

CRMO Baseline Cave Inventory

Purpose

The purpose of this data is an initial attempt to acquire and organize specific information on the caves and related resources in CRMO. Such documentation will be the basis of an effective cave management program and will help standardize cave policy and guidelines.

Objectives

Several objectives were set for this project:

1. to document cave sites identified on the topo map
2. to locate additional sites, being time effective
3. to establish a cave resources file, allowing for incorporation of newly discovered sites into the system
4. to identify information within the six prime interest areas of each cave site, keeping in-line with inter-agency consistency and classification methods
5. establish cave slide collection for inventory documentation and to supplement the Interpretation Division cave slide collection
6. utilize information system adapted for computerized storage and analysis
7. identify research needs of specific cave sites
8. suggest optimum cave management techniques for the specific cave site
9. update cave related literature in the cave resources file

Background

Prior to organization of data in this report, there were only limited attempts at inventoring the monument's cave resources. Sources of background information available from: R. Limbert, "Among the Craters of the Moon", H. T. Stearns, "Geology of Craters of the Moon, Idaho" and S. Peck's "A Lava Tube Atlas". Other information acquired by personal inquiry.

As the 'Caves Area' of the loop drive indicates consistantly high visitor interest in caves, it became apparent that this prime resource of the park should be adequately documented.

Upon inspection of the park's photo/slide files it became equally apparent that the park was lacking in a visual record of the resources, too.

Cave literature available at the park was scanned and determined to be insufficient. Attempts were made to acquire more specific information with more direct value to the park's resources.

Through cooperation and communication between the park and the Bureau of Land Management, Shoshone, technical advice and suggestions were acquired.

Methods

Initial survey of all available cave literature within the park library was made, with discouraging results. The slide/photo documentation files and catalogues were also inventoried for evidence of the need and extent of slide identification of these valuable resource sites within the park. Again the results were negligible.

As there was no site-specific cave information to be found, including for the developed caves- it appeared time efficient to go and attempt to document those sites already located but with no accompanying information. Location of new sites by 1 individual would require more time and was of lesser importance.

Each cave site was documented with a minimum of 1 entrance shot and 1 interior or unique feature shot, if possible. Potential hazards were noted enroute and within the cave site. Hazards were classified according to current system used by the Forest Service, Bureau of Land Management and some National Park Service areas. Contents were described at each site with special note of: speleothems/ minerals, biologic and hydrologic information, geologic info was recorded and any archaeology/ paleontology features were noted. Site location on the standard size park topo map was included for orientation. Slides of each area were identified and cross-filed. Cave sites classified according to condition of contents. Environmental impact was noted and Management recommendations made.

Results

45 site locations were inventoried and photographed. The cave card file/computer information system was initiated and the additional record file established. Additional cave literature acquired for CRMO library. BLM advice acquired concerning aerial reconnaissance cave surveys. Cave photography suggestions were also given. Vertical experience acquired and outside caving trips were made in effort to better interpret and understand lava tubes and to enhance the interpretation of my results.

Coding key for the cave card file, Hazard and Content rating classification definitions and suggested management directions included with slight modifications for application to lava tubes.

Suggestions for future research/management

The information in this report is divided into 8 Cave Study Areas: 1.) the North end, (north of the highway), 2.) the East-side (beyond the developed caves), 3.) the South-end or wilderness, 4.) the West end or the area west of the loop drive, 5.) the developed caves (dealt with only lightly), 6.) the Crystal Pit Fissure area and the Carey Kipuka extension and Shoshone District BLM aerial slides are included for future reference.

One major suggestion for future inventories- use Kodachrome film (versus Ektachrome). The colors and final product are much truer

with Kodachrome.

Carey Kipuka Extension was not ground proofed for cave sites at all. However, a brief flight overland was made with the Shoshone BLM on July 15, 1982. A 15 minute survey of the area resulted in 4 potential cave sites as observed from the air. Therefore, this area warrants a special search for caves. Aerials of BLM caves or district land are included only for comparison or interest purposes. Additionally, a few scenic shots of the park are included.

Amphitheatre cave, Moss cave, etal, are not included in this report because of adequate previous documentaion; though I think their information should be transcribed to fit the inventory form and added to the whole. More extensive cave locating work should be done in essentially every study area of CRMO (especially the developed cave area lava sinks). The most efficient way to do this would be by an initial aerial reconnaissance of the area. The central rift/fissure zone in the wilderness and the park's waterholes deserve added documentation. The former's areas require vertical gear for exploration and a minimum of two people.

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September, 1982

Coding Key for Cave Card File

Item Number

1. Cave Number- each cave will be numbered as follows:
 - A. Agency abbreviation, i.e. NPS
 - B. State abbreviation, i.e. ID
 - C. Site Identification Number, i.e. 130340
 - D. Cave Number, starting with 001
(Example: NPS-ID-130340-001)
2. Cave Name- determine/establish name:
 - A. Attempt to discover historic name (or name given by first person discovering cave).
 - B. If unable to uncover a historic name, then create a name that is most descriptive of the cave.
 - C. List all other names used for the cave on separate cards with reference to final assigned cave name.
 - 1.) List other names under remarks of final name cave card.
 - 2.) List other names in Master Cave File.
3. Slide Exposure Number- List the number and date printed on the slides that corresponds to the cave.
4. Map- indicate if cave location has been plotted on topo map.
Y= Yes
N= No
5. Legal Location- The state and county will always be the same for the monument: Idaho, Butte; therefore, list only: Township, Range, Section and Quarter.
6. Geologic Formation- as all caves in the monument start and end in basalt lava flows, identify type of lava structure found in.
7. Elevation of Entrance-
E- Estimated reading in feet using contours on topo map (i.e. E5900)
A- Altimeter reading
8. Type of Cave-

F- fissure	E- secondary lava tube (multi-level floors, tide marks)
P- pit only	A- tertiary lava tube (surface tubes, floors not multi-level)
R- rock shelter or blister opening	S- rift and assoc. flow features
I- primary lava tube, large diameter	
9. Number of Levels- visible levels (may join to main room)
 - 1- single level
 - 2- two levels
 - 3- three levels
 - 4- (etc.)
10. Dominant Rock Type- BA is the only one CRMO is concerned with, unless caves are discovered in certain portions of the Pioneer Mts.

BA- Basalt	GY- Gypsum
CO- Conglomerate	HA- Halite
DO- Dolomite	IG- Igneous

TR- Travertine
LS- Limestone
MX- other metamorphic

SH- Shale
SO- Soil
SS- Sandstone

11. Type of Entrance- (Code as many as apply, starting with "main" entrance.)
L- large horizontal (10'x10' or larger)
H- small horizontal (less than 10'x10')
V- large vertical (10'x10' or larger)
S- small vertical (less than 10'x10')
12. Number of Entrances-
1- one
2- two
3- three
4- (etc.)
13. Length of All Known Passages-
A10- approximately 10 feet
14. Pattern of Cave-
S- single passage/ room only
P- pit only/no passages or rooms
R- rectilinear pattern
D- dendritic pattern, bifurcating
V- vertical (vent) with associated horizontal chamber(s)
15. Trend of Cave From Entrance-
N10 W- north 10 west
16. Vertical Relief of Cave- highest ceiling to lowest floor.
A10- approximately 10 feet
17. Water Element- code as many as apply.
A- arid, no water
D- dripping water
M- moist earth
P- pool present (less than 100 sq. ft. of surface area and less than 6' deep)
O- pool present (less than 100 sq. ft. of surface area and greater than 6' deep)
18. Hazards Present- code as many as apply.
C- confusing passageways
L- loose rocks or cave-in hazard
V- vertical drops
W- stationary water
N- none
19. Specialized Skills Required.
R- rappelling, prusiking, cable ladder climbing, etc.
N- none
20. Cave Contents- code as many as apply.
A- archaeological (artifacts)
B- biological (organisms)
G- geological (structural, hydrological, genetic)

H- paleontological (fossils)

S- speleothems

N- none; cave, shelter, or sink of no special attraction or significance

21. Type of Protection Needed-

G- gate

H- sign concerning hazards

S- sign concerning protection

F- fence

N- none

22. Type of Protection Provided-

G- gate

H- sign concerning hazards

S- sign concerning protection

F- fence

N- none

23. Q- does not apply to CRMO

24. Dual Classification Coding-

Content- A, B, C, D, E

Hazard- I, II, III, IV

Explanation of Hazard Ratings

Class 'I' Caves-

Offers the least hazard to cavers. Exploration should be conducted by no less than three cavers who use the following basic equipment: hard hats, 3 light sources per person, boots with nonskid soles and protective protective clothing (i.e. overhauls).

Class 'I' Caves- General Characteristics:

1. single well defined passageway, with no lateral passages.
2. no passageways less than 1 meter un diameter
3. no step-type drops over 1 meter.
4. stable ceiling rocks
5. stable floor material

Class 'II' Caves-

Contain moderate hazards and is mostly horizontal in structure. Exploration should be conducted by no less than three cavers, one of which is experienced and who use the following basic equipment: hard hats, 3 light sources per person, boots with nonskid soles and protective clothing.

Class 'II' Caves- General Characteristics:

1. well defined main passageways, with only dead end lateral passages.
2. crawlways less than 60 cm (24") high.
3. no step-type drops over 3 m (10').
4. stable ceiling and floor.

Class 'III' Caves-

Contain structural hazards not found in Class I and II. Exploration should be conducted by no less than three cavers, two of which have moderate caving experience (including vertical descent and climbing) and use the following equipment: hard hats, 3 light sources per person, boots with nonskid soles, vertical descent and climbing gear and protective clothing with no loose or protruding attachments which might become entangled while doing vertical work. Each caver should have a complete set of climbing equipment. (Vertical gear may not be needed in some Class 'III' Caves.)

Class 'III' Caves- General Characteristics:

1. multiple passageways with straight connecting passages
2. crawlways less than 60 cm (24").
3. vertical drops up to 15 m (50').
4. unstable rocks in ceilings over 2 m in height. stable rocks on passages less than 2 m in height.

Class 'IV' Caves-

Most hazardous from a structural standpoint. Exploration should be conducted by no less than 4 cavers, all of whom have considerable caving experience (including vertical descent and climbing), who use the following equipment: hard hats, 3 light sources per person, boots with nonskid soles, vertical descent and climbing gear and protective clothing with no loose or protruding attachments which might become entangled while doing vertical work. Each caver should have a complete set of climbing equipment.

Class 'IV' Caves- General Characteristics:

1. maze-type passageways.
2. vertical drops greater than 15 m.
3. unstable ceiling rocks on crawlways under 2 m.

Explanation of Content Ratings

Class 'A' Caves-

1. Contain few or no items of scenic or scientific value.
2. If any such items are present within the cave, they are of the type which cannot, without great effort, be destroyed or removed from the cave.
3. A cave in which frequent visitation by any and all types of cavers will cause little or no change within the cave.

Class 'B' Caves-

1. Contain secondary deposit-type formations of the ordinary type (stalactites, stalacmites, columns and draperies) which are either of such size or so positioned in the cave that they are not easily damaged and vandalized; or any items of scientific value which cavers could not seriously destroy or disturb.

Class 'C' Caves-

1. Contain secondary deposit-type formations of the ordinary type (stalactites, stalacmites, columns and draperies) which are either of such size or so positioned in the cave that they are quite susceptible to damage and vandalism; or any items of scientific value which cavers could seriously destroy or disturb.

Class 'D' Caves-

1. Caves which contain formations that are of unusual quality or are very delicate and susceptible to breakage, even by well trained and very careful cavers; or any items of scientific value which are of the type which cavers could seriously disturb or destroy. (i.e. cave helictites, gypsum flowers)

Class 'E' Caves-

1. Caves which contain items of scientific value which could be seriously disturbed or destroyed by frequent visits, or by visits of uninformed cavers as to the item or items of scientific value (i.e. a biological species which has a delicate habitat or is in danger of extinction in the area or within the particular cave). The items of scientific value could be either archaeological, biological or paleontological in nature, or rare cave formations.

Suggested Management Directions

1. Hazard Classes:

- 1.) Class 'I'- left open to public with no restrictions
- 2.) Class 'II'- left open, but with sign stating requirements for exploration placed at entrance.
- 3.) Class 'III' and 'IV'- gated when necessary. Entry will be by permit only. Sign stating requirements and where to obtain a permit will be placed at entrance.

2. Contents Classification:

- 1.) Class 'A' and 'B'- left open to public with no restrictions. Sign stating it is unlawful to damage cave formations will be placed at entrance.
- 2.) Class 'C'- gated when feasible. Entry by permit only. Sign stating where permit may be obtained, along with sign stating it is unlawful to damage cave formations will be placed at entrance.
- 3.) Class 'D'- gated when possible. Entry by permit only. Sign stating where permit may be obtained along with sign stating it is unlawful to damage cave formations will be placed at entrance. Expedition must be accompanied by an employee.
- 4.) Class 'E'- gated when possible. Entry by permit only. Sign stating where permit may be obtained, along with sign stating it is unlawful to damage cave formations will be placed at entrance. Permits will be issued only for bonafide scientific study by qualified individuals. May be necessary to require that a qualified agency employee accompany each expedition.

Figure 5. Proposed Classification System Table.

Class 1 - Primary:

Tubes that form in main channels, and usually are the primary supply channel for the lava front. Leveed and layered lava may be present, while it often has multi-levels or conspicuous tide marks. They are usually the larger tubes in the system, and tend to be found nearer the vents, where lava flow was deeper. Examples include Maze Cave, Idaho, and Dynamited Cave, Washington.

Class 2 - Secondary:

Usually formed by branching of previously existing primary tube, but may form independently. They may have leveed walls, but more commonly layered. Multi-levels may be present, but usually, only tide marks are revealed. They may have a flat floor and usually a rounded roof. These tubes are normally smaller than the primary and some distance from the vent. Examples include Tee Cave, Idaho, and Horse Cave, Oregon.

Class 3 - Tertiary:

The final class of true lava tubes includes surface tubes, terminal tubes, overflow tubes, and hornitos. They are normally formed at the flow margins except in the case of an overflow. Levees are absent, but layered walls could be present. Typically, they are only in a single flow thickness of lava and are semi-circular to elliptoidal in cross section. Linings are composed of a rudimentary glaze or are nonexistent. Multi-levels are absent, though rudimentary tide marks may exist. These are normally the smallest tubes of the flow, and feed the flow fronts. Examples include Masochist Maze of Deadhorse Cave, Washington, and the lower end of Arco Tunnel, Idaho.

Class 4 - Rifts and Associated Flow Features:

This class includes rift caves, spatter cone vents, lateral pressure ridges, subsidence cracks, and blisters. They do not have the "tube" shape of the first three classes, tending more to look like a crack in formed lava, a somewhat rounded single room, or a vertical, roughly rounded pit. Examples include Crystal Pit, Idaho, and The Shaft, Australia.

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