

Integrated Monitoring Protocol for Cave Entrance Communities and Cave Environments in the Klamath Network

Standard Operating Procedure #7: Visitation

Version 2017Feb10

Citation:

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To create a new version of this SOP, carefully follow the instructions in SOP #18: Revising the Protocol (<https://irma.nps.gov/DataStore/Reference/Profile/2238840>). Use the Revision History Log below to describe the revisions:

- Populate the top table of the revision history log, providing the previous version date, author of the change, a specific but concise description of the changes made, the footnote number associated with change details, and a new version date.
- In the bottom table, add a footnote and as much text as needed to describe in detail the reasons for and implications of the change.

Revision History Log

Previous Version Date	Author of Change	Changes Made	Footnote #	New Version Date

Footnote #	Detailed Reasons for and Implications of the Changes

1 Introduction

This Standard Operating Procedure (SOP) provides guidelines on monitoring visitation at caves in Oregon Caves National Monument and Preserve (ORCA) and Lava Beds National Monument (LBE). Visitation can serve as a basic indicator of the degree of human impacts on a cave, thus measuring visitation levels at caves is of paramount importance to a monitoring program. Other parameters that are monitored as part of this plan may be influenced by visitation, and recording visitation may allow managers to correlate changes in visitation levels with changes in other monitored parameters and address those changes through adaptive management strategies. The methods for recording visitation at ORCA and LBE are different and are treated independently. Monitoring visitation will be the responsibility of each of the parks and implemented year-round.

At ORCA, Oregon Caves (“The Cave”) is gated and visitor access is controlled. The number of visitors is recorded through ticket sales, which are managed by the Crater Lake Natural History Association (CLNHA), a National Park Service (NPS) recognized 501(c)(3) nonprofit organization. Monthly ticket sales are reported to the NPS office in Washington, D.C., via monthly reports. Visits to the cave by park staff are not ticketed and will be recorded on a visitation log in the Visitor Center. Pilot study data indicated that less than 1% of visitors were staff members. Because staff often travel off-trail, they could have a disproportionate impact on the cave; thus, it is considered important to distinguish and track staff visitation. In order to verify the accuracy of counts in the cave register at Blind Leads Cave and ticket sales records of The Cave, trip-beam style TRAFx infrared trail counters have been installed inside both caves.

At LBE, visitors are not required to purchase a ticket before entering a cave. Therefore, visitation at LBE caves will be monitored using trip-beam style TRAFx infrared trail counters in all monitored frontcountry (i.e., visitor-use) caves, and cave registers at all monitored backcountry caves. A single exception is made for the gated Crystal Ice Cave through a visitation log filled out by tour guides and management staff. Because many backcountry caves receive very low visitation rates, NPS staff visitation may be a significant or primary source of cave impact; staff will record each of their own visits in the cave register.

Table 7-1 shows the visitation monitoring methods used at each cave.

Table 7-1. Visitation monitoring method(s) used at each monitored cave. ORCA = Oregon Caves National Monument and Preserve, LBE = Lava Beds National Monument.

Park	Cave Code	TRAFx Trail Counter	Cave Register	Visitation Log
ORCA	OREGON CAVES	X		X
ORCA	BLIND LEADS	X	X	
LBE	BEAC		X	
LBE	DRHE		X	
LBE	SENT—Sentinel Cave	X	X	

Table 7-1 (continued). Visitation monitoring method(s) used at each monitored cave. ORCA = Oregon Caves National Monument and Preserve, LABE = Lava Beds National Monument.

Park	Cave Code	TRAFx Trail Counter	Cave Register	Visitation Log
LABE	BIPA—Big Painted Cave	X		
LABE	CAIC		X	
LABE	COIC		X	
LABE	SKIC—Skull Ice Cave	X		
LABE	SKYL		X	
LABE	FOCA		X	
LABE	JURI		X	
LABE	SYMB		X	
LABE	YELL		X	
LABE	JUPO		X	
LABE	MEIC—Merrill Ice Cave	X		
LABE	NOBE		X	
LABE	IDWL—Indian Well Cave	X		
LABE	BLGR—Blue Grotto Cave	X		
LABE	PEAR		X	
LABE	VALE—Valentine Cave	X		
LABE	CGCA		X	
LABE	ANGL		X	
LABE	JUHE—Juniper - Hercules Leg Cave	X		
LABE	INCA		X	
LABE	LALA—Labyrinth - Lava Brook Cave	X		
LABE	EMST		X	
LABE	RALO		X	
LABE	DECA		X	
LABE	CRCA		X	
LABE	HIMM		X	
LABE	LOPI		X	
LABE	SEAN		X	
LABE	CRIC—Crystal Ice Cave			X
LABE	ROCO		X	
LABE	ICEB		X	
LABE	THDB—Thunderbolt Cave	X		
LABE	SOLA—South Labyrinth Cave		X	
LABE	SPID		X	

2 Equipment

2.1 TRAFx Visitation Monitoring Equipment

TRAFx is an advanced counting system that the Klamath Network (KLMN) uses to monitor visitation to caves. The complete G3 edition package includes infrared trail counters, a dock and cables for downloading counter data to a computer, analysis software, and user manuals and CDs. Although TRAFx counters are not the only brand available, they will be used for this protocol to maintain continuity and minimize training given that LABE has been using them in frontcountry caves since 2009.

Operation of the trail counters is well-detailed in the manufacturer's manuals, and while we give a brief overview, the manual should be consulted for specific operating guidance. The user manuals are available online and from network and park drives in the following locations:

TRAFx G3 User Manual Part 1 – Overview and dock setup

Online: https://www.trafx.net/downloads/TRAFx_Manual_Part_I.pdf

KLMN common drive: S:\Monitoring\Caves\Cave_Documents\Protocol\Supporting_docs

LABE common drive: S:\TEAMS\Resource Management\Branches\Caves_Bats\Cave Program\I & M\Cave_Documents\Equipment_Events\Equipment_Manuals

ORCA common drive: O:\shdata\Public\Manuals\Equipment

TRAFx G3 User Manual Part II – Infrared trail counters

Online: https://www.trafx.net/downloads/TRAFx_Infrared_Trail_Counter_Instructions.pdf

KLMN common drive: S:\Monitoring\Caves\Cave_Documents\Protocol\Supporting_docs

LABE common drive: S:\TEAMS\Resource Management\Branches\Caves_Bats\Cave Program\I & M\Cave_Documents\Equipment_Events\Equipment_Manuals

ORCA common drive: O:\shdata\Public\Manuals\Equipment

2.2 Cave Registers

While cave registers require voluntary visitor effort and provide significantly more varied and less accurate visitation data, they are inexpensive, easy to maintain, and provide some measure of visitor impact to those environments. Also popular on mountaintop summits, registers provide a way for visitors to “leave their mark” without defacing the natural environment.

2.3 Equipment List

2.3.1 TRAFx Infrared Trail Counters

- Dedicated and/or decontaminated caving equipment including: helmet with mounted light(s), backup lights, kneepads, gloves, and boots
- Cave zone maps

- TRAFx 3rd generation Infrared Trail Counter
- Non-rechargeable alkaline AA batteries for long-term cold deployment in TRAFx Infrared Trail Counters
- TRAFx G3 Dock for downloading data
- Connection cable for uploading data from G3 Dock
- TRAFx DataNet subscription for easily managing and summarizing data

2.3.2 Cave Registers

- Dedicated and/or decontaminated caving equipment including: helmet with mounted light(s), backup lights, kneepads, gloves, and boots
- Cave zone maps
- PVC storage tubes
- Cable tether for PVC tube
- Blank Cave Register form (available at end of SOP) printed on moisture-proof paper (e.g., Rite in the Rain)
- Cover sheet for cave register, laminated or printed on moisture-proof paper (available at end of SOP)
- Any other relevant material for cave register (e.g., cave maps, special warnings about dangerous or sensitive areas)
- Pencils for cave registers
- Zip-top bag for materials inside cave register

2.3.3 Visitation Logs and Ticket Sales

- Equipment managed by CLNHA to control and track access
- Staff and researcher visitation log (available at end of SOP)

3 Timing

Because different techniques are used to collect visitation data at different sites, the schedule for collecting data from cave sites is flexible and occurs throughout the year. In order to incorporate the data into Annual Effort Reports, all data available from the previous calendar year must be entered into the database no later than January 31 of the following year. Ideally the data are collected in early January so the annual effort report can contain the entire previous calendar year's data.

3.1 Oregon Caves National Monument and Preserve

Reports on visitor numbers will be obtained from the staff visitation log that tracks non-ticketed entrants to The Cave (staff and researchers), combined with the CLNHA data, and uploaded into a

Cave Visitation file each summer. Information from the in-cave register at Blind Leads Cave will also be collected and input according to a schedule selected by park staff and adjusted to visitation levels. This cave register will be collected annually.

As of 2016, TRAFx G3 Trail Counters are being used to verify accuracy of cave register and ticket sales data for Blind Leads Cave and The Cave, respectively. Data from these Trail Counters will be downloaded monthly. Batteries in the counter units and dock should be replaced whenever the low battery warning appears; therefore, staff will always carry replacement batteries when visiting Trail Counters. Data and settings are automatically retained during a battery change or power failure.

Prior to January 31, the data from the previous calendar year will be entered into the database so it can be incorporated into reports. The park Field Lead will ensure that data are properly compiled and that copies of visitation data are provided to the KLMN Data Manager.

3.2 Lava Beds National Monument

Data from the TRAFx G3 Trail Counters should be downloaded on or after the 28th of each month to comply with parkwide visitation reporting to the national NPS office. Batteries in the counter units and dock should be replaced whenever the low battery warning appears; staff will always carry replacement batteries when visiting Trail Counters. Data and settings are automatically retained during a battery change or power failure.

Information from cave registers will be collected and input according to a schedule selected by park staff and adjusted to visitation levels. Cave registers will be collected at least annually, ideally in early January.

Prior to January 31, all data from the previous calendar year will be entered into the database so it can be incorporated into reports. The park Field Lead will ensure data are properly compiled and that copies of visitation data are provided to the KLMN Data Manager.

4 Location

The exact location and placement of counters is heavily dependent on cave morphology and will be left to the discretion of the installers. The serial number and location of each device will be recorded in the database. In general, trip-beam counters will be placed near entrances and at constrictions where visitors funnel through in single file. Beams will spread entirely across the trail, yet devices will be shielded from view as much as possible to avoid tampering. Typically, the counters will be covered with rocks, leaving just enough room for the beam to shine through a gap. The TRAFx counters have a range of 6 m, come with a 1 m cable, and do not need a reflector or receiver. They can be oriented horizontally or at a downward angle.

Currently, at LABE, the counters are housed in capped PVC pipe with a 1 m extension of conduit attached. A data logger for the counter is stored in the pipe and the cord extends away from the pipe so that the probe is situated at the end of the conduit. The entire apparatus is concealed with rock and the logger can be accessed without disturbing the probe.

Counters for ORCA are fully contained in a mobile, PVC housing with an opening for the probe to extend from. The counter is accessed by unscrewing the lid and removing the counter. The unit must be re-situated after accessing the counter (if the entire unit is moved) such that the probe is aimed properly over the path. The counter for The Cave is concealed by rock shortly beyond the main entrance and is not locked in place, while the counter for Blind Leads is locked in place and requires a general access key for ORCA staff to open.

Cave registers in both parks will be placed in capped 40-cm-long PVC pipe located within the cave where they are plainly visible and can be secured to a fixed object with a cable tether. The location of registers will be described and shown on the cave monitoring maps in the cave site dossiers, which are referenced in Appendix C: Examples of Cave Site Dossier Materials.

5 Instructions

5.1 Visitation Logs and Ticket Sales

At ORCA, work with administration officials to arrange monthly or annual visitation reports to be sent from the NPS office in Washington, D.C., to the cave monitoring park Project Lead. Ensure both resource management and interpretation staff fill out the visitation log for each staff/researcher visit to The Cave.

At LABE, ensure both resource management and interpretation staff fill out the visitation log spreadsheet after each tour or staff/researcher visit to Crystal Ice Cave.

A blank visitation log usable by both parks is available at the end of this SOP.

5.2 Cave Registers

Cave registers are located at cave entrances or interiors and prompt cavers to voluntarily record their visit. Template materials for creating a cave register are available at the end of this SOP:

- Cover page appropriate to the park
- Cave register form

The blank cave register form will be printed on waterproof paper to ensure it can withstand the moist cave environment. Add the cave name to the form before placing it in the register for quality data collection and visitor recognition. When caves pose unusual hazards to visitors or contain sensitive areas that the park wishes to warn people to avoid impacting, this information can be included on the cave register. Cave maps can also be included if deemed desirable.

Information from cave registers will be recorded either by removing the used sheets from the register or taking pictures of them in the field.

5.3 TRAFx Infrared Trail Counters:

It bears repeating that this is a brief overview, and the manufacturer's instructions should be consulted for full guidance.

Operation: Read and follow manufacturer's instructions on TRAFx Infrared Trail Counter for the unit to be downloaded. To be programmed, TRAFx 3rd Generation counters must be connected to a PC via the TRAFX G3 Dock (dock). Data will be offloaded from counters in the field using the dock and then uploaded to a PC.

To Offload Data from Counter: Read and follow manufacturer's instructions for the unit to be downloaded. Using the manufacturer's instructions, connect the dock to the counter and it will automatically offload the data and launch the counter. A green indicator light will flash when it is finished transferring data and can be disconnected. Connect the dock to a PC to upload the data.

Maintenance: Whenever a counter is moved, data are offloaded, or batteries are replaced, technicians will confirm that the device flashes a green light when tripped. If counters need to be replaced or upgraded, the change should be recorded in the Equipment and Event Log provided in SOP #5: Climate.

5.4 Data Entry

Total number of staff and public visitors will be entered into separate fields in the database.

6 Visitation Log and Cave Register Template Materials

6.1 Blank Cave Visitation Log for Lava Beds National Monument and Oregon Caves National Monument and Preserve

Visitation Log

for

(Cave Name/Number printed here)

[illegible]

6.2 Cave Register Cover Page for Lava Beds National Monument

Cave Name

Please read and sign this register.

Lava Beds National Monument is one of six National Park Service units that belong to the Klamath Network, which conducts a natural resource inventory and monitoring program. In 2012, the *Integrated Cave Entrance Community and Cave Environments Long-term Monitoring Protocol* was established by the Klamath Network to monitor the health of our caves. Parameters for this protocol include cave climate (temperature and humidity), entrance vegetation, nutrient input, cave invertebrates, bat populations, water and ice levels, and human visitation. Lava Beds is monitoring these parameters in 31 caves spread throughout the monument (including this one). By signing this register and volunteering a small amount of information about you and your party, you are helping Lava Beds and the Klamath Network understand how human visitation impacts our caves.

Cave Conservation

While you are in this, and other caves, please be extremely careful. Caves are fragile, non-renewable resources, and impacts that occur underground often last for decades or can be permanent. Trash left in caves will decompose extremely slowly or not at all, and organic waste (food scraps, feces, etc.) will negatively impact cave ecosystems, including the bats, invertebrates, rodents, bacteria, and other organisms that live within the cave. Please do not leave anything behind while caving, do not smoke in caves, and never use caves as restrooms. The formations you see are very delicate and, once broken, can never grow back. Refrain from touching cave features whenever possible, and do not build cairns or mark the cave. Practice *Leave No Trace* standards:

- | | |
|-----------------------------|------------------------------|
| ✓ Plan ahead and prepare | ✓ Leave what you find |
| ✓ Minimize your impact | ✓ Travel on durable surfaces |
| ✓ Dispose of waste properly | ✓ Respect wildlife |

Bat Protection

Never enter closed caves. Seasonal or year-round cave closures are used at Lava Beds to protect bat species that use the caves for hibernation in winter or for raising their pups in maternity colonies during the summer. Bat colonies are extremely sensitive to human disturbance and are also being threatened by white-nose syndrome (WNS), an often fatal disease that is caused by an invasive fungus. When entering any cave, please first acquire a WNS screening pass to ensure you do not have any clothing or equipment that may be contaminated with the fungal spores that cause WNS.

Cave Safety

Protect yourself while caving. Undeveloped caves may contain hazards such as loose rock, pits or drop-offs, and low ceilings. Caves contain areas of total darkness and are often damp and chilly. It is important to have the right equipment and dress appropriately for the cave environment:

- | | |
|----------------------|-----------------|
| ✓ helmet | ✓ knee pads |
| ✓ 3 sources of light | ✓ gloves |
| ✓ boots | ✓ warm clothing |

Do not attempt any crawls, squeezes, or climbs that you are not comfortable with. Do not go caving alone, and always tell someone on the surface where you are going and when you plan to return.

Thank you for your help in preserving this fragile geologic treasure. Your efforts will provide future cave visitors the same wonderful underground experience that you are enjoying today!

6.3 Cave Register Cover Page and Map for Blind Leads Cave in Oregon Caves National Monument and Preserve

Blind Leads Cave Register

Dear Caver,

Firstly, congratulations! You have successfully traversed a difficult and treacherous path to reach the treasure! Perhaps it is not the treasure you were expecting, but a treasure none the less.

You are currently inside Blind Leads Cave. This cave is 137 feet long and more than 20 feet deep. See the cave map on the back of this page for a top down and side view of the extent of its passages. Many species use this cave including a variety of invertebrates, spiders, banana slugs, and even pacific giant salamanders! So far, bats have not been observed in Blind Leads Cave, but they do live in many other places within the monument.

Now, for the business part.

Please read and sign this register!

Your participation will be recorded as part of the National Park Service's Integrated Cave Entrance Community and Cave Environments Long-term Monitoring Protocol. This information will allow us to correlate visitation to Blind Leads Cave with changes in its environmental variables, such as temperature, relative humidity, scat and organic material deposition, invertebrate populations, and entrance vegetation.

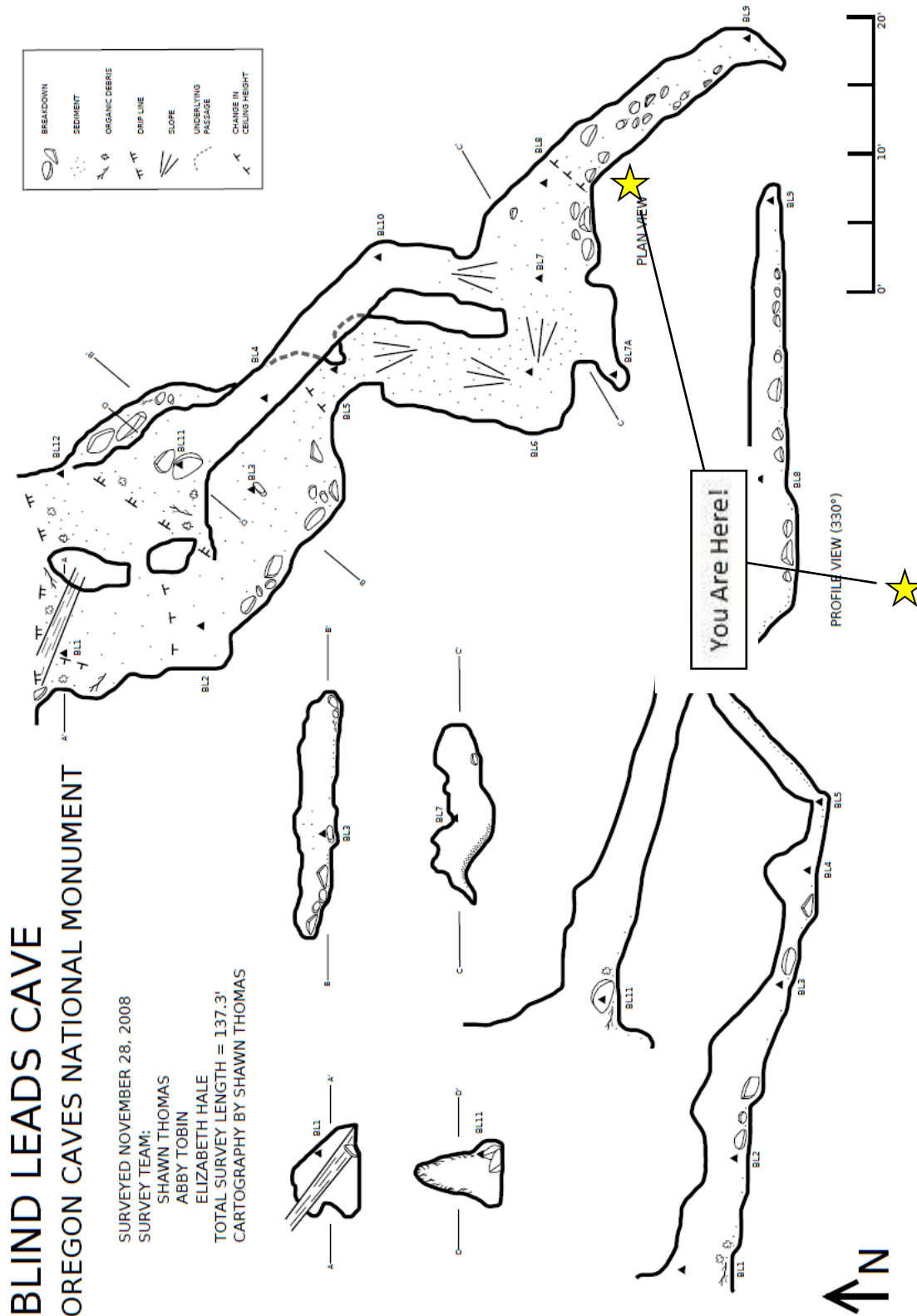
To find out more about this program, visit the Klamath Network website at <http://science.nature.nps.gov/im/units/klmn>

Please protect this and all caves by not eating, drinking, smoking, or littering in the caves, by not using them as restrooms, and by only using battery-powered sources of light. If you see any bats, exit the area quietly and quickly. Avoid rodent nests to minimize contact with disease-carrying organisms. Pets are not permitted in any cave, on any trail, nor away from any developed area (roads, parking lots, picnic areas, and campgrounds are OK as long as the pet is either on a leash or in your vehicle).

Thank you for your help in preserving this fragile geologic treasure. Your efforts will provide future cave visitors the same wonderful underground experience that you are enjoying today.

***** CAVE SOFTLY! ***** CAVE SAFELY! *****

Oregon Caves National Monument
Resource Management Division



6.4 Blank Cave Register for Lava Beds National Monument and Oregon Caves National Monument and Preserve

Cave Name:		Monument Name:		
Today's Date	Your Name or Organization	Number in Party	City, State, Country	Comments