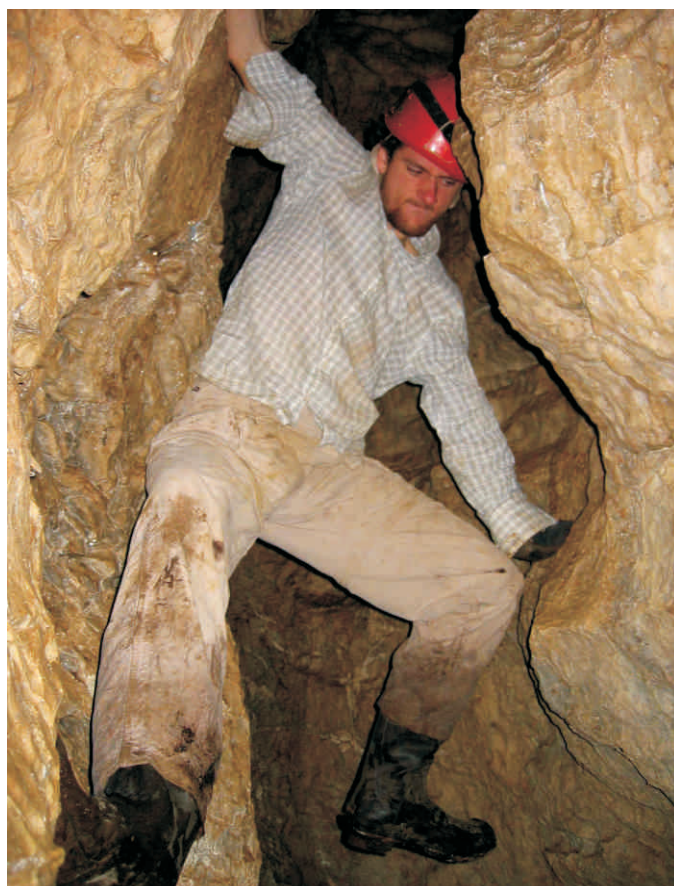
TONGASS INVENTORY, continued from page 7  
 as the project progressed through the summer, I gained self-confidence. I was able to further develop my skills as a geologist, a valuable resource for my future endeavors. Furthermore, the experience was indispensable for my



*Dylan Linet records data at the entrance of Three Princesses, photo by Becky Roberts.*

## GROTTO MEETING

On January 8 (2010) a Glacier Grotto/UAS Caving Club meeting was held in the Hendrikson Building on the University of Alaska campus in Juneau. The meeting began at 7:00 pm, and among the 14 who attended were Grotto members Gwen Herrewig, David Love, and Kevin and Carlene Allred. Some others who attended included Bud Rosenbruch, Shannon Williams, and scout leaders Gene Miller and Keith Palhke. Troop 11 Scout Keiran Edwards gave a slide presentation on their "Cave Trip to Prince of Wales Island- intro to Vertical Caving", which was mentored by grotto members. Afterwards we discussed how the scouts could continue caving and use of vertical skills. Dave Love gave a Sealaska/karst update. ¶¶



*Dylan Linet maneuvers through a cave, photo by Becky Roberts.*

personal and professional growth and prepared me for the future in many ways. I enhanced my ability to be decisive and get things done. I strengthened my personal confidence in geological interpretations. It was great as my first job out of college and worthwhile to use my knowledge for practical application in the field. I am very fortunate to have found such an opportunity and to be paid for what many would do for enjoyment.

¶¶



*Dylan Linet examines features underground, photo by Becky Roberts.*



# KOSCIUSKO ISLAND EXPEDITION 2008

By Johanna Kovarik

The initial week of our Tongass expedition '08, Dr. Dan Monteith, Dr. Carl Bern, Andrea Croskrey, Dan Nolfi, and I inventoried and surveyed caves in proposed second growth thinning units on Kosciusko Island. From August 3rd to August 8th, not one drop of rain fell on our helmeted heads as we hiked out in PVC suits to wield compass and tape through virgin caves. Some expedition members actually complained that they were, "too hot"!

On August 3rd the team set out from the harbor in Craig, Prince of Wales Island, Alaska aboard the SS Suspect Terrain – the US Forest Service boat skippered by Forest Geologist Jim Baichtal. The seas were calm and beautiful and the sky was clear, so we took a long detour on our way to Kosciusko Island past the outer coast of Heceta Island to investigate a few sea caves. The team located and noted them for a return trip on future expeditions. Upon landing on Kosciusko Island in the village of Edna Bay, the gear was quickly unloaded and maps were spread out for evening reconnaissance trips. In addition to our main goal of mapping caves in proposed timber harvest units, a landowner requested that a few of his caves be investigated and mapped. A resident of Edna Bay, Heather, enthusiastically volunteered to come and help as a guide and as a survey team member. That evening, Andrea, Dr. Dan, and I located a short cave and mapped it to 30 meters, while Dan N. and Carl set out to locate and assess a larger cave mentioned by locals. Dan N. and Carl returned that evening quite excited, describing a large entrance with quite a bit of potential.

The next morning dawned beautiful and sunny. Andrea, Carl, and Dr. Dan headed out to map caves located during the 2007 field season by Jim Baichtal and myself. Dan N. and I headed out to recon through some units that had previously been walked, but could use more thorough coverage. Andrea's group mapped a new cave, "The You Trap" to a length of 81 meters, where flowing water continued in pinched passage too

small even for the expedition ferret. The next pit was located, and Carl investigated down to about 10 meters where he declared it would need a bolt. Andrea and Dan M. noted that the pit had quite rotten rock and was a little sketchy for descent. The cave is now affectionately known as "Carl's Rotten Pit". Finally, the team checked out the last pit on the list, which contained beautiful vermiculations that reminded Andrea of a leopard print pattern. "Leopard Skin Well" was mapped to a length of 20 meters.

Meanwhile, Dan N. and I returned empty handed. After meeting with the other group, we headed over to check out a couple of pit leads near the road. Dan N. climbed down through a thick nest of Devil's club into the first pit and found that it soon choked down with sediment, breakdown,

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*Carl Bern admires a stalagmite in Goliath Waits Cave, photo by Andrea Croskrey.*



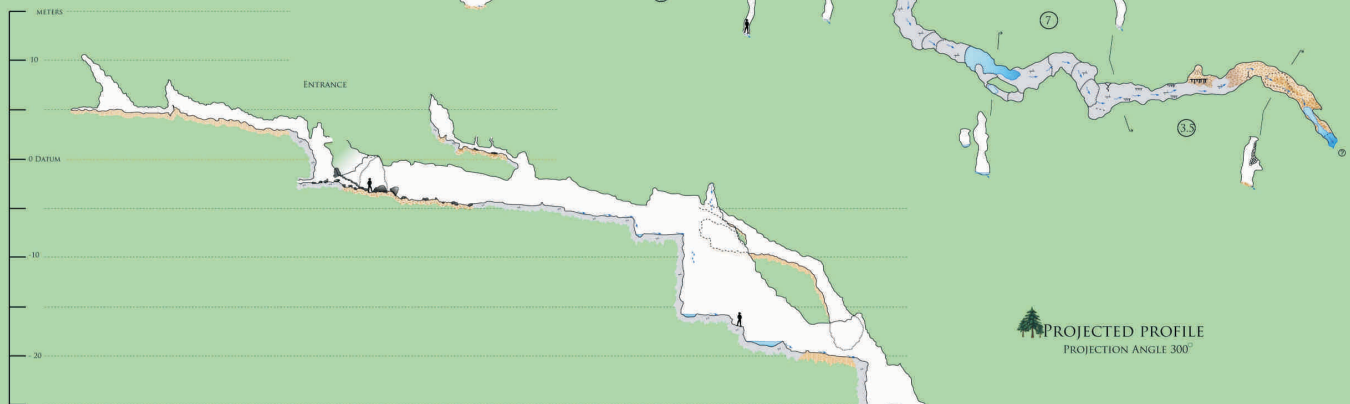
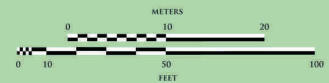
# Heather's Grotto TONGASS NATIONAL FOREST KOSCIUSKO ISLAND, ALASKA

A COMPASS, TAPE, AND INCLINOMETER SURVEY 2008  
BY THE TONGASS CAVE PROJECT AND THE GLACIER GROTTO  
OF THE NATIONAL SPEOLOGICAL SOCIETY

SURVEYED PASSAGE LENGTH 233 METERS (764 FT)  
VERTICAL EXTENT 53 METERS (174 FT)  
DATA COLLECTED BY DAN MONTEITH, DAN NOLLE, CARL BERN,  
HEATHER RICHTER, ANDREA CROSSKEY, JOHANNA KOVARIK

CARTOGRAPHY © 2009 BY JOHANNA KOVARIK

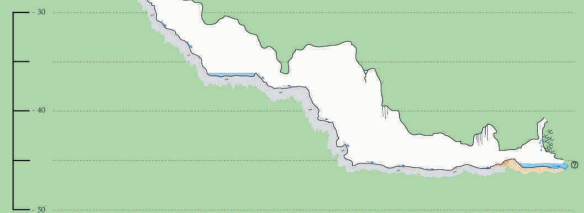
## PLAN VIEW



## PROJECTED PROFILE PROJECTION ANGLE 300°

## LEGEND

	PASSAGE WALLS		FLOWING WATER		STALACTITE/STALAGMITE		UNEXPLORED PASSAGE
	PASSAGE WALL OBSCURED		RISING STREAM		DRAPERY		CEILING HEIGHT
	DRIPLINE		BEDROCK		SODA STRAWS		PIT DEPTH
	CLIFF		SEDIMENT		SLOPE INDICATOR		CAVER JANE
	CEILING HEIGHT CHANGE		MUD		FLOWSTONE		TREES
	CEILING CHANNEL		POOL		BREAKDOWN		





KOSCIUSKO ISLAND..., continued from page 9

and vegetation. The second pit, however, looked promising from the initial approach and did not disappoint. As I climbed down into a deep sink, the entrance was soon visible with a small trickle of water draining into it. Approximately 10 meters into the cave, the passage took a sharp turn to the right and headed steeply down into the earth. Dan N. and I rigged a rope down a tight curving pit that ended in a small room with a sediment floor. While I finished sketching, Dan busied himself with checking a small lead under a bedrock shelf. After a bit of digging, I saw his Xtra Tufts disappear through the 20-centimeter hole. Much to our excitement, the passage continued down two meters into a muddy sediment tube of walking passage. Total surveyed passage in "My Skirt is Wet" is 60 meters, and a going lead remains in walking passage at the end of the survey line. The sediment in "My Skirt is Wet" presents an interesting study of the length of time it may take for a karst system to wash out sediment introduced during timber harvest. The sediment plug, which is washed out enough through the center to allow for human passage, appears to be representative of a single event – perhaps from 50 years ago, during the harvesting of the watershed above.

The next day the teams headed out with our new caver, Heather, to map the cave that Dan N. and Carl investigated our first evening on the island. The entrance of "Heather's Grotto" was impressive and the view of it contributed to our excitement as we donned harnesses and put together survey gear. This trip would be Heather's first official survey trip as well as vertical trip. She had previous experience working as an arborist; so much of her gear was from that profession. After spending some time with her that morning showing her the ropes with her unique gear, she was looking forward to exploring! A "boy's team" made up of

Carl, Dan N., and Dr. Dan began surveying from the entrance while the girl's team of Heather, Andrea, and I worked our way down the main passage to begin our survey farther in. Two short pitches made for an easy first vertical trip for Heather and she was happily covered in mud in no time. She picked up running compass and clino with ease, and we quickly met up with the boys. Total survey was 233 meters.

At the end of the survey line, a low crawl half filled with water remains to be pushed – possibly during a dryer year or during the winter, definitely with dry suits. The loud sound of water dropping over a precipice just beyond the crawl makes the chilly ear dip enticing. Local rumors in the area tell of a through trip from the entrance down to the ocean. Numerous springs at the shoreline in this area mark that this could be possible! The group continued mapping the rest of the day with several side leads off the main passage. "Heather's Grotto" currently rivals "Goliath's Wait" for the longest cave on Kosciusko Island.

Wrapping up our work on Kosciusko, the team was excited to one day return and push the going lead in bottom of "Heather's Grotto"! ππ



*Dan Monteith, Dan Nolfi, Johanna Kovarik and Carl Bern sit in a Kosciusko Island sinkhole, photo by Andrea Croskrey.*

The Alaskan Caver  
c/o Carlene Allred  
Gen. Del.  
Tenakee Springs, AK 99841

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