Cave Biota of Great Basin National Park, White Pine County, Nevada

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Illinois Natural History Survey
Technical Report 2008(25)

Prepared for
Great Basin National Park

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Executive Summary

Bioinventory of 19 caves in Great Basin National Park, and 3 outside the Park boundaries, was carried out in 2006 and 2007. This investigation reports on some 155 taxa, primarily macroinvertebrates, reported from these caves, providing notes on distribution, altitudinal range, and habitats. A GIS table was created which will allow Park resource managers to assess distributions of individual cavernicole taxa across caves in the Park. Color digital photographs are provided for many of the animals.

Several new species have been discovered in the course of this work, two of which are presently being studied by taxonomic experts (a millipede and a globular springtail). The description of a third new species, the cave millipede *Idagona lehmanensis*, has already been published.

Detailed, long-term monitoring of the fauna of Lehman Caves, the most heavily visited cave in this Park, has been initiated, and detailed analysis of the first year+ of data from the monitoring identified a number of important trends.

Great Basin National Park personnel have been trained in monitoring protocols, and several management recommendations have been made, focusing primarily on attempting to maintain caves in their natural conditions, including maintaining the natural flow of nutrients into the caves, and maintaining sufficient moisture.

Future studies should include enhancing our understanding of cave utilization by packrats, placing the biota of Great Basin National Park caves in the context of other, as yet unstudied, caves in the surrounding mountain ranges, and continued monitoring and inventory of caves within the Park.

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Introduction

Great Basin National Park (GRBA) contains 45 known caves, all of which have the potential to harbor endemic cave invertebrates. Geographic isolation of karst[1] areas within the Park provides a setting in which caves in different parts of the Park may contain different but closely related species, while the isolation of individual mountain ranges in eastern Nevada and western Utah provides still more potential for unique taxa within GRBA. The caves occur in a variety of altitudinal, vegetative, and hydrological settings, providing further opportunities for cave faunal diversity.

Little is known of the cave invertebrate populations in GRBA. What work that has been done found several endemic species. A 1962 study of pseudoscorpions by Muchmore (1962) in Lehman Caves and Little Muddy Cave resulted in the description of a new species of apparently cave-adapted pseudoscorpion, *Microcreagris grandis*. Briggs (1971) described an endemic harvestman, *Cyptobunus ungulatus ungulatus*, from specimens collected in Model Cave by R. de Saussure in 1952. We (Krejca and Taylor 2003) conducted preliminary invertebrate inventories during the summer of 2003 in eight caves within the Park. The inventory resulted in the discovery of several new cave-adapted invertebrates (one of which has already been described). These new species of troglobites (obligate cave-adapted species) are potentially endemic as well as exclusively cave-adapted.

Problem Statement

Troglobites are often rare and limited in distribution. The physical barriers surrounding troglobitic populations combined with their limited distributions and low reproductive rates make them especially vulnerable to extinction. Although several North American troglobitic species are thought to be extinct (Elliot 2000), many more remain to be discovered. Current estimates are that less than half of all U.S. troglobites have been described, and thus it is likely that some species have disappeared without our knowledge (Elliott 2000). The decline of cave communities over time may go unnoticed due to the lack of baseline inventories and systematic monitoring.

RM 77 (Natural Resource Management Guidelines) outlines objectives for management of NPS caves, and several of these are addressed by this proposal. Cave management should include: 1) detailed inventory of resources within cave systems; 2) protection and perpetuation of natural cave systems; and, 3) the establishment of regulations, guidelines and permit stipulations that will ensure the conservation of cave resources.

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[1] Karst - A terrane, generally underlain by limestone or dolomite, in which the topography is chiefly formed by the dissolving of rock, and which may be characterized by sinkholes, sinking streams, closed depressions, subterranean drainage, and caves (USEPA 2002).

In addition, cave macroinvertebrates have the characteristics that classify them as NPS “sensitive species” or “species of concern,” specifically: 1) local rarity of native species; 2) species are endemic to the Park or local vicinity; and, 3) usefulness as an indicator species to assess human impacts. Great Basin National Park’s primary objective as stated in the General Management Plan is to “Manage the park to maintain the greatest degree of biological diversity and ecosystem integrity within the provisions of the authorizing legislation.”

Lehman Caves is subject to relative high levels of impact from annual visitation when compared to wild caves in the Park. Without basic cave faunal data, GRBA cannot make effective management decisions for Lehman Caves. The cave harbors the pseudoscorpion, *Microcreagris grandis*, but few other taxa are known from the cave, and no comprehensive bioinventory of this important cave had been conducted prior to this project. Human impact to all caves in the Park, not just Lehman Caves, can impact sensitive invertebrate populations. In order to begin to understand the impact of visitation on the life history, abundance, and distribution of the pseudoscorpion and other invertebrates in the caves, baseline data are needed. With appropriate species information, it may be possible to begin to track population trends to ensure the survival of the pseudoscorpion and other cave-adapted species.

The 2003 inventories (Krejca and Taylor 2003) showed that cave-adapted invertebrates exist in Park caves, and that previously unknown (and undescribed) species are readily located in at least some of the caves. The diversity found in the eight surveyed caves demonstrates the importance of gaining species information in all of the Park caves to allow for effective and informed management of sensitive species in the caves. Species information will allow GRBA personnel to develop management strategies to protect sensitive habitat based on knowledge about individual species and relative uniqueness of different caves within the Park. These data will also establish a baseline for monitoring potential changes in population composition and structure.

Objectives

The objectives of this study were to: 1) Conduct cave invertebrate surveys in 15 known caves within the Park; 2) Develop complete cave invertebrate species composition lists for inventoried caves within the Park; 3) Identify potential threats to cave invertebrate populations and develop management strategies for caves harboring endemic and sensitive species based on the ecological and biological information available for the collected taxa; and, 4) Create a biological database that will allow GRBA personnel to create a GIS data layer of cave invertebrate species composition in the caves within the Park.

Krejca and Taylor (2003) provide a detailed literature review of the biological work done in caves of Great Basin National Park, and while that literature is included in the bibliography near the end of this report, we only refer to selected references here.

Materials and Methods

Study Area

Great Basin National Park is located in the Southern Snake Range of White Pine County, Nevada, near the Utah border (Figure 1). The caves included in this report are: Lehman Caves, Model Cave, Ice Cave, Root Cave, Lehman Annex Cave, Squirrel Spring Cave, Water Trough Cave, Bristlecone Cave, Mountain View Cave, Pine Cone Cave, Cave 24, Fissure Cave, Lincoln Canyon Mine (Miners Massacre and Drumming caves), as well as caves beyond the boundaries of Great Basin National Park, Indian Burial Cave, Cave Valley Cave, and Smith Creek Cave (all on BLM land). All of the caves are at least partially accessible from Park roads. Model and Squirrel Spring caves are only fully accessible during the driest months, December-March, while the higher altitude caves, especially Cave 24, Bristlecone, Mountain View, Fissure and Pine Cone caves are alpine and accessible only in July and August. All other caves are accessible year round, although they are most accessible from May-October.

Sampling Techniques

Field work took place between 21 May 2006 and 21 July 2007 (with minor collections on 4 September and 29 October 2007, and some sampling by NPS starting 25 January 2006). A total of 64 cave visits (Table 1) were undertaken to obtain data for this report.

In-cave collections focused especially on troglobitic[2] species, but invertebrates classified as trogloxenes[3] or troglophiles[4] also were collected. Accidental taxa[5] – typically most abundant in the entrance and twilight zones of caves – were not a major focus of this study, but were often collected, because they were frequently encountered. Only representatives of dominant accidental taxa were collected in the entrance zone. Collections of cave-adapted taxa were limited only to representatives of each taxon when additional collecting could significantly impact the cave community. Field collections focused on macroinvertebrates – no effort was made to collect vertebrates, fungi, bacteria, protists, nematodes, and other microfauna, although we made notes on the presence of these organisms when they were observed.

Our sampling was qualitative in nature, with a focus on maximizing diversity of taxa and habitats within each cave. The primary technique was hand collecting,

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[2] troglobite - a species which does not exist outside of caves, the upper hypogean zone, or superficial underground compartments (after Humphreys 2000).

[3] trogloxene - a species that does not normally feed in caves but which may utilize them for part of its life cycle (roughly following Humphreys 2000).

[4] troglophile - a species which is able to complete its life cycle in caves, but also can do so in epigean environments (roughly following Humphreys 2000).

[5] accidental – an animal which does not normally live in caves for any part of its life cycle.

facilitated by use of forceps, aspirator, or a fine paintbrush as conditions and taxa dictated (aspirator for fast-moving taxa, forceps for taxa too delicate for hand collecting, paintbrush for smallest and most delicate taxa). For aquatic habitats, a baster (used to collect larger aquatic taxa, such as amphipods and isopods), fine mesh net (used to dip out samples of debris or larger organisms and to wash sediment in search of benthic macroinvertebrates), and a plankton net (where flowing streams are sufficiently deep and have sufficient flow to attempt plankton sampling) were utilized. Baited pitfalls and bottle traps were also utilized at some sites. On return visits, we were careful to examine the area around the bait in addition to the trap itself, as predatory taxa are sometimes only attracted to the general vicinity of the bait, and are only recovered through careful search of the surrounding area. Samples were collected into 70% ethanol in Nalgene® containers. At significant points in each cave (by zone: Entrance, Twilight, Middle and/or Dark), temperature and humidity measurements were recorded on the field forms. Data on field forms includes: cave name, collectors, sample number, trap or sample type (e.g. pitfall, hand collection, photograph), set or sample date (date of collection or date the trap was set), recover date (for traps), organism (to most convenient taxonomic level), habitat, and location in cave. Copies of the completed forms, including maps with marks showing where collections were made, have been provided (Appendix 3). All photographs are by the authors of this report, except where noted. Except where indicated, all analyses are based on data collected during this project, and does not include earlier studies.

Microhabitat conditions, including temperature, humidity, and substrate, were assessed systematically throughout most caves in the entrance, twilight, and dark zones during the inventories. Information on caves was extracted from the Cave Resource Condition Report (GRBA 2005), and this resource was also used to obtain cave maps for use in the field. Caves located higher than 3000 meters (9843 feet) above sea level were considered "high elevation caves."

In the laboratory, material was sorted by taxon and curated in glass museum vials with museum quality stoppers and internal labels with complete locality data.

These collections have been deposited primarily in the collections of the Illinois Natural History Survey and secondarily in the Texas Memorial Museum – both institutions have large, well curated permanent research collections. Some material has been sent to taxonomic experts, and this material will also ultimately be deposited in one or both of these collections, except for material retained by specialists (a common practice among taxonomists). Material for which there is no available (or willing) taxonomist will be deposited in one of the above two collections, ready to be loaned when suitable taxonomic expertise becomes available. Digital photographs of taxa are made available whenever possible. All material collected remains property of the Park, and thus museum specimens and material to be sent to appropriate specialists is "on loan."

Lehman Caves Long-term Sampling: Levels of Visitation and Distance from Trail Methods

We examined several null hypotheses about the fauna of Lehman Caves. Not all of these could be tested by rigorous statistical methods, and we quickly learned that confounding effects could not easily be teased apart. Nonetheless, having these null hypotheses in mind helped shape our study design, as well as the analysis of the data:

1. No difference between near to, and far from, trail samples (e.g. A vs. AA).
2. No difference between samples with different levels of human impact.
3. No difference based on distance into cave
4. No difference between seasons
5. No difference based on temperature and humidity

Sampling stations were labeled A - O, each with a near trail (e.g., A) and far from trail (e.g., AA) bait station as shown on the map (Figure 2).

Stations were classified as high, medium, low, and very low levels of human impact, based on number of visitors (described in greater detail in results section, below), and data loggers were placed (by NPS) at several locations (see map, Figure 2).

Once per month, bait was placed at each of 30 stations (15 paired stations). Bait consisted of a small amount (<0.5 cm^3) of peanut butter or limburger cheese smeared on the underside of a rock (Figure 3). Twenty-four hours later, the bait stations were checked, with observers noting all taxa within onne meter of the bait and timing this search effort. Taxa were field identified to the most specific taxonomic level feasible. After the organisms were counted, the bottom of the rock was wiped clean using an ethanol soaked paper towel. The rock was thoroughly cleaned to prevent establishing a permanent arthropod population at the locality. The duration of sampling was just over one year (monthly between May 2006 and April 2007, and in June 2007) for a total of 13 sampling events.

During each of the organism counts, the following climate data (Figure 4) were recorded: air temperature, soil temperature, wet bulb, dry bulb and relative humidity (using ExTech meter or PsychroDyne psychrometer[6]), atmospheric pressure (AWS weather station in resource management building), and water temperature, salinity, pH, specific conductance and dissolved oxygen (when water was present at the following three localities: Lost River Passage, Queen's Bathtub, and Sunken Garden, using YSI85 and pHtestr2 meters). Relative humidity was also calculated using a formula based on wet and dry bulb readings and atmospheric pressure (Appendix 1).

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[6] During a number of visits, data from both the ExTech and PsychroDyne were available. When both wet bulb/dry bulb data and meter-calculated RH were available, we compared the two datasets. The two meters were generally comparable when operating correctly (Figure 5), but sometimes only one meter was carried into the cave, or there were erroneous readings (such as when the wick on the wet bulb was not sufficiently moist). Therefore, we examined all data and chose the "best" reading for each station on each date for reporting herein.

After the first several baiting events, it was noted that the undersides of the bait rocks had fungal growth from residual bait leftover from prior baiting events, regardless of attempts to clean the rocks after each organism count. For this reason, we would find an abnormally large diversity and abundance of fauna at the stations prior to baiting, indicating that we may have been providing a more permanent food source than we intended. If this was the case, we may have been testing what species were capable of living in that area of the cave when provided with a steady, small, fungal food source rather than what species were naturally occurring in that area of the cave. Interpretation of all four hypotheses should be considered in light of this fact. In future studies, we recommend using a disposable baiting substrate in order to avoid this problem.

Results and Discussion

Multiple Cave Bioinventory

During this study, 155 taxa were recorded from the 22 caves examined. The distribution of taxa across caves is summarized as presence/absence data in Table 2, and specific collection and habitat data are provided in Appendix 5. The majority of these taxa are recorded from only a single site (Figure 6). The single-site occurrence is in most cases merely reflective of accidental taxa – taxa which normally do not occur in caves. However, in other cases, single-site taxa are actually quite interesting and important. For example, and undescribed troglobitic pseudoscorpion collected only from a single alpine cave is consistent with what we might expect. First, troglobitic predators are often rare and infrequently encountered, and second, adaptation to high altitude caves is likely to result in relictual and isolated populations known as sky islands[7].

Other taxa occurred at numerous caves (Figure 6), but this is in part a reflection of level of identification. For example, one taxon occurred at 15 sites, but this taxon is the order Diptera, and represents a variety of families and species. This problem of taxonomic resolution is also reflected in high numbers of sites for Acari (12 caves), Araneae (10 caves), and Collembola (10 caves). Other taxa, even groups including a number of different species, reflect the importance of these taxa to cave communities of Great Basin National Park. For example Heleomyzidae (13 caves), Sciaridae (13 caves), Rhagidiidae (10 caves), and Staphylinidae (9 caves) are all families which demonstrate a strong association with caves in this area, and constitute important components of the ‘typical’ cave community in Great Basin National Park. Also important are several widespread genera and species, including *Ceuthophilus* spp. (9 caves), *Microcreagris grandis* (8 caves), *Idagona lehmanensis* (8 caves), *Tomocerus* sp. (8 caves) and the undescribed troglobitic polydesmid/macrosternodesmid millipede (5 caves) (Figure 6). Relationships of individual taxa to various parameters such as moisture level (Figure 7), spatial position (Figure 8), and substrate type (Figure 9) are often critical to understanding their distribution within and among caves, and these are discussed under

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[7] The “sky island” concept is widely used in current scientific literature (e.g., Boyd 2002, Knowles 2000, Smith and Farrell 2005, Waltari and Guralnick 2008).

individual taxon treatments in Appendix 4. These taxa are all members of the typical cave community at Great Basin National Park.

Cave Faunal Analysis

Caves in this study varied by as much as 1689 meters (5541 feet) in altitude, spanning a range from 1724 to 3413 meters (5656-11198 feet) (Figure 10). Caves at elevations in excess of 3000 meters (9843 feet) are considered as 'alpine' caves in the analysis below (Figure 11), but only a few of these (Broken Cave, Fissure Cave, Mountain View Cave) are clearly above timberline (Figure 12). Caves in this study also are distributed across a broad geographic range in the Park and surrounding areas. Cave Valley Cave and Smith Creek Cave are located in adjacent mountain ranges, but collections from those caves were minimal. Other caves, however, are located in distinctly separated blocks of karstified rock. Elliott et al. (2006) show some of these separations in their Plate I, where it can be seen that the Park contains a variety of intrusive rock units, with surface or near-surface expression of undifferentiated sedimentary rock (including sandstones and limestones) occurring in disjunct patches throughout the Park. From that Plate, for example, it is evident that the caves in the vicinity of Lehman Caves are disjunct from those of the Baker Creek System.[8] In addition, surficial geology of the Park is available as geospatial data (NPS-GRE 2007, Figure 13), and this shows that soluble carbonates – limestone and dolomites – are distributed primarily in the southern half of the Park, and occur in a variety of distinct units, some more clearly separated from one another than others (Figure 13). When the locations of caves in Great Basin National Park are overlaid on this figure, nearly all caves plot over the areas indicated as limestone in Figure 13. Delineation of specific karst areas within Great Basin National Park is beyond the scope of the present study, so we have instead encircled proximate caves and given them more or less arbitrary designations as "cave areas" to facilitate examination of spatial distributions of select taxa (Figures 14, 15). We hope that the usage of these areas will not be arbitrarily retained, and that, instead, more rigorous analyses ultimately are used to define true karst areas within the Park.

Some taxa, such as *Cyptobunus ungulatus ungulatus*, have distributions within Great Basin National Park that are difficult to explain (Figure 14A). In this case, we are dealing with a relatively uncommon but fairly large troglobite – it is possible that it may occur in suitable adjacent cave areas, where it has not been recorded. The lack of any records of this species from Lehman Caves, which has been subject to more intensive study, is surprising. Its presence in the south alpine cave area suggests that it might also occur in the central alpine cave area, where only one cave was visited, and thus it could have been missed. The distribution of *Microcreagris grandis* (Figure 14B) is also somewhat surprising, in that it occurs much more widely than was formerly known, and spans a wide range of elevations. For both of these species, more intensive study of

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[8] But conversations with GRBA NPS personnel indicate that the bedrock in the area of the Baker Creek caves and the area where Lehman Caves is located are the same limestone unit – perhaps differences in moisture levels account for some of the faunal differences.

caves in adjacent mountain ranges should be undertaken, as we have insufficient data to determine the endemicity of these two ‘flagship’ invertebrates.

The millipede *Idagona lehmanensis* (Figure 14C) is apparently widely distributed in the Park, across a wide range of elevations. Its absence from the Lehman area caves is puzzling – perhaps the geological history or moisture levels could account for differences in cave faunas of the Baker Creek system and the Lehman area observed in several taxa (Figures 14, 15).

The undescribed troglobitic millipede near the families Polydesmidae/ Macrosternodesmidae is restricted to lower elevation caves, but is otherwise widely distributed across different regions (Figure 14D). Similarly, globular springtails, *Arrhopalites* spp., seem to be absent from the high elevation caves, but are otherwise widely distributed (Figure 14E). Their association with water accounts for their absence from the foothills area (Indian Burial Cave is quite dry, and generally lacks standing water). Springtails of the subfamily Onychiurinae were also broadly distributed, occurring at high and mid-elevations (Figure 14F). These were commonly associated with water, so their seeming absence from the Baker Creek system and southeast canyon area is puzzling. Springtails of the genus *Tomocerus* (Figure 15A) have exactly the same distribution across cave areas as the Onychiurinae – this distribution, as well as to concordance of these two distributions, is difficult to explain, but may be an artifact of level of identification. That is, different species within these groups may have differing distributions. Similarly, cave crickets (*Ceuthophilus* spp.) were recorded from both high and lower elevation caves (Figure 15B) – it is not clear how many species are represented in these samples.

The facultatively trogloxenic butterfly, *Aglais milberti*, was only recorded from high-elevation caves in the south (Figure 15C). Its absence from the central alpine area probably has to do with that cave, Bristlecone Cave, being somewhat below timberline. Its distribution reflects the biology of the species (see discussion in species account, Appendix 4).

Two families of flies, Heleomyzidae (Figure 15D) and Sciaridae (Figure 15E) are recorded from all areas. While these records likely represent more than one species, it is clear not only from the distribution, but also from the abundance of collection of these taxa that they are very important components of the cave community throughout the Park.

Not shown is the distribution of packrats. As evidenced by their guano, however, they are distributed across all cave areas except the mine area in the southeast (this side is probably just too wet – packrats no doubt occur in the surrounding landscape).

Finally, when all records of bats are plotted across areas, cave utilization by the bats appears to be altitudinally restricted (Figure 15F)[9]. While this makes good biological sense, it is an important point for management of caves.

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[9] However, *Corynorhinus townsendii pallescens* has been observed in Long Cold Cave, elevation 9,879 feet (NPS-GRBA pers. comm.. 2008).

How similar are the faunas of the various caves? Unfortunately this simple question does not have a simple answer – individual taxa are often habitat specific, and, as discussed earlier, the presence of numerous accidentals complicates analysis of the data. Further, sampling effort was not equal at the 22 sites – in fact it is more or less impossible to equalize sampling effort among caves in any faunal inventory study because the caves themselves are not directly comparable – no two caves are equivalent units. Some caves are large, complex and varied (e.g., Lehman Caves), while others are small and simple (such as Fox Skull Cave). Complex caves require more effort to sample at a similar level to simple caves, and there is no mechanism for fully adjusting for this reality. In addition, the logistics of getting to a cave like Bristlecone Cave, with a 3000 foot vertical ascent just to reach the entrance, makes it difficult to apply the same level of personnel involvement as can be attained at an essentially drive-up cave, such as Lehman Caves. Nonetheless, we can use the presence/absence data in Table 2 to examine similarity in faunal presence absence among caves, and this is done in Figure 16.

The tree of similarities (Figure 16) indicates that Water Trough Cave, Model Cave, and Pine Cone Cave have the most unique faunas, followed by Ice, Lehman and Fox Skull caves. This more or less agrees with what we would expect based on informed judgment, with some caveats. Water Trough includes a large number of accidentals, but this may actually reflect the unique configuration of the entrance (with a sheltered pool of water), which attracts a variety of vertebrate and invertebrate wildlife. Lehman Caves also includes a number of accidentals, but also has been subject to a much more intensive inventory – it may not be as unique (relative to adjacent caves, such a Lehman Annex Cave) as this tree suggests. Other caves came out appearing very similar to one another in this analysis – Bristlecone, Cave Valley, Fissure, Little Muddy, Long Cold, and Smith Creek caves are almost identical in level of similarly when the 155 taxa are considered. This primarily reflects, with the possible exception of Bristlecone Cave, the very limited sampling in these caves relative to the rest of the caves studied – few specimens were taken from most of these 6 sites. The relationship between sampling effort – or at least number of taxa collected – and the uniqueness and richness of cave faunas is better understood by comparing Figure 16 to the taxa richness of the individual caves (Figure 17). The five of the six caves for which little between-cave difference was reflected in the cluster analysis (Figure 16) are among the lowest in recorded taxa richness (Figure 17), with Bristlecone Cave being the exception. Similarly, Water Trough, Model, and Pine Cone caves, those with the most unique faunas in the cluster analysis (Figure 16), are among the most taxon rich caves (Figure 17).

Earlier, we noted that single-site occurrence is in most cases merely reflective of accidental taxa. When we examine the data in terms of which caves have the most single-site occurrences, or ‘unique’, taxa (Figure 18) we see the pattern is similar to that of Figure 17, and, especially to the tree of similarities (Figure 16). Is the number of unique taxa more or less a reflection of the total taxa sampled from each cave? It appears this is the case (Figure 19), with the two factors being strongly and linearly correlated. Finally, we see no apparent relationship between taxa richness (Figure 20A) or number of unique taxa (Figure 20B) and cave elevation, other than, possibly a reduction in richness and number of uniques above about 10,000 feet – those caves above timberline.

Great Basin Caves – Faunal Summaries

The majority of this report is based on visits to 17 caves, with a total of 60 visits, 198 person-visits, with caves averaging 11.9 Taxa and 115.7 specimens (Table 3). Names of personnel involved in collecting trips are given in Appendix 3, with field notes.

Bristlecone Cave

Located in a remote area at just under 3170 meters (10390 feet) elevation, this medium-sized (length 9.1 meters [309 feet]) cave (Figure 21) was one of the most difficult to access, requiring a single-day ascent of 3000 feet on foot, followed by a vertical drop on rope (Figure 22) into the cave, and a return (up rope, down mountain) the same day. The cave was visited for bioinventory on 11 July 2007 and again on 21 July 2007. The fauna of Bristlecone Cave (Table 4) included few mites, spiders, and geophilomorph centipedes, and was dominated by the recently described cave millipede, *Idagona lehmanensis*, at least three springtail taxa, and flies (especially the family Sciaridae). A total of 76 specimens were recorded from this cave (includes sight records, hand collections, and pitfall traps).

Broken Cave

Broken Cave (Figure 23) is situated at 3407 meters (11178 feet) elevation, and was visited on 9 July 2007 and 16 July 2007 for bioinventory. This medium-sized (length 32.9 meters [108 feet]) cave is located slightly above timberline.

The 62 specimens recorded from this cave (Table 5) are based on hand collections and sight records – nothing was found in the pitfall trap. The fauna of this cave was dominated by flies (especially Heleomyzidae) and the cave millipede *Idagona lehmanensis*. The cave was notable as well for harboring a number of roosting Milbert's Tortiseshell butterflies (*Aglais milberti*).

Cave 24

Located at 3013 meters (9885 feet), below timberline, this medium-sized (length 83 meters [272.4 feet]) cave (Figure 24) was visited on 9 July 2007 and 17 July 2007. The faunal list (Table 6) is based on 126 specimens determined from sight records, hand collections, and pitfall trapping. Dominant taxa included Collembola (especially the istomid *Desoria* sp. 2), Diptera, and spiders (especially Linyphiidae). Three noteworthy cavernicoles were present, including the Model Cave Harvestman (*Cyptobunus ungulatus*), the pseudoscorpion *Microcreagris grandis*, and the newly described millipede *Idagona lehmanensis*. In addition, the beetle fauna was fairly diverse (at least 7 taxa), perhaps due to the pitfall-like nature of the cave entrance.

Fissure Cave

This small (length 9.1 meters [30 feet]) cave, similar in elevation to nearby Broken Cave and above timberline, was briefly examined on 16 July 2007. Most of the passage was unenterable due to collapse. Thirteen specimens, all hand collections, were obtained. Diptera and the collembolan *Tomocerus* sp. appeared to be dominant community members in this cave (Table 7).

Fox Skull Cave

Fox Skull Cave, a medium-sized (length 31.1 meters [102 feet]) cave located at 2024 meters (6640 feet) elevation on a dry, south-facing slope with sparse vegetation, was sampled on 21 May 2006, recording 86 specimens based on hand collections and sight records. The fauna of this cave (Table 8) was fairly diverse, dominated by spiders, beetles, and Collembola. Most of the taxa in this small, very dry cave were accidentals or troglophiles, but the presence of *Microcreagris grandis* in this cave was a significant range extension to the southeast. The psocopteran *Speleketor* sp. is thought to be a cavernicole. The other pseudoscorpion, a chernetid, is probably just a mammal nest (woodrat) associate.

Ice Cave

Ice Cave, at 2148 meters (7047 feet) elevation, was visited on 22 May 2006, 24 May 2006, and 2 October 2006. Hand and bottle trap collections recorded 42 specimens. Water in this large (length 206.4 meters [677.2 feet]) cave and the presence of a nearby perennial stream were reflected in the list of taxa, which contains a number of aquatic groups (Gastropoda, 3 families of Ephemeroptera, Trichoptera, and some Diptera) (Table 9) in addition to some terrestrial, cave-associated taxa (Rhagidiidae, Heleomyzidae, and Sciaridae). Ephemeroptera and Diptera were the numerically dominant taxa in these collections.

Lehman Annex Cave

Lehman Annex Cave is a large (length 302.2 meters [991.6 feet]) cave located above and behind Lehman Caves, in the same hill complex, at an elevation of 2235 meters (7333 feet). Collembola and Diptera were the numerically dominant groups found in this cave (Table 10). Other notable taxa included *Microcreagris grandis* and, just inside the entrance of the cave, the Great Basin Rattlesnake (*Crotalus viridis lutosus*).

Lehman Caves

Lehman Caves, at an elevation of 2096 meters (6877 feet), is the largest (length ~3352.8 meters [~11,000 feet]) cave in the Park and is covered extensively elsewhere in this document, but here we report on incidental collections/observations of 546 individual animals from this cave, based on collections (hand, bait station, litter extraction) or observations on the dates listed in Table 11. Collembola, Diptera, and mites (Acari) dominated the fauna of Lehman Caves, with the pseudoscorpion *Microcreagris grandis* and the undescribed Polydesmid/Macrosternodesmid millipede both being relatively common. Notably absent from the Lehman Caves records below (Table 12), in spite of the intensive collections, were the Model Cave Harvestman and *Idagona lehmanensis*. The diversity of springtail (Collembola) taxa in this cave was quite high (at least eight taxa, probably more), perhaps reflecting the greater collecting effort.

Lincoln Canyon Mine (Drumming and Miner's Massacre)

Lincoln Canyon Mine (Figure 25) is a large mine (length 1415.8 meters [4645 feet]) at an elevation of 2621 meters (8599 feet) with two small caves within it (Drumming and Miner's Massacre). The mine and caves were sampled for cave biota on 5 July 2007 and 15 July 2007. A total of 228 organisms were recorded by hand collection, pitfall trapping, and sight records (Table 13). The fauna was dominated by large numbers of Diptera and Collembola. The recently described cave millipede, *Idagona lehmanensis*, was also fairly common. Both the Diptera and Collembola were represented by a wide variety of taxa.

Little Muddy Cave

Little Muddy Cave is a large cave (length 309.2 meters [10104.5 feet]) at an elevation of 2045 meters (6709 feet). It was not tasked for the present study, but a visit on 29 October 2007 recorded two taxa, the cave pseudoscorpion *Microcreagris grandis* and, more interestingly, the undescribed Polydesmidae/Macrosternodesmidae cave millipede. Both of these were reported by Krejca and Taylor (2003), and *Microcreagris grandis* by Schmitz (1986).

Long Cold Cave

Long Cold Cave is a large cave (length 219.8 meters [721 feet]) at an elevation of 3011 meters (9879 feet). It also was not tasked for the present study, but a visit on 4 September 2007 by Park staff resulted in an additional cave record for *Cyptobunus ungulatus ungulatus*. The bat *Corynorhinus townsendii pallescens* (Chiroptera: Verspertilionidae) also has been observed in this cave (NPS-GRBA pers. comm. 2008).

Model Cave

Model Cave is a large cave (length 599.9 meters [1968.1 feet]) at an elevation of 2080 meters (6824 feet). The biota of this cave was inventoried on 27 January 2006, 2 February 2006, 22 May 2006, 24 May 2006, 2 October 2006, and 1 March 2007. A total of 198 specimens were recorded in 2006 and 2007, and these are summarized in Table 14. The fauna of Model Cave was dominated numerically by Collembola, followed by mites, mayflies, and flies. Globular springtails (*Arrhopalites* spp.) including an undescribed species, were particularly abundant. The presence of mayflies (Ephemeroptera) was suggestive of a surface stream influence to the cave fauna. The cave was unusual in having four of the more charismatic cavernicoles present, including *Cyptobunus ungulatus ungulatus*, the undescribed polydesmid/ macrosternodesmid troglobitic millipede, the recently described milliped *Idagona lehmanensis*, and even one specimen of *Microcreagris grandis*.

Mountain View Cave

Eighty-one specimens (Table 15) were recorded from Mountain View Cave (Figures 26, 27). This small (length 16.2 meters [53 feet]) cave is the highest elevation cave (Figure 28) in this study at 3413 meters (11198 feet), located above timberline and visited on 10 July 2007 and 18 July 2007 for bioinventory. The fauna was numerically dominated by Diptera (especially Heleomyzidae) and springtails of the genus *Tomocerus*. Notable fauna include diplurans and another record for the roosting alpine butterfly, *Aglais milberti*.

Pine Cone Cave

Pine Cone Cave (Figure 29) is a medium-sized (length 108 meters [354.3 feet]) cav at an elevation of 3020 meters (9908 feet). It is located just below timberline, not far from Cave 24 and Long Cold Cave. The biota of this cave was inventoried on 9 July 2007 and 17 July 2007. A total of 73 specimens were recorded during the bioinventory of this cave, and these were numerically dominated by a diverse assemblage of spiders and beetles (Table 16). In addition, the recently described cave millipede *Idagona lehmanensis* was found in this cave. Ants, flies, rhagidiid mites, and Collembola were also important components of the community in this cave.

Root Cave

Root Cave is a medium-sized (length 55.7 meters [182.7 feet]) cave at an elevation of 2089 meters (6854 feet) and in the same hill as Lehman Caves, visited on 25 May 2007 and 17 October 2007. Numerically dominant taxa among the 37 specimens recorded from Root Cave (Table 17) included campodiid diplurans, Diptera, and the pseudoscorpion *Microcreagris grandis*. The diplurans, in particular, seemed to be associated with roots exposed within the cave.

Snake Creek Cave

Snake Creek Cave is a large (length 512.7 meters [1682.2 feet]) cave at an elevation of 2030 meters (6660 feet), and located on a fairly barren, south facing slope. It was sampled on 21 May 2006 and again on 24 October 2006. A complete bioinventory was not attempted as the cave had previously been well sampled. Our goal was to obtain more specimens of the undescribed polydesmid/ macrosternodesmid millipede. These millipedes (32 specimens), along with springtails and the psocopteran *Speleketor* sp., were dominant in collections (Table 18).

Squirrel Spring Cave

Squirrel Spring Cave is a small cave (length 15.4 meters [50.5 feet]) at an elevation of 2179 meters (7149 feet), visited on 21 May 2006, 27 February 2007 and 2 March 2007. During the May visit, the cave was almost completely flooded, with water issuing forth from the entrance as a spring. During the winter visits, snowmelt was no longer a problem, and we were able to explore considerably more passage. There were 59 specimens recorded from the cave (Table 19). It is notable that the recently described millipede *Idagona lehmanensis* and the pseudoscorpion *Microcreagris grandis* occured here in spite of seasonal flooding. The fauna was numerically dominated by Diptera, especially Heleomyzidae, but spiders and Coleoptera were also present in numbers.

Water Trough Cave

Water Trough Cave is medium-sized (length 44 meters [144.3 feet]) and at an elevation of 2337 meters (7667 feet). It was visited on 24 May 2006 and 8 November 2006 to conduct bioinventories. The May visit was documented in a recently published story (Baker 2007). The diverse faunal list was based on records for 169 specimens (Table 20), dominated numerically by springtails, beetles and flies. The taxon list included the cave pseudoscorpion *Microcreagris grandis* and the cave millipede *Idagona lehmanensis*. Some accidental taxa, in particular the three bird species, and the vespid wasp, were attracted to the cave entrance zone, which is quite open and has a perennial water source.

Caves Outside of NPS Boundaries

Three caves outside of Great Basin National Park were inventoried and are included here to ensure the information is not lost and to provide a context for comparisons.

Cave Valley Cave

Although Cave Valley Cave (more than 40 miles to the southwest of Park headquarters at the base of the Schell Creek Range at an elevation 1966 meters [6450 feet]) was not part of this study, we examined specimens collected there on 30 September 2006. These include: an unidentified insect, two cave crickets (Rhaphidophoridae, *Ceuthophilus* sp.), a Leiodid beetle, and a dipteran larva – too little information to allow informed comparisons with the other caves. This cave is of interest in part because a map by the Wheeler Survey of this cave from 1869 is among the earliest cave surveys known from the western half of the United States (Davis, accessed 2008; McLane, 1969).

Indian Burial Cave

Indian Burial Cave, a large cave (length 160 meters [525 feet]), is located about 8 miles south of the Park headquarters in the Southern Snake Range, but outside of the Park at an elevation of 1724 meters (5656 feet). It was visited on 28 February 2007 and 3

March 2007 for bioinventory. Collembola, Diptera, and Spiders were the most abundant taxa (Table 21). The cave was also notable for the large variety of vertebrate remains found below the entrance drop. The rate of vertebrate accumulation in the cave appears to be fairly high. The cave also contained more bats than most of the caves examined during this study.

Smith Creek Cave

Smith Creek Cave (Figure 30), about 23 miles north of Park headquarters in the Northern Snake Range at an elevation of 1947 meters (6388 feet), was not one of the sites tasked for this project, but was visited on 21 July 2007. The sparse collections were dominated by moths and *Lieobunum* sp. opilionids (Table 22). The cave was very dry and partially filled with packrat guano. It is probably of relatively little interest in terms of true cave-limited taxa.

Lehman Caves Monitoring

Lehman Cave: Visitation

We obtained data from NPS on levels of visitation in Lehman Caves from FY2001 through FY2007, with monthly summaries and summaries by tour length. In total, 7 years of data were examined over 84 months from October 2000 through September 2007, with the exception of two months missing data: September of 2006 and September of 2007. During this seven year time period, there were 206,792 visitors on cave walks, averaging 30,517 visitors per year. The data show a distinct trend of decreasing numbers of visitors on cave walks (Figure 31). The predicted number of visitors on cave walks by linear regression is:

Number of visitors/fiscal year = (fiscal year * (-1945)) + 3927322

Fiscal year is a strong predictor of number of visitors on cave walks ($R^2=0.9278$, $p<0.001$), and if we project into the future using this regression line, cave visitation will cease at some time during FY2019. While this prediction is unlikely to be realized, and obviously obscures other factors, the trend is worth noting.

Visitation varied across month of calendar year, with highest levels of visitation in the summer months, peaking in July, and the lowest visitation in the winter, especially December-February (Figure 32). This visitation pattern is consistent across years (Figure 33).

From 2001-2007, most of the visitors to Lehman Caves participated in the 90 minute (44.7%, average 12,641 visitors/year) or 60 minute (42.2%, average 12,887 visitors/year) cave tours (Figure 34). Considerably fewer visitors chose the 30 minute tour (8.2%, average 2,500 visitors/year) or participated in educational/school tours (4.9%, average 1,489 visitors/year). Tours proceed from the entrance tunnel, through the cave, and out the exit tunnel. Therefore, longer tours are extensions of the shorter tours, covering the same ground and more. For example, the 90 minute tour includes sections of cave used by the 30 minute and 60 minute tour.

Because longer tours overlap shorter tours, some sections of the cave receive more impact, and the cave can be divided into five visitation zones: Heavy Visitation, Medium Visitation, Lighter Visitation, Historic Visitation, and Low Impact Wild Areas (Figure 35). Historic Visitation and Low Impact Wild Areas receive no visitor tours and only rare visits by resource managers. The differences in level of impact can be readily discerned from Figure 36, wherein it is clear there is no measured difference between the Historic Visitation and Low Impact Wild Areas, and relatively little difference between the Heavy and Medium visitation areas. We pool Heavy and Medium visitation for some analyses below (coded has Level 3). For these analyses, Lighter Visitation is coded as Level 2, Historic Visitation as Level 1, and Low Impact Wild Areas as Level 0. These last two categories are not pooled as it was thought that we might have sufficient data to tease out differences. Each of the now four categories (Levels 0-3) contains several sampling stations.

The distance from each bait station to the nearest known cave entrance (natural or artificial) was determined using a digital copy of the cave map, with scale bar, and a digital measuring program (Image Pro Express).

One of the most confounding factors in this analysis is that the number of visitors per year to an area is strongly correlated with distance from the cave entrance (Figure 37). Note that zero-visitation stations occur at a wide range of distances from entrance – for example, there are areas classified as “Low Impact Wild Areas” very close to the historic entrance. Because nutrients naturally coming in from all the cave entrances are thought to provide the major energy source for most natural caves in Great Basin National Park, we expect there to be a nutrient-related entrance effect on faunal abundance and diversity. This effect can obscure the effect of level of visitation.

In an attempt to control for the above problem – to try to detect a visitation effect in the face of the presumed nutrient gradient from near to far from the cave entrance, we placed bait stations near the trail and far from the trail at each location. We did not know if the distance between the two stations was sufficient to detect a difference, but the far stations were far enough from the trail to be outside of the area where tourists would drop food particles, hair, etc.

Lehman Caves: temperature & humidity in relation to distance from entrance and time of year

In general, 2 cm soil temperature at station, air temperature at station, and relative humidity at station were strongly correlated with the distance from the nearest entrance (Figure 38). Soil temperature explained 98.56% of the variation in air temperature (regression line: [Soil] = 0.9868*[Air] - 0.3266), so strong a correlation that the two values are essentially interchangeable.[10] Humidity and soil temperature were also strongly correlated, with 80.26% of the variation in relative humidity being explained by soil temperature (Figure 38). The relationship of distance from entrance to the humidity and temperature variables was less pronounced, but still highly significant, with 51.20%, and 52.33% of the variation in these variables, respectively, explainable by distance from entrance (Figure 38). A more detailed examination of these relationships (Figures 39, 40) shows that not only do these parameters strongly correlate with distance from entrance, they become *less variable* (more predictable) as one proceeds deeper into the cave. This relationship shows up clearly and strongly when we plot the standard error of the mean values (of the 13 monthly sampling dates) for these parameters at each distance from the entrance. The standard error of the mean (a conservative measure of variability) for these three parameters (soil and air temperatures, relative humidity) is largely explained by distance from entrance, the data fitting best to a trend line that is a power curve explaining 85.21, 70.84, and 50.38 percent of the variability in these three variables, respectively (Figures 41-43).

The variability observed in temperature and humidity (above), also has a temporal component which interacts with distance from nearest entrance. This interaction is most clearly visible in the soil temperatures. When soil temperature by station (station pair) is plotted across sampling periods (months) for each station, it becomes readily apparent that stations nearer the entrances exhibit seasonal cycles of temperature fluctuation, while those deep in the cave are much more stable (Figure 44). While this trend may be obscured somewhat for air temperatures (Figure 45), it is clearly still present. While relative humidity is much more variable near the cave entrances (Figure 46), seasonal fluctuations in relative humidity are unclear.

Lehman Caves: Biota in relation to distance from entrance, distance from trail, and level of visitation

The most convenient and decisive way to identify a visitation effect would be to record a difference in numbers of taxa near the trails and far from the trails (Figure 47). While this representation of the data shows no difference between near to, and far from, trail stations in numbers of taxa, it is possible that the pooling of visitation levels obscured existing trends. When the same data are broken out by level of visitation, we see that number of taxa, and numbers of individuals, at stations generally decrease with decreasing levels of visitation, but show no clear trend in near to trail and far from trail stations (Figures 48, 49).

The apparent decrease in numbers of taxa and number of individuals as level of impact (visitation) decreases observed above (Figures 48, 49), is confounded by distance from entrance. That is, when we plot numbers of specimens (Figure 50) at individual station versus distance from entrance, and number of taxa at individual stations versus distance from entrance (Figure 51), the confounding effect of distance from entrance on

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[10] Therefore, air temperature is not included in Figure 38. Soil temperature at 2 cm is generally considered to be a more stable measurement, less influenced by moment to moment fluctuations, and thus we use this preferred value, sometimes ignoring air temperature.

interpretation of level of impact (visitation) becomes clear. In fact, 10.94% (Figure 50) of the variation in numbers of individuals, and, more impressively, 64.79% (Figure 51) of the variation in number of taxa, is explained by distance from entrance in log-linear regression.

We also examined the variation in the number of specimens and taxa (Figures 52, 53, respectively) across all sampling periods (sampling stations pooled) in Lehman Caves. The number of specimens was generally higher from September through January and lowest from May through July (Figure 52). While the number of specimens increased during the winter months, the taxonomic diversity did not show any such trend (Figure 53). If anything, the taxonomic diversity tended to be slightly lower in the winter months than in the spring and early summer.

Little information regarding the impacts of visitation can be gleaned from taxa that were recorded only once, or a very few times, but several taxa were commonly present in the cave, and thus allow the potential for more detailed analyses. We scored 20 categories[11] of substrate in the 30 study plots, but these can be conveniently pooled into "Organics," "Rocks, Soil, Gravel," and "Other" (see Figures 54-56 for more detailed itemization of these categories). Such a lumping allows us to identify taxa which might be particularly associated with accumulations of organic materials or more complex substrates, such as loose rocks and gravel, which generally provide more habitat heterogeneity, and interstices where animals can hide than do harsher, barren surfaces such as tour trails and bedrock. Examining the distribution of these more common animals in relation to substrate, then, we found that several taxa (especially, Tenebrionidae, Collembola, Diptera, and *Microcreagris grandis*) were strongly associated with relatively high levels (>=30%) of rocks, gravel and soils (Figure 54). Organic materials tended to be quite sparse (as is normal in caves), and several taxa (Tenebrionidae, *Microcreagris grandis*, Diptera, and White Millipeds) also were associated with higher levels (>=5%) of organic materials (Figure 55). Interestingly, the highest levels of organic materials tended to be associated with the historic entrance of the cave, the location were Tenebrionidae and *Microcreagris grandis* were most frequently encountered. In general, the proportion of high heterogeneity (rock, gravel, soil) habitats in study plots tended to decrease with decreasing levels of visitation, which, of course, corresponds to decreasing with increasing distance from the cave entrance (Figure 56). The highest levels of organic materials tended to be associated with the lighter levels of visitation and the low impact wild areas (Figure 56) – the latter strongly influenced by the high organic content in the historic entrance.

Examining individual species distributions also informs our understanding of temporal and spatial distributions of the cave fauna. Again, we have chosen to focus only on the more commonly encountered species. Earlier, we noted that the number of specimens in Lehman Caves was higher in the winter months (Figure 52). Most of this seasonal increase in abundance can be attributed to large numbers of grey springtails

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[11] Soil, Clay, Silt/Clay or Soil/Clay, Soil/Gravel, Gravel, Crushed Calcite/Gypsum, Rocks/Soil, Rocks, RocksLoose, RocksEmbeded, Breakdown, Organics/Soil, Organics, Guano, Wood or Woody Debris, Plastic, Metal, Electrical, Cement Trail, Bedrock/Calcite, Calcite, Bedrock

(Figure 57) in late winter, and large numbers of white springtails (Figure 58) earlier in the winter months. The overwhelming influence of these two groups on the seasonal trend observed earlier (Figure 52) is clearly evident (Figure 59). Thus, there is, with the exception of the springtails, little evidence of a seasonal trend in abundance of the cave fauna of Lehman Caves. Examination of the seasonal distribution of two other common taxa thought to be cave adapted, the pseudoscorpion *Microcreagris grandis* (Figure 60) and the undescribed white millipede (Figure 61) shows no seasonal trend.

The distribution throughout the cave of individual taxa was also informative. Grey springtails, presumably less cave-adapted (i.e., few are likely to be troglobites, most would be classified as troglophiles) were more abundant nearer to the cave entrances (Figure 62), decreasing in abundance further from the entrance and reaching very low levels in excess of 1000 meters into the cave. Thus, in general, they were more abundant in areas with higher levels of visitation, whereas the white springtails, presumably more cave-adapted (i.e., more are likely to be classified as troglobites, fewer as troglophiles or edaphobites), were markedly more abundant at distances greater than 200 meters from the nearest entrance (Figure 63). Interestingly, the troglobitic pseudoscorpion, *Microcreagris grandis*, drops off markedly as one moves deeper into the cave, and was almost[12] completely absent at distances greater than 250 meters from the cave entrance (Figure 64). The apparent absence of *Microcreagris grandis* deep in the cave during this study is intriguing because many troglobites are found throughout deep cave systems. Lack of food/prey deeper in Lehman Caves might be influencing abundance and distribution of this population. Long-term monitoring of experimentally established deep cave food plots (e.g., woody debris) might identify the presence of the species deeper in the cave. Alternatively, proximity to entrances suggests troglophilic characteristics, or at least a tendency to be associated with higher energy environments. Studying suitable epigean habitat during mild weather (e.g., under boulders, etc.) might determine the species is actually a troglophile. In contrast, the undescribed white millipede (Figure 65) increases in abundance beyond 200 meters into the cave (Figure 65), which is consistent with the species being classified as a troglobite.

Finally, we examined the abundance of individual taxa at stations near to the trail versus far from the trail (Figure 66), finding no clear trend in relation to proximity to trail. However, two of the most important (from a management perspective) taxa in the cave, *Microcreagris grandis* and the undescribed white millipede, were both notably more abundant far from the trail than near it (Figure 66).

GIS Database

One of the deliverables for this project was to create a GIS database, "Create a biological database that will allow GRBA personnel to create a GIS data layer of cave invertebrate species composition in the caves within the Park." Once Table 2 was

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[12] NPS-GRBA staff have reported seeing a *Microcreagris grandis* molt in the Gypsum Annex of Lehman Caves, and they have reported numerous records of this species in the Grand Palace area of Lehman Caves, but these data were not included in our analysis.

assembled, this product was easily converted to a form useable in ArcGIS. Figure 67 is an example produced in ArcGIS, the appropriate data files have been made available to Great Basin National Park.

Concluding Remarks

New, and potentially new, species from Great Basin National Park caves

The present study and Krejca and Taylor (2003) have yielded several species unknown to science, reviewed below.

Arachnida: Acari: Rhagidiidae

Rhagidiid mites from Krejca and Taylor (2003) were sent to the expert on this group, Miloslav Zacharda in the Czech Republic, including material that may represent an undescribed cavernicolous species. Dr. Zacharda has not yet looked at this material at this time.

Arachnida: Pseudoscorpionida

A clearly troglomorphic pseudoscorpion taken at high elevation in Broken Cave is clearly an undescribed species, and one of us (SJTaylor) plans to work on this description in the future.

Diplopoda

A cave millipede described by Shear (2007) as *Idagona lehmanensis* is known only from caves in Great Basin National Park on the basis of our collections (present study, Krejca and Taylor 2003). The present survey greatly increases the range of elevations and number of caves from which the species is known.

A second millipede is recognized as an undescribed troglobitic form of still uncertain familial placement, in or near the families Polydesmidae or Macrosternodesmidae. Shear is presently working on describing this species.

Collembola: Arrhopalitidae

An undescribed troglophilic or troglobitic globular springtail of the genus *Arrhopalites* is presently being described by Zeppelini, Taylor, and Slay on the basis of specimens taken by Krejca and Taylor (2003) in Model Cave. This manuscript should be completed within the next year.

Other taxa

Several taxonomic groups in which we have not yet found undescribed species hold a high likelihood of including at least some material which is in fact undescribed. The most likely of these groups include: Araneae, Collembola, and Diplura. Of these, the campodeid diplurans are almost certain to include some unnamed species. These groups require closer examination by taxonomic experts.

Lehman Caves Monitoring

The findings from the quantitative bait station study in Lehman Caves document details of distribution and abundance that reflect the biology of the animals, but provide little compelling data on the impacts of visitation, largely because any such effect is masked by the importance of distance into the cave and proximity to nutrients.

We quantified visitation, measured distance into cave, distance from tour trails, season, temperature and humidity in order to determine what factors relate best to cave fauna distribution. We generally found that diversity and abundance of species drops off farther into the cave. This pattern is easily recognized by qualitative observation, but has not been specifically documented in many studies. The pattern is best explained by the changes in environmental parameters (2 cm soil temperature, air temperature, humidity, lower energy), but also happens to be correlated with human visitation levels which also decrease with increased distance into the cave. In order to more definitively assess the potential impacts of visitation, we placed paired stations both near and far from trails but at the same distance into the cave. This analysis showed no consistent differences between on and off-trail observations of abundance and diversity (Figures 47, 48). The implications of these results are that the tourist trails are not affecting the diversity or abundance of cave species as measured by these methods at Lehman Caves (however note that some rare species may be sensitive to trails as per discussion in next paragraph). A study of the tourist section of Carlsbad Caverns used similar near and far from trail comparisons and found significant differences between low and high impact areas (Krejca and Myers 2005). It is our feeling that the age of the trail, low percentage of the cave substrate covered by asphalt, combined with well trained cave tour guides (to minimize off-trail travel, food and trash, etc.) and large seasonal breaks in visitors, contributes to this encouraging result. We recommend the continued use of best management practices including short duration low-intensity lighting, not allowing food or drinks on the tours, and continued vigilance regarding possible negative affects of visitation.

We examined the physical and environmental parameters in 30 study plots to learn more about the biology of the common species, and found troglophiles (such as grey springtails (probably Tomoceridae?) near the entrance, dropping off almost entirely beyond 1 km into the cave. Troglobites (such as white springtails, probably Sinellidae, and the white millipedes in or near the families Polydesmidae or Macrosternodesmidae) were notably more abundant beyond 200 m into the cave. The pseudoscorpion *Microcreagris grandis*, presently classified as a troglobite, showed a pattern consistent with troglophiles. Two of the Park-endemic species, the pseudoscorpion and white millipede, were markedly more abundant far from trails than near trails (Figure 65). The pseudoscorpion was primarily found near the entrance, and on complex high energy substrates, pointing to the importance of maintaining undisturbed areas near the cave entrance. The troglobitic white millipede was never found at heavily impacted sites (Figure 40) and also was associated with high levels of organic materials, highlighting the need to maintain a natural energy flux into the cave. For example, since the natural entrance has a gate that may impede debris washing in, we recommend periodically bringing modest quantities of organic litter from adjacent surface areas into the natural cave entrance room to insure that energy is maintained.

We also wonder if the pseudoscorpion *Microcreagris grandis* might not be a troglobites as presently classified, but rather a troglophile based on the distribution throughout the cave (Figure 63) and their seasonality (Figure 59). We noticed a seasonality trend of higher numbers in the spring through fall, a reverse trend to that observed by Schmitz (1986) in Little Muddy Cave. Clearly more than one year of data are needed to detect significant seasonality trends. Sampling in other epigean microhabitats (such as under large boulders) during mild climatic periods may provide useful information on the distribution of this species.

Generalized Cave Ecosystems of Great Basin National Park

From the knowledge gained through this study, we can make some generalizations about the ecosystems of Great Basin National Park caves. Such generalizations are not made in isolation, but fall within a greater body of knowledge regarding cave ecosystems worldwide (e.g., see Wilkens et al. 2000). Lacking sunlight (beyond the twilight zone), caves are dependent on external energy sources. Important energy sources for Great Basin National Park caves include the influx of organic debris that either falls into caves, is brought into the cave in the form of accidentals (Figure 68A) or is brought into the caves by surface-foraging trogloxenes — perhaps most importantly the packrats, *Neotoma* sp. (Figure 68B), whose waste products, middens and ultimately, dead bodies (Figure 68C) are nearly ubiquitous across caves in Great Basin National Park, often forming major features in cave entrance, twilight and dark zones.

In some caves the influence of adjacent surface waters has been observed. The presence of aquatic life forms – a beetle, a water mite, and numerous Ephemeroptera – points to relatively unfiltered waters capable of transporting particulate organic matters into the caves (Figure 68D) via routes which are both invisible to the naked eye, and, as is so common in karst terrains, often unexpected – such as input of water from adjacent surface water basins (Figure 68F).

Energy inputs vary greatly among caves, depending on the hydrological setting, elevation, gradient, presence of cave gates (which may impede the natural movement of debris into caves), and especially, the size and configuration of the caves. Nonetheless, we almost always observed a rich fauna of accidentals and troglophiles (as well as some trogloxenes such as packrats and cave crickets) in the entrance and twilight zones (Figure 68G), where typically rubble covered floors provide ample habitat complexity to support a variety of arachnid predators and various detritovores. Deeper into the dark zones of the caves, ubiquitous troglophiles such as Heleomyzidae were commonly seen on cave walls and ceilings (Figure 68H), less frequently and only at lower elevations, bats were important trogloxenes in a small number of the caves we examined, roosting on cave walls and ceilings (Figure 68I) and foraging outside of caves during the daytime. A number of troglobites and troglophiles appeared to be associated with moist conditions associated with transport of water and nutrients into caves from either epikarst drips or surface water piracy (Figure 68J), while others were more typically associated with soil and woody organic debris accumulating from A, B, and C, above, as well as with the increased habitat complexity afforded by rocks, breakdown, and a variety of other substrate types (Figure 68K). Finally, drip pools of water deep in the dark zones of caves are important both in maintaining high relative humidity and in serving as habitat for a variety of smaller arthropods, such as springtails and rhagidiid mites (Figure 68F).

The above parameters are all influenced by environmental conditions. The temperature in caves corresponds to the average yearly temperature (Figure 69), but this temperature varies greatly by altitude in Great Basin National Park, as well as by aspect (i.e., south facing entrances generally result in warmer caves, all other factors being equal). In addition, there are daily and annual cycles of temperature, relative humidity, and light (Figure 68) and all of these, as well as the level of available nutrients attenuate to a near constant condition the deeper one goes into a cave (Figure 69). As one progresses deeper into the caves, the less surface influence there is and the less these parameters vary on a daily and annual cycle.

Current and Potential Threats

Current and potential threats to the fauna of the Park may include 1) drying of cave habitats due to both climate change and, especially at lower elevations, water drawdown; 2) thermal changes due to climatic changes or changes in surface vegetation (for example, following a fire or some type of development); 3) energetic changes due to modification of vegetative community above ground, changes in groundwater flow (transport of nutrients), or changes in trogloxene populations (especially packrats); 4) changes in cave climate, energy flow, and cavernicole access due to entrance modification (i.e., cave gates); and finally 5) negative impacts associated with human visitation.

Recommendations for Management

Our primary recommendation is that management be focused on attempting to maintain the most natural conditions possible in the caves of the Park, while providing an appropriate experience for the public. Thus, for most wild caves, we feel that the primary focus should be on maintaining natural conditions, not only in the cave, but above ground, where natural communities provide inputs of organic material, and where surface foraging trogloxenes, such as bats and packrats, acquire their foods. Gating caves is generally not encouraged, unless the potential threats of human visitation are fairly high (as is the case with some of the lower elevation caves). Cave gates should be evaluated for their possible impacts on environmental conditions (temperature, humidity, air flow) as well as their potential to impede the movements of the native fauna. In some cases, as has been recommended for Lehman Caves, judicious addition of woody debris to replace materials that are excluded from the cave by gating may be worth investigating as a management activity. In Lehman Caves in particular, and possibly in some of the permitted wild caves, visitation levels are so high that it is a certainty that some fauna, such as those organisms commonly associated with drip pools (e.g., *Arrhopalites* spp., Rhagidiidae) are frequent victims of trampling. Special care should be taken to ensure that the narrowest and most minimal trails feasible are used for cave visits, and that no unnecessary off-trail travel is allowed.

The generalizations about the cave ecosystems discussed earlier suggest several areas where cave resource management might focus. First, special effort should be made to ensure that *Neotoma* sp. habitat is maintained around caves. Further study of these animals is important in that a general understanding of their biology and interactions with the caves is needed. Second, because accidentals and organic debris from the surface provide a significant component of the energy for caves, the caves themselves need to be managed in a way that does not interfere with this energy flow. Most obviously, the benefits of gating caves should be carefully weighed against the possible negative impacts of gating to energy flow – including organic debris as well as packrats, bats, and larger vertebrates which could fall into caves naturally. Some caves, such as Indian Burial Cave and Lehman Caves, have relatively large accumulations of organic debris below their vertical (pit) entrance gates, highlighting the importance of this energy source, whereas other caves, such as Model Cave, seem to be only slightly influenced by the influx of energy from the natural entrance of the cave, but receive significant energy inputs from the permanent or seasonal water flows into these caves[13].

Finally, we have observed that water is extremely important in Great Basin caves, and water sources (inputs) for the caves are not always clear. Careful consideration should be given to the hydrological possibilities for surface water influence, especially unexpected connections among drainage basins that may seem, by examination of surface waters, to be unrelated. In the case of the Baker Creek System (Ice Cave, Systems Key, Haliday's Deep, etc.), the influx of water from the surface drainage basin (Baker Creek) is clearly a very important factor in shaping the structure and energetics of the cave ecosystem. In both Model Cave and Squirrel Spring Cave there is also a clear influence of seasonally elevated flow associated with annual snowmelt, but in both of these caves it is not clear where the water is coming from – in the case of Squirrel Spring Cave, there appears to be a hyporheic component, but it is also possible that during high flow there are much longer flow paths through karst conduits, as is clearly the case for Model Cave. For these and similar caves, more detailed studies of contributing water sources is critical to the long term management of the cave communities. Many of the other caves, including Lehman Caves, appear to receive waters percolating directly down from the surface above through the fissures in subcutaneous zone (epikarst) or talus and regolith

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[13] In most cases, this water is not entering therough the cave entrance, but from other subterranean sources.

(milieu souterrain superficial). These sometimes subtle (and thus easily ignored) influences on moisture levels can have great importance to troglobites dependant on high humidity levels. Because of the subtle and often unknown relationships between surface waters and groundwater influencing the cave ecosystems, it is clear that connectivity, surface drainage basins, and groundwater hydrology should play an important role in management of Great Basin caves, even though we still have much to learn in these areas.

Recommendations for Monitoring

The monitoring protocol set forth in Lehman Caves seems to work fairly well for that setting, although it is somewhat labor intensive, and requires some training of personnel. The personnel also need to have a strong biological background, or at least a strong interest. We recommend that this monitoring protocol be continued on a quarterly basis indefinitely to allow assessment of any changes in faunal composition. If this schedule is not feasible, then at minimum, the protocol should be implemented at set intervals by trained personnel. Although the monitoring failed to detect an off trail vs on trail effect, it can still be a highly informative means of assessing ecosystem health within this cave. The baseline of data already established will allow comparisons to be made with future, quarterly data. Future data should provide insights into seasonality of some taxa, and natural variations in population levels. Most importantly, however, these data will allow resource managers to assess potential impacts of any catastrophic events (spills, etc.), or changes in levels of visitation, on the community of organisms living in the cave.

There is no perfect method for monitoring the fauna of wild caves in Great Basin National Park. Fortunately, some of the larger and more visible macroinvertebrates frequently encountered (by trained eyes) include some of the most notable of cavernicoles: *Idagona lehmanensis*, *Microcreagris grandis*, and *Cyptobunus ungulatus ungulatus*. Any visit to a wild cave by Park staff should include taking careful note of any observations of these animals. In some of the high altitude caves, only a few records of these were made during this study, and this means that they were likely not recorded from some caves where repeated visitation could reveal their presence. Absence of taxa from particular caves, or even cave areas, in this study is no guarantee that they do not occur in these areas. Continued research on the biota of Great Basin National Park caves, especially including inventory of those not yet studied by biologists, continues to be a research need.

Additional details of management recommendations were laid out in Krejca and Taylor (2003) and the results of the present study provide no reason to change those recommendations, which we feel should hold force. In that study, we also listed several areas where future research might focus. These included a number of questions that might be useful to answer:

1. Pack rats: What caves are they using? During what seasons? What is their range? What do they eat? In what situations are they the primary source of nutrients entering the caves (e.g., Snake Creek Cave)? Can we quantify the rate of energy input from the packrats?

2. Is the cavernicolous fauna of the southern portion of the southern Snake Range typical of the greater Great Basin region mountain ranges potentially containing karstic bedrock?
3. Using a quantitative approach, what is the basis of the food chain that needs to be maintained? How much do these species rely on trogloxene guano vs. leaf litter vs. other parameters?
4. What are the drainage basins of these caves? What are the hydrologic connections between caves? What is the hydrologic connection between surface and ground water in park cave systems?
5. When severe impacts to the surface occur, such as fires, how does that affect these species?
6. To what extent do cave gates impede the flow of organic materials into caves? Should a protocol be set up for gated caves to help such debris pass the cave gate and enter the cave?
7. Might some taxa, especially *Idagona lehmanensis* and *Microcreagris grandis*, occur outside of caves in other protected habitats (within talus slopes, under larger boulders, etc.), perhaps seasonally?

Beginning to address the above questions, along with continued bioinventory within the Park and continued management of wild and developed caves, will further the management and protection of the cave resources.

Regional Cave Biodiversity: Future Directions

In the present study, we barely touched on caves outside of the Southern Snake Range, which includes Great Basin National Park (Figure 1). A notable finding of our work (present study and Krejca and Taylor 2003) is the discovery of a millipede, *Idagona lehmanensis*, closely related to but markedly distinct from *Idagona westcotti* (lava tubes in Idaho) and *Idagona jasperi* (high altitude caves in northern Utah). Might there be other, undiscovered congeners of *I. lehmanensis* in the karstic rock of adjacent mountain ranges? The geological history of the Great Basin is marked with changes in climate and with changes in degree of isolation of adjacent mountain ranges as shallow seas and freshwater lakes have expanded and contracted over time (see, for example, DeCourten 2003, Orndorff et al. 2001).

Waltari and Guralnick (2008) recently explored the concept of 'sky islands' – the isolated mountain ranges of the Great Basin – and how the connectivity of these islands changed over time, with respect to small mammal distributions and ecological niches. They found that, over time, there was significant connectivity due to changes in climatic conditions in the region. Will this hold true for cave invertebrates? Caves themselves are often thought of as islands, isolated by the necessity of appropriate bedrock composition (i.e., carbonate rocks or pseudokarst such as lava tubes) and processes needed for cave development (most typically bedrock dissolution). Even changes in climate through time, which would move thermal and ecological vegetative zones up and down the elevation gradient of mountain ranges, would not be able to move the suitably cavernous blocks of bedrock. Thus, it seems likely that ranges of the Great Basin do serve as 'sky islands' and that Waltari and Guralnick's (2008) findings for small mammals may not be applicable to troglobitic macroinvertebrates such as millipedes and pseudoscorpions.

The uniqueness of the fauna of Great Basin National Park cannot be fully appreciated until we understand its context in the Great Basin as a whole – is the cavernicolous fauna of the Southern Snake Range typical of Great Basin mountain ranges potentially containing karstic bedrock (Figures 1, 70)? Or is it, as at present it seems to be, a 'hotspot' of subterranean biodiversity in the Great Basin, with a growing list of uniquely endemic cave-limited organisms? Only future sampling of caves on a larger geographical scale can begin to address these questions.

Acknowledgements

We are very grateful to Gretchen Baker, Ben Roberts and Meg Horner, of the NPS, who have all put a great deal of time into this project. Without their continued contributions (including extensive field work when we were not present) and support, it would not have been possible.

We thank the many people who helped out with field work, some of whom, no doubt, we have failed to list here. The list minimally includes (listed in alphabetical order): Jay Anderson, Ross Anderson, Rick Bowersox, Steve Deveny, Kristine Deveny, Johnathan Deveny, Jeremy Deveny, Jonathan Hurst, Mark Kirtley, RaeJean Layland, Christy A. Moerbe, Billie O'Doan, Patrick M. O'Brien, Bryan R Petrytl, Loren Reinhold, Christy A. M. Slay, Ryan M. Thomas, Shawn C. Thomas, and Brittany L. Timm.

For expert taxonomic identifications and descriptions, we thank Drs. Douglas Zeppelini (globular springtails), William Shear (millipeds), Paul P. Tinnerella (Carabidae and Dytiscidae), and, especially Dr. Felipe Soto-Adames (Collembola).

For laboratory identifications we thank Terry Harrision, with assistance from various others, including Kristi Moss, Justin Fuller, and Maminirina Randrianandrasana.

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> Abstract: The subfamily Sclerobuninae is a group of laniatorean opilions found in western North America, currently classified into the genera *Zuma*, *Sclerobunus*, and *Cyptobunus*. *Sclerobunus* species are typically found in forested habitats, and range from Arizona north into Idaho and west to Washington and Oregon. Described *Cyptobunus* taxa are restricted to cave habitats in Montana, Nevada, and Utah. Currently these genera are hypothesized to be sister genera. Using CO1 mtDNA and 28S nuclear DNA, we present a phylogenetic analysis of all sclerobunines. The genus *Zuma* is not obviously a sclerobunine, and neither *Cyptobunus* nor *Sclerobunus* are recovered as monophyletic. Within *Sclerobunus*, *S. r. robustus* is split into 5 genetically distinct, geographically concordant clades, which may represent cryptic species. *Sclerobunus r. idahoensis* is found to be more closely related to *S. nondimorphicus* than to *S. robustus*. Specimens morphologically identified as *Cyptobunus* are nested within *Sclerobunus*, with at least three independent origins suggesting repeated convergence to a cave-dependent morphology. Of particular interest are *Cyptobunus* specimens found

near Taos, New Mexico. These particular *Cyptobunus* specimens were found deep in a rockpile, and are genetically closely-related to a syntopic population of *S. r. glorietus*. This suggests a recent, local transition to a "troglobitic" morphology in a non-cave environment.

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Figures

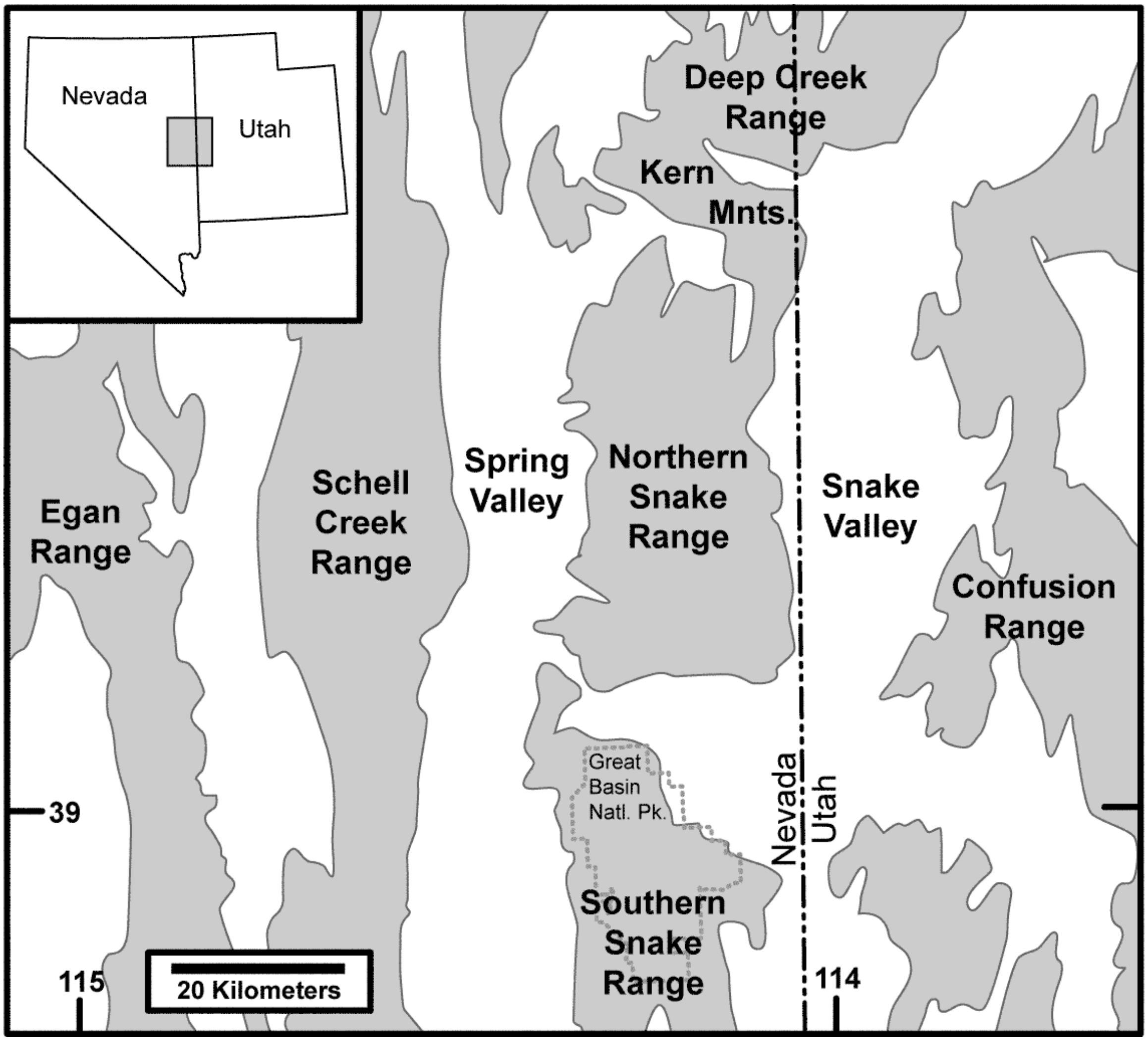


Figure 1. Mountain ranges and valleys of east-central Nevada and west-central Utah, with location of Great Basin National Park shown. Modified after Lee et al. (1999).

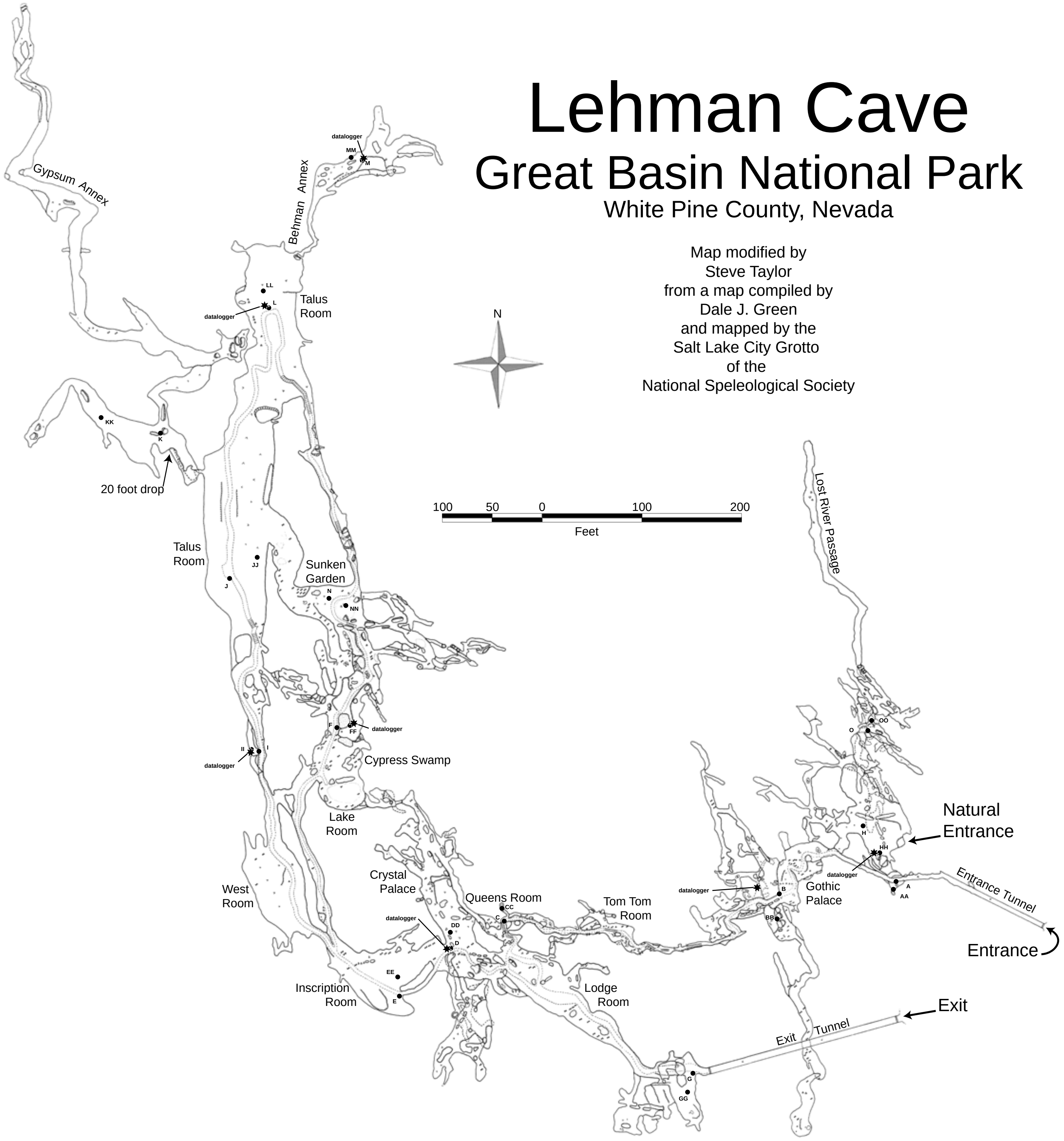


Figure 2. Map of Lehman Caves, showing locations of bait stations and data loggers. Black dots correspond to bait stations adjacent to trail (single letter designation, stations A-O) and away from trail (double letter designation, stations AA-OO). Stars correspond to locations of data loggers.

Figure 3. Smearing limburger cheese on a bait station rock in Lehman Caves (May 2006).

Figure 4. Mike Slay (left) and Steve Taylor collecting data along the trail in Lehman Caves (May 2006).

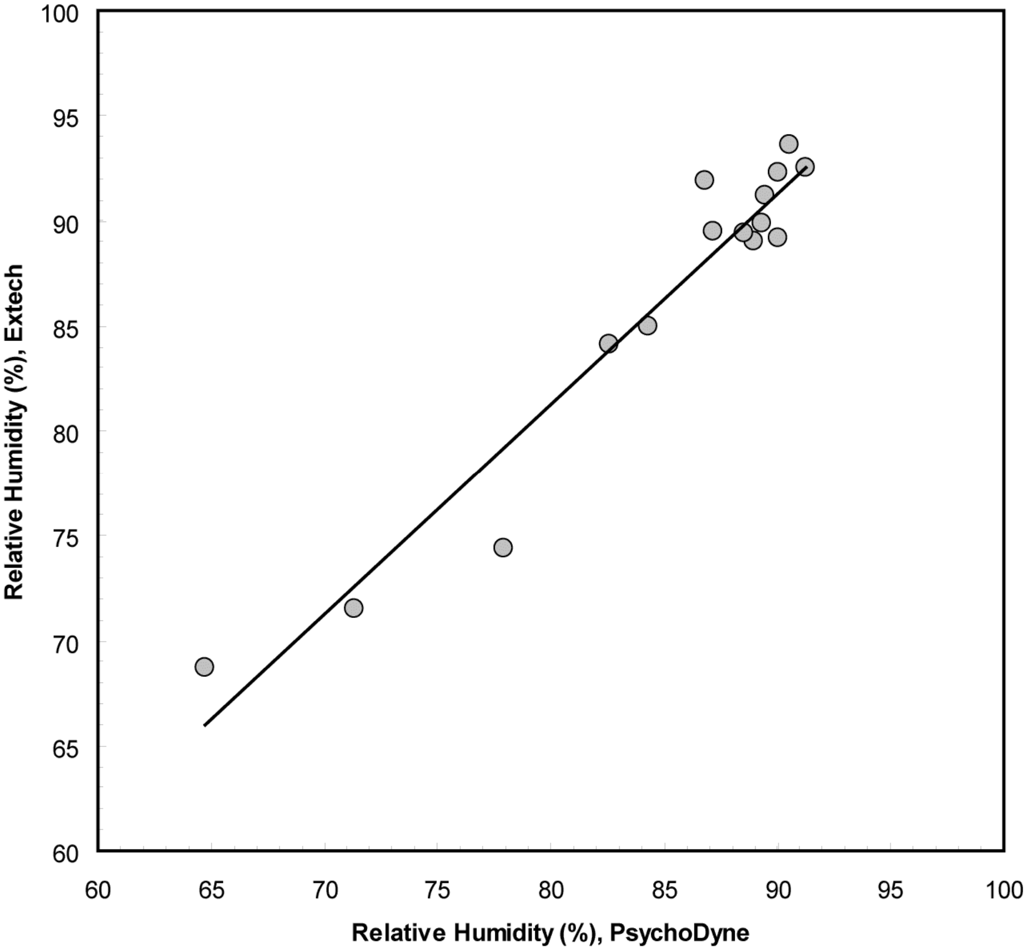


Figure 5. Correlation between ExTech RH Meter Relative Humidity (%) and Relative Humidity (%) calculated from PsychroDyne psychrometer wet and dry bulb readings in combination with barometric pressure, for 28 February 2007 data. See Appendix 1 for method of calculation. Best fit line is [RHExTech] = 1.001*[RHPsychroDyne] + 1.2031, with an R^2 value of 0.9356.

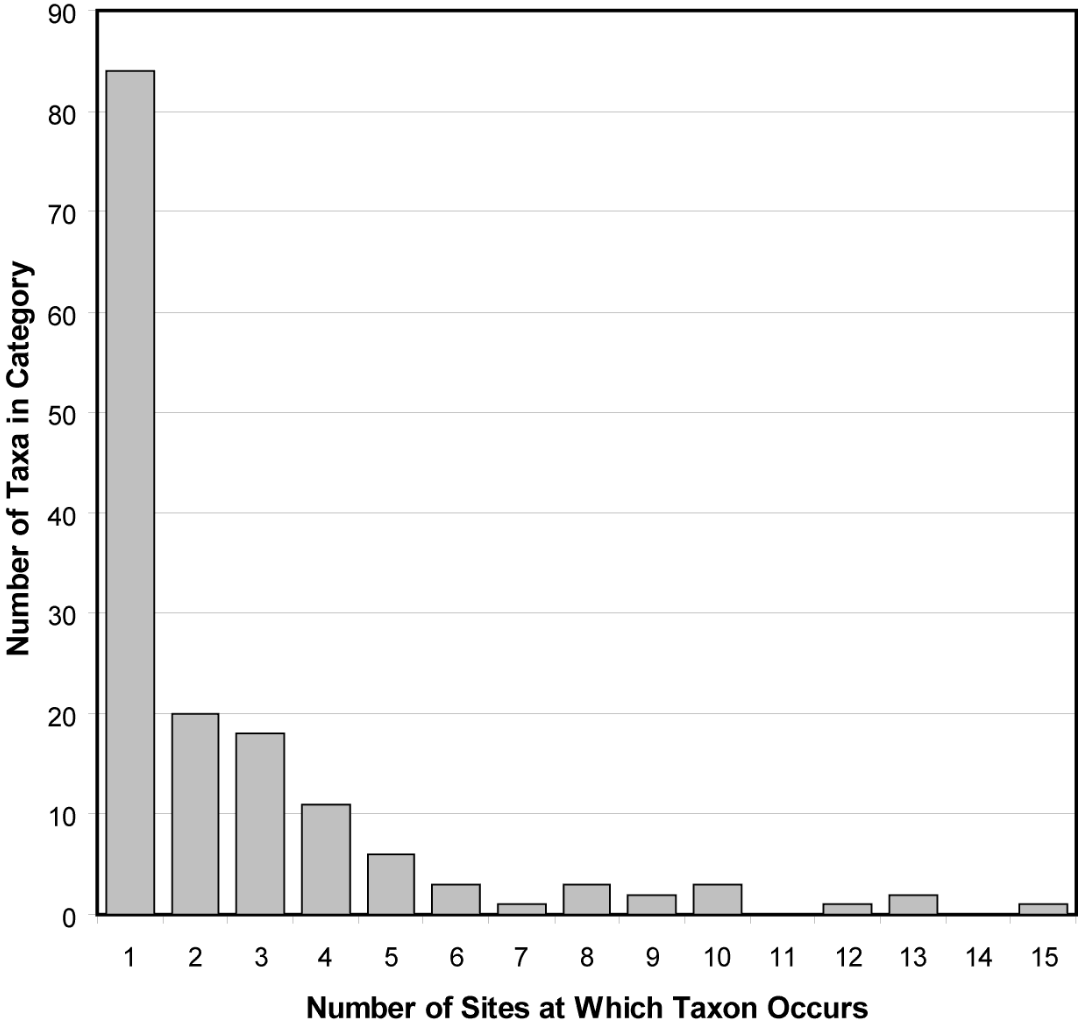


Figure 6. Number of sites at which individual taxa are known to occur in caves of the Great Basin National Park area.

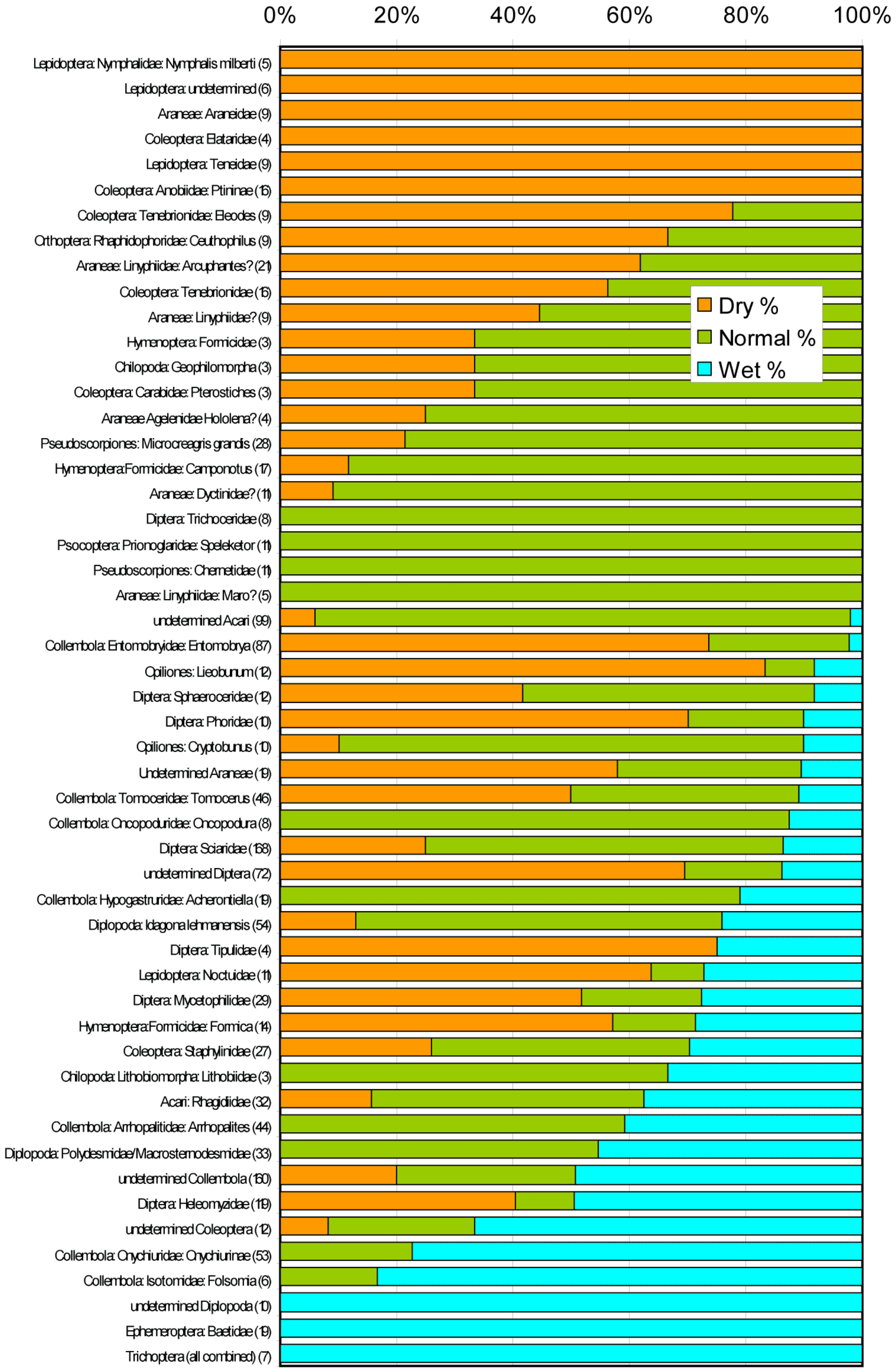


Figure 7. Moisture conditions at sample locations for select taxa inventoried at Great Basin National Park 2006-2007. Number in parentheses is sample size (number of individuals) of specimens for which moisture data were recorded.

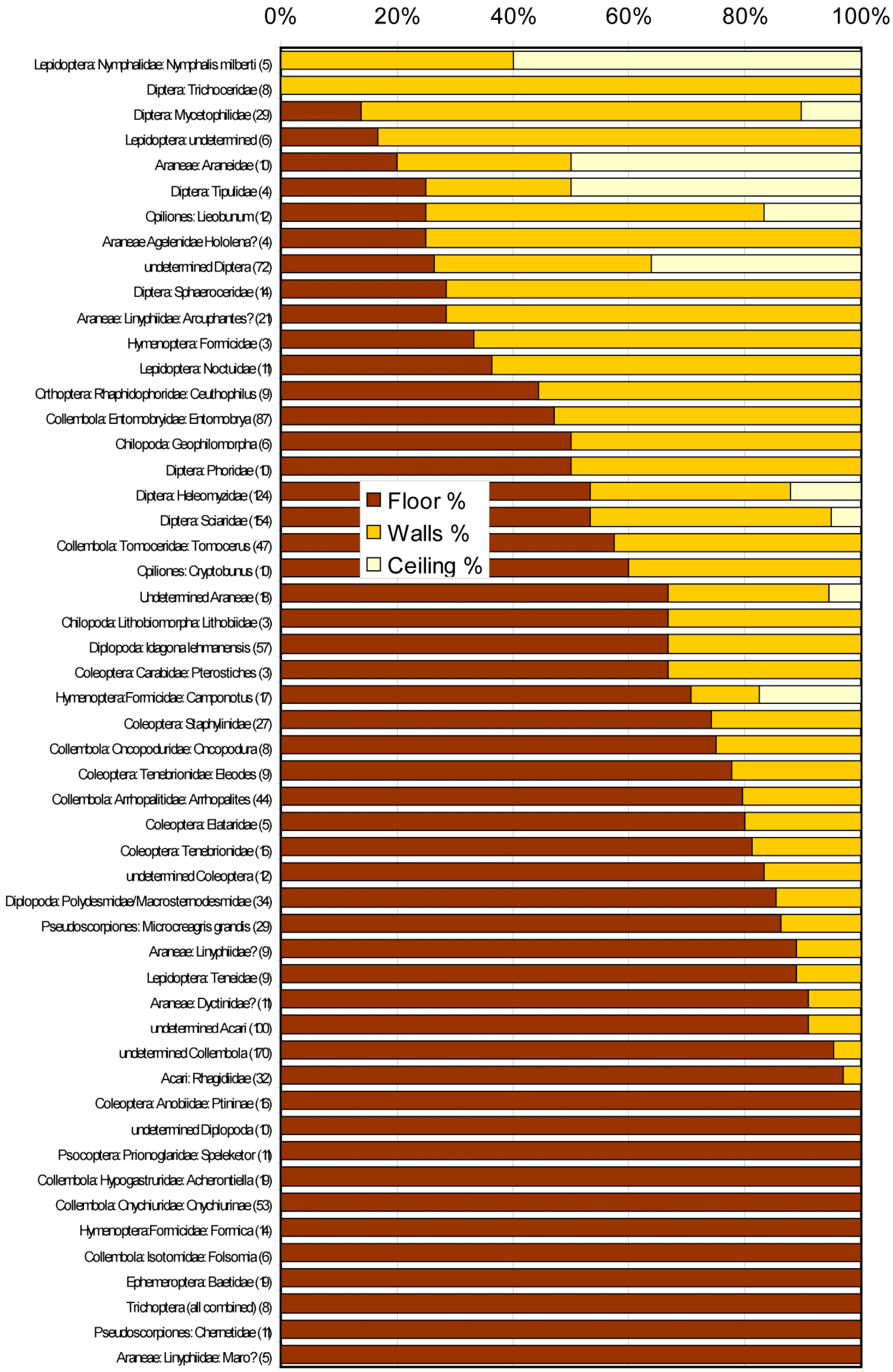


Figure 8. Spatial location of select sampled taxa during bioinventory at Great Basin National Park 2006-2007. Number in parentheses is sample size (number of individuals) of specimens for which spatial location data were recorded.

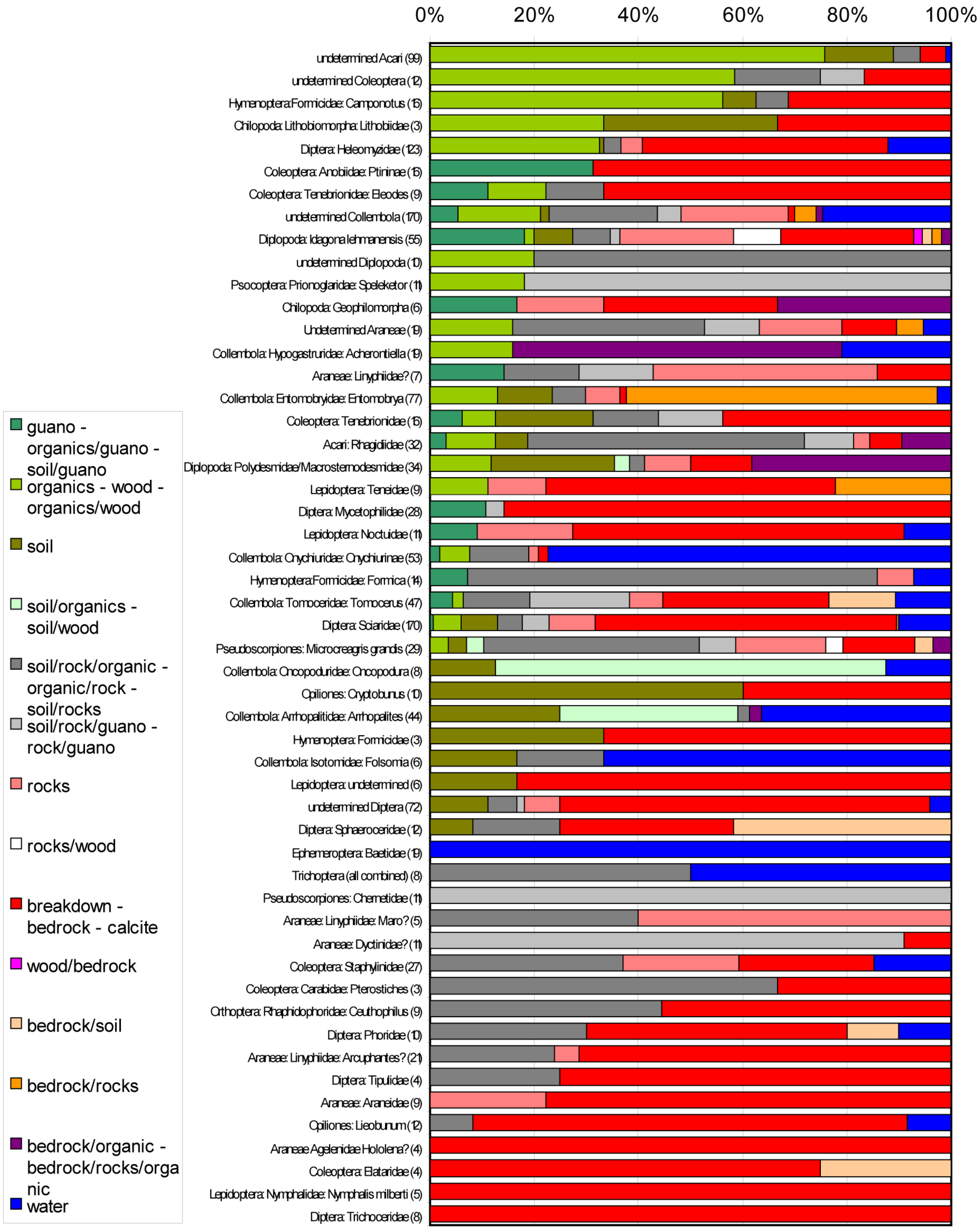


Figure 9. Generalized habitat associations for select sampled taxa during bioinventory at Great Basin National Park 2006-2007. Number in parentheses is sample size (number of individuals) of specimens for which habitat association data were recorded.

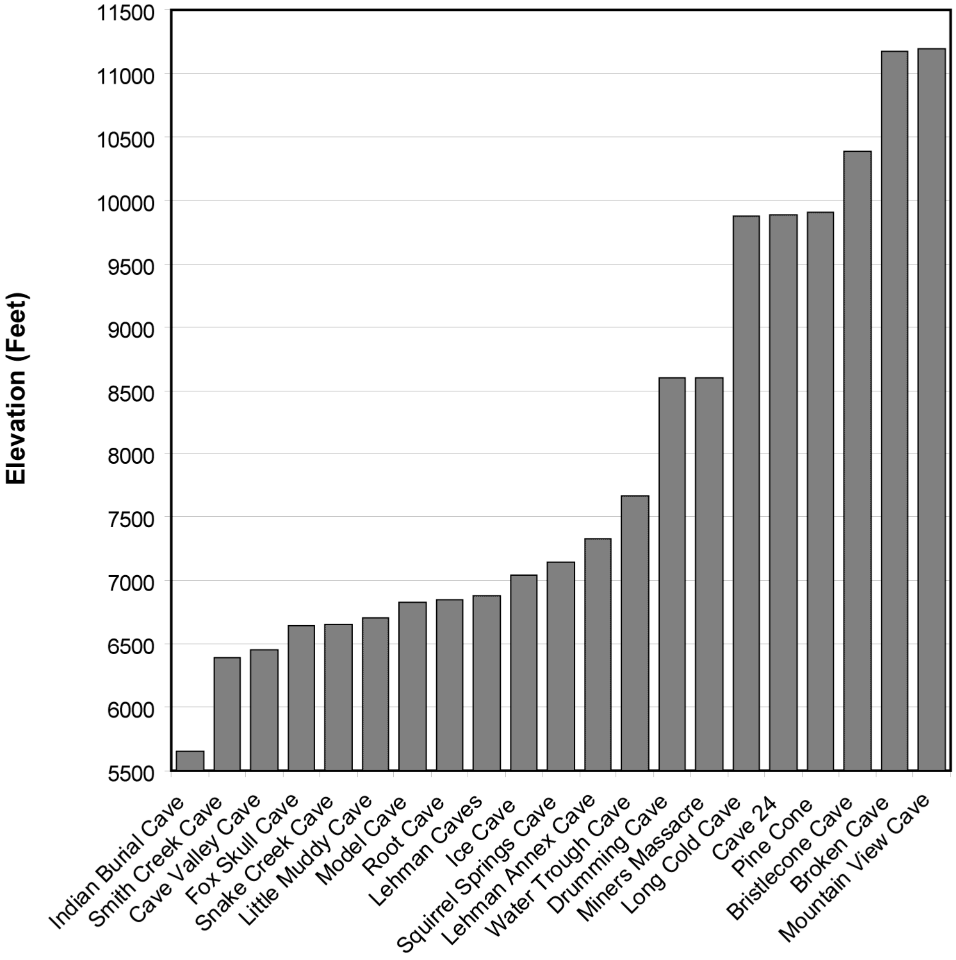


Figure 10. Study sites by rank order elevation (of entrance) in Great Basin National Park and surrounding areas. Exact elevation of Fissure Cave was not available, but is very close to that of Broken Cave.

Figure 11. Landscape in the vicinity of Cave 24 and Pine Cone Cave (17 July 2007).

Figure 12. Hiking from Mountain View Cave back towards Broken and Fissure caves (18 July 2007).

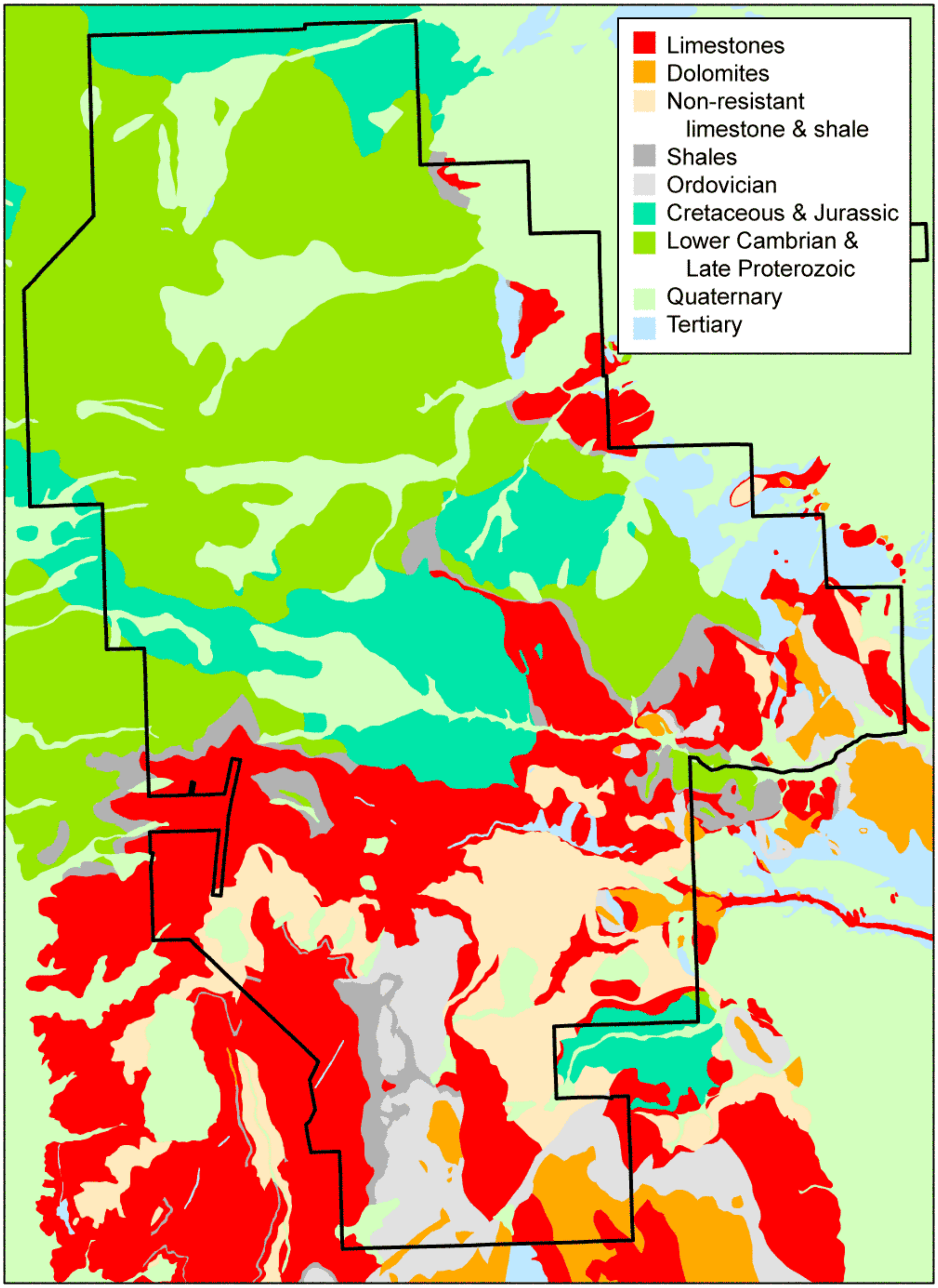


Figure 13. Surficial geology of Great Basin National Park (black line is boundary). Limestones are primarily Cambrian, Mississippian, Ordovician, and Pennsylvanian. Dolomites are Devonian and Ordovician-Silurian. The non-resistant limestone and shale make up the Cambrian Lincoln Peak Formation. Remaining rock and deposits are not soluble carbonates, thus will likely not contain karst. Nearly all of the caves in Great Basin National Park are in the limestones indicated in this figure. Adapted in part from NPS-GRE (2007).

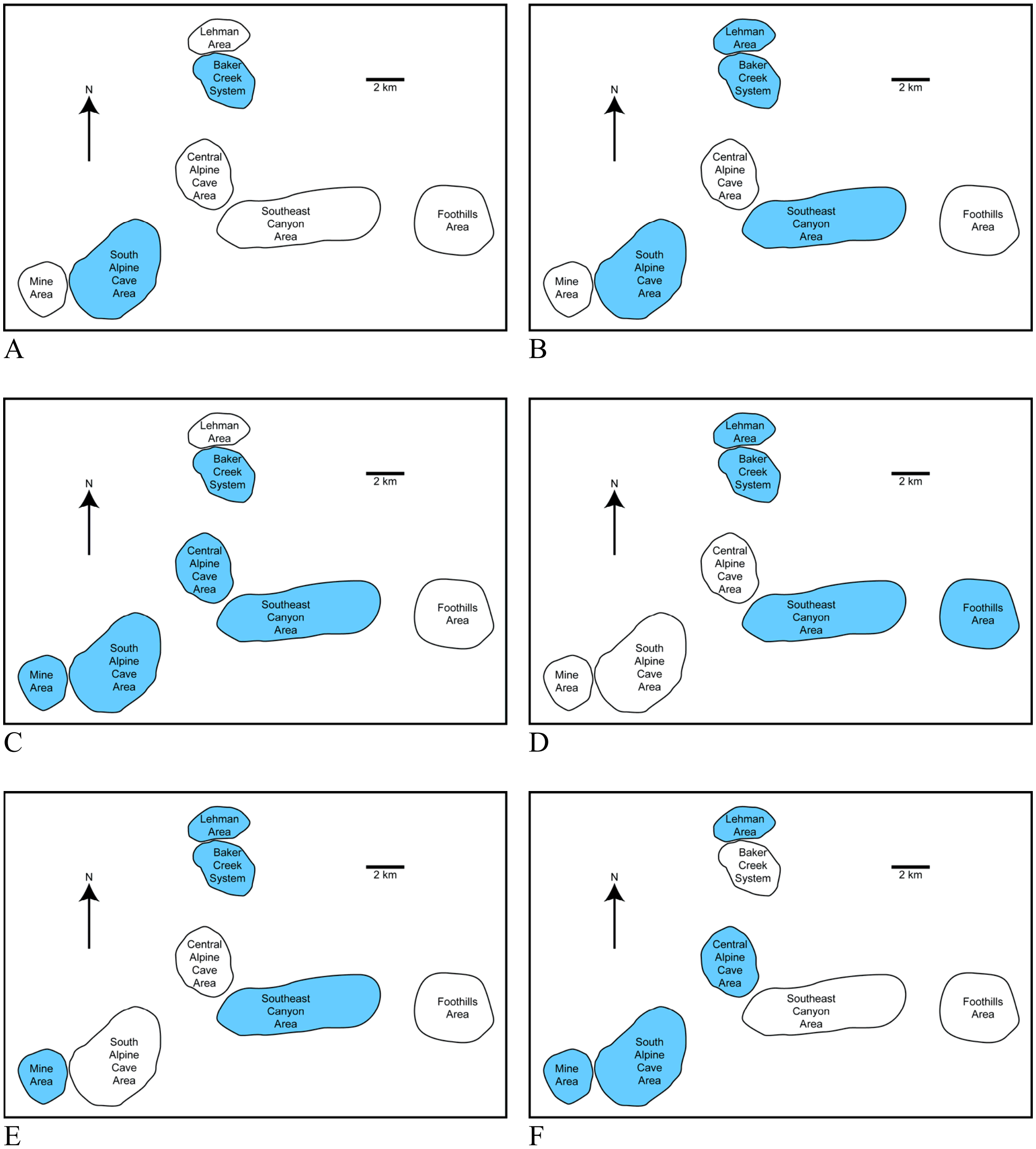


Figure 14. Distribution of select cavernicoles by cave area, in the Great Basin National Park area. A. *Cyptobunus ungulatus ungulatus*; B. *Microcreagris grandis*; C. *Idagona lehmanensis*; D. undescribed Polydesmidae/Macrosternodesmidae; E. *Arrhopalites* spp.; F. Onychiurinae. Bounded areas merely encircle cave locations and do not correspond to karst areas. Lehman Area: Lehman Annex Cave, Lehman Caves, Little Muddy Cave, Root Cave; Baker Creek System: Ice Cave, Model Cave, Water Trough Cave; Central Alpine Cave Area: Bristlecone Cave; Mine Area: Lincoln Canyon Mine (Drumming and Miner's Massacre); South Alpine Cave Area: Broken Cave, Cave 24, Long Cold Cave, Mountain View Cave, Pine Cone Cave, Fissure Cave; Southeast Canyon Area: Fox Skull Cave, Snake Creek Cave, Squirrel Spring Cave; Foothills Area: Indian Burial Cave.

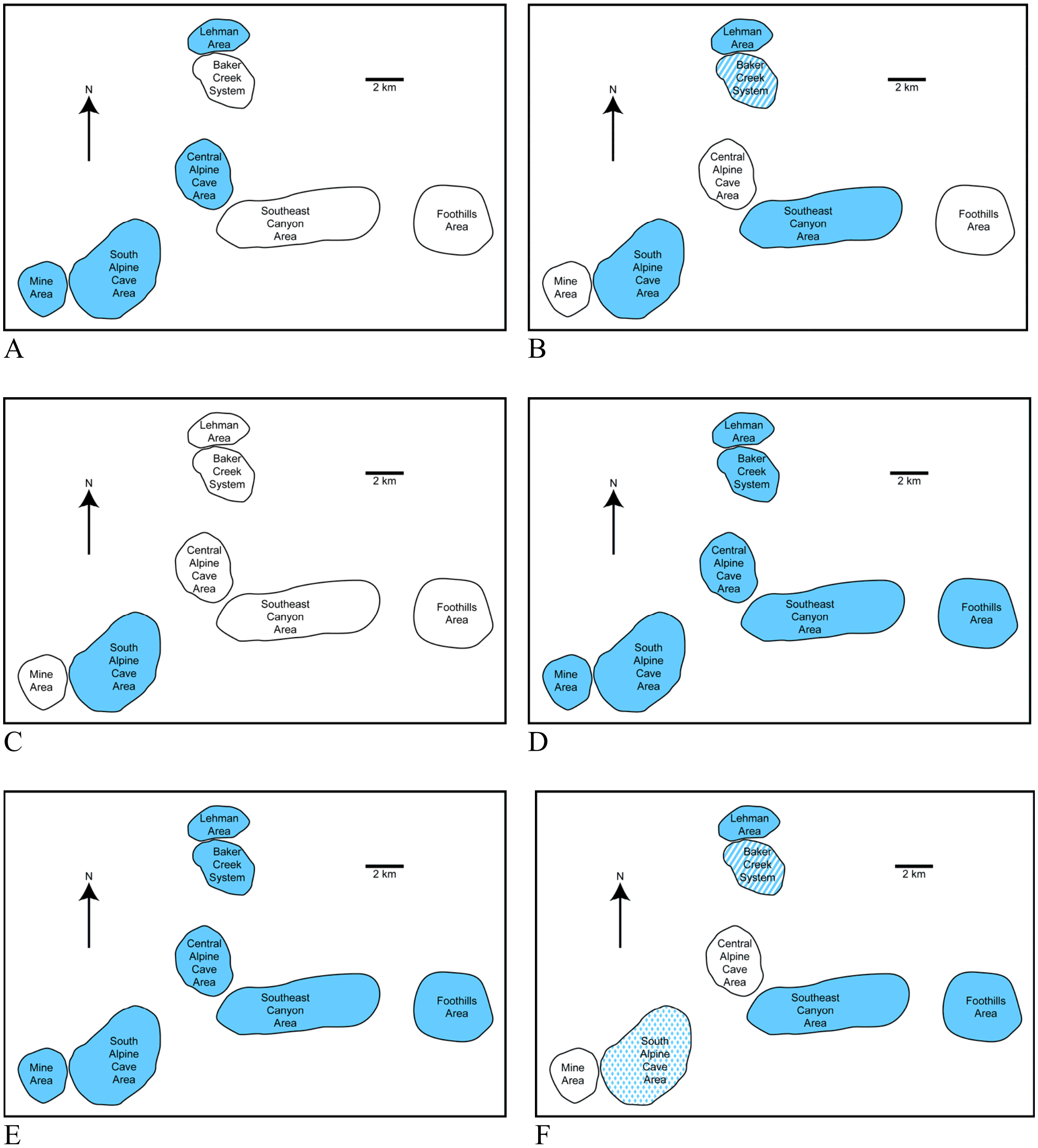


Figure 15. Distribution of select cavernicoles by cave area, in the Great Basin National Park area. A. *Tomocerus* sp.; B. *Ceuthophilus* sp. (hatched area=NPS-GRBA pers. comm. [2008]); C. *Aglais milberti*; D. Heleomyzidae; E. Sciaridae; F. all Vespertilionidae combined (hatched area=records from Krejca & Taylor [2003], cross-hatched area=NPS-GRBA pers. comm. [2008]). Bounded areas merely encircle cave locations and do not correspond to karst areas. Lehman Area: Lehman Annex Cave, Lehman Caves, Little Muddy Cave, Root Cave; Baker Creek System: Ice Cave, Model Cave, Water Trough Cave; Central Alpine Cave Area: Bristlecone Cave; Mine Area: Lincoln Canyon Mine (Drumming and Miner's Massacre); South Alpine Cave Area: Broken Cave, Cave 24, Long Cold Cave, Mountain View Cave, Pine Cone Cave, Fissure Cave; Southeast Canyon Area: Fox Skull Cave, Snake Creek Cave, Squirrel Spring Cave; Foothills Area: Indian Burial Cave.

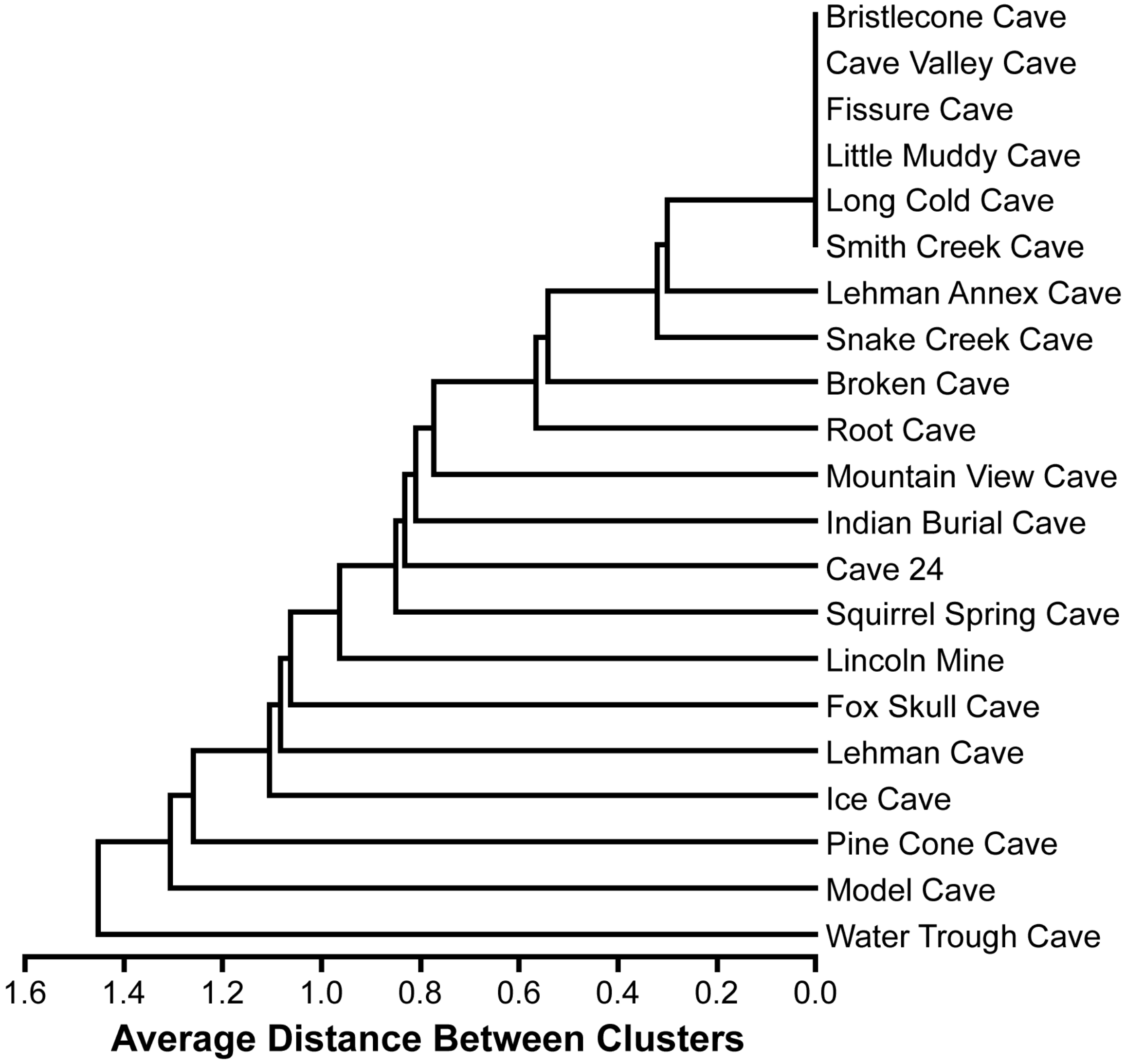


Figure 16. Similarity among caves as determined using taxon presence absence data and average linkage cluster analysis.

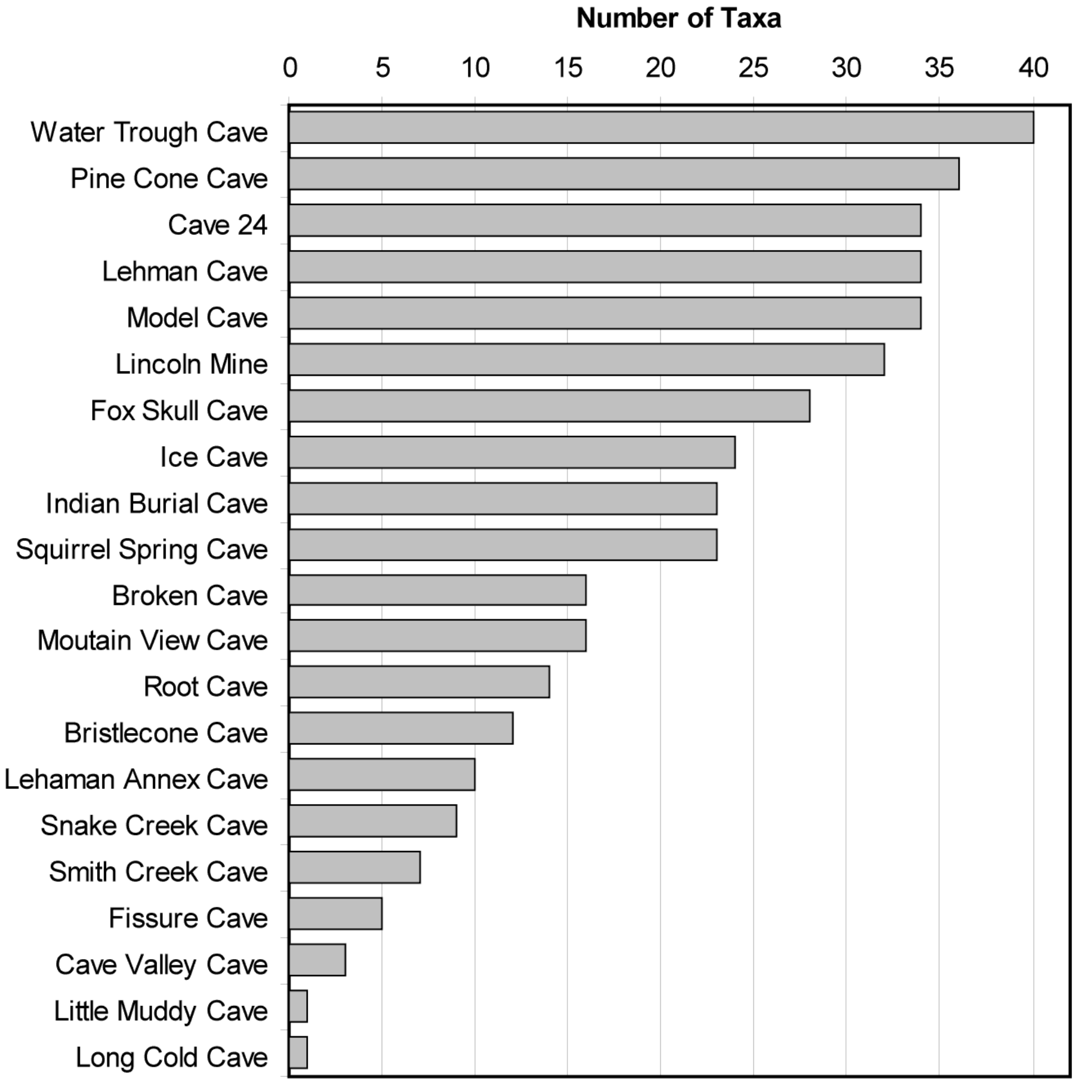


Figure 17. Number of taxa occurring at each cave sorted in rank order.

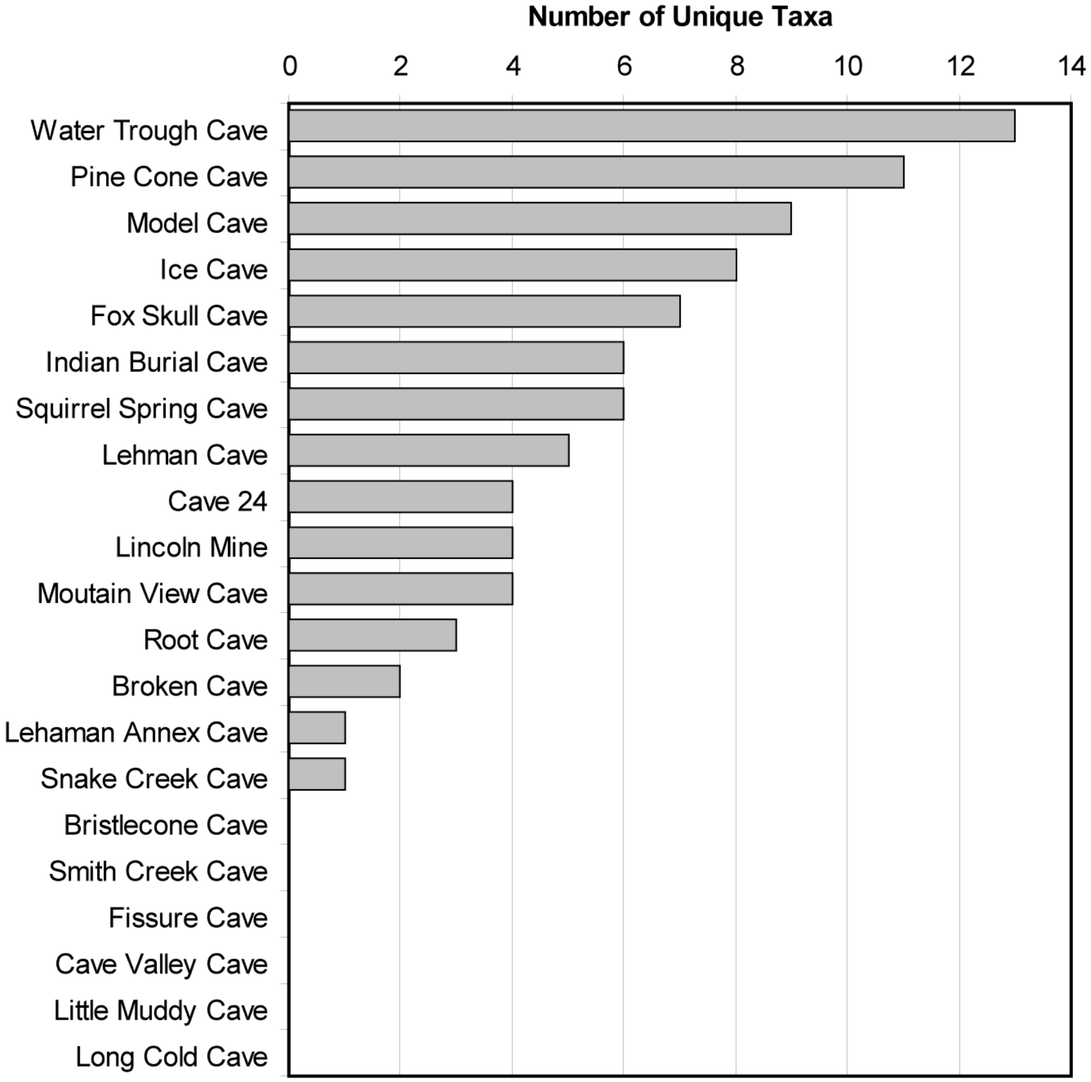


Figure 18. Number of unique (single site occurrence) taxa in each of the caves examined during this study.

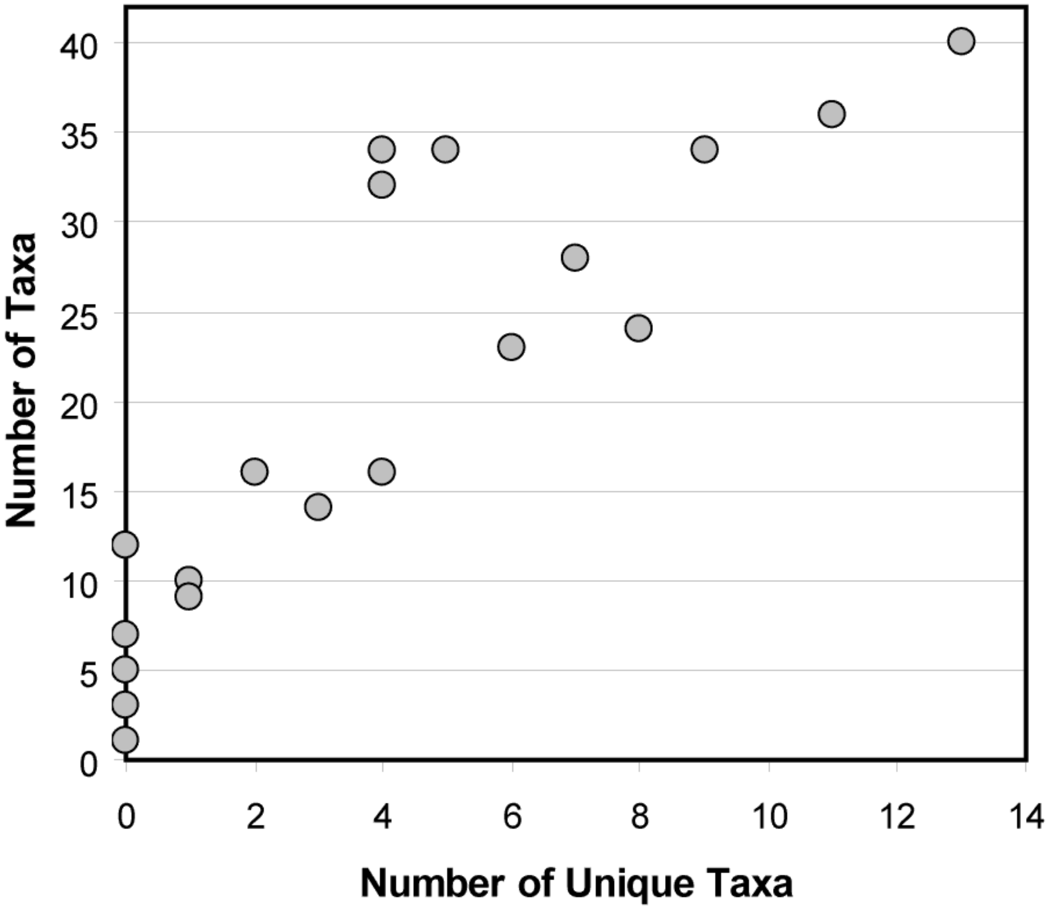
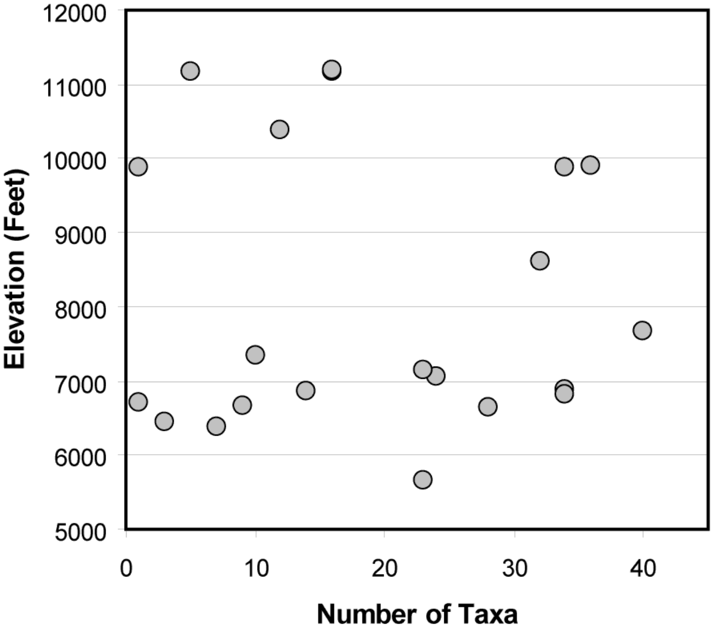
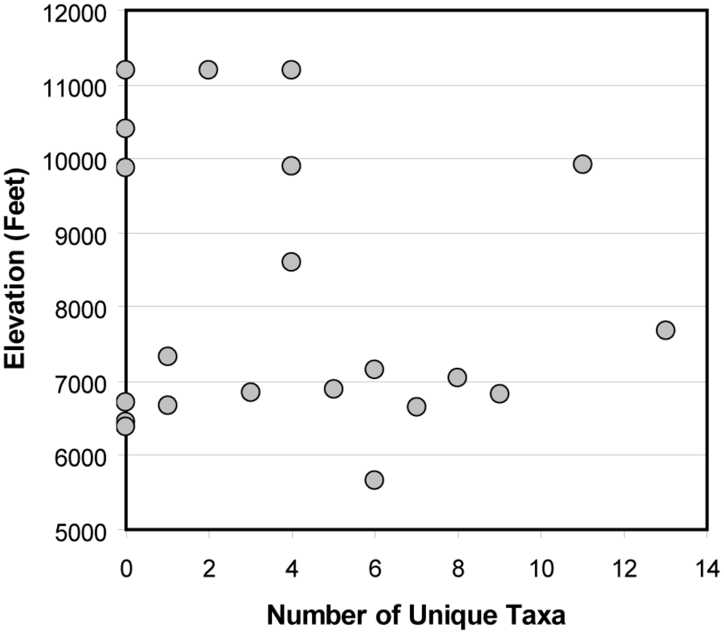


Figure 19. Correlation between number of taxa (taxa richness) and number of unique (single site occurrence) taxa.



A



B

Figure 20. Relationship of cave elevation to taxa richness (A) and number of unique taxa (B).

Figure 21. Entrance to Bristlecone Cave (21 July 2007).

Figure 22. On rope in Bristlecone Cave, ascending out towards entrance (21 July 2007).

Figure 23. Looking out the entrance of Broken Cave (16 July 2007). The ceiling in this area, and somewhat further into the cave, is where the nymphalid *Aglais milberti* (Milbert's Tortiseshell) was found.

Figure 24. Mike Slay sampling in Cave 24 (17 July 2007). Note the mix of loose rocks and organic debris. Photo by Ben Roberts, NPS.

Figure 25. The entrance to Lincoln Canyon Mine (15 July 2007). Note the person sitting atop the mine tailings to the right.

Figure 26. Meg Horner sampling in Mountain View Cave, with entrance in background. Note the extensive breakdown and old packrat guano in foreground (10 July 2007). Photo by Ben Roberts, NPS.

Figure 27. Speleothems in Mountain View Cave (18 July 2007).

Figure 28. Landscape in the vicinity of Mountain View Cave, note person to right (18 July 2007).

Figure 29. Rich organic debris on the floor of Pine Cone Cave (9 July 2007). Photo by Ben Roberts, NPS.

Figure 30. Looking out the entrance of Smith Creek Cave (21 July 2007). Large entrances such as this tend to result in very dry conditions, poorly suited to most highly cave adapted animals.

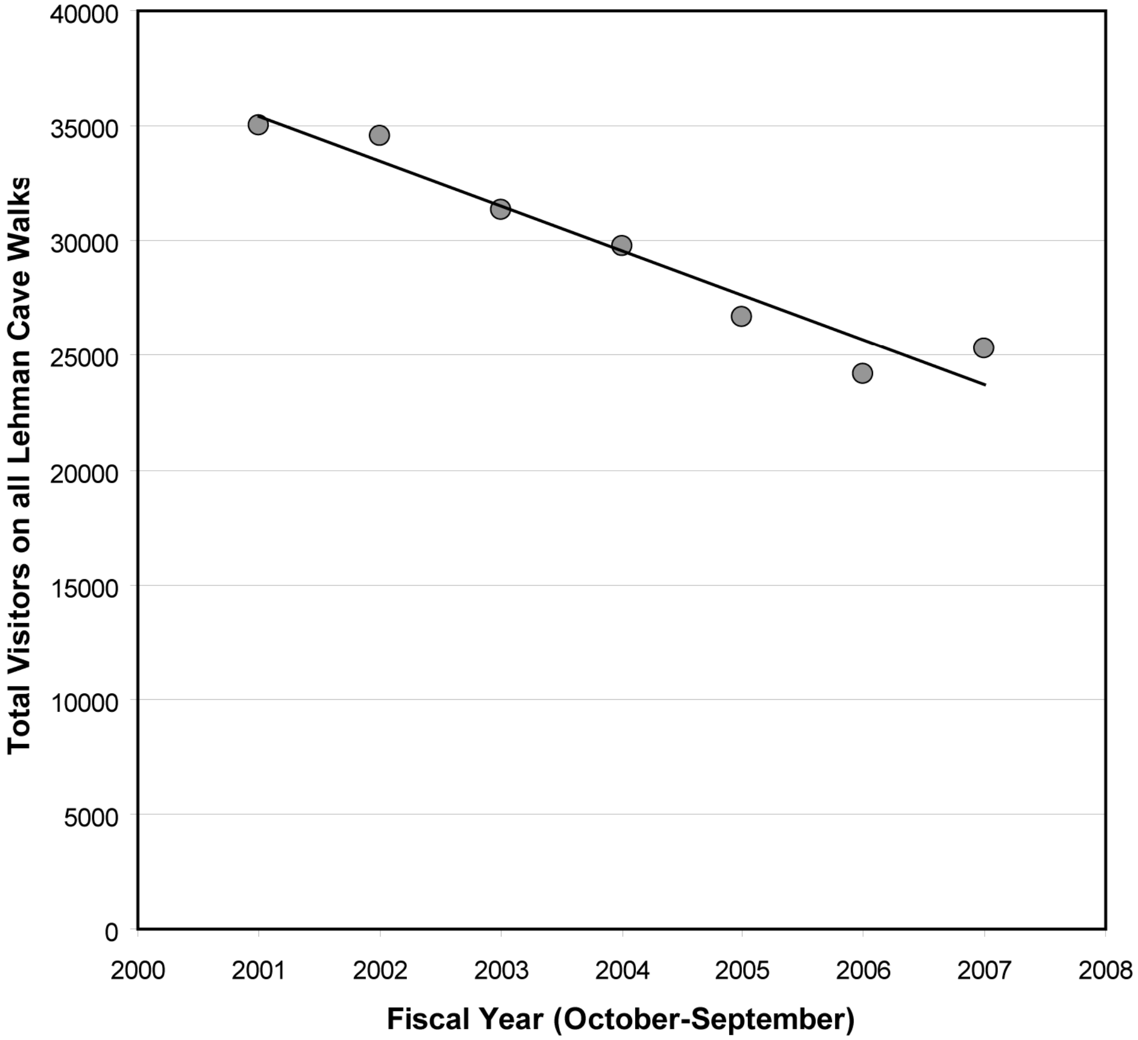


Figure 31. Number of visitors on Lehman Caves cave walks per fiscal year, based on seven years of data (excluding September of 2006 and September of 2007), shown as gray circles. Best fit regression line is: Number of visitors/fiscal year = (fiscal year * (-1945)) + 3927322.

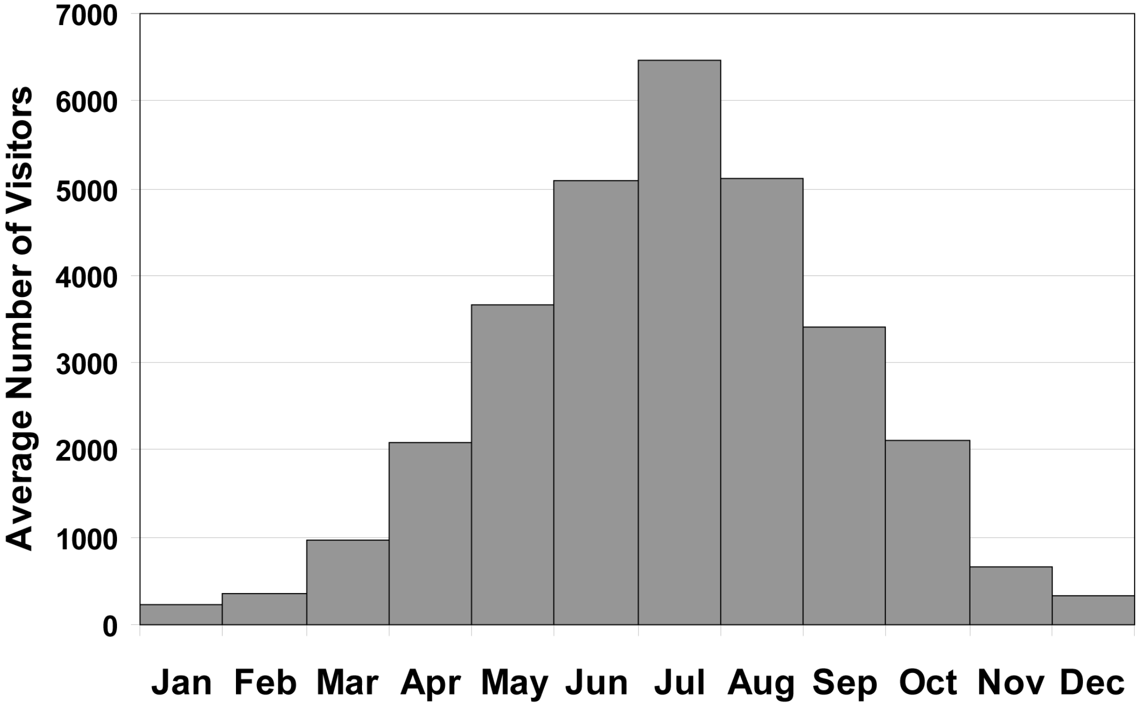


Figure 32. Visitation in Lehman Caves based on seven years (FY2001-FY2007) and averaged by month of year, except September is based on five years.

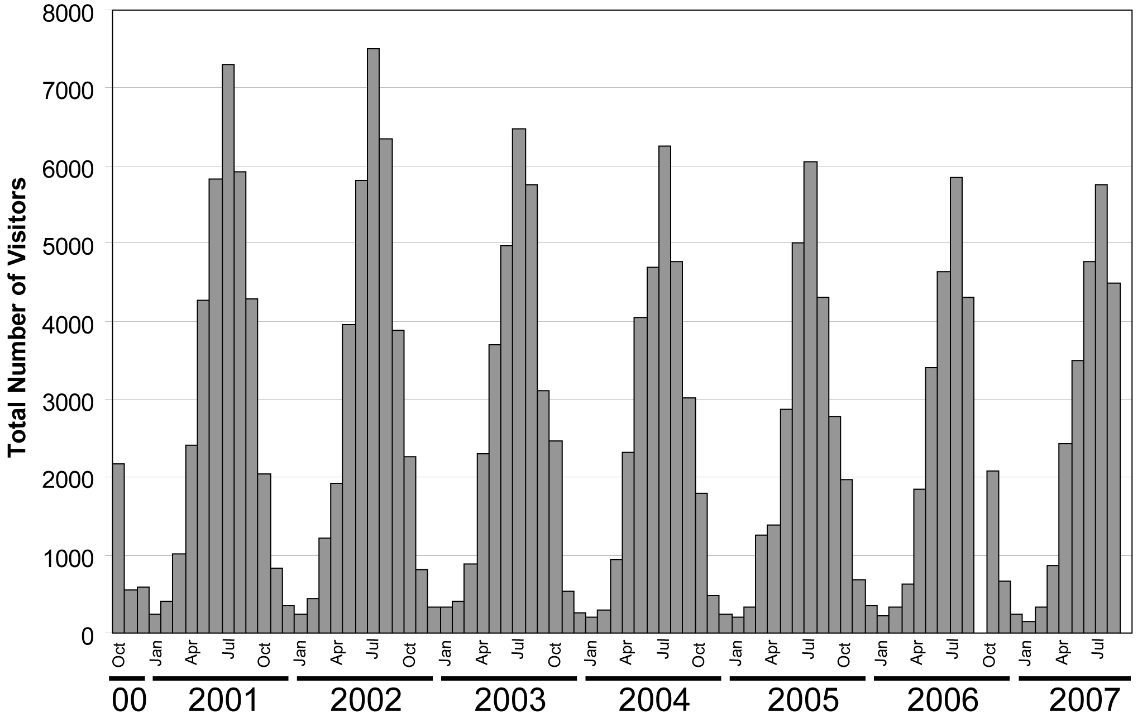


Figure 33. Visitation in Lehman Cave across seven fiscal years (FY2001-FY2007).

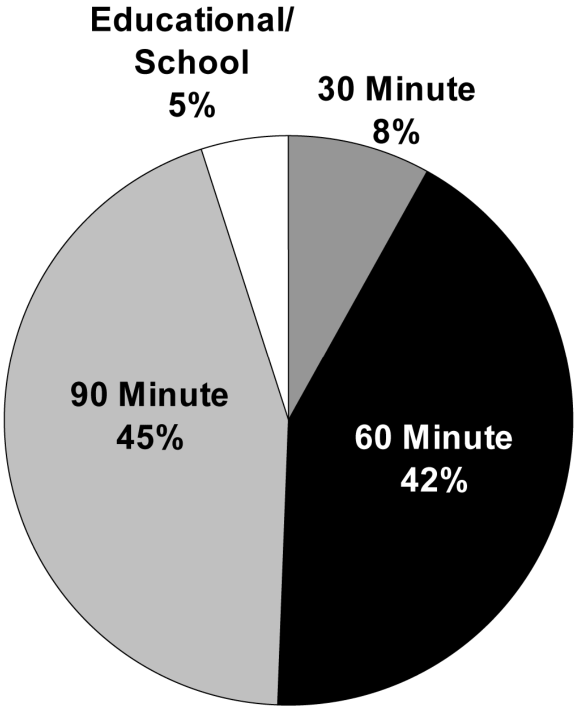


Figure 34. Average proportion of visitors to Lehman Caves cave that chose 30, 60, or 90 minute cave walks or educational/school cave tours. Based on seven fiscal years (FY2001-FY2007) of data on 206,792 visitors.

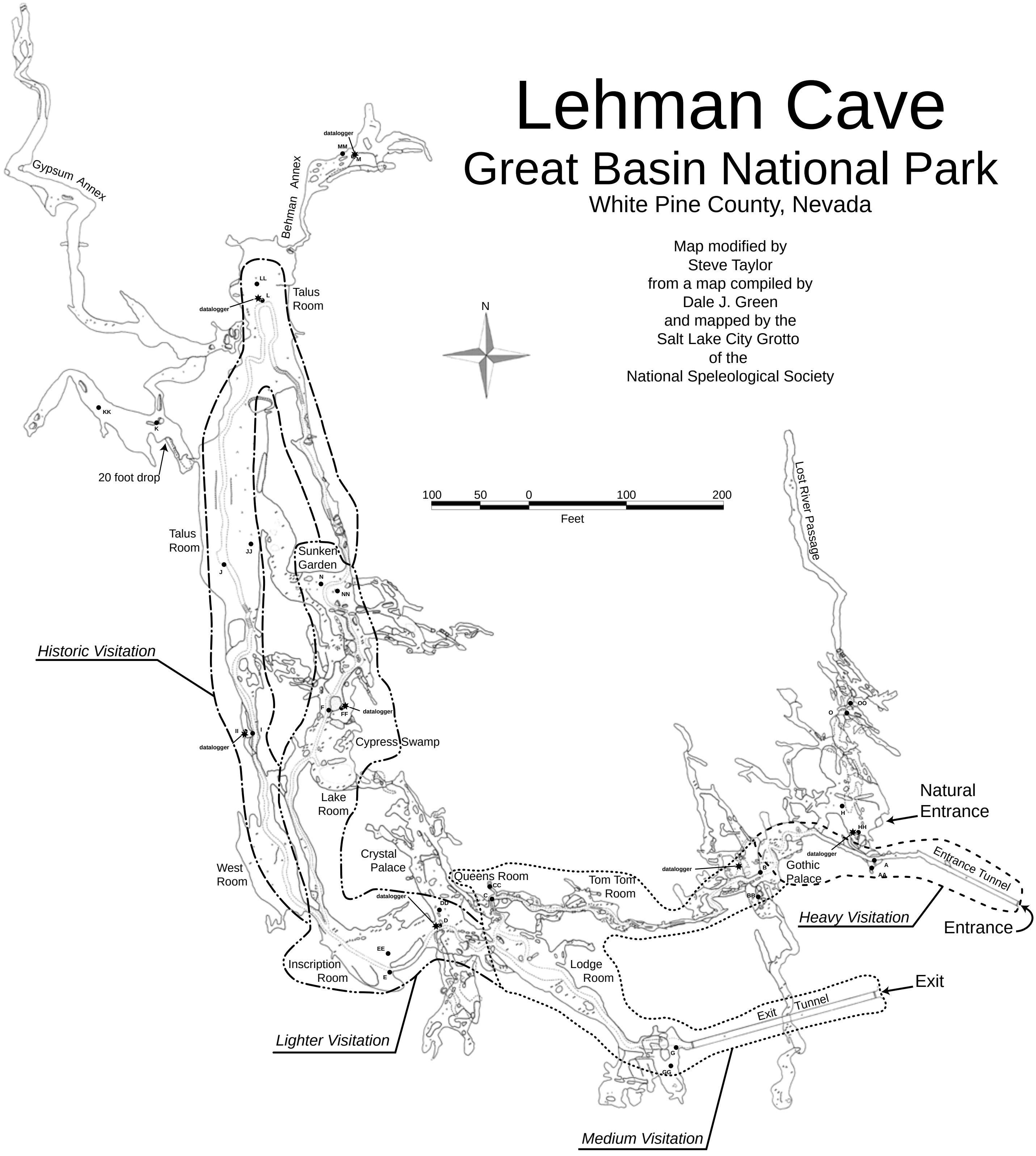


Figure 35. Map of Lehman Caves with tour routes shown. Heavy visitation zone receives 30 minute tours, Heavy + Medium zones receive 60 minute tours, and Heavy + Medium + Lighter zones receive 90 minute tours. Educational tours are generally restricted to the Heavy and Medium zones, and Historic Visitation area is no longer used for tours. Remaining portions of the cave are considered Low Impact Wild Areas. Black dots correspond to bait stations adjacent to trail (single letter designation, stations A-O) and away from trail (double letter designation, stations AA-OO). Stars correspond to locations of data loggers.

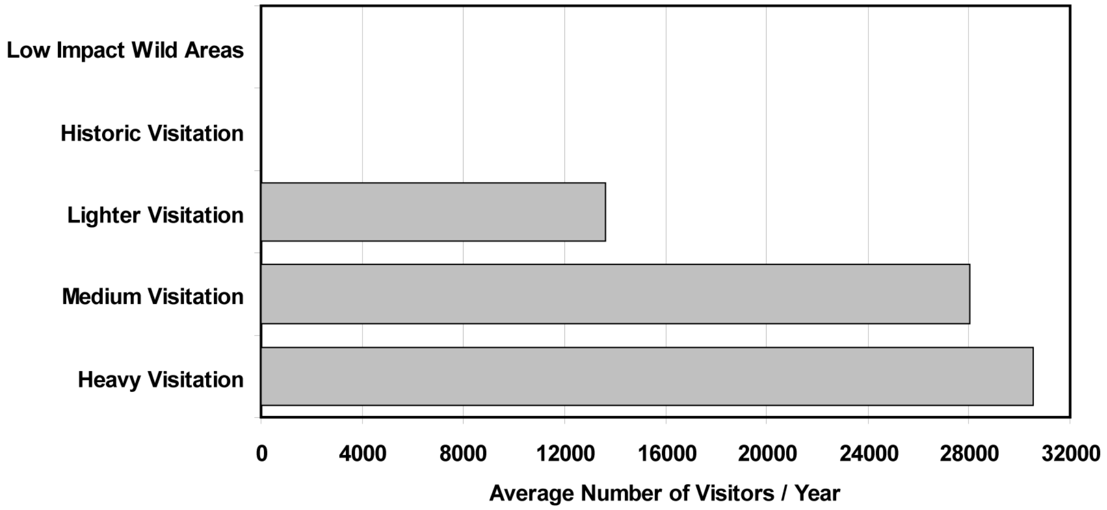


Figure 36. Average number of visitors per year in Heavy, Medium, and Lighter visitation zones as well as Historic Visitation and Low Impact Wild Areas of Lehman Caves, Great Basin National Park, White Pine County, Nevada. See Figure 35 for extent of each area.

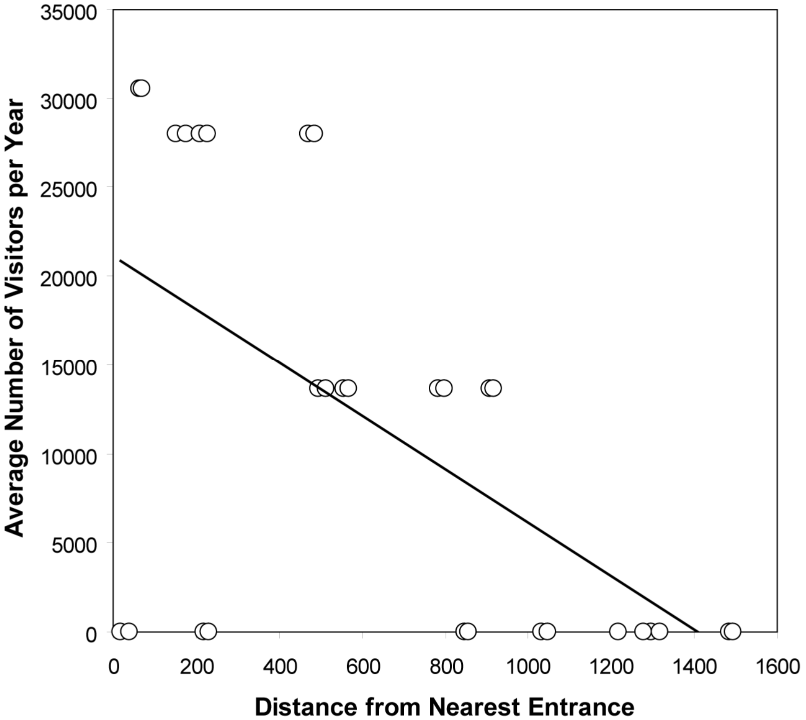


Figure 37. Correlation between distance from nearest entrance and average number of visitors per year at each bait station in Lehman Caves, Great Basin National Park, White Pine County, Nevada. Best fit linear regression line, y = -15.026x + 21178, explains about 1/3 of the variation (R^2=0.3363).

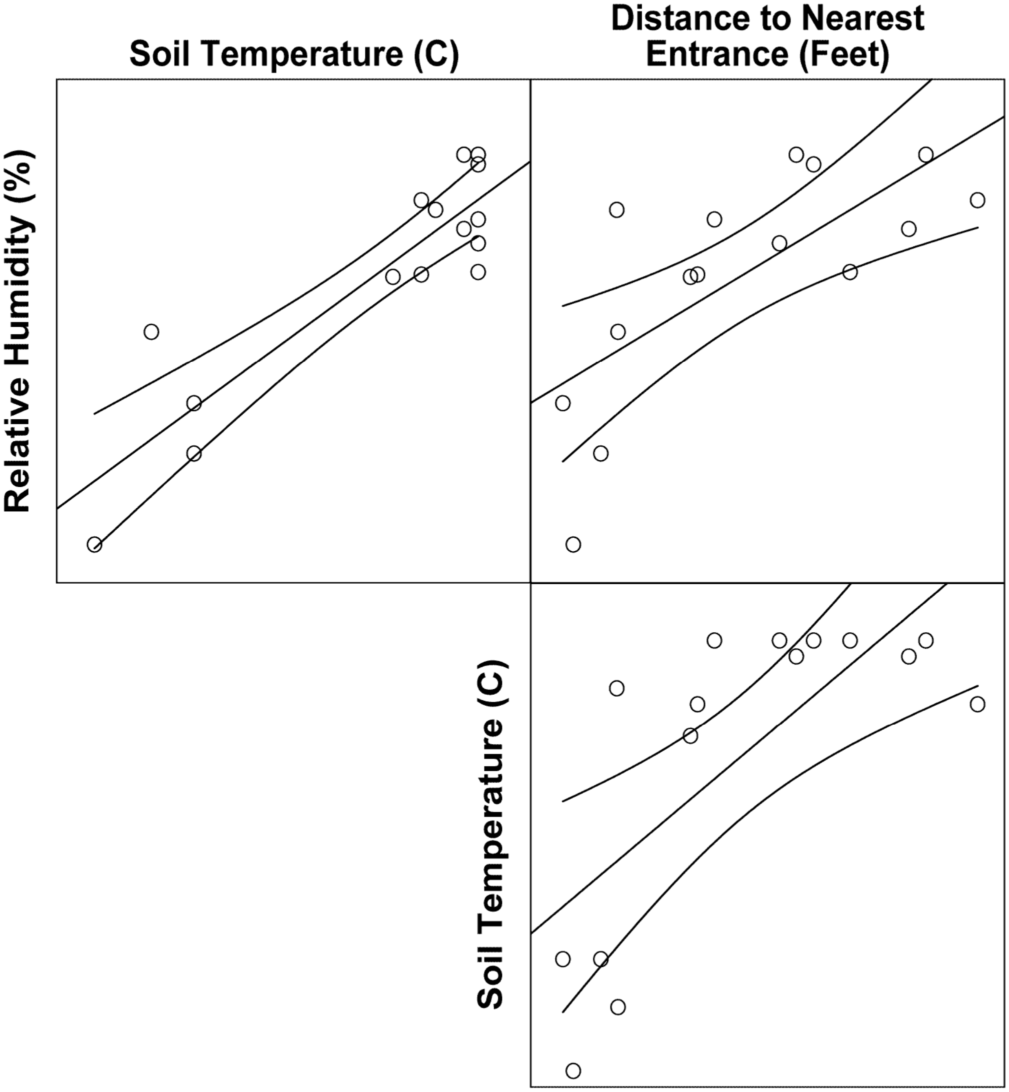
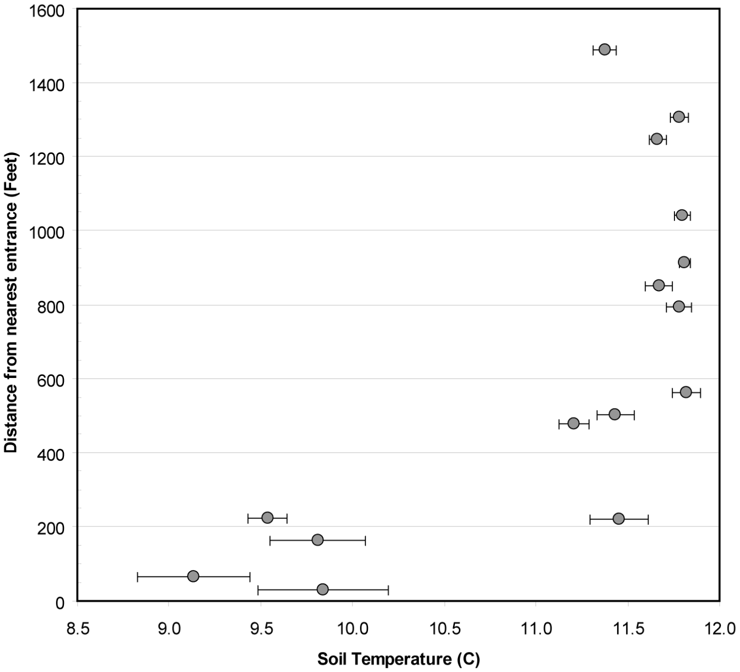
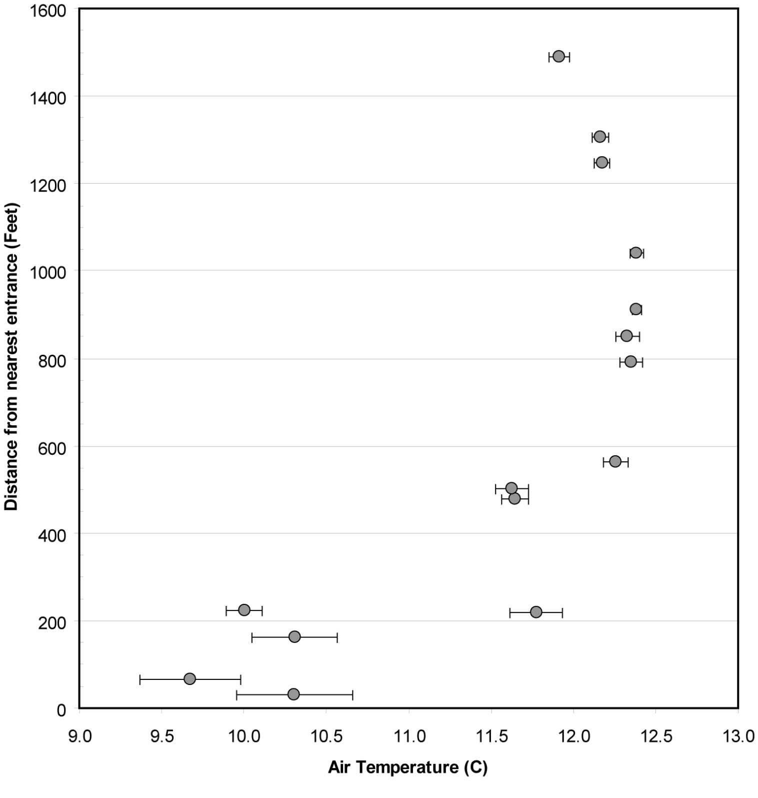


Figure 38. Sampling stations and linear regression with 95% confidence interval on the mean, for mean Relative Humidity (%), mean 2 cm Soil Temperature (^oC) and station Distance from nearest Entrance (Feet). Regression lines are [RH]=4.4193*[Soil]+33.917; [RH]=71.663*[Distance]-5278.6; [Soil]=0.0015*[Distance]+10.109. R^2=0.8026, 0.5120, and 0.5233, respectively.



A



B

Figure 39. Mean soil (A) and air (B) temperatures (ºC) at 15 sampling from nearest cave entrance distances (two stations, near and far from trail at each distance) in Lehman Caves, average of 13 monthly sampling periods. Error bars are standard error of the mean.

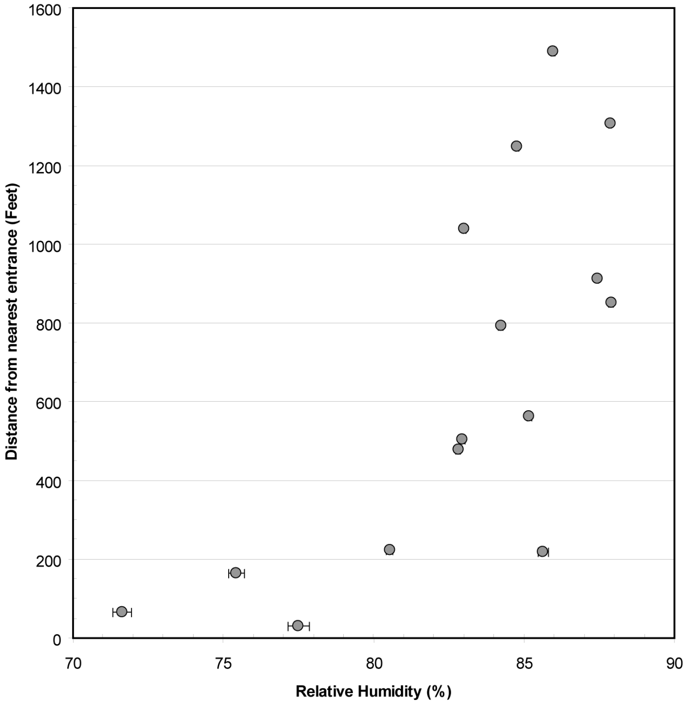


Figure 40. Mean relative humidity (%) at 15 sampling from nearest cave entrance distances (two stations, near and far from trail at each distance) in Lehman Caves, average of 13 monthly sampling periods. Error bars are standard error of the mean.

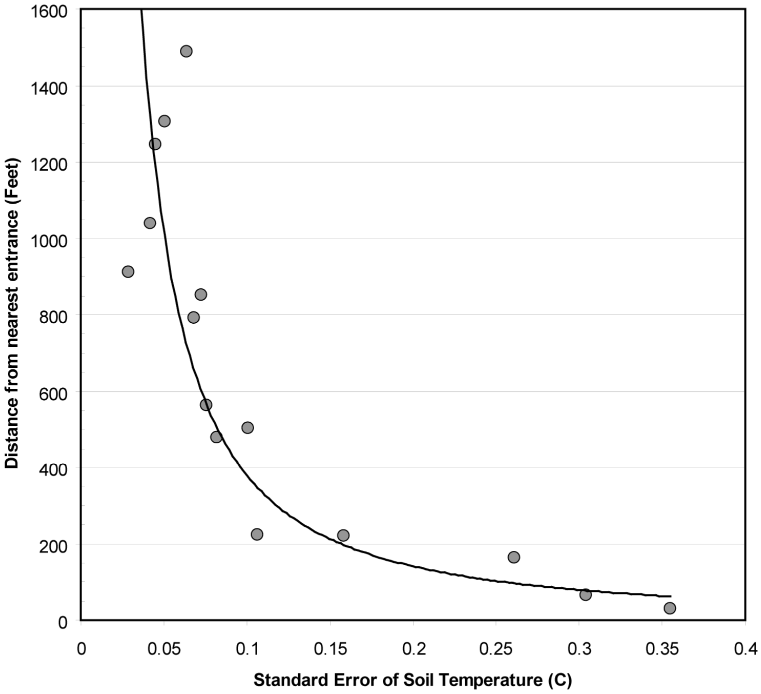


Figure 41. Distance from nearest entrance explains a significant portion of soil temperature variability. Power curve: [Distance]=14.197*[Soil]$^{-1.427}$, R^2=0.8521.

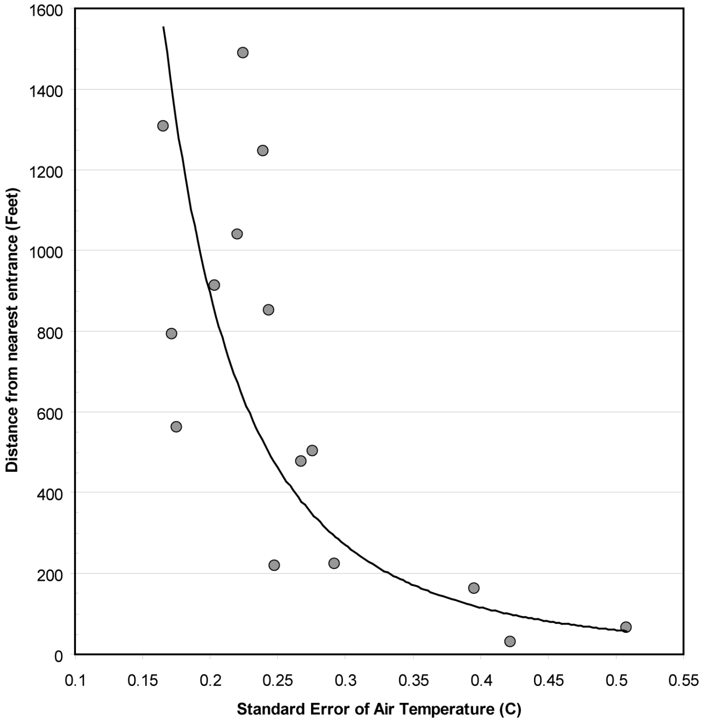


Figure 42. Distance from nearest entrance explains a significant portion of air temperature variability. Power curve: [Distance]=7.7684*[Air]$^{-2.9462}$, R^2=0.7084.

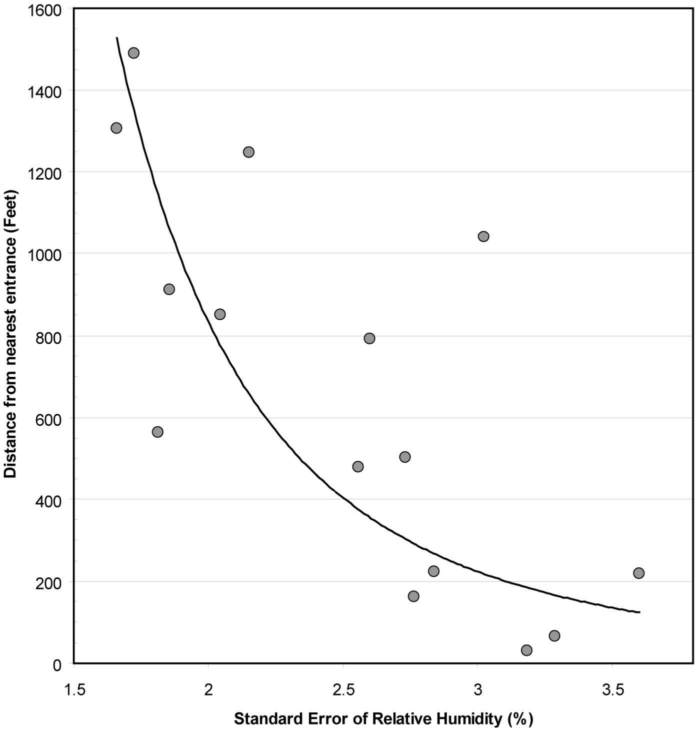


Figure 43. Distance from nearest entrance explains a significant portion of relative humidity variability. Power curve: [Distance]=7898.8*[Humidity]$^{-3.2453}$, R^2=0.5038

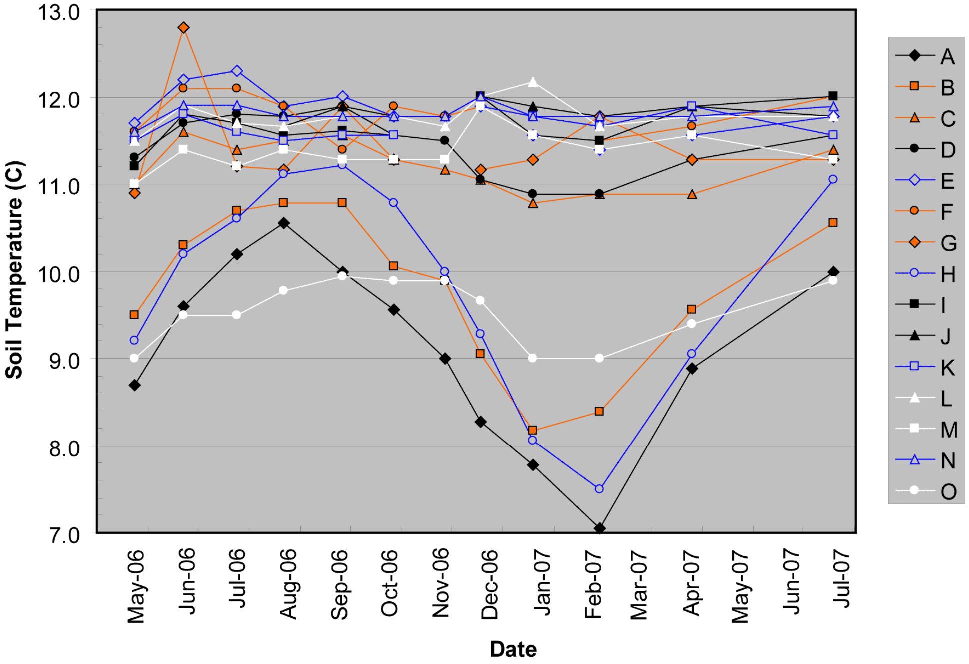


Figure 44. Soil temperature (ºC) at 15 sampling stations in Lehman Caves across 13 monthly sampling periods.

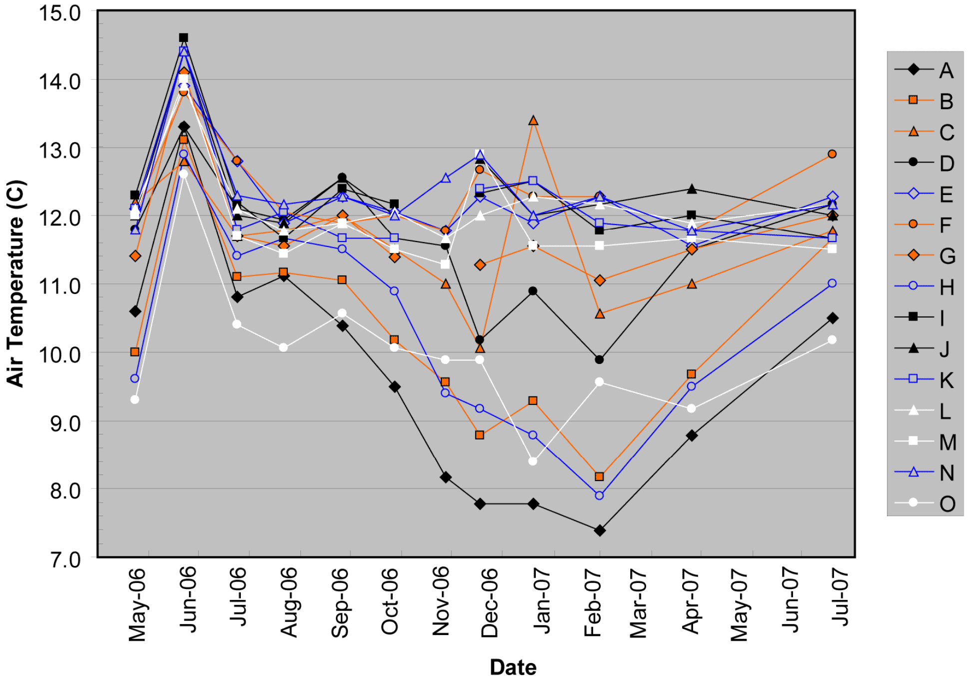


Figure 45. Air temperature (ºC) at 15 sampling stations in Lehman Caves across 13 monthly sampling periods.

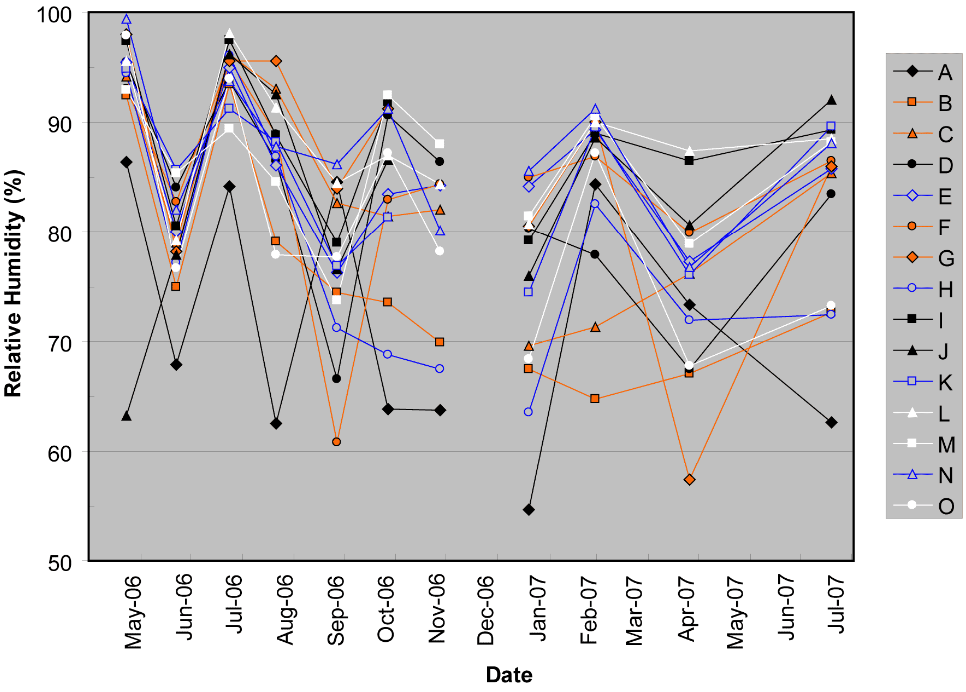


Figure 46. Relative humidity (%) at 15 sampling stations in Lehman Caves across 13 monthly sampling periods.

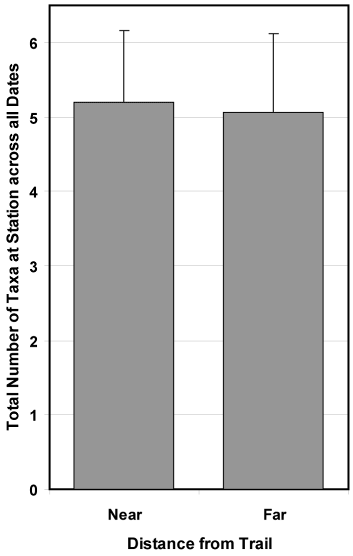


Figure 47. Mean number of taxa found at near-trail stations versus far-from-trail stations in Lehman Caves across 13 monthly sampling periods. Error bars are standard error of the mean.

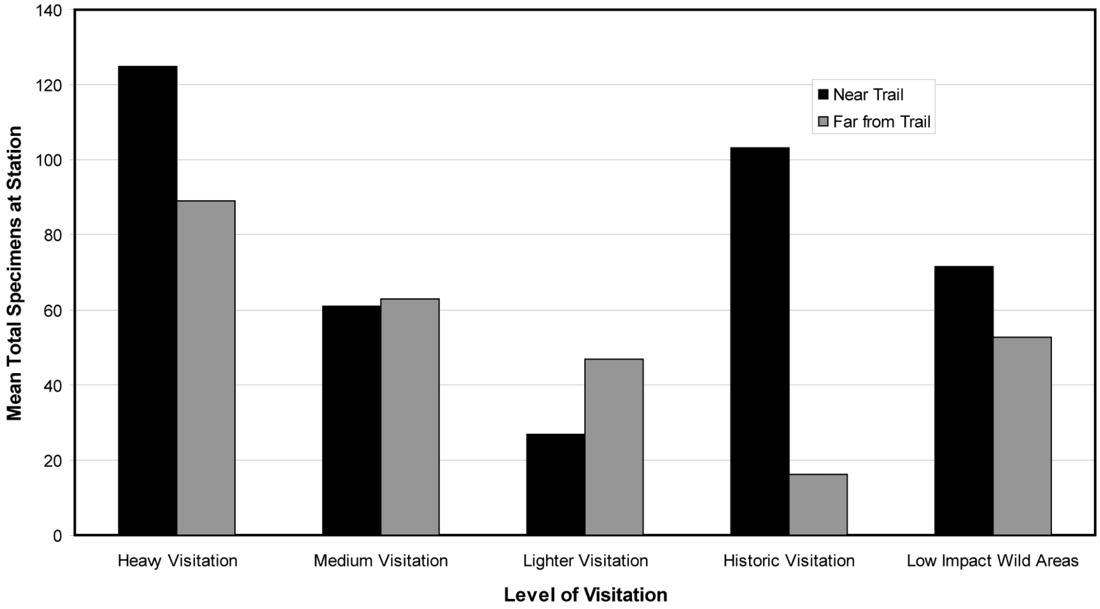


Figure 48. Mean total number of specimens for stations with in each level of visitation category, by distance from trail. Number of stations in each visitation category (n) was: Heavy Visitation, 1; Medium Visitation, 3; Lighter Visitation, 4; Historic Visitation, 3; and Low Impact Wild Areas, 4.

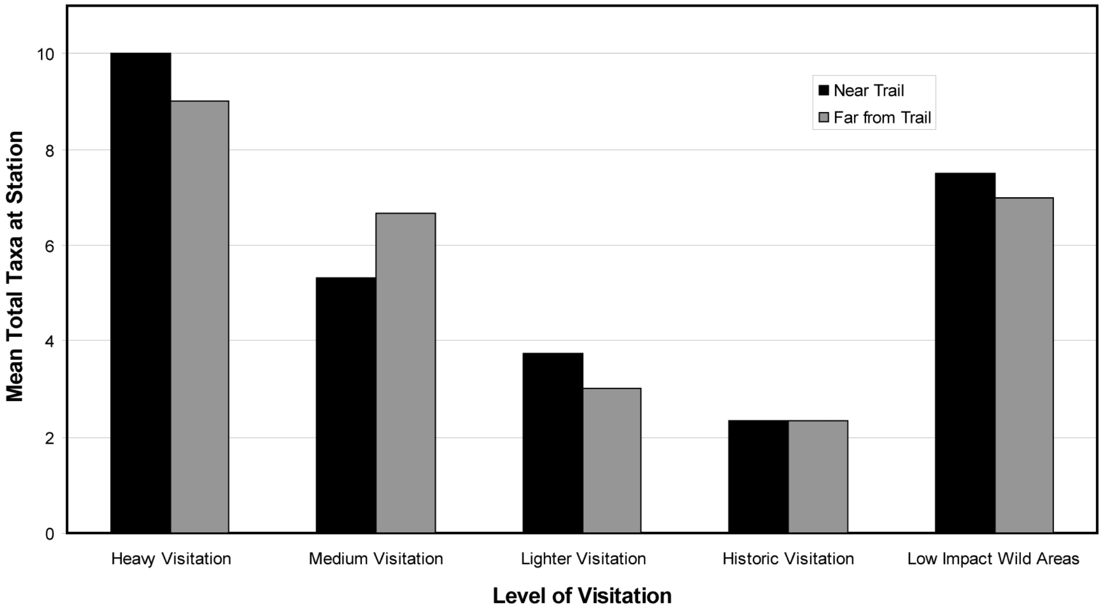


Figure 49. Mean total taxa at station for stations with in each level of visitation category, by distance from trail. Number of stations in each visitation category (n) was: Heavy Visitation, 1; Medium Visitation, 3; Lighter Visitation, 4; Historic Visitation, 3; and Low Impact Wild Areas, 4.

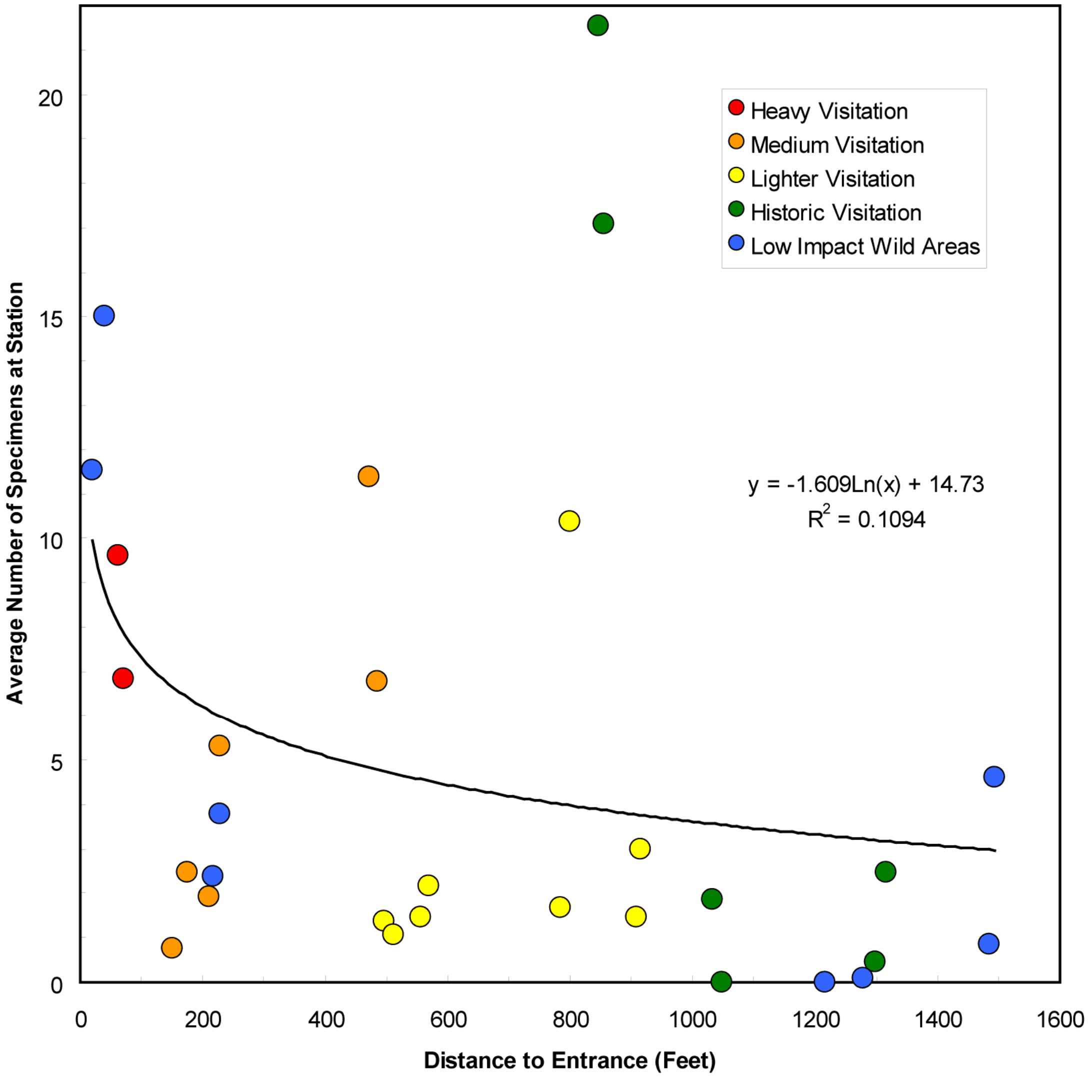


Figure 50. Relationship between the number of specimens at a station (averaged across sampling dates) and distance from cave entrance, with level of visitation indicated.

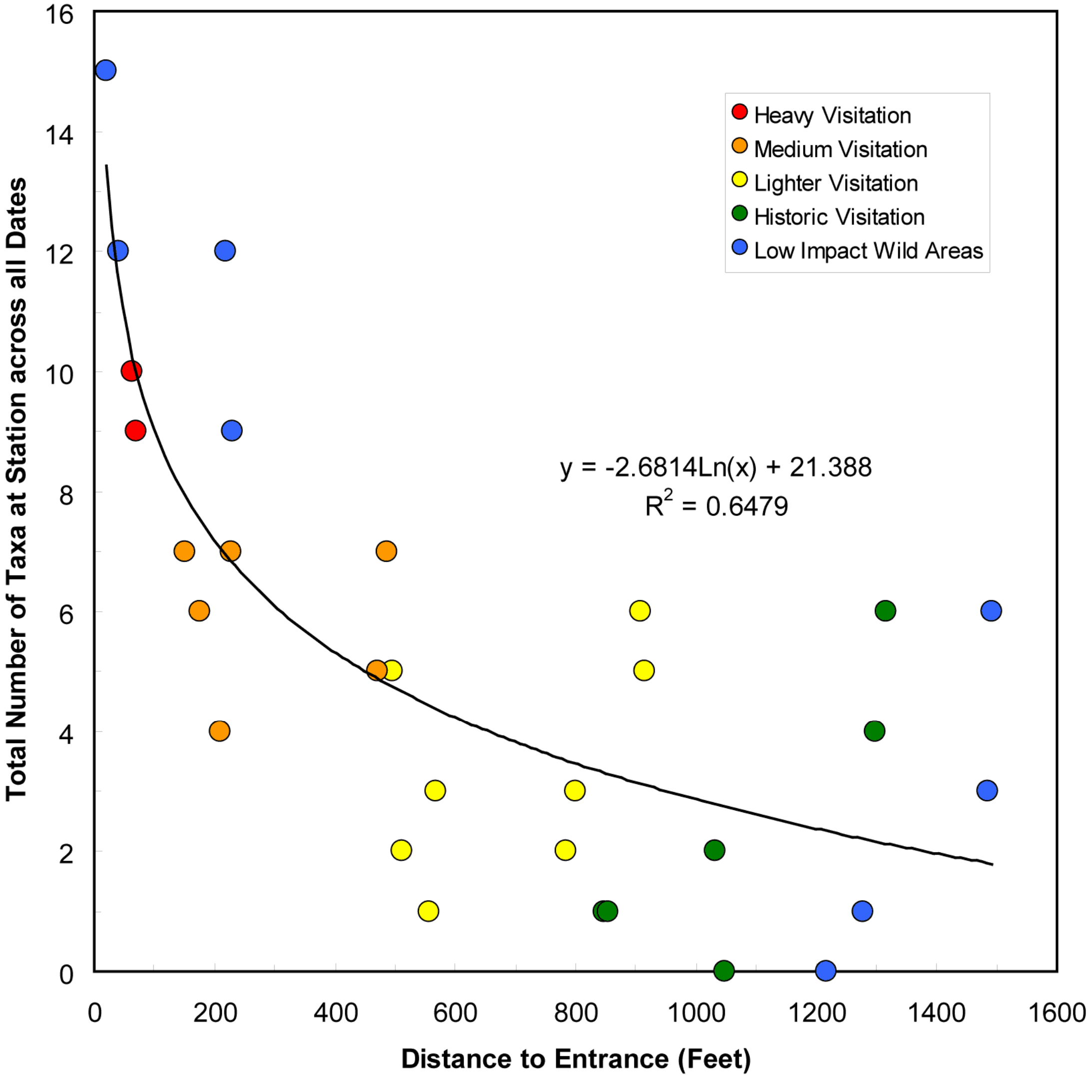


Figure 51. Relationship between the number of taxa at a station (averaged across sampling dates) and distance from cave entrance, with level of visitation indicated.

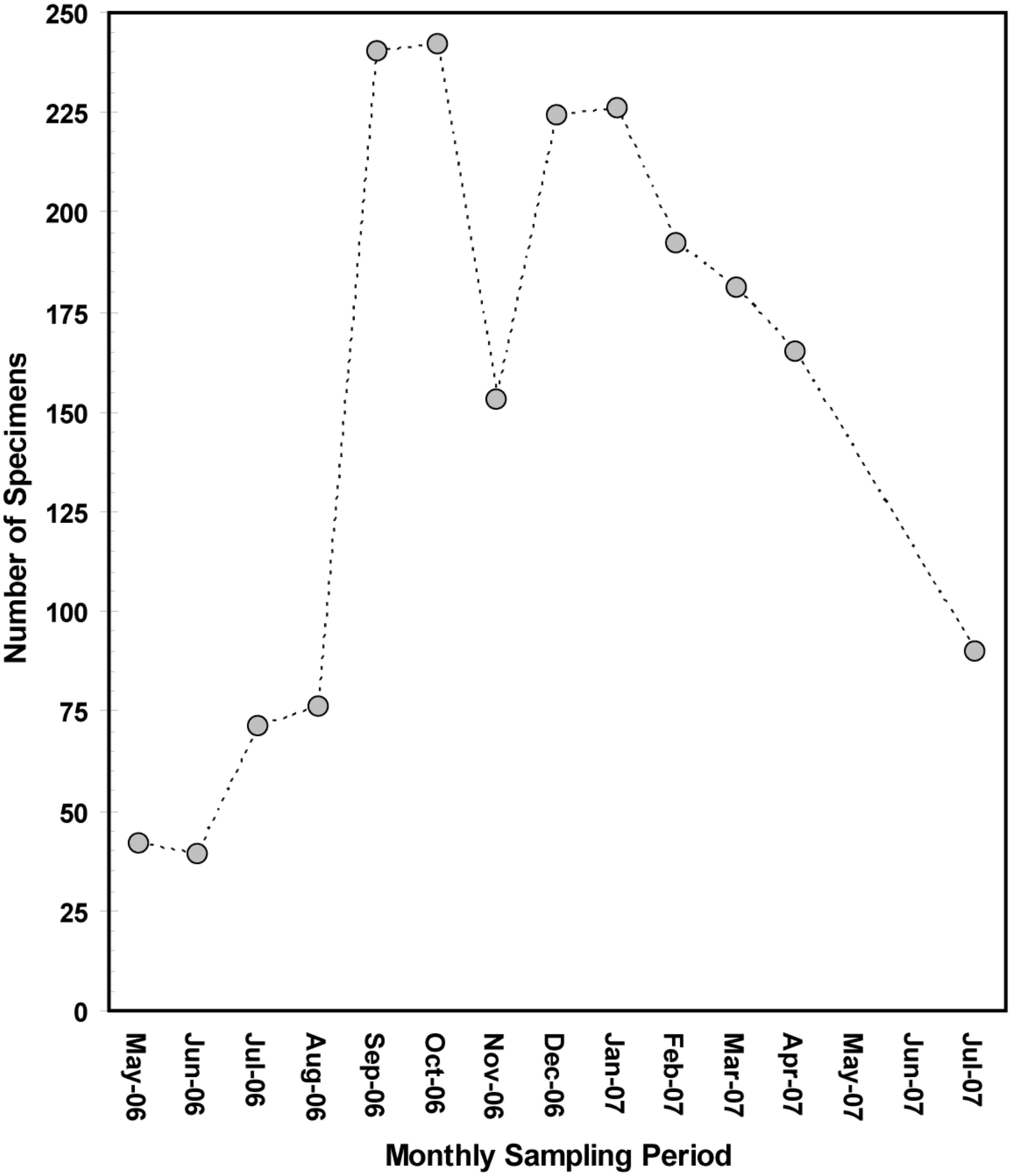


Figure 52. Total numbers of specimens observed in all sample plots in Lehman Caves, by month of sampling.

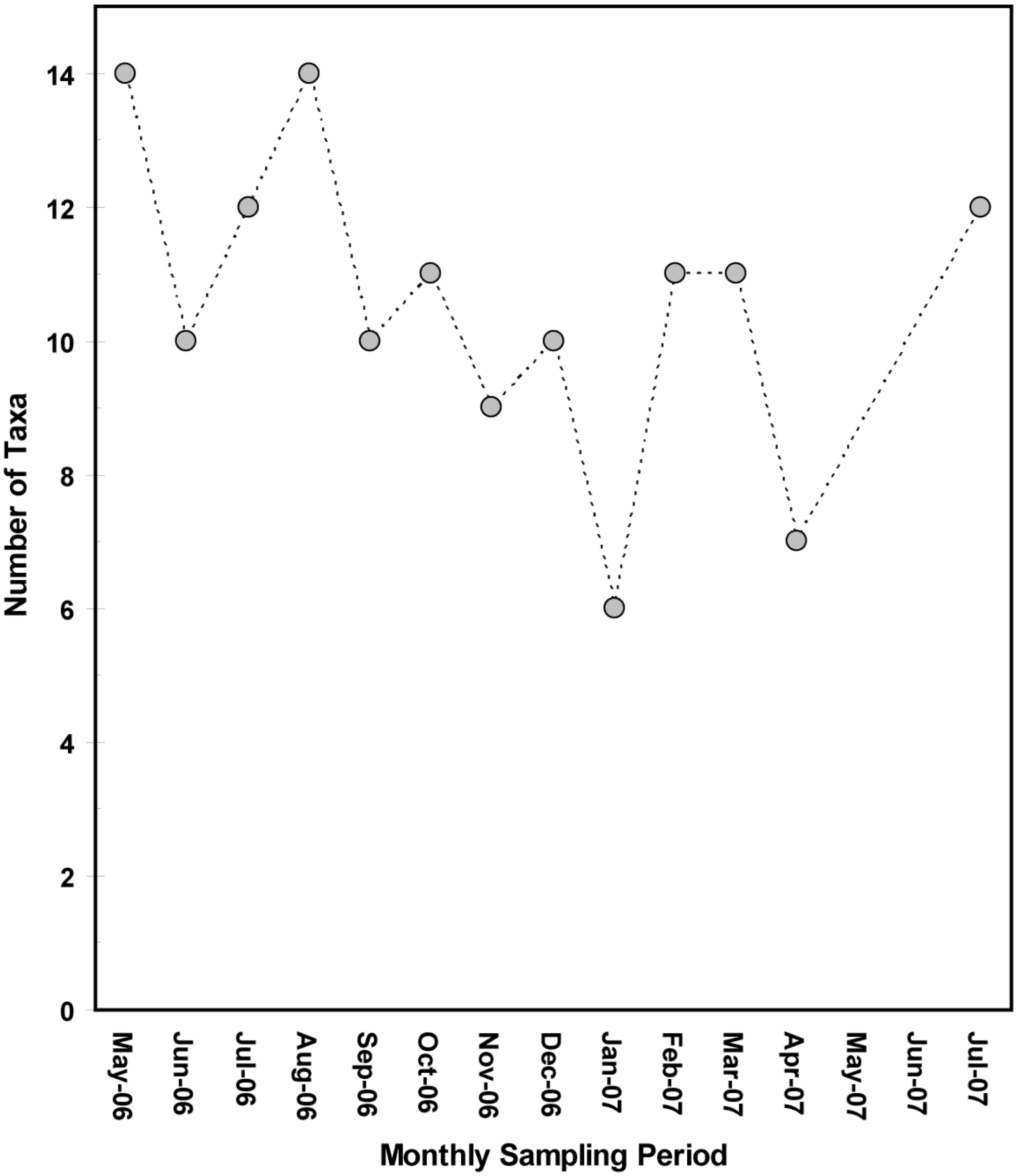


Figure 53. Total number of taxa observed in all sample plots in Lehman Caves, by month of sampling.

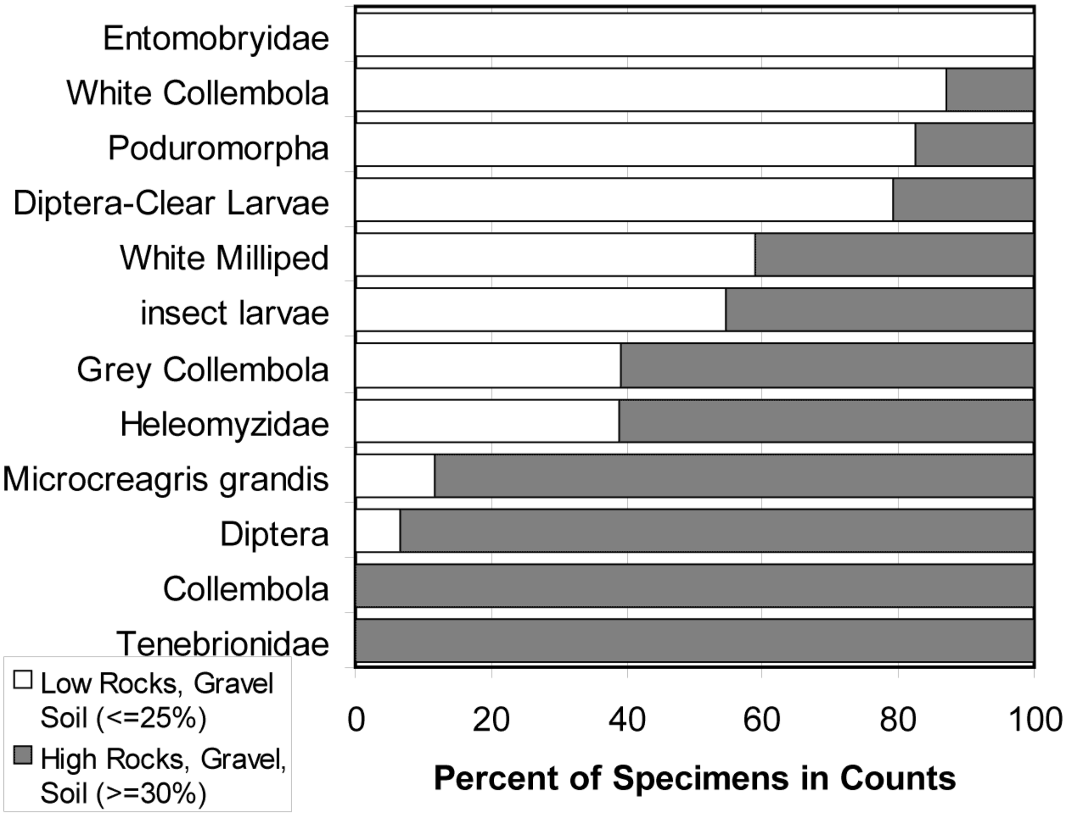


Figure 54. Proportion of substrate in timed-area searches that was classified, collectively, into the following six categories: Soil/Gravel + Gravel + Soil + Rocks/Soil + Rocks + Rocks Loose. If the cumulative total for these categories made up at least 30% of the substrate, the sampling site was classified as "High Rocks, Gravel, Soil," those with less as "Low Rocks, Gravel, Soil." Sample sizes for the selected taxa are: *Microcreagris grandis* (43), insect larvae (11), Tenebrionidae (10), Collembola (21), Grey Collembola (847), Poduromorpha (23), Entomobryidae (11), White Collembola (751), Diptera (15), Diptera-Clear Larvae (58), Heleomyzidae (31), and White Milliped (=undescribed Polydesmidae/Macrosternodesmidae) (39).

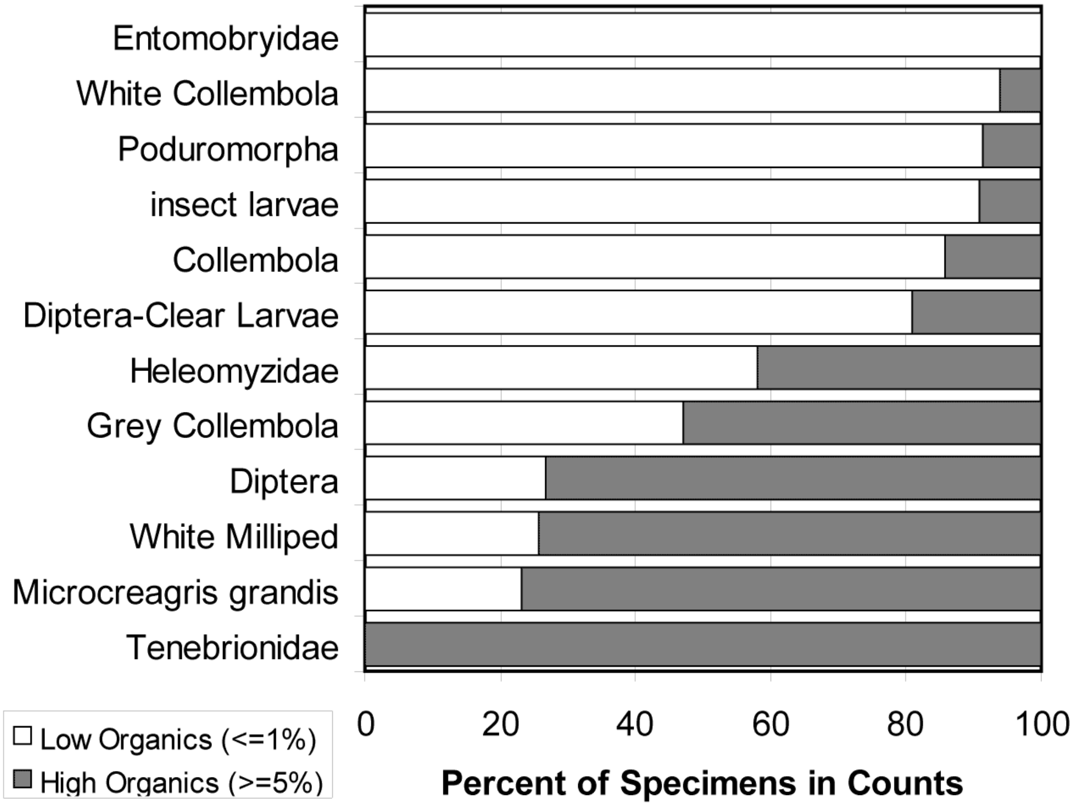


Figure 55. Proportion of substrate in timed-area searches that was classified, collectively, into the following four categories: Organics/Soil + Organics + Guano + Wood or Woody Debris. If the cumulative total for these categories made up at least 5% of the substrate, the sampling site was classified as "High Organics," those with less as "Low Organics." Sample sizes for the selected taxa are: *Microcreagris grandis* (43), insect larvae (11), Tenebrionidae (10), Collembola (21), Grey Collembola (847), Poduromorpha (23), Entomobryidae (11), White Collembola (751), Diptera (15), Diptera-Clear Larvae (58), Heleomyzidae (31), and White Milliped (=undescribed Polydesmidae/Macrosternodesmidae) (39).

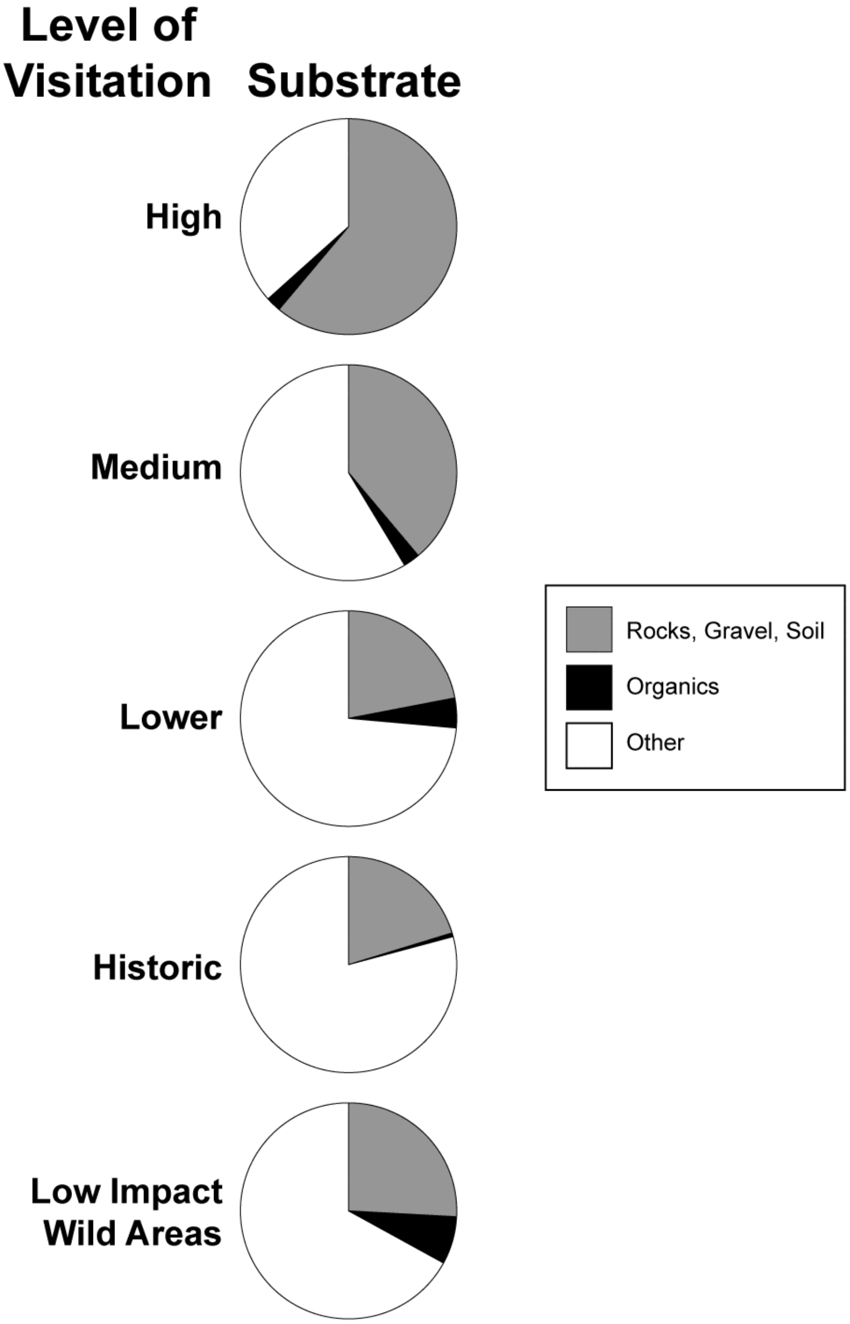


Figure 56. Level of visitation in relation to major substrate types for all sampling stations in Lehman Caves. Organics corresponds to field scored substrate types Organics/Soil + Organics + Guano + Wood or Woody Debris. Rocks, gravel, soil corresponds to field-scored substrate types Soil/Gravel + Gravel + Soil + Rocks/Soil + Rocks + Rocks Loose. Other corresponds to field scored substrate types Clay + Silt/Clay or Soil/Clay + Crushed Calcite/Gypsum + Rocks Embedded + Breakdown + Plastic, Metal, Electrical + Cement Trail + Bedrock + Bedrock/Calcite + Calcite. Number of sampling stations for each level of visitation, for which above proportions of major substrate types represents and average, are High, 2; Medium, 6; Lighter, 8; Historic, 6; and Low Impact Wild Areas, 8.

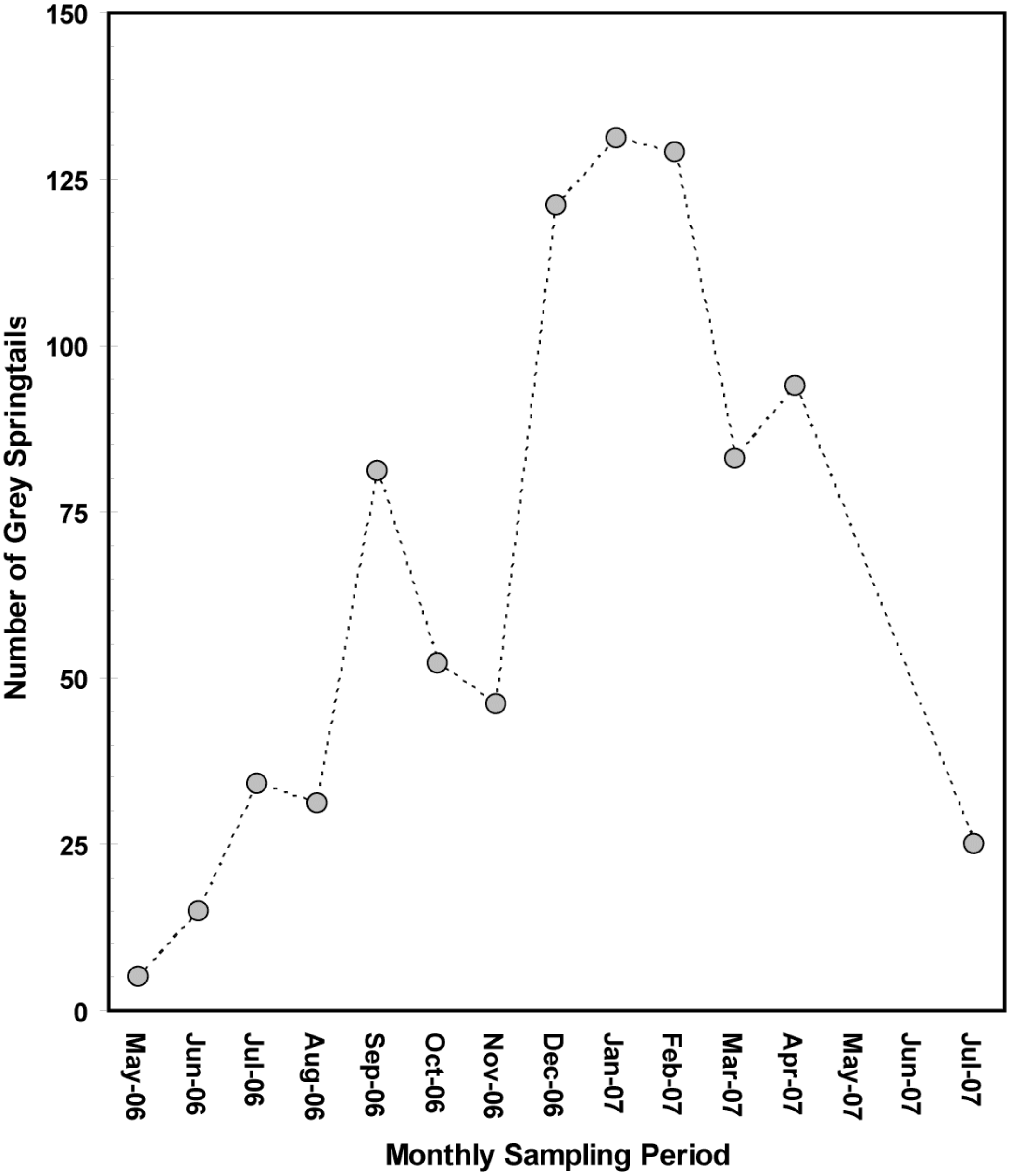


Figure 57. Abundance of grey springtails (Collembola) in Lehman Caves by sampling period, all sampling stations pooled.

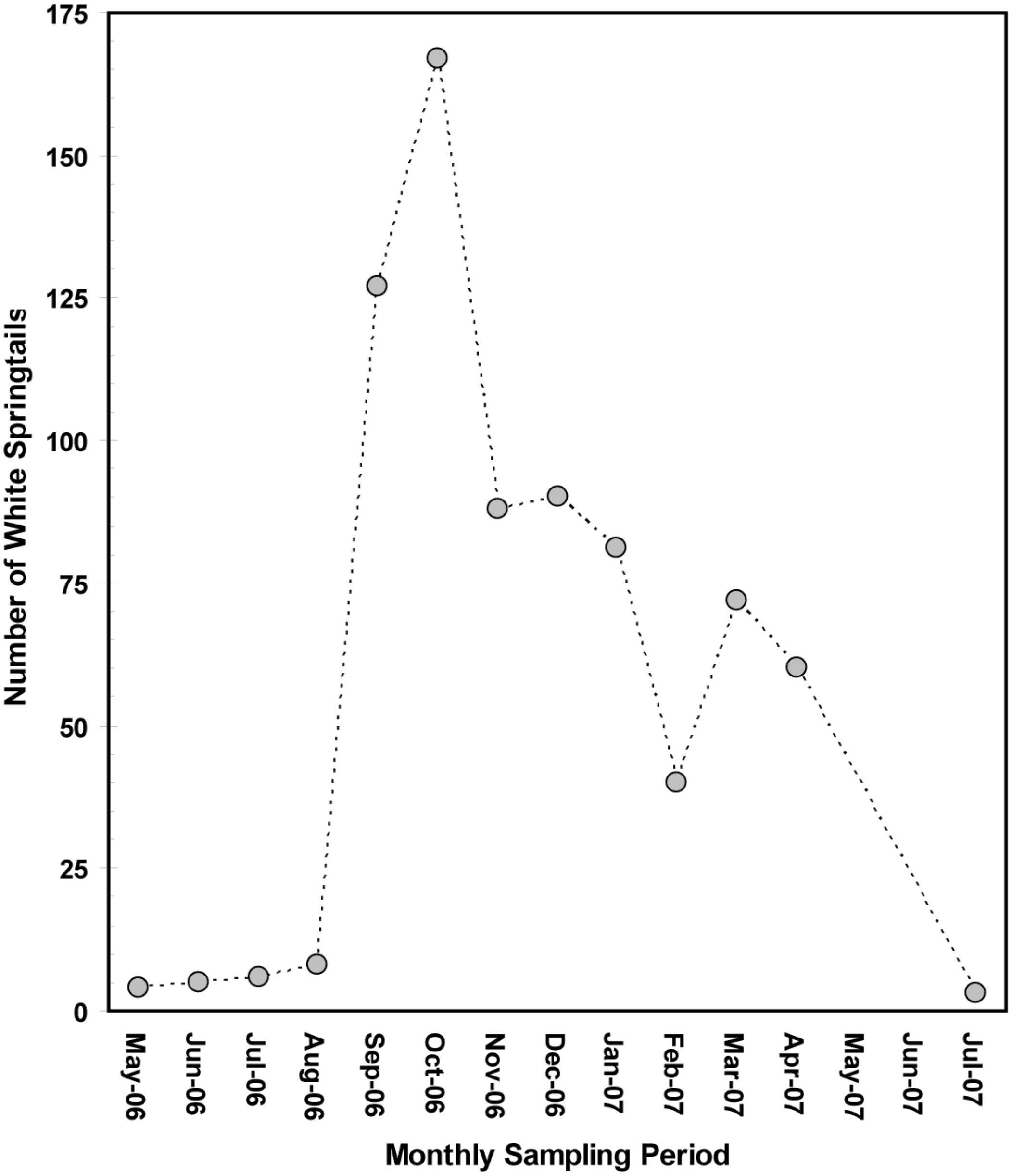


Figure 58. Abundance of white springtails (Collembola) in Lehman Caves by sampling period, all sampling stations pooled.

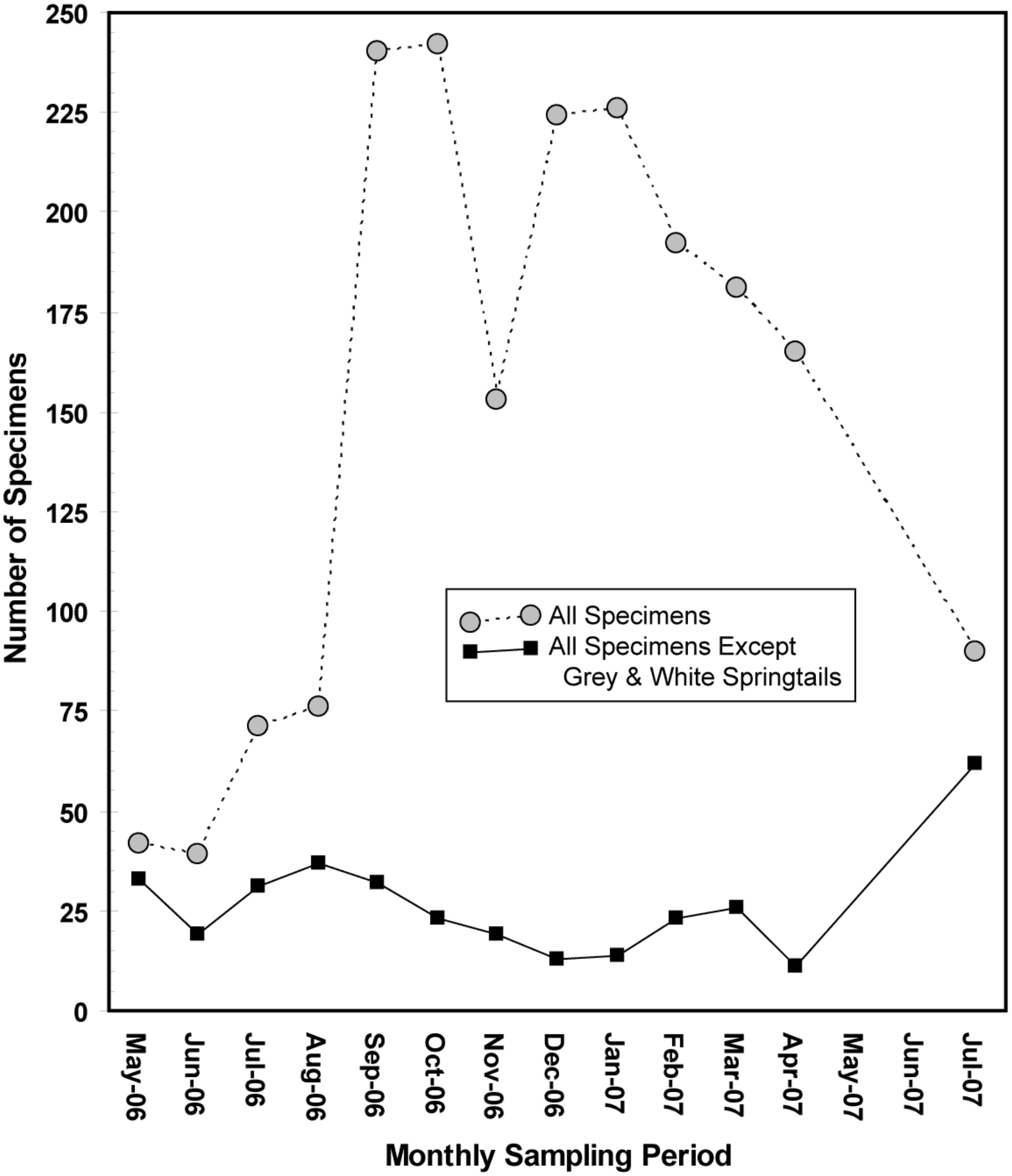


Figure 59. Abundance of cave fauna in Lehman Caves with (grey circles) and without (black squares) grey & white springtails (Collembola), by sampling period, all sampling stations pooled.

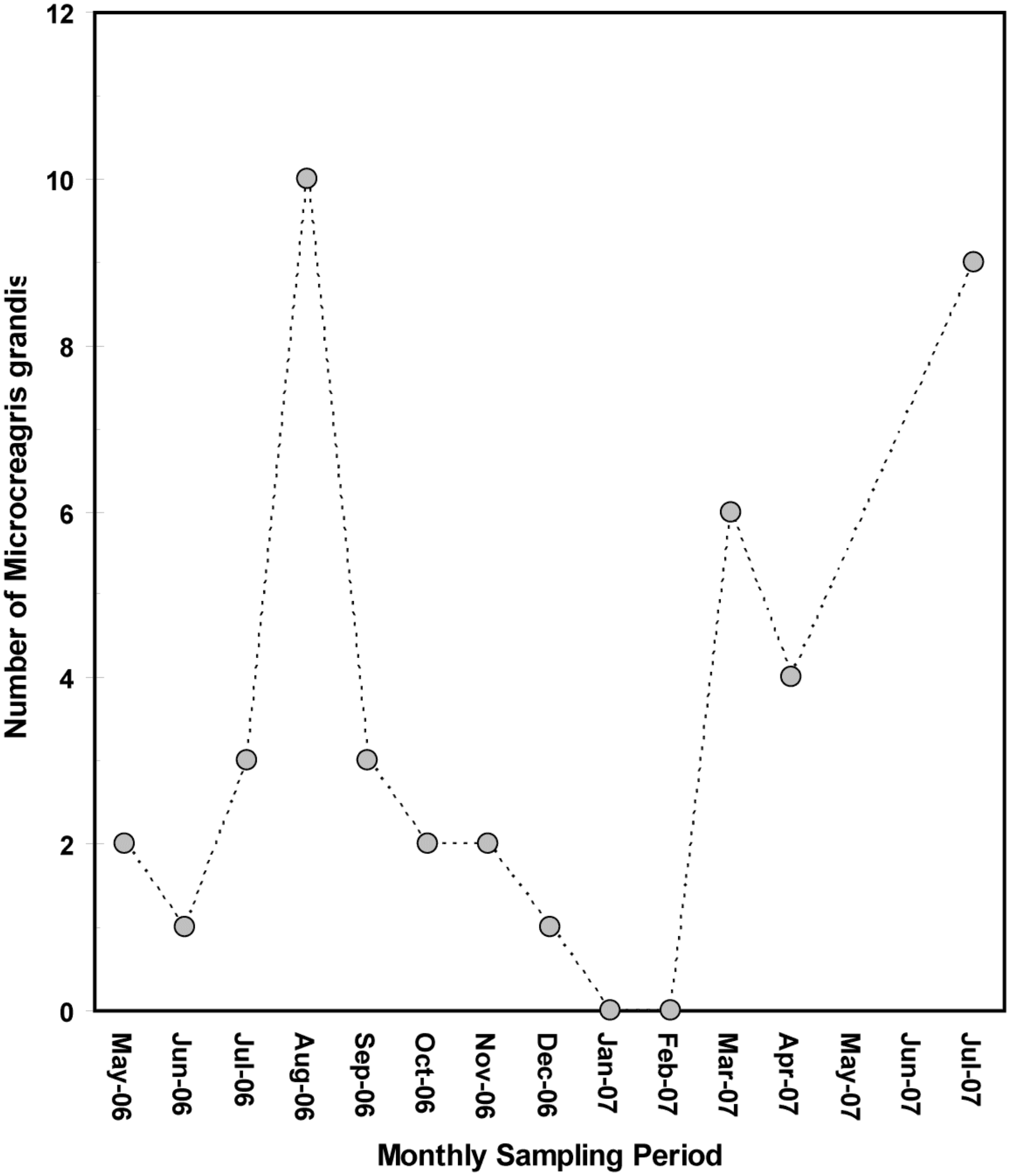


Figure 60. Abundance of *Microcreagris grandis* (Pseudoscorpionida) in Lehman Caves by sampling period, all sampling stations pooled.

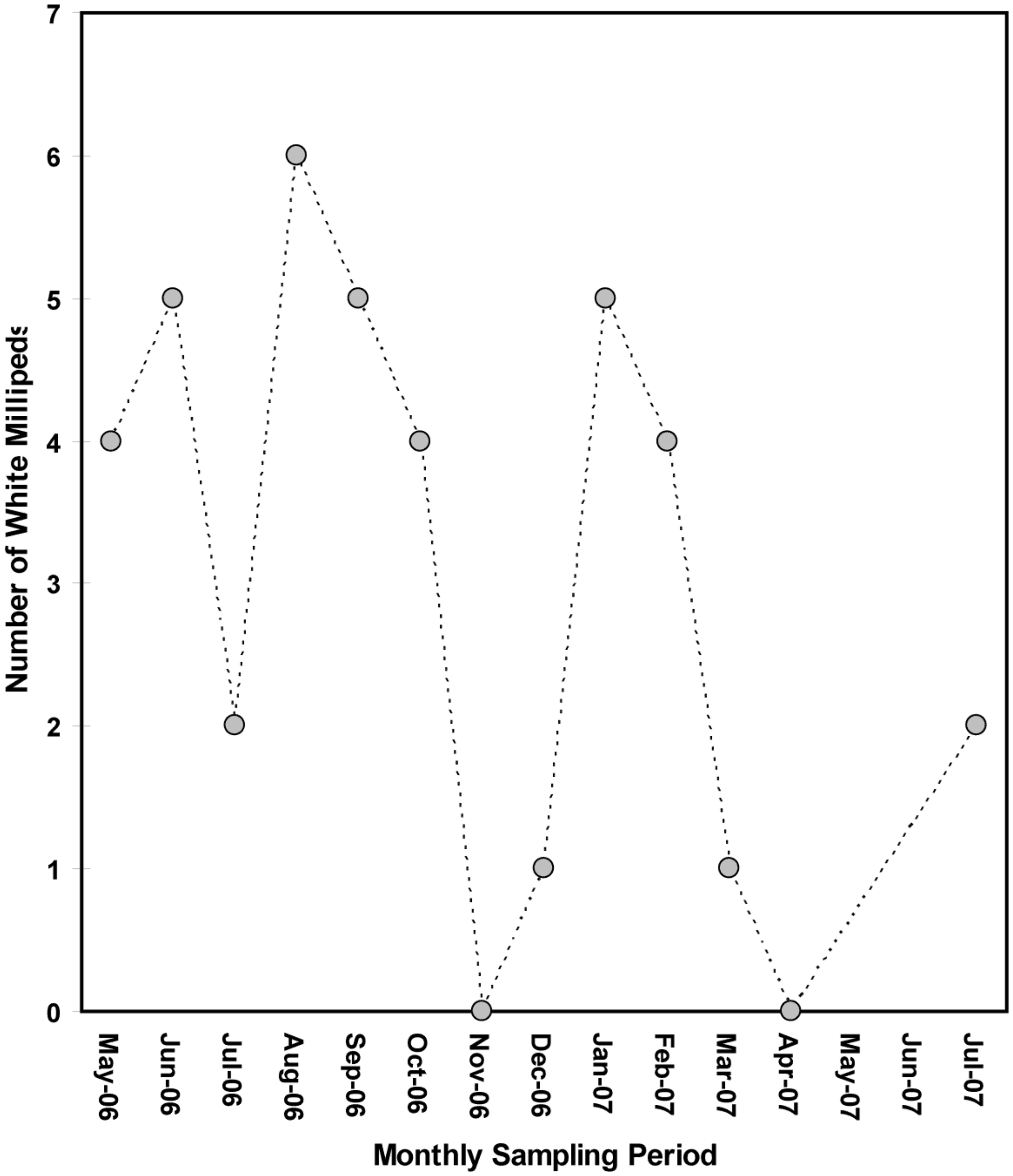


Figure 61. Abundance of the undescribed white millipede (nr. Polydesmidae-Macrosternodesmidae) in Lehman Caves by sampling period, all sampling stations pooled.

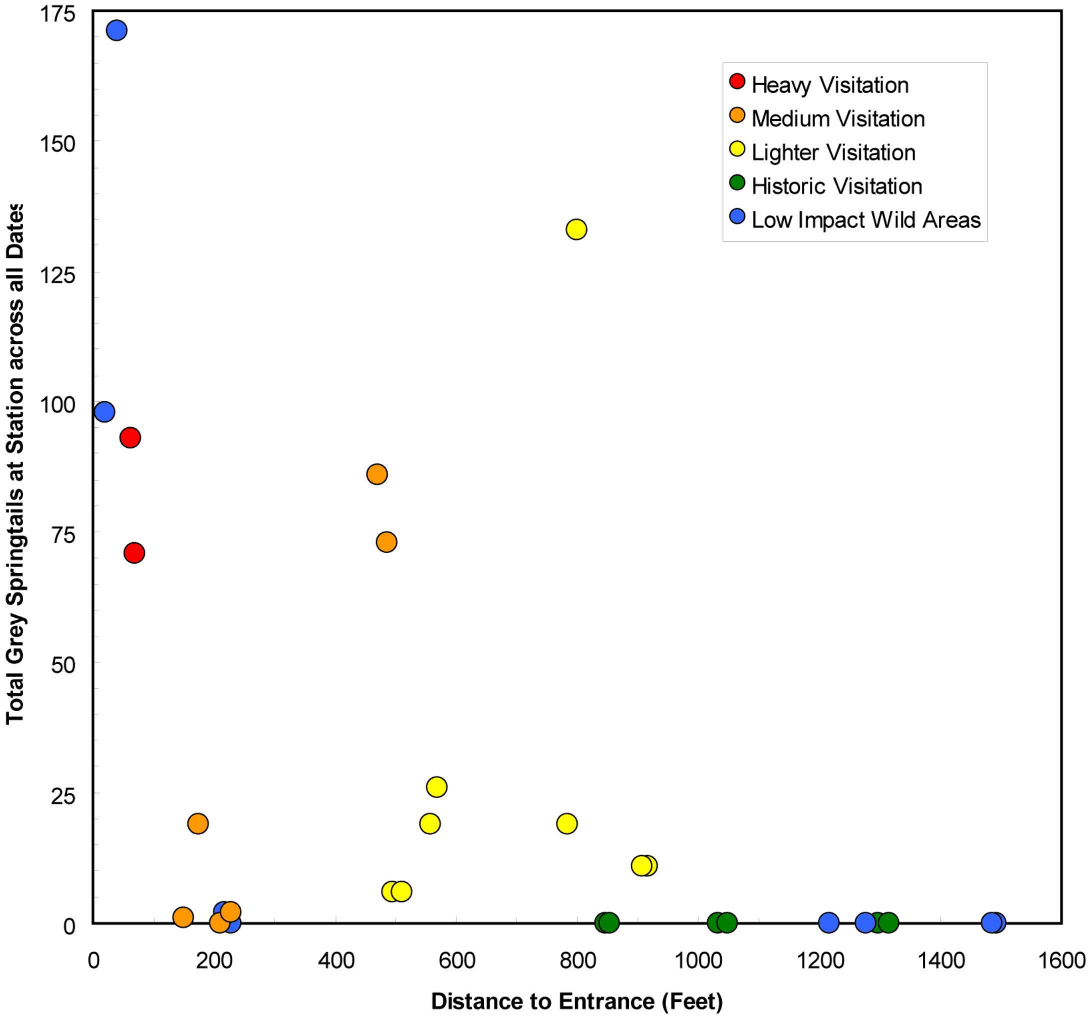


Figure 62. Relationship between the number of specimens of grey springtails at a station (across sampling dates) and distance from cave entrance, with level of visitation indicated.

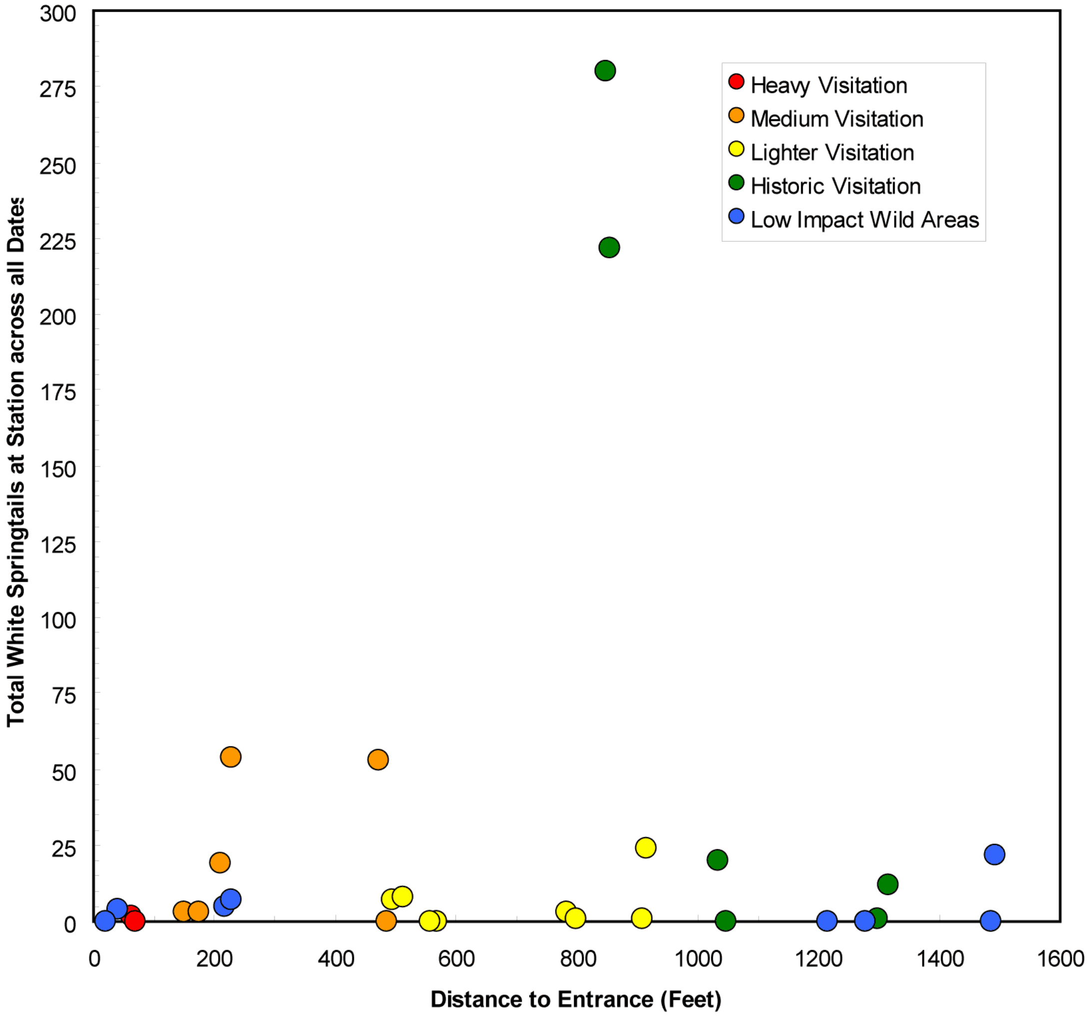


Figure 63. Relationship between the number of specimens of white springtails at a station (across sampling dates) and distance from cave entrance, with level of visitation indicated.

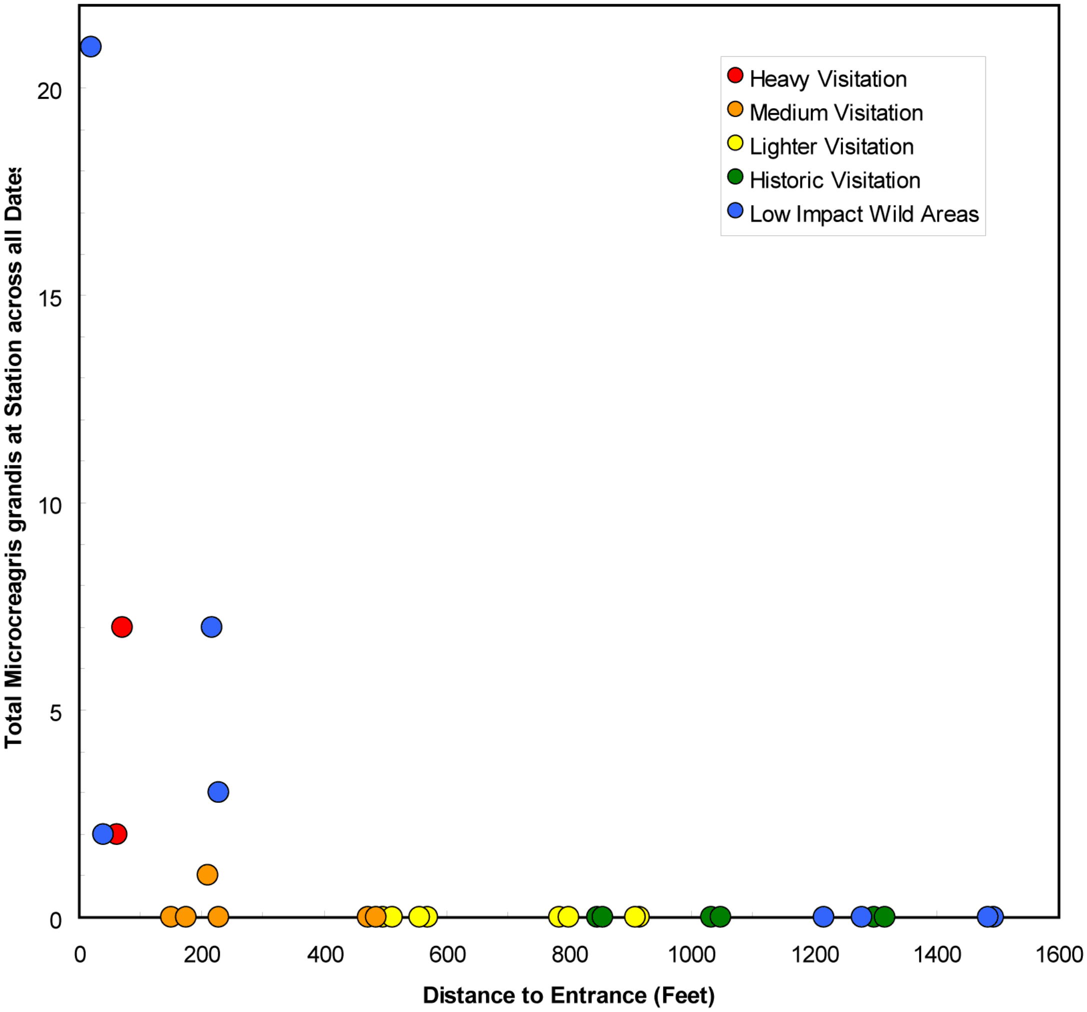


Figure 64. Relationship between the number of specimens of the pseudoscorpion *Microcreagris grandis* at a station (across sampling dates) and distance from cave entrance, with level of visitation indicated.

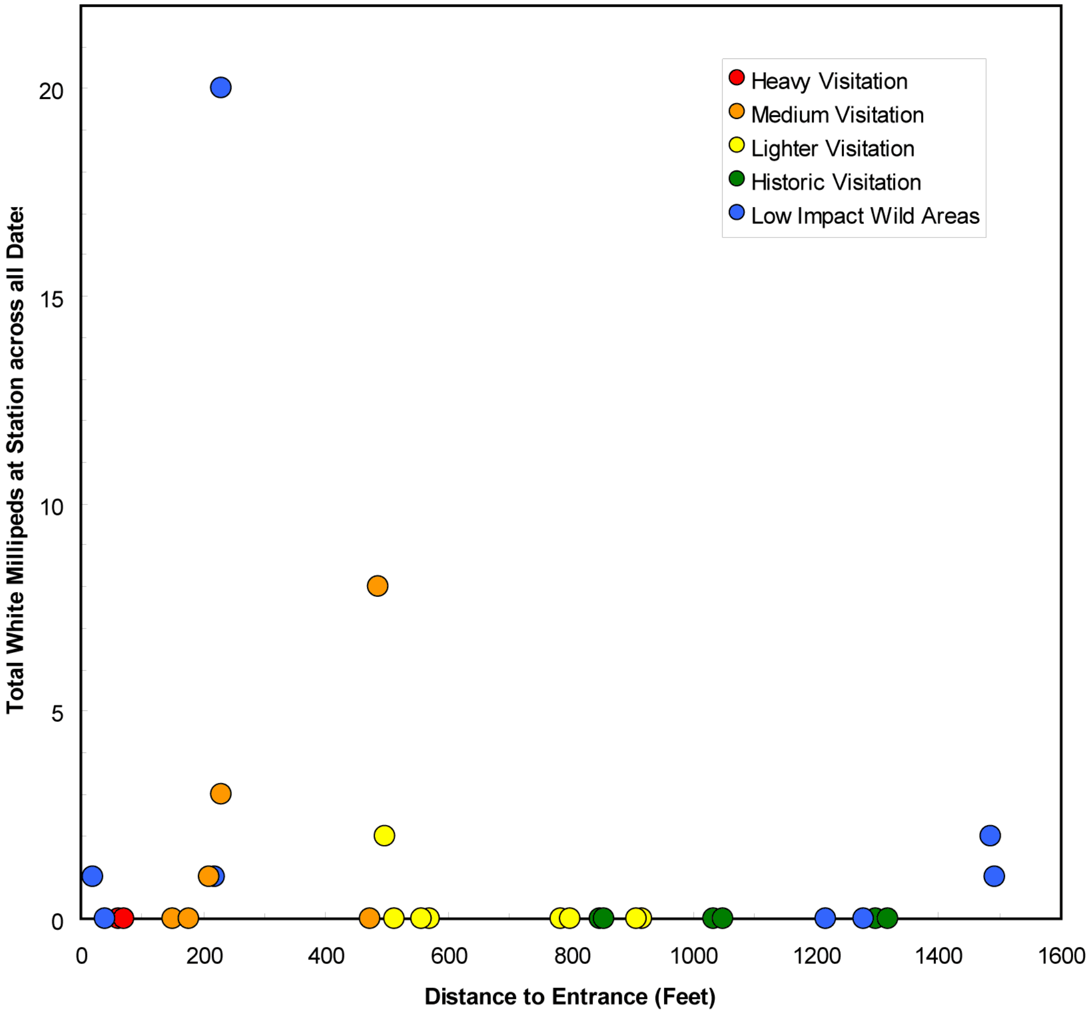


Figure 65. Relationship between the number of specimens the undescribed white milliped (nr. Polydesmidae-Macrosternodesmidae) at a station (across sampling dates) and distance from cave entrance, with level of visitation indicated.

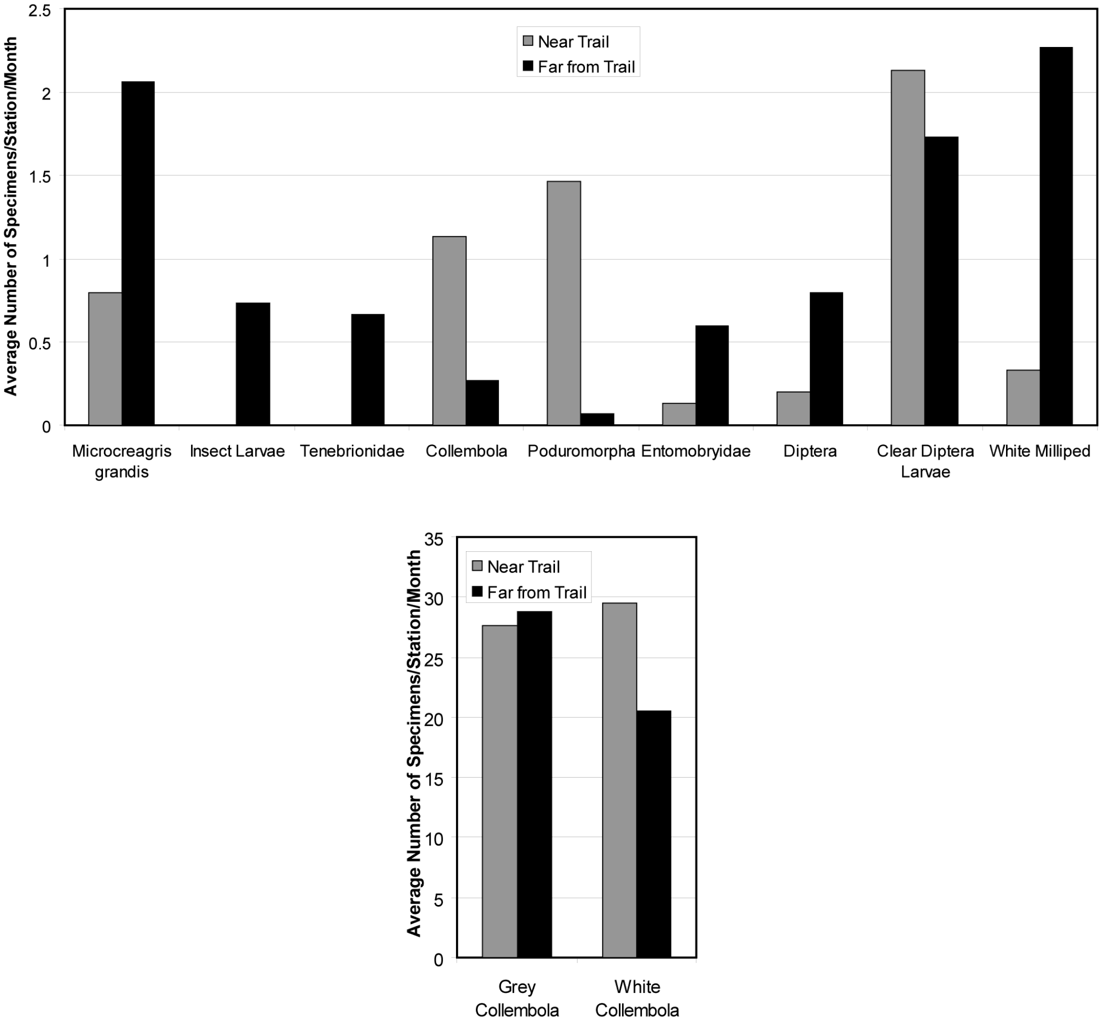


Figure 66. Relative abundance of selected taxa at stations near trail and far from trail, pooled across all sample dates. Sample sizes for the selected taxa are: *Microcreagris grandis* (43), insect larvae (11), Tenebrionidae (10), Collembola (21), Grey Collembola (847), Poduromorpha (23), Entomobryidae (11), White Collembola (751), Diptera (15), Diptera-Clear Larvae (58), Heleomyzidae (31), and White Milliped (undescribed Polydesmidae-Macrosternodesmidae) (39). Note difference in scale for Y axis in upper and lower parts of this figure.

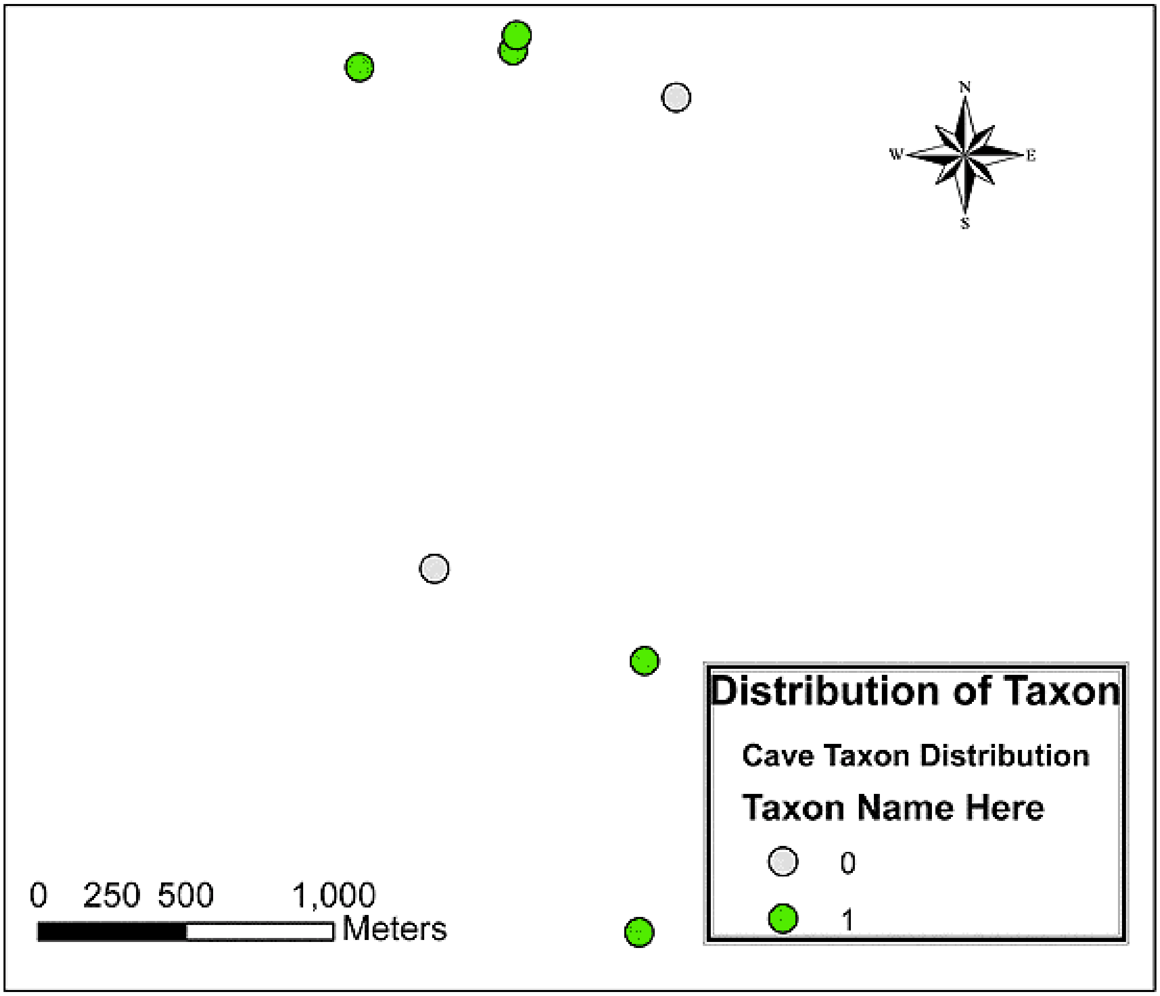


Figure 67. Distribution of a selected taxon in relation to the distribution of some caves at Great Basin National Park, as plotted in ArcGIS 9 using data file from the present study.

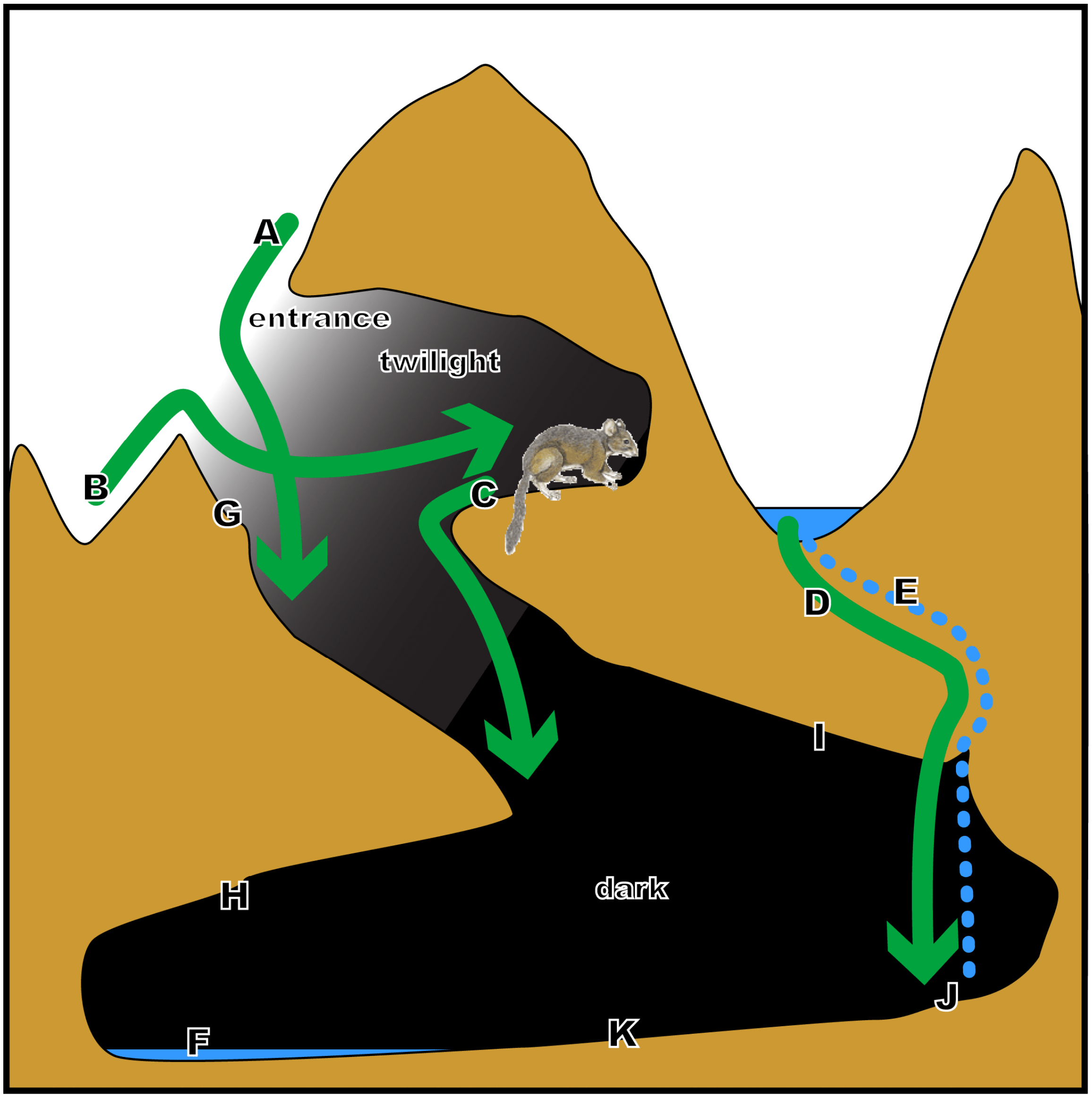


Figure 68. Generalized diagram of energy flow and major habitats in caves of Great Basin National Park. Green arrows represent generalized flow of energy into cave. Letters are discussed in text.

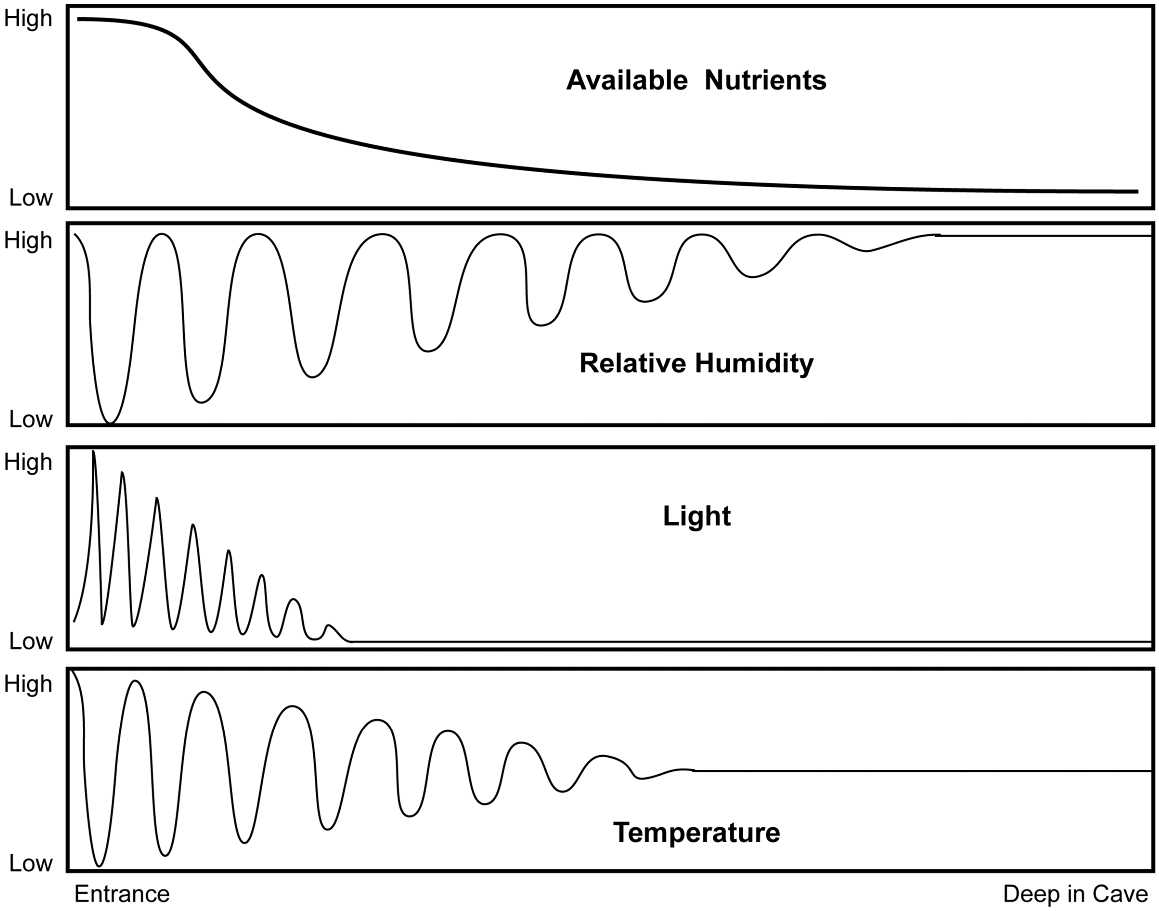


Figure 69. Effect of distance from entrance on available nutrients, humidity, light, and temperature in a hypothetical cave. Note that many caves are truncated – that is, elevated constant humidity may not ever be achieved.

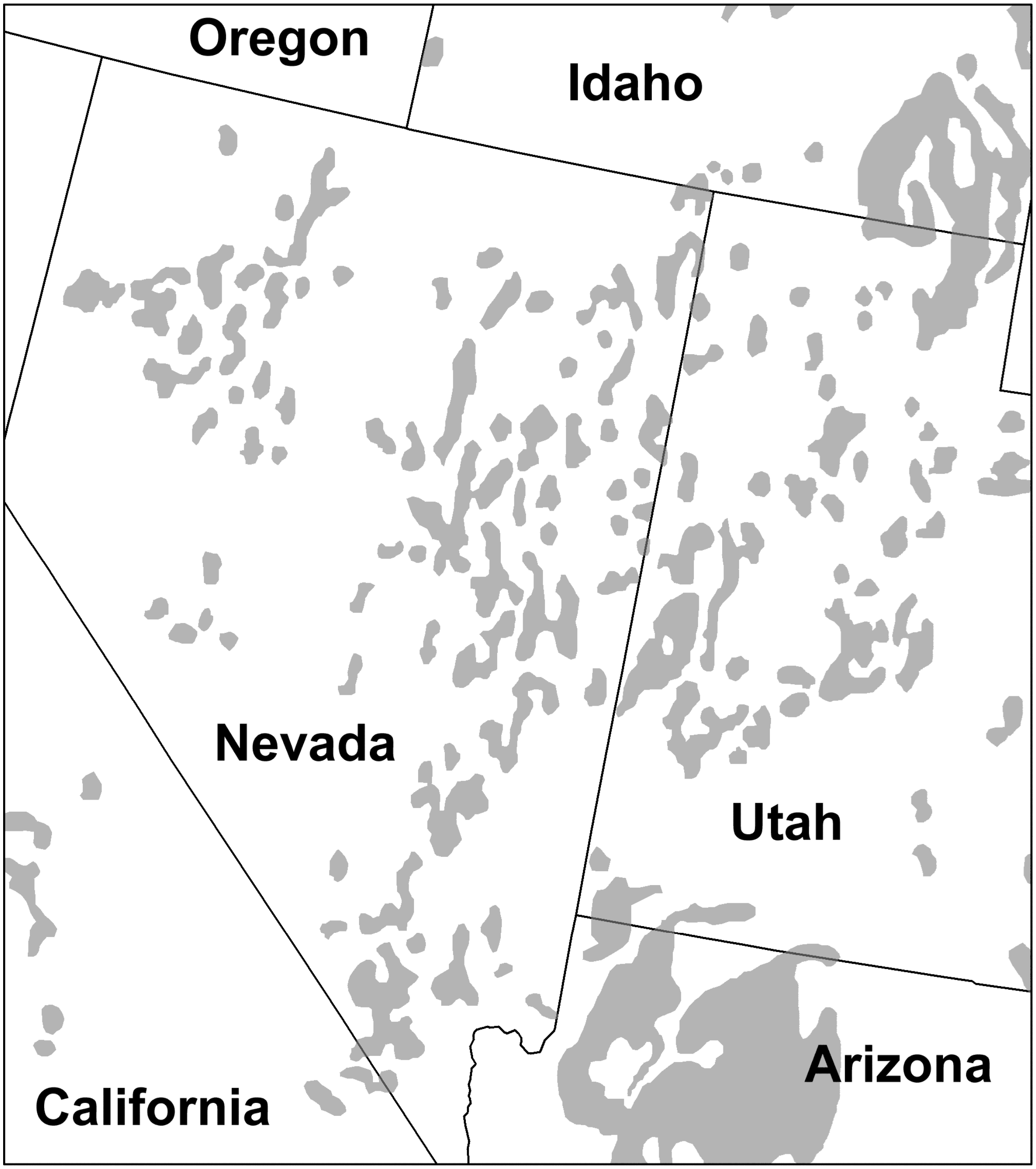


Figure 70. Exposed carbonate rocks in the Great Basin region. Modified after Veni (2002).

Figure 71. A water mite (Acari: Hydrachnidia) collected from Squirrel Spring Cave (27 February 2007).

Figure 72. The Model Cave Harvestman, *Cyptobunus ungulatus ungulatus* (Opiliones: Triaenonchidae) in Model Cave (May 2006).

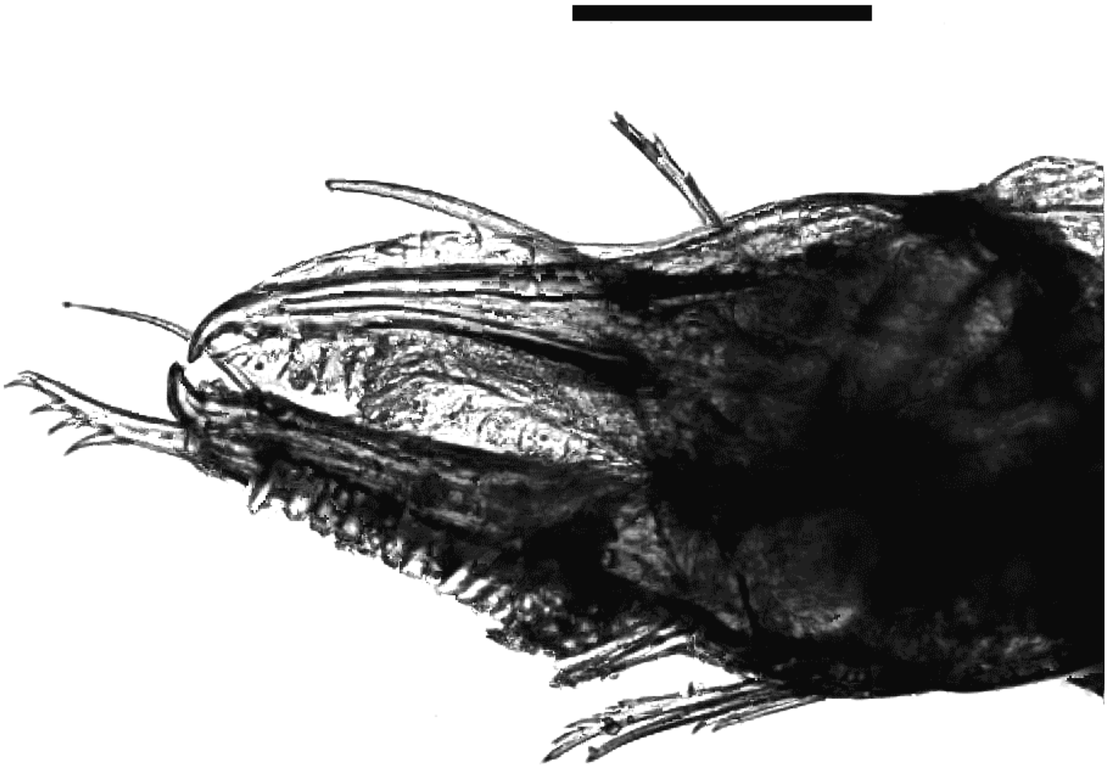


Figure 73. The chelicera of a chernetid pseudoscorpion collected from Fox Skull Cave (21 May 2006). Scale bar = 100 microns.

Figure 74. Late-instar nymph of *Microcreagris grandis* (Pseudoscorpionida : Neobisiidae) in Model Cave (22 May 2006).

Figure 75. ***Anyphaena*** **? sp. (Araneae: Anyphaenidae) in Squirrel Spring Cave (27 February 2007).**

Figure 76. *Hypsosinga*? sp. (Araneae: Araneidae) from the exit tunnel of Lehman Caves (27 February 2007).

Figure 77. Unidentified spider of the family Araneidae in Model Cave (22 May 2006).

Figure 78. A spider (family Dictynidae) in Lehman Caves (23 May 2006).

Figure 79. An adult male spider, tentatively identified as *Arcuphantes*? sp. (Linyphiidae), from Ice Cave (22 May 2006).

Figure 80. ***Maro*? sp. (Araneae: Linyphiidae) from Indian Burial Cave (28 February 2007).**

Figure 81. ***Physocyclus*? sp. (Araneae: Pholcidae) in the entrance tunnel of Lehman Caves (date unknown).**

Figure 82. Diplopoda: Polydesmida. Undescribed millipede, near families Polydesmidae/Macrosternodesmidae, from Little Muddy Cave (29 October 2007). Scale bar = 0.5 mm.

Figure 83. Undescribed milliped (near Polydesmidae/Macrosternodesmidae), Snake Creek Cave (21 May 2006).

Figure 84. ***Idagona lehmanensis*** **from Bristlecone Cave (top, 21 July 2007, Scale bar = 4.0 mm) and in Broken Cave (bottom, 16 July 2007).**

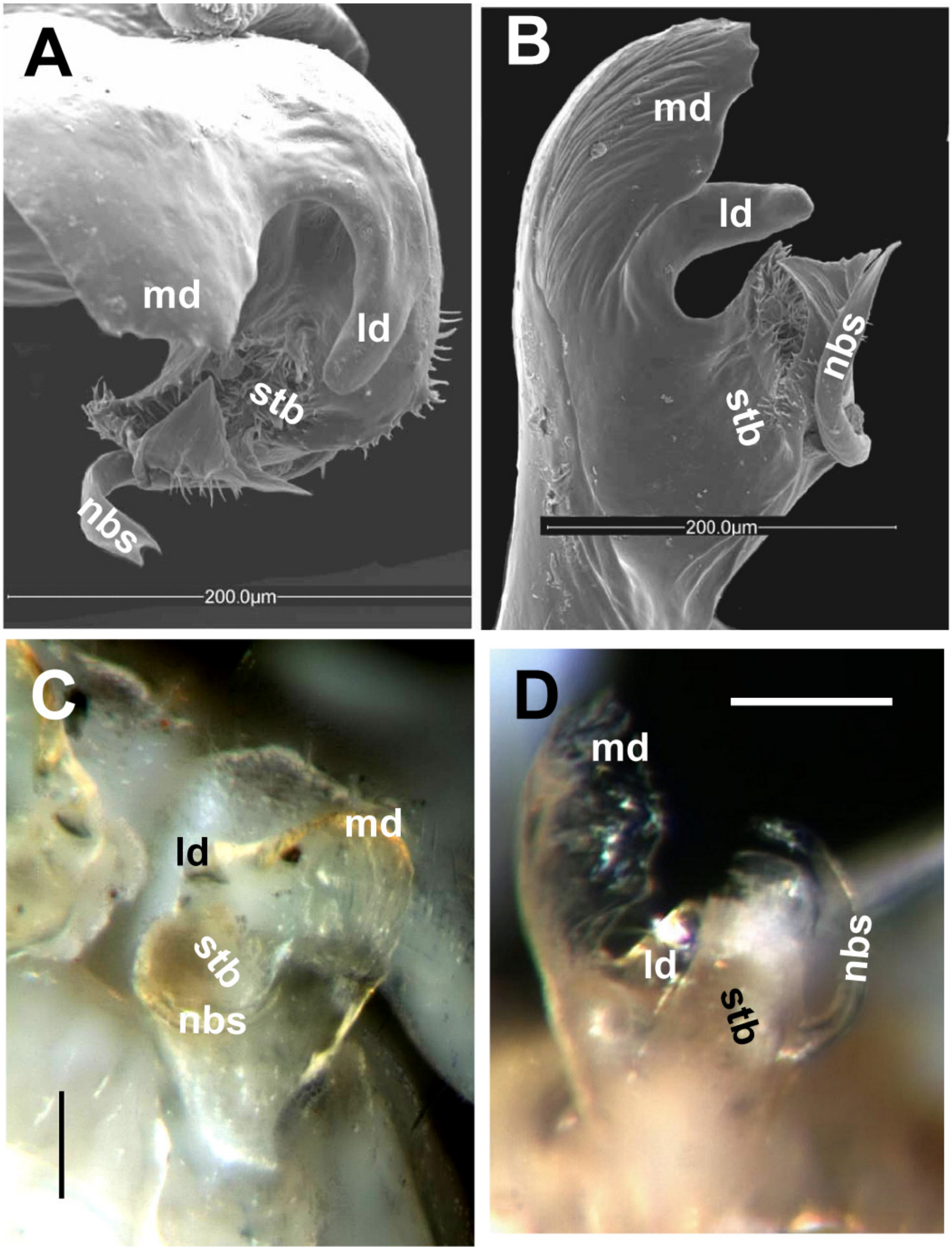


Figure 85. Anterior gonopod of *Idagona lehmanensis*. A, B – modified from Shear (2007) (Water Trough Cave, May 2006); C, D – this report (C-Lincoln Canyon Mine, 15 July 2007, NPS#6884. D-Broken Cave, 16 July 2007, NPS#6999). Scale bar in A, B=200 microns; in C, D=100 microns. Abbreviations: **ld**=lateral division of apex; **md**=median division of apex; **nbs**=narrow bifid subbranch of subterminal branch; **stb**=subterminal branch.

Figure 86. A globular springtail, *Arrhopalites* sp. (Collembola: Arrhopalitidae) on the surface film of a drip pool in Snake Creek Cave (21 May 2006).

Figure 87. ***Sinella*** **sp. (Collembola: Entomobryidae) from Snake Creek Cave (21 May 2006).**

Figure 88. *Eumesocampa*? sp. (Diplura: Campodeidae) from Root Cave (25 May 2006).

Figure 89. An adult female cave cricket, *Ceuthophilus* sp. (Orthoptera: Rhaphidophoridae) in Lehman Caves (24 May 2006).

Figure 90. Silken fungus beetle (family Cryptophagidae) in Lehman Caves (1 March 2007).

Figure 91. ***Hydroporus*** **sp. (Coleoptera: Dytiscidae) from the terminal sump pool of Squirrel Spring Cave (2 March 2007).**

Figure 92. A rove beetle (Staphylinidae) in Lehman Caves (27 February 2007).

Figure 93. Darkling beetle (Coleoptera : Tenebrionidae) in Snake Creek Cave (top, 21 May 2006) and *Eleodes hispilabris sculptilis* Blaisdell in Indian Burial Cave (bottom, 3 March 2007).

Figure 94. Undetermined caddis fly (Trichoptera) case from Squirrel Spring Cave (2 March 2007).

Figure 95. Milbert's Tortoiseshell, *Aglais milberti* (Nymphalidae) roosting on the ceiling of Broken Cave (16 July 2007).

Figure 96. A tineid moth in Indian Burial Cave (3 March 2007).

Figure 97. Adult heleomyzid fly on bedrock wall in Model Cave (22 May 2006).

Figure 98. A dead sciarid fly found during census of Lehman Caves (27 February 2007).

Figure 99. Dead snake, possibly a gopher snake, in Indian Burial Cave (3 March 2007).

Figure 100. A Great Basin Rattlesnake, *Crotalus viridis lutosus*, just inside the entrance of Lehman Annex Cave (25 May 2006).

Figure 101. A dead black-tailed jack rabbit, *Lepus californicus deserticola*, in Indian Burial Cave (3 March 2007).

Figure 102. Dead kit fox, *Vulpes macrotis nevadensis*, in Indian Burial Cave (3 March 2007).

Figure 103. Unidentified dead bat (Vespertilionidae) in Indian Burial Cave (3 March 2007).

Figure 104. Townsend's Big-Eared Bat high on a wall (telephoto shot) in Indian Burial Cave (3 March 2007).

Tables

Table 1. Summary of cave visits which provided data for this report.

Cave	Crew	Date
Bristlecone Cave	Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C Thomas, Loran Reinhold	11-Jul-07
Bristlecone Cave	Jean K. Krejca, Meg A. Horner, Michael E. Slay, Shawn C. Thomas	21-Jul-07
Broken Cave	Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C. Thomas	10-Jul-07
Broken Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay, Mathew Baker, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner	16-Jul-07
Cave 24	Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C. Thomas	9-Jul-07
Cave 24	Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C. Thomas, Gretchen M. Baker, Steven J. Taylor	17-Jul-07
Cave Valley Cave	Gretchen M. Baker, Steve Deveny, Kristine Deveny, Johnathan Deveny, Jeremy Deveny, Rick Bowersox	30-Sep-06
Fissure Cave	Ben M. Roberts, Michael E. Slay, Christy A.M. Slay	16-Jul-07
Fox Skull Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay	21-May-06
Fox Skull Cave	Gretchen M. Baker, Meg A. Horner, Christy A. Moerbe	24-Oct-06
Ice Cave	Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner	22-May-06
Ice Cave	Meg A. Horner, Gretchen M. Baker	24-May-06
Ice Cave	Gretchen M. Baker, Meg A. Horner, Brittany L. Timm	2-Oct-06
Indian Burial Cave	Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor	28-Feb-07
Indian Burial Cave	Steven J. Taylor, Jean K. Krejca	3-Mar-07
Lehman Annex Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Ben M. Roberts, Meg A. Horner	25-May-06
Lehman Caves	Gretchen M. Baker	25-Jan-06
Lehman Caves	Gretchen M. Baker, Meg A. Horner, Bryan R Petrytl	16-Mar-06
Lehman Caves	none specified	24-Apr-06
Lehman Caves	Gretchen M. Baker	27-Apr-06
Lehman Caves	Gretchen M. Baker	15-May-06
Lehman Caves	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner	23-May-06
Lehman Caves	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker	26-May-06
Lehman Caves	Gretchen M. Baker, Meg A. Horner	22-Jun-06
Lehman Caves	Gretchen M. Baker, Ben M. Roberts, Mark Kirtley	24-Jul-06
Lehman Caves	Gretchen M. Baker, Meg A. Horner, Billie O'Doan	25-Jul-06

Table 1. Continued.

Cave	**Crew**	**Date**
Lehman Caves	Gretchen M. Baker, Christy A. Moerbe, Brittany L. Timm	21-Aug-06
Lehman Caves	Gretchen M. Baker, Meg A. Horner, Loren Reinhold	22-Aug-06
Lehman Caves	Gretchen M. Baker	25-Sep-06
Lehman Caves	Gretchen M. Baker	26-Sep-06
Lehman Caves	Meg A. Horner, Gretchen M. Baker, Jonathan Hurst	27-Oct-06
Lehman Caves	Gretchen M. Baker, Meg A. Horner	27-Nov-06
Lehman Caves	Meg A. Horner, Ben M. Roberts	18-Dec-06
Lehman Caves	Meg A. Horner, Gretchen M. Baker	19-Dec-06
Lehman Caves	Meg A. Horner, Gretchen M. Baker, Ben M. Roberts, RaeJean Layland	19-Jan-07
Lehman Caves	Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor	27-Feb-07
Lehman Caves	Meg A. Horner, Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor	28-Feb-07
Lehman Caves	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay, Meg A. Horner	19-Jul-07
Lincoln Canyon Mine (Drumming and Miner’s Massacre)	Ben M. Roberts, Meg A. Horner, Patrick M. O’Brien	5-Jul-07
Lincoln Canyon Mine (Drumming and Miner’s Massacre)	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay	15-Jul-07
Little Muddy Cave	Meg A. Horner, Ben M. Roberts, Christy A. Moerbe	14-Nov-06
Little Muddy Cave	Gretchen M. Baker, Meg A. Horner	29-Oct-07
Long Cold Cave	Meg A. Horner	4-Sep-07
Model Cave	Gretchen M. Baker	27-Jan-06
Model Cave	Gretchen M. Baker, Meg A. Horner	2-Feb-06
Model Cave	Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner	22-May-06
Model Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Meg A. Horner, Gretchen M. Baker	24-May-06
Model Cave	Gretchen M. Baker, Meg A. Horner, Brittany L. Timm	2-Oct-06
Model Cave	Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor	1-Mar-07
Mountain View Cave	Ben M. Roberts, Meg A. Horner, Shawn C. Thomas	10-Jul-07
Mountain View Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay, Patrick M. O’Brien, Ben M. Roberts	18-Jul-07
Pine Cone Cave	Ben M. Roberts, Meg A. Horner, Patrick M. O’Brien, Shawn C. Thomas	9-Jul-07

Table 1. Concluded.

Cave	**Crew**	**Date**
Pine Cone Cave	Jean K. Krejca, Meg A. Horner, Michael E. Slay, Christy A.M. Slay, Ben M. Roberts	17-Jul-07
Root Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts	25-May-06
Root Cave	Gretchen M. Baker, Christy A. Moerbe, Jay Anderson, Ross Anderson	17-Oct-06
Snake Creek Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay	21-May-06
Snake Creek Cave	Meg A. Horner, Gretchen M. Baker, Christy A. Moerbe	24-Oct-06
Squirrel Spring Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay	21-May-06
Squirrel Spring Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay	27-May-06
Squirrel Spring Cave	Gretchen M. Baker, Meg A. Horner, Christy A. Moerbe	24-Oct-06
Squirrel Spring Cave	Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor	27-Feb-07
Squirrel Spring Cave	Jean K. Krejca	2-Mar-07
Water Trough Cave	Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Meg A. Horner,	24-May-06
Water Trough Cave	Gretchen M. Baker, Meg A. Horner, Ben M. Roberts, RaeJean Layland	8-Nov-06

Table 2. Summary of taxon presence and absence at caves inventoried during this study. Level of certainty in identifications is indicated in the body of the text (for example, some spider genera are only tentative identifications).

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
Mollusca: Gastropoda	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0
Nematoda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Annelidda: Clitellata: Opisthophora	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
Ostracoda	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Isopoda	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Acari	1	1	1	0	1	0	0	1	0	1	1	0	0	1	0	0	1	1	0	1	1
Ixodidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Hydrachnidia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Orabatoidea	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Rhagidiidae	0	1	0	0	0	1	1	0	0	1	1	0	0	1	1	1	0	0	0	1	1
Trombidiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Phalangiidae: *Olioglophus* sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
***Leiobunum* sp.**	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
Cyptobunus ungulatus ungulatus	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Pseudoscorpion	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Troglomorphic Pseudoscorpion	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. Continued.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
Chernetidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Microcreagris grandis	0	0	1	0	0	1	0	0	1	1	0	0	0	1	0	0	1	0	0	1	1
Araneae	0	0	1	0	0	1	0	0	0	1	1	0	0	1	1	1	1	0	0	1	1
Aegelenidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Hololena sp.	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0
Amaurobiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
***Callobius* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
***Anyphaena* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Araneidae	1	1	1	0	0	1	0	0	0	0	1	0	0	1	0	0	0	0	0	0	0
Araneus sp.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
***Hypsosinga* sp.**	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
***Neoscona* sp.**	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Cybaeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Dyctinidae	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
***Gnaphosa* sp.**	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Linyphiidae	0	0	1	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0
***Arcuphantes* sp.**	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0
***Maro* sp.**	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. Continued.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
***Physocyclus* sp.**	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
***Xysticus* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Scutigerellidae	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Geophilidae	1	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
Lithobiidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Diplopoda	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Polydesmidae/Macrosternodesmidae	0	0	0	0	0	0	0	1	0	1	0	1	0	1	0	0	0	0	1	0	0
Idagona lehmanensis	1	1	1	0	0	0	0	0	0	0	1	0	0	1	0	1	0	0	0	1	1
Collembola	1	0	1	0	1	1	1	0	1	1	1	0	0	1	0	0	0	0	0	0	1
***Arrhopalites* sp.**	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	1	0	0
***Entomobrya* sp. 1**	0	0	0	0	0	1	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
***Entomobrya* sp. 2**	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1
***Pseudosinella* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
***Sinella* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
***Acherontiella* sp.**	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0
***Desoria* sp. 1**	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0
***Desoria* sp. 2**	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***Folsomia* sp.**	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0

Table 2. Continued.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
***Isotoma* sp.**	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0
***Oncopodura* sp.**	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
Tullberginae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Onychiurinae	1	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
***Tomocerus* sp.**	1	1	1	0	1	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	0
Diplura	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1
Campodeidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
***Eumesocampa* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
***Metriocampa* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Microcoryphia	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1
***Pedetontus* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
***Hypomachilodes* sp.**	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Ephemeroptera	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Baetidae	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Heptageneiidae	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Siphlonuridae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plecoptera	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Orthoptera	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. Continued.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
***Ceuthophilus* sp.**	0	0	1	1	0	0	0	0	1	1	0	0	0	1	0	1	1	1	1	0	0
***Spelektor* sp.**	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
Homoptera	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cercopidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cicadellidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Cixiidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***Pangaeus* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Thyreocoridae	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Coleoptera	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	0	0	1
Ptininae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Byrrhidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
***Malthodes* sp.**	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***Bembidion* sp.**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Harpalus animosus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Pterostichus protractus	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Alticini	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Colydiidae	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cryptophagidae	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	1	0	0	0	0

Table 2. Continued.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
Curculionidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Dermestidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
***Hydroporus* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Elateridae	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Lathridiidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Leiodidae	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Playtypsyllinae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Nitidulidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
***Phyllophaga* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Scolytidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Staphylinidae	0	0	1	0	0	1	1	1	0	1	1	0	0	0	0	1	0	0	0	1	1
Tenebrionidae	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0
Eleodes hispilabris	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0
Trogossitidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Trichoptera	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1
Limnephilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Rhyacophilidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Lepidoptera	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	1	1

Table 2. Continued.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
Acrolophidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Alucitidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Noctuidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	1	0	1	0	0	1
Aglais milberti	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Tineidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Siphonaptera	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0
Cynipidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Formicidae	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	0	0	0
***Camponotus* sp.**	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	1	0	0	0	0	1
***Forelius* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
***Formica* sp.**	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Ichneumonidae	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0
Platygastridae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Pompilidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
***Vespula* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Diptera	1	1	1	1	0	1	1	1	1	1	1	0	0	1	1	0	1	0	0	1	1
Chironomidae	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
***Eukiefferiella* sp.**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table 2. Continued.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
Chloropidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Culicidae	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dixidae	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
Drosophilidae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
Empididae	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
***Ochthera* sp.**	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Heleomyzidae	1	1	1	0	1	0	1	1	0	1	1	0	0	1	1	0	0	0	1	1	1
Mycetophilidae	0	1	0	0	0	1	0	0	0	0	1	0	0	0	1	1	0	0	0	1	0
Phoridae	0	1	1	0	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0
Sciaridae	1	0	1	0	0	1	1	1	1	1	1	0	0	1	0	1	1	0	0	1	1
Simuliidae	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Sphaeroceridae	0	1	1	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	1	1
Tipulidae	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
Tichoceridae	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Chordata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Squamata	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Crotalus viridis lutosus	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
Selasphorus platycerus	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0

Table 2. Concluded.

Taxon	**Bristlecone Cave**	**Broken Cave**	**Cave 24**	**Cave Valley Cave**	**Fissure Cave**	**Fox Skull Cave**	**Ice Cave**	**Indian Burial Cave**	**Lehman Annex Cave**	**Lehman Caves**	**Lincoln Canyon Mine**	**Little Muddy Cave**	**Long Cold Cave**	**Model Cave**	**Mountain View Cave**	**Pine Cone Cave**	**Root Cave**	**Smith Creek Cave**	**Snake Creek Cave**	**Squirrel Spring Cave**	**Water Trough Cave**
Zenaida macroura	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Carpodacus cassinii	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Catherpes mexicanus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Mammalia	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	1	0
Rodentia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Cricetidae	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
***Peromyscus* sp.**	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0
***Neotoma* sp.**	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1
Lepus californicus deserticola	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Vulpes macrotis nevadensis	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Vespertilionidae	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Myotis evotis evotis	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
Corynorhinus townsendii pallescens	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	1	0	0

Table 3. Summary of cave visits and taxa collected.

Cave	Taxa	Specimens	Visits	Person-Visits	Length (feet)	Altitude (feet)
Indian Burial Cave	12	84	2	5	525	5656
Fox Skull Cave	15	86	2	6	102	6640
Snake Creek Cave	7	32	2	6	1682.2	6660
Model Cave	20	198	6	19	1969.1	6824
Root Cave	11	37	2	9	182.7	6854
Lehman Caves	18	554	22	57	11,000	6877
Ice Cave	11	42	3	10	677.2	7047
Squirrel Spring Cave	14	59	5	13	50.5	7149
Lehman Annex Cave	7	50	1	5	991.6	7333
Water Trough Cave	22	166	2	9	144.3	7667
Lincoln Canyon Mine[1]	13	228	2	7	4645	8599
Cave 24	14	126	2	10	272.4	9885
Pine Cone Cave	11	73	2	9	354.3	9908
Bristlecone Cave	6	76	2	9	309	10390
Fissure Cave[2]	3	13	1	3	30	11178
Broken Cave	9	62	2	12	108	11178
Mountain View Cave	9	81	2	9	53	11198
Total		**1967**	**60**	**198**		
Average	**11.9**	**115.7**	**3.5**	**11.6**	**1358.6**	**8296.7**

[1] Length estimated by measuring line plot of survey; [2] Length very approximate.

Table 4. Fauna of Bristlecone Cave.

- Arthropoda
  - Arachnida
    - Acari
    - Araneae
      - Araneidae
  - Chilopoda
    - Geophilomorpha
      - Geophilidae
  - Diplopoda
    - Chordeumatida
      - Conotylidae
        - *Idagona lehmanensis*
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Isotomidae
        - *Isotoma* sp. 1
      - Onychiuridae
        - Onychiurinae
      - Tomoceridae
        - *Tomocerus* sp.
    - Diptera
      - [undetermined Diptera]
      - Heleomyzidae
      - Sciaridae
      - Trichoceridae

Table 5. Fauna of Broken Cave.

- Arthropoda
    - Arachnida
        - Acari
            - [undetermined Acari]
            - Rhagidiidae
        - Pseudoscorpiones
            - [undetermined troglomorphic Pseudoscorpion]
        - Araneae
            - Araneidae
    - Diplopoda
        - Chordeumatida
            - Conotylidae
                - *Idagona lehmanensis*
    - Hexapoda
        - Collembola
            - Tomoceridae
                - *Tomocerus* sp.
        - Coleoptera
            - [undetermined Coleoptera]
            - Elateridae
            - Scolytidae
        - Lepidoptera
            - [undetermined Lepidoptera]
            - Nymphalidae
                - *Aglais milberti*
            - Tineidae
        - Diptera
            - [undetermined Diptera]
            - Heleomyzidae
            - Mycetophilidae
            - Phoridae
            - Sphaeroceridae
            - Tipulidae

Table 6. Fauna of Cave 24.

- Arthropoda
  - Arachnida
    - Acari
    - Opiliones
      - [undetermined Opiliones]
      - Triaenonychidae
      - *Cyptobunus ungulatus ungulatus*
    - Pseudoscorpiones
      - [undetermined Pseudoscorpiones]
      - Neobisiidae
        - *Microcreagris grandis*
    - Araneae
      - [undetermined Araneae]
      - Araneidae
      - Gnaphosidae
        - *Gnaphosa*? sp.
      - Linyphiidae
        - [undetermined Linyphiidae]
        - *Arcuphantes*? sp.
  - Chilopoda
    - Geophilomorpha
      - Geophilidae
  - Diplopoda
    - Chordeumatida
      - Conotylidae
        - *Idagona lehmanensis*
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Entomobryidae
        - *Entomobrya* sp. 2
      - Isotomidae
        - *Desoria* sp. 2
      - Onychiuridae
        - Onychiurinae
      - Tomoceridae
        - *Tomocerus* sp.
    - Orthoptera
      - Rhaphidophoridae
        - *Ceuthophilus* sp.
    - Coleoptera
      - Cantharidae
        - *Malthodes* sp.
      - Carabidae

- *Pterostiches* (*Hypherpes*) *protractus*
- Colydiidae
- Elateridae
- Staphylinidae
- Tenebrionidae
  - [undetermined Tenebrionidae]
  - *Eleodes hispilabris sculptilis*

- Lepidoptera
- Siphonaptera
- Hymenoptera
  - Formicidae
    - *Camponotus* sp.
    - *Formica* sp.
- Diptera
  - [undetermined Diptera]
  - Cecidomyiidae
  - Heleomyzidae
  - Phoridae
  - Sciaridae
  - Sphaeroceridae
  - Trichoceridae

Table 7. Fauna of Fissure Cave.

- Arthropoda
  - Arachnida
    - Acari
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Tomoceridae
        - *Tomocerus* sp.
  - Diptera
    - Heleomyzidae
    - Phoridae

Table 8. Fauna of Fox Skull Cave.

- Arthropoda
  - Arachnida
    - Acari
      - Rhagidiidae
    - Opiliones
      - Leiobunidae
        - *Leiobunum* sp.
    - Pseudoscorpiones
      - Chernetidae
      - Neobisiidae
        - *Microcreagris grandis*
    - Araneae
      - [undetermined Araneae]
      - Araneidae
      - Dyctinidae?
      - Linyphiidae?
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Entomobryidae
        - *Entomobrya* sp. 1
    - Microcoryphia
      - Meinertellidae
        - *Hypomachilodes*? sp.
    - Plecoptera
    - Orthoptera
    - Psocoptera
      - Prionoglaridae
        - *Speleketor* sp.
    - Homoptera
      - Cercopidae
      - Cixiidae
    - Coleoptera
      - [undetermined Coleoptera]
      - Chrysomelidae
        - Galerucinae
          - Alticini
      - Cryptophagidae
      - Dermestidae
      - Staphylinidae
      - Tenebrionidae
    - Hymenoptera
      - Formicidae
        - *Camponotus* sp.

- Diptera
  - [undetermined Diptera]
  - Culicidae?
  - Mycetophilidae
  - Sciaridae
- Chordata
  - Mammalia [mandible only]

Table 9. Fauna of Ice Cave. Records are all from the present study unless otherwise indicated.

- Mollusca
    - Gastropoda (present study and Krejca and Taylor 2003)
- Arthropoda
    - Arachnida
        - Acari
            - undetermined Acari (Krejca and Taylor 2006)
            - Rhagidiidae
    - Araneae
        - Linyphiidae
            - *Arcuphantes*? sp.
    - Opiliones
        - Triaenonychidae
            - *Cyptobunus ungulatus ungulatus* (Krejca and Taylor 2006)
    - Chilopoda
        - undetermined Chilopoda (Krejca and Taylor 2006)
    - Diplopoda
        - undetermined Diplopoda (Krejca and Taylor 2006)
    - Hexapoda
        - Collembola
            - [undetermined Collembola]
            - Hypogastruridae
                - *Acherontiella* sp.
            - Isotomidae
                - *Isotoma* sp. 1
        - Ephemeroptera
            - Baetidae
            - Heptageniidae
            - Siphlonuridae
        - Coleoptera
            - Carabidae
                - *Bembidion* sp.
            - Staphylinidae
        - Trichoptera
            - [undetermined Trochoptera larvae]
            - Rhyacophilidae
        - Lepidoptera
            - Noctuidae
        - Hymenoptera
            - Cynipidae
            - Formicidae
                - *Formica* sp.
            - Ichneumonidae
        - Diptera

- [undetermined Diptera]
- Chironomidae
  - *Eukiefferiella* sp.
- Chloropidae
- Ephydridae
  - *Ochthera* sp.
- Heleomyzidae (present study and Krejca and Taylor 2003)
- Sciaridae
- Simuliidae

- Chordata
  - Mammalia
    - Chiroptera
      - Vespertilionidae
        - skull (Krejca and Taylor 2003)

Table 10. Fauna of Lehman Annex Cave.

- Arthropoda
  - Arachnida
    - Pseudoscorpiones
      - Neobisiidae
        - *Microcreagris grandis*
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Arrhopalitidae
        - *Arrhopalites* sp.
      - Hypogastruridae
        - *Acherontiella* sp.
    - Orthoptera
      - Rhaphidophoridae
        - *Ceuthophilus* sp.
    - Diptera
      - [undetermined Diptera]
      - Sciaridae
- Chordata
  - Reptilia
    - Squamata
      - Viperidae
        - *Crotalus viridis lutosus*
  - Aves
  - Mammalia
    - [undetermined Mammalia bones]
    - Rodentia
      - Cricetidae
        - *Peromyscus* sp.
        - *Neotoma* sp.

Table 11. Collection/observation dates for taxon records reported in the checklist of taxa below (Table 12).

25 January 2006	GMBaker
16 March 2006	GMBaker, MAHorner, Bryan R Petrytl
27 April 2006	GMBaker
15 May 2006	GMBaker
23 May 2006	SJTaylor JKKrejca MESlay GMBaker BMRoberts MAHorner
26 May 2006	SJTaylor JKKrejca MESlay GMBaker
24 July 2006	GMBaker, BMRoberts, Mark Kirtley
25 July 2006	GMBaker, MAHorner, Billie O'Doan
22 August 2006	GMBaker, MAHorner, Loren Reinhold
25 September 2006	GMBaker
26 September 2006	GMBaker
27 February 2007	GMBaker JKKrejca SJTaylor
28 February 2007	MAHorner, GMBaker, JKKrejca, SJTaylor
19 July 2007	SJTaylor JKKrejca MESlay CAMSlay MAHorner

Table 12. Fauna of Lehman Caves.

Records are all from the present study unless otherwise indicated.

- Cyanobacteria
  - Myxophyceae
    - *Anacystis montana* (Stark 1969)
    - *Schizothrix calcicola* (Stark 1969)
    - *Oscillatoria* sp. (Stark 1969)
    - *Anabaena* sp. (Stark 1969)
- Eubacteria (Stark 1969)
- Proteobacteria
  - Betaproteobacteria
    - Burkholderiales
      - *Leptothrix* sp. (Desert Research Institute 1968)
    - Rhodocyclates
      - Rhodocyclaceae
        - *Zoogloea ramigera* (Desert Research Institute 1968)
- Amoebozoa
  - Mycetozoa
    - Dictyostelia
      - Dictyosteliidae
        - *Dictyostelium* sp. (Desert Research Institute 1968, Stark 1969)
  - Myxomycoa
    - Stemonitomycetes
      - Stemonitidae
        - *Stemonitis* sp. (Desert Research Institute 1968, Stark 1969)
- unidentified fungus (Went, undated; Sheps 1972, Stark 1969)
- Basidiomycota
  - Agaricomycetes
    - Agaricales
      - Marasmiaceae
        - *Marasmius* sp. (Desert Research Institute 1969)
- Chytridiomycota (Desert Research Institute 1968, Stark 1969)

- Bryophyta
  - Bryopsida
    - Dicranales
      - Bruchiaceae
        - *Bruchia* sp. (Sheps 1972)
    - Hypnales
      - Amblystegiaceae
        - *Campylium chrysophyllum* (Sheps 1972)
    - Funariales
      - Funariaceae
        - *Physcomitrium* sp. (Sheps 1972)

- Hepatophyta
  - Jungermanniopsida
    - Jungermanniales
      - Metzgeriales
        - near *Metzgeria* sp. (Desert Research Institute 1968, Stark 1969)
- Pteridophyta
  - Filicopsida
    - Polypodiales
      - Dryopteridaceae
        - *Cystopteris fragilis* (Stark 1969)
      - Aspleniaceae
        - *Asplenium* sp. (Stark 1969)
- Chlorophyta
  - Chlorophyceae
    - *Mugeotiopsis calospora* (Stark 1969)
    - *Chlorococcum humicola* (Stark 1969)
    - *Protococcum viridis* (Stark 1969)
    - *Nannochloris* sp. (Stark 1969)
    - *Roya anglica* (Stark 1969)
    - *Cosmarium* sp. (Stark 1969)
    - *Chlorella vulgaris* (Stark 1969)
    - *Coccomyxa dispar* (Stark 1969)
    - *Palmella miniata* (Stark 1969)
- Bacillariophyta
  - Bacillariophyceae
    - Naviculales
      - Naviculaceae
        - *Navicula* spp. (Stark 1969)
    - Centrales
      - Coscinodiscoideaee
        - *Coscinodiscus* sp. (Stark 1969)
- Protozoa
  - Lobosa
    - Arcellinida
      - Difflugiidae
        - *Curcubitella* sp. (Desert Research Institute 1968)
    - Amoebida
      - Amoebidae
        - *Amoeba* sp. (Desert Research Institute 1968)
      - Vahlkampfidae
        - *Vahlkampfia* sp. (Desert Research Institute 1968)
  - Heliozoa
    - Actinophryidae
      - Actinosphaeridae
        - *Actinosphaerium* sp. (Desert Research Institute 1968)

- Euglenozoa
  - Euglenida
    - Euglenales
      - Peranemataceae
        - *Peranema* sp. (Desert Research Institute 1968)
- Ciliophora
  - Ciliatea
    - Peritrichida
      - Lagenophryidae
        - *Lagenophrys nassa* (Desert Research Institute 1968)
  - Litostomatea
    - Cyclotrichida
      - Mesodiniidae
        - *Mesodinium acarus* (Desert Research Institute 1968)
    - Haptorida
      - Enchelyidae
        - *Rhopalophrya* sp. (Desert Research Institute 1968)
  - Oligohymenophorea
    - Peniculida
      - Parameciidae
        - *Paramecium* sp. (Desert Research Institute 1968)
    - Sessilida
      - Vorticellidae
        - *Vorticella* sp. (Desert Research Institute 1968)
  - Oligotrichida
    - Strombidiida
      - Strombidiidae
        - *Strombidium viridae* (Desert Research Institute 1968)
  - Phyllopharyngea
    - Chlamydodontida
      - Chilodonellidae
        - *Chilodonella* sp. (Desert Research Institute 1968)
  - Spirotrichea
    - Euplotida
      - Euplotidae
        - *Euplotes* sp. (Desert Research Institute 1968)
    - Sporadotrichida
      - Oxytrichidae
        - *Oxytricha* sp. (Desert Research Institute 1968)
    - Urostylida
      - Urostylidae
        - *Urostyla* sp. (Desert Research Institute 1968)
- Uncertain Placement (?Nematoda?)
- Annelida
  - Oligochaeta (Desert Research Institute 1968)
- Arthropoda

- [undetermined arthropod fragments]
- Crustacea
  - Isopoda
- Arachnida
  - Acari
    - [undetermined Acari]
    - Oribatida
      - Oribatidae (Desert Research Institute 1968, Stark 1969)
      - Rhagidiidae
  - Pseudoscorpiones
    - Neobisiidae
      - *Microcreagris grandis* (present study, Muchmore 1969, Desert Research Institute 1968, Stark 1969, Schmitz 1986)
  - Araneae
    - [undetermined Araneae] (present study, Desert Research Institute 1968, Stark 1969)
    - Agelenidae
      - [undetermined Agelenidae]
      - *Hololena*? sp.
    - Araneidae
      - *Hypsosinga*? sp.
    - Dictynidae
    - Pholcidae
      - *Physocyclus*? sp.
- Symphyla
    - Scutigerellidae?
      - *Hanseniella*? sp.
- Diplopoda
  - Polydesmida
    - Polydesmidae/Macrosternodesmidae?
      - [undescribed species]
- Hexapoda
  - Collembola
    - [undetermined Collembola]
    - Arrhopalitidae
      - undetermined (Desert Research Institute 1968 – see Krejca and Taylor 2003)
      - *Arrhopalites* sp.
      - *Arrhopalites caecus*
    - Entomobryidae
      - *Entomobrya marginata* (Stark 1969)
      - *Entomobrya* sp. 2
    - Hypogastruridae
      - *Acherontiella* sp.
    - Isotomidae
      - *Folsomia* sp.

    - Oncopoduridae
        - *Oncopodura* sp.
    - Onychiuridae
        - Tullberginae
        - Onychiurinae
    - Poduridae (Desert Research Institute 1968)
    - Tomoceridae
        - *Tomocerus* sp.
- Microcoryphia
- Orthoptera
    - Rhaphidiophoridae
        - *Ceuthophilus* sp.
- Psocoptera
    - Prionoglaridae
        - *Speleketor* sp.
    - Psyllipsocidae
        - *Psyllipsocus* sp. (Desert Research Institute 1968, Stark 1969)
- Coleoptera
    - Cryptophagidae (present study, Desert Research Institute 1968)
    - Staphylinidae
    - Tenebrionidae
- Hymenoptera
    - Formicidae
- Lepidoptera
    - Tineidae
        - prob. *Amydria* sp. (Desert Research Institute 1968, Stark 1969)
- Diptera
    - [undetermined Diptera]
    - Calliphoridae
    - Ceratopogonidae
        - *Culicoides* sp. (Desert Research Institute 1968, Stark 1969)
    - Heleomyzidae
        - undetermined Heleomyzidae
        - *Pseudoleria* sp. ((Desert Research Institute 1968)
    - Phoridae
        - *Megaselia* sp. (Desert Research Institute 1968, Stark 1969)
    - Psychodidae
        - Psychoda sp. (Desert Research Institute 1968, Stark 1969)
    - Sciaridae
        - undetermined Sciaridae
        - *Bradysia* sp. (Desert Research Institute 1968, Stark 1969)
    - Sphaeroceridae
    - Streblidae (Desert Research Institute 1968, Stark 1969)

Chordata

- Aves
  - Galliformes
    - Phasianidae (Orr 1952 – see Krejca and Taylor 2003)
- Mammalia
  - Rodentia
    - Erethizonitidae
      - cf. *Erethizon* sp. (Mead 1980 – see Krejca and Taylor 2003)
    - Cricetidae
      - *Neotoma* sp. (present study, Desert Research Institute 1968, Stark 1969)
    - Muridae
      - *Peromyscus maniculatus* (Desert Research Institute 1968, Stark 1969)
      - *Reithrodontomys* sp. (Mead 1980 – see Krejca and Taylor 2003)
    - Sciuridae
      - *Tamias* sp. (Mead 1980 – see Krejca and Taylor 2003)
      - *Tamias dorsalis* (Desert Research Institute 1968, Stark 1969)
      - *Marmota* cf. *flaviventris* (Mead 1980 – see Krejca and Taylor 2003)
  - Lagomorpha
    - Cf. *Sylvilagus* sp. (Mead 1980 – see Krejca and Taylor 2003)
  - Primates
    - Hominidae
      - *Homo sapiens* (Orr 1952)
  - Carnivora
    - Canidae
      - *Canis latrans* (Orr 1952)
      - *Vulpes*? sp. (Orr 1952)
  - Chiroptera
    - Vespertilionidae
      - *Myotis evotis evotis*
      - *Corynorhinus townsendii pallescens*

Table 13. Fauna of Lincoln Canyon Mine and Drumming and Miner's Massacre caves.

- Arthropoda
  - Arachnida
    - Acari
      - [undetermined Acari]
      - Rhadidiidae
    - Araneae
      - [undetermined Araneae]
      - Linyphiidae
        - *Arcuphantes*? sp.
  - Chilopoda
    - Geophilomorpha
      - Geophilidae
    - Lithobiomorpha
      - Lithobiidae
  - Diplopoda
    - [undetermined Diplopoda]
    - Chordeumatida
      - Conotylidae
        - *Idagona lehmanensis*
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Arrhopalitidae
        - *Arrhopalites* sp.
      - Entomobryidae
        - *Entomobrya* sp. 1
      - Isotomidae
        - *Desoria* sp. 1
      - Onychiuridae
        - Onyciurinae
      - Tomoceridae
        - *Tomocerus* sp.
    - Microcoryphia
      - Meinertellidae
        - *Hypomachilodes*? sp.
    - Coleoptera
      - Staphylinidae
    - Lepidoptera
    - Hymenoptera
      - Formicidae
        - *Camponotus* sp.
        - *Formica* sp.
      - Ichneumonidae
      - Platygastridae

        - Diptera
            - [undetermined Diptera]
            - Agromyziidae
            - Anthomyiidae
            - Cecidomyiidae
            - Drosophilidae
            - Empididae
            - Heleomyzidae
            - Mycetophilidae
            - Phoridae
            - Sciaridae
            - Sphaeroceridae
            - Tipulidae
- Chordata
    - Aves
        - Apodiformes
            - Trochilidae
                - *Selasphorus platycercus*

Table 14. Fauna of Model Cave.
Records are all from the present study unless otherwise indicated.

- [undertermined vermiform animals]
- Mollusca
  - Gastropoda (present study and Krejca and Taylor 2003)
- Nematoda
- Annelida
  - Clitellata (=Oligochaeta)
    - undetermined Clitellata (Krejca and Taylor 2003)
    - Opisthopora
      - [undetermined Opisthopora]
      - Lumbricidae?
- Arthropoda
  - Crustacea
    - Copepoda (Krejca and Taylor 2003)
    - Ostracoda (present study and Krejca and Taylor 2003)
  - Arachnida
    - Acari
      - [undetermined Acari] (present study and Krejca and Taylor 2003)
      - Rhagidiidae (present study and Krejca and Taylor 2003)
      - Orabatoidea
    - Opiliones
      - Triaenonychidae
        - *Cyptobunus ungulatus ungulatus* (present study and Krejca and Taylor 2003)
    - Pseudoscorpiones
      - Neobisiidae
        - *Microcreagris grandis*
    - Araneae
      - [undetermined Araneae]
      - Araneidae
  - Symphyla
  - Diplopoda
    - [undetermined Diplopoda] (present study and Krejca and Taylor 2003)
    - Polydesmida
      - Polydesmidae/Macrosternodesmidae?
        - [undescribed species] (present study and Krejca and Taylor 2003)
    - Chordeumatida
      - Conotylidae
        - *Idagona lehmanensis*
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Arrhopalitidae

        - *Arrhopalites* sp. (present study and Krejca and Taylor 2003)
        - *Arrhopalites* [undescribed *Arrhopalites*]
      - Entomobryidae
        - undetermined Entomobryidae (Krejca and Taylor 2003)
        - *Pseudosinella* sp. 1
      - Isotomidae
        - *Folsomia* sp.
      - Oncopoduridae
        - *Oncopodura* sp.
      - Tomoceridae
        - *Tomocerus* sp. (Krejca and Taylor 2003)
    - Diplura
    - Ephemeroptera
      - [undetermined Ephemeroptera]
      - Baetidae
      - Heptageniidae
    - Orthoptera
      - Rhaphidiophoridae
        - *Ceuthophlus* sp.
    - Heteroptera
      - Cydnidae
        - *Pangaeus* sp.
    - Coleoptera
      - [undetermined Coleoptera]
      - Cryptophagidae
      - Lathridiidae
      - Leiodidae
        - Playtypsyllinae(=Leptininae)
    - Siphonaptera
    - Diptera
      - [undetermined Diptera]
      - Chironomidae
      - Heleomyzidae
      - Sciaridae
- Chordata
  - Mammalia
    - Chiroptera
      - Vespertilionidae
        - *Myotis californicus*

Table 15. Fauna of Mountain View Cave.

- Arthropoda
  - Arachnida
    - Acari
      - Rhagidiidae
      - Trombidiidae
    - Opiliones
      - Phalangiidae
        - *Oliogolophus*? sp.
    - Araneae
      - [undetermined Araneae]
      - Araneidae
        - *Araneus*? sp.
      - Linyphiidae
  - Chilopoda
    - Geophilomorpha
  - Hexapoda
    - Collembola
      - Tomoceridae
        - *Tomocerus* sp.
    - Diplura
      - [undetermined Diplura]
      - Campodeidae
    - Coleoptera
      - Byrrhidae
    - Lepidoptera
      - Noctuidae
      - Nymphalidae
        - *Aglais milberti*
      - Tineidae
    - Diptera
      - [undetermined Diptera]
      - Heleomyzidae
      - Mycetophilidae

Table 16. Fauna of Pine Cone Cave.

- Arthropoda
  - Arachnida
    - Acari
      - Rhagidiidae
    - Araneae
      - [undetermined Araneae]
      - Agelenidae
        - *Hololena*? sp.
      - Amaurobiidae
        - *Callobius*? sp.
      - Araneidae
        - *Araneus*? sp.
      - Cybaeidae
      - Linyphiidae
        - [undetermined Linyphiidae]
        - *Arcuphantes*? sp.
      - Thomisidae
        - *Xysticus*? sp.
  - Chilopoda
    - Lithobiomorpha
      - Lithobiidae
  - Diplopoda
    - Chordeumatida
      - Conotylidae
        - *Idagona lehmanensis*
  - Hexapoda
    - Collembola
      - Isotomidae
        - *Desoria* sp. 1
        - *Isotoma* sp. 1
      - Tomoceridae
        - *Tomocerus* sp. 2
    - Microcoryphia
      - Machilidae
        - *Pedetontus* sp.
    - Orthoptera
      - Rhaphidophoridae
        - *Ceuthophilus* sp.
    - Coleoptera
      - [undetermined Coleoptera]
      - Carabidae
        - *Harpalus animosus* Casey
        - *Pterostiches* (*Hypherpes*) *protractus* LeConte
      - Curculionidae

- Elateridae
- Leiodidae
- Nitidulidae
- Scarabaeidae
  - *Phyllophaga* sp.
- Staphylinidae
- Tenebrionidae
  - [undetermined Tenebrionidae]
  - *Eleodes* sp.
  - *Eleodes hispilabris sculptilis* Blaisdell 1909
- Trogossitidae

Lepidoptera
- Noctuidae

Hymenoptera
- Formicidae
  - [undetermined Formicidae]
  - *Camponotus* sp.
- Pompilidae

Diptera
- Mycetophilidae
- Phoridae
- Sciaridae
- Trichoceridae

Table 17. Fauna of Root Cave.

- Arthropoda
  - Arachnida
    - Acari
      - [undetermined Acari]
      - Ixodidae
    - Opiliones
      - Leiobunidae
        - *Leiobunum* sp.
    - Pseudoscorpiones
      - Neobisiidae
        - *Microcreagris grandis*
    - Araneae
  - Hexapoda
    - Diplura
      - Campodeidae
        - *Eumesocampa*? sp.
    - Orthoptera
      - Rhaphidiophoridae
        - *Ceuthophilus* sp.
    - Coleoptera
      - Cryptophagidae
      - Leiodidae
    - Lepidoptera
      - [undetermined Lepodoptera]
      - Acrolophidae
    - Hymenoptera
      - Formicidae
    - Diptera
      - [undetermined Diptera]
      - Sciaridae
- Chordata
  - Mammalia
    - Rodentia
      - Cricetidae
        - *Peromyscus* sp.

Table 18. Fauno of Snake Creek Cave.
Records are all from the present study unless otherwise indicated.

- Arthropoda
  - Diplopoda
    - Polydesmida
      - Polydesmidae/Macrosternodesmidae?
        - [undescribed species] (present study and Krejca and Taylor 2003)
  - Hexapoda
    - Collembola
      - Arrhopalitidae
        - Arrhopalites n. sp.? (Krejca and Taylor 2003)
        - *Arrhopalites caecus*
      - Entomobryidae
        - undetermined Entomobryidae (Krejca and Taylor 2003)
        - *Sinella* sp.
    - Orthoptera
      - Rhaphidiophoridae
        - *Ceuthophilus* sp.
    - Psocoptera
      - undetermined Psocoptera (Krejca and Taylor 2003)
      - Prionoglaridae
        - *Speleketor* sp.
    - Coleoptera
      - undetermined Coleoptera (Krejca and Taylor 2003)
      - Anthicidae (Krejca and Taylor 2003)
      - Tenebrionidae
        - *Eleodes hispilabris sculptilis*
    - Diptera
      - Heleomyzidae
      - Sciaridae (Krejca and Taylor 2003)
      - Tipulidae (Krejca and Taylor 2003)
    - Hymenoptera
      - Formicidae
        - *Aphaenogaster* sp. (Krejca and Taylor 2003)
- Chordata
  - Aves
    - Passeriformes
      - Troglodytidae
        - *Catherpes mexicanus* (Krejca and Taylor 2003)
  - Mammalia
    - Chiroptera
      - Vespertilionidae
        - *Antrozous pallidus* (Krejca and Taylor 2003)

Corynorhinus townsendii pallescens (present study and Krejca and Taylor 2003)

Myotis ciliolabrum (Krejca and Taylor 2003)
Myotis evotis (Krejca and Taylor 2003)
Myotis volans (Krejca and Taylor 2003)

Table 19. Fauna of Squirrel Spring Cave.

- [unidentified vermiform organism]
- Mollusca
    - Gastropoda
- Arthropoda
    - Arachnida
        - Acari
            - [undetermined Acari]
            - Hydrachnidia
            - Rhagidiidae
        - Opiliones
            - Leiobunidae
                - *Leiobunum* sp.
        - Pseudoscorpiones
            - Neobisiidae
                - *Microcreagris grandis*
        - Araneae
            - [undetermined Araneae]
            - Anyphaenidae
                - *Anyphaena*? sp.
    - Diplopoda
        - Chordeumatida
            - Conotylidae
                - *Idagona lehmanensis*
    - Hexapoda
        - Collembola
            - Entomobryidae
                - *Entomobrya* sp. 2
        - Homoptera
            - Cicadellidae
        - Coleoptera
            - Dytiscidae
                - *Hydroporus* sp.
            - Staphylinidae
        - Trichoptera
            - [undetermined Trichoptera]
            - Limnephilidae
        - Lepidoptera
        - Diptera
            - [undetermined Diptera]
            - Dixidae
            - Heleomyzidae
            - Mycetophilidae
            - Sciaridae
            - Sphaeroceridae

Chordata
    Mammalia (fur only)

Table 20. Fauna of Water Trough Cave.

- [unidentified vermiform organism]
- Annelida
  - Clitellata (=Oligochaeta)
- Arthropoda
  - Arachnida
    - Acari
      - [undetermined Acari]
      - Rhagidiidae
    - Pseudoscorpiones
      - Neobisiidae
        - *Microcreagris grandis*
    - Araneae
      - [undetermined Araneae]
      - Amaurobiidae?
  - Chilopoda
    - Lithobiomorpha
      - Lithobiidae
  - Diplopoda
    - [undetermined Diplopoda]
    - Chordeumatida
      - Conotylidae
        - *Idagona lehmanensis*
  - Hexapoda
    - Collembola
      - [undetermined Collembola]
      - Entomobryidae
        - *Entomobrya* sp. 2
    - Diplura
      - [undetermined Diplura]
      - Campodeidae
        - *Metriocampa*? sp.
    - Microcoryphia
    - Ephemeroptera
    - Plecoptera
    - Homoptera
    - Coleoptera
      - [undetermined Coleoptera]
      - Anobiidae: Ptininae
      - Colydiidae?
      - Staphylinidae
    - Trichoptera
    - Lepidoptera
      - [undetermined Lepidoptera}
      - Alucitidae

      - Noctuidae
    - Hymenoptera
      - Formicidae
        - *Camponotus* sp.
        - *Forelius* sp.
        - *Formica* sp.
      - Vespidae
    - Diptera
      - [undetermined Diptera]
      - Heleomyzidae
      - Sciaridae
      - Sphaeroceridae
      - Tipulidae
- Chordata
  - [undetermined Chordata bones]
  - Aves
    - Columbiformes
      - Columbidae
        - *Zenaida macroura*
    - Passeriformes
      - Fringillidae
        - *Carpodacus cassinii*
      - Troglodytidae
        - *Catherpes mexicanus*
  - Mammalia
    - Rodentia
      - [undetermined Rodentia]
      - Cricetidae
        - *Neotoma*? sp.

Table 21. Fauna of Indian Burial Cave.

- Arthropoda
    - Arachnida
        - Acari
        - Opiliones
            - Leiobunidae
                - *Leiobunum* sp.
        - Araneae
            - Agelenidae
                - *Hololena*? sp.
            - Araneidae
                - *Neoscona*? sp.
            - Linyphiidae
                - *Maro*? sp.
    - Diplopoda
        - Polydesmida
            - Polydesmidae/Macrosternodesmidae?
                - [undescribed species]
    - Hexapoda
        - Collembola
            - Entomobryidae
                - *Entomobrya* sp. 1
        - Coleoptera
            - Staphylinidae
            - Tenebrionidae
                - *Eleodes hispilabris sculptilis*
        - Lepidoptera
            - Tineidae
        - Siphonaptera
        - Diptera
            - [undetermined Diptera]
            - Heleomyzidae
            - Phoridae
            - Sciaridae
            - Sphaeroceridae
- Chordata
    - Reptilia
        - Squamata
            - [undetermined dead lizard]
            - [undetermined dead snake]
    - Mammalia
        - [undetermined dead Mammalia]
        - Rodentia
            - Cricetidae
        - Lagomorpha

- Leporidae
  - *Lepus californicus deserticola*
- Carnivora
  - Canidae
    - *Vulpes macrotis nevadensis*
- Chiroptera
  - Vespertilionidae
    - [undetermined dead Vespertilionidae]
    - *Myotis evotis evotis*
    - *Corynorhinus townsendii pallescens*

Table 22. Fauna of Smith Creek Cave.

- Arthropoda
    - Arachnida
        - Acari
        - Opiliones
            - Leiobunidae
                - *Leiobunum* sp.
    - Hexapoda
        - Orthoptera
            - Rhaphidophoridae
                - *Ceuthophilus* sp.
        - Coleoptera
            - Tenebrionidae
        - Lepidoptera
            - Noctuidae
            - Tineidae?
        - Hymenoptera
            - Ichneumonidae

Appendices

APPENDIX 1: Calculation of relative humidity from station elevation data (barometric pressure), wet bulb, and dry bulb values (Barnes 2005).

APPENDIX 2: GIS data table (*.dbf file) of taxa and caves.

APPENDIX 3: Field notes from cave visits.

APPENDIX 4: Fauna of Great Basin National Park caves.

APPENDIX 5: Specimen data from field collections.

Appendix 1: Calculation of relative humidity from station elevation data (barometric pressure), wet bulb, and dry bulb values (Barnes 2005).

Notation:
es_{wb} saturation vapor pressure at T_{wb} (kPa)
es_{db} saturation vapor pressure at T_{db} (kPa)
e_d vapor pressure (kPa)
P_{inches} station pressure (inches of Hg)
P_{kPa} station pressure (kPa)
T_{wb} wet bulb temperature (°C)
T_{db} dry bulb temperature (°C)

Procedure:

Step 1. Station pressure (P) was converted from inches Hg to kiloPascals:

$$P_{kPa} = P_{inches}\ (101\ \text{kPa} / 29.9213\ \text{inches Hg})$$

Step 2. A conversion factor, A, was calculated using wet bulb temperature (T_{wb}) (Rosenberg et al., 1990):

$$A = 0.00066(1.0+0.00115T_{wb})$$

Step 3. Saturation vapor pressure at T_{wb} (es_{wb}) was calculated (Tetens, 1930):

$$es_{wb} = e^{\left(\frac{16.78T_{wb}-116.9}{T_{wb}+237.3}\right)}$$

Step 4. Vapor pressure (e_d) was calculated using previous equations and dry bulb temperature (T_{db}):

$$e_{d\,=}\, es_{wb} - AP(T_{db} - T_{wb})$$

Step 5. Saturated vapor pressure (es_{db}) was calculated:

$$es_{db} = e^{\left(\frac{16.78T_{db}-119.9}{T_{db}+237.3}\right)}$$

Step 6. Finally, relative humidity (RH) was calculated:

$$RH = 100\left(\frac{e_d}{es_{db}}\right)$$

Appendix 2. GIS data table (*.dbf file) of taxa and caves.

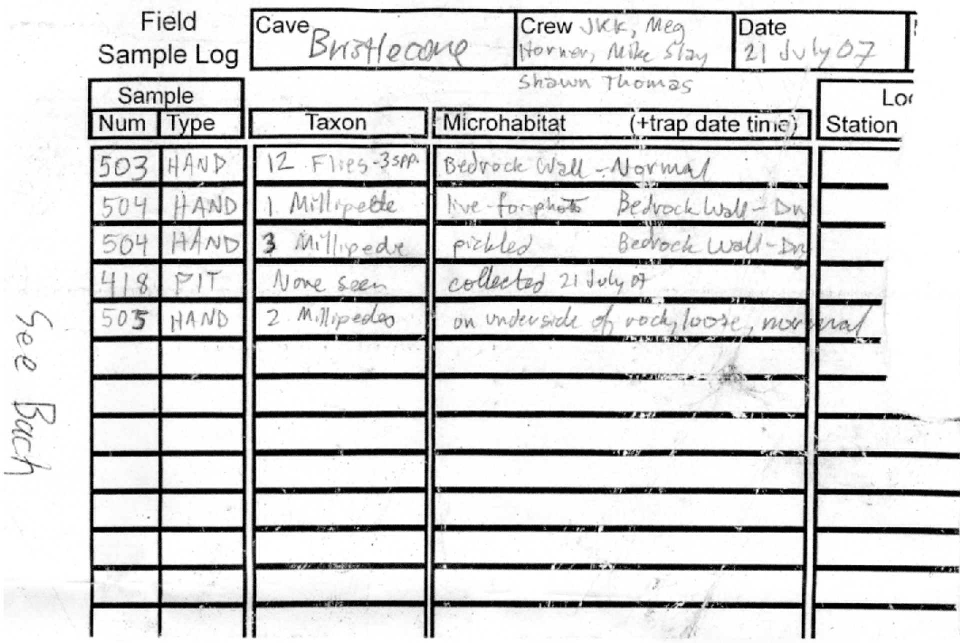
Has been provided to NPS electronically.

Appendix 3. Field notes from cave visits.

(notes are reduced to 45% size to save space)

Bristlecone Cave

Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C Thomas, Loran Reinhold
11-Jul-07
Jean K. Krejca, Meg A. Horner, Michael E. Slay, Shawn C. Thomas
21-Jul-07



Field Sample Log

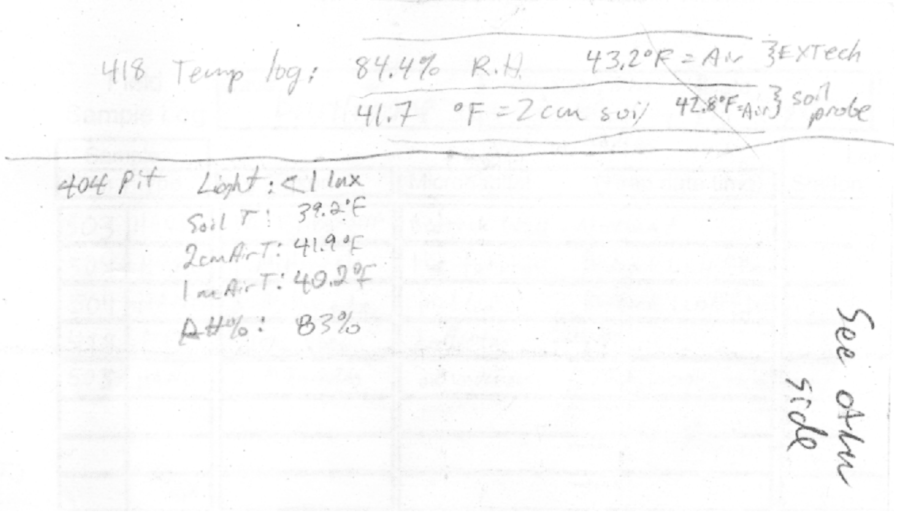
Cave Bristlecone

Crew JKK, Meg Horner, Mike Slay Shawn Thomas

Date 21 July 07

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Lo Station
503	HAND	12 Flies-3spp.	Bedrock Wall - Normal	
504	HAND	1 Millipede	live-for photo Bedrock Wall - Dr	
504	HAND	3 Millipede	pickled Bedrock Wall - Dr	
418	PIT	None seen	collected 21 July 07	
505	HAND	2 Millipedes	on underside of rock, loose, normal	

See Back

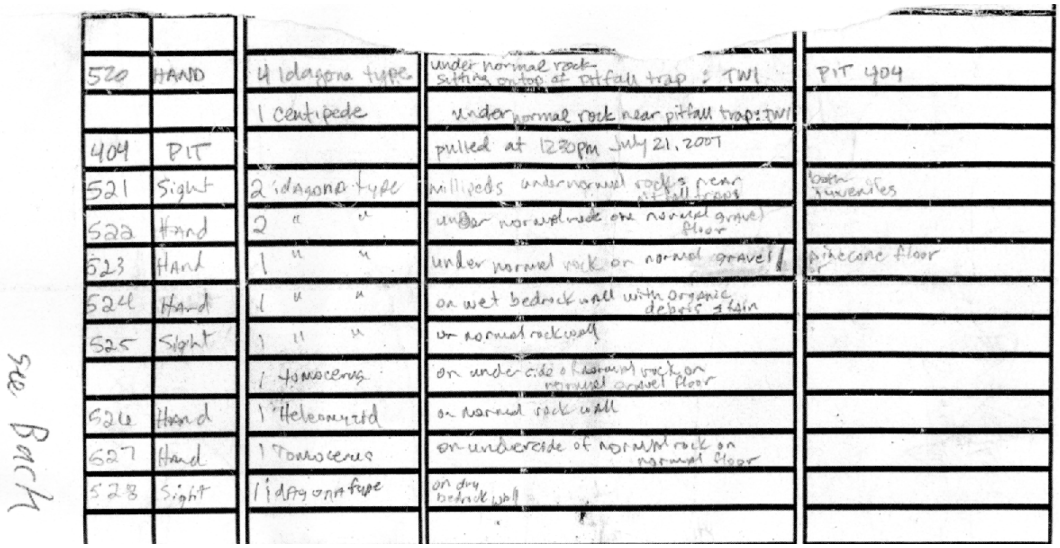


418 Temp log: 84.4% R.H. 43.2°F = Air } EXTech
41.7 °F = 2cm soil 42.8°F = Air } soil probe

404 Pit Light: <1 lux
Soil T: 39.2°F
2cm Air T: 41.9°F
1m Air T: 40.2°F
RH%: 83%

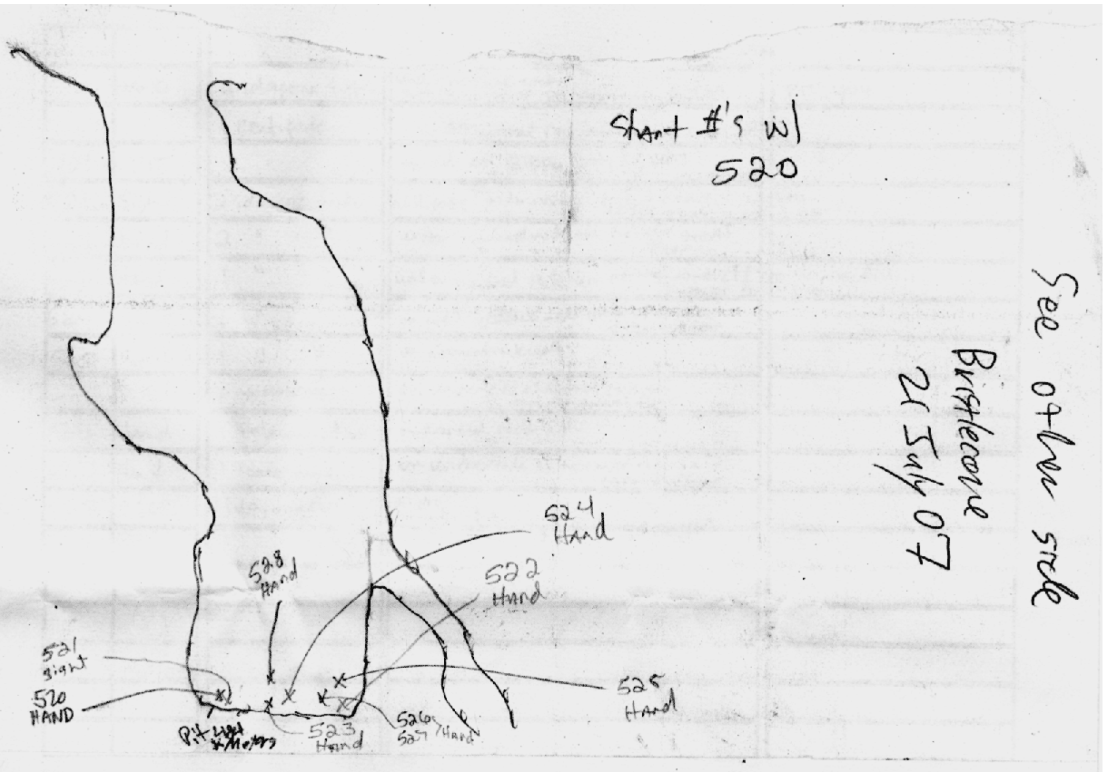
See other side

Bristlecone Cave (continued).

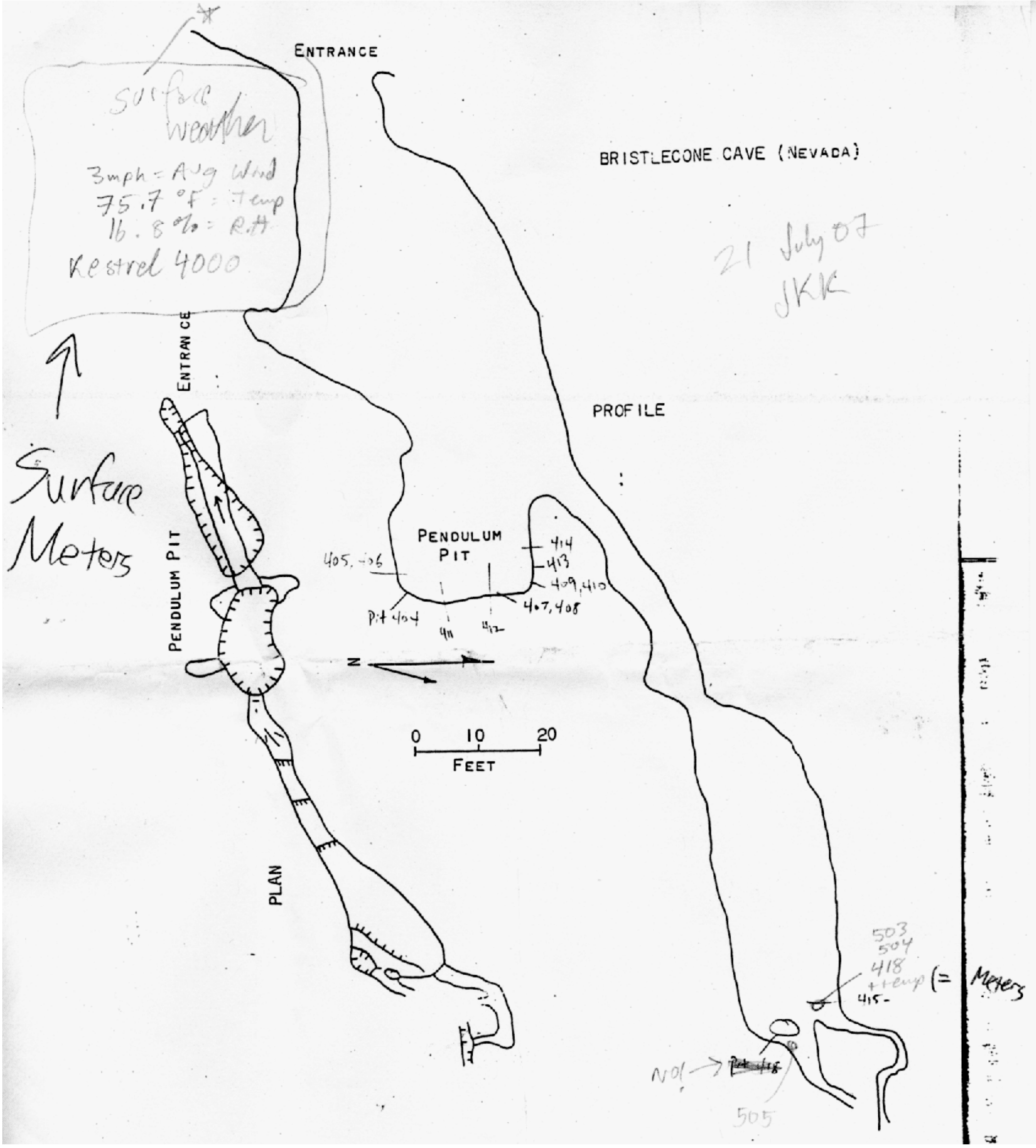


520	HAND	4 Idagona type	under normal rock sitting on top of pitfall trap : TW1	PIT 404
		1 centipede	under normal rock near pitfall trap: TW1	
404	PIT		pulled at 1230pm July 21, 2007	
521	Sight	2 idagona type	millipeds under normal rocks near pitfall traps	both juveniles
522	Hand	2 " "	under normal rock on normal gravel floor	
523	Hand	1 " "	under normal rock on normal gravel /	pinecone floor
524	Hand	1 " "	on wet bedrock wall with organic debris & stain	
525	Sight	1 " "	on normal rock wall	
		1 tomocerus	on underside of normal rock on normal gravel floor	
526	Hand	1 Heleomyzid	on normal rock wall	
527	Hand	1 Tomocerus	on underside of normal rock on normal floor	
528	Sight	1 idagona type	on dry bedrock wall	

See Back

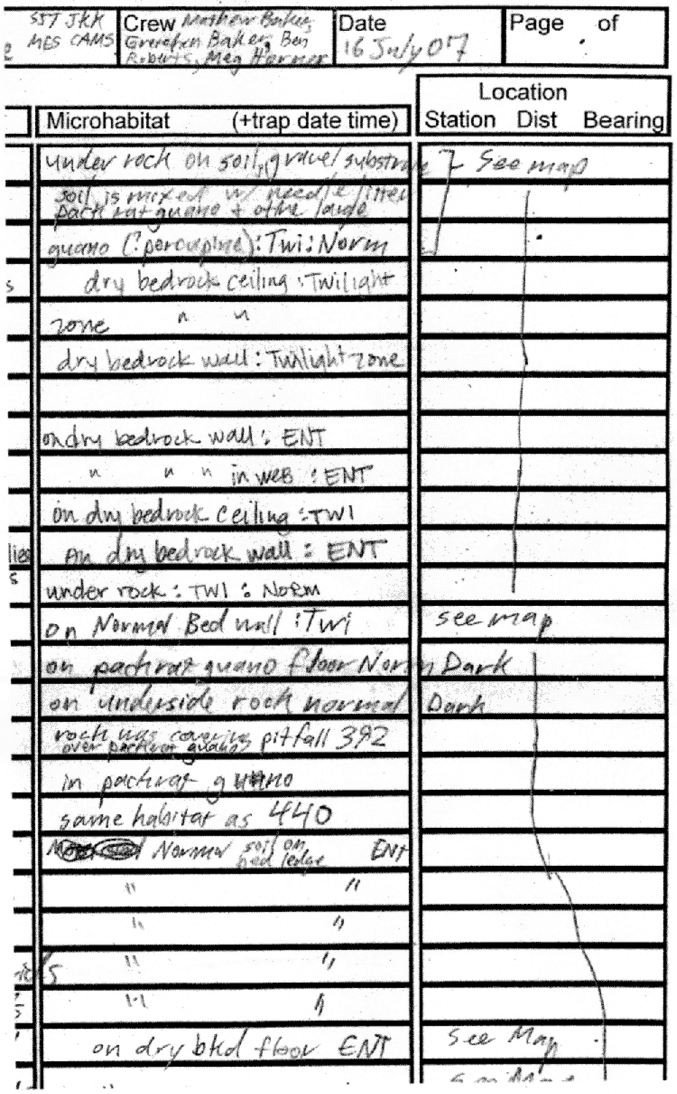


Bristlecone Cave (continued).



Broken Cave

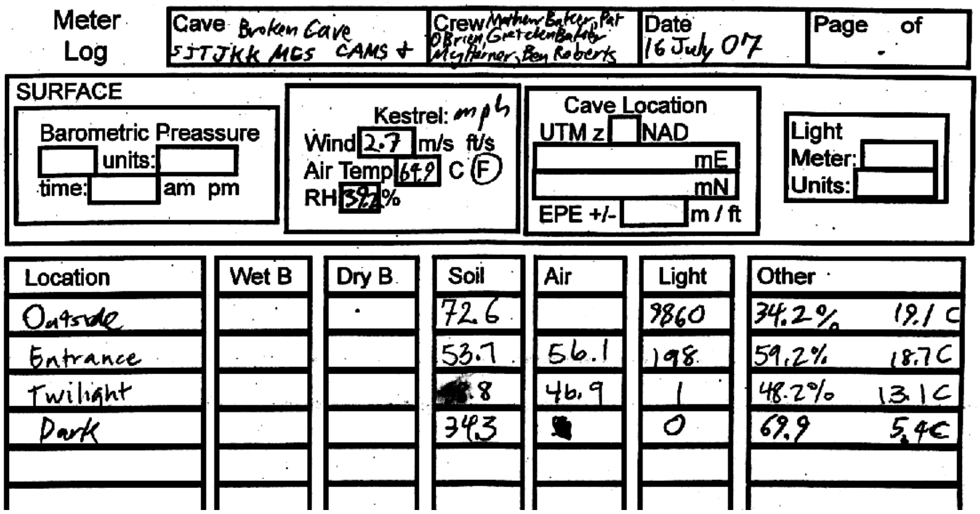
Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C. Thomas
10-Jul-07
Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay, Mathew Baker, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner
16-Jul-07



SST JKK MES CAMS	Crew Mathew Baker, Gretchen Baker, Ben Roberts, Meg Horner	Date 16 July 07	Page of

Microhabitat (+trap date time)	Location Station	Dist	Bearing
under rock on soil/gravel/substrate	See map		
soil is mixed w/ needle litter pack rat guano + other large			
guano (?porcupine): Twi: Norm			
dry bedrock ceiling: Twilight			
zone " "			
dry bedrock wall: Twilight zone			
on dry bedrock wall: ENT			
" " " in web: ENT			
on dry bedrock ceiling: TWI			
on dry bedrock wall: ENT			
under rock: TWI: Norm			
on Normal Bed wall: Twi	see map		
on packrat guano floor Norm	Dark		
on underside rock normal	Dark		
rock was covering over packrat guano pitfall 392			
in packrat guano			
same habitat as 440			
Normal soil on bed ledge ENT			
" "			
" "			
" "			
" "			
on dry bkd floor ENT	See Map		

Broken Cave (continued).



Meter Log

Cave Broken Cave 5JTJKK MCS CAMS +

Crew Mathew Baker, Pat OBrien, Gretchen Baker, Meg Horner, Ben Roberts

Date 16 July 07

Page of

SURFACE

Barometric Preassure
units:
time: am pm

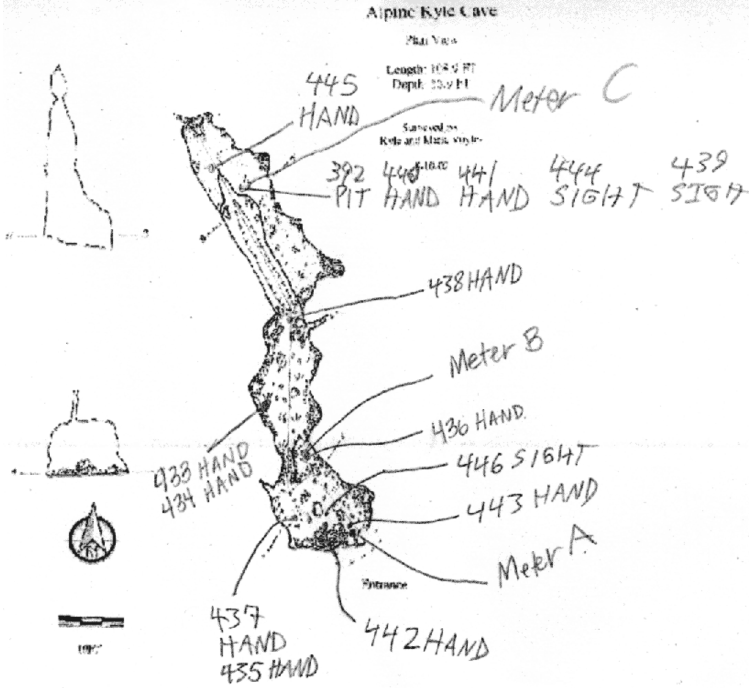
Kestrel: mph
Wind 2.7 m/s ft/s
Air Temp 64.9 C [✓ F]
RH 39.2 %

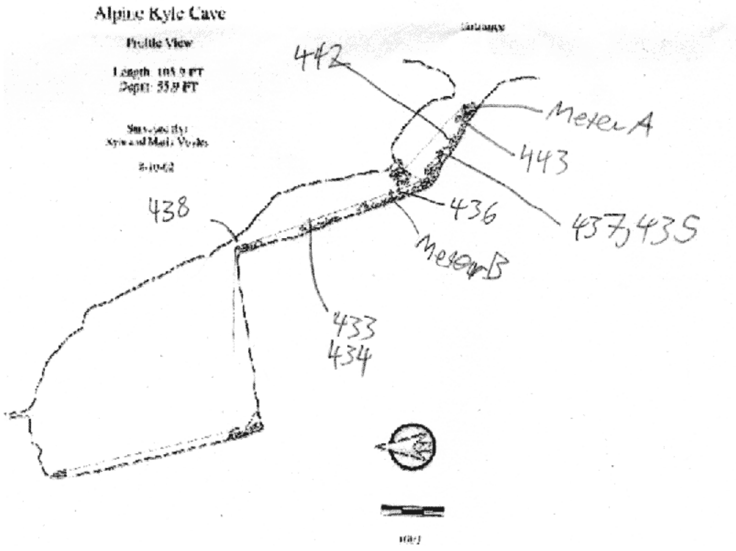
Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

	Location	Wet B	Dry B	Soil	Air	Light	Other
	Outside			72.6		9860	34.2% 19.1 C
A	Entrance			53.7	56.1	198	59.2% 18.7C
B	Twilight			[illegible].8	46.9	1	48.2% 13.1C
C	Dark			34.3	[illegible]	0	69.9 5.4C

Broken Cave (continued).





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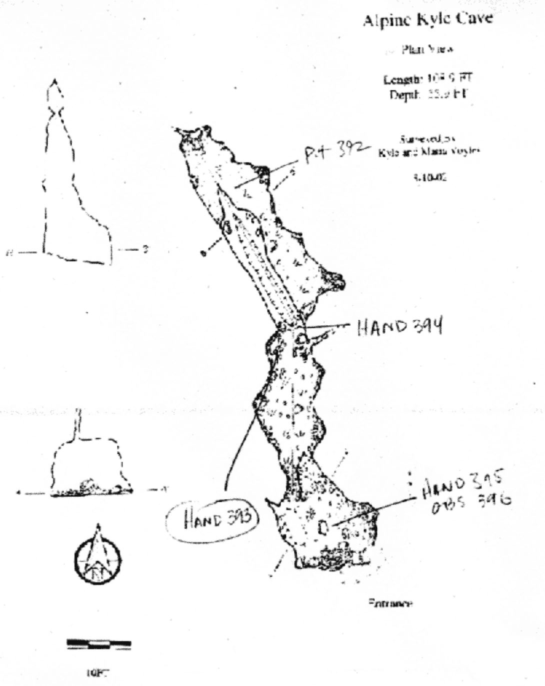
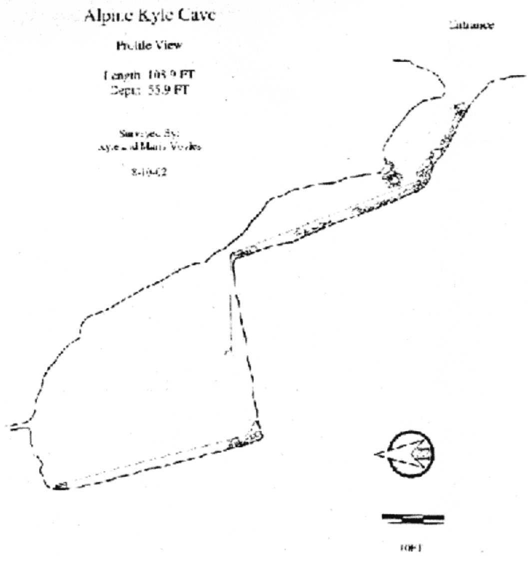
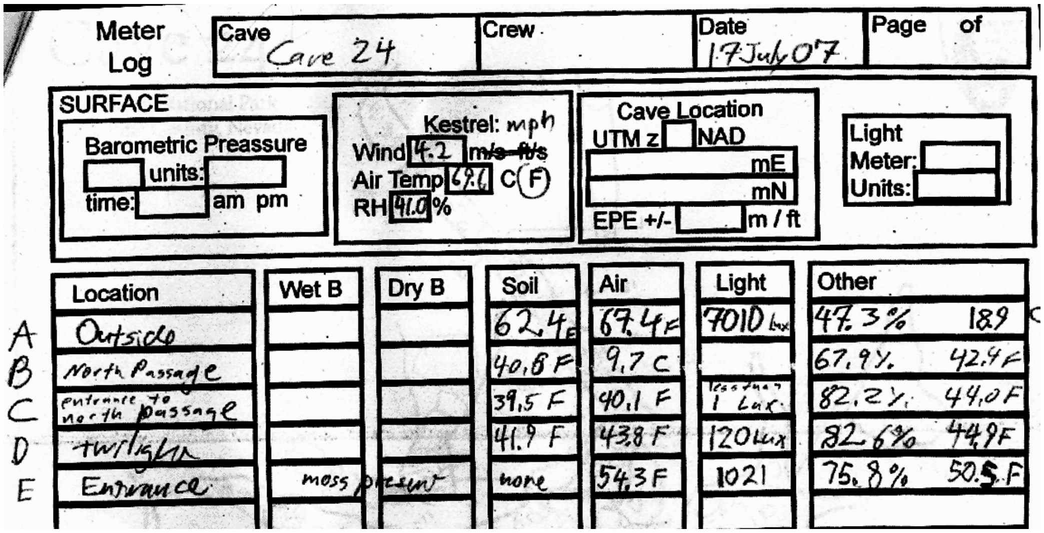
Broken Cave (continued).





Cave 24

Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C. Thomas
9-Jul-07
Ben M. Roberts, Meg A. Horner, Patrick M O'Brien, Shawn C. Thomas, Gretchen M. Baker, Steven J. Taylor
17-Jul-07



Meter Log

Cave: Cave 24
Crew:
Date: 17July07
Page of

SURFACE

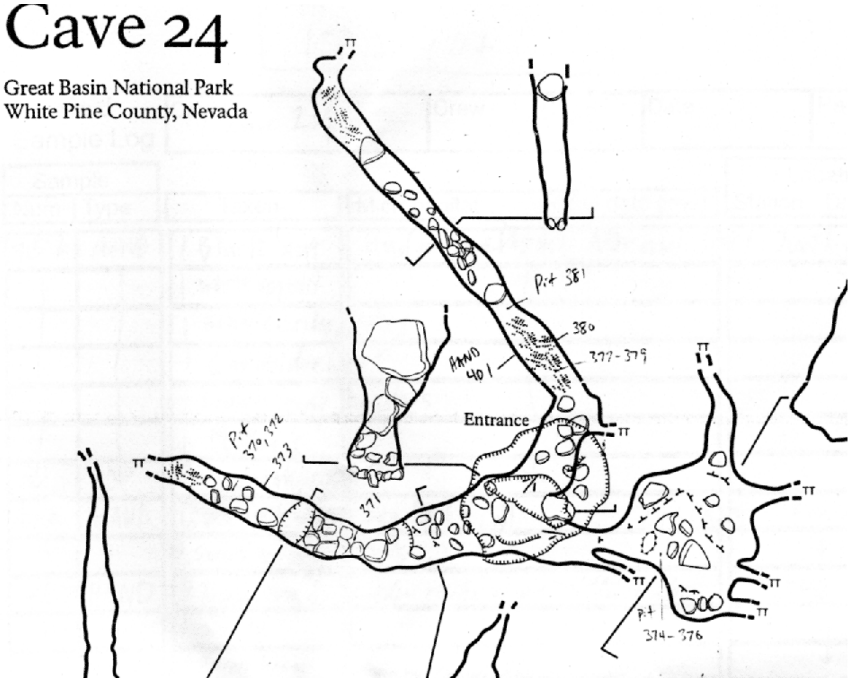
Barometric Preassure
units:
time: am pm

Kestrel: mph
Wind 4.2 ~~m/s ft/s~~
Air Temp 69.6 C [✓ F]
RH 41.0 %

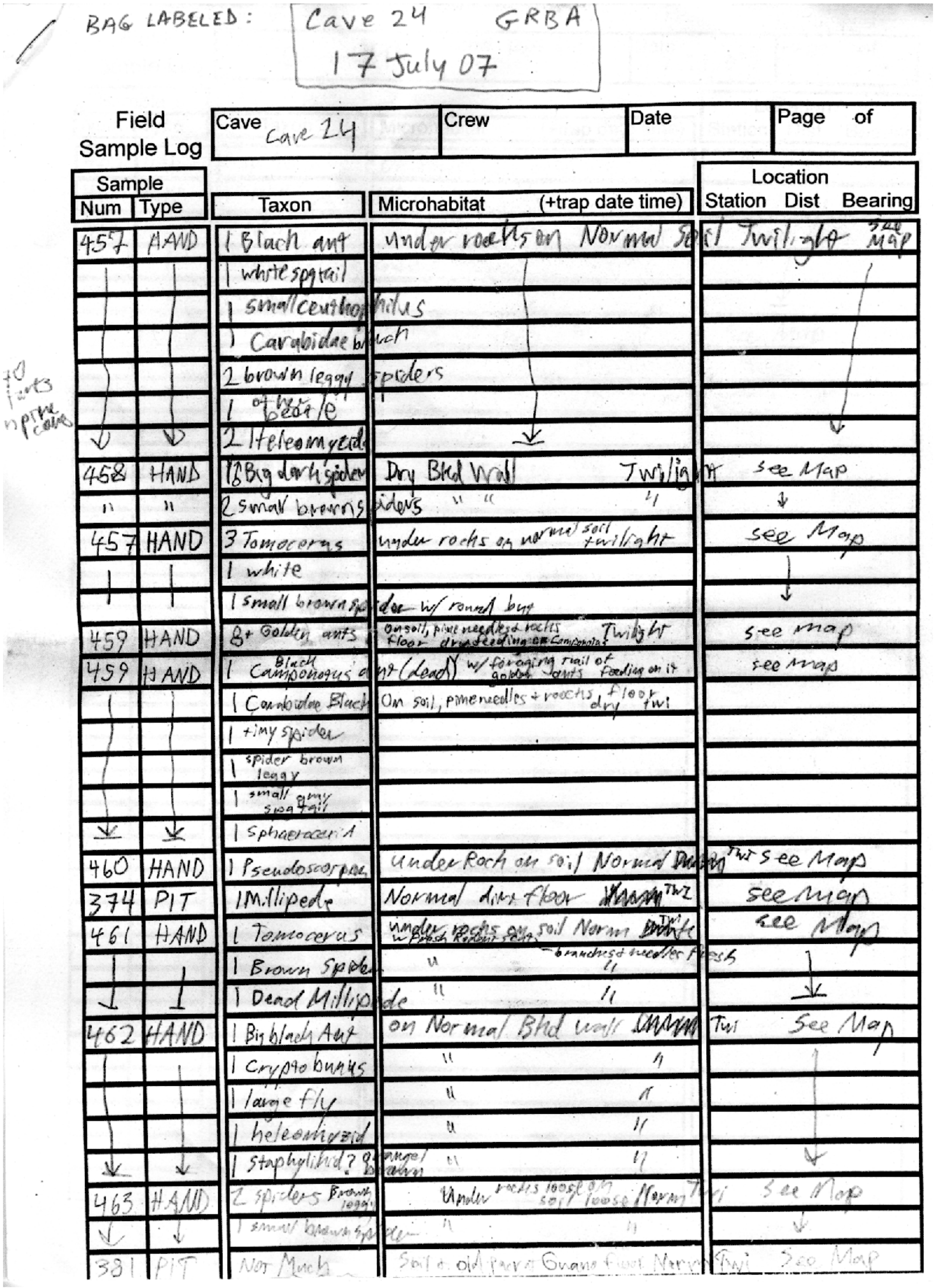
Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

	Location	Wet B	Dry B	Soil	Air	Light	Other
A	Outside			62.4F	67.4F	7010 lux	47.3% 189
B	North Passage			40.8 F	9.7 C		67.9% 42.4F
C	entrance to north passage			39.5 F	40.1 F	less than 1 Lux	82.2% 44.0F
D	twilight			41.9 F	43.8 F	120 lux	82.6% 44.9F
E	Entrance	moss present		none	54.3F	1021	75.8% 50.5F



Cave 24 (continued).



BAG LABELED: Cave 24 GRBA
17 July 07

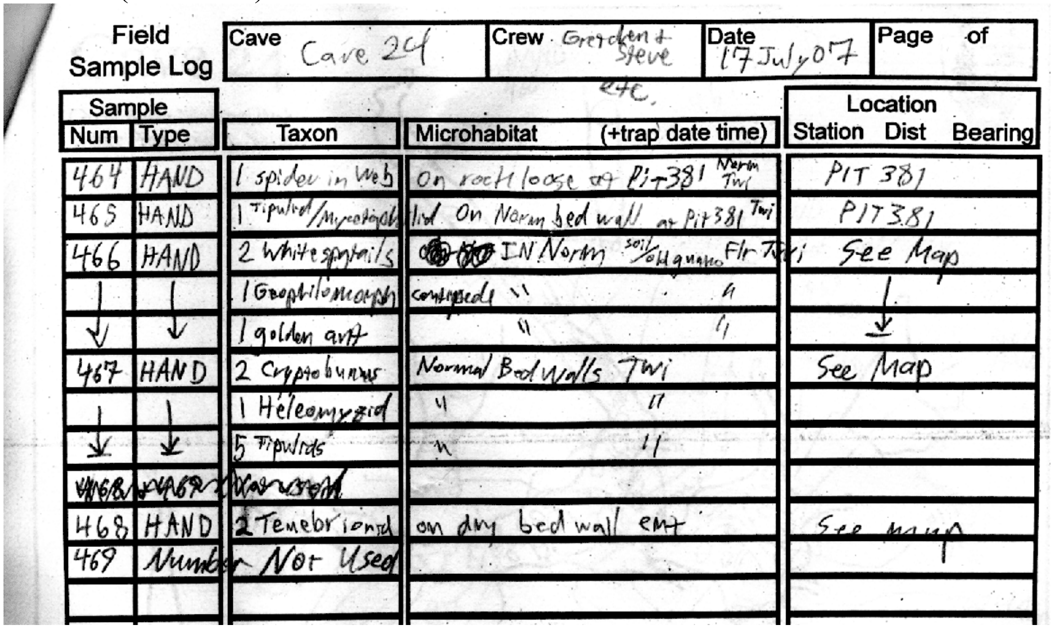
Field Sample Log

Cave	Crew	Date	Page of
Cave 24			

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing
457	HAND	1 Black ant	under rocks on Normal Soil	Twilight		see Map
		1 white springtail				
		1 small ceuthophilus				
		1 Carabidae black				
		2 brown leggy spiders				
		1 other beetle				
↓	↓	2 Heleomyzids	↓			↓
458	HAND	18 Big dark spiders	Dry Bhd Wall Twilight		see Map	
"	"	2 small browns spiders	" " "		↓	
457	HAND	3 Tomocerus	under rocks on normal soil twilight		see Map	
		1 white				
		1 small brown spider w/ round bug			↓	
459	HAND	8+ Golden ants	on soil, pine needles & rocks floor dry feeding on Camponotus Twilight		see map	
459	HAND	1 Black Camponotus ant (dead)	w/ foraging trail of golden ants feeding on it		see map	
		1 Carabidae Black	On soil, pine needles + rocks floor dry twi			
		1 tiny spider				
		1 spider brown leggy				
		1 small gray springtail				
↓	↓	1 Sphaerocerid				
460	HAND	1 Pseudoscorpion	Under Rock on soil Normal ~~Dusty~~ TWI		see Map	
374	PIT	1 Millipede	Normal dirt floor ~~[illegible]~~ TWI		see Map	
461	HAND	1 Tomocerus	under rocks on soil Norm ~~White~~ TWI w/ Peach Rodent scat		see Map	
		1 Brown Spider	" branches & needles Fresh "			
↓	↓	1 Dead Millipede	" "		↓	
462	HAND	1 Big black Ant	on Normal Bhd wall ~~[illegible]~~	Twi	see Map	
		1 Cryptobunus	" "			
		1 large fly	" "			
		1 heleomyzid	" "			
↓	↓	1 Staphylinid? orange/brown	" "		↓	
463	HAND	2 spiders Brown leggy	Under rocks loose on soil loose Norm Twi		See Map	
↓	↓	1 small brown spider	" "		↓	
381	PIT	Not Much	Soil & old pack rat Guano floor Norm	Twi	See Map	

70 ants in pine cones

Cave 24 (continued).

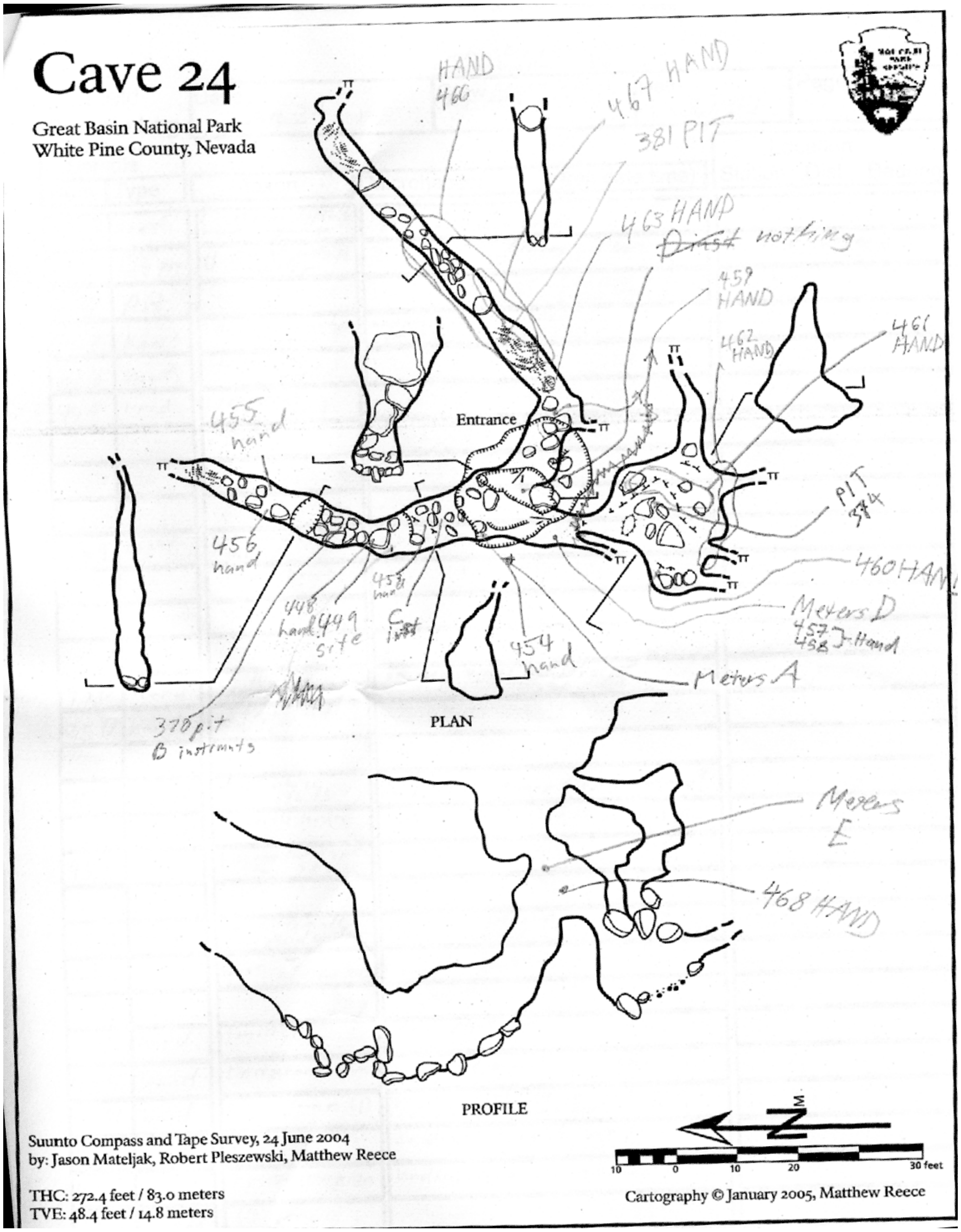


Field Sample Log

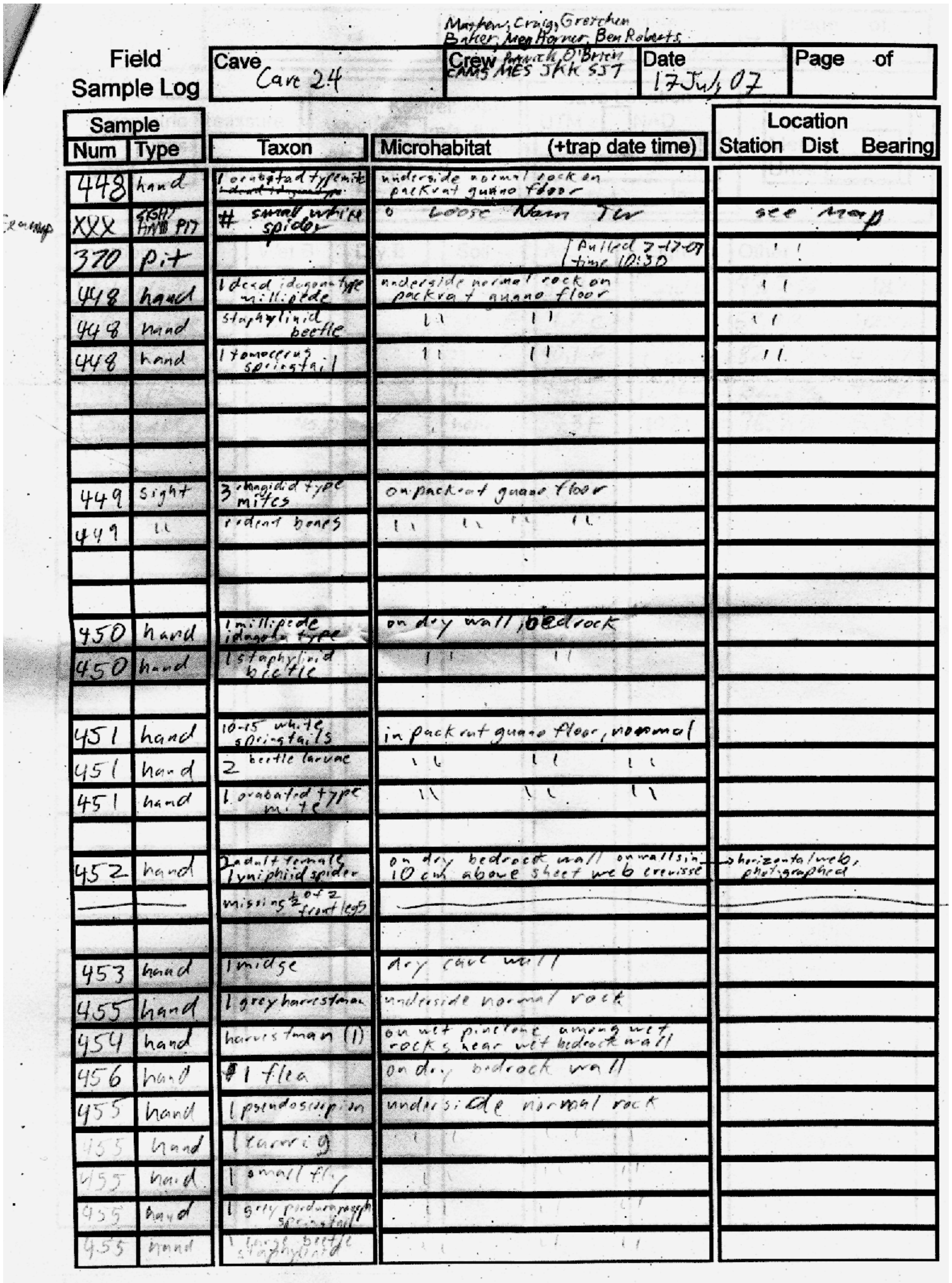
Cave: Cave 24
Crew: Gretchen + Steve etc.
Date: 17 July 07
Page of

Sample					Location	
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
464	HAND	1 spider in Web	On rock loose at Pit 381 Norm Twi	PIT 381		
465	HAND	1 Tipulid/Mycetophilid	On Norm bed wall at Pit 381 Twi	PIT 381		
466	HAND	2 White springtails	IN Norm soil/old guano Flr Twi	See Map		
↓	↓	1 Geophilomorph	centipede " "	↓		
↓	↓	1 golden ant	" "	↓		
467	HAND	2 Cryptobunus	Normal Bed Walls Twi	See Map		
↓	↓	1 Heleomyzid	" "			
↓	↓	5 Tipulids	" "			
~~468~~	[illegible]	[illegible]				
468	HAND	2 Tenebrionid	on dry bed wall ent	See map		
469	Number Not Used					

Cave 24 (continued).



Cave 24 (continued).



Field Sample Log

Cave: Cave 24

Crew: Mathew, Craig, Gretchen Baker, Meg Horner, Ben Roberts, Annie O'Brien CAMS MES JKK SJT

Date: 17 Jul 07

Page of

Examp

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
448	hand	1 orabatad type mite ~~1 dead idagona type~~	underside normal rock on packrat guano floor			
XXX	SIGHT HAND PIT	# small white spider	0 Loose Nam Tw	see map		
370	pit		Pulled 7-17-07 time 10:30	''		
448	hand	1 dead idagona type millipede	underside normal rock on packrat guano floor	''		
448	hand	staphylinid beetle	'' ''	''		
448	hand	1 tomocerus springtail	'' ''	''		
449	sight	3 rhagidiid type mites	on packrat guano floor			
449	''	rodent bones	'' '' '' ''			
450	hand	1 millipede idagona type	on dry wall, bedrock			
450	hand	1 staphylinid beetle	'' ''			
451	hand	10-15 white springtails	in packrat guano floor, normal			
451	hand	2 beetle larvae	'' '' ''			
451	hand	1 orabated type mite	'' '' ''			
452	hand	2 adult female linyphiid spider	on dry bedrock wall on walls in 10 cm above sheet web crevisse	→ horizontal web, photographed		
——	——	missing ½ of 2 front legs	——	——		
453	hand	1 midge	dry cave wall			
455	hand	1 grey harvestman	underside normal rock			
454	hand	harvestman (1)	on wet pinecone among wet rocks near wet bedrock wall			
456	hand	#1 flea	on dry bedrock wall			
455	hand	1 pseudoscorpion	underside normal rock			
455	hand	1 earwig	'' '' ''			
455	hand	1 small fly	'' '' ''			
455	hand	1 grey podurامorph springtail	'' '' ''			
455	hand	1 large beetle staphylinid	'' '' ''			

Cave Valley Cave

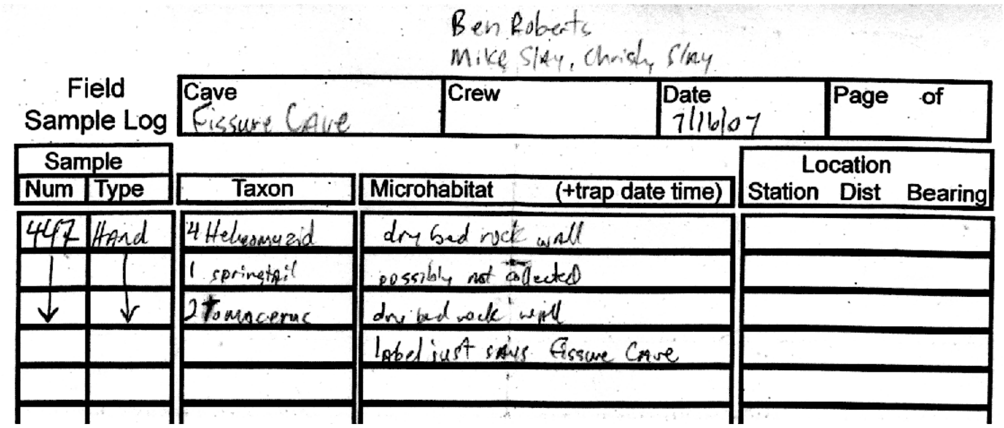
Gretchen M. Baker, Steve Deveny, Kristine Deveny, Johnathan Deveny, Jeremy Deveny, Rick Bowersox
30-Sep-06

(field notes not available)

Fissure Cave

Ben M. Roberts, Michael E. Slay, Christy A.M. Slay

16-Jul-07



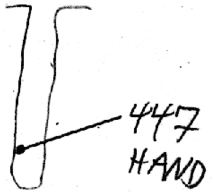
Ben Roberts
Mike Slay, Christy Slay

Field Sample Log

Cave	Crew	Date	Page of
Fissure Cave		7/16/07	

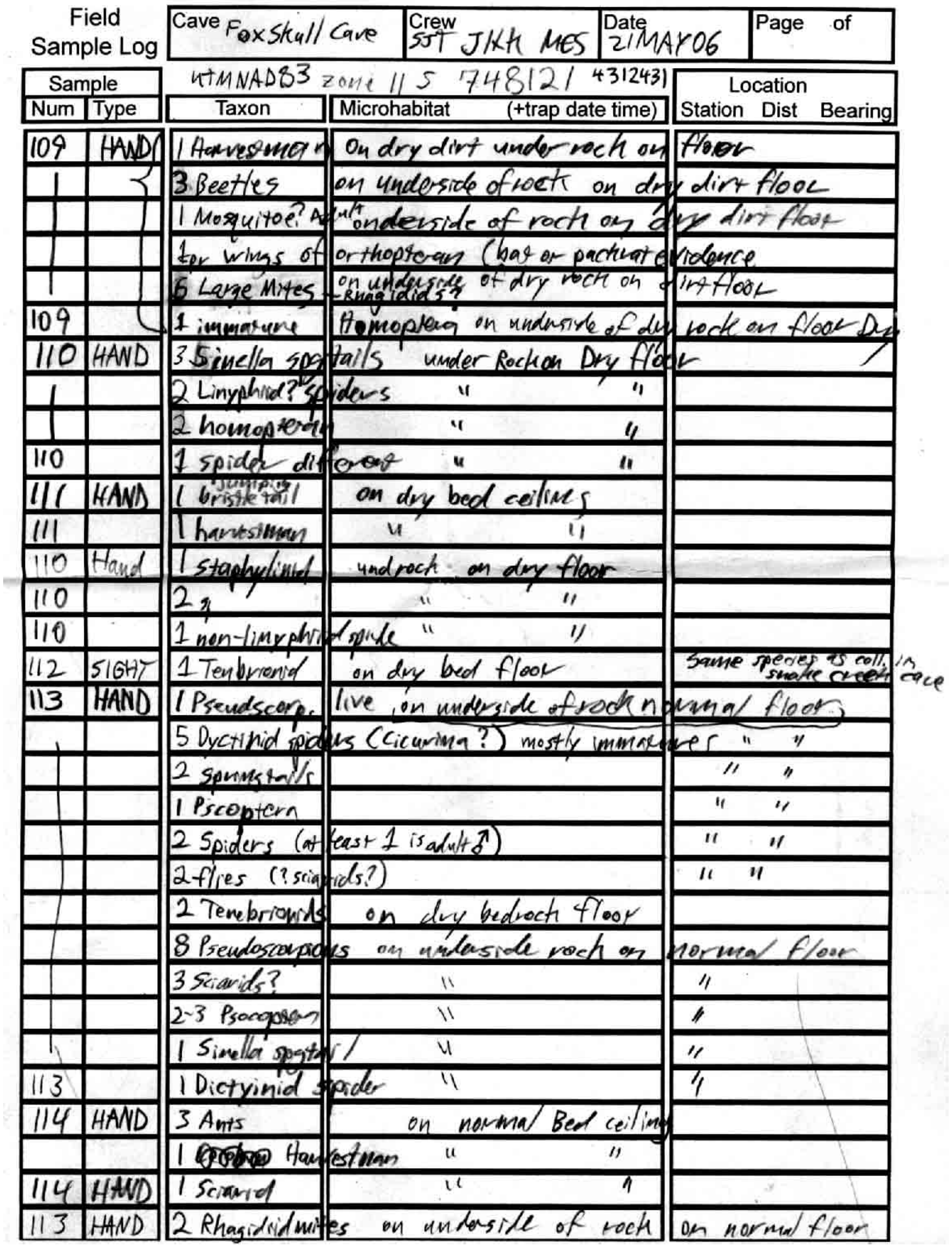
Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
447	Hand	4 Heleomyzid	dry bed rock wall			
↓	↓	1 springtail	possibly not collected			
↓	↓	2 Tomacerus	dry bed rock wall			
			label just says Fissure Cave			

Appears to have filled with rock about 15 ft into passage



Fox Skull Cave

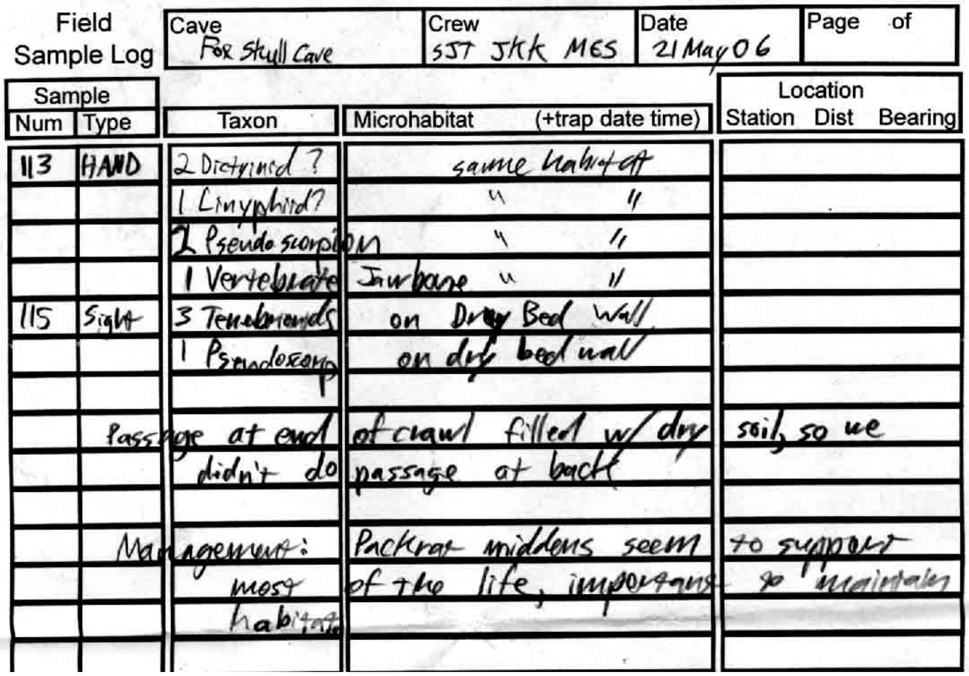
Steven J. Taylor, Jean K. Krejca, Michael E. Slay
21-May-06
Gretchen M. Baker, Meg A. Horner, Christy A. Moerbe
24-Oct-06



Field Sample Log
Cave Fox Skull Cave
Crew SJT JKK MES
Date 21MAY06
Page of
UTM NAD83 zone 11 S 748121 4312431

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
109	HAND	1 Harvestman	On dry dirt under rock on	floor
		3 Beetles	on underside of rock on dry	dirt floor
		1 Mosquitoe? Adult	underside of rock on dry	dirt floor
		1 pr wings of	orthopteran (bat or packrat	evidence
		6 Large Mites - Rhagidiids?	on underside of dry rock on	dirt floor
109		1 immature	Homoptera on underside of dry	rock on floor Dry
110	HAND	3 Sinella springtails	under Rock on Dry floor	/
		2 Linyphiid? spiders	" "	
		2 homoptera	" "	
110		1 spider different	" "	
111	HAND	1 jumping bristle tail	on dry bed ceiling	
111		1 harvestman	" "	
110	Hand	1 staphylinid	und rock on dry floor	
110		2 "	" "	
110		1 non-linyphiid spider	" "	
112	SIGHT	1 Tenbrionid	on dry bed floor	same species as coll. in snake creek cave
113	HAND	1 Pseudscorp.	live, on underside of rock	normal floor
		5 Dyctinid spiders	(Cicurina?) mostly immatures	" "
		2 springtails		" "
		1 Pscoptera		" "
		2 Spiders	(at least 1 is adult ♂)	" "
		2 flies	(? sciarids?)	" "
		2 Tenebrionids	on dry bedrock floor	
		8 Pseudoscorpions	on underside rock on	normal floor
		3 Sciarids?	"	"
		2-3 Psocoptera	"	"
		1 Sinella springtail /	"	"
113		1 Dictyinid spider	"	"
114	HAND	3 Ants	on normal Bed ceiling	
		1 Harvestman	" "	
114	HAND	1 Sciarid	" "	
113	HAND	2 Rhagidiid mites	on underside of rock	on normal floor

Fox Skull Cave (continued).



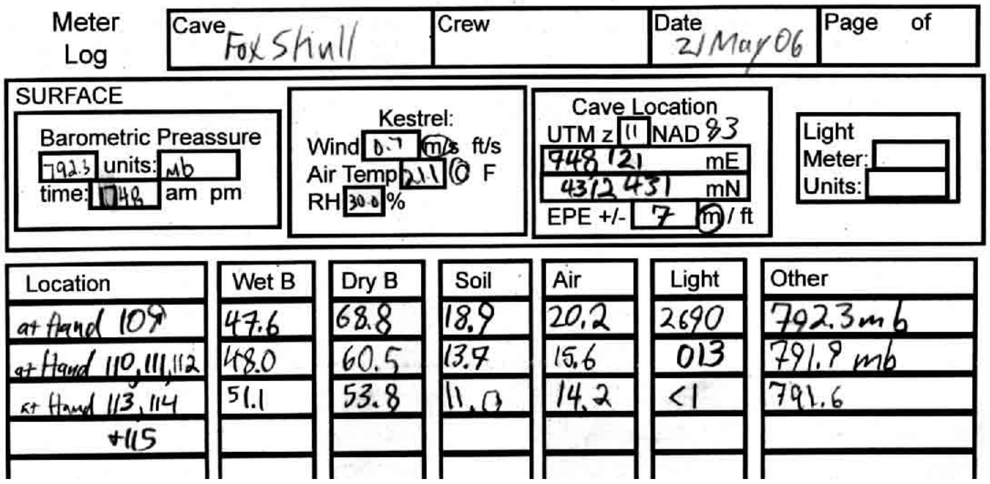
Field Sample Log

Cave: Fox Skull Cave
Crew: SJT JKK MES
Date: 21 May 06
Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Dist	Bearing
113	HAND	2 Dictynid ?	same habitat			
		1 Linyphiid?	" "			
		2 Pseudoscorpion	" "			
		1 Vertebrate	Jawbone " "			
115	Sight	3 Tenebrionids	on Dry Bed Wall			
		1 Pseudoscorp	on dry bed wall			

Passage at end of crawl filled w/ dry soil, so we didn't do passage at back

Management: Packrat middens seem to support most of the life, important to maintain habitat



Meter Log

Cave: Fox Skull
Crew:
Date: 21 May 06
Page of

SURFACE

Barometric Preassure: 792.3 units: mb
time: 1148 am pm

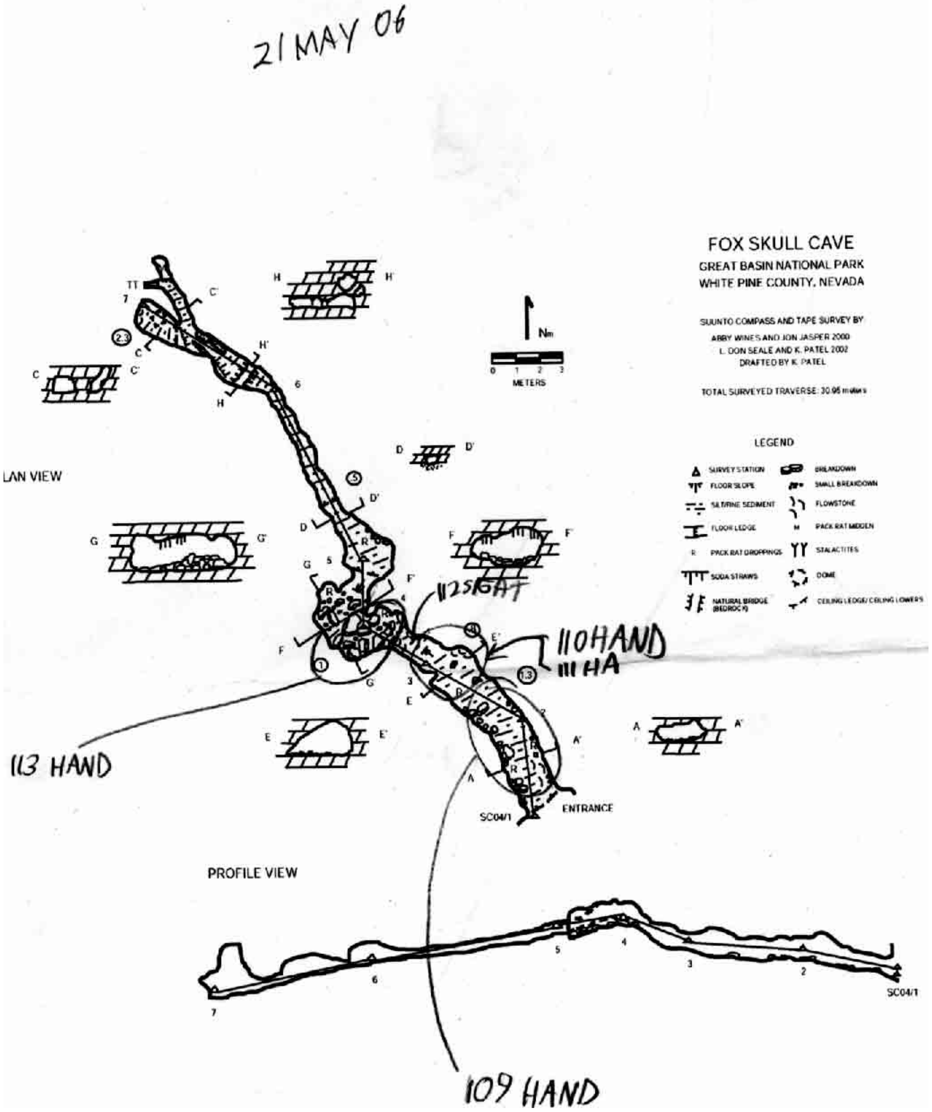
Kestrel:
Wind 0.7 [✓ m/s] ft/s
Air Temp 21.1 [✓ C] F
RH 30.0 %

Cave Location
UTM z 11 NAD 83
948121 mE
4312431 mN
EPE +/- 7 [✓ m] / ft

Light Meter:
Units:

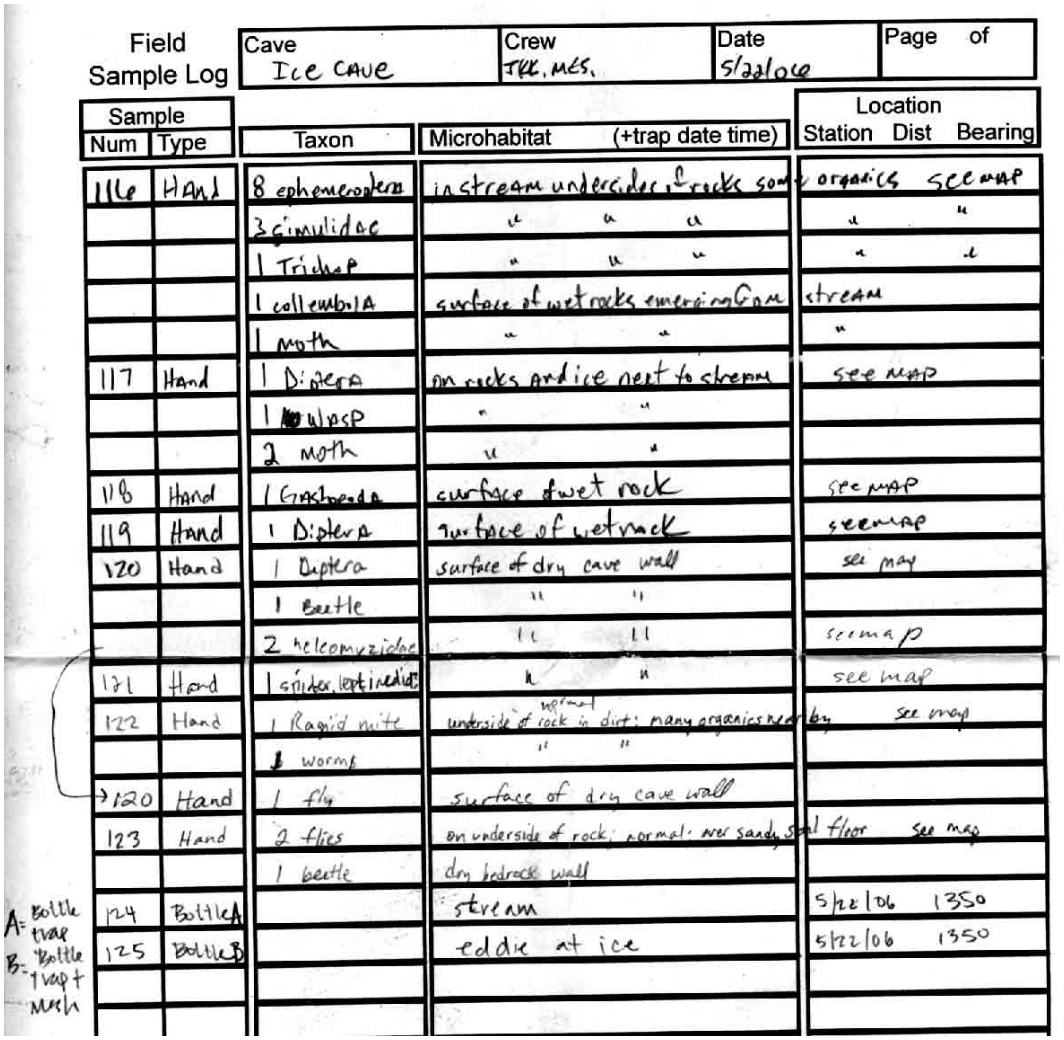
Location	Wet B	Dry B	Soil	Air	Light	Other
at Hand 109	47.6	68.8	18.9	20.2	2690	792.3 mb
at Hand 110, 111, 112	48.0	60.5	13.7	15.6	013	791.9 mb
at Hand 113, 114	51.1	53.8	11.0	14.2	<1	791.6
+115						

Fox Skull Cave (continued).



Ice Cave

Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner
22-May-06
Meg A. Horner, Gretchen M. Baker
24-May-06
Gretchen M. Baker, Meg A. Horner, Brittany L. Timm
2-Oct-06



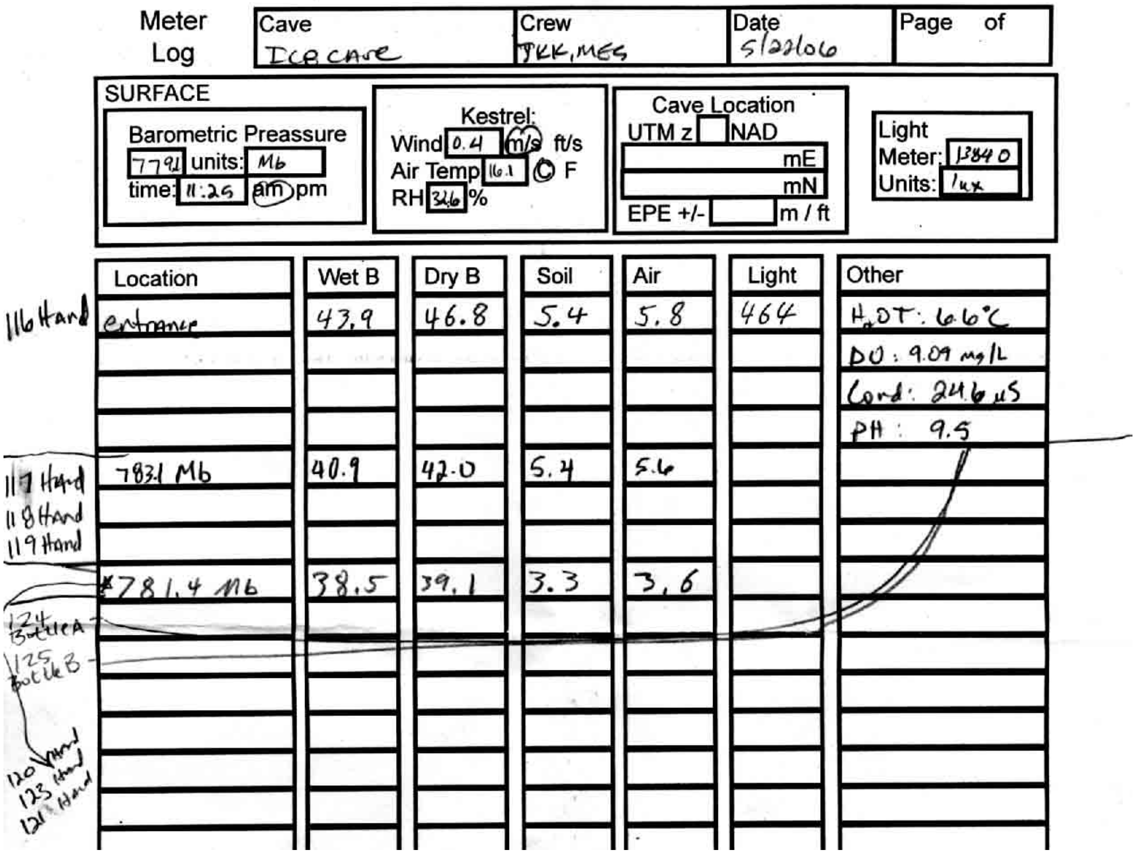
Field Sample Log

Cave: Ice Cave
Crew: JKK, MES.
Date: 5/22/06
Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
116	Hand	8 ephemeroptera	instream undersides of rocks some organics	see MAP
		3 simulidae	" " "	" "
		1 Trichop	" " "	" "
		1 collembola	surface of wet rocks emerging from stream	
		1 moth	" "	"
117	Hand	1 Diptera	on rocks and ice next to stream	see MAP
		1 wasp	" "	
		2 moth	" "	
118	Hand	1 Gastropoda	surface of wet rock	see MAP
119	Hand	1 Diptera	surface of wet rock	see map
120	Hand	1 Diptera	surface of dry cave wall	see map
		1 Beetle	" "	
		2 heleomyzidae	" "	see map
121	Hand	1 spider, leptinedae	" "	see map
122	Hand	1 Rapid mite	underside of normal rock in dirt: many organics nearby	see map
		1 worms	" "	
120	Hand	1 fly	surface of dry cave wall	
123	Hand	2 flies	on underside of rock; normal: wet sandy soil floor	see map
		1 beetle	dry bedrock wall	
124	Bottle A		stream	5/22/06 1350
125	Bottle B		eddie at ice	5/22/06 1350

A= Bottle trap
B= Bottle trap + mesh

Ice Cave (continued).



Meter Log

Cave	Crew	Date	Page of
Ice cave	JKK, MEG	5/22/06	

SURFACE

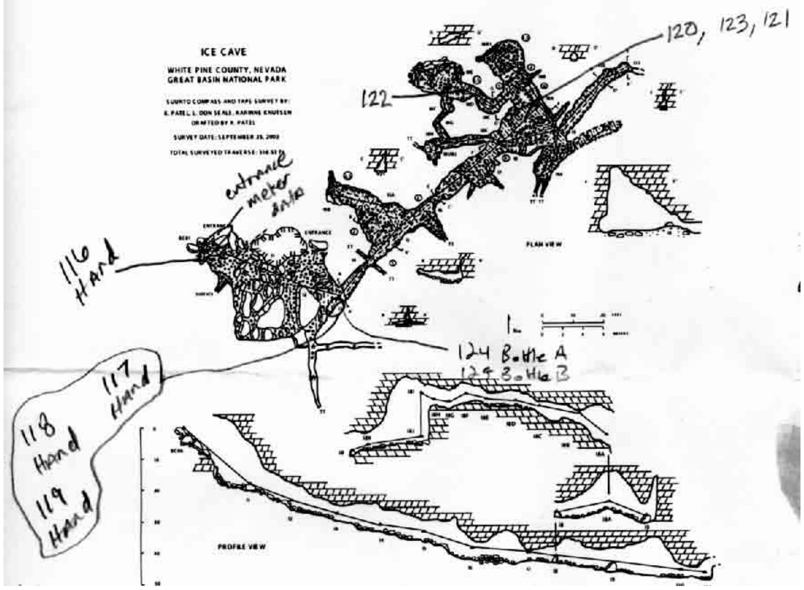
Barometric Preassure 7791 units: Mb
time: 11:25 [✓ am] pm

Kestrel:
Wind 0.4 [✓ m/s] ft/s
Air Temp 16.1 [✓ C] F
RH 36.6 %

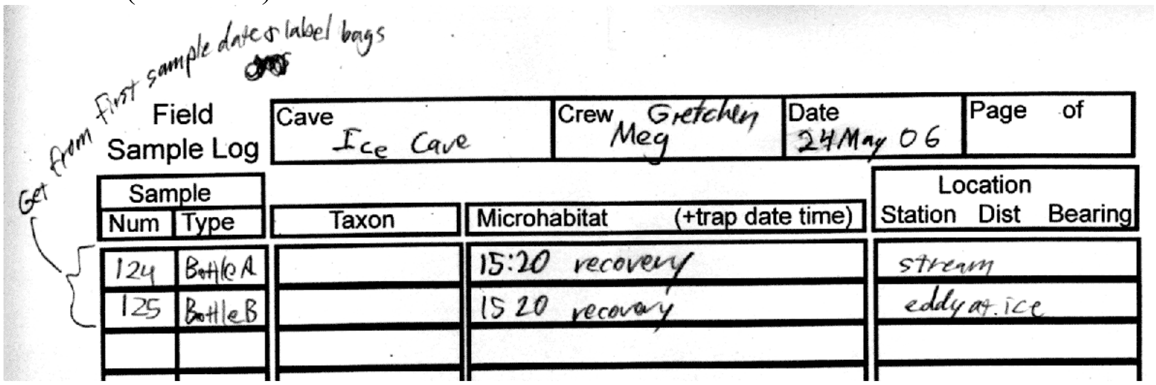
Cave Location
UTM z ☐ NAD
mE
mN
EPE +/- m / ft

Light Meter: 13840
Units: lux

	Location	Wet B	Dry B	Soil	Air	Light	Other
116 Hand	entrance	43.9	46.8	5.4	5.8	464	H_2O T: 6.6°C
							DO: 9.09 mg/L
							Cond: 24.6 µS
							pH: 9.5
117 Hand	7831 Mb	40.9	42.0	5.4	5.6		
118 Hand							
119 Hand							
	*781.4 Mb	38.5	39.1	3.3	3.6		
124 Bottle A							
125 Bottle B							
120 Hand 123 Hand 121 Hand							



Ice Cave (continued).



Get from first sample date & label bags

Field Sample Log

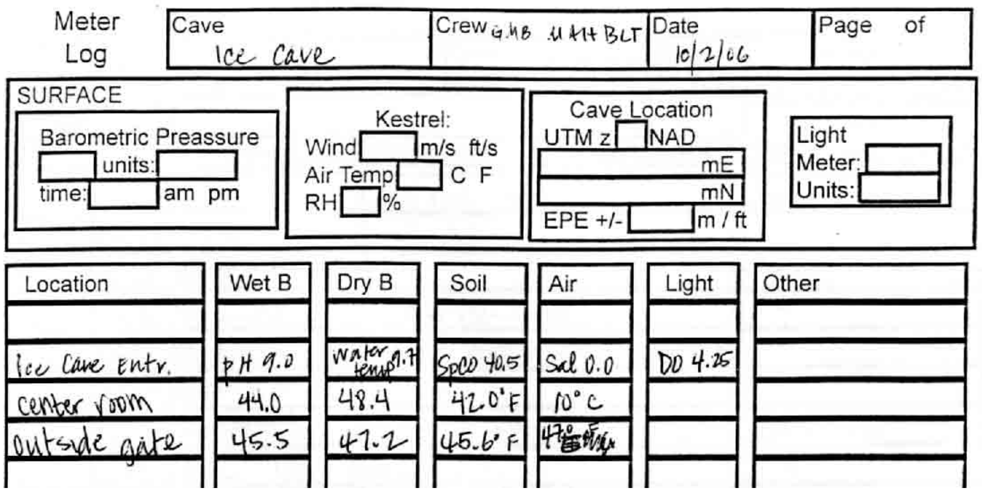
Cave Ice Cave

Crew Gretchen Meg

Date 24May 06

Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
124	Bottle A		15:20 recovery	stream
125	Bottle B		15 20 recovery	eddy at ice



Meter Log

Cave Ice Cave

Crew G.MB MH+ BLT

Date 10/2/06

Page of

SURFACE

Barometric Preassure ☐ units: ☐

time: ☐ am pm

Kestrel:

Wind ☐ m/s ft/s

Air Temp ☐ C F

RH ☐ %

Cave Location

UTM z ☐ NAD

☐ mE

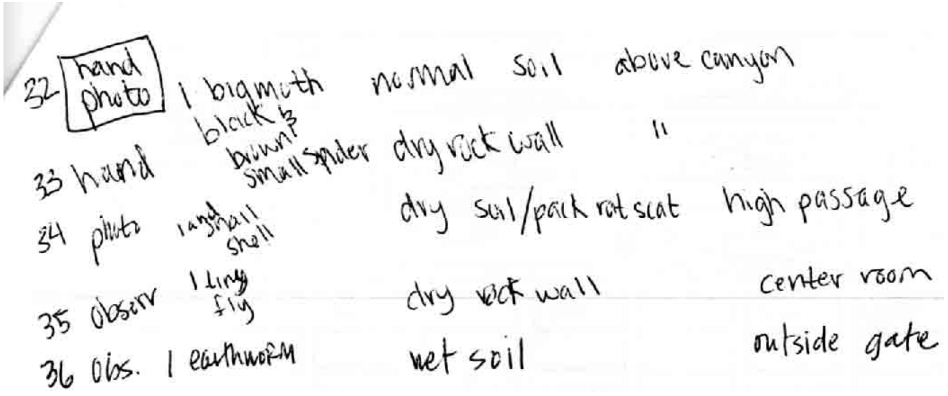
☐ mN

EPE +/- ☐ m / ft

Light Meter: ☐

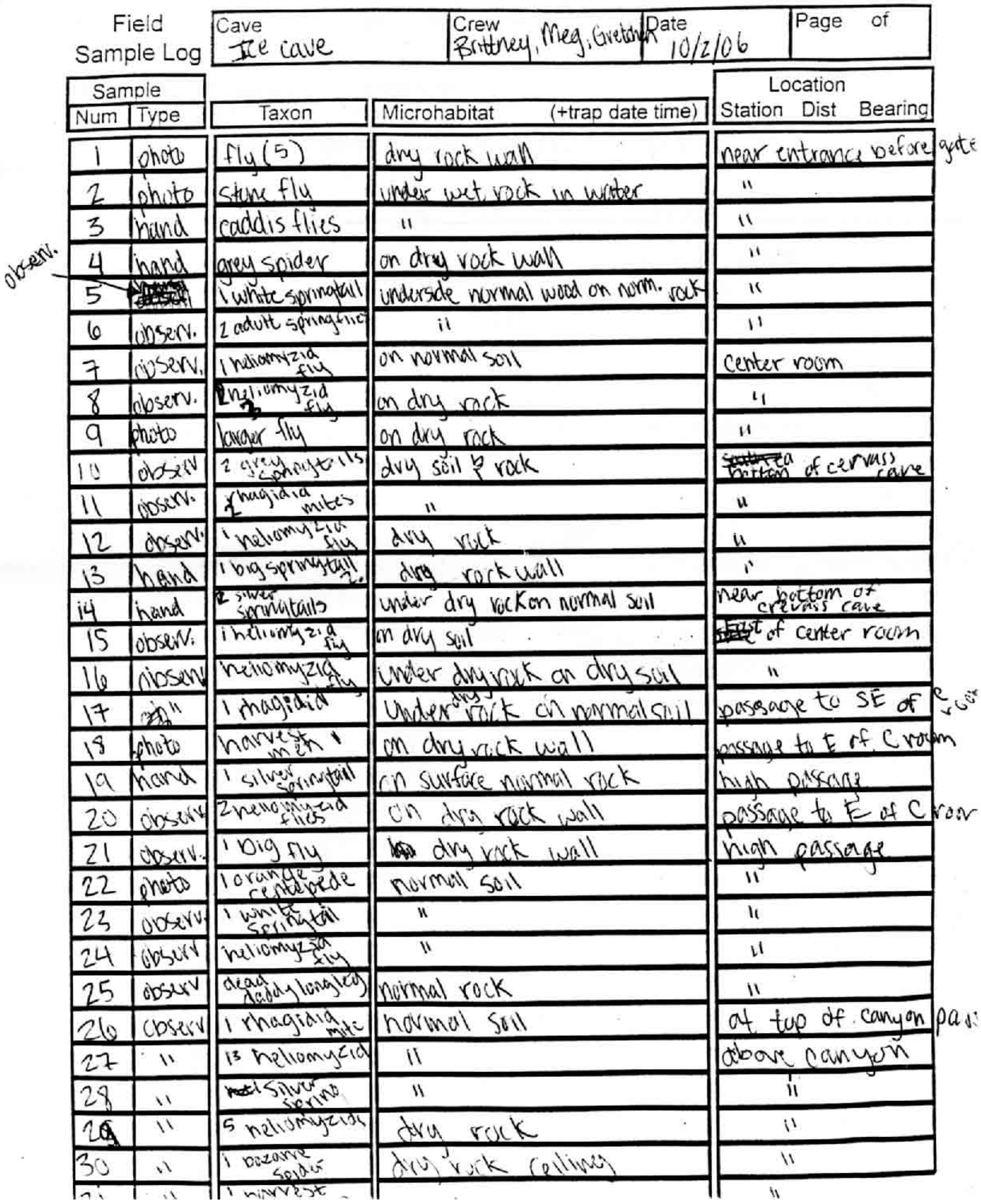
Units: ☐

Location	Wet B	Dry B	Soil	Air	Light	Other
Ice Cave Entr.	pH 9.0	water temp 9.7	SpCO 40.5	Sal 0.0	DO 4.25	
center room	44.0	48.4	42.0°F	10°C		
outside gate	45.5	47.2	45.6°F	47°F		



32	hand photo	1 bigmouth	normal soil	above canyon
33	hand	black & brown small spider	dry rock wall	"
34	photo	1 land snail shell	dry soil/pack rat scat	high passage
35	observ	1 tiny fly	dry rock wall	center room
36	Obs.	1 earthworm	wet soil	outside gate

Ice Cave (continued).



Field Sample Log

Cave: Ice cave

Crew: Brittney, Meg, Gretchen

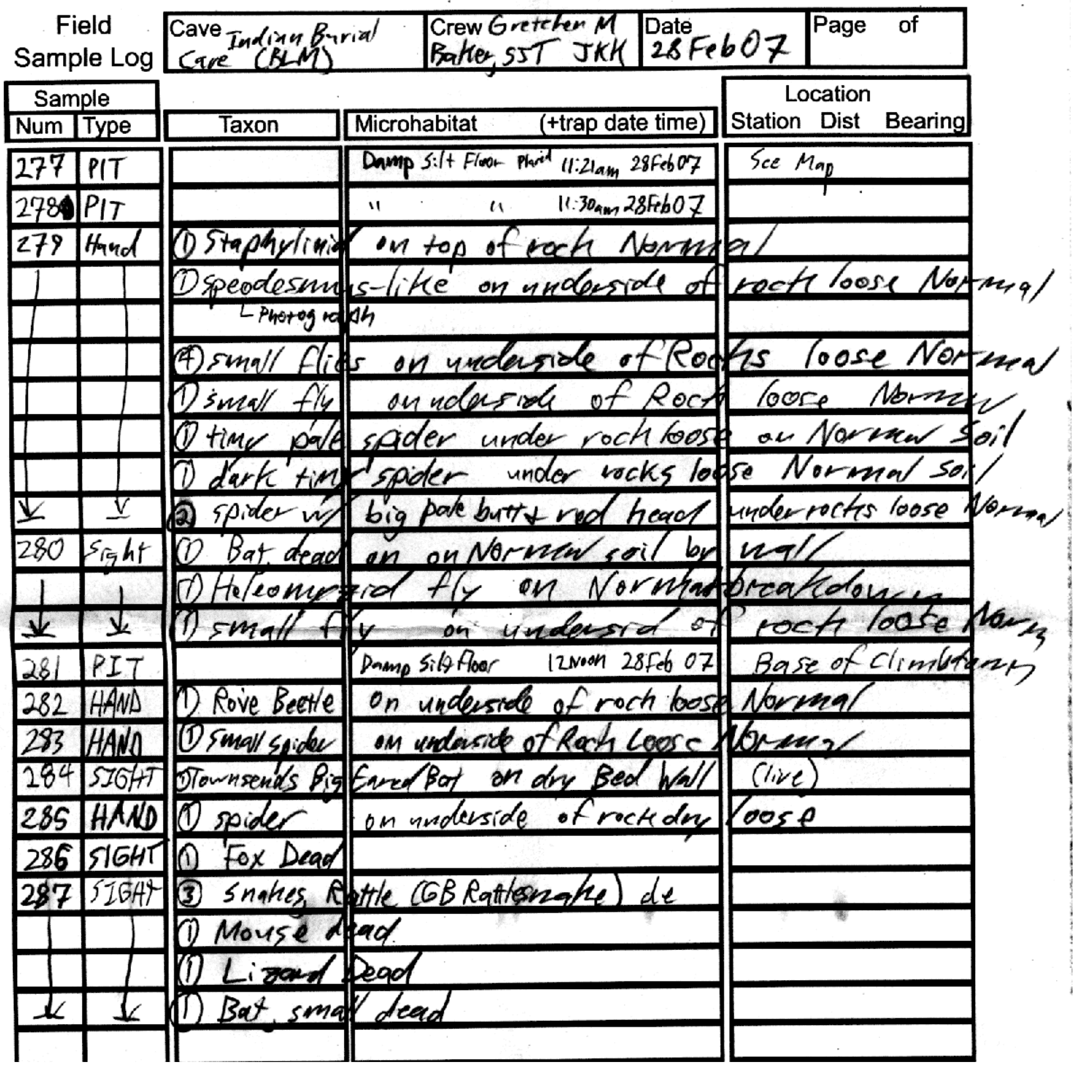
Date: 10/2/06

Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing
1	photo	fly (5)	dry rock wall	near entrance before gate		
2	photo	stone fly	under wet rock in water	"		
3	hand	caddis flies	"	"		
4	hand	grey spider	on dry rock wall	"		
5	observ.	1 white springtail	underside normal wood on norm. rock	"		
6	observ.	2 adult springtails	"	"		
7	observ.	1 heliomyzid fly	on normal soil	center room		
8	observ.	2 heliomyzid fly	on dry rock	"		
9	photo	larger fly	on dry rock	"		
10	observ	2 grey springtails	dry soil & rock	bottom of cervass cave		
11	observ.	2 rhagidia mites	"	"		
12	observ.	1 heliomyzid fly	dry rock	"		
13	hand	1 big springtail 2.	dry rock wall	"		
14	hand	2 silver springtails	under dry rock on normal soil	near bottom of crevass cave		
15	observ.	1 heliomyzid fly	on dry soil	East of center room		
16	observ	heliomyzid fly	under dry rock on dry soil	"		
17	"	1 rhagidiid	Under dry rock on normal soil	passage to SE of C room		
18	photo	harvest men	on dry rock wall	passage to E of C room		
19	hand	1 silver springtail	on surface normal rock	high passage		
20	observ	2 heliomyzid flies	on dry rock wall	passage to E of C room		
21	observ.	1 big fly	dry rock wall	high passage		
22	photo	1 orange centipede	normal soil	"		
23	observ.	1 white springtail	"	"		
24	observ	heliomyzid fly	"	"		
25	observ	dead daddy longleg	normal rock	"		
26	observ	1 rhagidia mite	normal soil	at top of canyon pa		
27	"	13 heliomyzid	"	above canyon		
28	"	silver spring	"	"		
29	"	5 heliomyzids	dry rock	"		
30	"	1 bizarre spider	dry rock ceiling	"		
31	"	1 harvest		"		

Indian Burial Cave

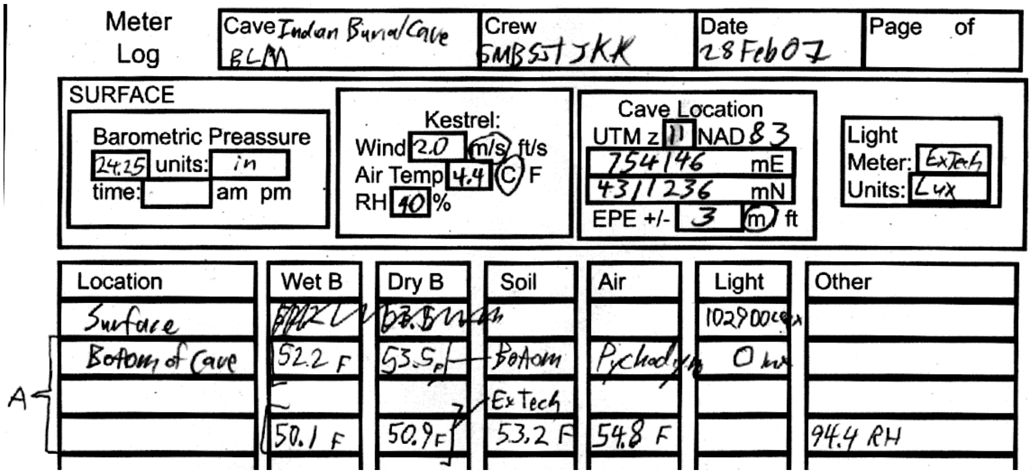
Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor
28-Feb-07
Steven J. Taylor, Jean K. Krejca
3-Mar-07



Field Sample Log	Cave Indian Burial Cave (BLM)	Crew Gretchen M Baker, SST JKK	Date 28 Feb 07	Page of

Sample				Location
Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing
277	PIT		Damp Silt Floor Phorid 11:21am 28Feb07	See Map
278	PIT		" " 11:30am 28Feb07	
279	Hand	① Staphylinid	on top of rock Normal	
↓	↓	① Speodesmus-like	on underside of	rock loose Normal
		└ Photograph		
		④ small flies	on underside of Rocks	loose Normal
		① small fly	on underside of Rock	loose Normal
		① tiny pale	spider under rock loose	on Normal Soil
		① dark tiny	spider under rocks loose	Normal soil
↓	↓	② spider w/	big pale butt + red head	under rocks loose Normal
280	Sight	① Bat dead	on on Normal soil by	wall
↓	↓	① Heleomyzid fly	on Normal	breakdown
↓	↓	① small fly	on undersid of	rock loose Normal
281	PIT		Damp Silt floor 12Noon 28Feb 07	Base of Climbway
282	HAND	① Rove Beetle	On underside of rock loose	Normal
283	HAND	① small spider	on underside of Rock Loose	Normal
284	SIGHT	① Townsend's Big	Eared Bat on dry Bed Wall	(live)
285	HAND	① spider	on underside of rock dry	loose
286	SIGHT	① Fox Dead		
287	SIGHT	③ snakes, Rattle	(GB Rattlesnake) de	
↓	↓	① Mouse dead		
		① Lizard Dead		
↓	↓	① Bat, small dead		

Indian Burial Cave (continued).



Meter Log

Cave Indian Burial Cave BLM

Crew SMB SST JKK

Date 28 Feb 07

Page of

SURFACE

Barometric Preassure

24.25 units: in

time: am pm

Kestrel:

Wind 2.0 [✓ m/s] ft/s

Air Temp 4.4 [✓ C] F

RH 40 %

Cave Location

UTM z 11 NAD 83

754146 mE

4311236 mN

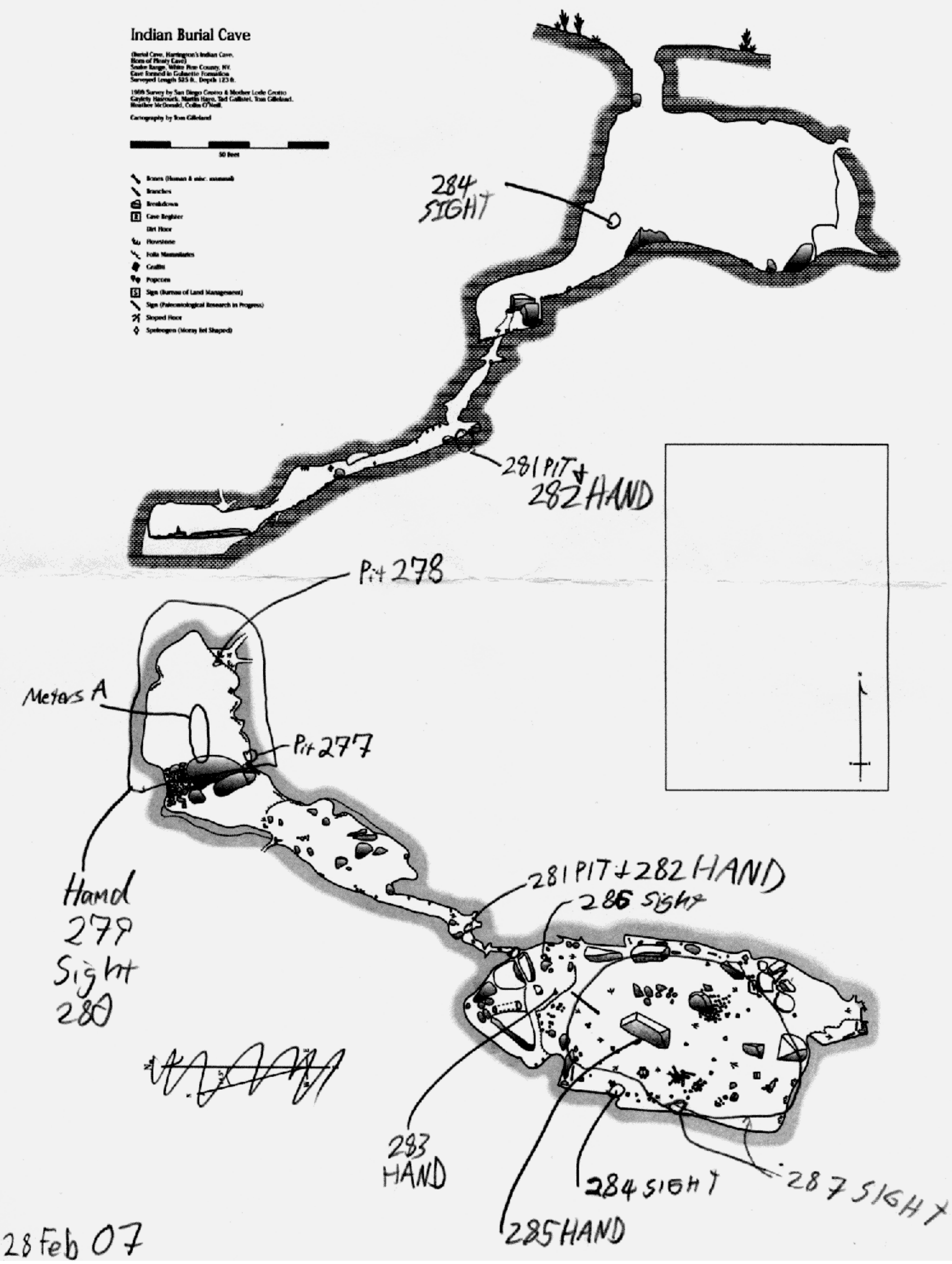
EPE +/- 3 [✓ m] ft

Light Meter: ExTech

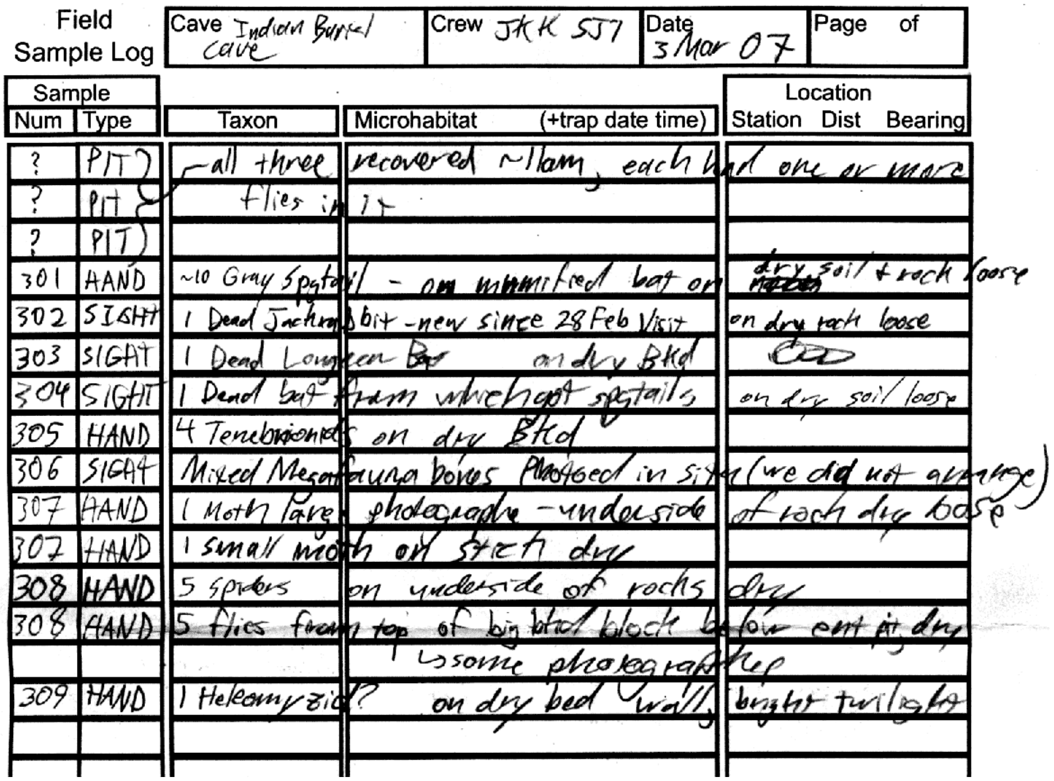
Units: Lux

	Location	Wet B	Dry B	Soil	Air	Light	Other
	Surface	[illegible]	[illegible]			102900 lux	
A	Bottom of Cave	52.2 F	53.5 F	Bottom	Psychodyn	0 lux	
				ExTech			
		50.1 F	50.9 F	53.2 F	54.8 F		94.4 RH

Indian Burial Cave (continued).



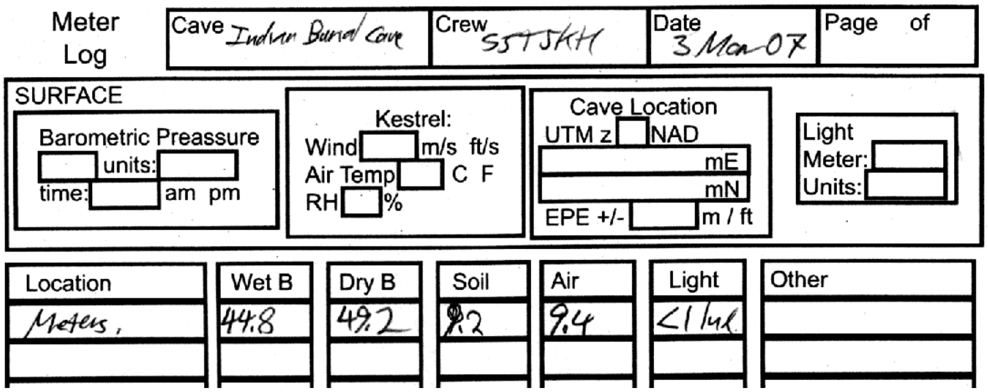
Indian Burial Cave (continued).



Field Sample Log

Cave Indian Burial Cave | Crew JKK SJT | Date 3 Mar 07 | Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
?	PIT	all three	recovered ~11am, each had	one or more
?	PIT	flies in	it	
?	PIT			
301	HAND	~10 Gray Spgtail	- on mummified bat on	dry soil + rock loose
302	SIGHT	1 Dead Jackrabbit	- new since 28 Feb Visit	on dry rock loose
303	SIGHT	1 Dead Longear Bat	on dry Bkd	
304	SIGHT	1 Dead bat	from which got spgtails	on dry soil/loose
305	HAND	4 Tenebrionids	on dry Bkd	
306	SIGHT	Mixed Megafauna bones	Photoed in situ	(we did not arrange)
307	HAND	1 Moth Larva	photographed - underside	of rock dry base
307	HAND	1 small moth	on stick dry	
308	HAND	5 spiders	on underside of rocks	dry
308	HAND	5 flies from	top of big bkd block	below ent it, dry
			↳some photographed	
309	HAND	1 Heleomyzid?	on dry bed wall,	bright twilight



Meter Log

Cave Indian Burial Cave | Crew SJT JKH | Date 3 Mar 07 | Page of

SURFACE

Barometric Preassure ☐ units: ☐ time: ☐ am pm

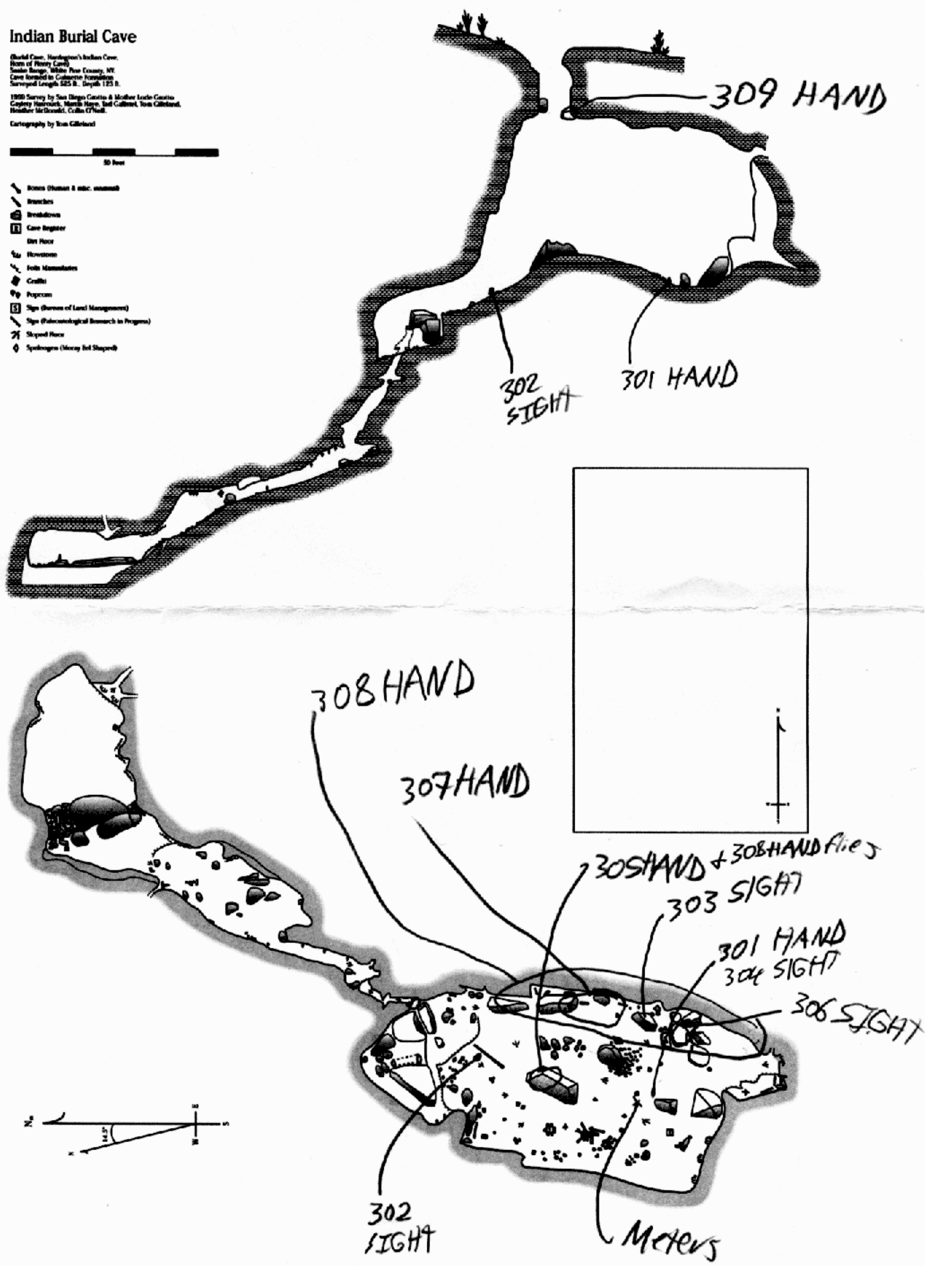
Kestrel: Wind ☐ m/s ft/s Air Temp ☐ C F RH ☐ %

Cave Location UTM z ☐ NAD ☐ mE ☐ mN EPE +/- ☐ m / ft

Light Meter: ☐ Units: ☐

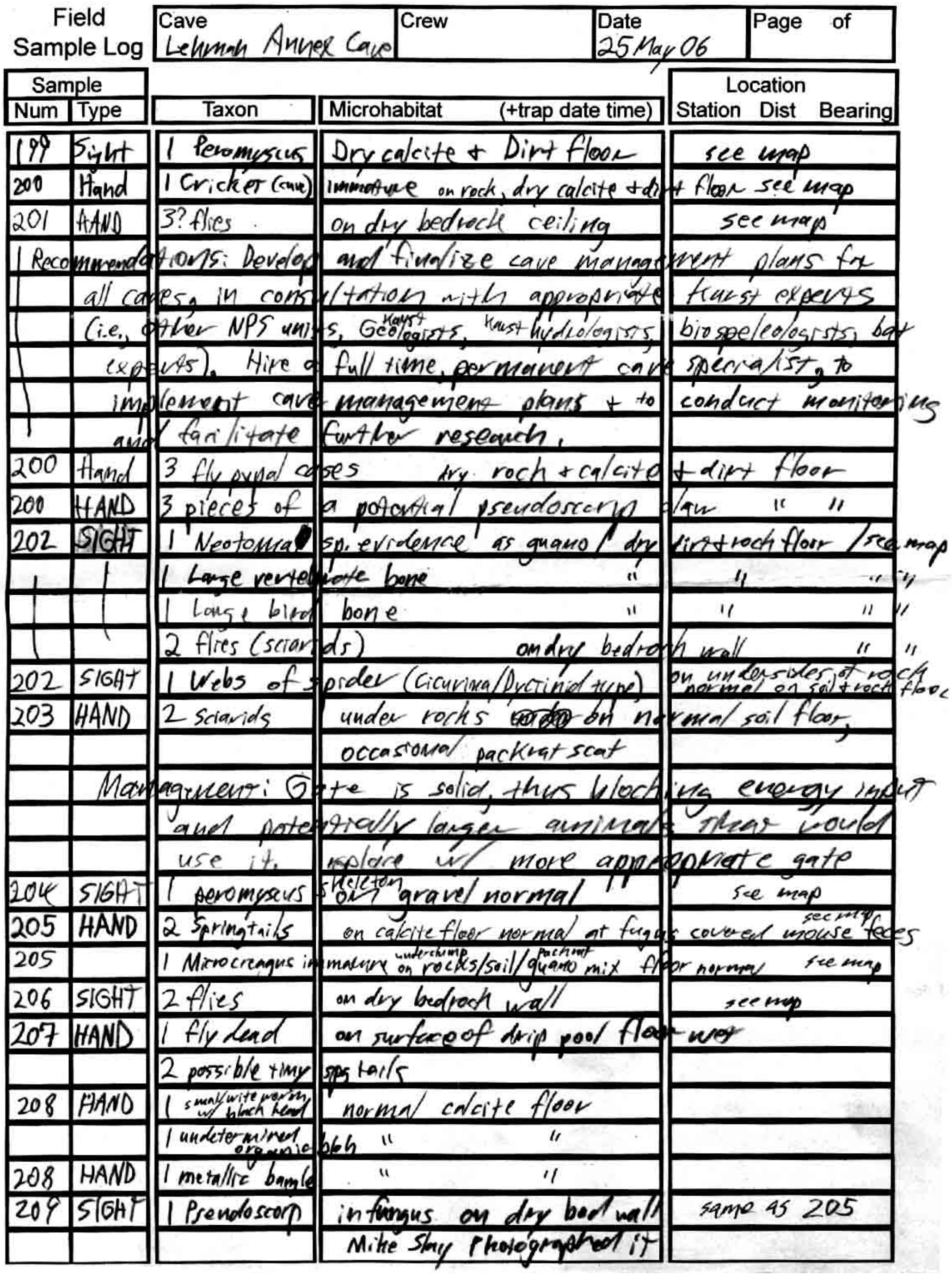
Location	Wet B	Dry B	Soil	Air	Light	Other
Meters,	44.8	49.2	9.2	9.4	<1 lux	

Indian Burial Cave (continued).



Lehman Annex Cave

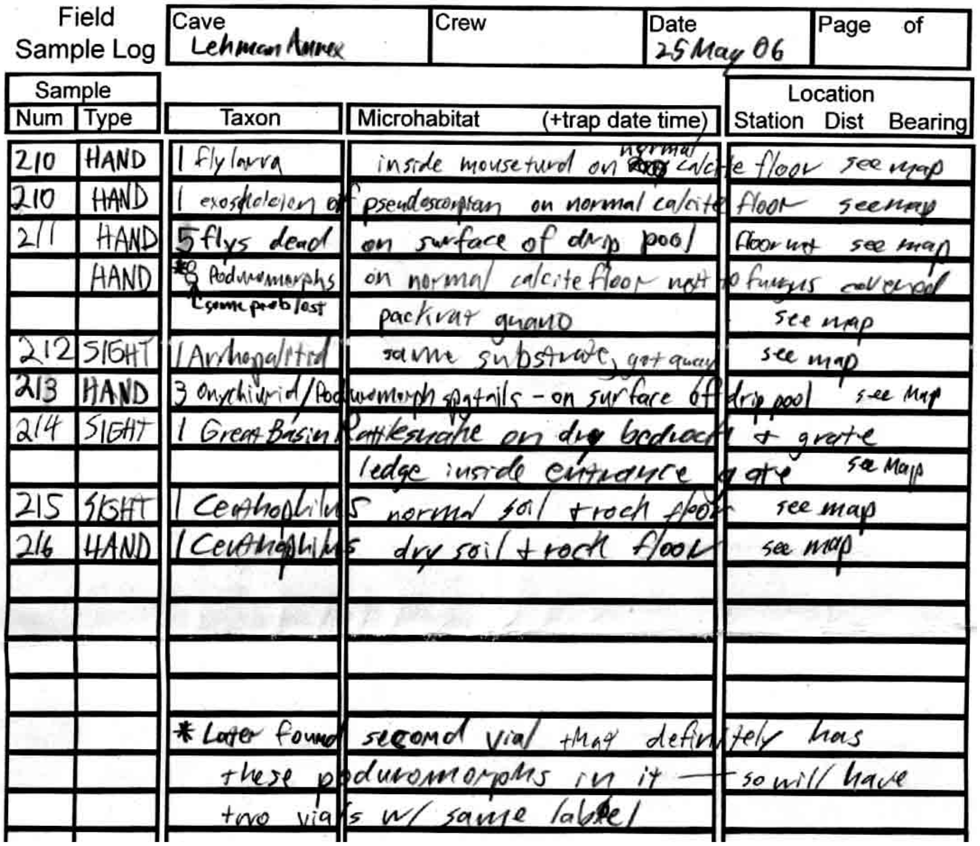
Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Ben M. Roberts, Meg A. Horner
25-May-06



Field Sample Log
Cave: Lehman Annex Cave
Crew:
Date: 25 May 06
Page of

Sample				Location
Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing
199	Sight	1 Peromyscus	Dry calcite + Dirt floor	see map
200	Hand	1 Cricket (cave)	immature on rock, dry calcite + dirt	floor see map
201	HAND	3? flies	on dry bedrock ceiling	see map
Recommendations: Develop and finalize cave management plans for				
	all caves, in consultation with appropriate karst experts			
	(i.e., other NPS units, Karst Geologists, karst hydrologists, biospeleologists, bat			
	experts). Hire a full time, permanent cave specialist, to			
	implement cave management plans + to conduct monitoring			
	and facilitate further research.			
200	Hand	3 fly pupal cases	dry rock + calcite	+ dirt floor
200	HAND	3 pieces of a potential pseudoscorp claw		" "
202	SIGHT	1 Neotoma sp.	evidence as guano / dry	dirt+rock floor / see map
		1 Large vertebrate bone	"	" " "
		1 Large bird bone	"	" " "
		2 flies (sciarids)	on dry bedrock wall	" "
202	SIGHT	1 Webs of spider (Cicurina/Dictynid type)		on undersides of rock normal on soil+rock floor
203	HAND	2 Sciarids	under rocks ~~[illegible]~~ on normal	soil floor,
			occasional packrat scat	
	Management: Gate is solid, thus blocking energy input			
		and potentially larger animals that would		
		use it. replace w/ more appropriate gate		
204	SIGHT	1 peromyscus	skeleton on gravel normal	see map
205	HAND	2 Springtails	on calcite floor normal at fungus	covered mouse feces see map
205		1 Microcreagris immature	under clump on rocks/soil/packrat guano mix floor	normal see map
206	SIGHT	2 flies	on dry bedrock wall	see map
207	HAND	1 fly dead	on surface of drip pool floor	wet
		2 possible tiny spg tails		
208	HAND	1 small white worm w/ black head	normal calcite floor	
		1 undetermined organic blob	" "	
208	HAND	1 metallic bangle	" "	
209	SIGHT	1 Pseudoscorp	in fungus on dry bed wall	same as 205
			Mike Slay photographed it	

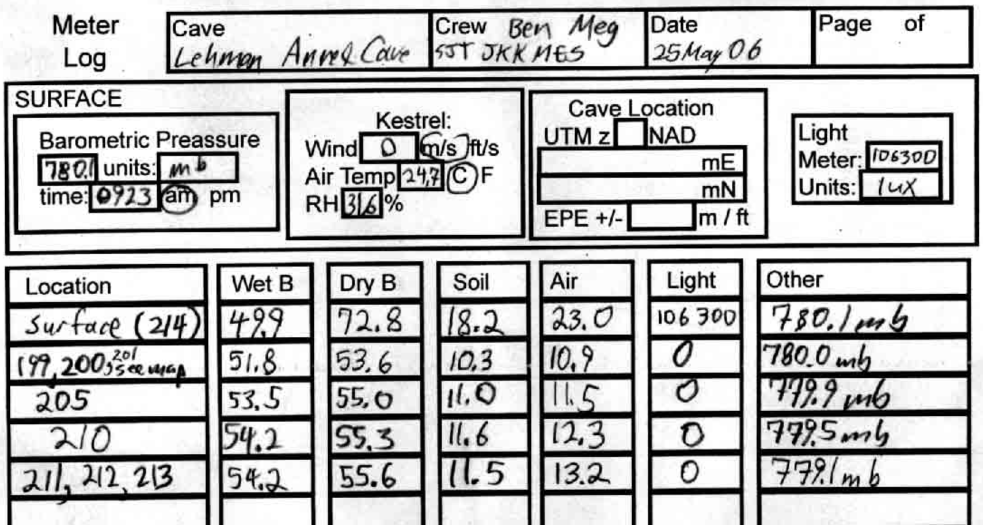
Lehman Annex Cave (continued).



Field Sample Log

Cave: Lehman Annex
Crew:
Date: 25 May 06
Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
210	HAND	1 fly larva	inside mouseturd on normal calcite	floor see map
210	HAND	1 exoskeleton of	pseudoscorpion on normal calcite	floor see map
211	HAND	5 flys dead	on surface of drip pool	floor wet see map
	HAND	*8 Poduromorphs	on normal calcite floor not	no fungus covered
		(some prob lost	packrat guano	see map
212	SIGHT	1 Arrhopalitid	same substrate, got away	see map
213	HAND	3 Onychiurid/Poduromorph springtails	- on surface of	drip pool see Map
214	SIGHT	1 Great Basin Rattlesnake	on dry bedrock	+ grate
			ledge inside entrance	gate see Map
215	SIGHT	1 Ceuthophilus	normal soil + rock floor	see map
216	HAND	1 Ceuthophilus	dry soil + rock floor	see map
		* Later found	second vial that	definitely has
		these	poduromorphs in it —	so will have
		two	vials w/ same label	



Meter Log

Cave: Lehman Annex Cave
Crew: Ben Meg SST JKK MES
Date: 25 May 06
Page of

SURFACE

Barometric Preassure: 780.1 units: mb
time: 0923 [✓ am] pm

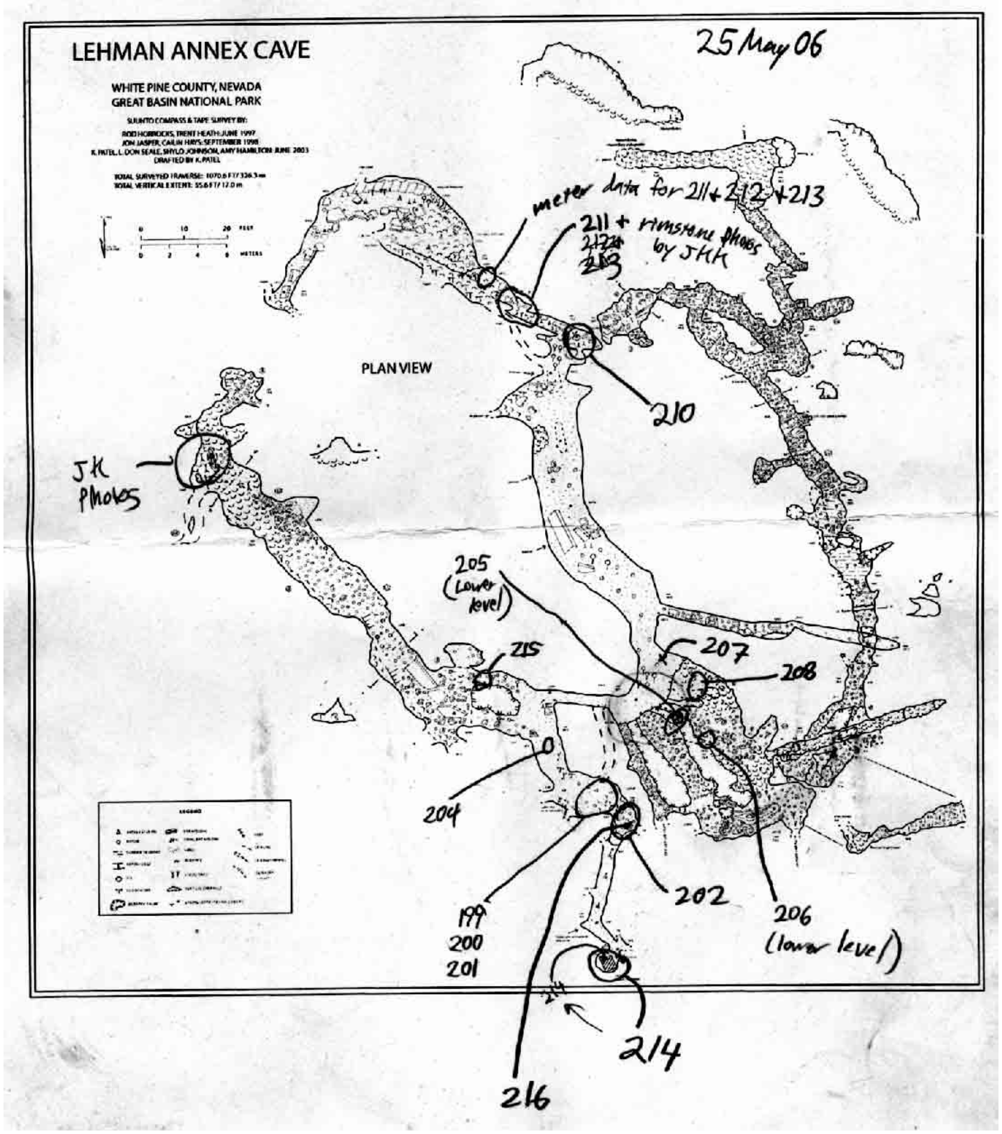
Kestrel:
Wind 0 [✓ m/s] ft/s
Air Temp 24.7 [✓ C] F
RH 31.6 %

Cave Location
UTM z ☐ NAD
mE
mN
EPE +/- m / ft

Light
Meter: 106300
Units: lux

Location	Wet B	Dry B	Soil	Air	Light	Other
Surface (214)	49.9	72.8	18.2	23.0	106 300	780.1 mb
199, 200, 201 see map	51.8	53.6	10.3	10.9	0	780.0 mb
205	53.5	55.0	11.0	11.5	0	779.9 mb
210	54.2	55.3	11.6	12.3	0	779.5 mb
211, 212, 213	54.2	55.6	11.5	13.2	0	779.1 mb

Lehman Annex Cave (continued).



Lehman Caves

Gretchen M. Baker (25-Jan-06); Gretchen M. Baker, Meg A. Horner, Bryan R Petrytl (16-Mar-06); none specified (24-Apr-06); Gretchen M. Baker (27-Apr-06); Gretchen M. Baker (15-May-06); Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner (23-May-06); Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker (26-May-06); Gretchen M. Baker, Meg A. Horner (22-Jun-06); Gretchen M. Baker, Ben M. Roberts, Mark Kirtley (24-Jul-06); Gretchen M. Baker, Meg A. Horner, Billie O'Doan (25-Jul-06); Gretchen M. Baker, Christy A. Moerbe, Brittany L. Timm (21-Aug-06); Gretchen M. Baker, Meg A. Horner, Loren Reinhold (22-Aug-06); Gretchen M. Baker (25-Sep-06); Gretchen M. Baker (26-Sep-06); Meg A. Horner, Gretchen M. Baker, Jonathan Hurst (27-Oct-06); Gretchen M. Baker, Meg A. Horner (27-Nov-06); Meg A. Horner, Ben M. Roberts (18-Dec-06); Meg A. Horner, Gretchen M. Baker (19-Dec-06); Meg A. Horner, Gretchen M. Baker, Ben M. Roberts, RaeJean Layland (19-Jan-07); Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor (27-Feb-07); Meg A. Horner, Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor (28-Feb-07); Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay, Meg A. Horner (19-Jul-07)

(January, March, and April 2006 field notes not available)

Lehman Caves
May 2006

Field Sample Log

Cave: Lehman Cave

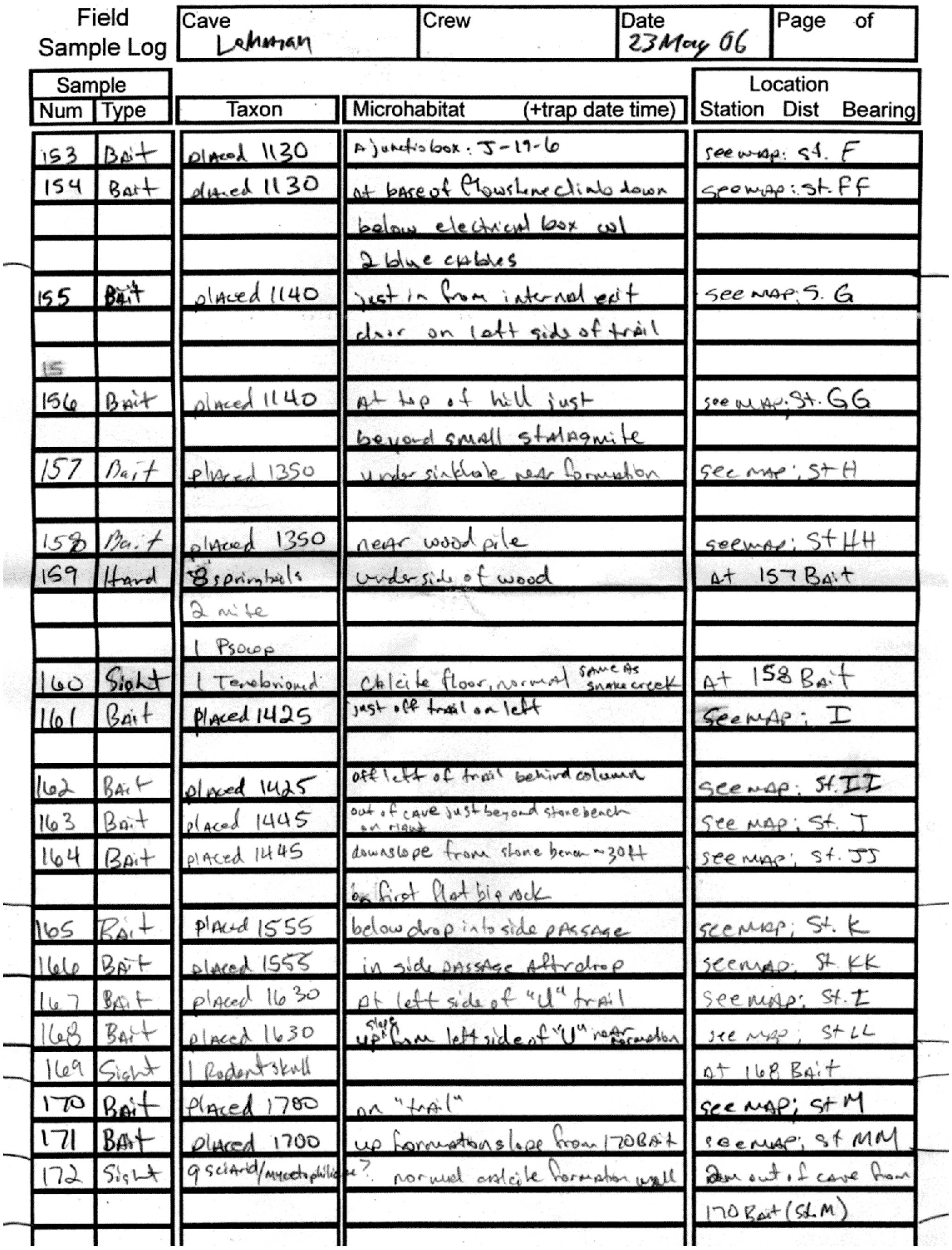
Crew: SST, JKK, MES
Gretchen, Ben, Meg

Date: 23 May 06

Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Dist	Bearing
142	Bait		placed 5/23/06 1030 {collection [illegible] going in cave 10 ft from light	see map Station A		
			collection of rocks going in cave			
			10ft in cave from light			
			in room on trail below			
			natural entrance			
143	Bait		placed 5/23/06 e 1035	See map Station AA		
			in cave at same place as			
			142 Bait, behind formation			
			After climb up to light on			
			left side of trail			
144	Hand	2 Ceuthophilus	on dry cement wall at external	See map; 1♂; 1♀		
		~~[illegible]~~	exit door			
		1 Cicurina	on dry cement wall at internal	See map: [illegible]		
			exit door			
145	Bait	placed 1050	just before trail to Civil defense	see map: station B		
146	Bait	placed 1055	room; on right side behind formation	see map: st. BB		
			into Civil defense trail; half way			
			up 2nd flight of stairs			
			on left			
147	Bait	placed 1105	base of stairs on left side	see map: st C		
			going away from entrance			
148	Bait	placed 1110	down dead end passage; on right on	See map: st CC		
			top of sheild in rubble			
149	Bait	placed 1115	next to electrical junction box	See map; st D		
			J-076			
150	Bait	placed 1120	left side of queens tub	see map: St. DD		
			behind formation			
151	Bait	placed 1125	on rock covering electrical box	see map; st. E		
			J-096A			
152	Bait	placed 1125	R-side of Room on side of	see map; St. EE		
			formation rise/hill			

Lehman Caves May 2006 (continued).



Field Sample Log

Cave: Lehman

Crew:

Date: 23 May 06

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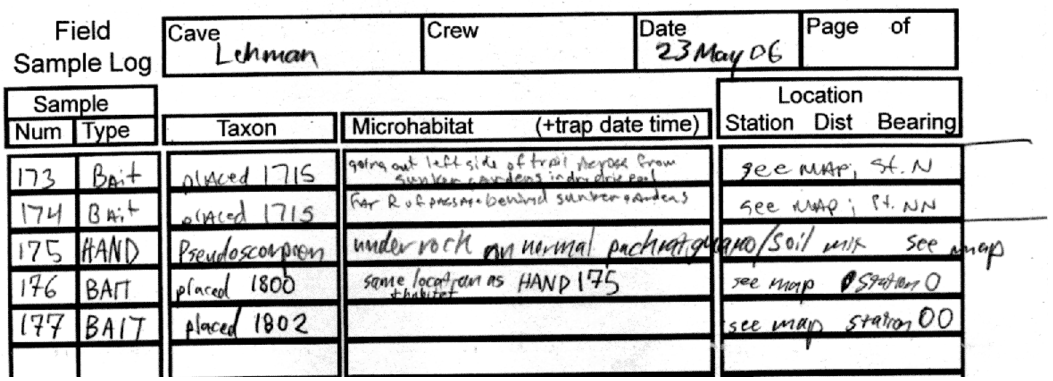
Sample				Location
Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing
153	Bait	placed 1130	A junctio box: J-19-6	see map: St. F
154	Bait	placed 1130	at base of flowstone climb down	see map: St. FF
			below electrical box w/	
			2 blue cables	
155	Bait	placed 1140	just in from internal exit	see map; S. G
			door on left side of trail	
15				
156	Bait	placed 1140	At top of hill just	see map; St. GG
			beyond small stalagmite	
157	Bait	placed 1350	under sinkhole near formation	see map; St H
158	Bait	placed 1350	near wood pile	see map; St HH
159	Hand	8 springtails	underside of wood	At 157 Bait
		2 mite		
		1 Psocop		
160	Sight	1 Tenebrionid	Calcite floor, normal same as snake creek	At 158 Bait
161	Bait	placed 1425	just off trail on left	See map; I
162	Bait	placed 1425	off left of trail behind column	see map: St. II
163	Bait	placed 1445	out of cave just beyond stone bench on right	See map; St. J
164	Bait	placed 1445	downslope from stone bench ~30ft	see map; St. JJ
			on first flat big rock	
165	Bait	placed 1555	below drop into side passage	see map; St. K
166	Bait	placed 1555	in side passage after drop	see map: St. KK
167	Bait	placed 1630	at left side of "U" trail	see map; St. L
168	Bait	placed 1630	up slope from left side of "U" near formation	see map; St LL
169	Sight	1 Rodent skull		At 168 Bait
170	Bait	placed 1700	on "trail"	see map; St M
171	Bait	placed 1700	up formation slope from 170 Bait	see map; St MM
172	Sight	9 sciarid/mycetophilidae?	normal calcite formation wall	2m out of cave from
				170 Bait (St. M)

Lehman Caves May 2006 (continued).



Field Sample Log

Cave: Lehman
Crew:
Date: 23 May 06
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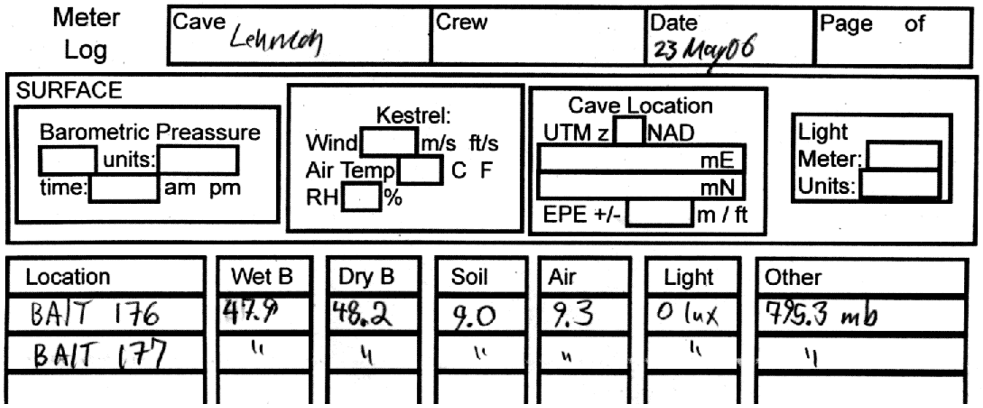
Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
173	Bait	placed 1715	going out left side of trail across from sunken gardens in dry drip pool	see MAP, St. N
174	Bait	placed 1715	far R of passage behind sunken gardens	see MAP; St. NN
175	HAND	Pseudoscorpion	under rock on normal packrat guano/soil mix	see map
176	BAIT	placed 1800	same location as HAND 175 + habitat	see map Station O
177	BAIT	placed 1802		see map station OO



Meter Log

Cave: Lehman
Crew:
Date: 23 May 06
Page of

SURFACE

Barometric Preassure ☐ units: ☐ time: ☐ am pm

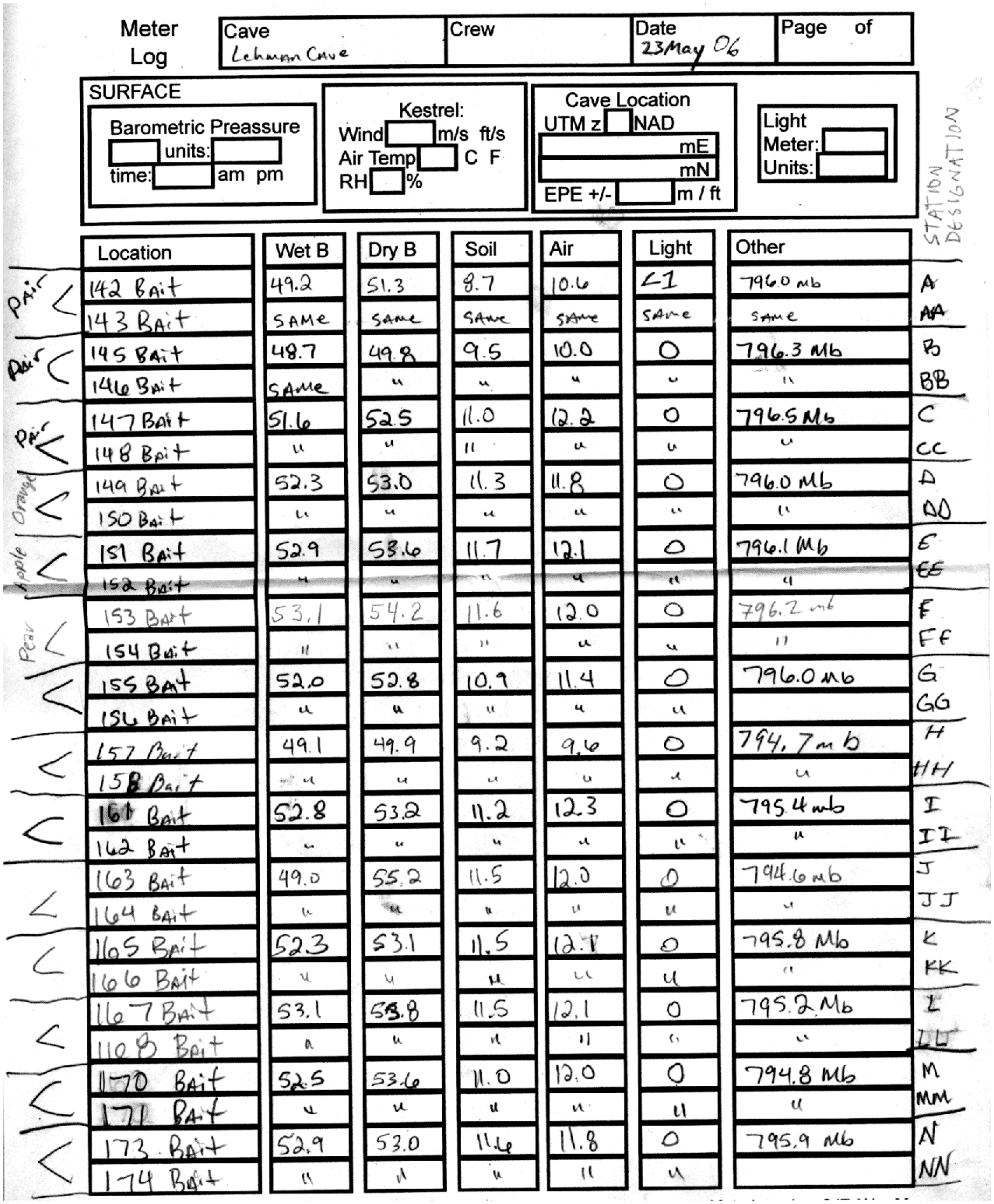
Kestrel: Wind ☐ m/s ft/s Air Temp ☐ C F RH ☐ %

Cave Location UTM z ☐ NAD ☐ mE ☐ mN EPE +/- ☐ m / ft

Light Meter: ☐ Units: ☐

Location	Wet B	Dry B	Soil	Air	Light	Other
BAIT 176	47.9	48.2	9.0	9.3	0 lux	795.3 mb
BAIT 177	"	"	"	"	"	"

Lehman Caves May 2006 (continued).



Meter Log

Cave: Lehman Cave
Crew:
Date: 23 May 06
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SURFACE

Barometric Preassure
units:
time: am pm

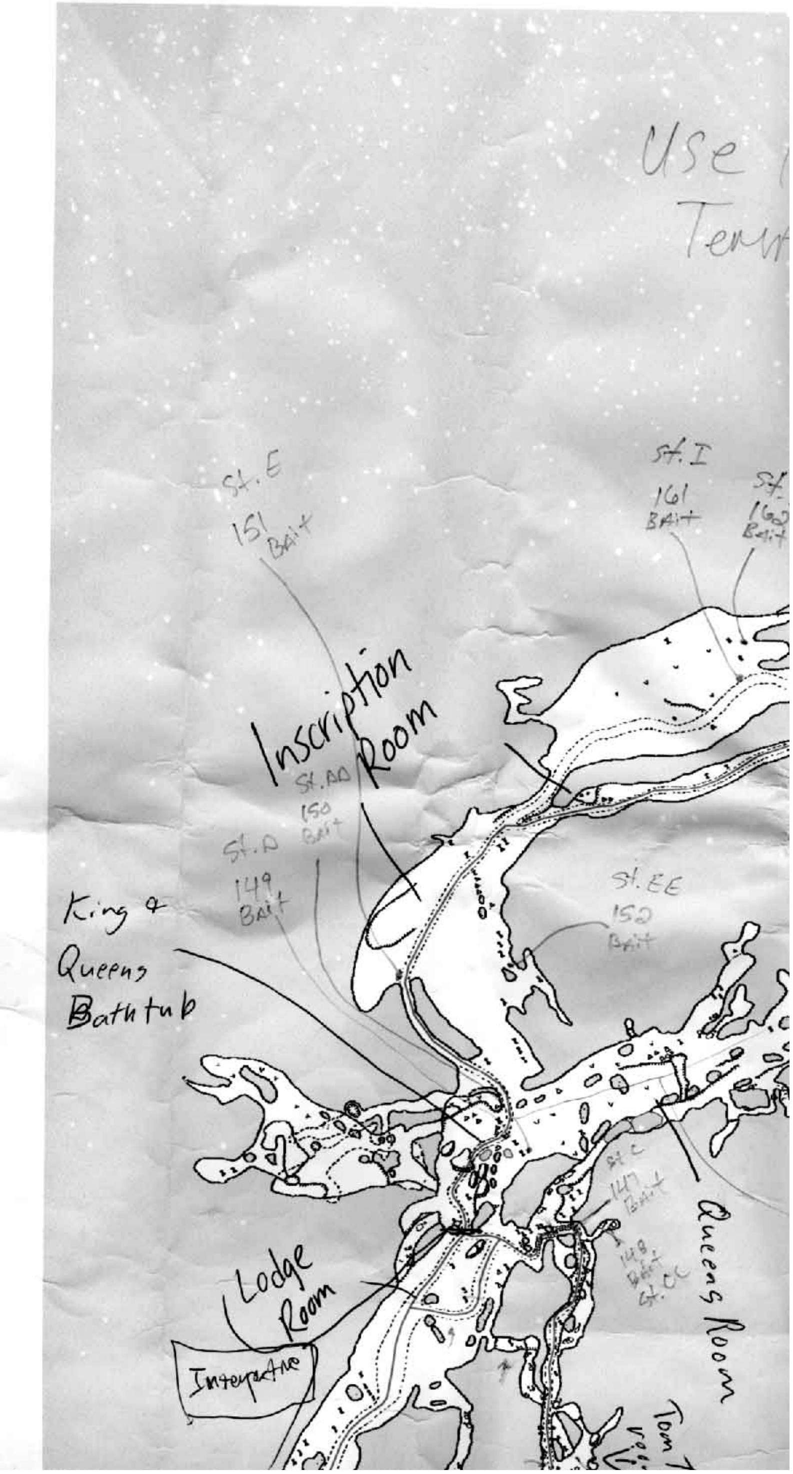
Kestrel:
Wind m/s ft/s
Air Temp C F
RH %

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

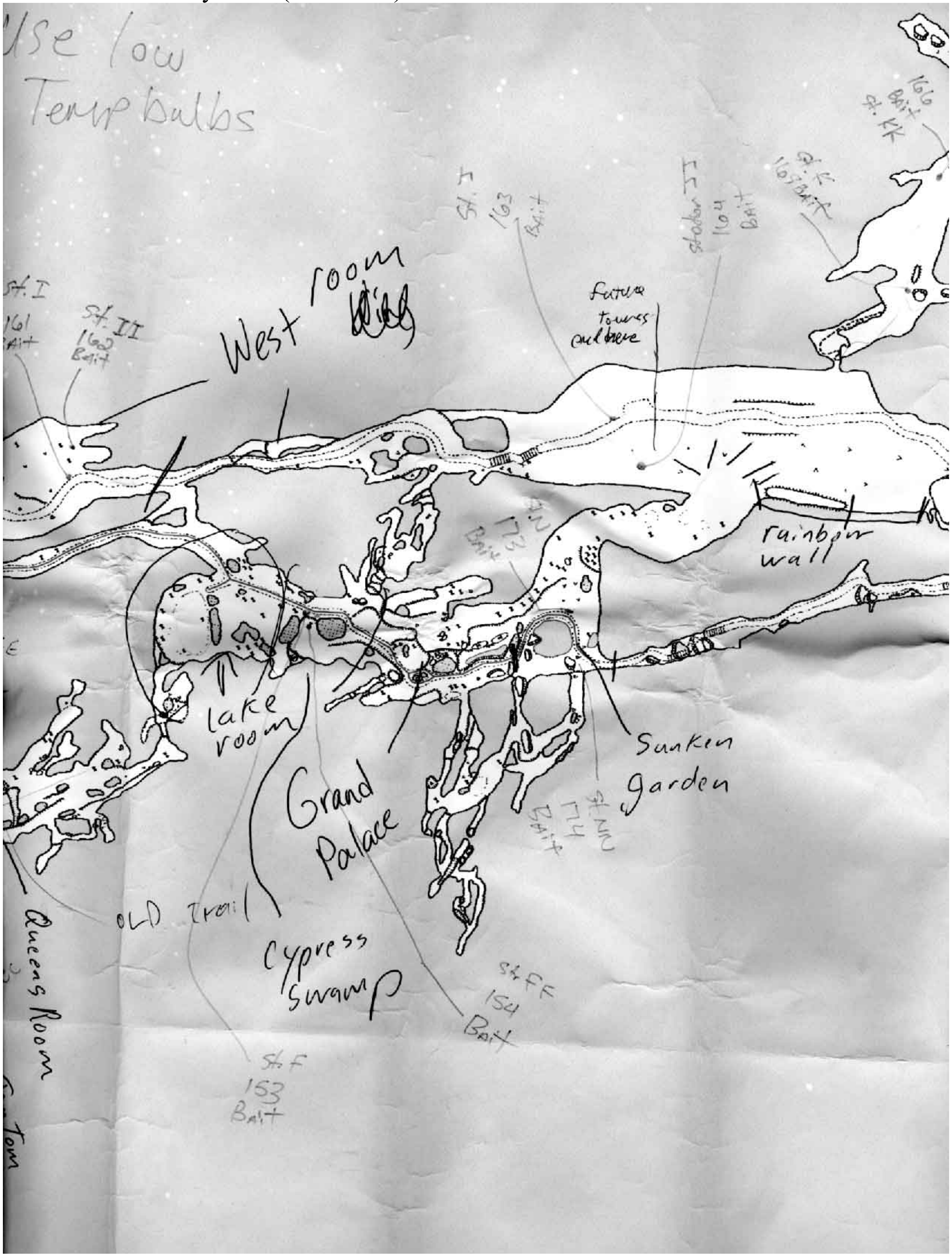
Light Meter:
Units:

	Location	Wet B	Dry B	Soil	Air	Light	Other	STATION DESIGNATION
Pair	142 Bait	49.2	51.3	8.7	10.6	<1	796.0 mb	A
	143 Bait	SAME	SAME	SAME	SAME	SAME	SAME	AA
Pair	145 Bait	48.7	49.8	9.5	10.0	0	796.3 Mb	B
	146 Bait	SAME	"	"	"	"	"	BB
Pair	147 Bait	51.6	52.5	11.0	12.2	0	796.5 Mb	C
	148 Bait	"	"	"	"	"	"	CC
Orange	149 Bait	52.3	53.0	11.3	11.8	0	796.0 Mb	D
	150 Bait	"	"	"	"	"	"	DD
Apple	151 Bait	52.9	53.6	11.7	12.1	0	796.1 Mb	E
	152 Bait	"	"	"	"	"	"	EE
Pear	153 Bait	53.1	54.2	11.6	12.0	0	796.2 mb	F
	154 Bait	"	"	"	"	"	"	FF
	155 Bait	52.0	52.8	10.9	11.4	0	796.0 Mb	G
	156 Bait	"	"	"	"	"		GG
	157 Bait	49.1	49.9	9.2	9.6	0	794.7 mb	H
	158 Bait	"	"	"	"	"	"	HH
	161 Bait	52.8	53.2	11.2	12.3	0	795.4 mb	I
	162 Bait	"	"	"	"	"	"	II
	163 Bait	49.0	55.2	11.5	12.0	0	794.6 mb	J
	164 Bait	"	"	"	"	"	"	JJ
	165 Bait	52.3	53.1	11.5	12.1	0	795.8 Mb	K
	166 Bait	"	"	"	"	"	"	KK
	167 Bait	53.1	53.8	11.5	12.1	0	795.2 Mb	L
	168 Bait	"	"	"	"	"	"	LL
	170 Bait	52.5	53.6	11.0	12.0	0	794.8 Mb	M
	171 Bait	"	"	"	"	"	"	MM
	173 Bait	52.9	53.0	11.6	11.8	0	795.9 Mb	N
	174 Bait	"	"	"	"	"		NN

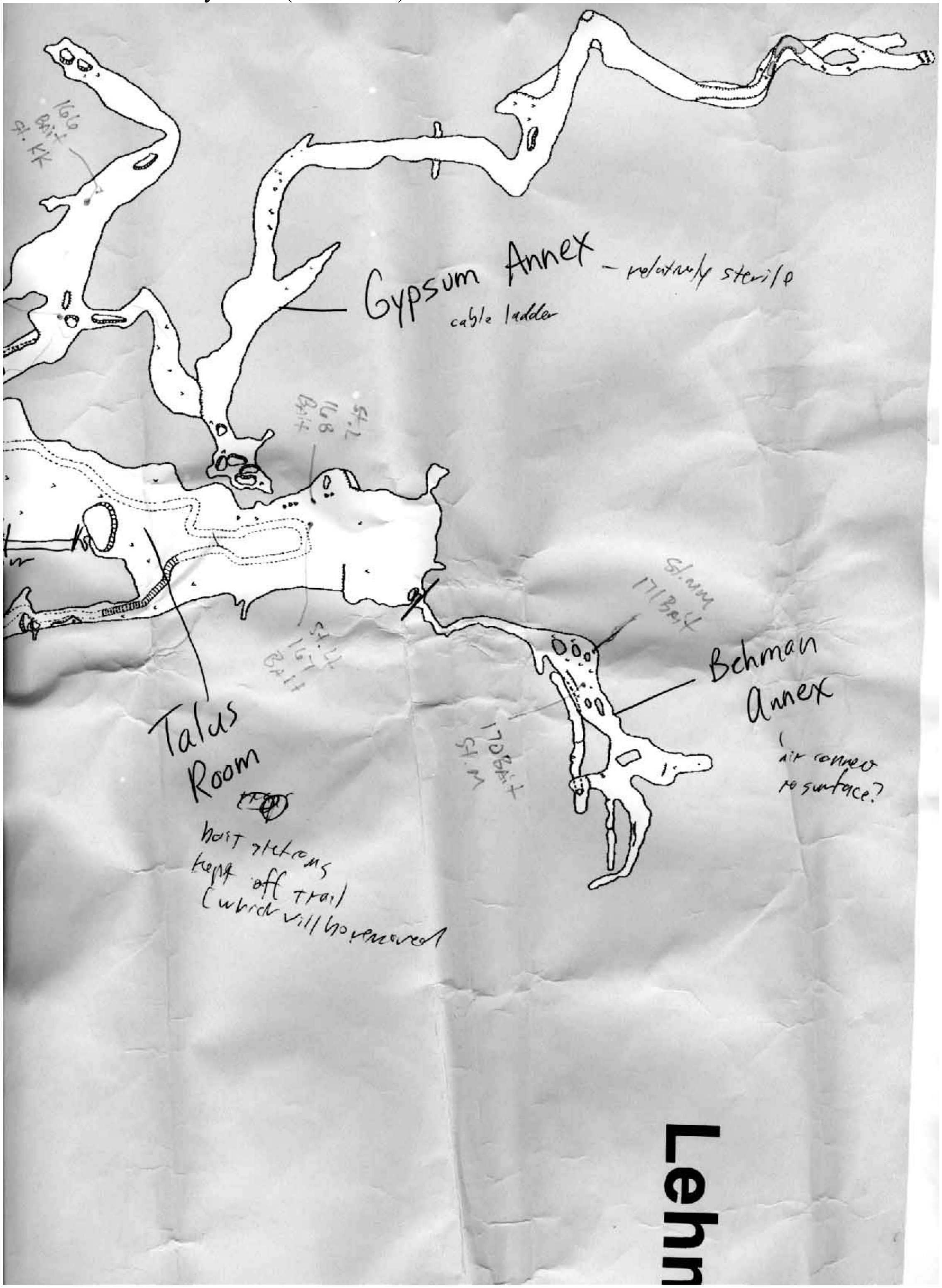
Lehman Caves May 2006 (continued).



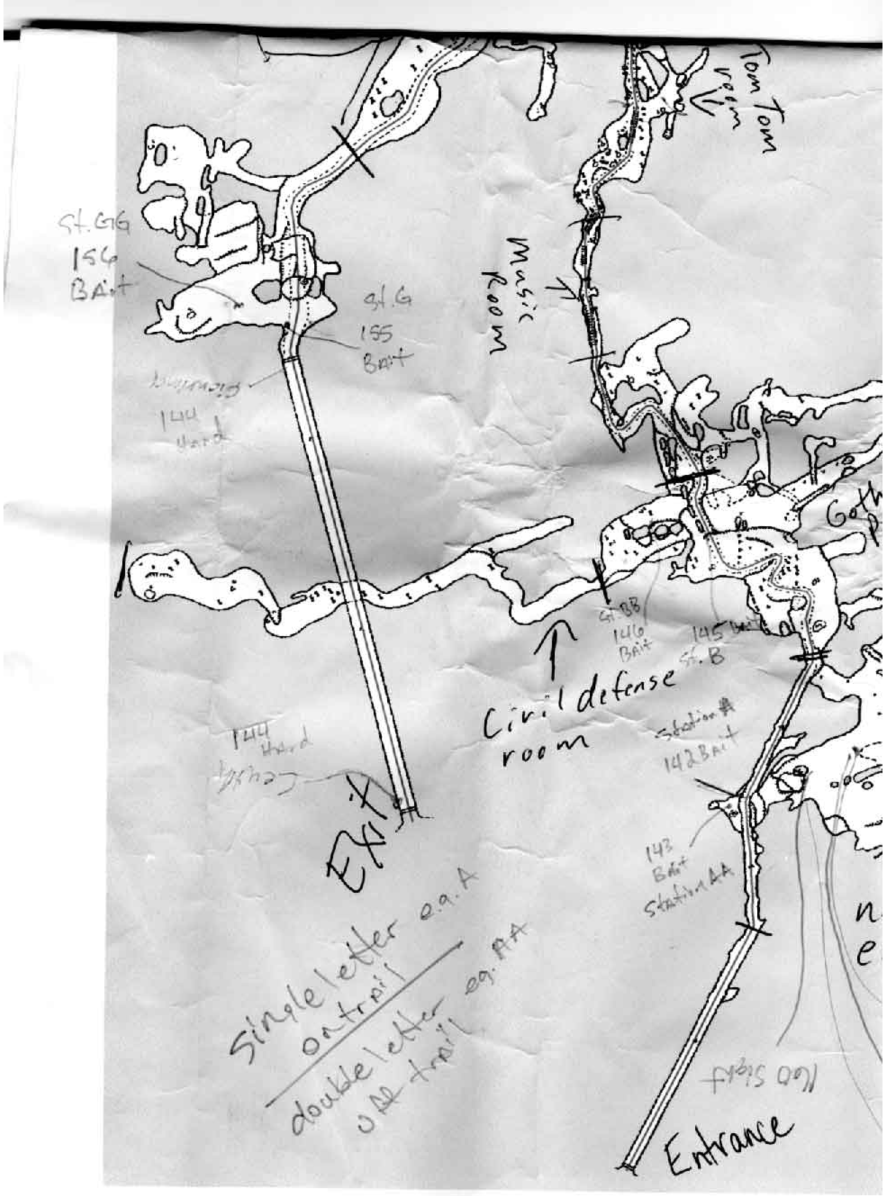
Lehman Caves May 2006 (continued).



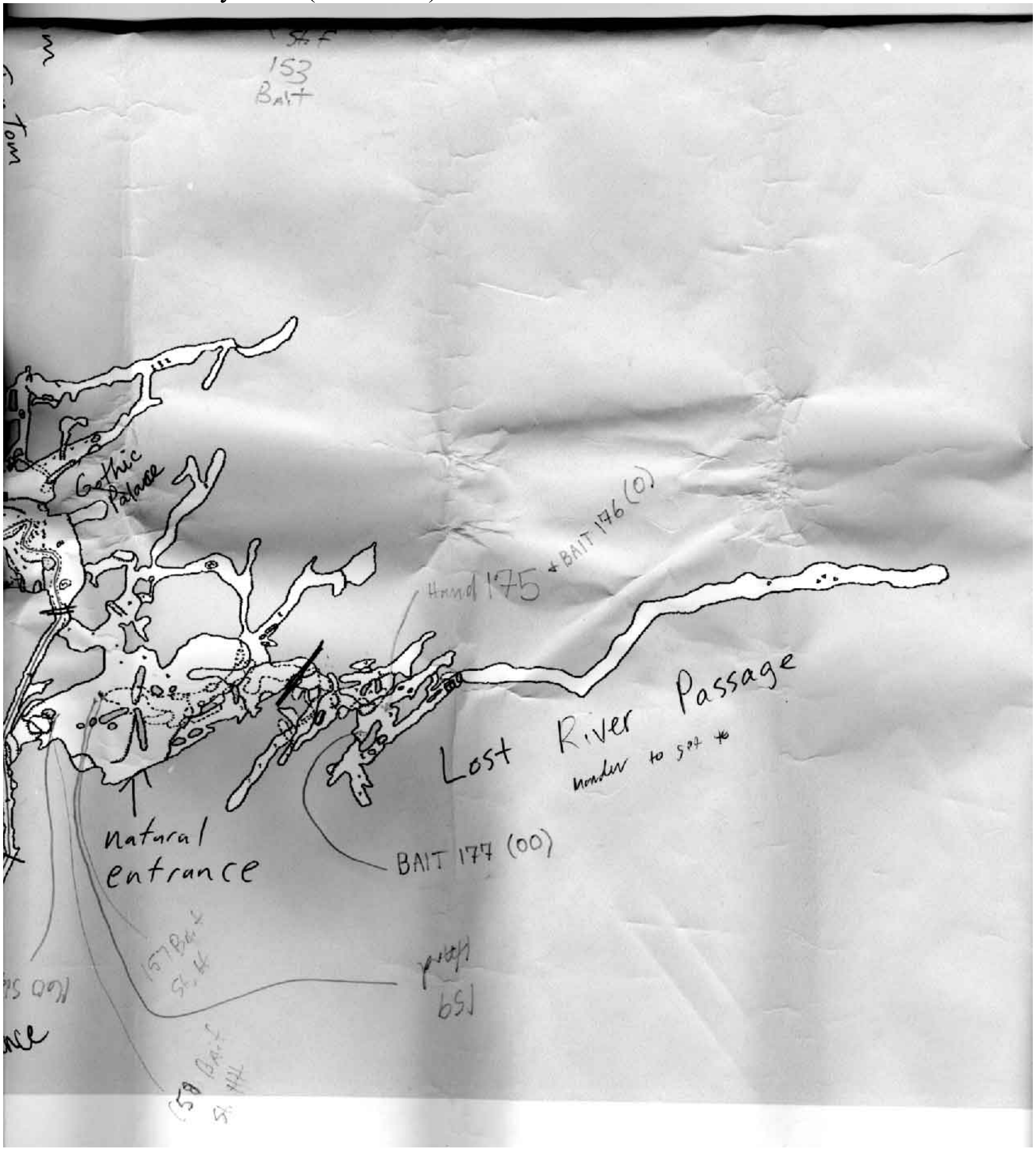
Lehman Caves May 2006 (continued).



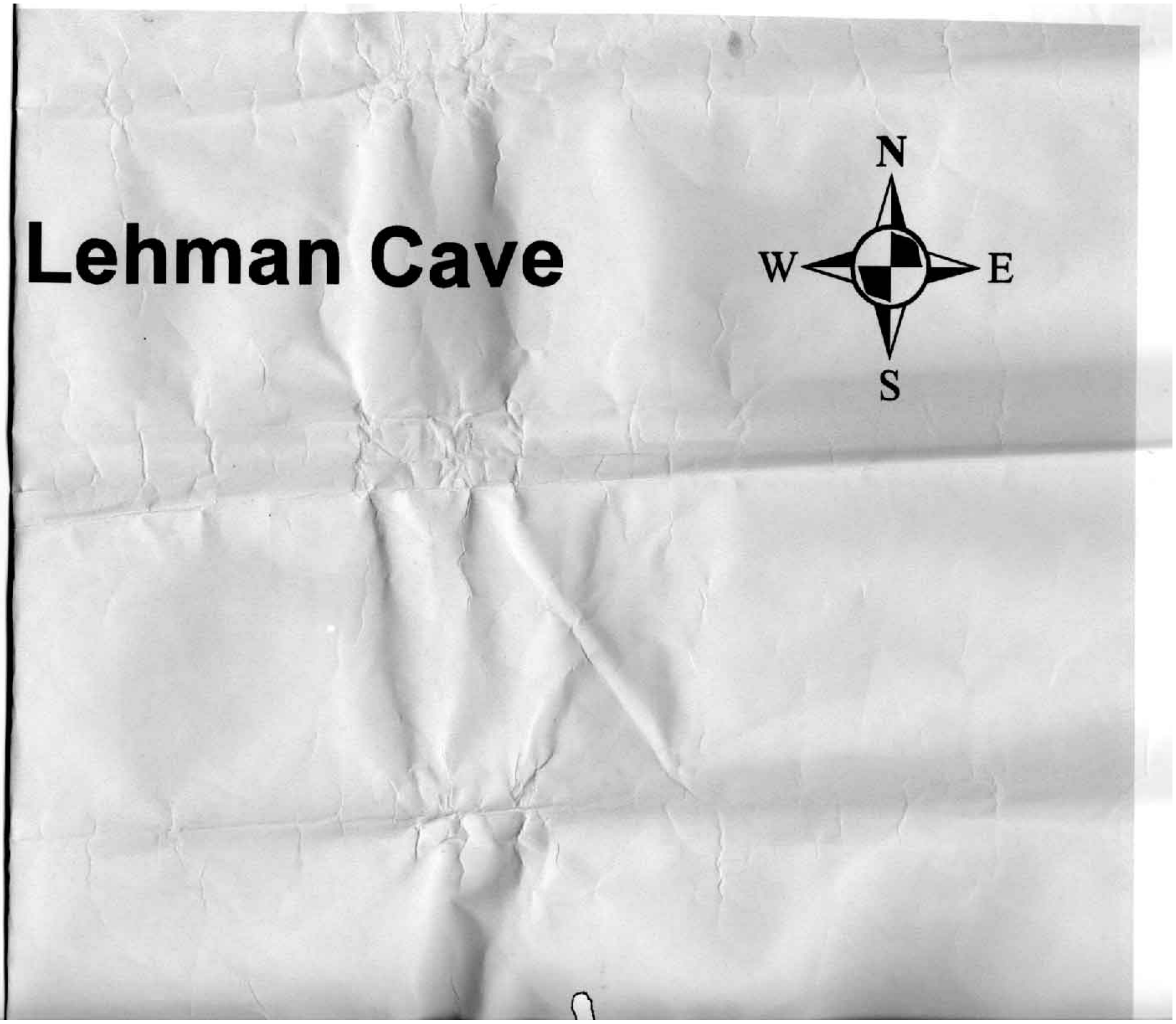
Lehman Caves May 2006 (continued).



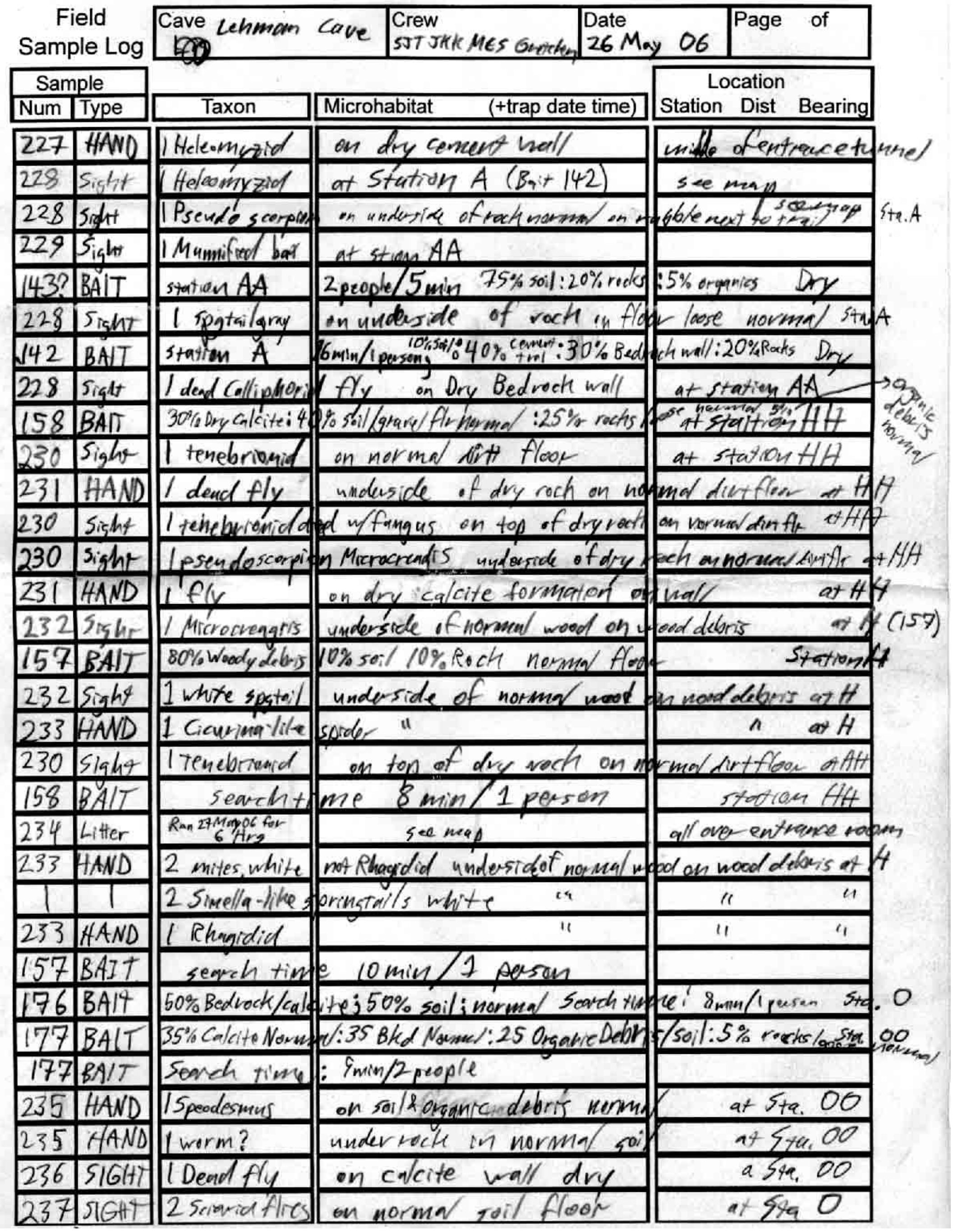
Lehman Caves May 2006 (continued).



Lehman Caves May 2006 (continued).



Lehman Caves May 2006 (continued).



Field Sample Log

Cave: Lehman Cave

Crew: SJT JKK MES Gretchen

Date: 26 May 06

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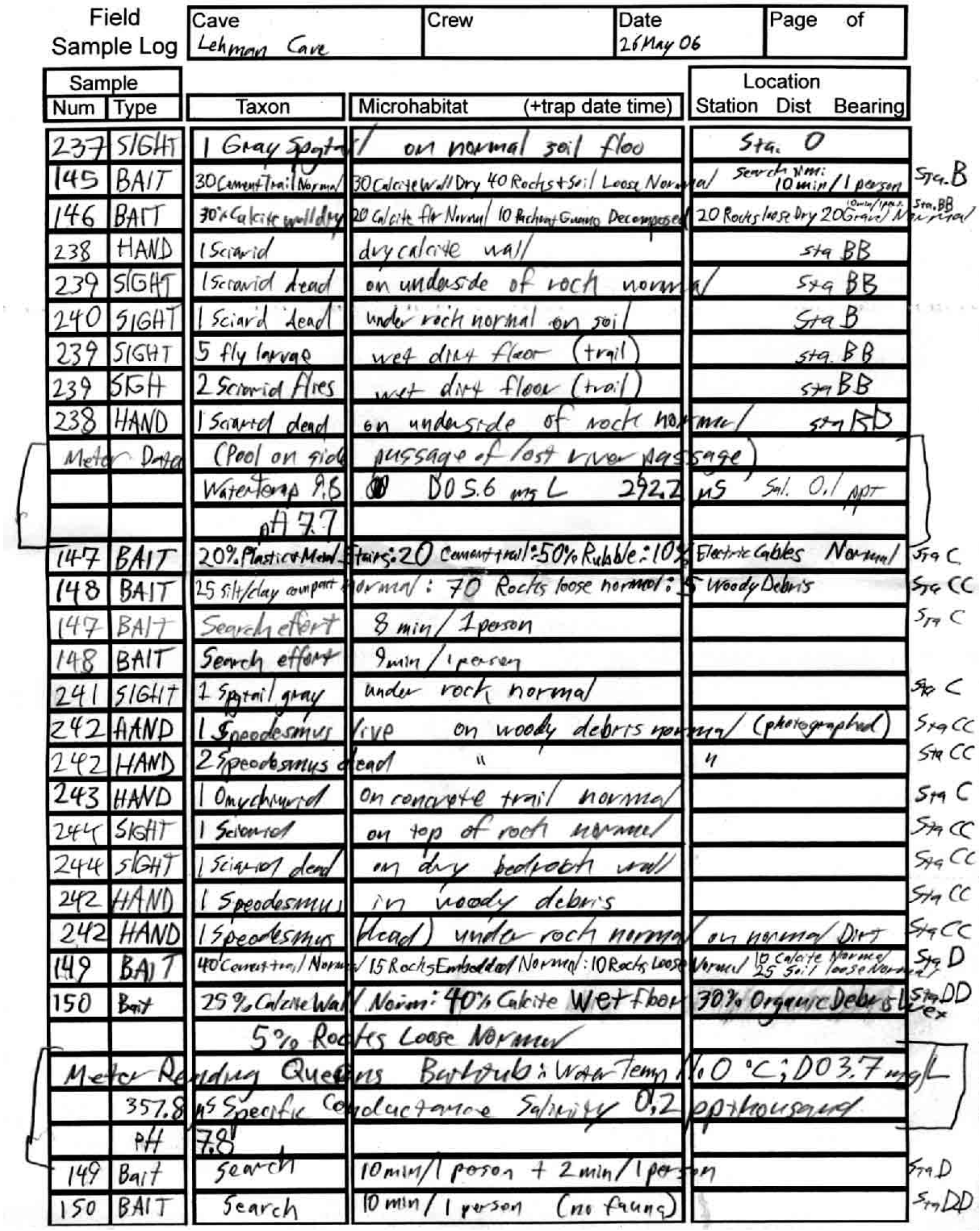
Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
227	HAND	1 Heleomyzid	on dry cement wall/	middle of entrance tunnel/		
228	Sight	1 Heleomyzid	at Station A (Bait 142)	see map		
228	Sight	1 Pseudoscorpion	on underside of rock normal/ on rubble next to trail/	see map Sta. A		
229	Sight	1 Mummified bat	at station AA			
143?	BAIT	station AA	2 people/5 min 75% soil:20% rocks	:5% organics Dry		
228	Sight	1 Spgtail gray	on underside of rock in floor	loose normal/ Sta A		
142	BAIT	station A	6min/1 person; 10%soil/0 40% cement trail:30% Bedrock	wall:20% Rocks Dry		
228	Sight	1 dead Calliphorid fly	on Dry Bedrock wall	at station AA → organic debris normal		
158	BAIT	30% Dry Calcite: 40% soil/gravel flr normal	:25% rocks loose normal 5%	at Station HH		
230	Sight	1 tenebrionid	on normal dirt floor	at station HH		
231	HAND	1 dead fly	underside of dry rock on normal dirt floor	at HH		
230	Sight	1 tenebrionid dead w/fungus	on top of dry rock on normal dirt flr	at HH		
230	Sight	1 pseudoscorpion Microcreagris	underside of dry rock on normal dirt flr	at HH		
231	HAND	1 fly	on dry calcite formation on wall/	at HH		
232	Sight	1 Microcreagris	underside of normal wood on wood debris	at H (157)		
157	BAIT	80% Woody debris	10% soil 10% Rock normal floor	Station H		
232	Sight	1 white spgtail	underside of normal wood on wood debris	at H		
233	HAND	1 Cicurina-like spider	"	" at H		
230	Sight	1 Tenebrionid	on top of dry rock on normal dirt floor	at HH		
158	BAIT	search time	8 min/1 person	station HH		
234	Litter	Ran 27 May 06 for 6 Hrs	see map	all over entrance room		
233	HAND	2 mites, white	not Rhagidid underside of normal wood on wood debris	at H		
|	|	2 Sinella-like springtails white	"	" "		
233	HAND	1 Rhagidid	"	" "		
157	BAIT	search time	10 min/1 person			
176	BAIT	50% Bedrock/calcite; 50% soil; normal	Search time: 8 min/1 person	Sta. 0		
177	BAIT	35% Calcite Normal/:35 Bkd Normal/:25 Organic Debris/soil:5% rocks/loose normal		Sta. 00		
177	BAIT	Search time	: 9min/2 people			
235	HAND	1 Speodesmus	on soil & organic debris normal/	at Sta. 00		
235	HAND	1 worm?	under rock in normal soil	at Sta. 00		
236	SIGHT	1 Dead fly	on calcite wall dry	a Sta. 00		
237	SIGHT	2 Sciarid flies	on normal soil floor	at Sta O		

Lehman Caves May 2006 (continued).



Field Sample Log

Cave: Lehman Cave

Crew:

Date: 26 May 06

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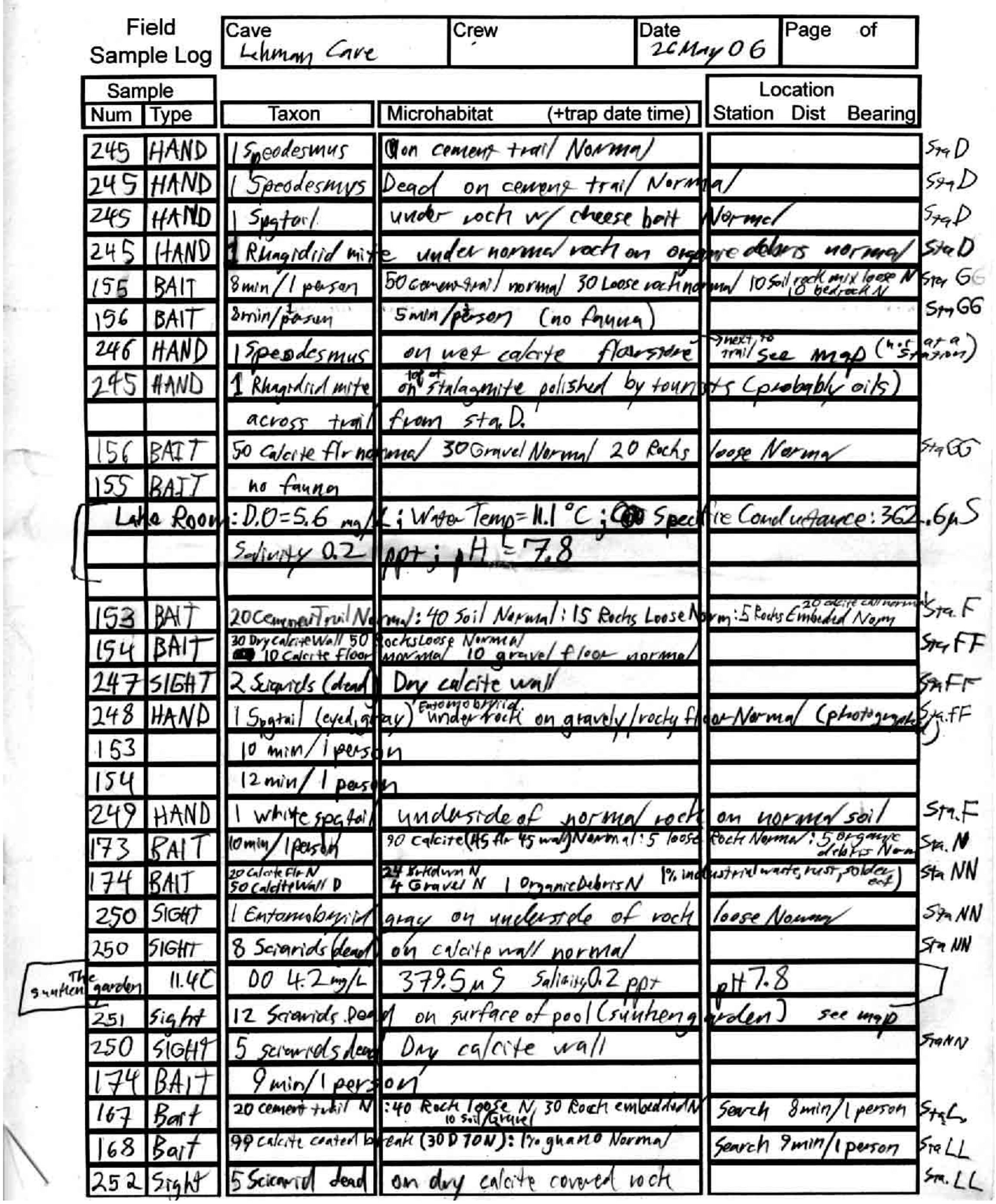
Sample				Location	
Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing	
237	SIGHT	1 Gray Spgtail/	on normal soil floo	Sta. O	
145	BAIT	30 Cement Trail Normal/	30 Calcite Wall Dry 40 Rocks+Soil Loose Normal/	Search time: 10 min/1 person	Sta. B
146	BAIT	30% Calcite wall dry	20 Calcite flr Normal 10 Packrat Guano Decomposed	20 Rocks loose Dry 20 Gravel Normal 10 min/1 pers.	Sta. BB
238	HAND	1 Sciarid	dry calcite wall	sta BB	
239	SIGHT	1 Sciarid dead	on underside of rock normal/	Sta BB	
240	SIGHT	1 Sciarid dead	under rock normal on soil	Sta B	
239	SIGHT	5 fly larvae	wet dirt floor (trail)	sta. BB	
239	SIGH	2 Sciarid flies	wet dirt floor (trail)	sta BB	
238	HAND	1 Sciarid dead	on underside of rock normal/	sta BD	
Meter Data		(Pool on side	passage of lost river passage)		
		Water temp 9.8	DO 5.6 mg L 292.2	μS Sal. 0.1 ppt	
		pH 7.7			
147	BAIT	20% Plastic+Metal	Stairs: 20 Cement trail: 50% Rubble: 10%	Electric Cables Normal/	Sta C
148	BAIT	25 silt/clay compact	normal: 70 Rocks loose normal: 5	Woody Debris	Sta CC
147	BAIT	Search effort	8 min/1 person		Sta C
148	BAIT	Search effort	9 min/1 person		
241	SIGHT	1 Springtail gray	under rock normal		Sta C
242	HAND	1 Speodesmus	live on woody debris normal/	(photographed)	Sta CC
242	HAND	2 Speodesmus	dead "	"	Sta CC
243	HAND	1 Onychiurid	on concrete trail normal/		Sta C
244	SIGHT	1 Sciarid	on top of rock normal/		Sta CC
244	SIGHT	1 Sciarid dead	on dry bedrock wall		Sta CC
242	HAND	1 Speodesmus	in woody debris		Sta CC
242	HAND	1 Speodesmus	(dead) under rock normal	on normal Dirt	Sta CC
149	BAIT	40 Cement trail/Normal	/15 Rocks Embedded Normal: 10 Rocks Loose	Normal/ 10 Calcite Normal/ 25 Soil loose Normal	Sta D
150	Bait	25% Calcite Wall	/Norm: 40% Calcite Wet floor	30% Organic Debris	Sta DD
		5% Rocks Loose Normal			
Meter Reading		Queens	Bathtub: Water Temp	10.0 °C; DO 3.7 mg/L	
	357.8	μS Specific	Conductance Salinity 0.2	ppthousand	
	pH	7.8			
149	Bait	search	10 min/1 person + 2 min/1 person		Sta D
150	BAIT	Search	10 min/1 person (no fauna)		Sta DD

Lehman Caves May 2006 (continued).



Field Sample Log

Cave: Lehman Cave

Crew:

Date: 26 May 06

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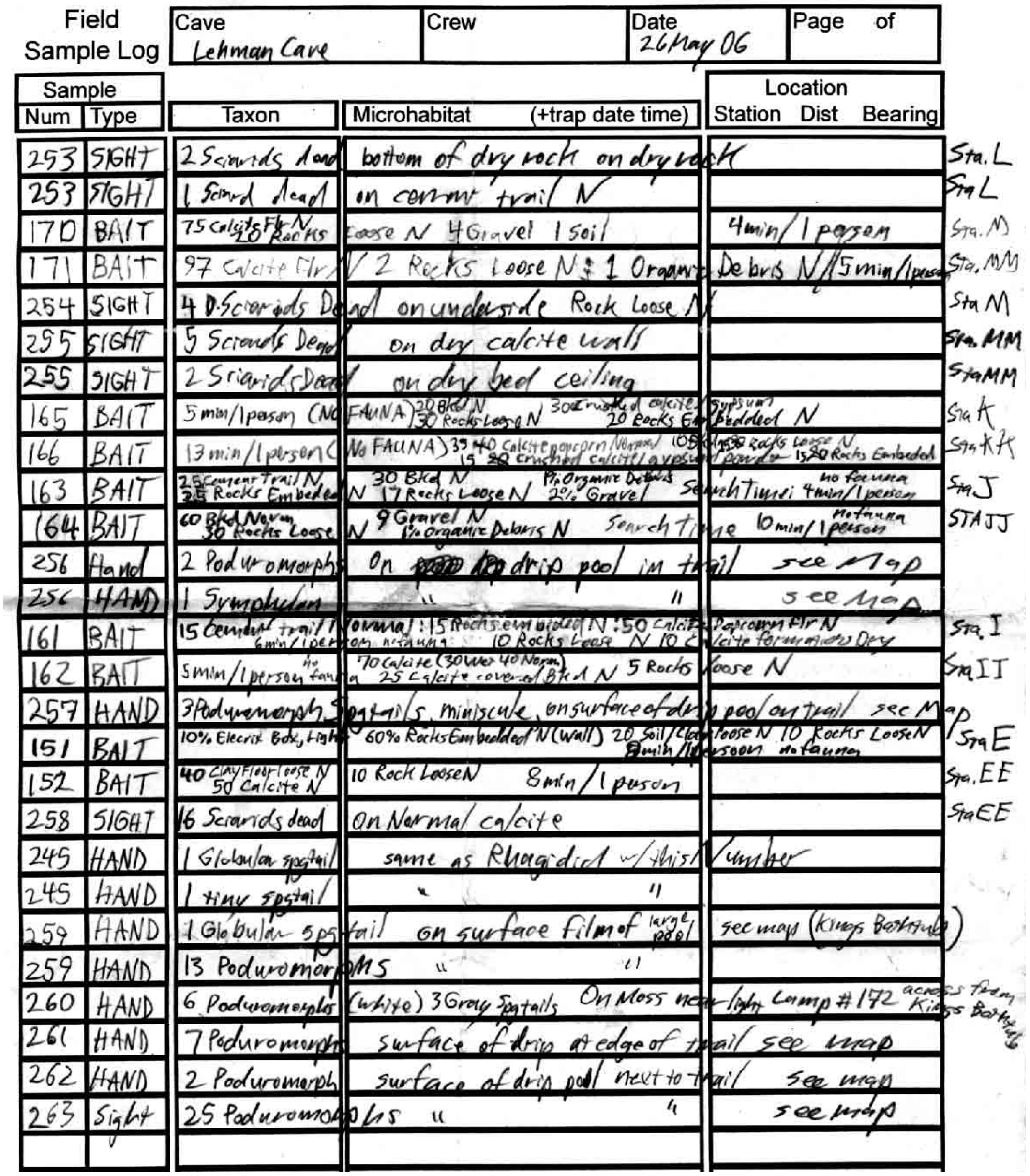
Sample				Location			
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing	
245	HAND	1 Speodesmus	on cement trail/ Normal/				Sta D
245	HAND	1 Speodesmus	Dead on cement trail/ Normal/				Sta D
245	HAND	1 Spgtail	under rock w/ cheese bait	Normal/			Sta D
245	HAND	1 Rhagidiid mite	under normal rock on organic debris normal/				Sta D
155	BAIT	8 min/1 person	50 cement trail/ normal/ 30 Loose rock normal/	10 Soil rock mix loose N 10 bedrock N			Sta GG
156	BAIT	8 min/1 person	5 min/person (no fauna)				Sta GG
246	HAND	1 Speodesmus	on wet calcite flowstone	next to trail/ see map (not at a station)			
245	HAND	1 Rhagidiid mite	on top of stalagmite polished by tourists (probably oils)				
		across trail	from sta. D.				
156	BAIT	50 Calcite flr normal/	30 Gravel Normal/ 20 Rocks	loose Normal/			Sta GG
155	BAIT	no fauna					
Lake Room		: D.O=5.6 mg/L	; Water Temp=11.1 °C; Specific Conductance: 362.6 μS				
		Salinity 0.2	ppt; pH = 7.8				
153	BAIT	20 Cement Trail Normal:	40 Soil Normal: 15 Rocks Loose Norm:	5 Rocks Embeded Norm 20 calcite wall normal			Sta. F
154	BAIT	30 Dry calcite Wall 50 10 Calcite Floor	Rocks Loose Normal/ normal/ 10 gravel/floor normal/				Sta FF
247	SIGHT	2 Sciarids (dead)	Dry calcite wall				Sta FF
248	HAND	1 Spgtail (eyed, gray)	Entomobryid under rock on gravely/rocky floor	Normal/ (photograph)			Sta. FF
153		10 min/1 person					
154		12 min/1 person					
249	HAND	1 white spgtail	underside of normal rock	on normal soil/			Sta. F
173	BAIT	10 min/1 person	90 calcite (45 flr 45 wall) Normal: 5 loose	Rock Normal: 5 organic debris Norm			Sta. N
174	BAIT	20 Calcite Flr N 50 Calcite Wall D	24 Breakdown N 4 Gravel N 1 Organic Debris N	1% industrial waste, rust, solder etc)			Sta NN
250	SIGHT	1 Entomobryid	gray on underside of rock	loose Normal/			Sta NN
250	SIGHT	8 Sciarids (dead)	on calcite wall normal				Sta NN
The sunken garden	11.4C	DO 4.2 mg/L	379.5 μS Salinity 0.2 ppt	pH 7.8			
251	Sight	12 Sciarids Dead	on surface of pool (sunken garden)	see map			
250	SIGHT	5 sciarids dead	Dry calcite wall				Sta NN
174	BAIT	9 min/1 person					
167	Bait	20 cement trail N	:40 Rock loose N, 30 Rock embedded N 10 Soil/Gravel	Search 8 min/1 person			Sta L
168	Bait	99 calcite coated breakdown	(30 D 70 N): 1% guano Normal/	Search 9 min/1 person			Sta LL
252	Sight	5 Sciarid dead	on dry calcite covered rock				Sta. LL

Lehman Caves May 2006 (continued).



Field Sample Log

Cave: Lehman Cave

Crew:

Date: 26 May 06

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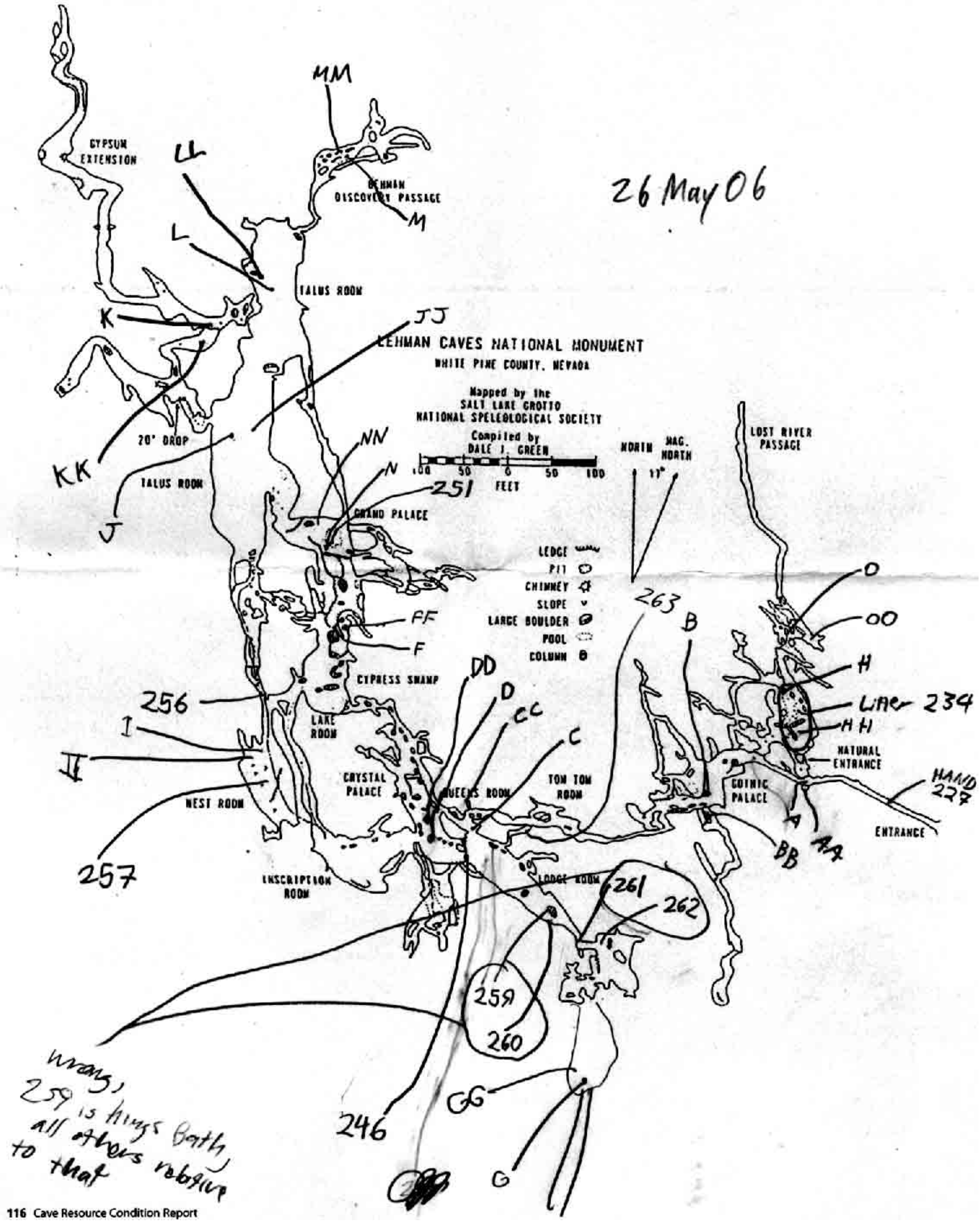
Sample				Location			
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing	
253	SIGHT	2 Scarids dead	bottom of dry rock on dry rock				Sta. L
253	SIGHT	1 Scarid dead	on cement trail N				Sta L
170	BAIT	75 Calcite Flr N 20 Rocks	Loose N 4 Gravel 1 soil	4min/1 person			Sta. M
171	BAIT	97 Calcite Flr N	2 Rocks Loose N ; 1 Organic	Debris N / 5 min/1person			Sta. MM
254	SIGHT	4 D. Scarids Dead	on underside Rock Loose N				Sta M
255	SIGHT	5 Scarids Dead	on dry calcite wall				Sta. MM
255	SIGHT	2 Sciarids Dead	on dry bed ceiling				Sta MM
165	BAIT	5 min/1person (NO	FAUNA) 20 Bkd N 30 Rocks Loose N 30 crushed calcite/gypsum 20 Rocks Em	bedded N			Sta K
166	BAIT	13 min/1person (	No FAUNA) ~~35~~ 40 Calcite popcorn Normal 10 15 ~~20~~ crushed calcite/gypsum	~~15~~ 30 rocks Loose N powder 15 ~~20~~ Rocks Embedded			Sta KK
163	BAIT	25 Cement Trail N 25 Rocks Embedded	N 30 Bkd N 17 Rocks Loose N 1% Organic Debris 2% Gravel	Search Time: 4min/1person no fauna			Sta J
164	BAIT	60 Bkd Norm 30 Rocks Loose	N 9 Gravel N 1% Organic Debris N Search time	10 min/1person no fauna			STA JJ
256	Hand	2 Poduromorphs	On ~~pool~~ ~~drip~~ drip pool in trail	see Map			
256	HAND	1 Symphylan	" "	see Map			
161	BAIT	15 Cement trail Normal : 6min/1person no fauna	15 Rocks embedded N : 50 Calcite 10 Rocks Loose N 10 Calcite	Popcorn Flr N formations Dry			Sta. I
162	BAIT	5min/1person no fauna	70 Calcite (30 Wet 40 Norm) 25 Calcite covered Bkd N 5 Rocks	Loose N			Sta II
257	HAND	3 Poduromorph Springtails,	miniscule, on surface of drip	pool on trail see Map			
151	BAIT	10% Elecric Box, Light	60% Rocks Embedded N (wall) 20 Soil/Clay	loose N 10 Rocks Loose N 8min/1person no fauna			Sta E
152	BAIT	40 Clay Floor loose N 50 Calcite N	10 Rock Loose N 8min/1 person				Sta. EE
258	SIGHT	16 Scarids dead	On Normal calcite				Sta EE
245	HAND	1 Globular spgtail	same as Rhagidiid w/ this	Number			
245	HAND	1 tiny spgtail	" "				
259	HAND	1 Globular spgtail	on surface film of large pool	see map (Kings Bathtub)			
259	HAND	13 Poduromorphs	" "				
260	HAND	6 Poduromorphs	(white) 3 Gray Spgtails On Moss near light	Lamp #172			across from Kings Bathtub
261	HAND	7 Poduromorphs	surface of drip at edge of trail	see map			
262	HAND	2 Poduromorph	surface of drip pool next to trail	see map			
263	Sight	25 Poduromorphs	" "	see map			

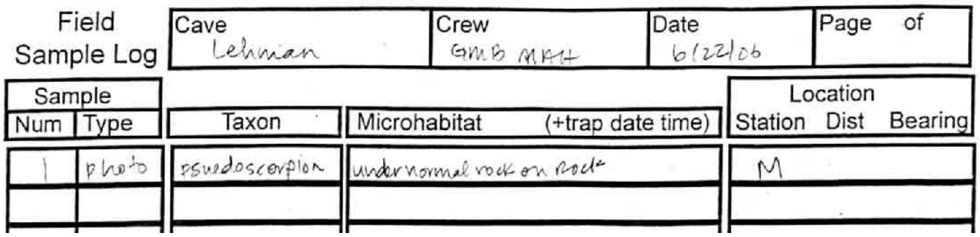
Lehman Caves May 2006 (continued).



26 May 06

wrong, 259 is Kings Bath, all others relative to that

Lehman Caves
June 2006



Field Sample Log

Cave: Lehman

Crew: GMB MAH

Date: 6/22/06

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Sample		Taxon	Microhabitat (+trap date time)	Location		
Num	Type			Station	Dist	Bearing
1	photo	psuedoscorpion	under normal rock on Rock	M		

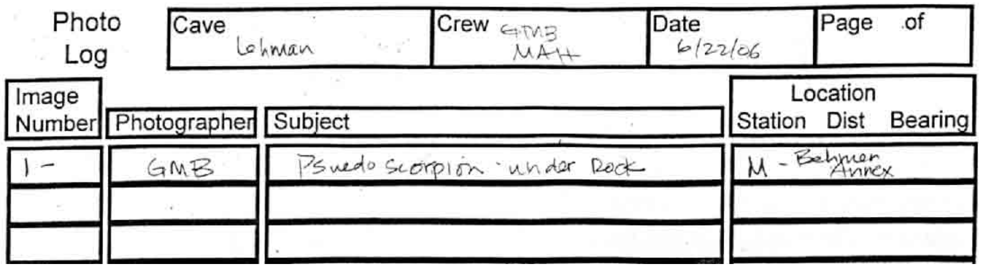

Photo Log

Cave: Lehman

Crew: GMB MAH

Date: 6/22/06

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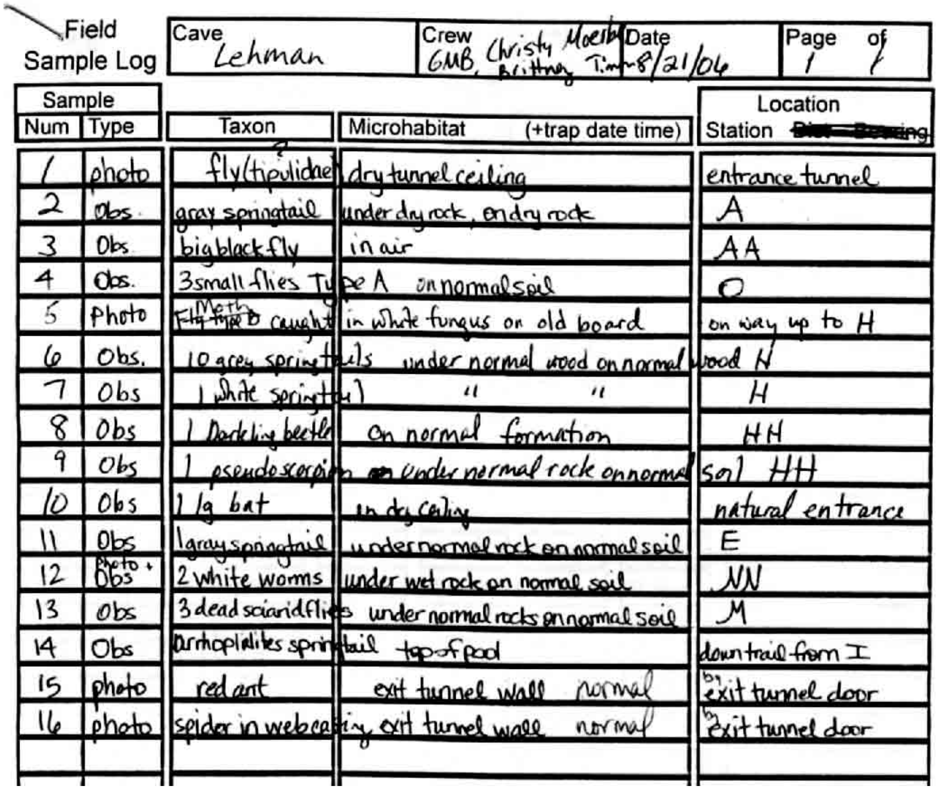
Image Number	Photographer	Subject	Location		
			Station	Dist	Bearing
1 -	GMB	Psuedo scorpion · under Rock	M - Behmer Annex		

Lehman Caves
July 2006

(field notes not available)

Lehman Caves
August 2006

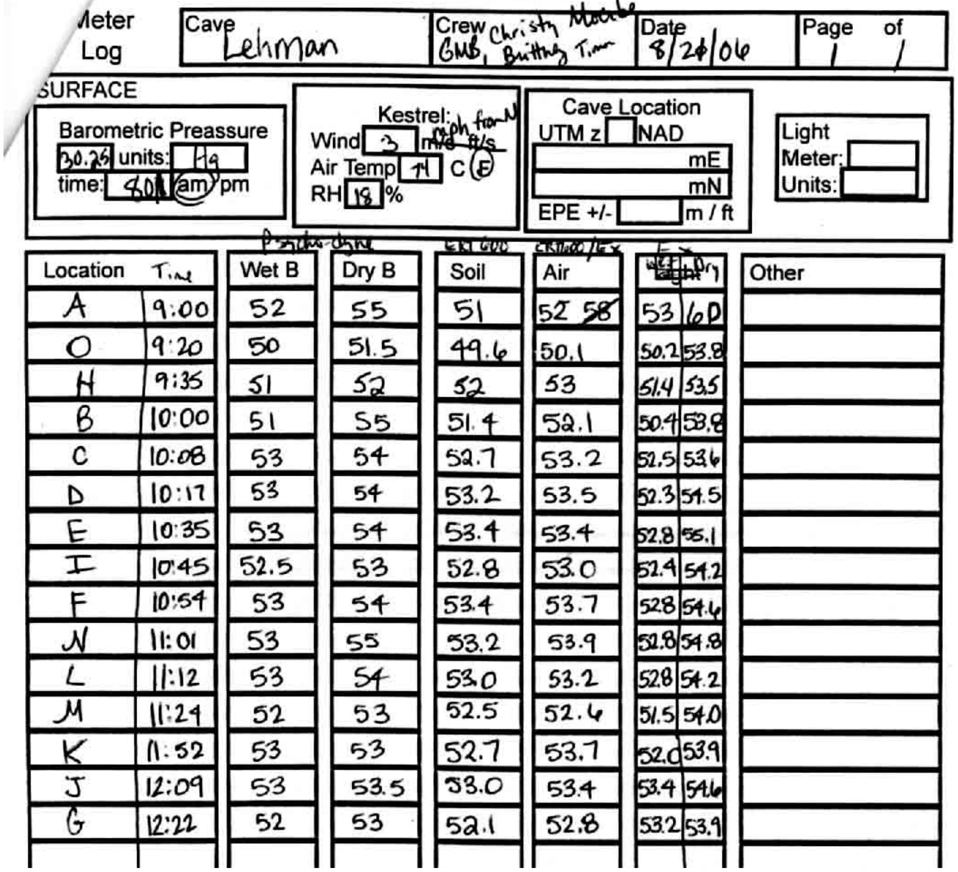


Field Sample Log

Cave	Crew	Date	Page of
Lehman	GMB, Christy, Moeib, Brittney, Tim	8/21/06	1 1

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station ~~Dist Bearing~~
1	photo	fly (tipulidae?)	dry tunnel ceiling	entrance tunnel
2	Obs.	gray springtail	under dry rock, on dry rock	A
3	Obs	big black fly	in air	AA
4	Obs.	3 small flies Type A	on normal soil	O
5	Photo	~~Fly type B~~ Moth caught	in white fungus on old board	on way up to H
6	Obs.	10 grey springtails	under normal wood on normal wood	H
7	Obs	1 white springtail	" "	H
8	Obs	1 Darkling beetle	on normal formation	HH
9	Obs	1 pseudoscorpion	under normal rock on normal soil	HH
10	Obs	1 lg bat	in dry ceiling	natural entrance
11	Obs	1 gray springtail	under normal rock on normal soil	E
12	Photo + Obs	2 white worms	under wet rock on normal soil	NN
13	Obs	3 dead sciarid flies	under normal rocks on normal soil	M
14	Obs	Arrhopalites springtail	top of pool	down trail from I
15	photo	red ant	exit tunnel wall normal	by exit tunnel door
16	photo	spider in web ceiling	exit tunnel wall normal	by exit tunnel door

Lehman Caves August 2006 (continued).



eter Log

Cave Lehman	Crew Christy Moebe GMB, Britting Tim	Date 8/24/06	Page 1 of 1

URFACE

Barometric Preassure 30.26 units: Hg
time: 8:00 [✓ am] pm

Kestrel: mph from N
Wind 3 ~~m/s ft/s~~
Air Temp 74 C [✓ F]
RH 18 %

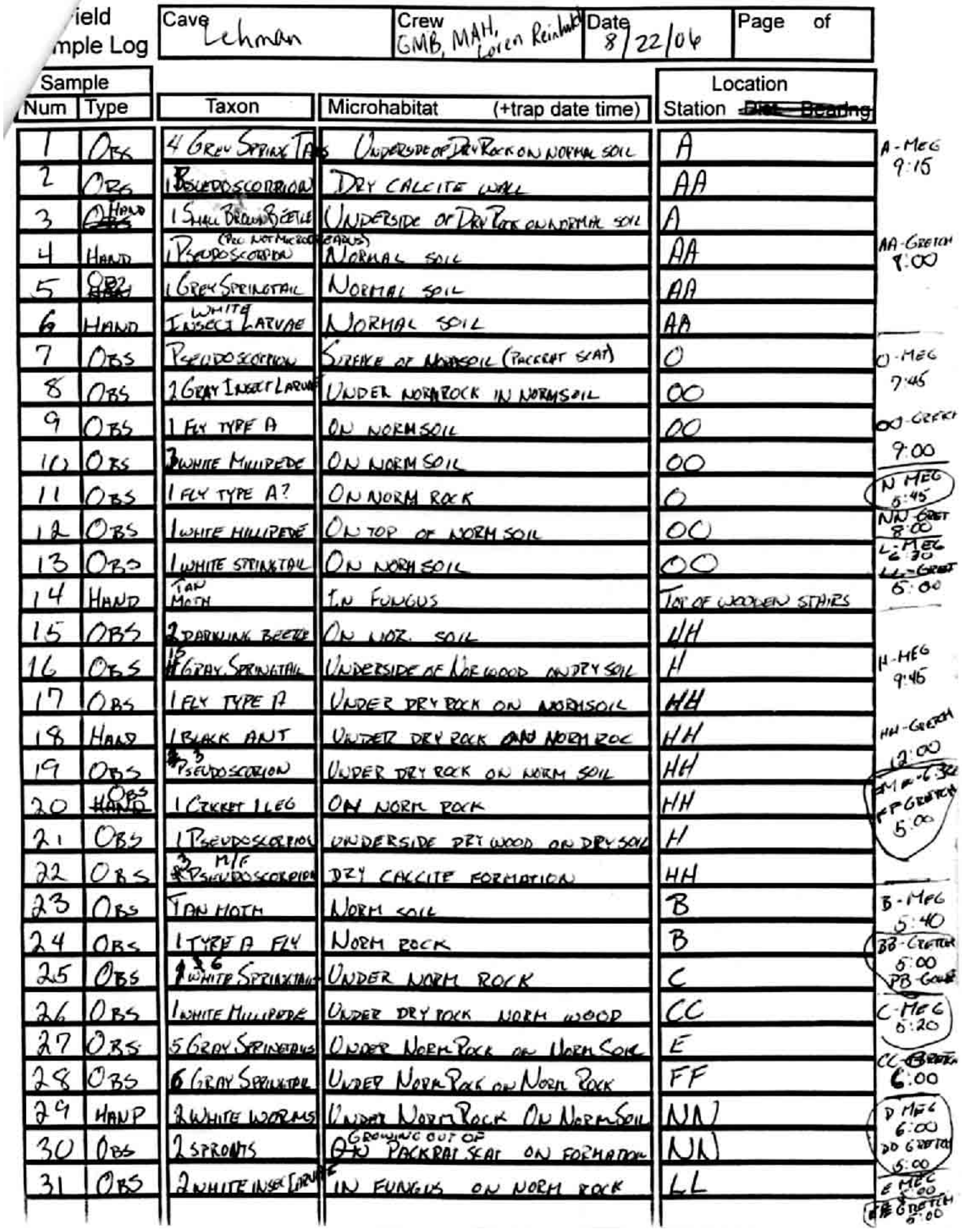
Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light
Meter:
Units:

Psychro-dyne [illegible] [illegible]

Location	Time	Wet B	Dry B	Soil	Air	~~Light~~ Wet	Dry	Other
A	9:00	52	55	51	52 ~~58~~	53	60	
O	9:20	50	51.5	49.6	50.1	50.2	53.8	
H	9:35	51	52	52	53	51.4	53.5	
B	10:00	51	55	51.4	52.1	50.4	53.8	
C	10:08	53	54	52.7	53.2	52.5	53.6	
D	10:17	53	54	53.2	53.5	52.3	54.5	
E	10:35	53	54	53.4	53.4	52.8	55.1	
I	10:45	52.5	53	52.8	53.0	52.4	54.2	
F	10:54	53	54	53.4	53.7	52.8	54.6	
N	11:01	53	55	53.2	53.9	52.8	54.8	
L	11:12	53	54	53.0	53.2	52.8	54.2	
M	11:24	52	53	52.5	52.6	51.5	54.0	
K	11:52	53	53	52.7	53.7	52.0	53.9	
J	12:09	53	53.5	53.0	53.4	53.4	54.6	
G	12:22	52	53	52.1	52.8	53.2	53.9	

Lehman Caves August 2006 (continued).



ield
mple Log

Cave Lehman

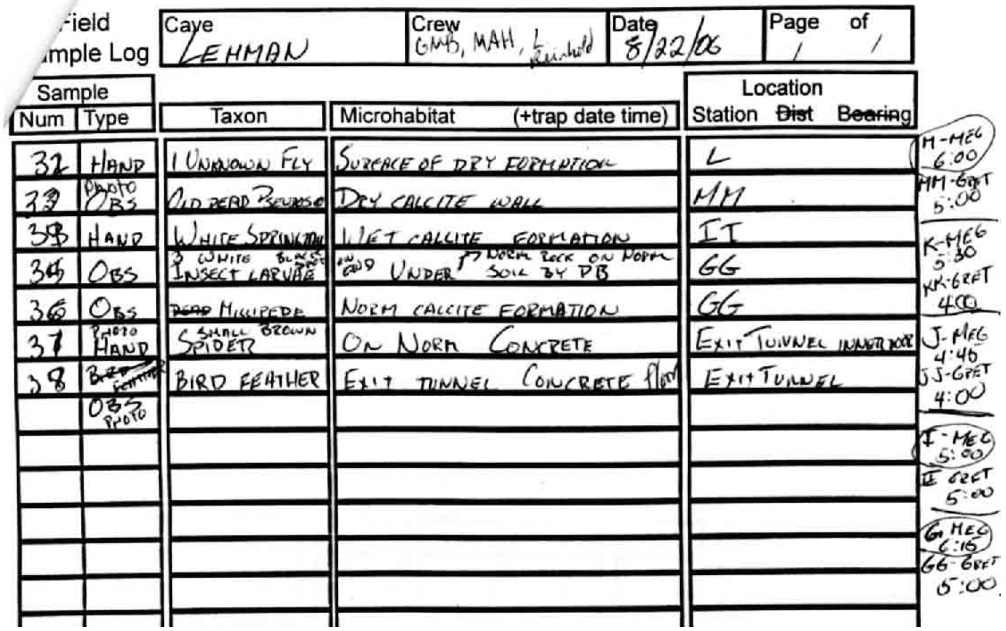
Crew GMB, MAH, Loren Reinhart

Date 8/22/06

Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station ~~Dist Bearing~~	
1	OBS	4 GREY SPRINGTAILS	UNDERSIDE OF DRY ROCK ON NORMAL SOIL	A	A-MEG 9:15
2	OBS	1 PSEUDOSCORPION	DRY CALCITE WALL	AA	
3	~~OBS~~ HAND	1 SMALL BROWN BEETLE	UNDERSIDE OF DRY ROCK ON NORMAL SOIL	A	
4	HAND	1 PSEUDOSCORPION (PROB NOT MICROCREAGRIS)	NORMAL SOIL	AA	AA-GRETCH 8:00
5	OBS	1 GREY SPRINGTAIL	NORMAL SOIL	AA	
6	HAND	WHITE INSECT LARVAE	NORMAL SOIL	AA	
7	OBS	PSEUDOSCORPION	SURFACE OF NORMSOIL (PACKRAT SCAT)	O	O-MEG 7:45
8	OBS	1 GRAY INSECT LARVAE	UNDER NORM ROCK IN NORMSOIL	OO	
9	OBS	1 FLY TYPE A	ON NORMSOIL	OO	OO-GRETCH 9:00
10	OBS	3 WHITE MILLIPEDE	ON NORM SOIL	OO	
11	OBS	1 FLY TYPE A?	ON NORM ROCK	O	N MEG 5:45
12	OBS	1 WHITE MILLIPEDE	ON TOP OF NORM SOIL	OO	NN GRET 8:00
13	OBS	1 WHITE SPRINGTAIL	ON NORM SOIL	OO	L-MEG 6:30
14	HAND	TAN MOTH	IN FUNGUS	TOP OF WOODEN STAIRS	LL-GRET 6:00
15	OBS	2 DARKLING BEETLE	ON NOR. SOIL	HH	
16	OBS	15 GRAY SPRINGTAIL	UNDERSIDE OF NOR WOOD ON DRY SOIL	H	H-MEG 9:45
17	OBS	1 FLY TYPE A	UNDER DRY ROCK ON NORMSOIL	HH	
18	HAND	1 BLACK ANT	UNDER DRY ROCK ~~AND~~ NORM ROC	HH	HH-GRETCH 12:00
19	OBS	3 PSEUDOSCORPION	UNDER DRY ROCK ON NORM SOIL	HH	F MEG 6:30
20	~~HAND~~ OBS	1 CRICKET 1 LEG	ON NORM ROCK	HH	FF GRETCH 5:00
21	OBS	1 PSEUDOSCORPION	UNDERSIDE DRY WOOD ON DRY SOIL	H	
22	OBS	3 M/F PSEUDOSCORPION	DRY CALCITE FORMATION	HH	
23	OBS	TAN MOTH	NORM SOIL	B	B-MEG 5:40
24	OBS	1 TYPE A FLY	NORM ROCK	B	BB-GRETCH 6:00
25	OBS	6 WHITE SPRINGTAIL	UNDER NORM ROCK	C	BB-[illegible]
26	OBS	1 WHITE MILLIPEDE	UNDER DRY ROCK NORM WOOD	CC	C-MEG 6:20
27	OBS	5 GRAY SPRINGTAILS	UNDER NORM ROCK ON NORM SOIL	E	
28	OBS	6 GRAY SPRINGTAIL	UNDER NORM ROCK ON NORM ROCK	FF	CC-GRETCH 6:00
29	HAND	2 WHITE WORMS	UNDER NORM ROCK ON NORM SOIL	NN	D MEG 6:00
30	OBS	2 SPROUTS	~~ON~~ GROWING OUT OF PACKRAT SCAT ON FORMATION	NN	DD GRETCH 5:00
31	OBS	2 WHITE INSECT LARVAE	IN FUNGUS ON NORM ROCK	LL	E MEG 6:00 EE GRETCH 5:00

Lehman Caves August 2006 (continued).

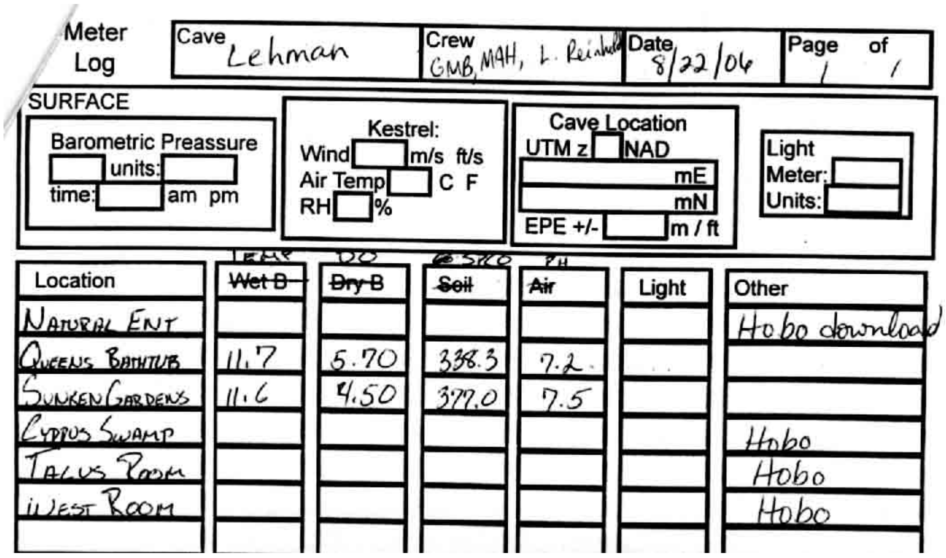


Field Sample Log

Cave LEHMAN | Crew GMB, MAH, L Reinhold | Date 8/22/06 | Page 1 of 1

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station ~~Dist~~ ~~Bearing~~
32	HAND	1 UNKNOWN FLY	SURFACE OF DRY FORMATION	L
33	PHOTO OBS	OLD DEAD PSEUDOSC	DRY CALCITE WALL	MM
34	HAND	WHITE SPRINGTAIL	WET CALCITE FORMATION	IT
35	OBS	3 WHITE BLACK SPOT INSECT LARVAE	ON GND UNDER NORM ROCK ON NORM SOIL BY PB	GG
36	OBS	~~DEAD~~ MILLIPEDE	NORM CALCITE FORMATION	GG
37	PHOTO HAND	SMALL BROWN SPIDER	ON NORM CONCRETE	EXIT TUNNEL INNER DOOR
38	~~BIRD FEATHER~~	BIRD FEATHER	EXIT TUNNEL CONCRETE floor	EXIT TUNNEL
	OBS PHOTO			

M-MEG 6:00
MM-GRET 5:00
K-MEG 5:30
KK-GRET 4:00
J-MEG 4:45
JJ-GRET 4:00
I-MEG 5:00
II GRET 5:00
G MEG 6:15
GG-GRET 5:00



Meter Log

Cave Lehman | Crew GMB, MAH, L. Reinhold | Date 8/22/06 | Page 1 of 1

SURFACE

Barometric Preassure ☐ units: ☐ time: ☐ am pm

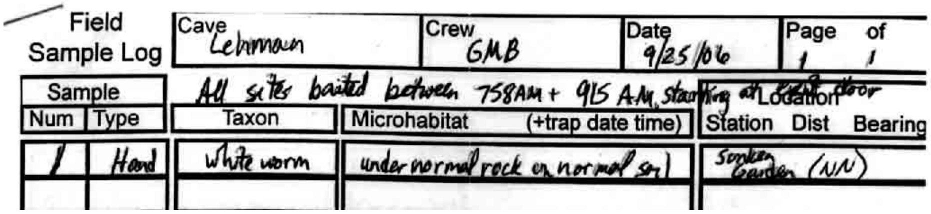
Kestrel: Wind ☐ m/s ft/s Air Temp ☐ C F RH ☐ %

Cave Location UTM z ☐ NAD ☐ mE ☐ mN EPE +/- ☐ m / ft

Light Meter: ☐ Units: ☐

Location	TEMP ~~Wet B~~	DO ~~Dry B~~	@SPC ~~Soil~~	PH ~~Air~~	Light	Other
NATURAL ENT						Hobo download
QUEENS BATHTUB	11.7	5.70	338.3	7.2		
SUNKEN GARDENS	11.6	4.50	377.0	7.5		
CYPRUS SWAMP						Hobo
TALUS ROOM						Hobo
WEST ROOM						Hobo

Lehman Caves
September 2006

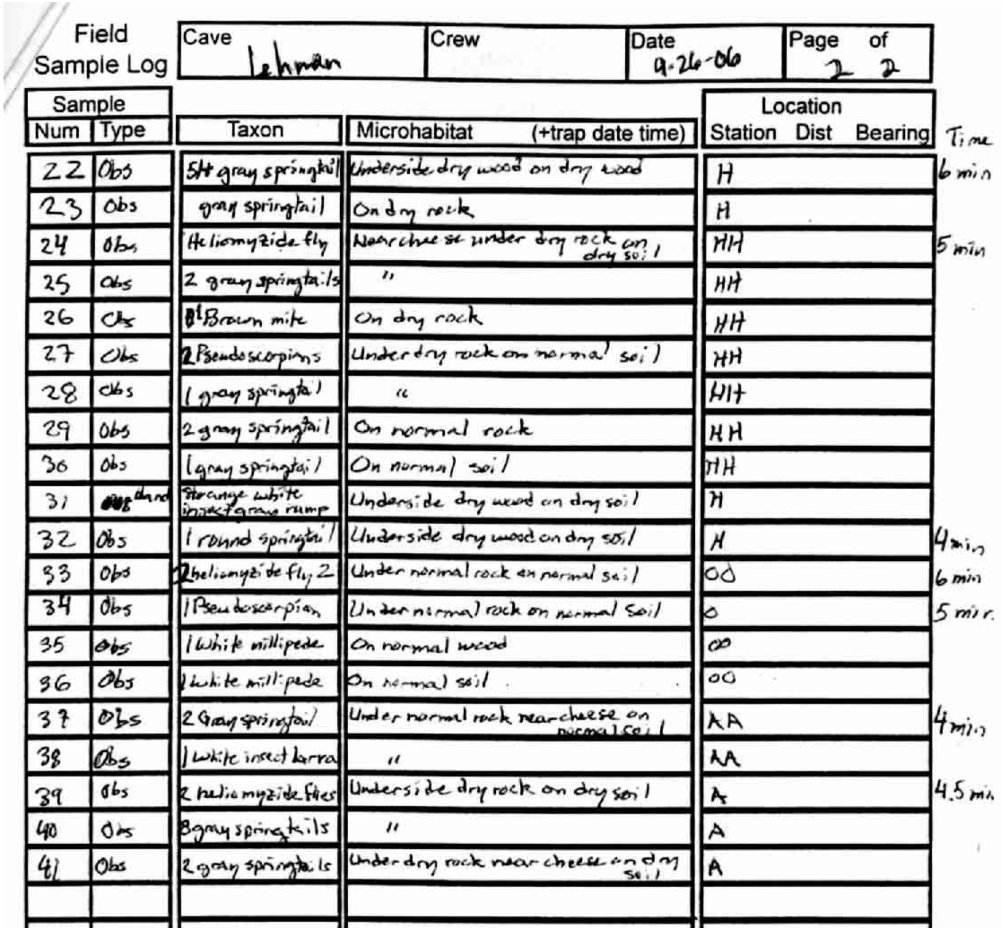


Field Sample Log

Cave: Lehman
Crew: GMB
Date: 9/25/06
Page 1 of 1

All sites baited between 758AM + 915 A.M. starting at [illegible] door

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
1	Hand	White worm	under normal rock on normal soil	Sunken Garden (NN)		

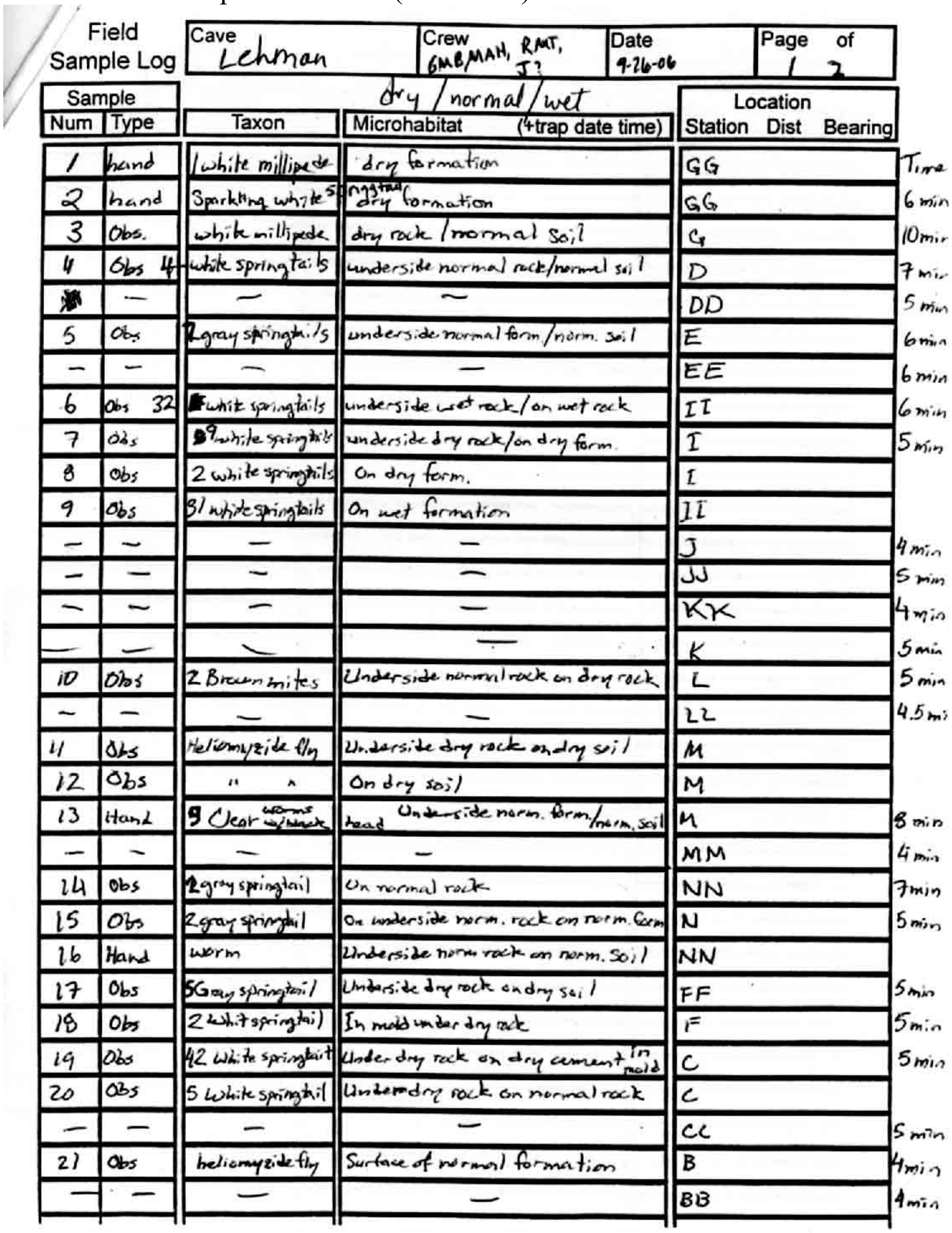


Field Sample Log

Cave: Lehman
Crew:
Date: 9-26-06
Page 2 of 2

Sample				Location			
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing	Time
22	Obs	5+ gray springtail	Underside dry wood on dry wood	H			6 min
23	Obs	gray springtail	On dry rock	H			
24	Obs	Heliomyzide fly	Near cheese under dry rock on dry soil	HH			5 min
25	Obs	2 gray springtails	"	HH			
26	Obs	1 Brown mite	On dry rock	HH			
27	Obs	2 Pseudoscorpions	Under dry rock on normal soil	HH			
28	Obs	1 gray springtail	"	HH			
29	Obs	2 gray springtail	On normal rock	HH			
30	Obs	1 gray springtail	On normal soil	HH			
31	Hand	Strange white insect gray rump	Underside dry wood on dry soil	H			
32	Obs	1 round springtail	Underside dry wood on dry soil	H			4 min
33	Obs	2 heliomyzide fly 2	Under normal rock on normal soil	OO			6 min
34	Obs	1 Pseudoscorpion	Under normal rock on normal soil	O			5 min
35	Obs	1 White millipede	On normal wood	OO			
36	Obs	1 white millipede	On normal soil	OO			
37	Obs	2 Gray springtail	Under normal rock near cheese on normal soil	AA			4 min
38	Obs	1 white insect larva	"	AA			
39	Obs	2 heliomyzide flies	Underside dry rock on dry soil	A			4.5 min
40	Obs	8 gray springtails	"	A			
41	Obs	2 gray springtails	Under dry rock near cheese on dry soil	A			

Lehman Caves September 2006 (continued).



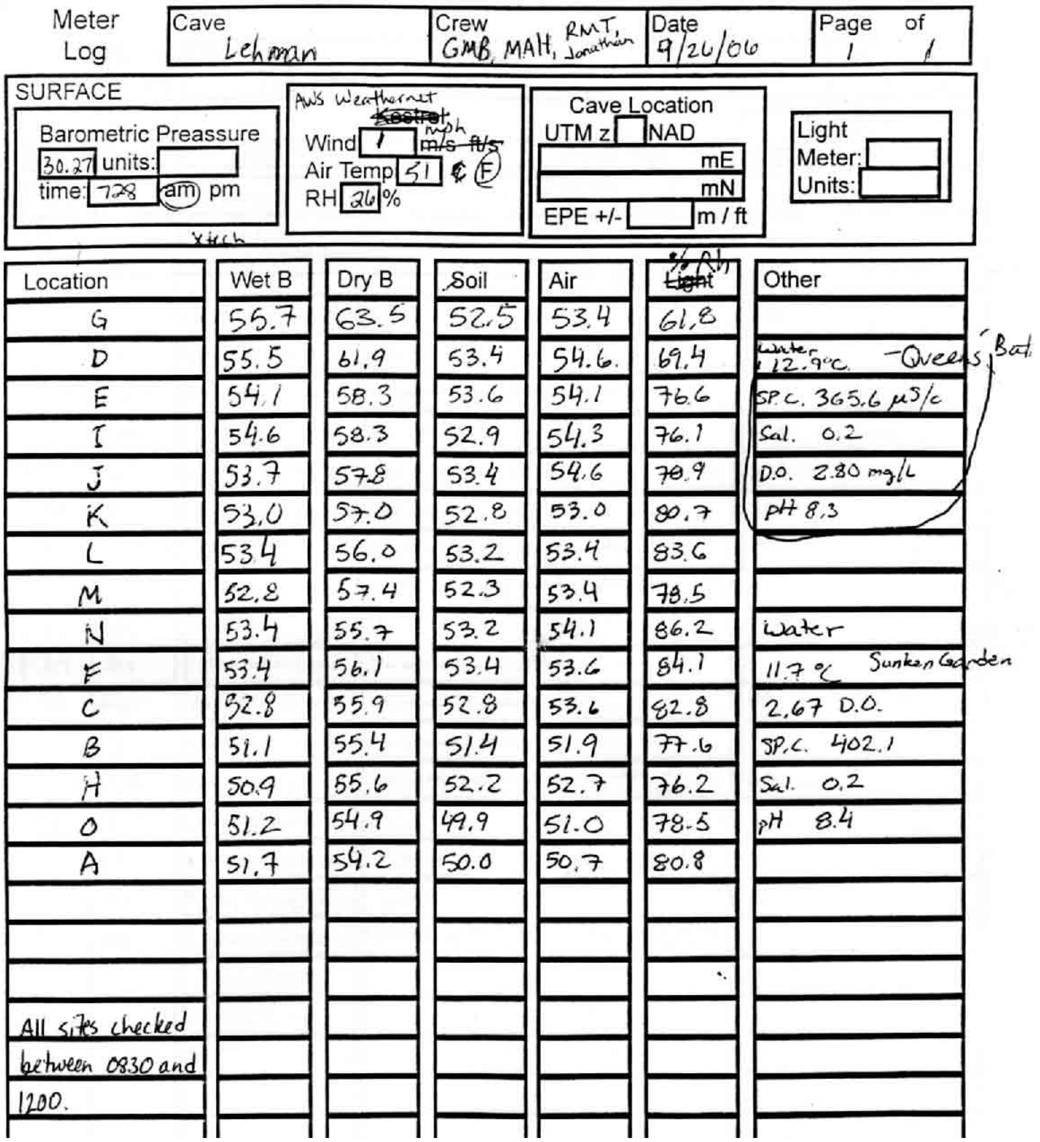
Field Sample Log

Cave: Lehman
Crew: GMB, MAH, RMT, J?
Date: 9-26-06
Page 1 of 2

dry / normal / wet

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing	Time
1	hand	1 white millipede	dry formation	GG			
2	hand	Sparkling white springtail	dry formation	GG			6 min
3	Obs.	white millipede	dry rock / normal soil	G			10 min
4	Obs 4	white springtails	underside normal rock/normal soil	D			7 min
[illegible]	—	—	~	DD			5 min
5	Obs	2 gray springtails	underside normal form / norm. soil	E			6 min
—	—	—	—	EE			6 min
6	Obs 32	white springtails	underside wet rock / on wet rock	II			6 min
7	Obs	9 white springtails	underside dry rock/on dry form.	I			5 min
8	Obs	2 white springtails	On dry form.	I			
9	Obs	31 white springtails	On wet formation	II			
—	—	—	—	J			4 min
—	—	—	—	JJ			5 min
—	—	—	—	KK			4 min
—	—	—	—	K			5 min
10	Obs	2 Brown mites	Underside normal rock on dry rock	L			5 min
—	—	—	—	LL			4.5 min
11	Obs	Heliomyzide fly	Underside dry rock on dry soil	M			
12	Obs	" "	On dry soil	M			
13	Hand	9 Clear worms w/black head	Underside norm. form/norm. soil	M			8 min
—	—	—	—	MM			4 min
14	Obs	2 gray springtail	On normal rock	NN			7 min
15	Obs	2 gray springtail	On underside norm. rock on norm. form	N			5 min
16	Hand	worm	Underside norm rock on norm. Soil	NN			
17	Obs	5 Gray springtail	Underside dry rock on dry soil	FF			5 min
18	Obs	2 White springtail	In mold under dry rock	F			5 min
19	Obs	42 White springtail	Under dry rock on dry cement in mold	C			5 min
20	Obs	5 White springtail	Under dry rock on normal rock	C			
—	—	—	—	CC			5 min
21	Obs	heliomyzide fly	Surface of normal formation	B			4 min
—	—	—	—	BB			4 min

Lehman Caves September 2006 (continued).



Meter Log

Cave: Lehman
Crew: GMB, MAH, RMT, Jonathan
Date: 9/26/06
Page 1 of 1

SURFACE

Barometric Preassure
30.27 units:
time: 728 [✓ am] pm
Xtech

AWS Weathernet ~~Kestrel~~,
Wind 1 mph ~~m/s~~ ~~ft/s~~
Air Temp 51 ~~C~~ [✓ F]
RH 26 %

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light
Meter:
Units:

Location	Wet B	Dry B	Soil	Air	~~Light~~ % Rh	Other
G	55.7	63.5	52.5	53.4	61.8	
D	55.5	61.9	53.4	54.6.	69.4	Water 12.9°C. – Queens' Bat
E	54.1	58.3	53.6	54.1	76.6	SP.C. 365.6 µS/c
I	54.6	58.3	52.9	54.3	76.1	Sal. 0.2
J	53.7	57.8	53.4	54.6	78.9	D.O. 2.80 mg/L
K	53.0	57.0	52.8	53.0	80.7	pH 8.3
L	53.4	56.0	53.2	53.4	83.6	
M	52.8	57.4	52.3	53.4	78.5	
N	53.4	55.7	53.2	54.1	86.2	Water
F	53.4	56.1	53.4	53.6	84.1	11.7 °C Sunken Garden
C	52.8	55.9	52.8	53.6	82.8	2.67 D.O.
B	51.1	55.4	51.4	51.9	77.6	SP.C. 402.1
H	50.9	55.6	52.2	52.7	76.2	Sal. 0.2
O	51.2	54.9	49.9	51.0	78.5	pH 8.4
A	51.7	54.2	50.0	50.7	80.8	
All sites checked						
between 0830 and						
1200.						

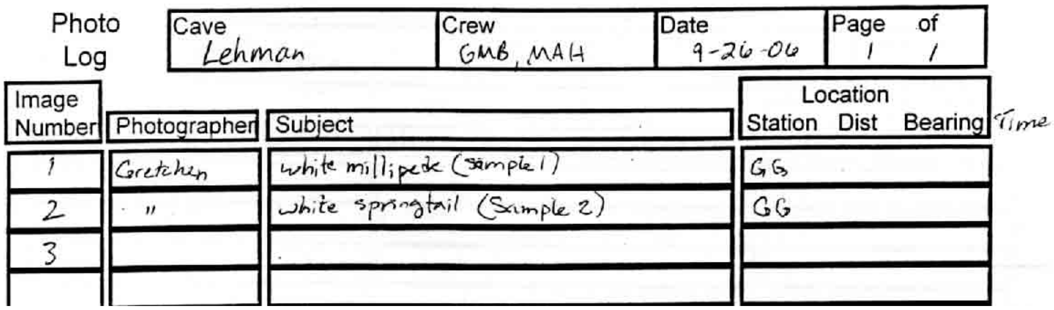
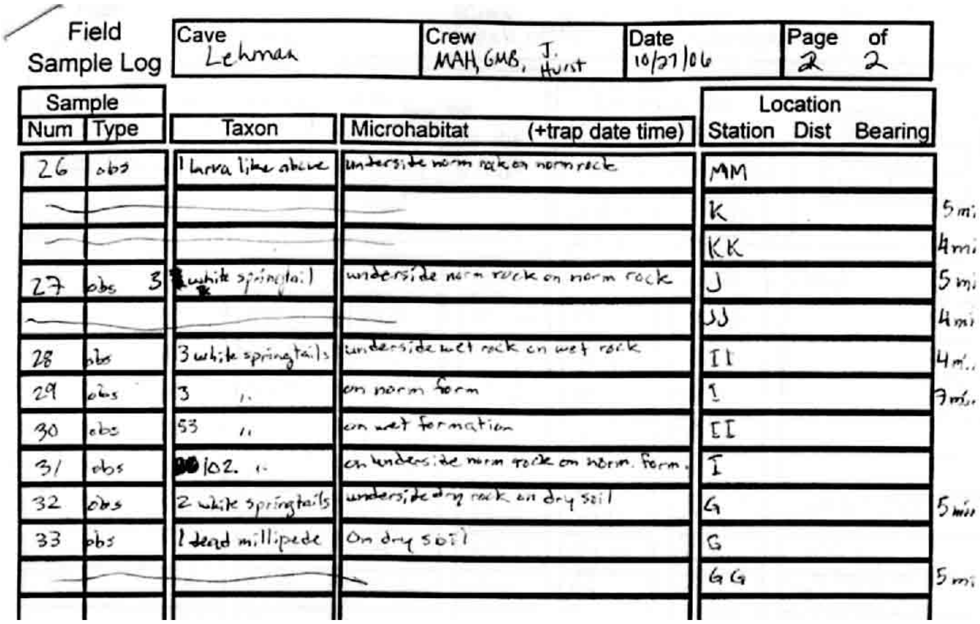


Photo Log

Cave: Lehman
Crew: GMB, MAH
Date: 9-26-06
Page 1 of 1

Image Number	Photographer	Subject	Location Station Dist Bearing	Time
1	Gretchen	white millipede (sample 1)	GG	
2	"	white springtail (Sample 2)	GG	
3				

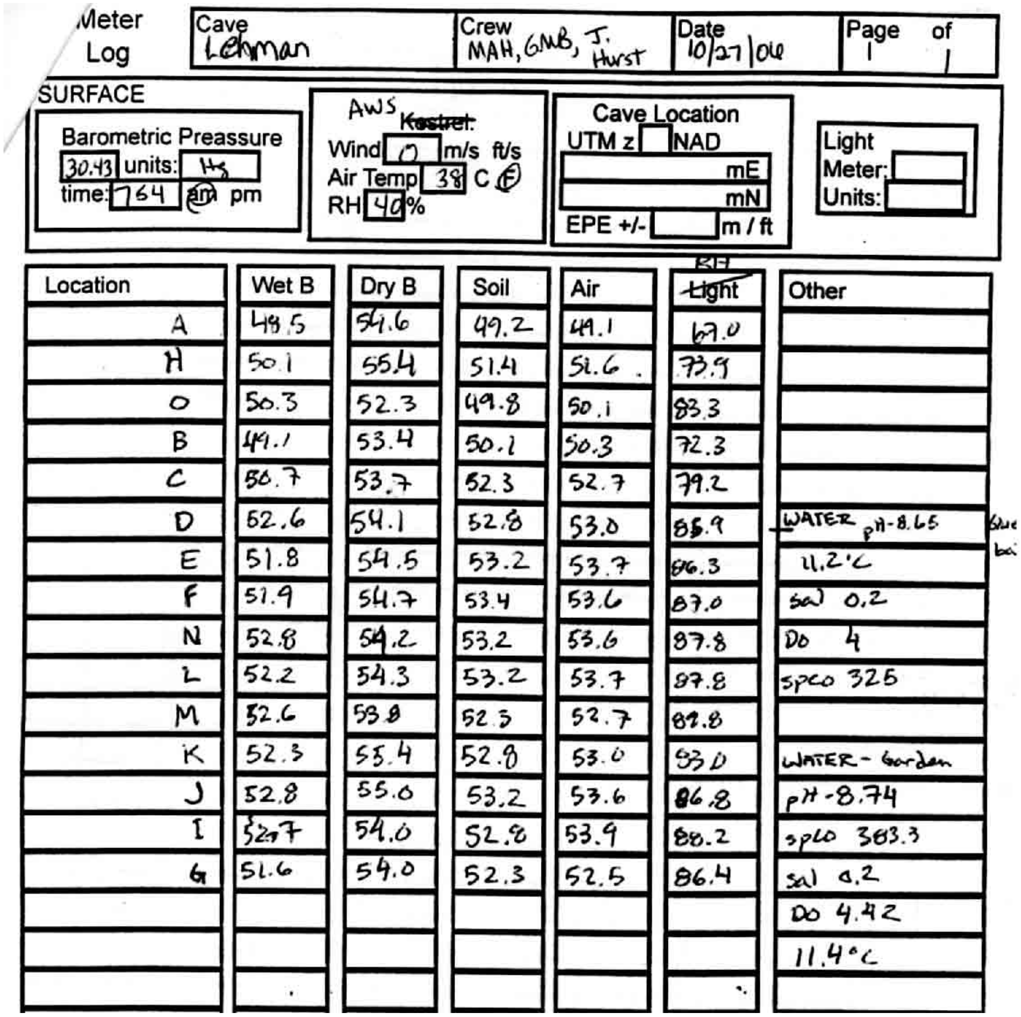
Lehman Caves
October 2006



Field Sample Log

Cave	Crew	Date	Page	of
Lehman	MAH, GMB, J. Hurst	10/27/06	2	2

Sample				Location			
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing	
26	obs	1 larva like above	underside norm rock on norm rock	MM			
				K			5 mi
				KK			4 mi
27	obs 3	white springtail	underside norm rock on norm rock	J			5 mi
				JJ			4 mi
28	obs	3 white springtails	underside wet rock on wet rock	II			4 m..
29	obs	3 "	on norm form	I			7 m..
30	obs	53 "	on wet formation	II			
31	obs	102. "	on underside norm rock on norm. form.	I			
32	obs	2 white springtails	underside dry rock on dry soil	G			5 min
33	obs	1 dead millipede	On dry soil	G			
				GG			5 mi



Meter Log

Cave: Lehman

Crew: MAH, GMB, J. Hurst

Date: 10/27/06

Page 1 of 1

SURFACE

Barometric Preassure 30.43 units: Hg
time: 764 [✓ am] pm

AWS ~~Kestrel:~~
Wind 0 m/s ft/s
Air Temp 38 C [✓ F]
RH 40%

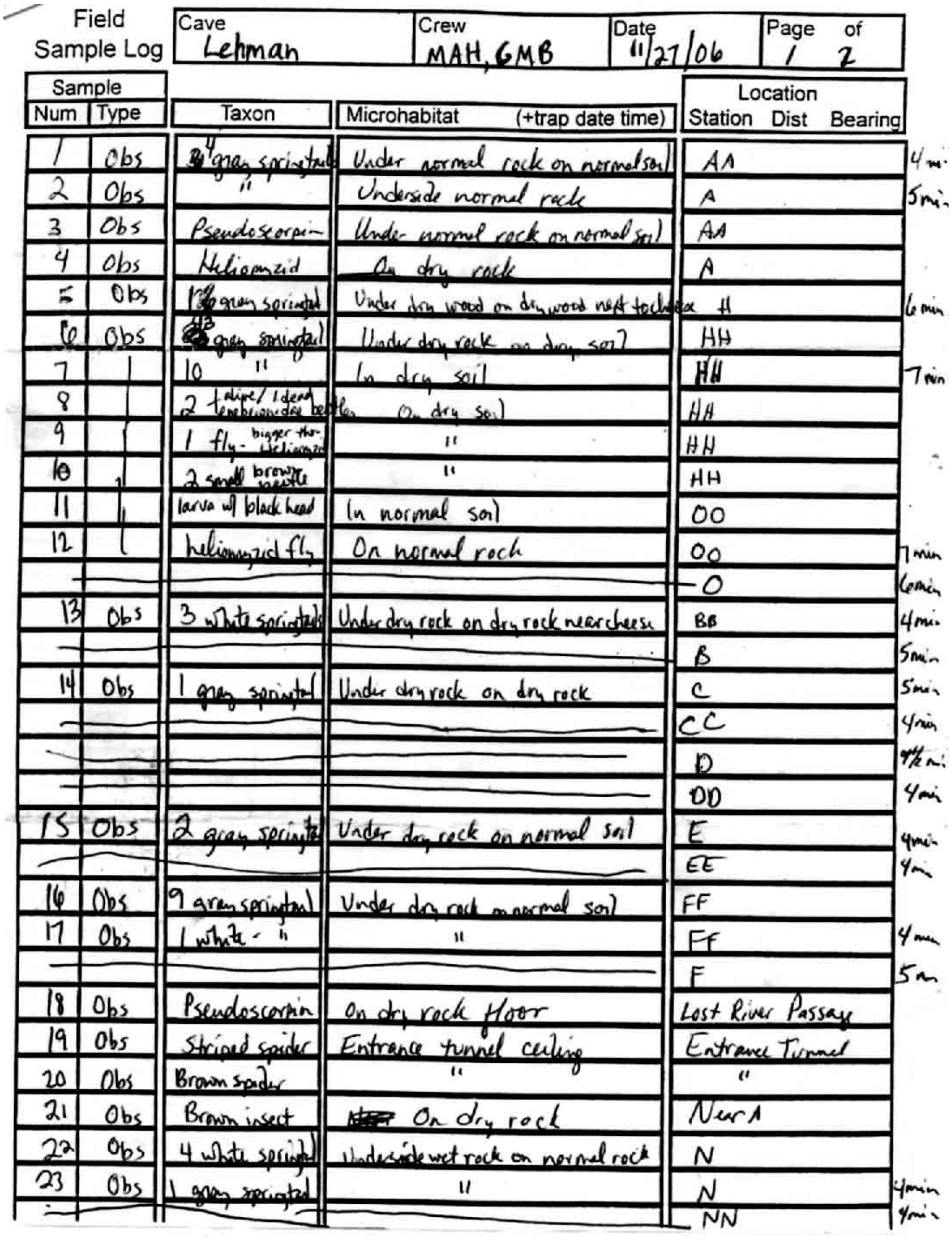
Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

Location	Wet B	Dry B	Soil	Air	~~Light~~ RH	Other
A	48.5	54.6	49.2	49.1	67.0	
H	50.1	55.4	51.4	51.6	73.9	
O	50.3	52.3	49.8	50.1	83.3	
B	49.1	53.4	50.1	50.3	72.3	
C	50.7	53.7	52.3	52.7	79.2	
D	52.6	54.1	52.8	53.0	85.9	WATER pH-8.65
E	51.8	54.5	53.2	53.7	86.3	11.2°C
F	51.9	54.7	53.4	53.6	87.0	sal 0.2
N	52.8	54.2	53.2	53.6	87.8	DO 4
L	52.2	54.3	53.2	53.7	87.8	spco 325
M	52.6	53.8	52.3	52.7	87.8	
K	52.3	55.4	52.8	53.0	93.0	WATER - Garden
J	52.8	55.0	53.2	53.6	86.8	pH-8.74
I	52.7	54.0	52.8	53.9	88.2	spco 383.3
G	51.6	54.0	52.3	52.5	86.4	sal 0.2
						DO 4.42
						11.4°C

Blue
ba

Lehman Caves
November 2006

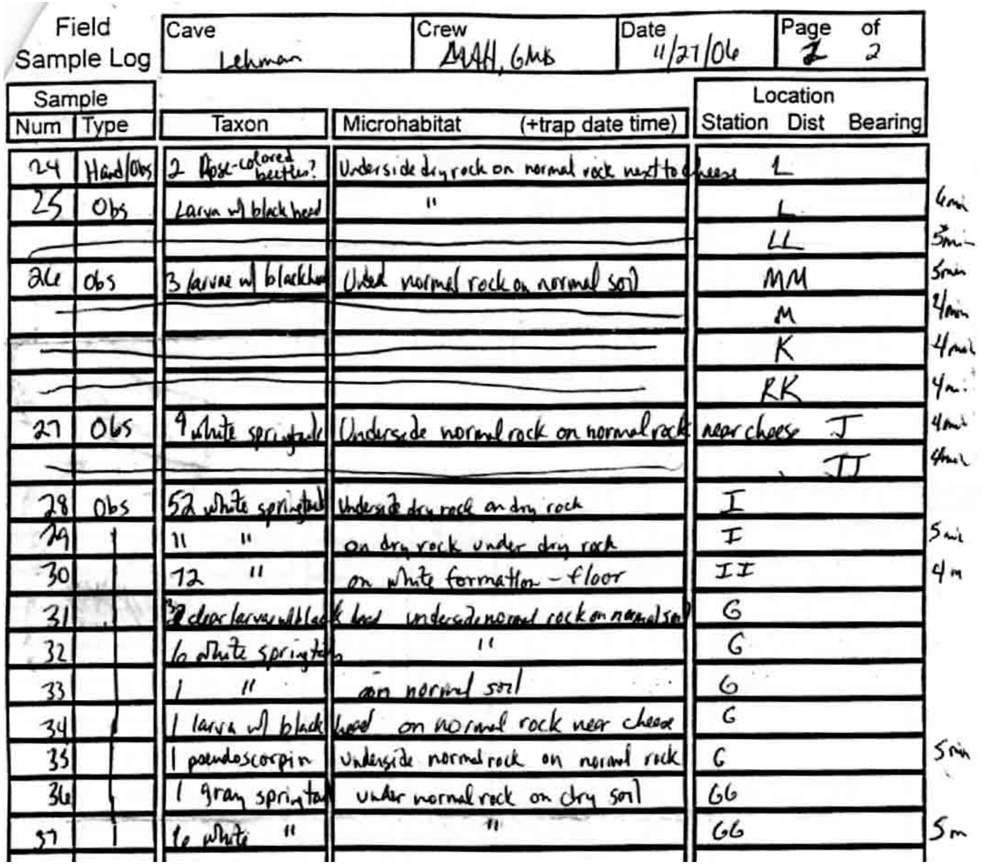


Field Sample Log

Cave: Lehman
Crew: MAH, GMB
Date: 11/27/06
Page 1 of 2

Sample				Location			
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing	
1	Obs	4 gray springtail	Under normal rock on normal soil	AA			4 min
2	Obs	"	Underside normal rock	A			5 min
3	Obs	Pseudoscorpion	Under normal rock on normal soil	AA			
4	Obs	Heliomyzid	On dry rock	A			
5	Obs	1 gray springtail	Under dry wood on dry wood next to cheese	H			6 min
6	Obs	3 gray springtail	Under dry rock on dry soil	HH			
7		10 "	In dry soil	HH			7 min
8		2 alive/1 dead tenebrionidae beetles	On dry soil	HH			
9		1 fly - bigger than Heliomyzid	"	HH			
10		2 small brown beetle	"	HH			
11		larva w/ black head	In normal soil	OO			
12		heliomyzid fly	On normal rock	OO			7 min
				O			6 min
13	Obs	3 white springtails	Under dry rock on dry rock near cheese	BB			4 min
				B			5 min
14	Obs	1 gray springtail	Under dry rock on dry rock	C			5 min
				CC			4 min
				D			4½ min
				DD			4 min
15	Obs	2 gray springtail	Under dry rock on normal soil	E			4 min
				EE			4 min
16	Obs	9 gray springtail	Under dry rock on normal soil	FF			
17	Obs	1 white - "	"	FF			4 min
				F			5 min
18	Obs	Pseudoscorpion	On dry rock floor	Lost River Passage			
19	Obs	Striped spider	Entrance tunnel ceiling	Entrance Tunnel			
20	Obs	Brown spider	"	"			
21	Obs	Brown insect	On dry rock	Near A			
22	Obs	4 white springtail	Underside wet rock on normal rock	N			
23	Obs	1 gray springtail	"	N			4 min
				NN			4 min

Lehman Caves November 2006 (continued).

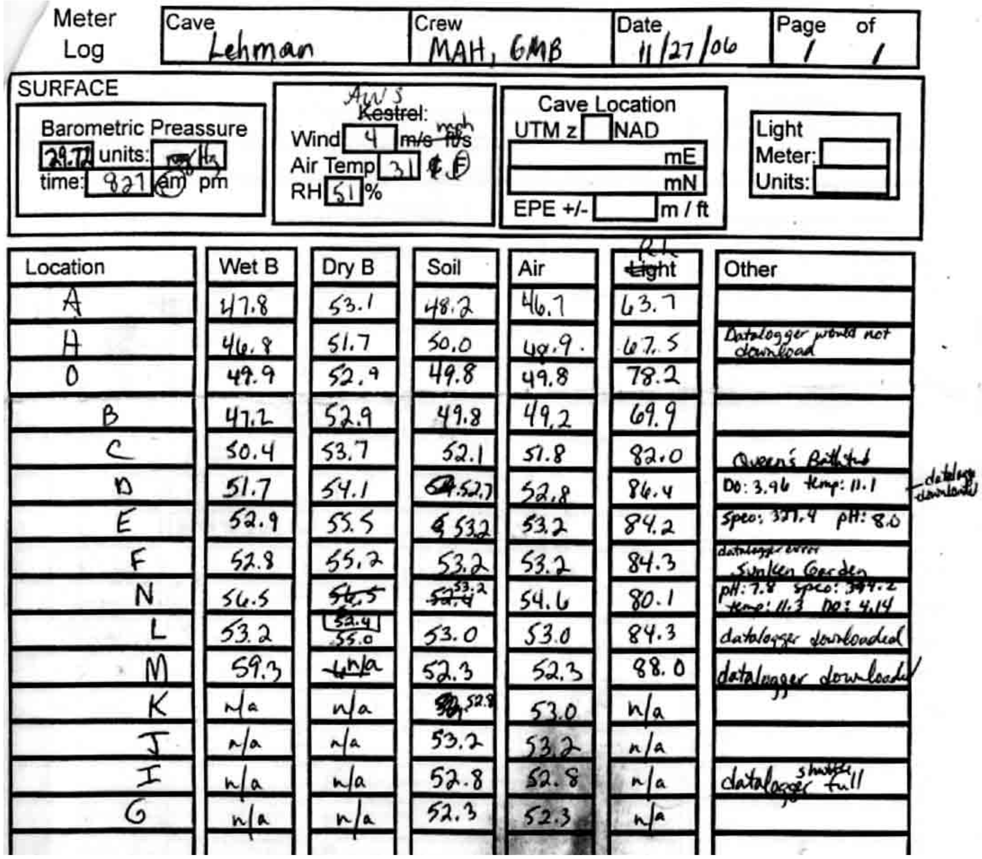


Field Sample Log

Cave: Lehman
Crew: MAH, GMB
Date: 11/27/06
Page 2 of 2

Sample				Location			
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing	
24	Hand/Obs	2 Rose-colored beetles?	Underside dry rock on normal rock next to cheese	L			
25	Obs	Larva w/ black head	"	L			6min
				LL			5min
26	obs	3 larvae w/ black head	Under normal rock on normal soil	MM			5min
				M			4min
				K			4min
				RK			4min
27	Obs	9 white springtails	Underside normal rock on normal rock	near cheese J			4min
				JJ			4min
28	Obs	52 white springtails	Underside dry rock on dry rock	I			
29	|	" "	on dry rock under dry rock	I			5min
30	|	12 "	on white formation - floor	II			4m
31	|	32 clear larvae w/ black head	underside normal rock on normal soil	G			
32	|	6 white springtails	"	G			
33	|	1 "	on normal soil	G			
34	|	1 larva w/ black head	on normal rock near cheese	G			
35	|	1 pseudoscorpion	Underside normal rock on normal rock	G			5min
36	|	1 gray springtail	under normal rock on dry soil	GG			
37	|	6 white "	"	GG			5m

Lehman Caves November 2006 (continued).



Meter Log

Cave: Lehman
Crew: MAH, GMB
Date: 11/27/06
Page 1 of 1

SURFACE

Barometric Preassure
29.72 units: ~~mb~~ in Hg
time: 821 [✓ am] pm

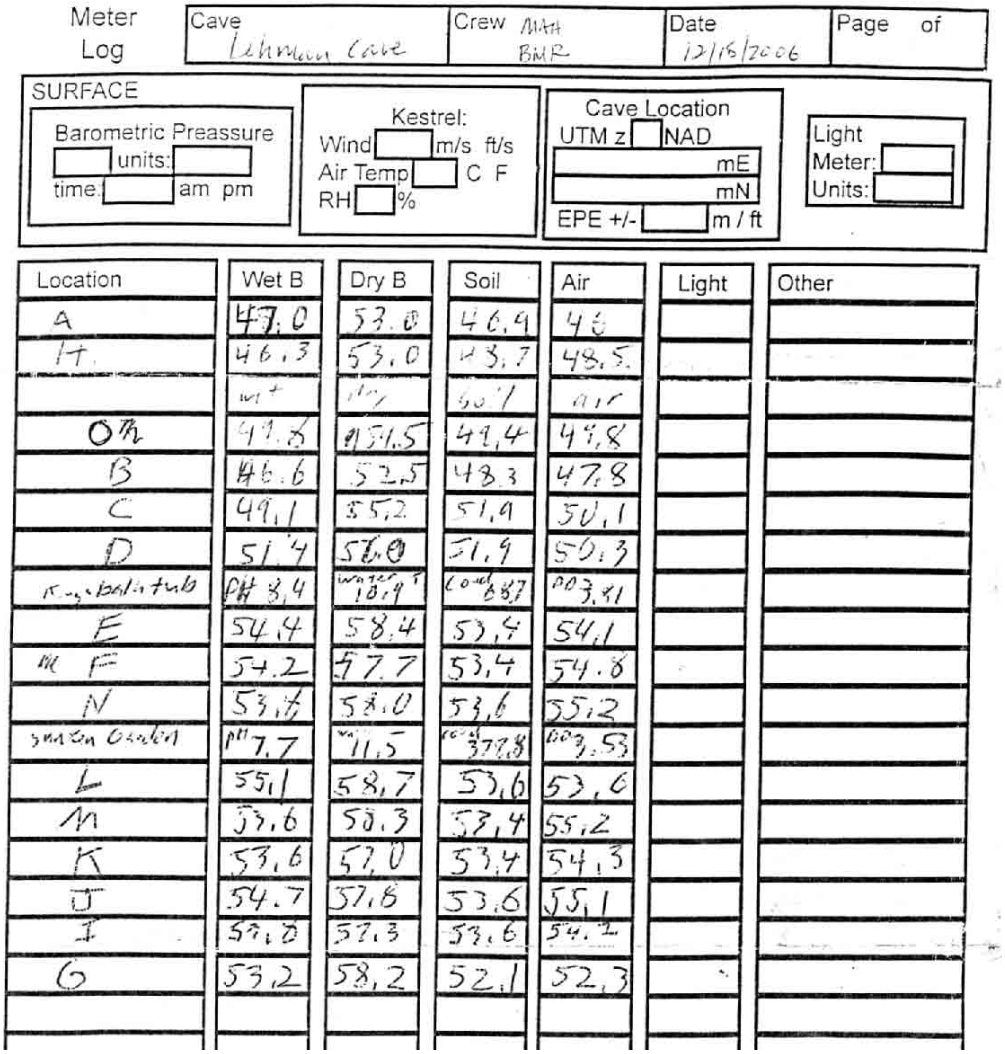
AWS ~~Kestrel~~:
Wind 4 ~~m/s~~ ~~ft/s~~ mph
Air Temp 31 C [✓ F]
RH 51 %

Cave Location
UTM z ☐ NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

Location	Wet B	Dry B	Soil	Air	~~Light~~ RH	Other
A	47.8	53.1	48.2	46.7	63.7	
H	46.8	51.7	50.0	48.9	67.5	Datalogger would not download
O	49.9	52.9	49.8	49.8	78.2	
B	47.2	52.9	49.8	49.2	69.9	
C	50.4	53.7	52.1	51.8	82.0	Queen's Bathtub
D	51.7	54.1	52.7	52.8	86.4	DO: 3.96 temp: 11.1 datalogger downloaded
E	52.9	55.5	53.2	53.2	84.2	spec: 321.4 pH: 8.0
F	52.8	55.2	53.2	53.2	84.3	datalogger error Sunken Garden
N	56.5	~~56.5~~	~~52.4~~ 53.2	54.6	80.1	pH: 7.8 spec: ~~344.2~~ temp: 11.3 DO: 4.14
L	53.2	53.4 55.0	53.0	53.0	84.3	datalogger downloaded
M	59.3	n/a	52.3	52.3	88.0	datalogger downloaded
K	n/a	n/a	~~53~~ 52.8	53.0	n/a	"
J	n/a	n/a	53.2	53.2	n/a	
I	n/a	n/a	52.8	52.8	n/a	datalogger shuttle full
G	n/a	n/a	52.3	52.3	n/a	

Lehman Caves
December 2006



Meter Log

Cave: Lehman Cave

Crew: MAH
BMR

Date: 12/18/2006

Page of

SURFACE

Barometric Preassure
units:
time: am pm

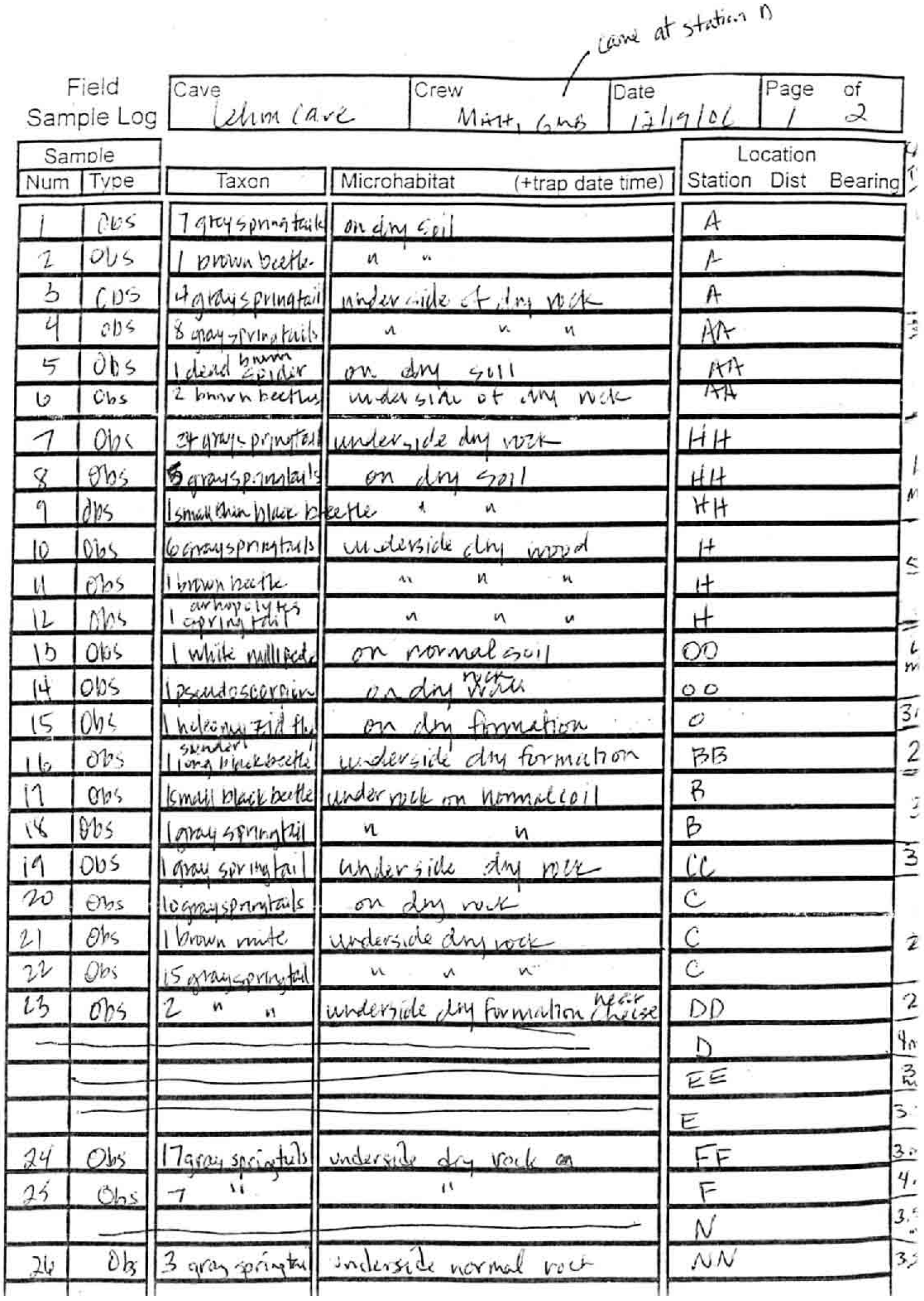
Kestrel:
Wind m/s ft/s
Air Temp C F
RH %

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light
Meter:
Units:

Location	Wet B	Dry B	Soil	Air	Light	Other
A	47.0	53.0	46.9	46		
H.	46.3	53.0	43.7	48.5		
	wet	dry	soil	air		
OR	49.8	51.5	49.4	49.8		
B	46.6	52.5	48.3	47.8		
C	49.1	55.2	51.9	50.1		
D	51.4	56.0	51.9	50.3		
Kings bath tub	pH 8.4	water T 10.9	cond 887	DO 3.81		
E	54.4	58.4	53.4	54.1		
m F	54.2	57.7	53.4	54.8		
N	53.6	58.0	53.6	55.2		
sunken Garden	pH 7.7	wT 11.5	cond 377.8	DO 3.53		
L	55.1	58.7	53.6	53.6		
M	53.6	58.3	53.4	55.2		
K	53.6	57.0	53.4	54.3		
J	54.7	57.8	53.6	55.1		
I	54.0	57.3	53.6	54.2		
G	53.2	58.2	52.1	52.3		

Lehman Caves December 2006 (continued).



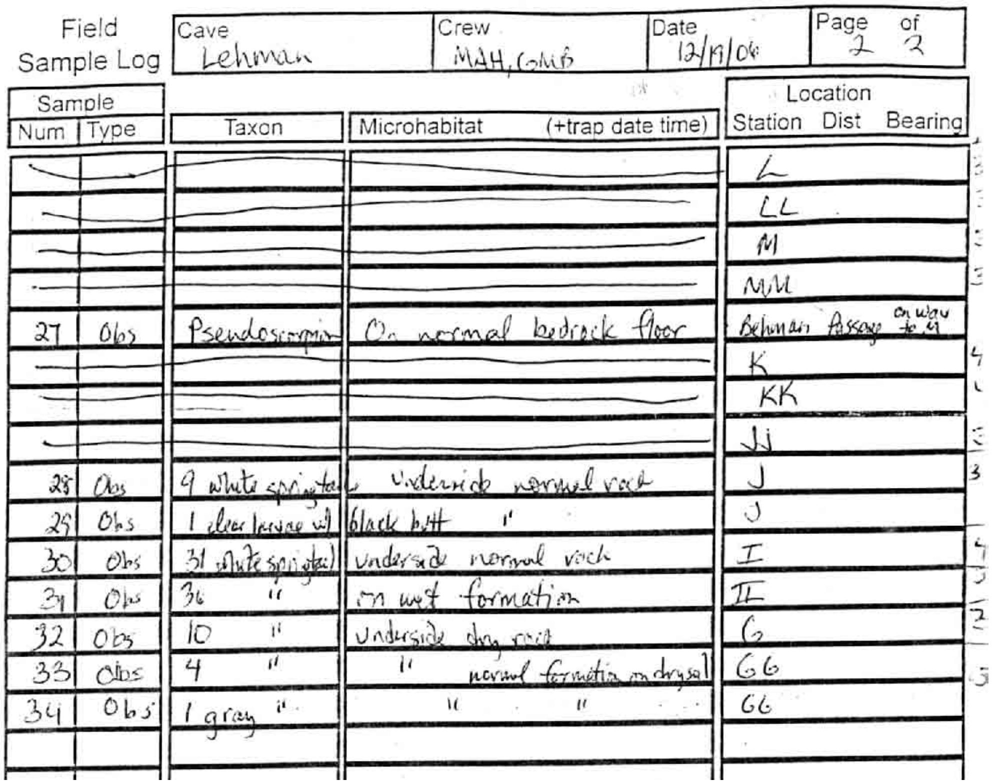
came at station D

Field Sample Log

Cave	Crew	Date	Page	of
Lehm Cave	Matt, Gmb	12/19/06	1	2

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
1	Obs	7 gray springtails	on dry soil	A		
2	Obs	1 brown beetle	" "	A		
3	Obs	4 gray springtail	underside of dry rock	A		
4	Obs	8 gray springtails	" " "	AA		
5	Obs	1 dead brown spider	on dry soil	AA		
6	Obs	2 brown beetles	underside of dry rock	AA		
7	Obs	34 gray springtail	underside dry rock	HH		
8	Obs	5 gray springtails	on dry soil	HH		
9	Obs	1 small thin black beetle	" "	HH		
10	Obs	6 gray springtails	underside dry wood	H		
11	Obs	1 brown beetle	" " "	H		
12	Obs	1 arhopalites springtail	" " "	H		
13	Obs	1 white millipede	on normal soil	OO		
14	Obs	1 pseudoscorpion	on dry rock	OO		
15	Obs	1 heleomyzid fly	on dry formation	O		
16	Obs	1 slender long black beetle	underside dry formation	BB		
17	Obs	1 small black beetle	under rock on normal soil	B		
18	Obs	1 gray springtail	" "	B		
19	Obs	1 gray springtail	underside dry rock	CC		
20	Obs	10 gray springtails	on dry rock	C		
21	Obs	1 brown mite	underside dry rock	C		
22	Obs	15 gray springtail	" " "	C		
23	Obs	2 " "	underside dry formation near Cheese	DD		
				D		
				EE		
				E		
24	Obs	17 gray springtails	underside dry rock on	FF		
25	Obs	7 "	"	F		
				N		
26	Obs	3 gray springtail	underside normal rock	NN		

Lehman Caves December 2006 (continued).



Field Sample Log

Cave Lehman

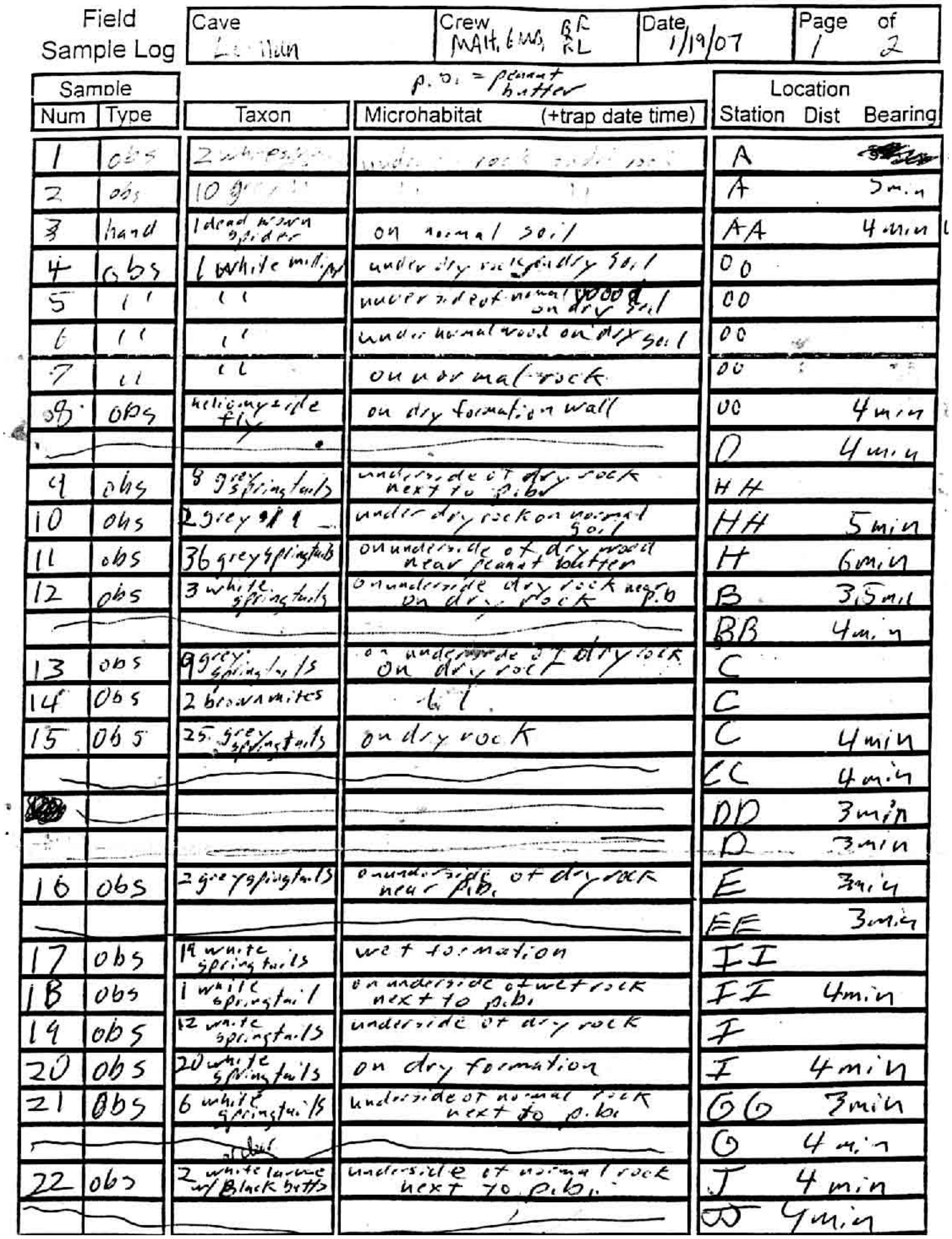
Crew MAH, GMB

Date 12/19/06

Page 2 of 2

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
				L		
				LL		
				M		
				MM		
27	Obs	Pseudoscorpion	On normal bedrock floor	Lehman Passage on way to M		
				K		
				KK		
				JJ		
28	Obs	9 white springtails	underside normal rock	J		
29	Obs	1 clear larvae w/	black butt "	J		
30	Obs	31 white springtail	underside normal rock	I		
31	Obs	36 "	on wet formation	II		
32	Obs	10 "	underside dry rock	G		
33	Obs	4 "	" normal formation on dry soil	GG		
34	Obs	1 gray "	" "	GG		

Lehman Caves
January 2007



Field Sample Log

Cave: Lehman

Crew: MAH, GMB, BR, RL

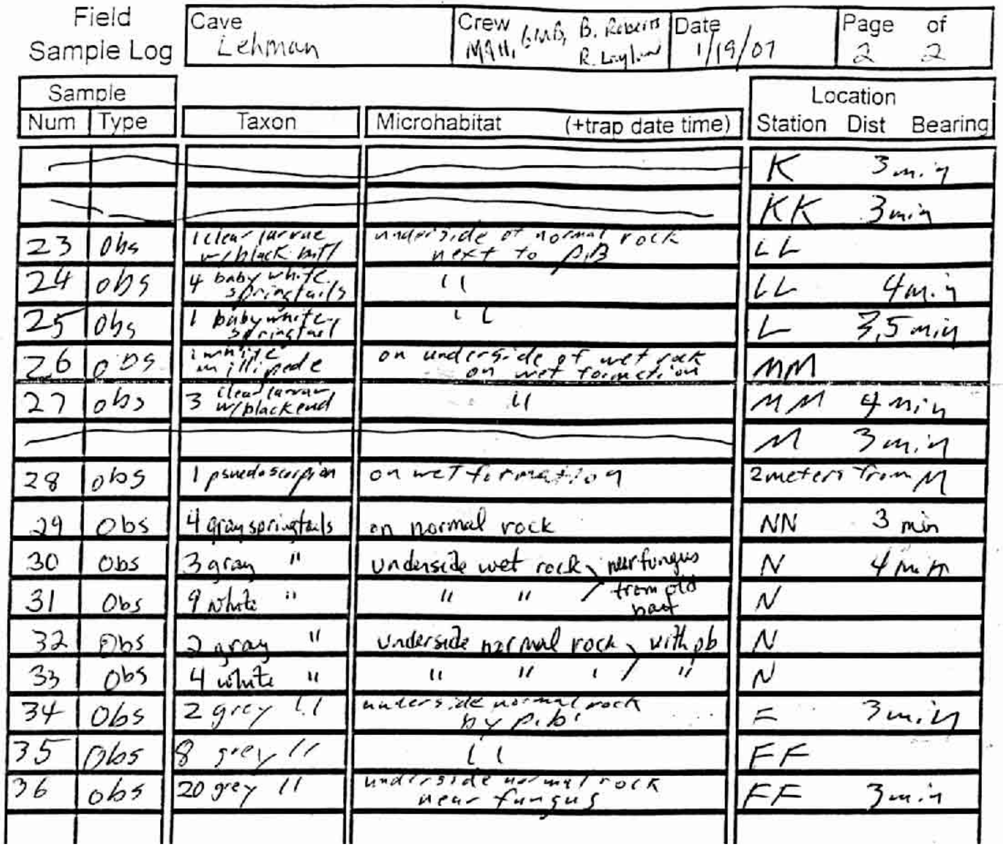
Date: 1/19/07

Page 1 of 2

p.b. = peanut butter

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
1	obs	2 white sp[illegible]	under [illegible] rock [illegible]	A		[illegible]
2	obs	10 gr[illegible]	'' ''	A		3min
3	hand	1 dead brown spider	on normal soil	AA		4min
4	obs	1 white millip	under dry rock on dry soil	00		
5	''	''	underside of normal wood on dry soil	00		
6	''	''	under normal wood on dry soil	00		
7	''	''	on normal rock	00		
8	obs	heligmyzide fly	on dry formation wall	0C		4min
				D		4min
9	obs	8 grey springtails	underside of dry rock next to p.b.	HH		
10	obs	2 grey s/t	under dry rock on normal soil	HH		5min
11	obs	36 grey springtails	on underside of dry wood near peanut butter	H		6min
12	obs	3 white springtails	on underside dry rock near p.b on dry rock	B		3.5min
				BB		4min
13	obs	9 grey springtails	on undersde of dry rock on dry rock	C		
14	obs	2 brown mites	'' ''	C		
15	obs	25 grey springtails	on dry rock	C		4min
				CC		4min
				DD		3min
				D		3min
16	obs	2 grey springtails	on underside of dry rock near p.b.	E		3min
				EE		3min
17	obs	19 white springtails	wet formation	II		
18	obs	1 white springtail	on underside of wet rock next to p.b.	II		4min
19	obs	12 white springtails	underside of dry rock	I		
20	obs	20 white springtails	on dry formation	I		4min
21	obs	6 white springtails	underside of normal rock next to p.b.	GG		3min
				G		4min
22	obs	2 white larvae w/ Black butts	underside of normal rock next to p.b.	J		4min
				JJ		4min

Lehman Caves January 2007 (continued).



Field Sample Log

Cave: Lehman

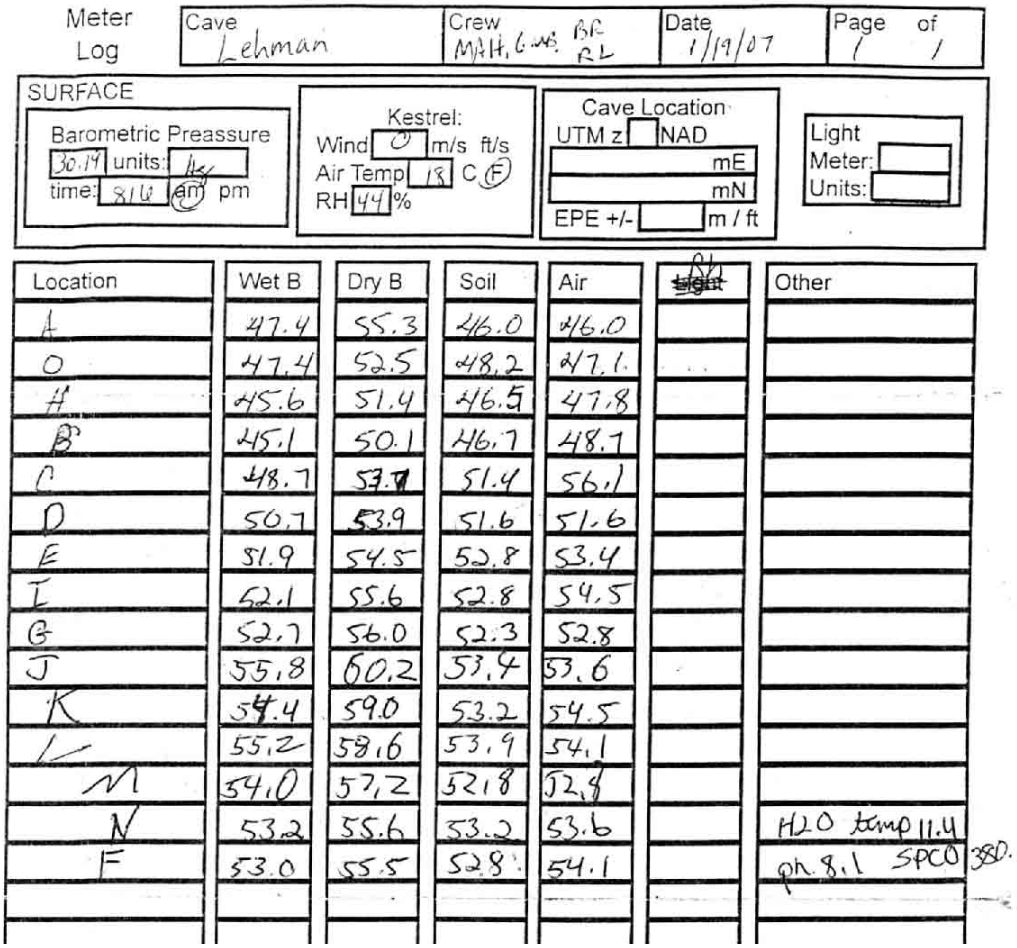
Crew: MAH, GMB, B. Roberts, R. Laylon

Date: 1/19/07

Page 2 of 2

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
				K	3 m.in	
				KK	3 min	
23	obs	1 clear larvae w/black tail	underside of normal rock next to P.B	LL		
24	obs	4 baby white springtails	"	LL	4 m.in	
25	obs	1 baby white springtail	"	L	3,5 min	
26	obs	1 white millipede	on underside of wet rock on wet formation	MM		
27	obs	3 clear larvae w/black end	"	MM	4 min	
				M	3 min	
28	obs	1 psuedoscorpion	on wet formation	2meters from M		
29	Obs	4 gray springtails	on normal rock	NN	3 min	
30	Obs	3 gray "	underside wet rock, near fungus from old bait	N	4 min	
31	Obs	9 white "	" "	N		
32	Obs	2 gray "	underside normal rock, with pb	N		
33	obs	4 white "	" " " "	N		
34	Obs	2 grey "	underside normal rock by P.B.	F	3 min	
35	Obs	8 grey "	"	FF		
36	obs	20 grey "	underside normal rock near fungus	FF	3 min	

Lehman Caves January 2007 (continued).



Meter Log

Cave: Lehman
Crew: MAH, GWB, BR, RL
Date: 1/19/07
Page 1 of 1

SURFACE

Barometric Preassure: 30.14 units: Hg
time: 816 [✓ am] pm

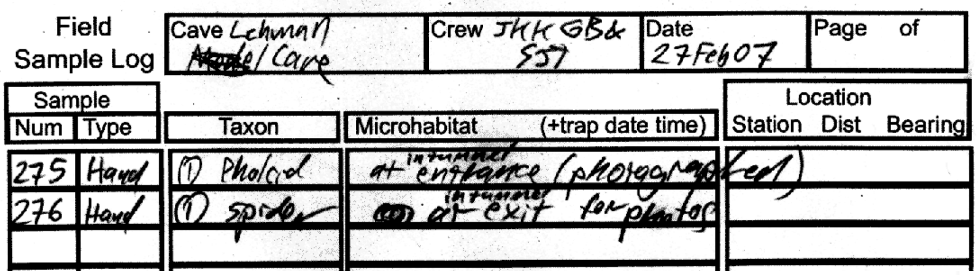
Kestrel:
Wind 0 m/s ft/s
Air Temp 18 C [✓ F]
RH 44 %

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

Location	Wet B	Dry B	Soil	Air	~~Light~~ RH	Other
A	47.4	55.3	46.0	46.0		
O	47.4	52.5	48.2	47.1		
H	45.6	51.4	46.5	47.8		
B	45.1	50.1	46.7	48.7		
C	48.7	53.7	51.4	56.1		
D	50.7	53.9	51.6	51.6		
E	51.9	54.5	52.8	53.4		
I	52.1	55.6	52.8	54.5		
G	52.7	56.0	52.3	52.8		
J	55.8	60.2	53.4	53.6		
K	54.4	59.0	53.2	54.5		
L	55.2	58.6	53.9	54.1		
M	54.0	57.2	52.8	52.8		
N	53.2	55.6	53.2	53.6		H2O temp 11.4
F	53.0	55.5	52.8	54.1		ph 8.1 SPCO 380.

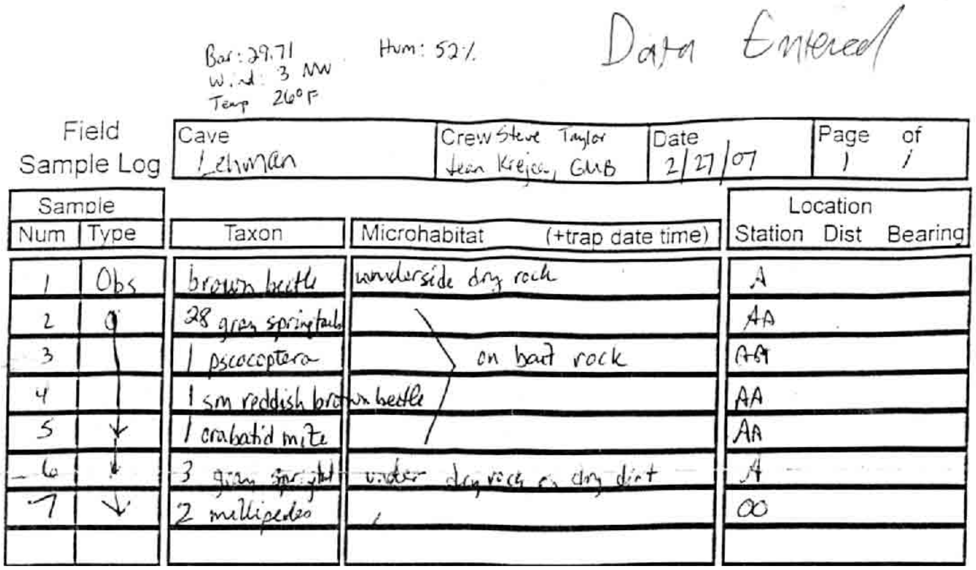
Lehman Caves
February 2007



Field Sample Log

Cave	Crew	Date	Page of
Lehman [illegible]/Cave	JKK GB& SJT	27Feb07	

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Dist	Bearing
275	Hand	(1) Pholcid	at in tunnel entrance (photographed)			
276	Hand	(1) spider	at in tunnel exit for photos			



Bar: 29.71
Wind: 3 NW
Temp 26°F

Hum: 52%

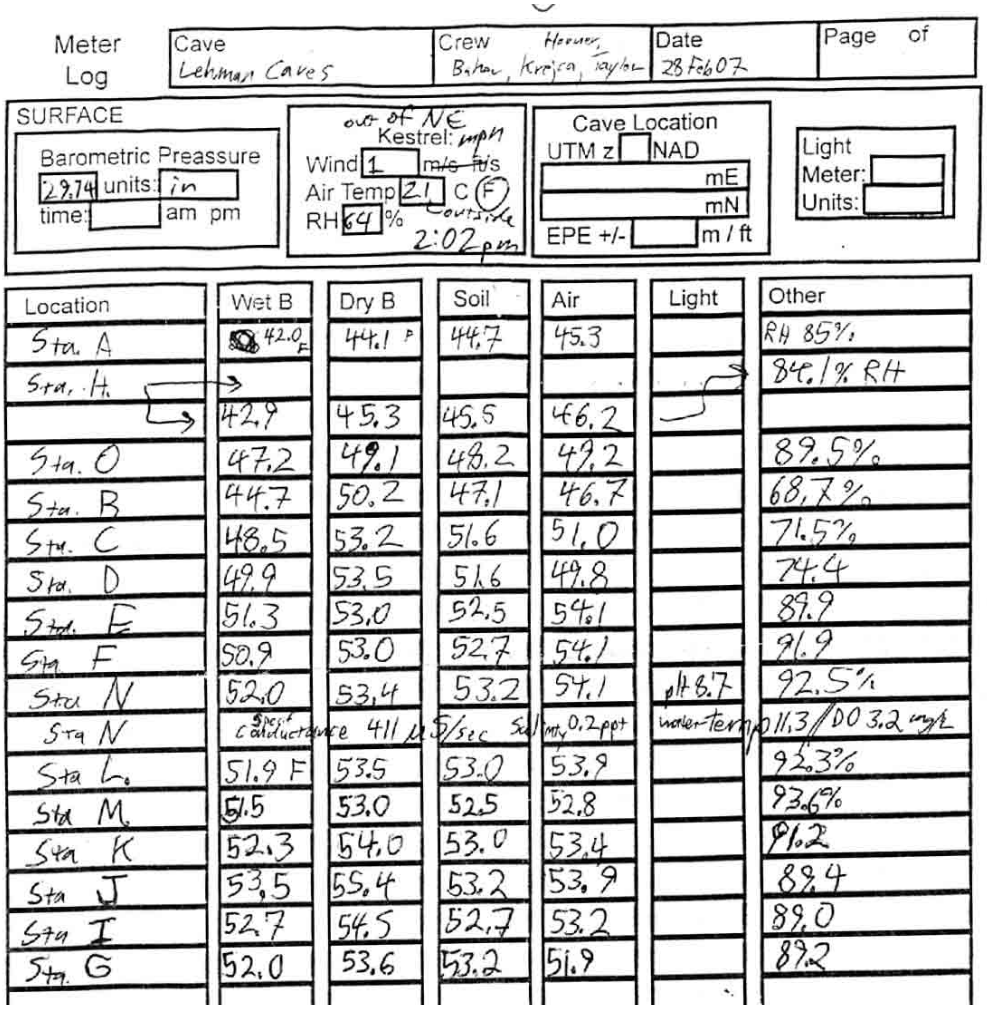
Data Entered

Field Sample Log

Cave	Crew	Date	Page of
Lehman	Steve Taylor Jean Krejca, GMB	2/27/07	1 / 1

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Dist	Bearing
1	Obs	brown beetle	underside dry rock	A		
2	O	28 grey springtails	on bait rock	AA		
3	↓	1 pscocoptera		AA		
4	↓	1 sm reddish brown beetle		AA		
5	↓	1 orabatid mite		AA		
6	↓	3 gray springtail	under dry rock on dry dirt	A		
7	↓	2 millipedes		OO		

Lehman Caves February 2007 (continued).



Meter Log

Cave: Lehman Caves

Crew: Horner, Baker, Krejca, Taylor

Date: 28 Feb 07

Page of

SURFACE

Barometric Preassure 29.74 units: in
time: am pm

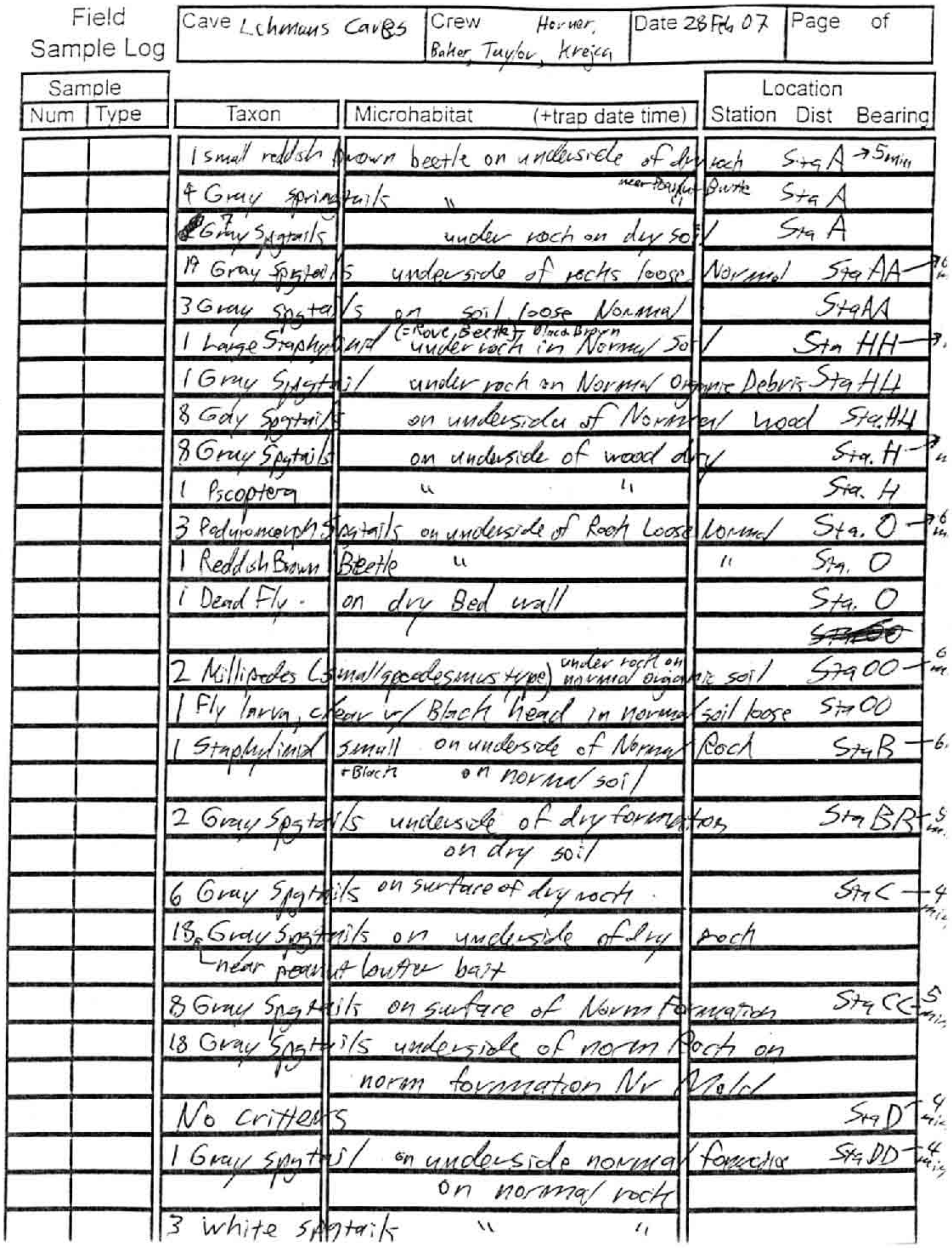
out of NE
Kestrel: mph
Wind 1 ~~m/s ft/s~~
Air Temp 21 C [✓ F] outside
RH 64 %
2:02 pm

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

Location	Wet B	Dry B	Soil	Air	Light	Other
Sta. A	42.0 F	44.1 F	44.7	45.3		RH 85%
Sta. H						84.1% RH
	42.9	45.3	45.5	46.2		
Sta. O	47.2	49.1	48.2	49.2		89.5%
Sta. B	44.7	50.2	47.1	46.7		68.7%
Sta. C	48.5	53.2	51.6	51.0		71.5%
Sta. D	49.9	53.5	51.6	49.8		74.4
Sta. E	51.3	53.0	52.5	54.1		89.9
Sta. F	50.9	53.0	52.7	54.1		91.9
Sta. N	52.0	53.4	53.2	54.1	pH 8.7	92.5%
Sta N	Specif conductance	411 µS/sec		Salinity 0.2ppt	water temp	11.3 // DO 3.2 mg/L
Sta L.	51.9 F	53.5	53.0	53.9		92.3%
Sta M.	51.5	53.0	52.5	52.8		93.6%
Sta K	52.3	54.0	53.0	53.4		91.2
Sta J	53.5	55.4	53.2	53.9		89.4
Sta I	52.7	54.5	52.7	53.2		89.0
Sta. G	52.0	53.6	53.2	51.9		89.2

Lehman Caves February 2007 (continued).

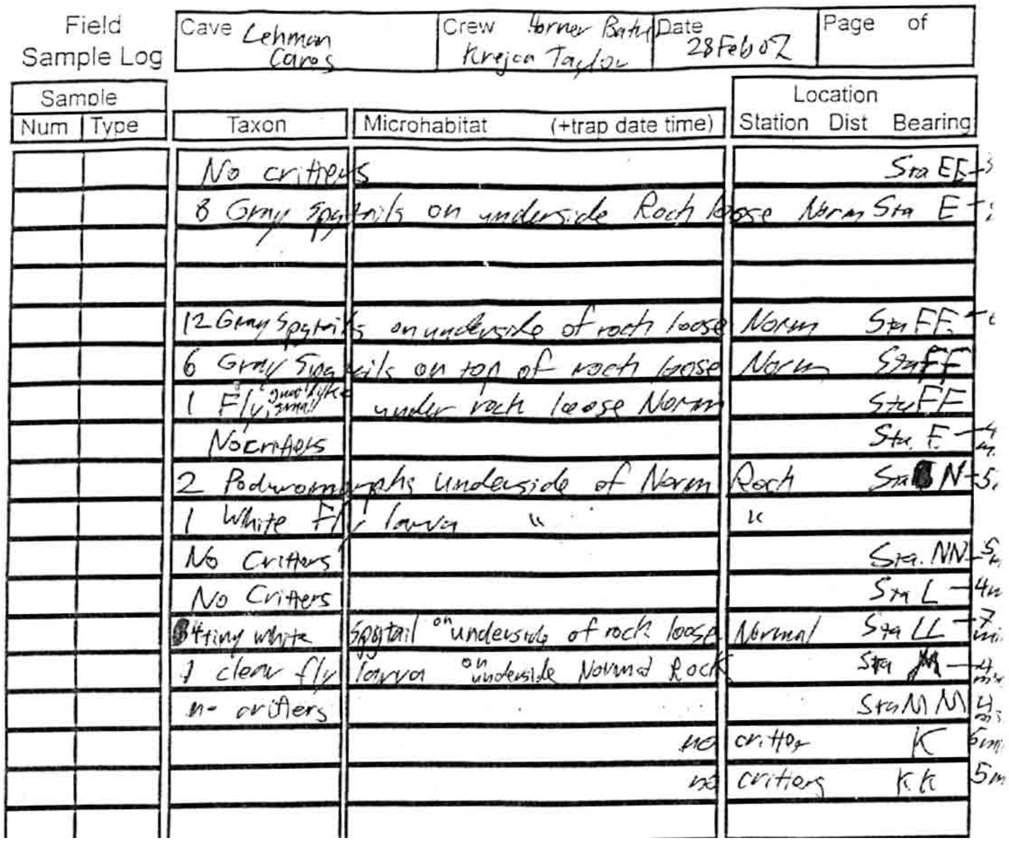


Field Sample Log

Cave Lehmans Caves | Crew Horner, Baker, Taylor, Krejca | Date 28 Feb 07 | Page of

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
		1 small reddish	brown beetle on underside of dry	rock	Sta A	→5 min
		4 Gray spring	tails " near Peanut "	Butter	Sta A	
		~~2~~7 Gray Spgtails	under rock on dry so	il	Sta A	
		19 Gray Spgtail	s underside of rocks loose	Normal	Sta AA	→
		3 Gray Spgtail	s on soil loose Normal		Sta AA	
		1 Large Staphyl	inid (=Rove Beetle) Black Brown under rock in Normal So	il	Sta HH	→
		1 Gray Spgtai	l under rock on Normal Or	ganic Debris	Sta HH	
		8 Gray Spgtail	s on underside of Norm	al wood	Sta HH	
		8 Gray Spgtails	on underside of wood dr	y	Sta. H	→ "
		1 Pscoptera	" "		Sta. H	
		3 Polyomorph Sp	gtails on underside of Rock Loose	Normal	Sta. O	→ 6 m
		1 Reddish Brown	Beetle "	"	Sta. O	
		1 Dead Fly.	on dry Bed wall		Sta. O	
					~~Sta OO~~	
		2 Millipedes (s	mall/geodesmus type) under rock on normal orga	nic soil	Sta OO	→ 6 m
		1 Fly larva, c	lear w/ Black head in normal	soil loose	Sta OO	
		1 Staphylinid	small on underside of Normal	Rock	Sta B	→ 6.
			+Black on normal soil			
		2 Gray Spgtai	ls underside of dry forma	tion	Sta BR	→ 5 m.
			on dry soil			
		6 Gray Spgta	ils on surface of dry rock		Sta C	→ 4 min
		18 Gray Spgta	ils on underside of dry	rock		
		near peanu	t butter bait			
		8 Gray Spgta	ils on surface of Norm Fo	rmation	Sta CC	→ 5 min
		18 Gray Spgta	ils underside of norm Ro	ck on		
			norm formation Nr M	old		
		No critter	s		Sta D	→ 4 min
		1 Gray spgta	il on underside normal	formation	Sta DD	→ 4 min
			on normal rock			
		3 white spgtails	" "			

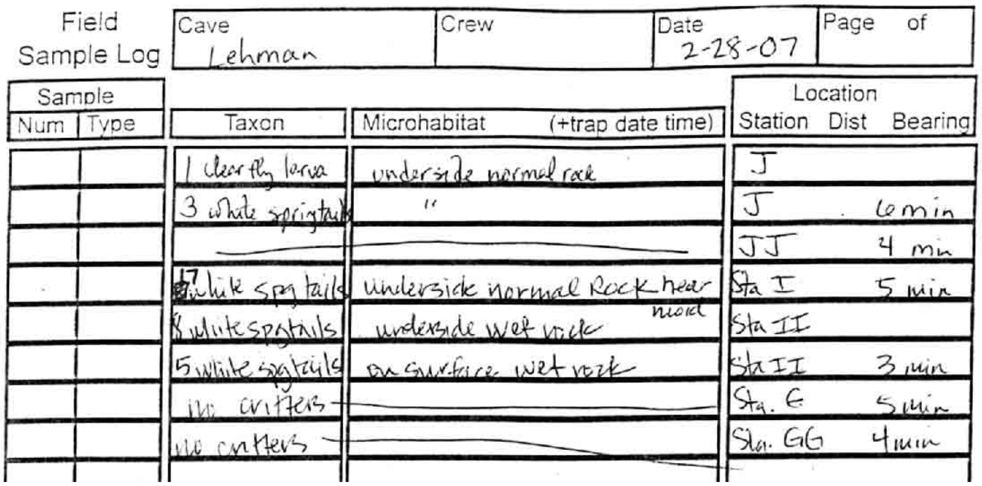
Lehman Caves February 2007 (continued).



Field Sample Log

Cave: Lehman Caves
Crew: Horner Bates Krejca Taylor
Date: 28Feb07
Page of

Sample				Location			
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing	
		No critters				Sta EE	3
		8 Gray Spgtails	on underside Rock loose	Norm		Sta E	2
		12 Gray Spgtails	on underside of rock loose	Norm		Sta FF	6
		6 Gray Spgtails	on top of rock loose	Norm		StaFF	
		1 Fly, gnat like small	under rock loose Norm			StaFF	
		No critters				Sta. F	4 m
		2 Podwormorphs	underside of Norm	Rock		Sta [illegible]N	5.
		1 White Fly larva	"	"			
		No Critters				Sta. NN	5 m
		No Critters				Sta L	4m
		[illegible]4 tiny white	Spgtail on underside of rock loose	Normal		Sta LL	7 min
		1 clear fly	larva on underside Normal Rock			Sta M	4 min
		no critters				Sta MM	4 min
			no	critter		K	6 min
			no	critters		KK	5 m

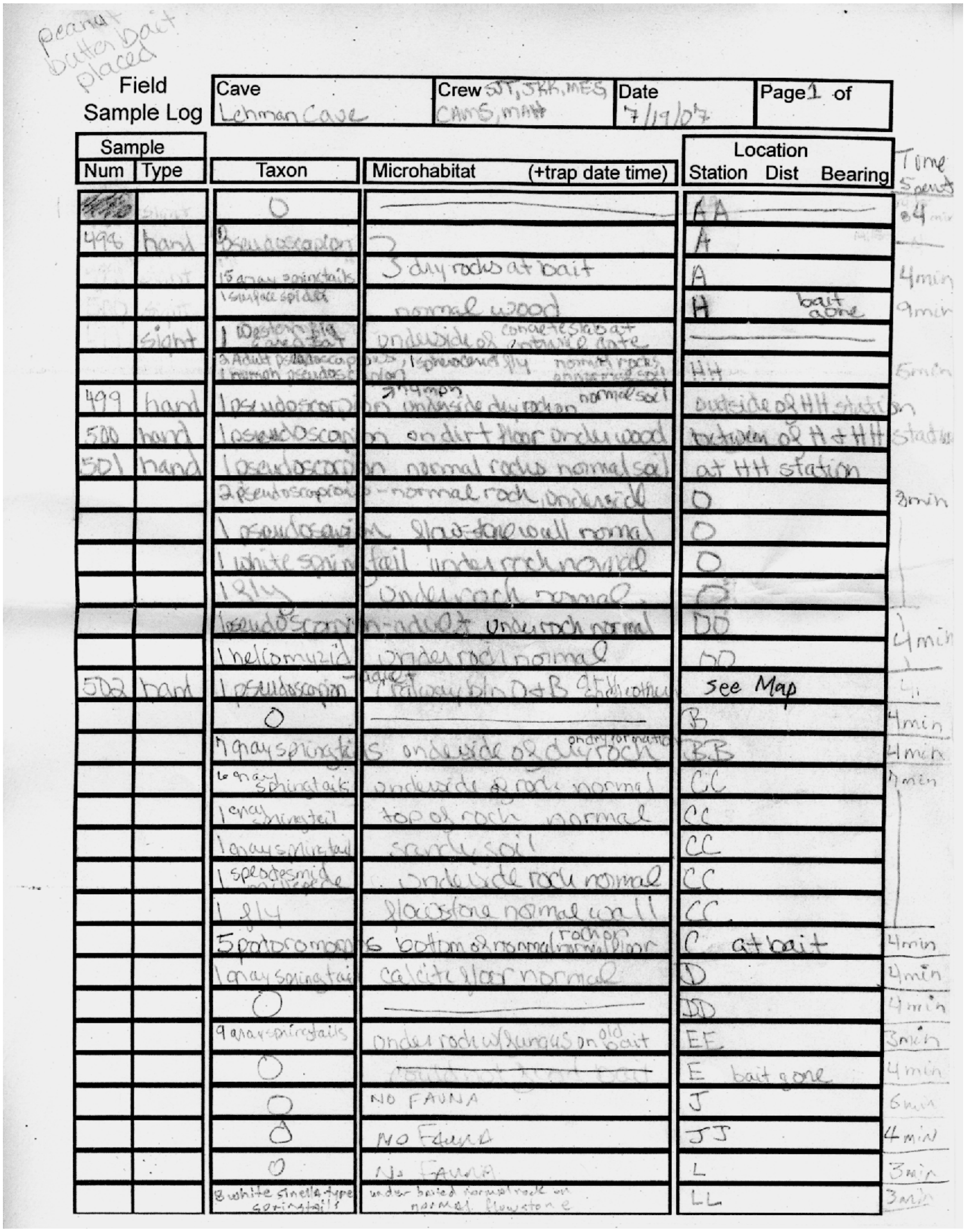


Field Sample Log

Cave: Lehman
Crew:
Date: 2-28-07
Page of

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
		1 clear fly larva	underside normal rock	J		
		3 white springtails	"	J		6 min
				JJ		4 min
		17 white spgtails	underside normal Rock near mold	Sta I		5 min
		8 white spgtails	underside wet rock	Sta II		
		5 white spgtails	on surface wet rock	Sta II		3 min
		no critters		Sta. G		5 min
		no critters		Sta. GG		4 min

Lehman Caves
July 2007



peanut butter bait placed

Field Sample Log

Cave: Lehman Cave

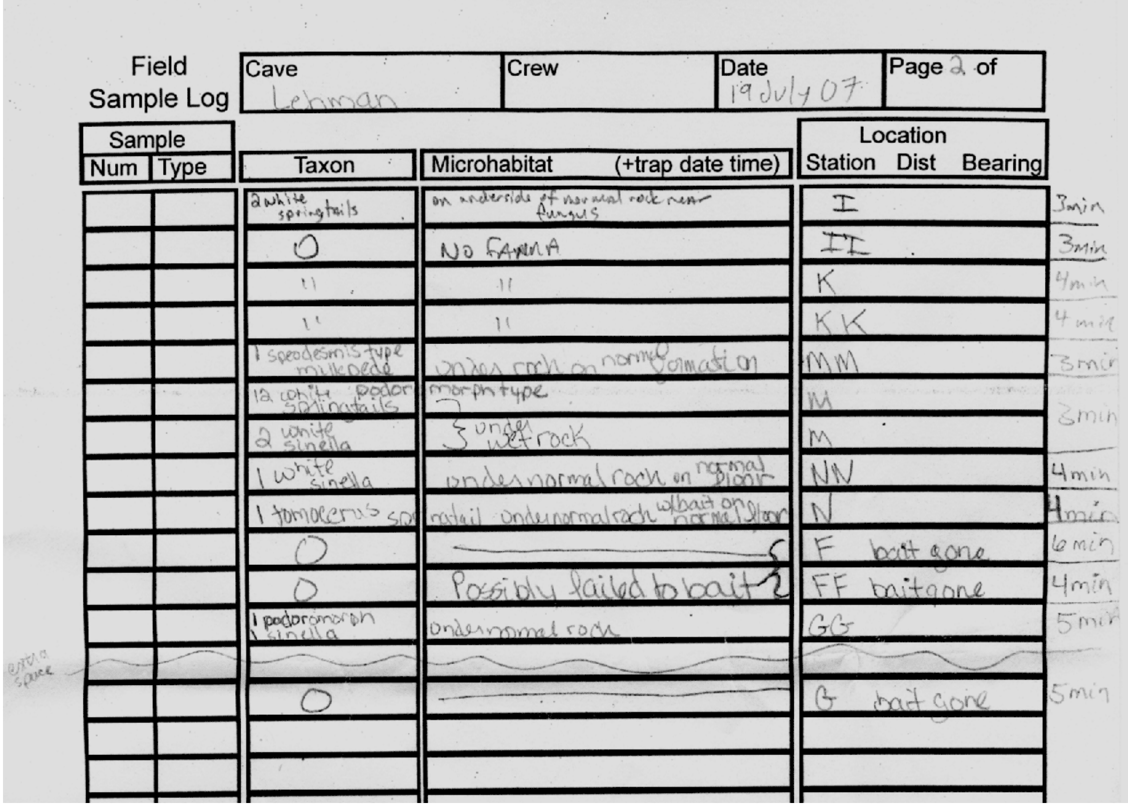
Crew: SJT, JKK, MES, CAMS, MAH

Date: 7/19/07

Page 1 of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing	Time Spent
[illegible]		0	—	AA	—		4 min
498	hand	1 pseudoscorpion	?	A			
		15 gray springtails	3 dry rocks at bait	A			4min
		1 surface spider	normal wood	H		bait gone	9min
	sight	1 Western big eared bat	underside of concrete slab at entrance gate	—			
		3 Adult pseudoscorpions, 1 sphaerocerid fly, 1 nymph pseudoscorpion	normal rocks, normal soil	HH			5min
499	hand	1 pseudoscorpion	14mph underside dry rock on normal soil	outside of HH station			
500	hand	1 pseudoscorpion	on dirt floor under wood	between of H + HH station			
501	hand	1 pseudoscorpion	normal rocks normal soil	at HH station			
		2 pseudoscorpions	- normal rock, underside	O			3min
		1 pseudoscorpion	flowstone wall normal	O			
		1 white springtail	under rock normal	O			
		1 fly	under rock normal	O			
		1 pseudoscorpion - adult	under rock normal	DD			4min
		1 heleomyzid	under rock normal	DD			
502	hand	1 pseudoscorpion	[illegible] pathway b/n D + B [illegible]	See Map			4
		0	—	B			4min
		7 gray springtails	underside of dry rock on dry formation	BB			4min
		6 gray springtails	underside of rock normal	CC			7min
		1 gray springtail	top of rock normal	CC			
		1 gray springtail	sandy soil	CC			
		1 spirodesmid millipede	underside rock normal	CC			
		1 fly	flowstone normal wall	CC			
		5 [illegible]	bottom of normal rock on normal floor	C	at bait		4min
		1 gray springtail	calcite floor normal	D			4min
		0	—	DD			4min
		9 gray springtails	under rock w/ fungus on old bait	EE			3min
		0	~~could not find bait~~	E	bait gone		4min
		0	NO FAUNA	J			6min
		0	NO FAUNA	JJ			4min
		0	NO FAUNA	L			3min
		8 white sinella-type springtails	under buried normal rock on normal flowstone	LL			3min

Lehman Caves July 2007 (continued).



Field Sample Log

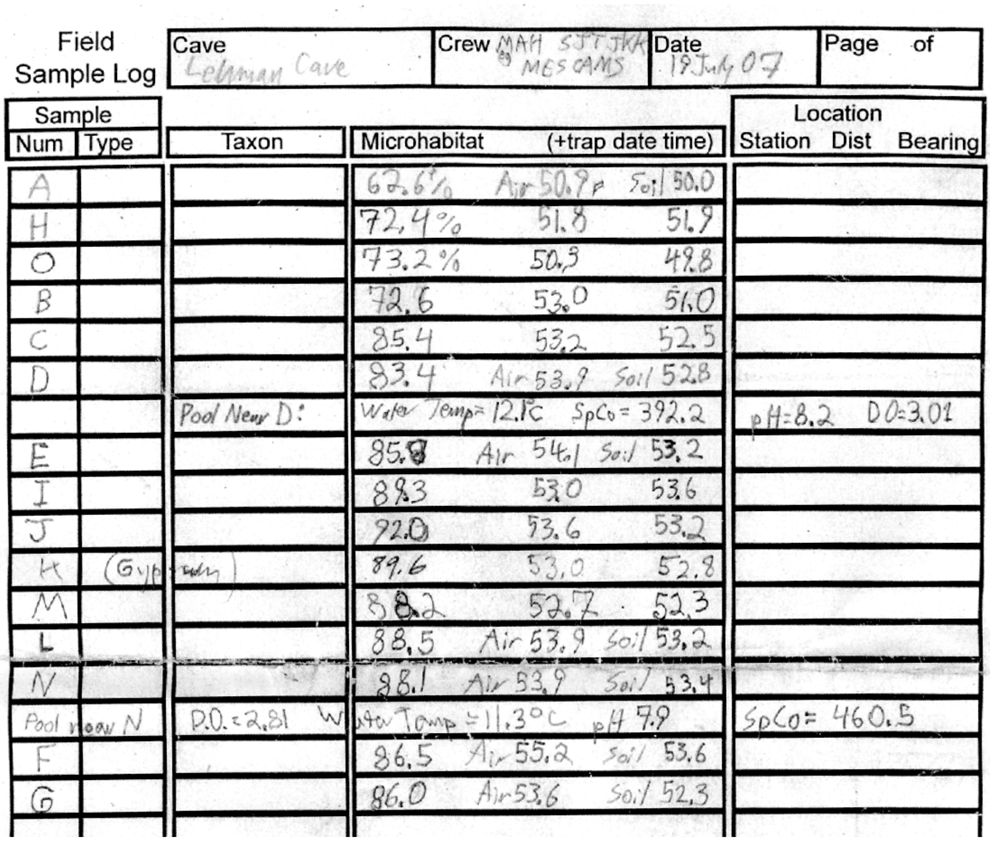
Cave: Lehman

Crew:

Date: 19 July 07

Page 2 of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing	
		2 white springtails	on underside of normal rock near fungus	I			3min
		0	NO FAUNA	II			3min
		"	"	K			4min
		"	"	KK			4 min
		1 speodesmis type millipede	under rock on normal formation	MM			3min
		12 white podor springtails	morph type	M			3min
		2 white sinella	under wet rock	M			
		1 white sinella	under normal rock on normal floor	NN			4min
		1 tomocerus springtail	under normal rock w/bait on normal floor	N			4min
		0		F	bait gone		6min
		0	Possibly failed to bait	FF	bait gone		4min
		1 podoromorph sinella	under normal rock	GG			5min
extra space							
		0		G	bait gone		5min



Field Sample Log

Cave: Lehman Cave

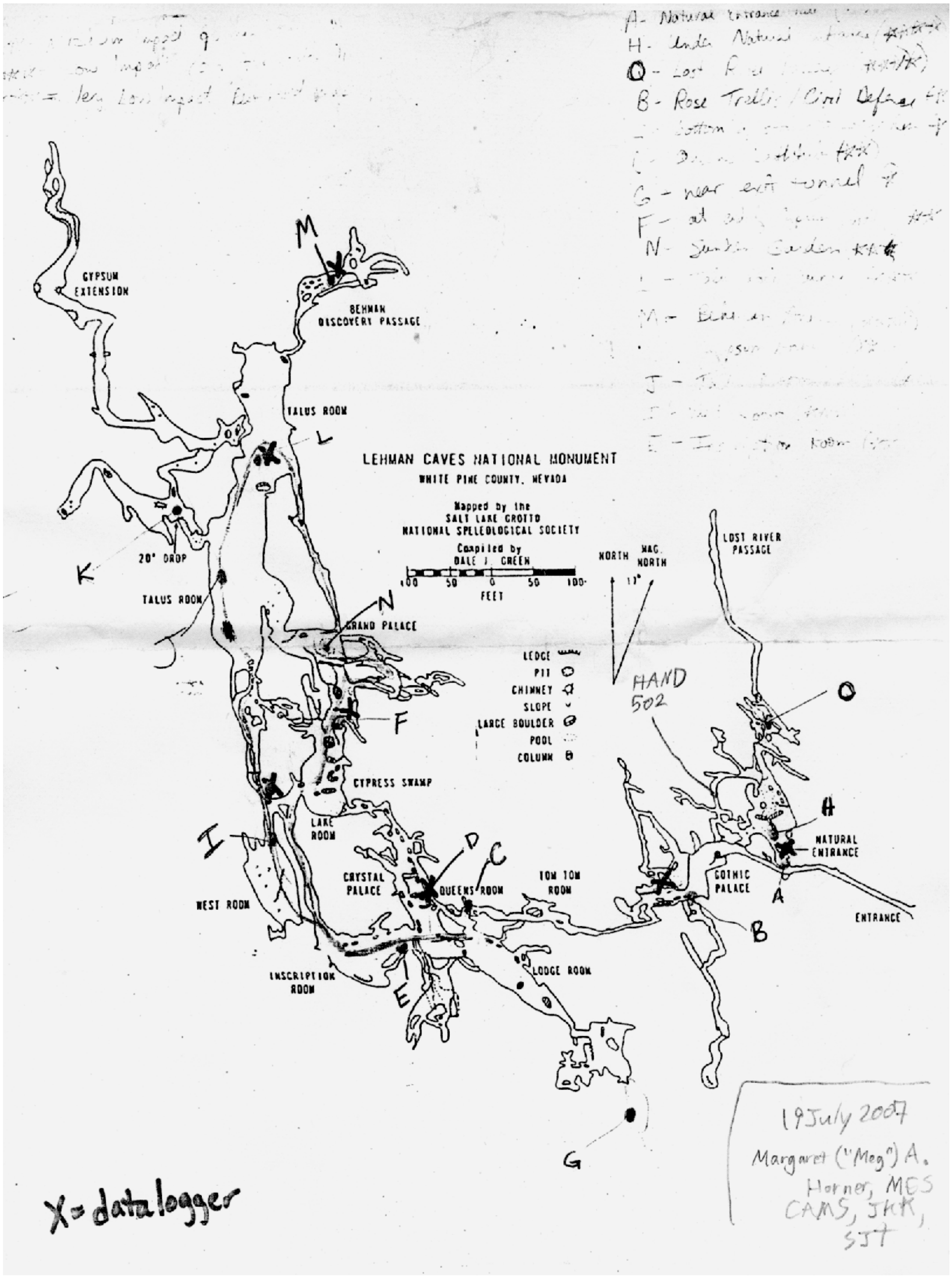
Crew: MAH SJT JKK MES CAMS

Date: 19 July 07

Page of

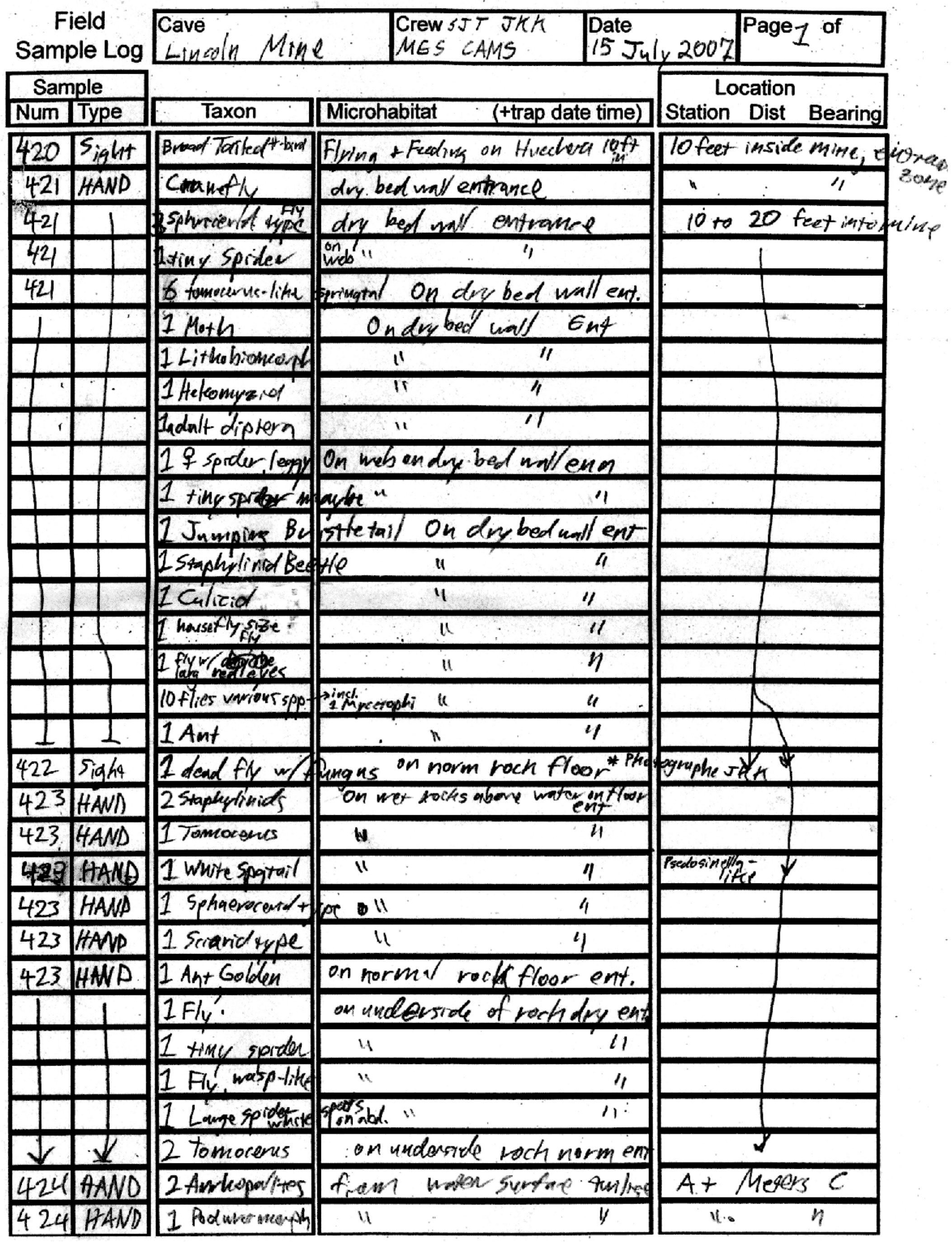
Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing
A			62.6% Air 50.9 F Soil 50.0			
H			72.4% 51.8 51.9			
O			73.2% 50.9 49.8			
B			72.6 53.0 51.0			
C			85.4 53.2 52.5			
D			83.4 Air 53.9 Soil 52.8			
		Pool Near D:	Water Temp= 12.1°C SpCo = 392.2	pH=8.2 DO=3.01		
E			85.8 Air 54.1 Soil 53.2			
I			89.3 53.0 53.6			
J			92.0 53.6 53.2			
K	(Gypsum)		89.6 53.0 52.8			
M			88.2 52.7 52.3			
L			88.5 Air 53.9 Soil 53.2			
N			88.1 Air 53.9 Soil 53.4			
Pool near N		D.O.=2.81	Water Temp =11.3°C pH 7.9	SpCo= 460.5		
F			86.5 Air 55.2 Soil 53.6			
G			86.0 Air 53.6 Soil 52.3			

Lehman Caves July 2007 (continued).



Lincoln Canyon Mine (Drumming and Miner's Massacre)

Ben M. Roberts, Meg A. Horner, Patrick M. O'Brien
5-Jul-07
Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay
15-Jul-07

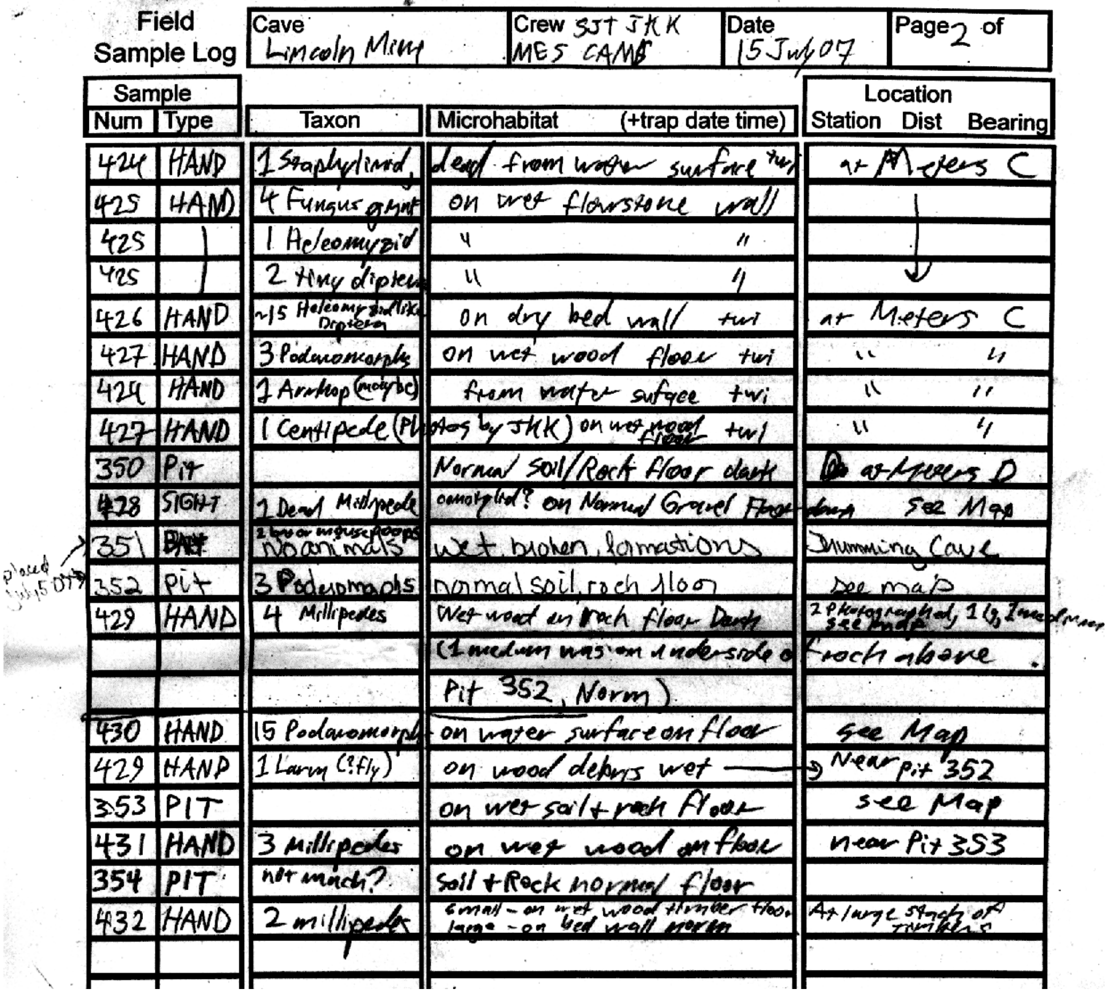


Field Sample Log

Cave: Lincoln Mine
Crew: SJT JKK MES CAMS
Date: 15 July 2007
Page 1 of

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
420	Sight	Broad Tailed H-bird	Flying + Feeding on Huechera 10 ft in	10 feet inside mine, entrance zone		
421	HAND	Cranefly	dry bed wall entrance	"		"
421		2 Sphaerocerid type Fly	dry bed wall entrance	10 to 20 feet into mine		
421		1 tiny Spider	on web " "			
421		6 Tomocerus-like springtail	On dry bed wall ent.			
		1 Moth	On dry bed wall Ent			
		1 Lithobiomorph	" "			
		1 Heleomyzid	" "			
		1 adult diptera	" "			
		1 ♀ spider leggy	On web on dry bed wall/ent			
		1 tiny spider maybe	" "			
		1 Jumping Bristletail	On dry bed wall ent			
		1 Staphylinid Beetle	" "			
		1 Culicid	" "			
		1 housefly size fly	" "			
		1 fly w/ large red eyes	" "			
		10 flies various spp. → incl. 1 Mycetophi	" "			
		1 Ant	" "			
422	Sight	1 dead fly w/ fungus	on norm rock floor * Photographed JKK			
423	HAND	2 Staphylinids	On wet rocks above water on floor ent			
423	HAND	1 Tomocerus	" "			
423	HAND	1 White Springtail	" "	Pseudosinella-like		
423	HAND	1 Sphaerocerid type	" "			
423	HAND	1 Sciarid type	" "			
423	HAND	1 Ant Golden	on normal rock floor ent.			
		1 Fly	on underside of rock dry ent			
		1 tiny spider	" "			
		1 Fly, wasp-like	" "			
		1 Large spider white spots on abd.	" "			
		2 Tomocerus	on underside rock norm ent			
424	HAND	2 Arrhopalites	from water surface [illegible]	A+ Meyers C		
424	HAND	1 Poduromorph	" "	"		"

Lincoln Canyon Mine (Drumming and Miner's Massacre) (continued).



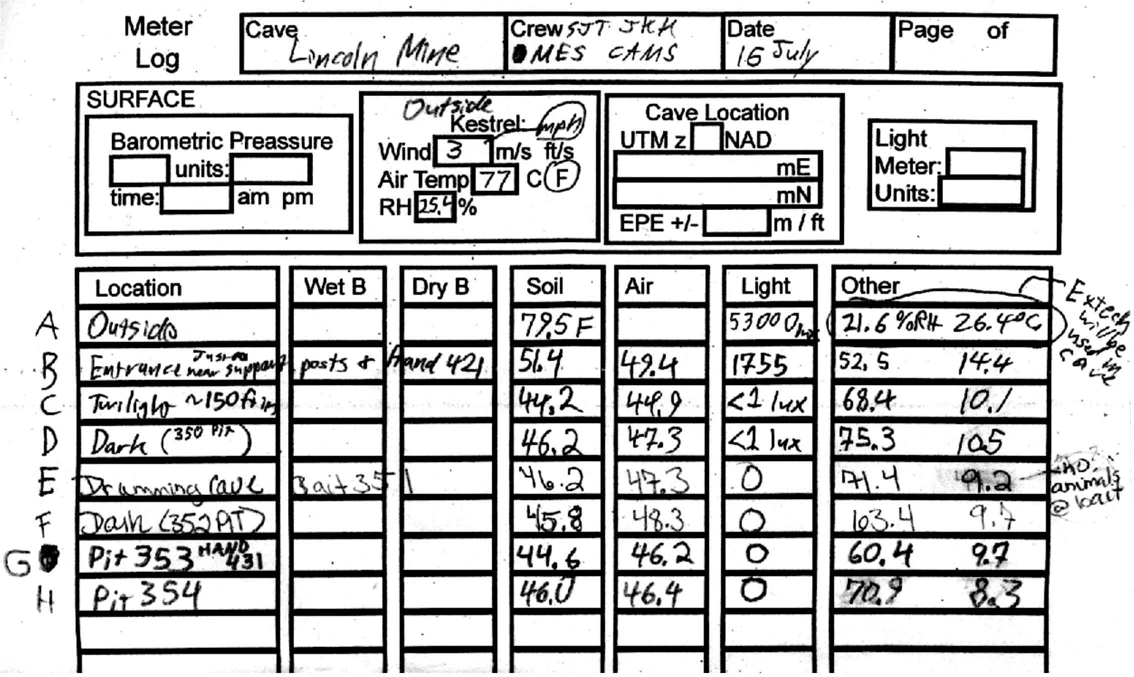
Field Sample Log

Cave: Lincoln Mine
Crew: SJT JKK MES CAMB
Date: 15 July 07
Page 2 of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing
424	HAND	1 Staphylinid,	dead from water surface twi	at Meters		C
425	HAND	4 Fungus gnat	on wet flowstone wall			
425		1 Heleomyzid	" "			
425		2 tiny diptera	" "			
426	HAND	~15 Heleomyzid like Diptera	on dry bed wall twi	at Meters		C
427	HAND	3 Podouromorphs	on wet wood floor twi	"		"
424	HAND	1 Arrhop (maybe)	from water surface twi	"		"
427	HAND	1 Centipede (Photos by JKK)	on wet wood floor twi	"		"
350	Pit		Normal Soil/Rock floor dark	at Meters		D
428	SIGHT	1 Dead Millipede	conotylid? on Normal Gravel Floor dark		See Map	
351	~~BAIT~~	2 bw or mouse poops No animals	wet, broken, formations	Drumming Cave		
352	Pit	3 Podouromorphs	normal soil, rock floor	see map		
429	HAND	4 Millipedes	Wet wood on rock floor Dark	2 photographed, 1 lg, 1 med see map		
			(1 medium was on underside of	rock above.		
			Pit 352, Norm)			
430	HAND	15 Podouromorphs	on water surface on floor	see Map		
429	HAND	1 Larva (?fly)	on wood debris wet →	Near pit 352		
353	PIT		on wet soil + rock floor	see Map		
431	HAND	3 millipedes	on wet wood on floor	near Pit 353		
354	PIT	not much?	Soil + Rock normal floor			
432	HAND	2 millipedes	small – on wet wood timber floor large – on bed wall norm	At large stack of timbers		

placed July 5 07

Lincoln Canyon Mine (Drumming and Miner's Massacre) (continued).



Meter Log

Cave: Lincoln Mine

Crew: SJT JKH MES CAMS

Date: 16 July

Page of

SURFACE

Barometric Preassure
units:
time: am pm

Outside
Kestrel: [✓ mph]
Wind 3 m/s ft/s
Air Temp 77 C [✓ F]
RH 25.4 %

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

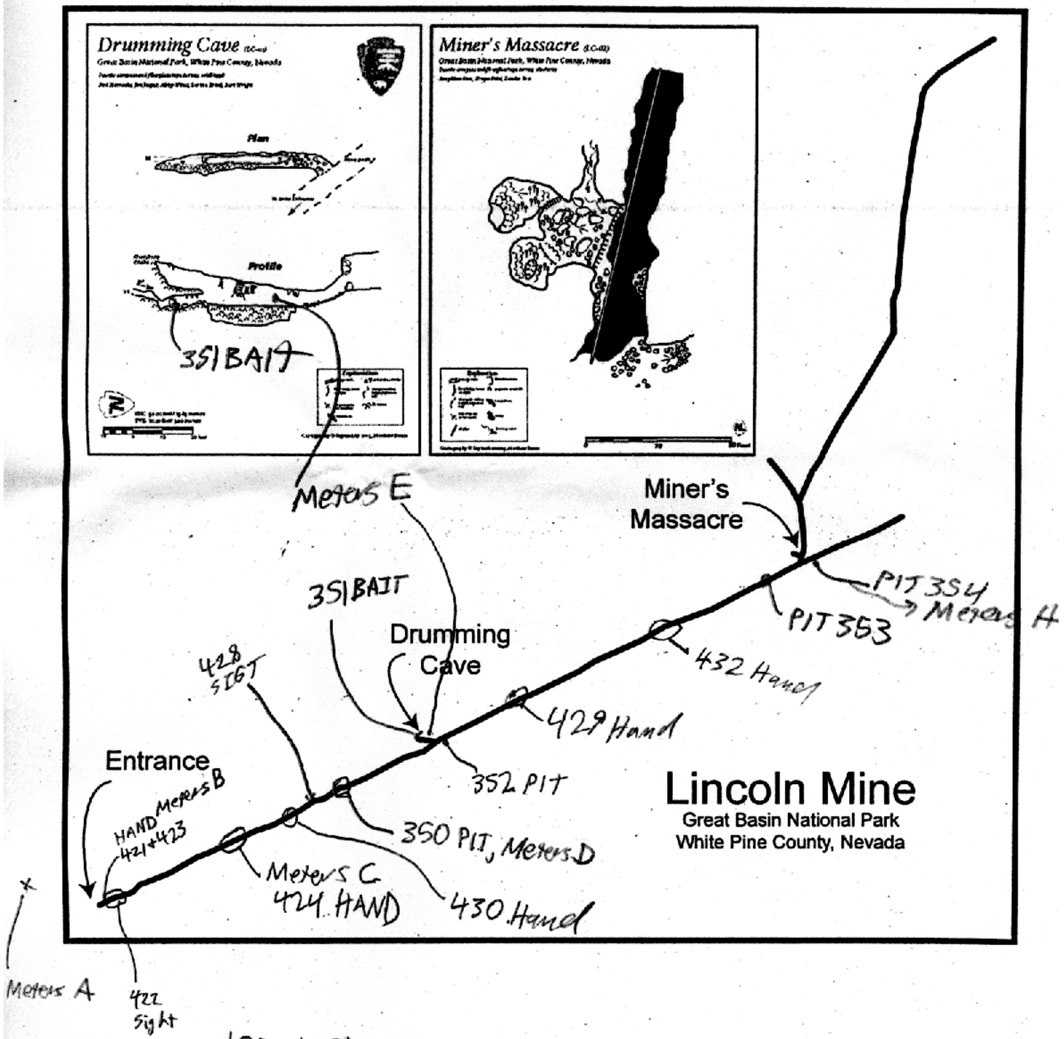
Light Meter:
Units:

	Location	Wet B	Dry B	Soil	Air	Light	Other
A	Outside			79.5 F		53000 lux	21.6 %RH 26.4°C
B	Entrance Just in near support posts & Hand 421			51.4	49.4	1755	52.5 14.4
C	Twilight ~150 ft in			44.2	44.9	<1 lux	68.4 10.1
D	Dark (350 Pit)			46.2	47.3	<1 lux	75.3 10.5
E	Drumming Cave	Bait 351		46.2	47.3	0	71.4 9.2
F	Dark (352 PIT)			45.8	48.3	0	103.4 9.7
G	Pit 353 HAND 431			44.6	46.2	0	60.4 9.7
H	Pit 354			46.0	46.4	0	70.9 8.3

Extech will be used in cave

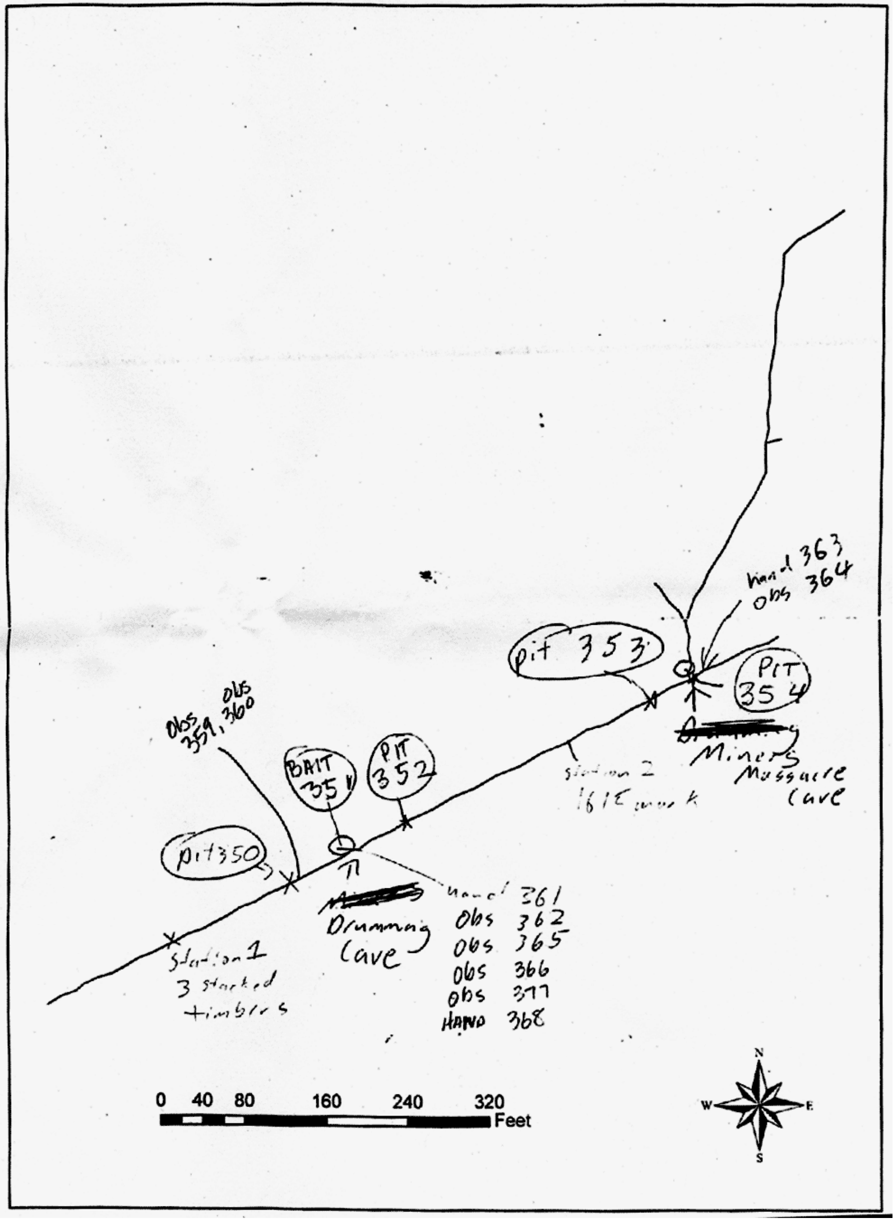
no animals @ bait

Lincoln Canyon Mine (Drumming and Miner’s Massacre) (continued).

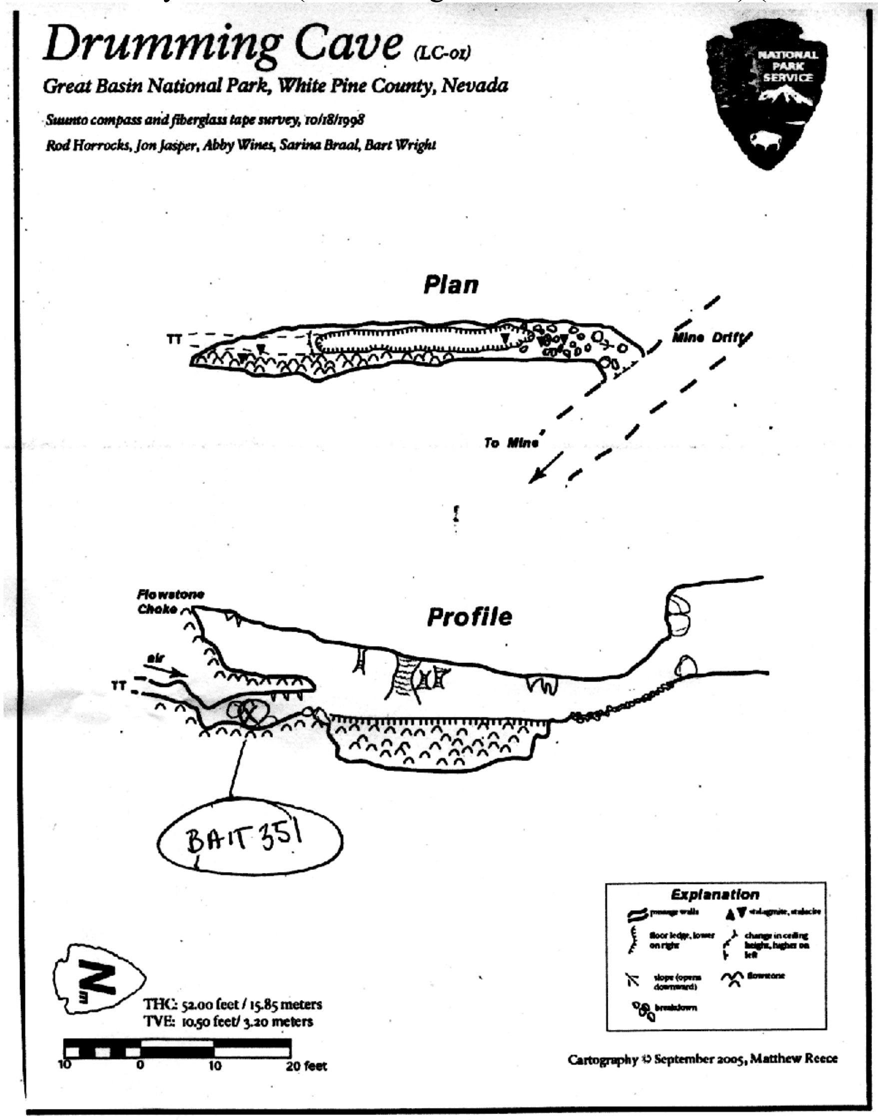


15 July 07
SJT JHK MES CAMS

Lincoln Canyon Mine (Drumming and Miner’s Massacre) (continued).

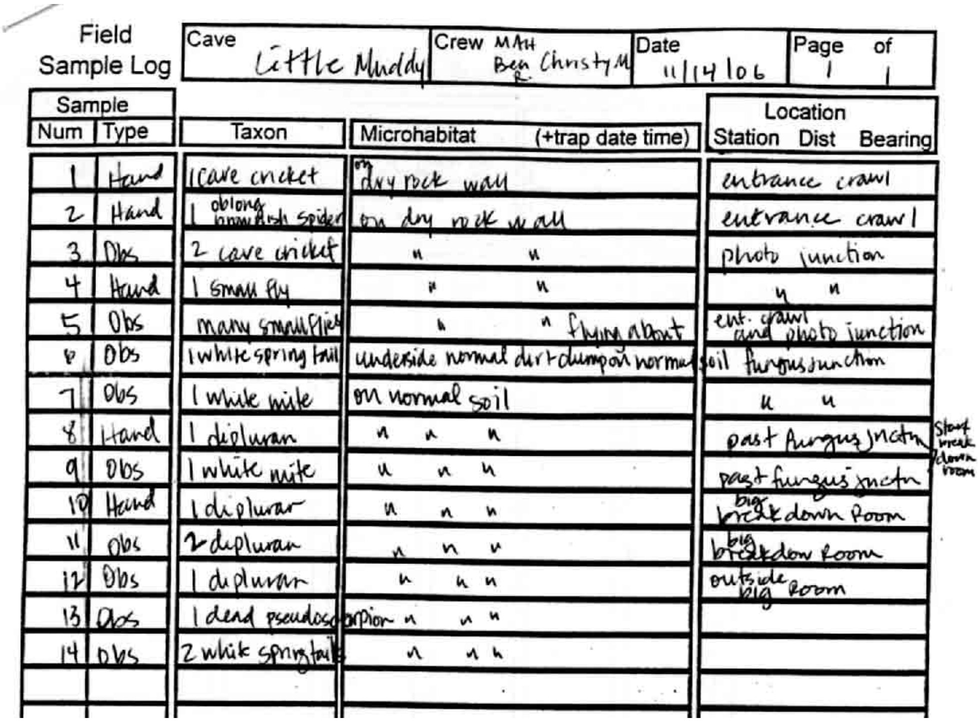


Lincoln Canyon Mine (Drumming and Miner's Massacre) (continued).



Little Muddy Cave

Meg A. Horner, Ben M. Roberts, Christy A. Moerbe
14-Nov-06
Gretchen M. Baker, Meg A. Horner
29-Oct-07

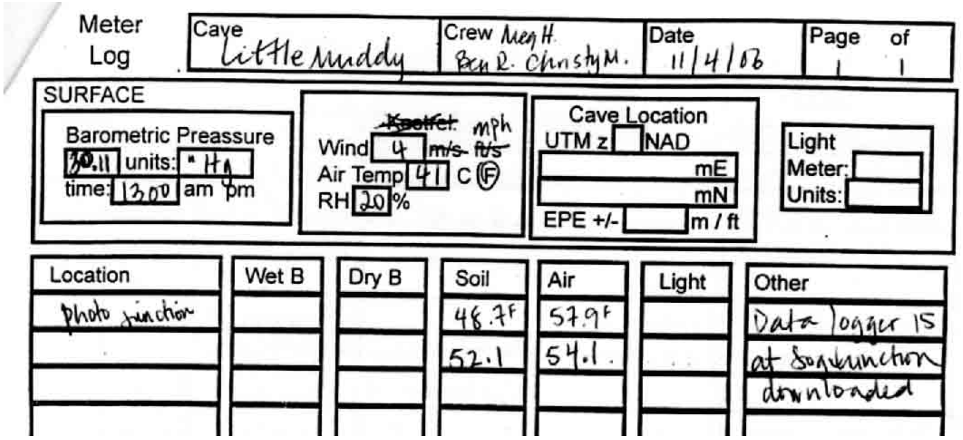


Field Sample Log

Cave: Little Muddy
Crew: MAH Ben R. Christy M
Date: 11/14/06
Page 1 of 1

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
1	Hand	1 cave cricket	on dry rock wall	entrance crawl		
2	Hand	1 oblong brownish spider	on dry rock wall	entrance crawl		
3	Obs	2 cave cricket	" "	photo junction		
4	Hand	1 small fly	" "	" "		
5	Obs	many small flies	" " flying about	ent. crawl and photo junction		
6	Obs	1 white spring tail	underside normal dirt clump on normal soil	fungus junction		
7	Obs	1 white mite	on normal soil	" "		
8	Hand	1 dipluran	" " "	past fungus junction		
9	Obs	1 white mite	" " "	past fungus junction		
10	Hand	1 dipluran	" " "	big breakdown Room		
11	Obs	2 dipluran	" " "	big breakdow Room		
12	Obs	1 dipluran	" " "	outside big Room		
13	Obs	1 dead pseudoscorpion	" " "			
14	Obs	2 white springtails	" " "			

Start break down room



Meter Log

Cave: Little Muddy
Crew: Meg H. Ben R. Christy M.
Date: 11/4/06
Page 1 of 1

SURFACE

Barometric Preassure
30.11 units: "Hg
time: 1300 am pm

Wind 4 ~~Knots~~ mph ~~m/s~~ ~~ft/s~~
Air Temp 41 C [✓ F]
RH 20 %

Cave Location
UTM z ☐ NAD
mE
mN
EPE +/- m / ft

Light
Meter:
Units:

Location	Wet B	Dry B	Soil	Air	Light	Other
photo junction			48.7F	57.9F		Data logger 15
			52.1	54.1		at fungus junction
						downloaded

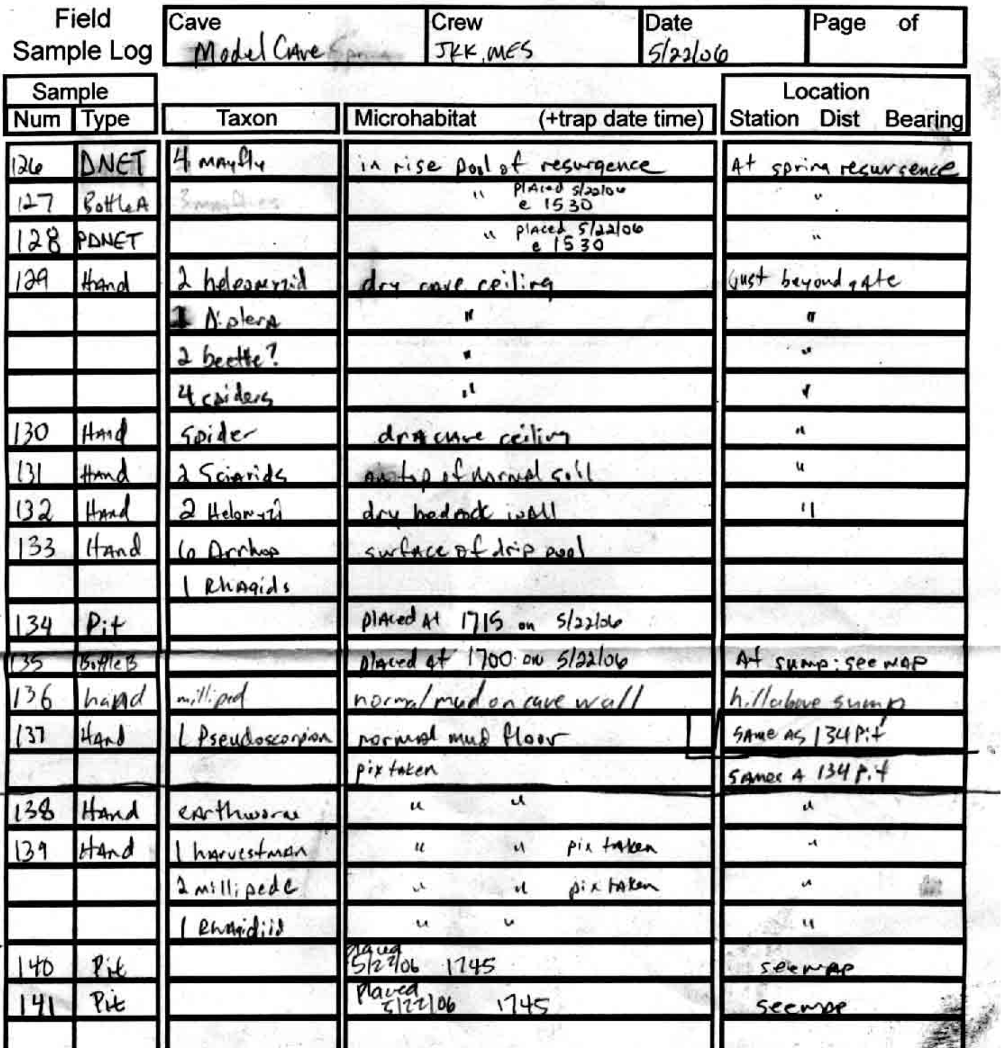
Long Cold Cave

Meg A. Horner
4-Sep-07

(field notes not available)

Model Cave

Gretchen M. Baker
27-Jan-06
Gretchen M. Baker, Meg A. Horner
2-Feb-06
Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts, Meg A. Horner
22-May-06
Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Meg A. Horner, Gretchen M. Baker
24-May-06
Gretchen M. Baker, Meg A. Horner, Brittany L. Timm
2-Oct-06
Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor
1-Mar-07



Field Sample Log

Cave: Model Cave Spr

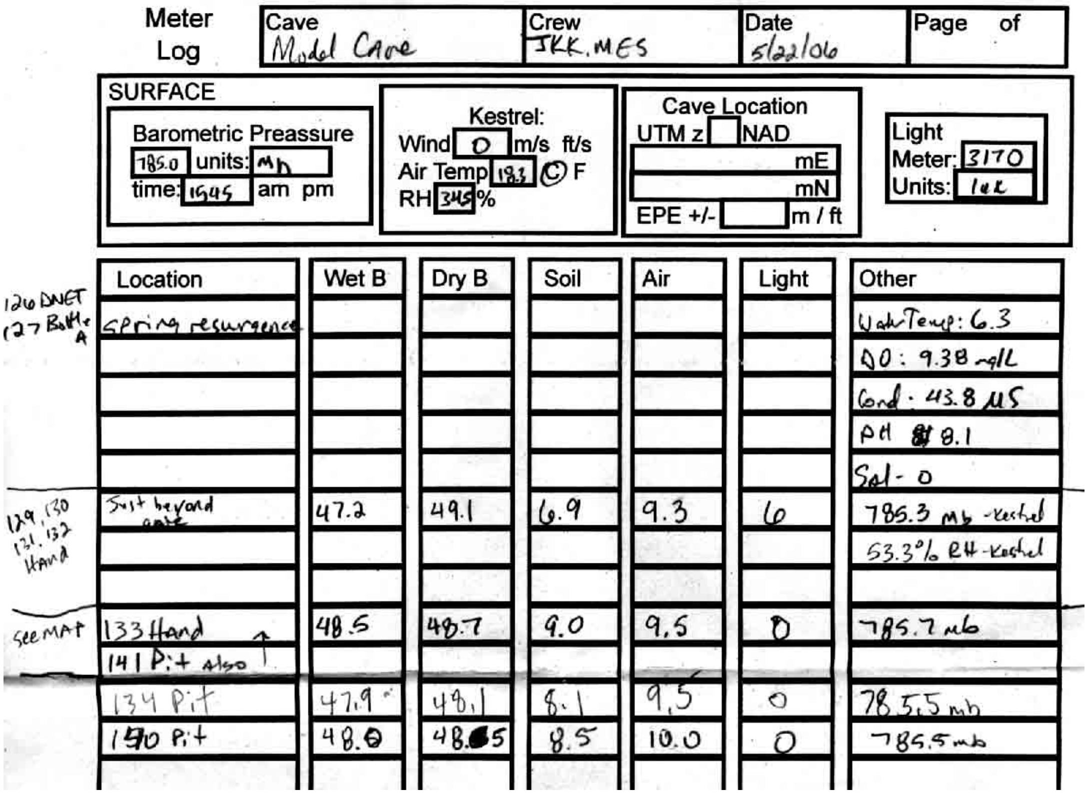
Crew: JKK, MES

Date: 5/22/06

Page of

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
126	DNET	4 mayfly	in rise pool of resurgence	At spring resurgence		
127	Bottle A	3 mayflies	" placed 5/22/06 @ 1530	"		
128	PDNET		" placed 5/22/06 @ 1530	"		
129	Hand	2 heleomyzid	dry cave ceiling	just beyond gate		
		1 Diptera	"	"		
		2 beetle?	"	"		
		4 spiders	"	"		
130	Hand	spider	dry cave ceiling	"		
131	Hand	2 Sciarids	on top of normal soil	"		
132	Hand	2 Heleomyzid	dry bedrock wall	"		
133	Hand	6 Arrhop	surface of drip pool			
		1 Rhagids				
134	Pit		placed at 1715 on 5/22/06			
135	Bottle B		placed at 1700 on 5/22/06	At sump: see map		
136	hand	milliped	normal/mud on cave wall	hill above sump		
137	Hand	1 Pseudoscorpion	normal mud floor	Same as 134 Pit		
			pix taken	Same as 134 Pit		
138	Hand	earthworm	" "	"		
139	Hand	1 harvestman	" " pix taken	"		
		2 millipede	" " pix taken	"		
		1 Rhagidiid	" "	"		
140	Pit		placed 5/22/06 1745	see map		
141	Pit		Placed 5/22/06 1745	see map		

Model Cave (continued).



Meter Log

Cave: Model Cave

Crew: JKK, MES

Date: 5/22/06

Page of

SURFACE

Barometric Preassure

785.0 units: mb

time: 1545 am pm

Kestrel:

Wind 0 m/s ft/s

Air Temp 18.3 [✓ C] F

RH 34.5 %

Cave Location

UTM z NAD

mE

mN

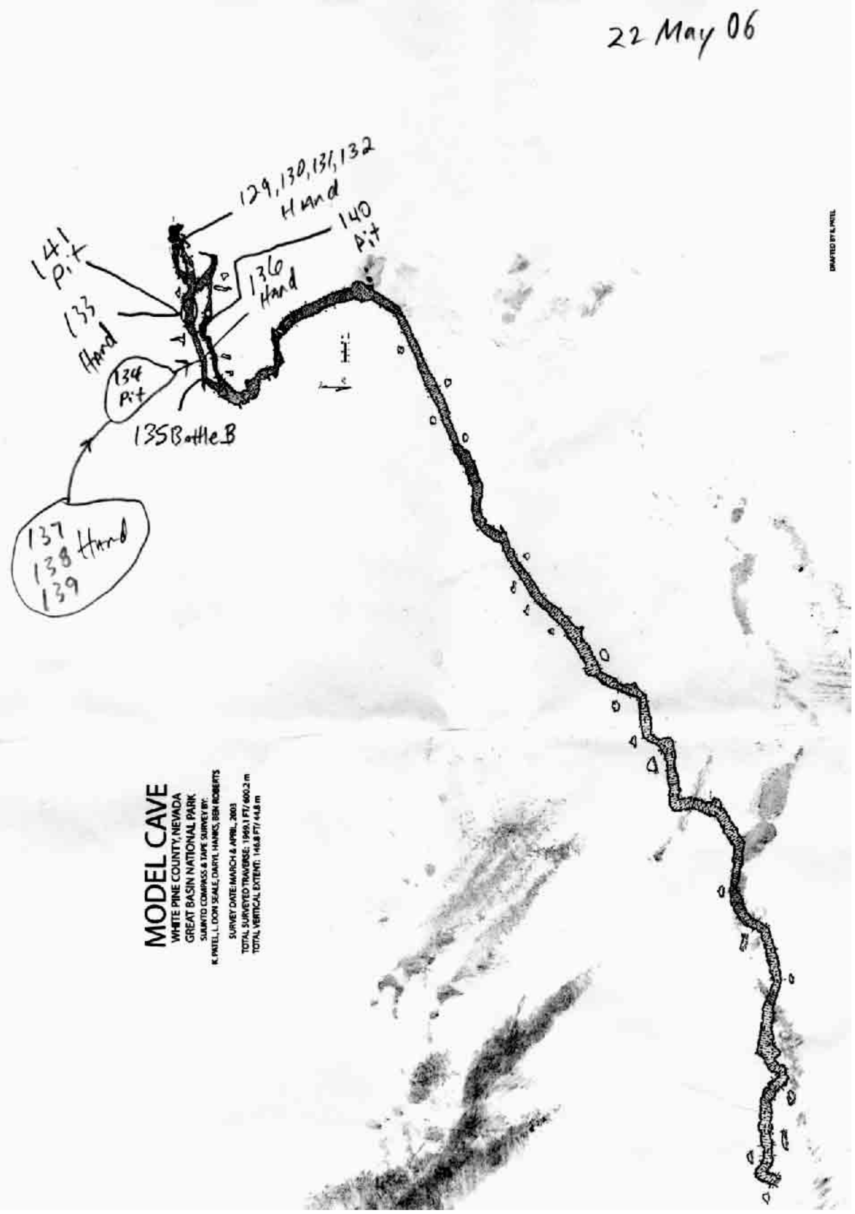
EPE +/- m / ft

Light Meter: 3170

Units: lux

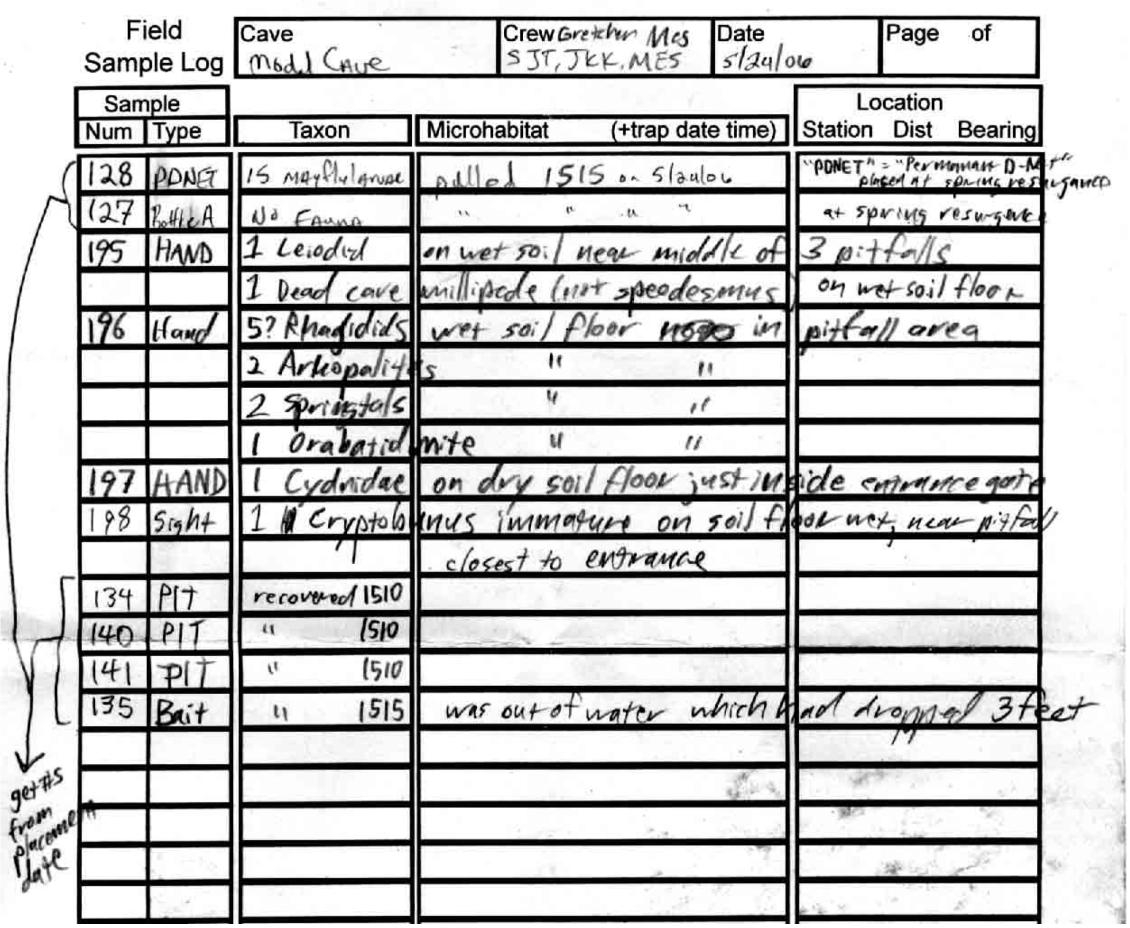
	Location	Wet B	Dry B	Soil	Air	Light	Other
126 DNET 127 Bottle A	spring resurgence						WatrTemp: 6.3
							DO: 9.38 mg/L
							Cond: 43.8 µS
							pH 8.1
							Sal- 0
129, 130 131, 132 Hand	Just beyond gate	47.2	49.1	6.9	9.3	6	785.3 mb -Kestrel
							53.3% RH-Kestrel
see MAP	133 Hand ↑	48.5	48.7	9.0	9.5	0	785.7 mb
	141 Pit Also						
	134 Pit	47.9	48.1	8.1	9.5	0	785.5 mb
	150 Pit	48.0	48.5	8.5	10.0	0	785.5 mb

Model Cave (continued).



22 May 06

Model Cave (continued).



Field Sample Log

Cave Modl Cave

Crew Gretchen Mes SJT, JKK, MES

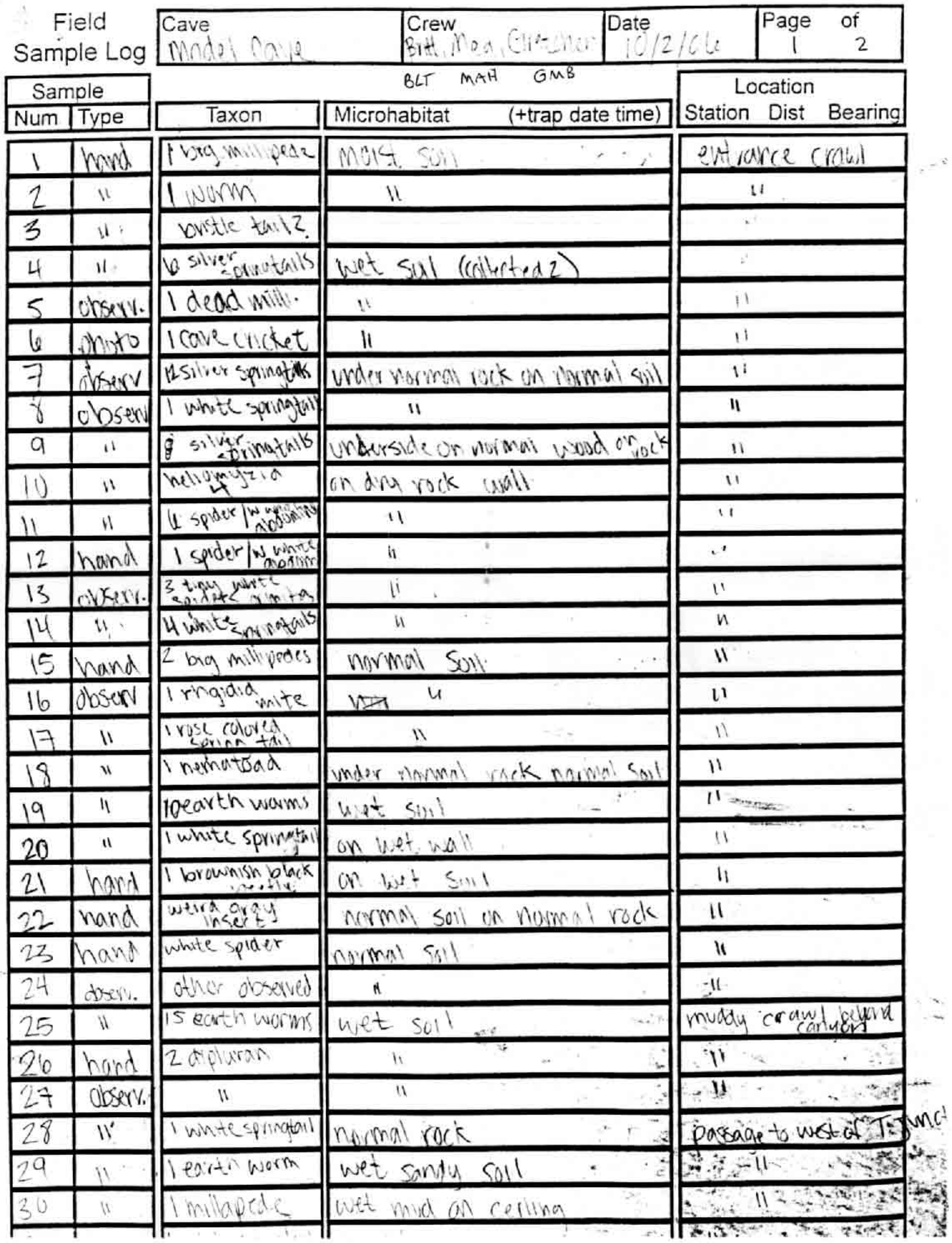
Date 5/24/06

Page of

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
128	PDNET	15 mayfly larvae	pulled 1515 on 5/24/06	"PDNET" = "Permanent D-Net" placed at spring resurgence		
127	BottleA	No Fauna	" " " "	at spring resurgence		
195	HAND	1 Leiodid	on wet soil near middle of	3 pitfalls		
		1 Dead cave	millipede (not speodesmus)	on wet soil floor		
196	Hand	5? Rhagidids	wet soil floor ~~near~~ in	pitfall area		
		2 Arkeopalites	" "			
		2 Springtals	" "			
		1 Orabatid mite	" "			
197	HAND	1 Cydnidae	on dry soil floor just inside entrance gate			
198	Sight	1 Cryptobunus	immature on soil floor wet, near pitfall			
			closest to entrance			
134	PIT	recovered 1510				
140	PIT	" 1510				
141	PIT	" 1510				
135	Bait	" 1515	was out of water which had dropped 3 feet			

get #s from placement date

Model Cave (continued).



Field Sample Log

Cave: Model Cave

Crew: Britt, Meg, Gretchen

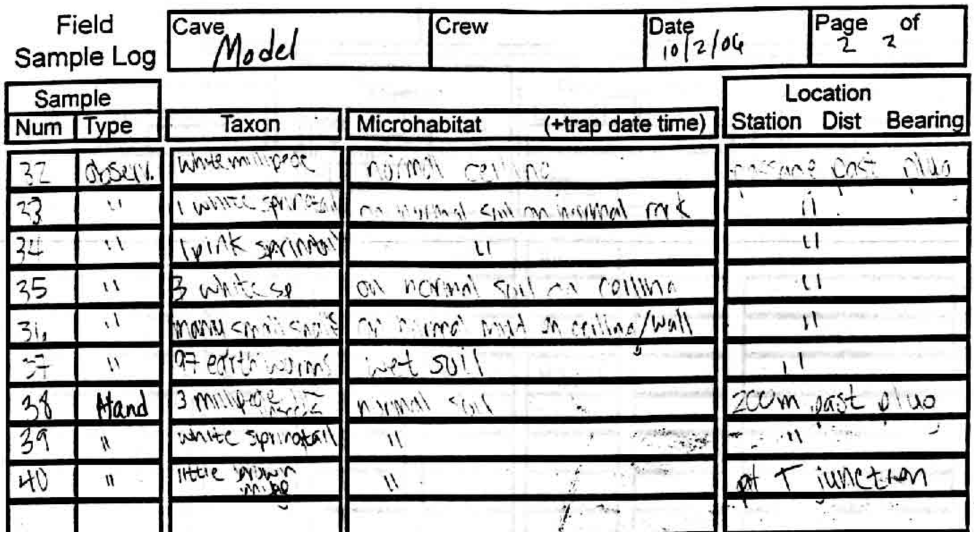
BLT MAH GMB

Date: 10/2/06

Page 1 of 2

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station	Location Dist	Location Bearing
1	hand	1 big millipede	moist soil	entrance crawl		
2	"	1 worm	"	"		
3	"	bristle tail 2				
4	"	6 silver springtails	wet soil (collected 2)			
5	observ.	1 dead milli.	"	"		
6	photo	1 cave cricket	"	"		
7	observ	12 silver springtails	under normal rock on normal soil	"		
8	observ	1 white springtail	"	"		
9	"	8 silver springtails	underside on normal wood on rock	"		
10	"	heliomyzia 4	on dry rock wall	"		
11	"	6 spider /w white abdomens	"	"		
12	hand	1 spider /w white abdomen	"	"		
13	observ.	3 tiny white spiders [illegible]	"	"		
14	"	4 white springtails	"	"		
15	hand	2 big millipedes	normal soil	"		
16	observ	1 ringidia mite	~~wet~~ "	"		
17	"	1 rose colored spring tail	"	"		
18	"	1 nematoad	under normal rock normal soil	"		
19	"	10 earth worms	wet soil	"		
20	"	1 white springtail	on wet wall	"		
21	hand	1 brownish black beetle	on wet soil	"		
22	hand	weird gray insect	normal soil on normal rock	"		
23	hand	white spider	normal soil	"		
24	observ.	other observed	"	"		
25	"	15 earth worms	wet soil	muddy crawl beyond canyon		
26	hand	2 dipluran	"	"		
27	observ.	"	"	"		
28	"	1 white springtail	normal rock	passage to west of T junc		
29	"	1 earth worm	wet sandy soil	"		
30	"	1 millapede	wet mud on ceiling	"		

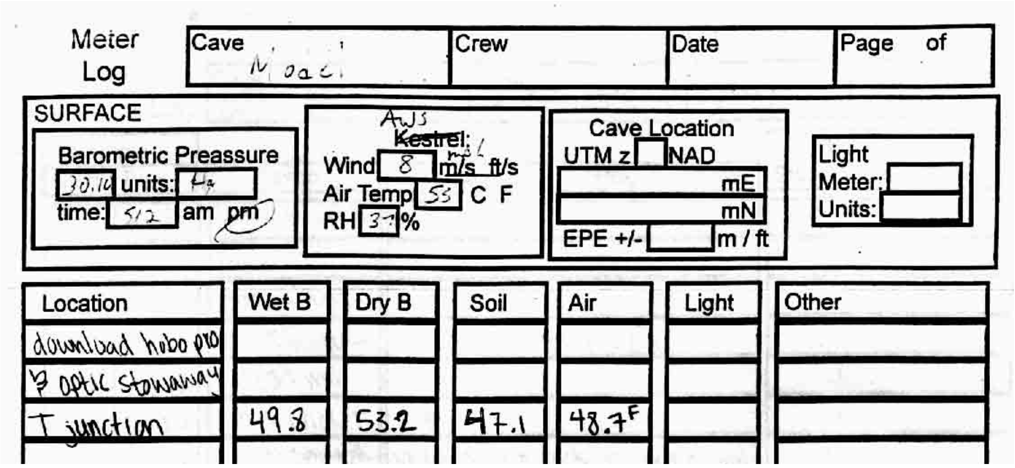
Model Cave (continued).



Field Sample Log

Cave: Model
Crew:
Date: 10/2/06
Page 2 of 2

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
32	observ.	white millipede	normal ceiling	passage past plug
33	"	1 white springtail	on normal soil on normal rock	"
34	"	1 pink springtail	"	"
35	"	3 white sp	on normal soil on ceiling	"
36	"	many springtails	on normal mud on ceiling/wall	"
37	"	97 earthworms	wet soil	"
38	Hand	3 millipede [illegible]	normal soil	200m past plug
39	"	white springtail	"	"
40	"	little brown mite	"	at T junction



Meter Log

Cave: Model
Crew:
Date:
Page of

SURFACE

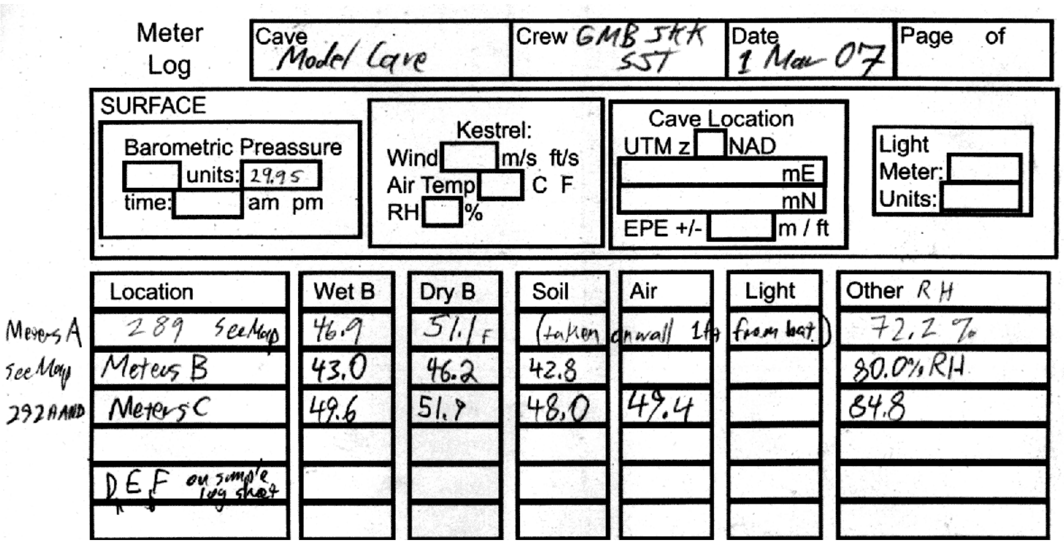
Barometric Preassure: 30.14 units: Hg
time: 5:12 am [✓ pm]

AWS ~~Kestrel~~:
Wind 8 [✓ m/s] ft/s
Air Temp 55 C F
RH 37 %

Cave Location
UTM z ☐ NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

Location	Wet B	Dry B	Soil	Air	Light	Other
download hobo pro						
7 optic stowaway						
T junction	49.8	53.2	47.1	48.7F		



Meter Log

Cave: Model Cave
Crew: GMB JKK SST
Date: 1 Mar 07
Page of

SURFACE

Barometric Preassure: units: 29.95
time: am pm

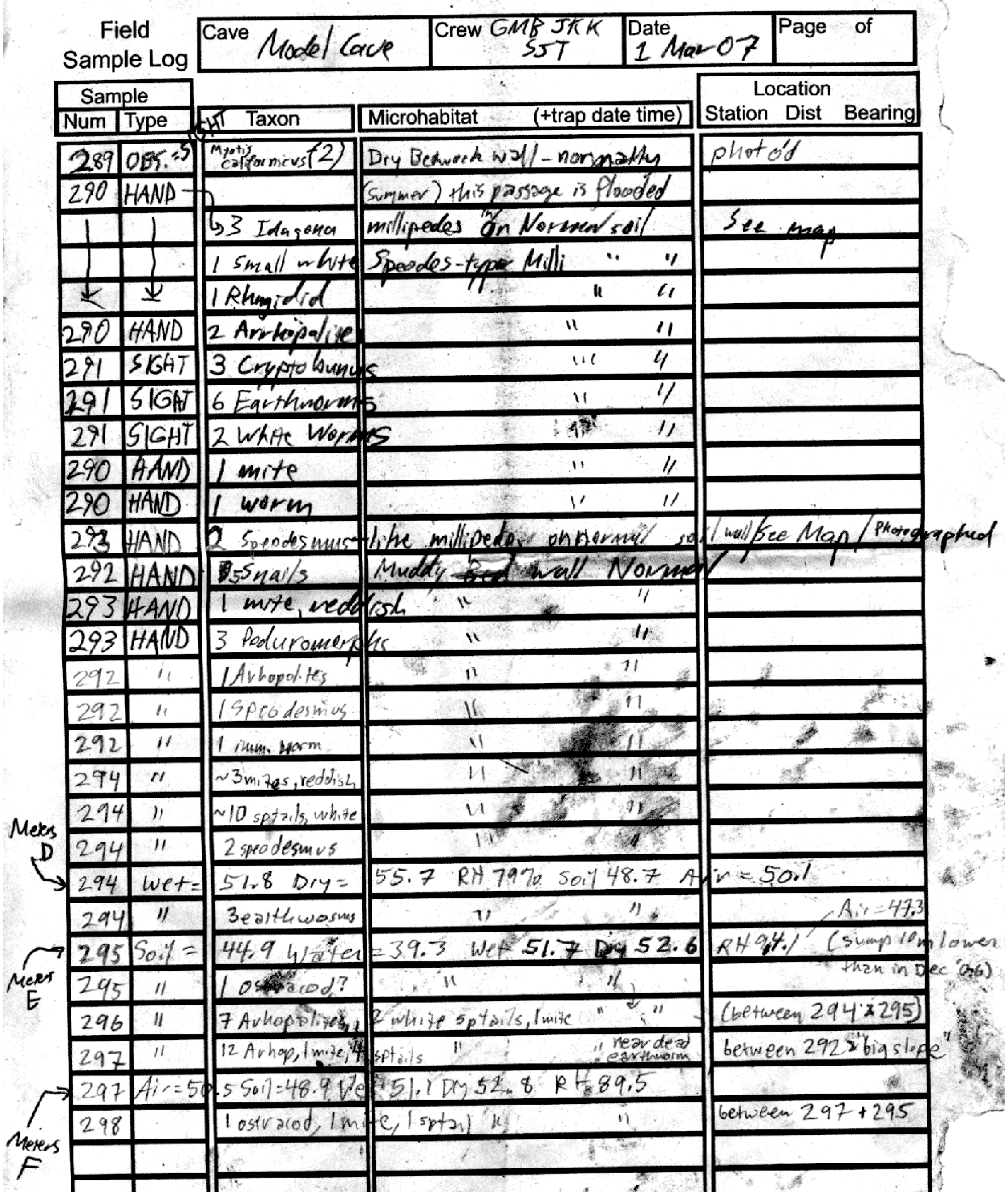
Kestrel:
Wind m/s ft/s
Air Temp C F
RH %

Cave Location
UTM z ☐ NAD
mE
mN
EPE +/- m / ft

Light Meter:
Units:

	Location	Wet B	Dry B	Soil	Air	Light	Other RH
Meters A	289 See Map	46.9	51.1 F	(taken on wall 1ft from bat)			72.2 %
See Map	Meters B	43.0	46.2	42.8			80.0% RH
292 AAND	Meters C	49.6	51.7	48.0	49.4		84.8
	D, E, F on sample log sheet						

Model Cave (continued).



Field Sample Log

Cave Model Cave

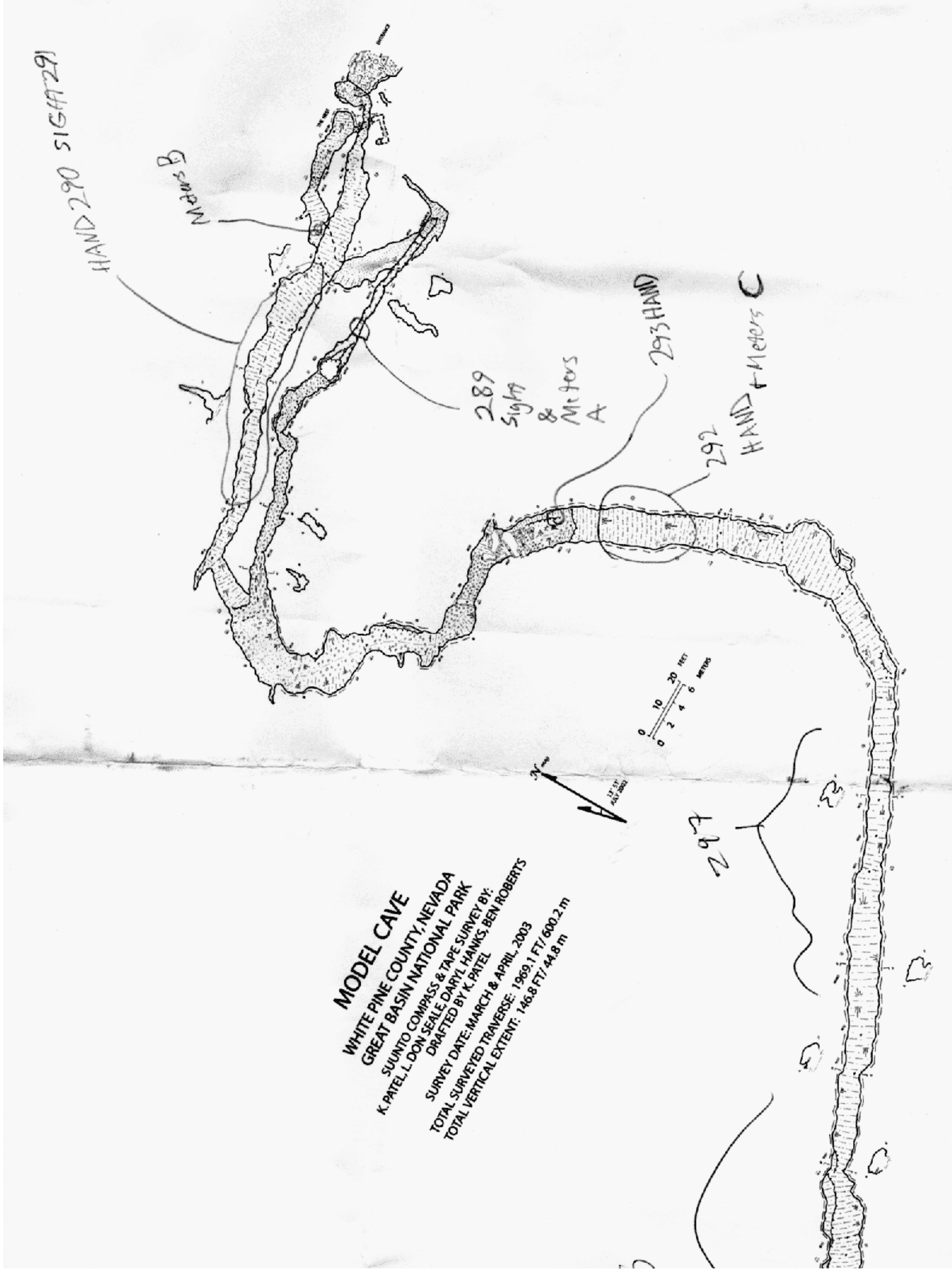
Crew GMB JKK SST

Date 1 Mar 07

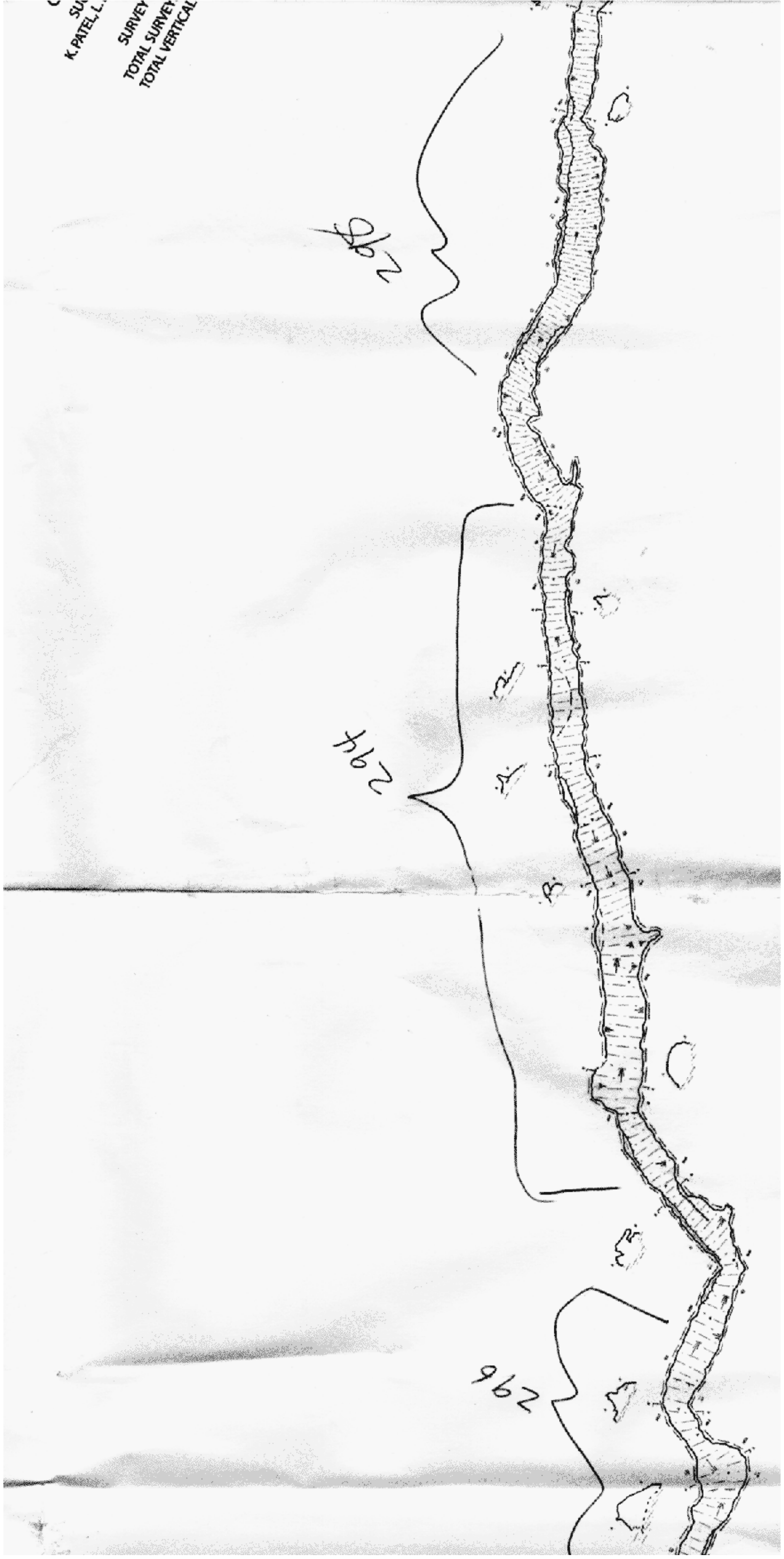
Page of

	Sample				Location		
	Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
	289	OBS. ~5	Myotis californicus (2)	Dry Bedrock wall - normally	photo'd		
	290	HAND		(summer) this passage is flooded			
	↓	↓	3 Idagona	millipedes in on Normal soil	See map		
			1 small white	Speodes-type Milli " "			
			1 Rhagidiid	" "			
	290	HAND	2 Arrhopalites	" "			
	291	SIGHT	3 Cryptobunus	" "			
	291	SIGHT	6 Earthworms	" "			
	291	SIGHT	2 White Worms	" "			
	290	HAND	1 mite	" "			
	290	HAND	1 worm	" "			
	293	HAND	2 Speodesmus-	like millipedes on normal soil/wall	See Map/Photographed		
	292	HAND	5 Snails	Muddy ~~Bed~~ wall Normal			
	293	HAND	1 mite, reddish	" "			
	293	HAND	3 Poduromorphs	" "			
	292	"	1 Arhopalites	" "			
	292	"	1 Speodesmus	" "			
	292	"	1 imm. worm	" "			
	294	"	~3 mites, reddish	" "			
	294	"	~10 sptails, white	" "			
Meters D	294	"	2 speodesmus	" "			
→	294	Wet=	51.8 Dry=	55.7 RH 79% Soil 48.7 Air = 50.1			
	294	"	3 earthworms	" "	Air=47.3		
→	295	Soil =	44.9 Water	=39.3 Wet 51.7 Dry 52.6	RH 94.1 (sump 10m lower than in Dec '06)		
Meters E	295	"	1 ostracod?	" "			
	296	"	7 Arhopalites,	2 white sptails, 1 mite " "	(between 294 & 295)		
	297	"	12 Arhop, 1 mite, 4	sptails " " near dead earthworm	between 292 & "big slope"		
→	297	Air=50	.5 Soil=48.9 Wet	=51.1 Dry 52.8 RH 89.5			
	298		1 ostracod, 1 mite, 1 sptail	" "	between 297 + 295		
Meters F							

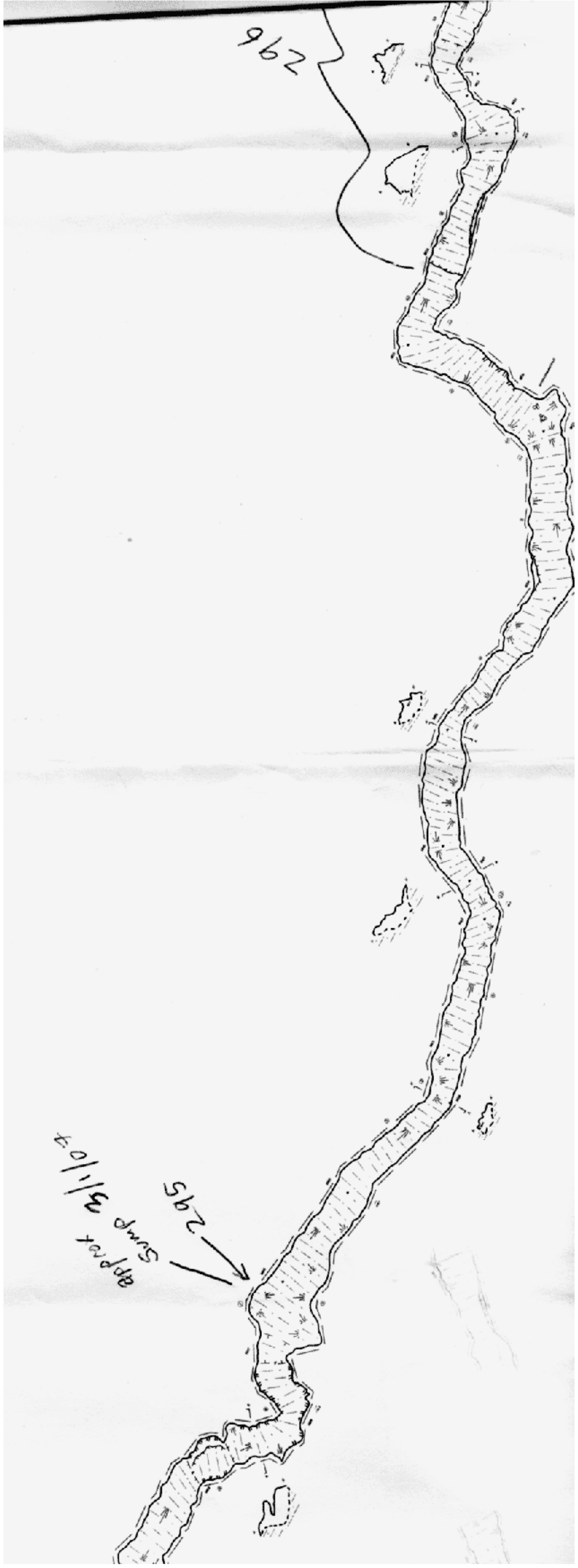
Model Cave (continued).



Model Cave (continued).

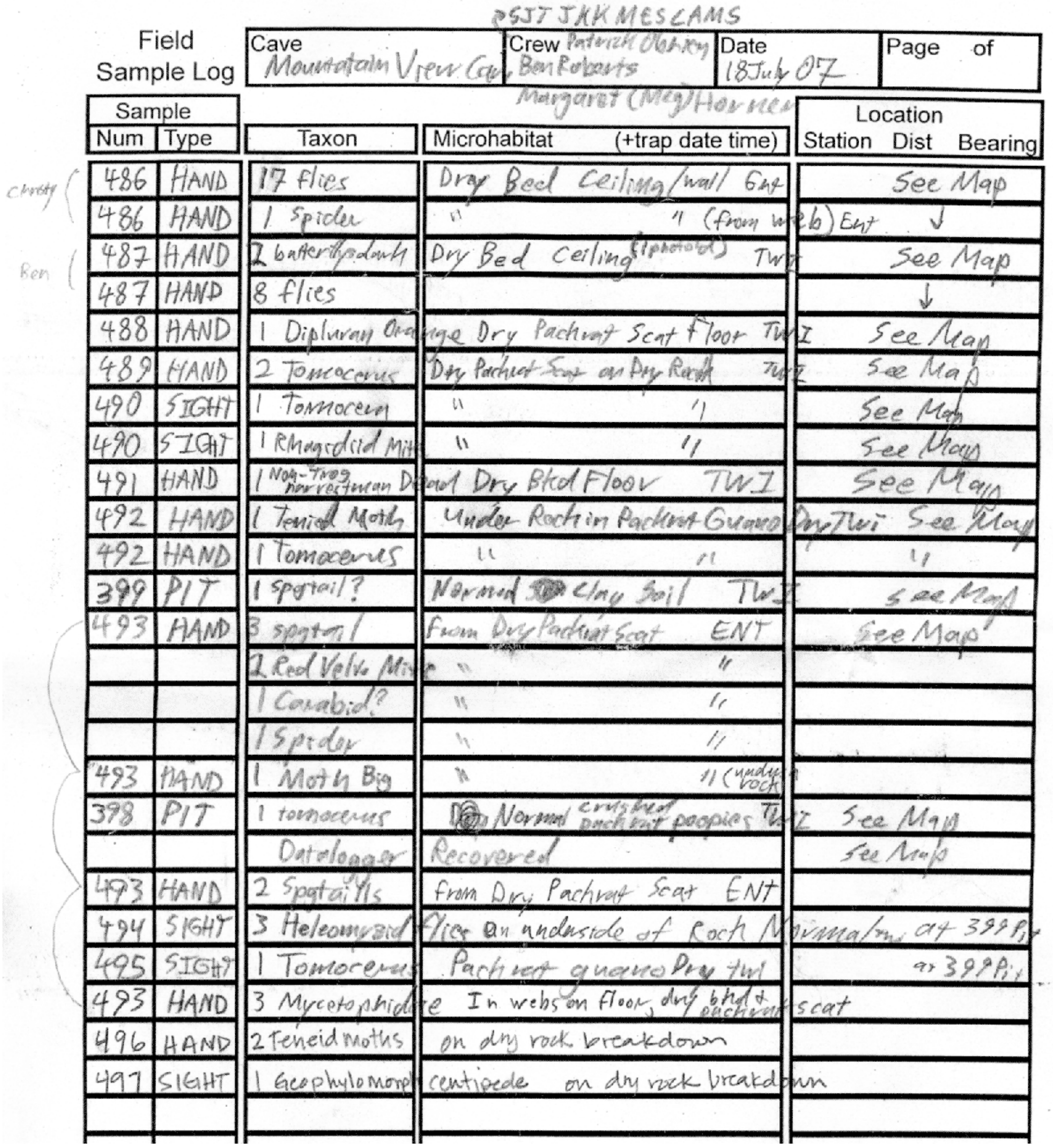


Model Cave (continued).



Mountain View Cave

Ben M. Roberts, Meg A. Horner, Shawn C. Thomas
10-Jul-07
Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Christy A.M. Slay, Patrick M. O'Brien, Ben M. Roberts
18-Jul-07



SJT JKK MES CAMS

Field Sample Log

Cave: Mountatain View Cav

Crew: Patrick Obrien, Ben Roberts, Margaret (Meg) Horner

Date: 18July 07

Page of

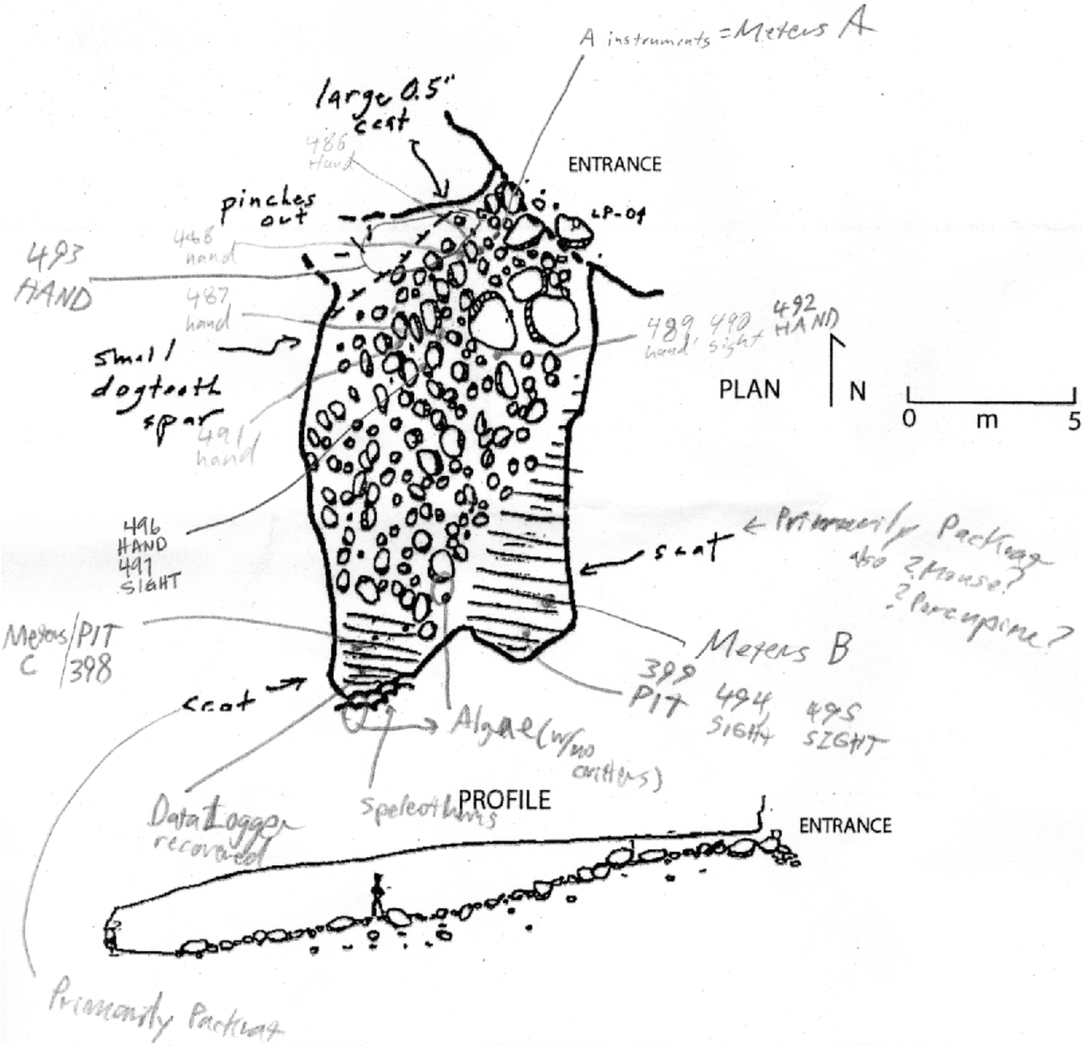
	Sample		Taxon	Microhabitat (+trap date time)	Location		
	Num	Type			Station	Dist	Bearing
Christy	486	HAND	17 flies	Dry Bed Ceiling/wall/ Ent		See Map	
	486	HAND	1 Spider	" " (from web) Ent		↓	
Ben	487	HAND	2 butterflydowls	Dry Bed Ceiling (photoed) TWI		See Map	
	487	HAND	8 flies			↓	
	488	HAND	1 Dipluran Orange	Dry Pachrat Scat Floor TWI		See Map	
	489	HAND	2 Tomocerus	Dry Pachrat Scat on Dry Rock TWI		See Map	
	490	SIGHT	1 Tomocerus	" "		See Map	
	490	SIGHT	1 Rhagidiid Mite	" "		See Map	
	491	HAND	1 Non-Trog norvestucan Dead	Dry Bkd Floor TWI		See Map	
	492	HAND	1 Teneid Moth	Under Rock in Packrat Guano Dry Twi		See Map	
	492	HAND	1 Tomocerus	" "		"	
	399	PIT	1 springtail?	Normal Clay Soil TWI		see Map	
	493	HAND	3 springtail	From Dry Packrat Scat ENT		See Map	
			2 Red Velvet Mite	" "			
			1 Carabid?	" "			
			1 Spider	" "			
	493	HAND	1 Moth Big	" " (under rock)			
	398	PIT	1 tomocerus	Normal crushed packrat poopies TWI		See Map	
			Datalogger	Recovered		See Map	
	493	HAND	2 Springtails	from Dry Pachrat Scat ENT			
	494	SIGHT	3 Heleomyzid flies	on underside of Rock Normal/rm		at 399 Pit	
	495	SIGHT	1 Tomocerus	Packrat guano Dry twi		at 399 Pit	
	493	HAND	3 Mycetophidae	In webs on floor, dry bkd + packrat scat			
	496	HAND	2 Teneid moths	on dry rock breakdown			
	497	SIGHT	1 Geophylomorph	centipede on dry rock breakdown			

Mountain View Cave (continued).

Mountain View

Surveyed by Jon Jasper and Kyle Voyles

July 15, 2000



Meter Log

Cave Mountain View | Crew dave | Date 18 Jul 07 | Page of

SURFACE

Barometric Preassure
676.4 units: m/b
time: 10:40 [✓ am] pm

max 18.8
avg Kestrel:
Wind 10.3 m/s [✓ ft/s]
Air Temp 68.3 C [✓ F]
RH 20.7 %

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

Light
Meter:
Units:

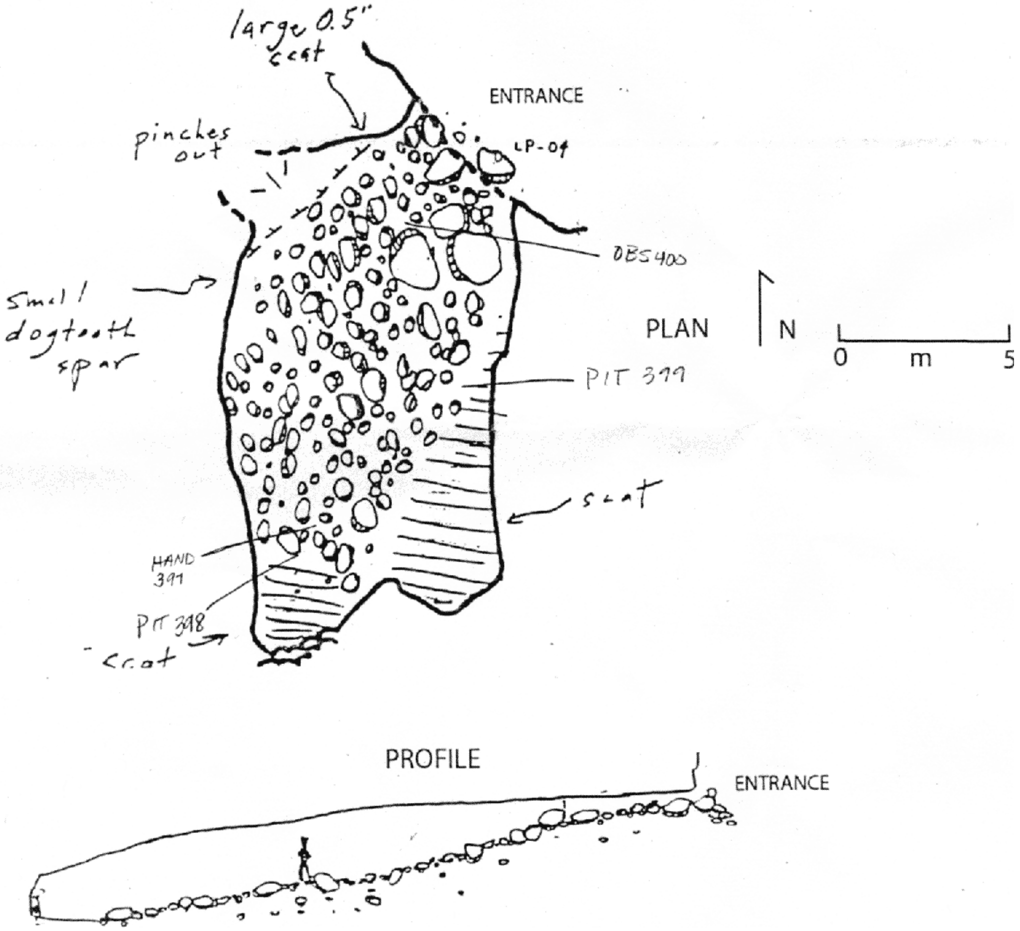
	Location	Wet B	Dry B	Soil	Air	Light	Other
	Outside			59.3 F	68.7 F	94600 Lux	25.9% 68.7 F
A	entrance			41.4 F	60.0 F	4 Lux	34.6% 61.5 F
B	twilight			35.0 F	35.0 F	<1 Lux	61.2% 45.5 F
C	Twilight			35.4 F	35.7 F	<1 Lux	80.9 38.5 F

Mountain View Cave (continued).

Mountain View

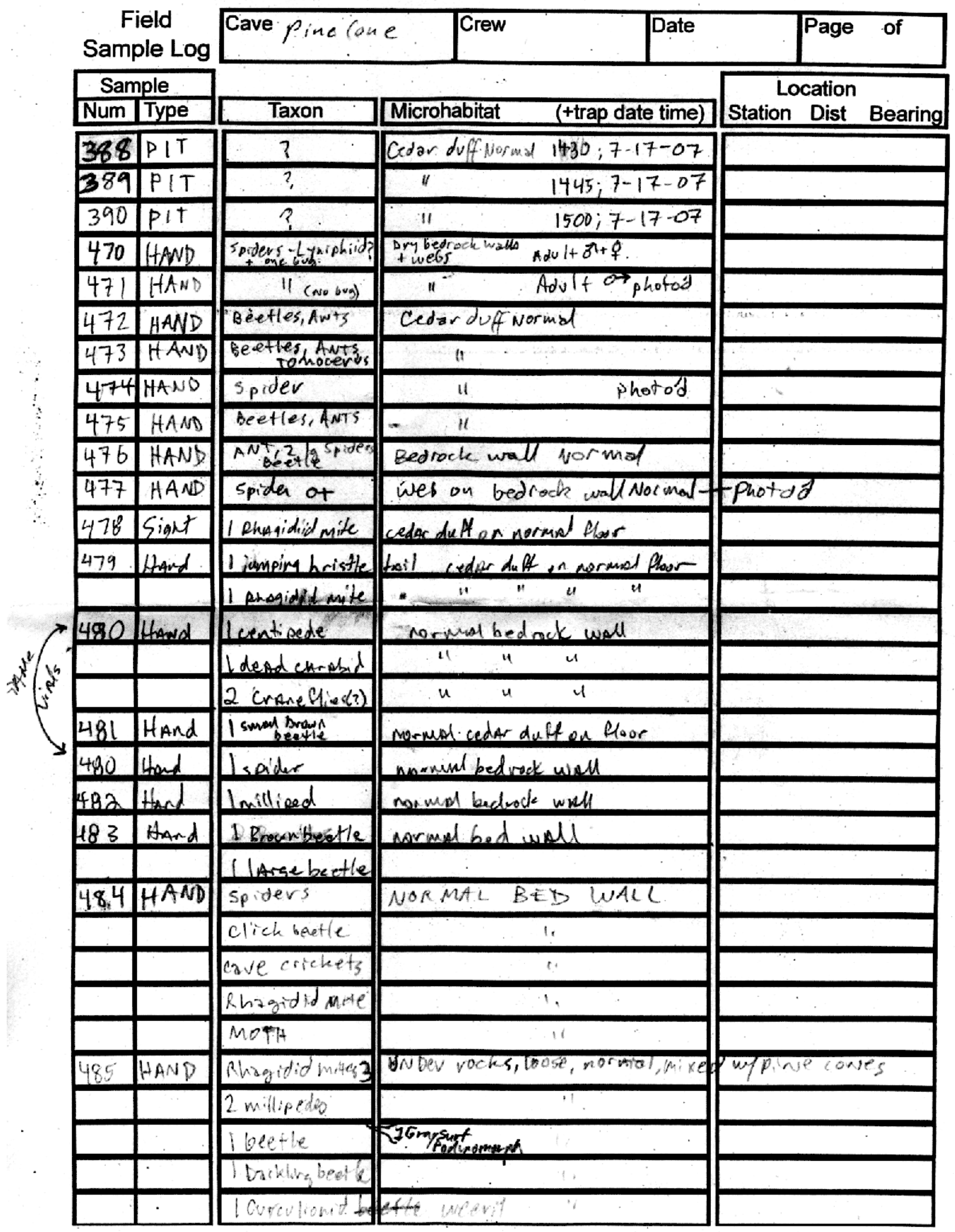
Surveyed by Jon Jasper and Kyle Voyles

July 15, 2000



Pine Cone Cave

Ben M. Roberts, Meg A. Horner, Patrick M. O'Brien, Shawn C. Thomas
9-Jul-07
Jean K. Krejca, Meg A. Horner, Michael E. Slay, Christy A.M. Slay, Ben M. Roberts
17-Jul-07



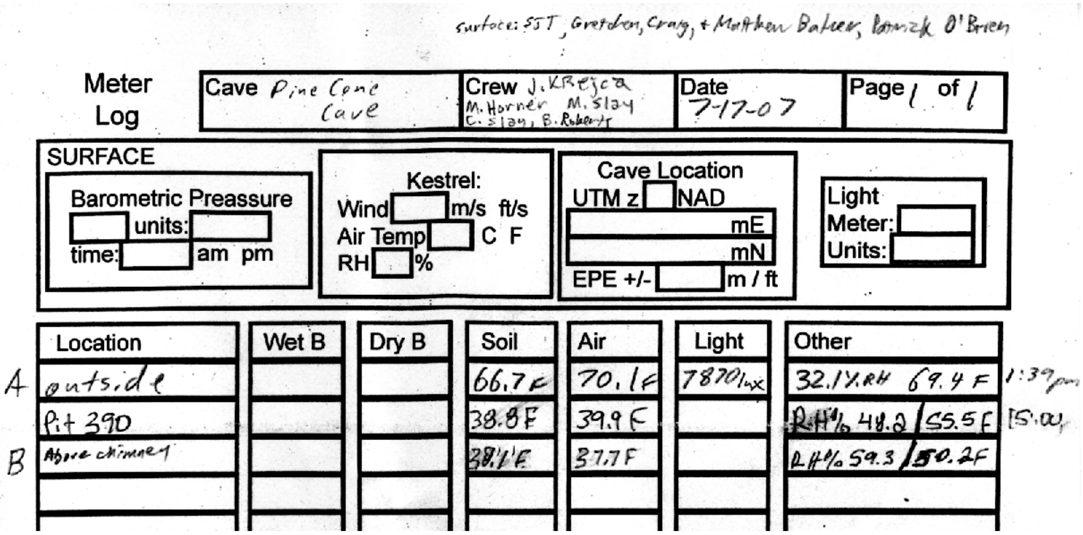
Field Sample Log

Cave: Pine Cone
Crew:
Date:
Page of

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
388	PIT	?	Cedar duff Normal 1430; 7-17-07			
389	PIT	?	″ 1445; 7-17-07			
390	PIT	?	″ 1500; 7-17-07			
470	HAND	Spiders - Lyniphiid? + one bug	Dry bedrock walls + webs Adult ♂+♀.			
471	HAND	″ (no bug)	″ Adult ♂ photo'd			
472	HAND	Beetles, Ants	Cedar duff normal			
473	HAND	Beetles, Ants, Tomocerus	″			
474	HAND	Spider	″ photo'd			
475	HAND	Beetles, Ants	″			
476	HAND	Ant, 2 beetle, 9 spiders	Bedrock wall normal			
477	HAND	spider ♂	web on bedrock wall Normal — photo'd ♂			
478	Sight	1 Rhagidiid mite	cedar duff on normal floor			
479	Hand	1 jumping bristle tail	cedar duff on normal floor			
		1 Rhagidiid mite	″ ″ ″ ″			
480	Hand	1 centipede	normal bedrock wall			
		1 dead carabid	″ ″ ″			
		2 crane flies(?)	″ ″ ″			
481	Hand	1 small brown beetle	normal cedar duff on floor			
480	Hand	1 spider	normal bedrock wall			
482	Hand	1 milliped	normal bedrock wall			
483	Hand	1 Brown beetle	normal bed wall			
		1 large beetle				
484	HAND	spiders	NORMAL BED WALL			
		click beetle	″			
		cave crickets	″			
		Rhagidiid mite	″			
		MOTH	″			
485	HAND	Rhagidiid mites 3	under rocks, loose, normal, mixed w/ pine cones			
		2 millipedes	″			
		1 beetle	1 Gray Surf Podicromorph ″			
		1 darkling beetle	″			
		1 Curculionid ~~beetle~~ weevil	″			

same vials

Pine Cone Cave (continued).



surface: 55T, Gretchen, Craig, + Matthew Baker, Patrick O'Brien

Meter Log

Cave Pine Cone Cave

Crew J. Krejca, M. Horner, M. Slay, C. Slay, B. Roberts

Date 7-17-07

Page 1 of 1

SURFACE

Barometric Preassure ☐ units: ☐ time: ☐ am pm

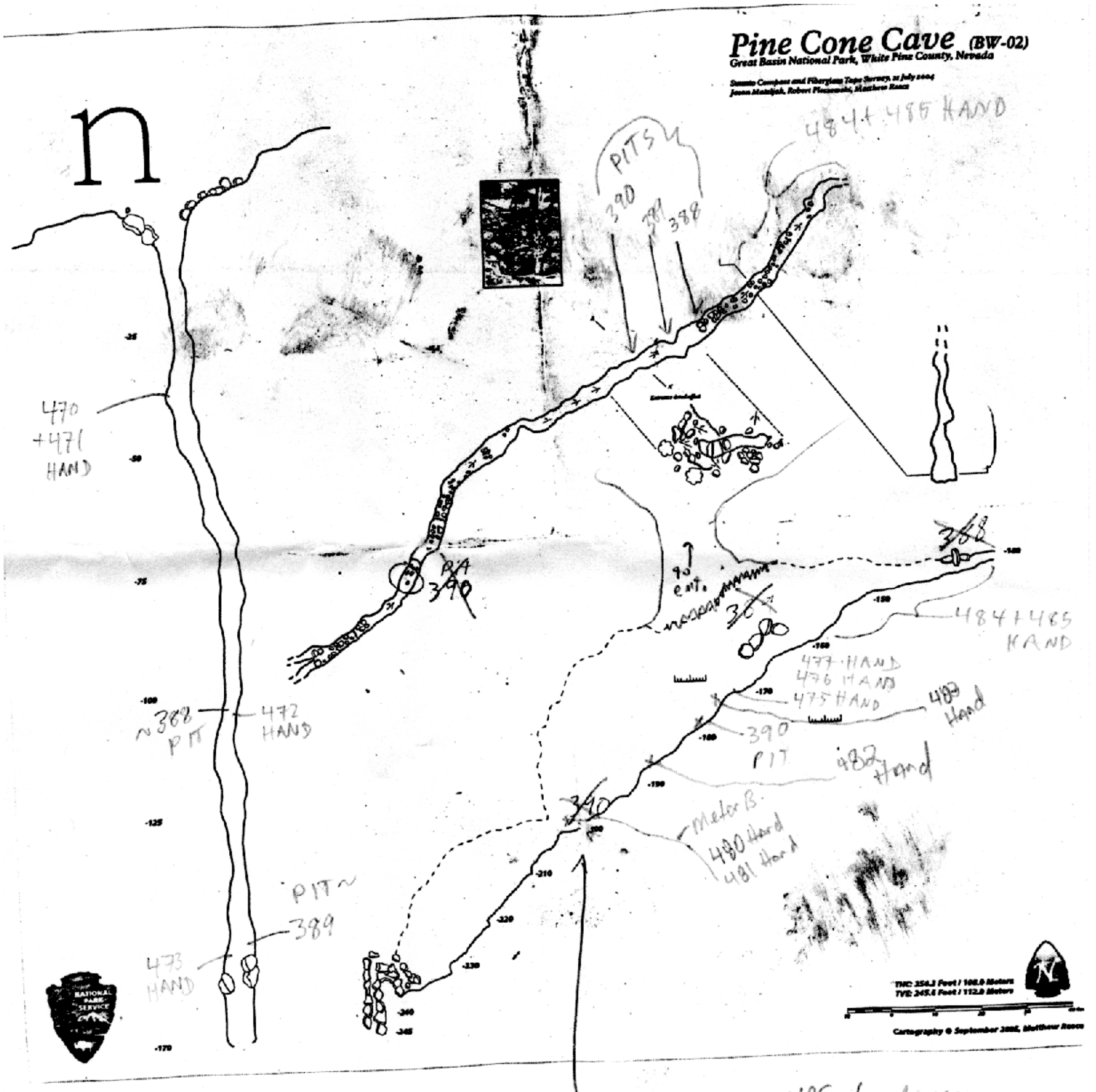
Kestrel: Wind ☐ m/s ft/s Air Temp ☐ C F RH ☐ %

Cave Location UTM z ☐ NAD ☐ mE ☐ mN EPE +/- ☐ m / ft

Light Meter: ☐ Units: ☐

Location	Wet B	Dry B	Soil	Air	Light	Other	
A outside			66.7F	70.1F	7870lux	32.1%RH 69.4F	1:39pm
Pit 390			38.8F	39.9F		RH% 48.2 / 55.5F	15:00
B Above chimney			38.1F	37.7F		RH% 59.3 / 50.2F	

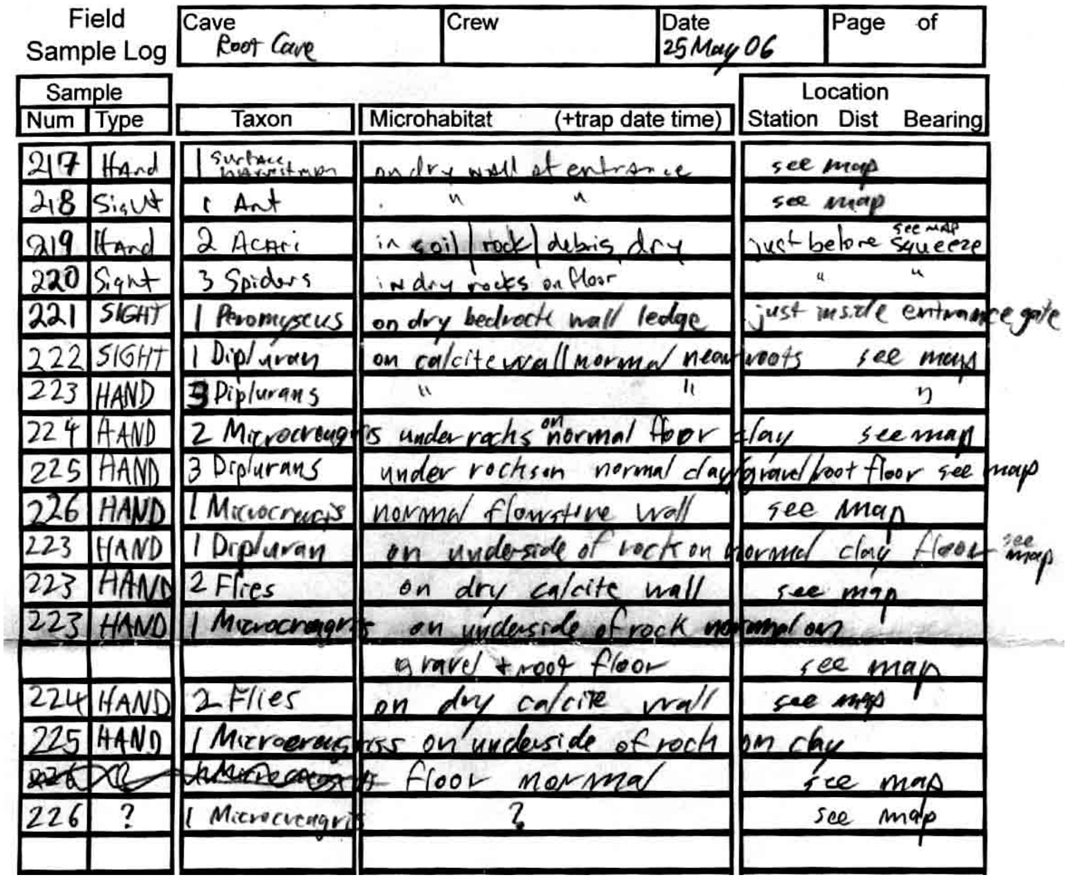
Pine Cone Cave (continued).



crossed out NPS locations, they are misplaced

Root Cave

Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Ben M. Roberts
25-May-06
Gretchen M. Baker, Christy A. Moerbe, Jay Anderson, Ross Anderson
17-Oct-06

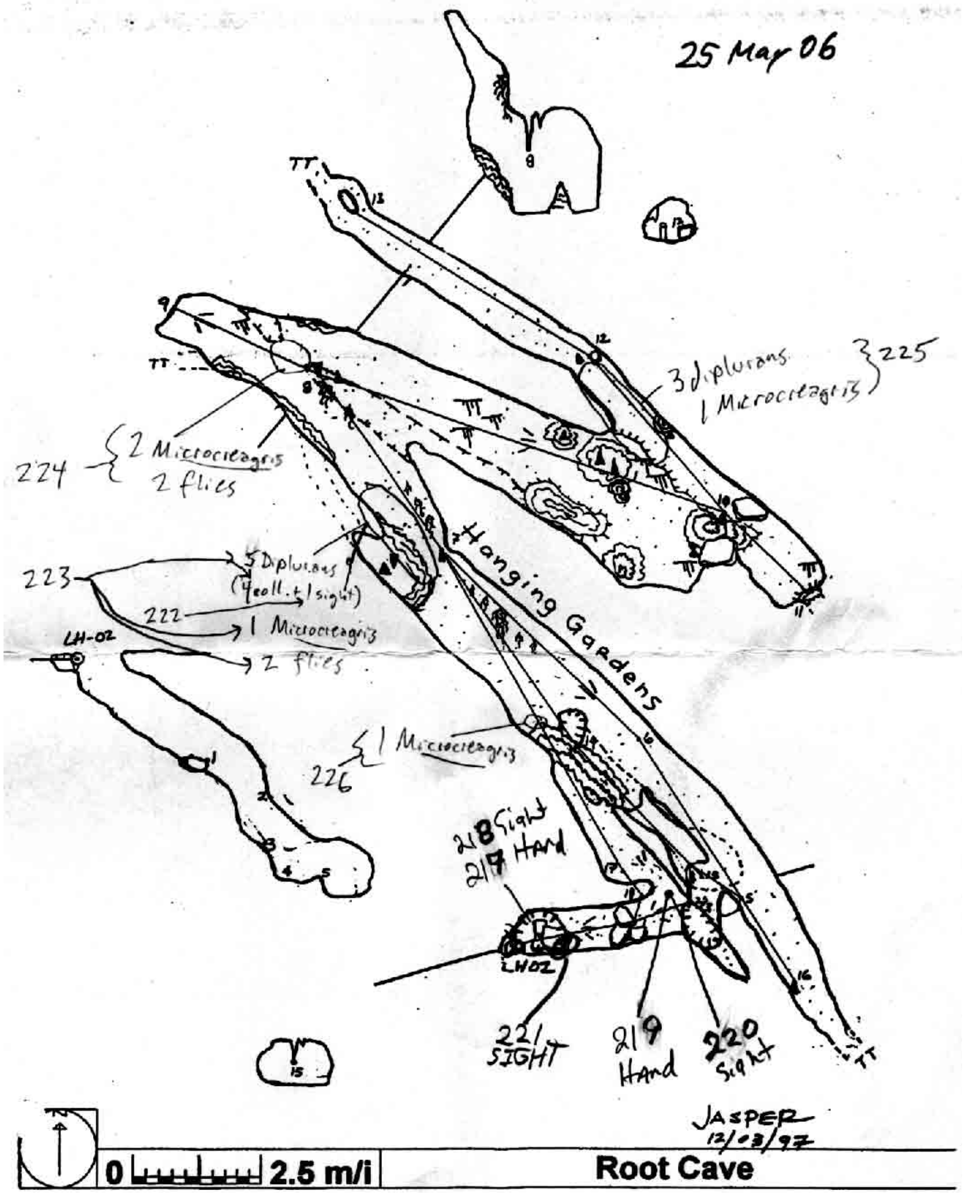


Field Sample Log

Cave: Root Cave
Crew:
Date: 25 May 06
Page of

Sample				Location
Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing
217	Hand	1 Surface harvestman	on dry wall at entrance	see map
218	Sight	1 Ant	" "	see map
219	Hand	2 Acari	in soil/rock/debris dry	just before squeeze see map
220	Sight	3 Spiders	in dry rocks on floor	" "
221	SIGHT	1 Peromyscus	on dry bedrock wall ledge	just inside entrance gate
222	SIGHT	1 Dipluran	on calcite wall normal/near roots	see map
223	HAND	3 Diplurans	" "	"
224	HAND	2 Microcreagris	under rocks on normal floor clay	see map
225	HAND	3 Diplurans	under rocks on normal clay/gravel/root floor	see map
226	HAND	1 Microcreagris	normal flowstone wall	see map
223	HAND	1 Dipluran	on underside of rock on normal clay floor	see map
223	HAND	2 Flies	on dry calcite wall	see map
223	HAND	1 Microcreagris	on underside of rock normal on	
			gravel + root floor	see map
224	HAND	2 Flies	on dry calcite wall	see map
225	HAND	1 Microcreagris	on underside of rock on clay	
~~226~~	~~XC~~	~~1 Microcreagris~~	floor normal	see map
226	?	1 Microcreagris	?	see map

Root Cave (continued).



25 May 06

3 Diplurans
1 Microcreagris } 225

224 { 2 Microcreagris
2 flies

223 → 5 Diplurans (4 coll. + 1 sight)

222 → 1 Microcreagris

→ 2 flies

226 { 1 Microcreagris

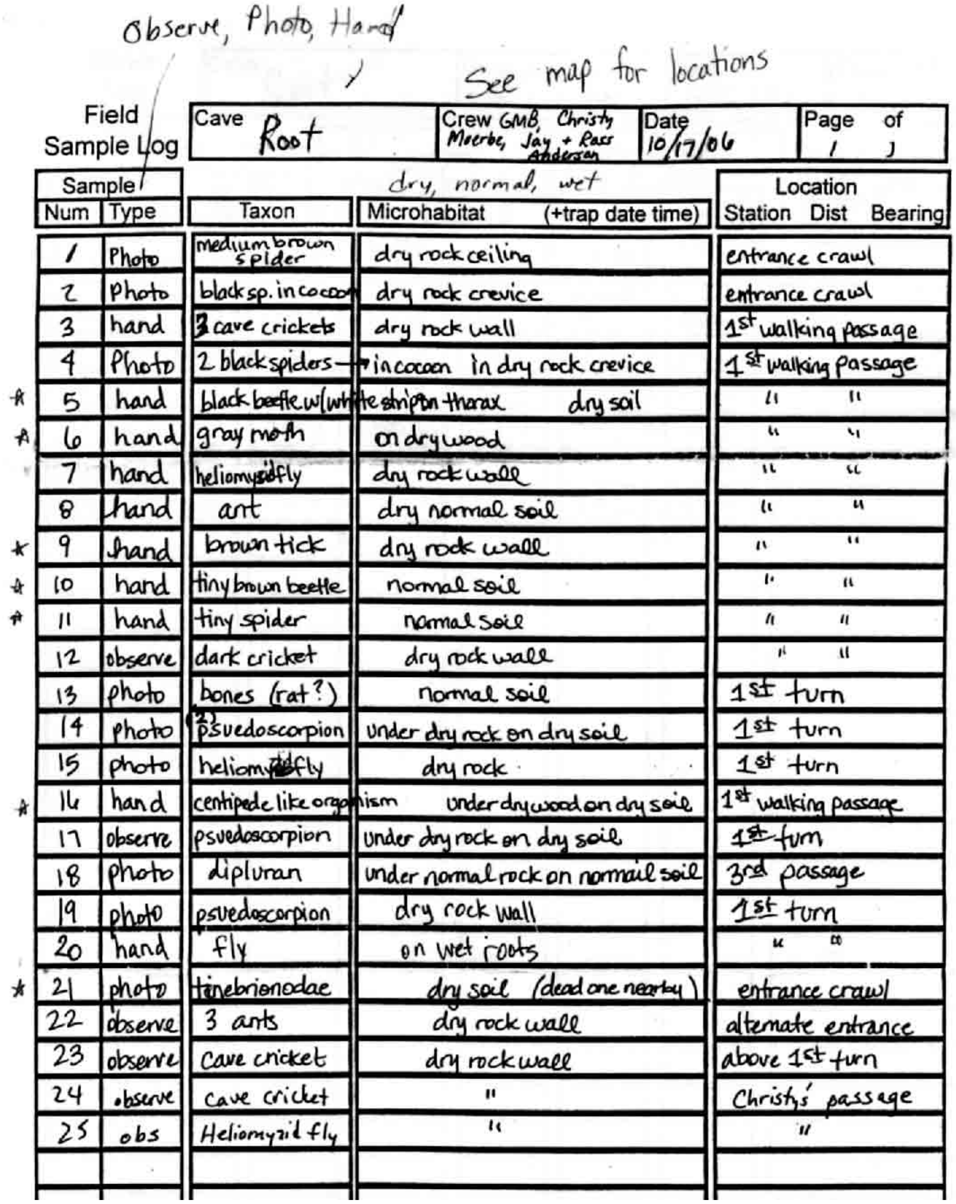
218 Sight
217 Hand

221 SIGHT

219 Hand

220 Sight

Root Cave (continued).



Observe, Photo, Hand

See map for locations

Field Sample Log

Cave Root

Crew GMB, Christy Moerbe, Jay + Russ Anderson

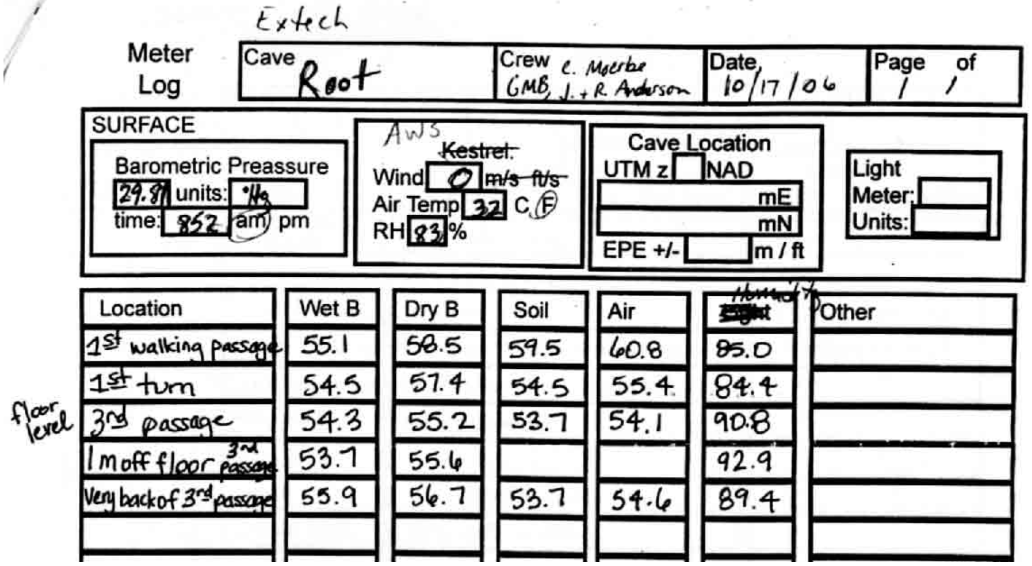
Date 10/17/06

Page 1 of 1

dry, normal, wet

	Sample				Location
	Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing
	1	Photo	medium brown spider	dry rock ceiling	entrance crawl
	2	Photo	black sp. in cocoon	dry rock crevice	entrance crawl
	3	hand	3 cave crickets	dry rock wall	1st walking passage
	4	Photo	2 black spiders →	in cocoon in dry rock crevice	1st walking passage
*	5	hand	black beetle w/(white strip on thorax	dry soil	" "
*	6	hand	gray moth	on dry wood	" "
	7	hand	heliomyzid fly	dry rock wall	" "
	8	hand	ant	dry normal soil	" "
*	9	hand	brown tick	dry rock wall	" "
*	10	hand	tiny brown beetle	normal soil	" "
*	11	hand	tiny spider	normal soil	" "
	12	observe	dark cricket	dry rock wall	" "
	13	photo	bones (rat?)	normal soil	1st turn
	14	photo	(2) psuedoscorpion	under dry rock on dry soil	1st turn
	15	photo	heliomyzid fly	dry rock	1st turn
*	16	hand	centipede like organism	under dry wood on dry soil	1st walking passage
	17	observe	psuedoscorpion	under dry rock on dry soil	1st turn
	18	photo	dipluran	under normal rock on normail soil	3rd passage
	19	photo	psuedoscorpion	dry rock wall	1st turn
	20	hand	fly	on wet roots	" "
*	21	photo	tenebrionodae	dry soil (dead one nearby)	entrance crawl
	22	observe	3 ants	dry rock wall	alternate entrance
	23	observe	cave cricket	dry rock wall	above 1st turn
	24	observe	cave cricket	"	Christy's passage
	25	obs	Heliomyzid fly	"	"

Root Cave (continued).



Extech

Meter Log

Cave Root

Crew c. Moerbe GMB, J. + R. Anderson

Date 10/17/06

Page 1 of 1

SURFACE

Barometric Preassure 29.89 units: "Hg
time: 852 [✓ am] pm

AWS ~~Kestrel.~~
Wind 0 ~~m/s ft/s~~
Air Temp 32 C [✓ F]
RH 83 %

Cave Location
UTM z NAD
mE
mN
EPE +/- m / ft

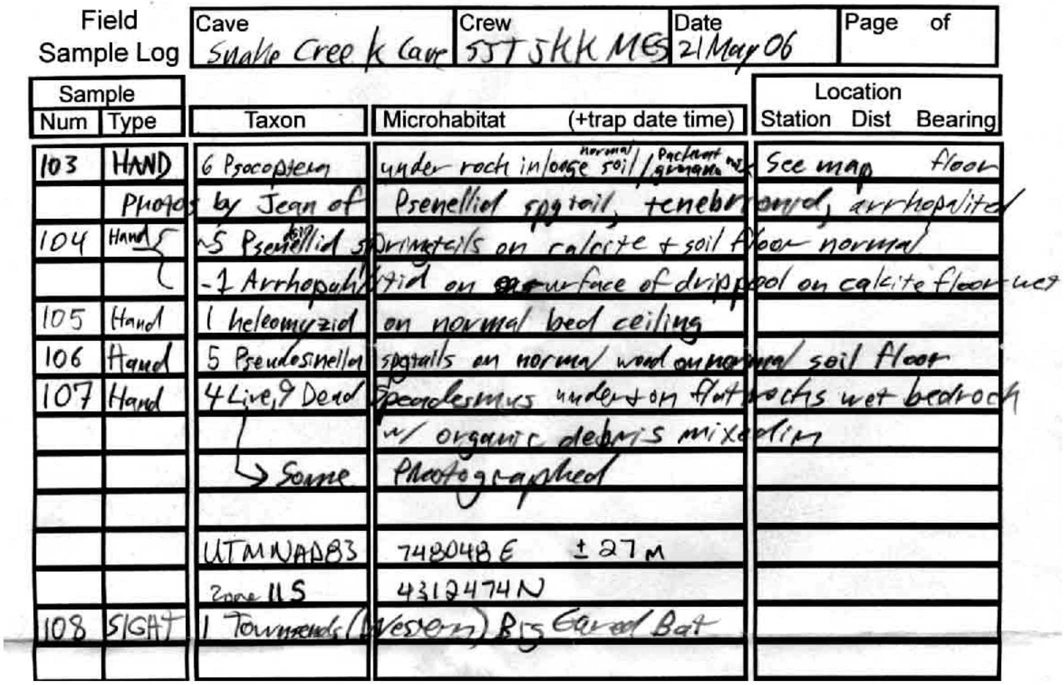
Light Meter:
Units:

Location	Wet B	Dry B	Soil	Air	~~Light~~ Humidity%	Other
1st walking passage	55.1	58.5	59.5	60.8	85.0	
1st turn	54.5	57.4	54.5	55.4	84.4	
3rd passage	54.3	55.2	53.7	54.1	90.8	
1 m off floor 3rd passage	53.7	55.6			92.9	
Very back of 3rd passage	55.9	56.7	53.7	54.6	89.4	

floor level

Snake Creek Cave

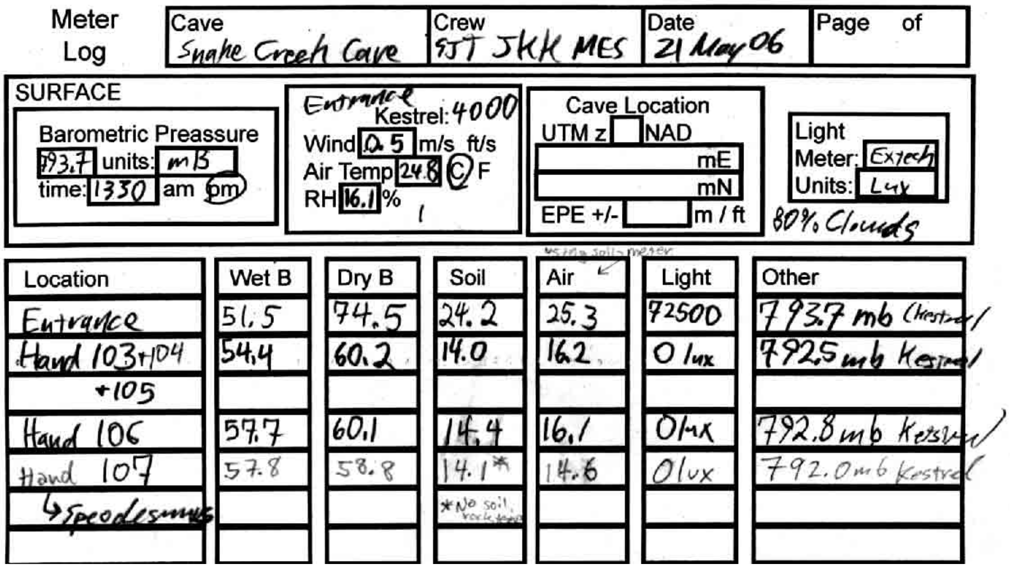
Steven J. Taylor, Jean K. Krejca, Michael E. Slay
21-May-06
Meg A. Horner, Gretchen M. Baker, Christy A. Moerbe
24-Oct-06



Field Sample Log

Cave: Snake Creek Cave
Crew: SJT JKK MES
Date: 21 May 06
Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
103	HAND	6 Psocoptera	under rock in/on normal soil / packrat guano w/	See map floor
	Photos	by Jean of	Psenellid spgtail, tenebrionid, arrhopalitid	
104	Hand	~5 Psenellid springtails on calcite + soil floor normal		
		-1 Arrhopalitid on surface of drip pool on calcite floor - wet		
105	Hand	1 heleomyzid	on normal bed ceiling	
106	Hand	5 Pseudosinella	spgtails on normal wood on normal soil floor	
107	Hand	4 Live, 9 Dead	Speodesmus under + on flat rocks wet bedrock	
			w/ organic debris mixed in	
		Some	Photographed	
		UTM NAD83	748048 E ±27 m	
		Zone 11S	4312474 N	
108	SIGHT	1 Townsends (Western) Big Eared Bat		



Meter Log

Cave: Snake Creek Cave
Crew: SJT JKK MES
Date: 21 May 06
Page of

SURFACE

Barometric Preassure
793.7 units: mB
time: 1330 am [✓ pm]

Entrance
Kestrel: 4000
Wind 0.5 m/s ft/s
Air Temp 24.8 [✓ C] F
RH 16.1 %

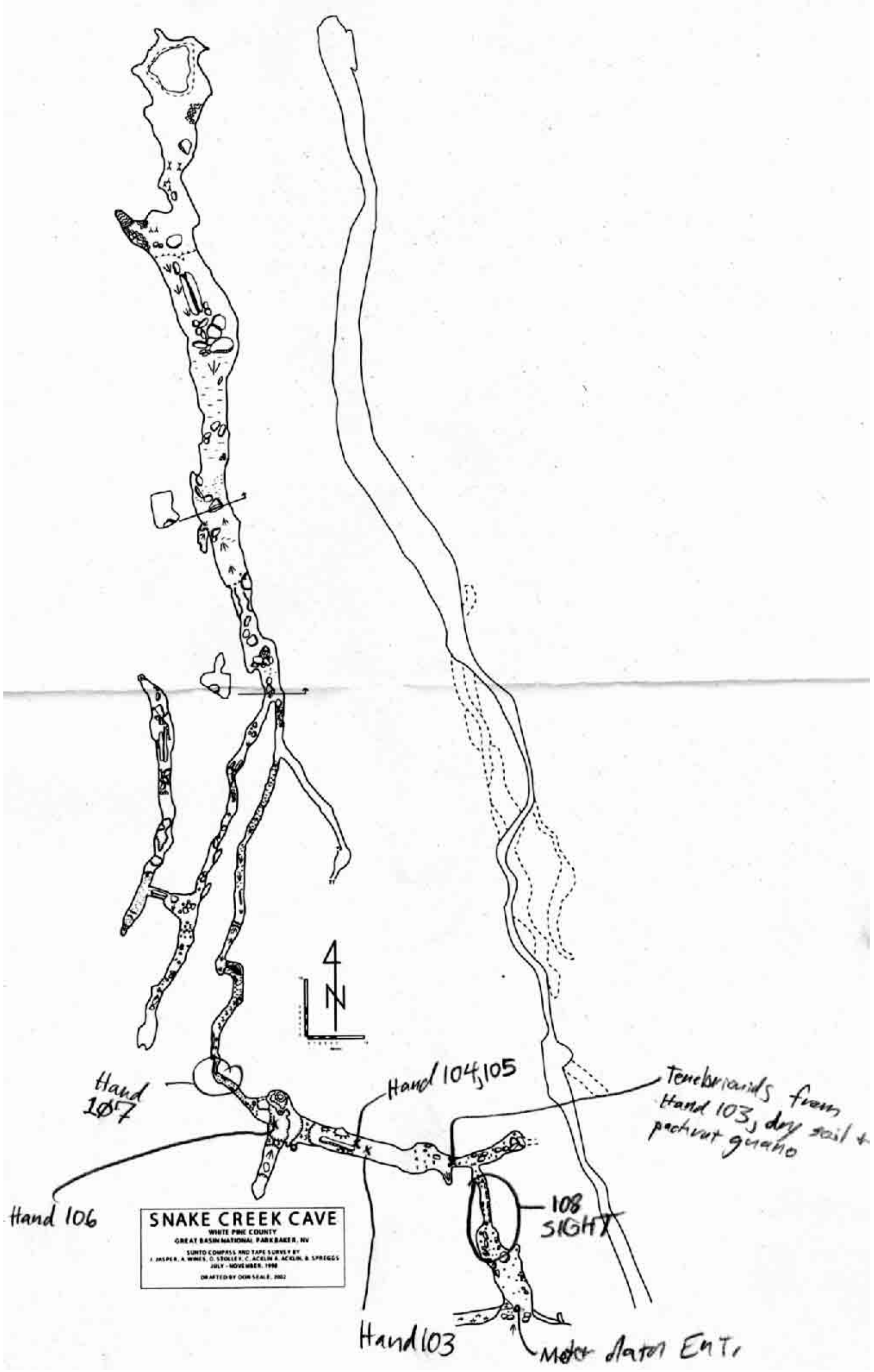
Cave Location
UTM z ☐ NAD
mE
mN
EPE +/- m / ft

Light
Meter: Extech
Units: Lux

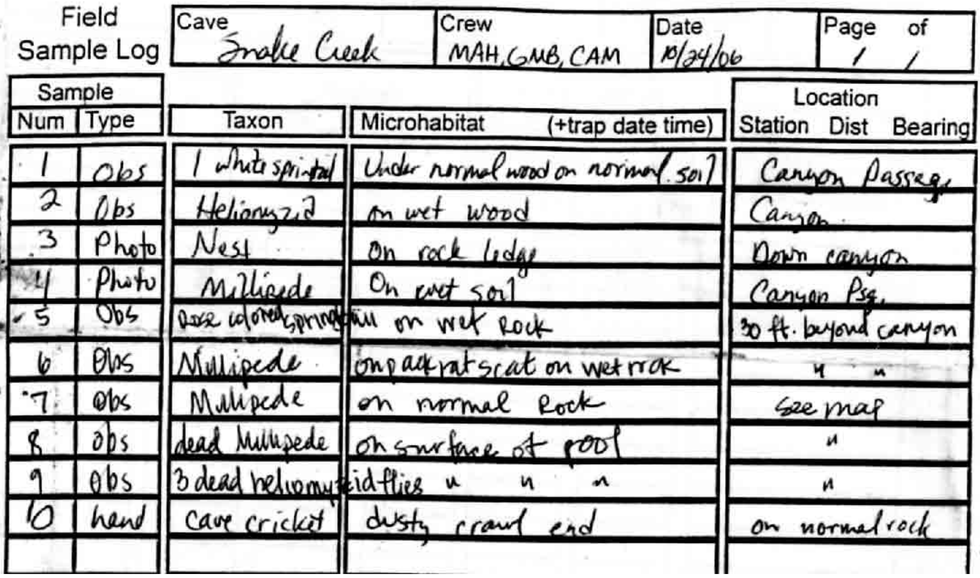
80% Clouds

Location	Wet B	Dry B	Soil	Air (using soil meter)	Light	Other
Entrance	51.5	74.5	24.2	25.3	72500	793.7 mb (Kestrel)
Hand 103+104	54.4	60.2	14.0	16.2	0 lux	792.5 mb Kestrel
+105						
Hand 106	57.7	60.1	14.4	16.1	0 lux	792.8 mb Kestrel
Hand 107	57.8	58.8	14.1*	14.6	0 lux	792.0 mb Kestrel
Speodesmus			*No soil, rock temp			

Snake Creek Cave (continued).



Snake Creek Cave (continued).



Field Sample Log

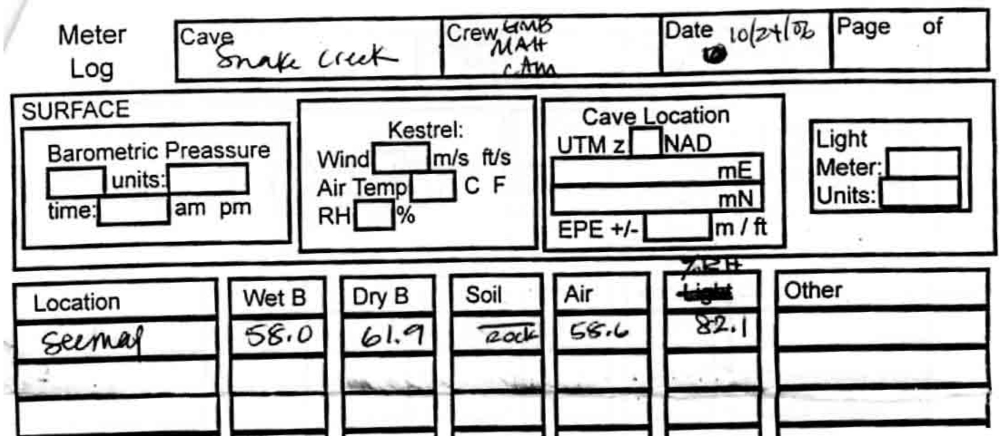
Cave: Snake Creek

Crew: MAH, GMB, CAM

Date: 10/24/06

Page 1 of 1

Sample				
Num	Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
1	Obs	1 white springtail	Under normal wood on normal soil	Canyon Passage
2	Obs	Heliomyzid	on wet wood	Canyon
3	Photo	Nest	On rock ledge	Down canyon
4	Photo	Millipede	On wet soil	Canyon Psg.
5	Obs	Rose colored springtail	on wet Rock	30 ft. beyond canyon
6	Obs	Millipede	on packrat scat on wet rock	" "
7	Obs	Millipede	on normal Rock	see map
8	obs	dead Millipede	on surface of pool	"
9	obs	3 dead heliomyzid flies	" " "	"
10	hand	cave cricket	dusty crawl end	on normal rock



Meter Log

Cave: Snake creek

Crew: GMB MAH CAM

Date: 10/24/06

Page of

SURFACE

Barometric Preassure ☐ units: ☐ time: ☐ am pm

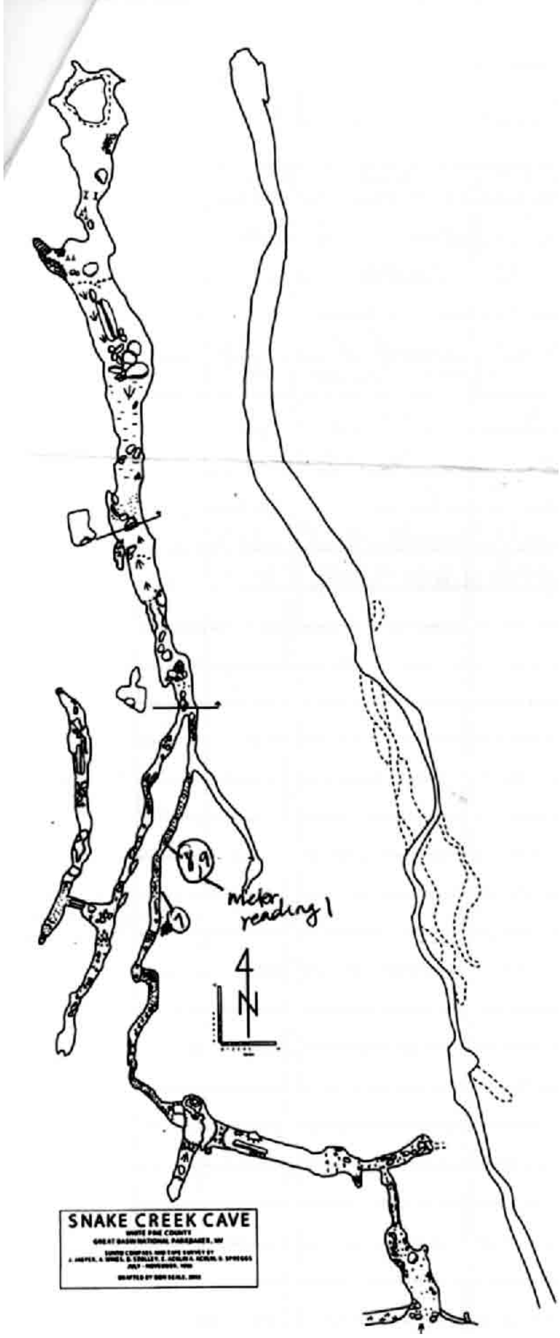
Kestrel: Wind ☐ m/s ft/s Air Temp ☐ C F RH ☐ %

Cave Location: UTM z ☐ NAD ☐ mE ☐ mN EPE +/- ☐ m / ft

Light Meter: ☐ Units: ☐

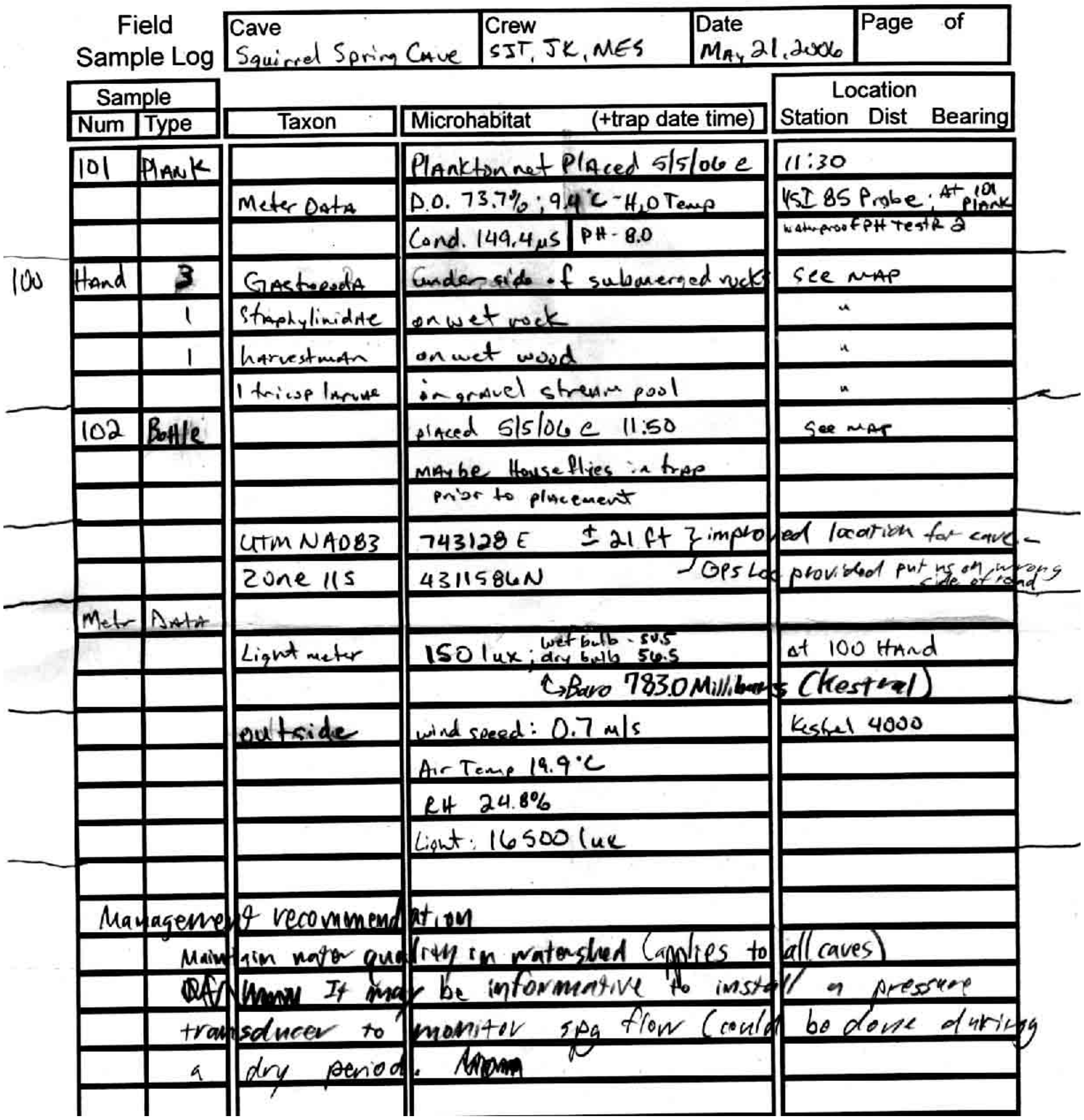
Location	Wet B	Dry B	Soil	Air	%RH ~~Light~~	Other
seemap	58.0	61.9	Rock	58.6	82.1	

Snake Creek Cave (continued).



Squirrel Spring Cave

Steven J. Taylor, Jean K. Krejca, Michael E. Slay
21-May-06
Steven J. Taylor, Jean K. Krejca, Michael E. Slay
27-May-06
Gretchen M. Baker, Meg A. Horner, Christy A. Moerbe
24-Oct-06
Gretchen M. Baker, Jean K. Krejca, Steven J. Taylor
27-Feb-07
Jean K. Krejca
2-Mar-07



Field Sample Log
Cave: Squirrel Spring Cave
Crew: SJT, JK, MES
Date: May 21, 2006
Page of

Sample		Taxon	Microhabitat (+trap date time)	Location
Num	Type			Station Dist Bearing
101	Plank		Plankton net Placed 5/5/06 e	11:30
		Meter Data	D.O. 73.7% ; 9.4°C - H_2O Temp	YSI 85 Probe : At 101 Plank
			Cond. 149.4 µS; PH - 8.0	waterproof PH testR 2
100 Hand	3	Gastropoda	underside of submerged rocks	See MAP
	1	Staphylinidae	on wet rock	"
	1	harvestman	on wet wood	"
		1 tricop larvae	in gravel stream pool	"
102	Bottle		placed 5/5/06 e 11:50	See MAP
			maybe House flies in trap	
			prior to placement	
		UTM NAD83	743128 E ± 21 ft } improved location for cave -	
		Zone 11S	4311586N GPS Loc provided put us on wrong side of road	
Meter	Data			
		Light meter	150 lux ; wet bulb - 50.5 dry bulb 56.5	at 100 Hand
			↳ Baro 783.0 Millibars (Kestrel)	
		outside	wind speed: 0.7 m/s	Kestrel 4000
			Air Temp 19.9°C	
			RH 24.8%	
			Light: 16500 lux	

Management recommendation
Maintain water quality in watershed (applies to all caves)
It may be informative to install a pressure transducer to monitor spg flow (could be done during a dry period.

Squirrel Spring Cave (continued).

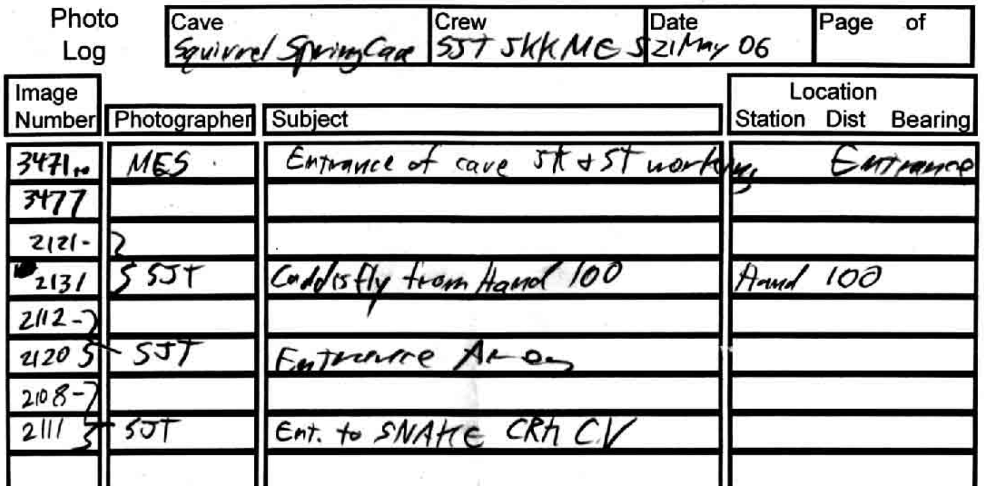


Photo Log

Cave: Squirrel Spring Cave

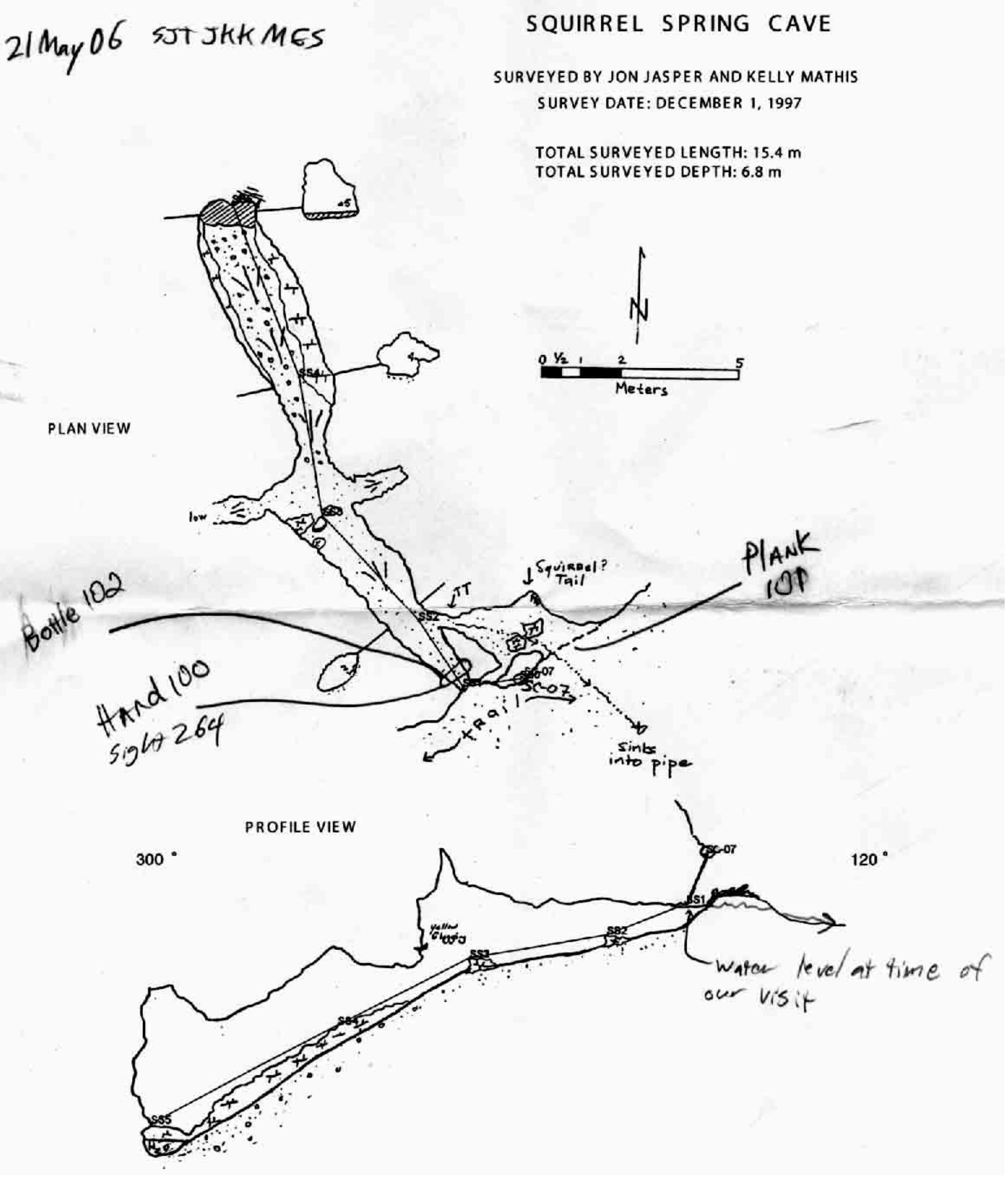
Crew: SJT SKK MES

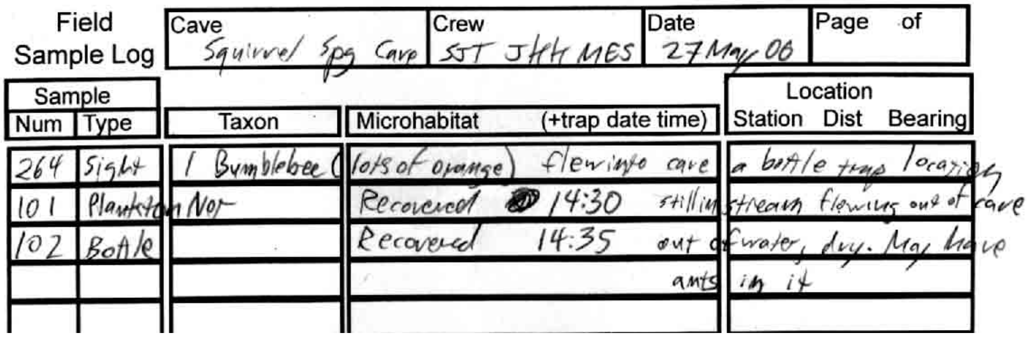
Date: 21 May 06

Page of

Image Number	Photographer	Subject	Location Station	Dist	Bearing
3471 to	MES	Entrance of cave SK + ST working		Entrance	
3477					
2121-					
2131	SJT	Caddisfly from Hand 100	Hand	100	
2112-					
2120	SJT	Entrance Area			
2108-					
2111	SJT	Ent. to SNAKE CRK CV			

Squirrel Spring Cave (continued).



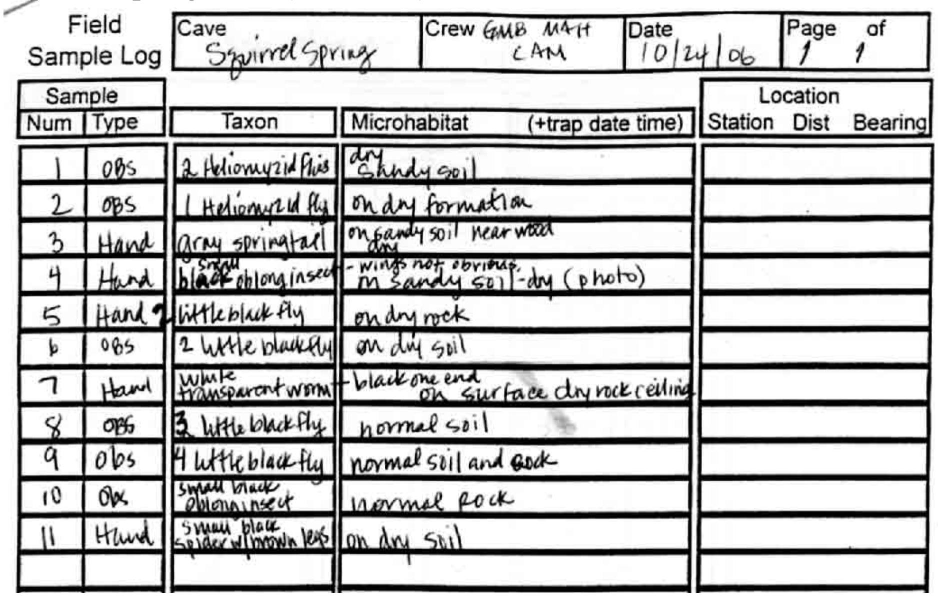


Field Sample Log

Cave	Crew	Date	Page of
Squirrel Spg Cave	SJT JKK MES	27 May 06	

Sample				Location
Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing
264	Sight	1 Bumblebee (	lots of orange) flew into cave	a bottle trap locating
101	Plankton Net		Recovered 14:30 stilling	stream flowing out of cave
102	Bottle		Recovered 14:35 out of	water, dry. May have
			ants	in it

Squirrel Spring Cave (continued).



Field Sample Log

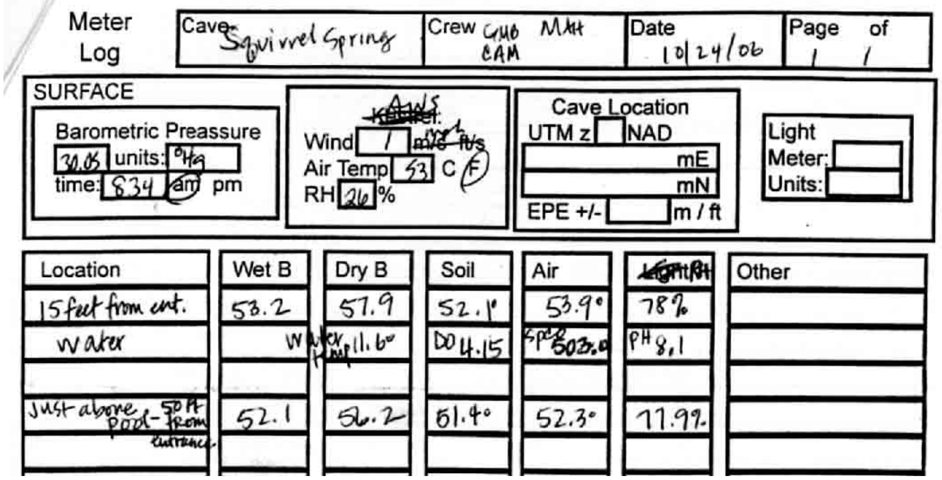
Cave: Squirrel Spring

Crew: GMB MAH CAM

Date: 10/24/06

Page 1 of 1

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
1	OBS	2 Heliomyzid flies	dry sandy soil			
2	OBS	1 Heliomyzid fly	on dry formation			
3	Hand	gray springtail	on sandy soil near wood dry			
4	Hand	small black oblong insect	- wings not obvious. in sandy soil -dry (photo)			
5	Hand ?	little black fly	on dry rock			
6	OBS	2 little black fly	on dry soil			
7	Hand	white transparent worm	- black one end on surface dry rock ceiling			
8	OBS	3 little black fly	normal soil			
9	obs	4 little black fly	normal soil and rock			
10	Obs	small black oblong insect	normal rock			
11	Hand	small black spider w/ brown legs	on dry soil			



Meter Log

Cave: Squirrel Spring

Crew: GMB MAH CAM

Date: 10/24/06

Page 1 of 1

SURFACE

Barometric Preassure

30.05 units: "Hg

time: 834 [✓ am] pm

~~Kestrel:~~ AWS

Wind 1 ~~m/s ft/s~~ mph

Air Temp 53 C [✓ F]

RH 26 %

Cave Location

UTM z ☐ NAD

mE

mN

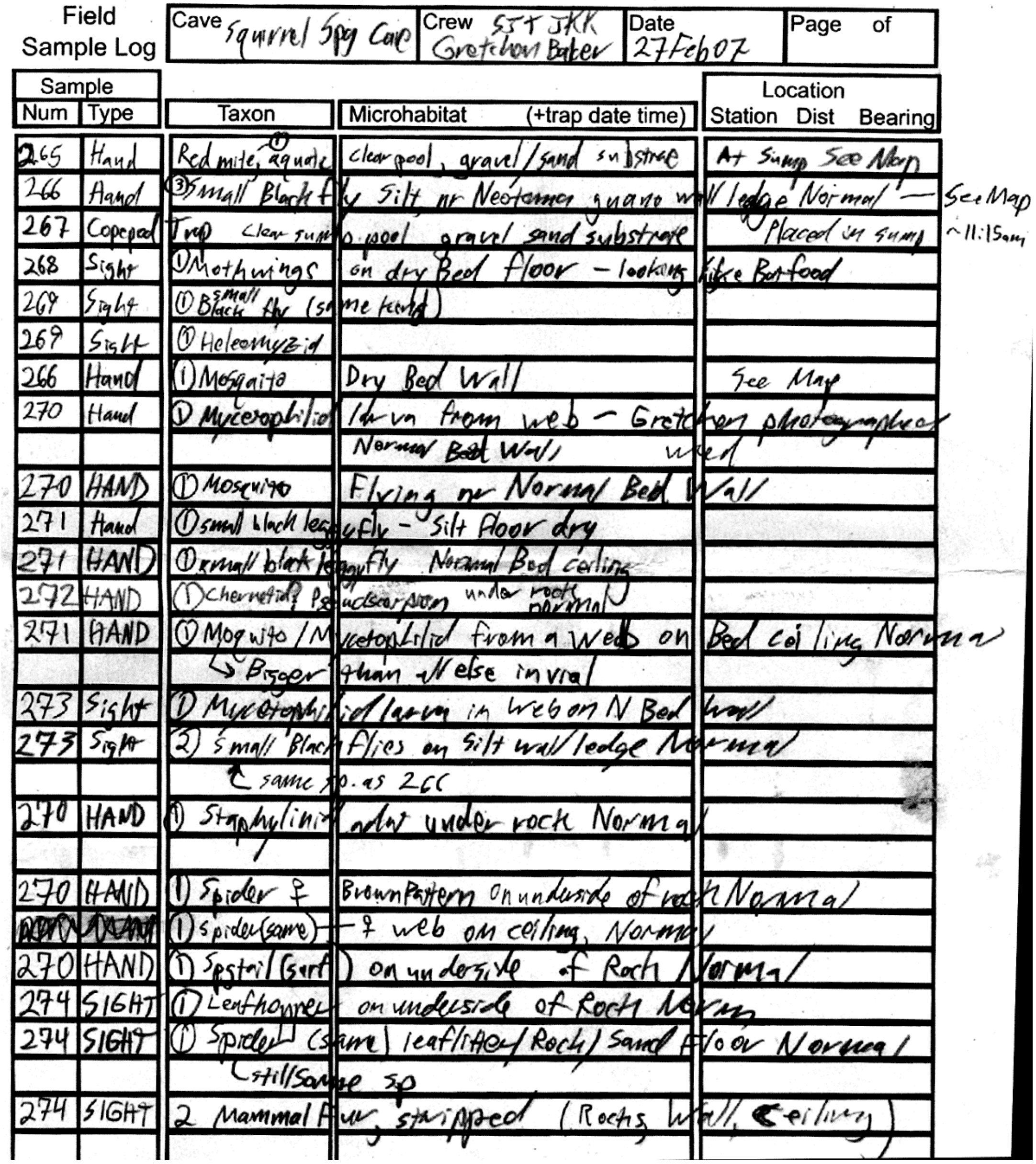
EPE +/- m / ft

Light Meter:

Units:

Location	Wet B	Dry B	Soil	Air	~~Light~~ RH	Other
15 feet from ent.	53.2	57.9	52.1°	53.9°	78%	
water		water temp 11.6°	DO 4.15	spec 503.0	pH 8.1	
Just above pool - 50 ft from entrance	52.1	56.2	51.4°	52.3°	77.9%	

Squirrel Spring Cave (continued).

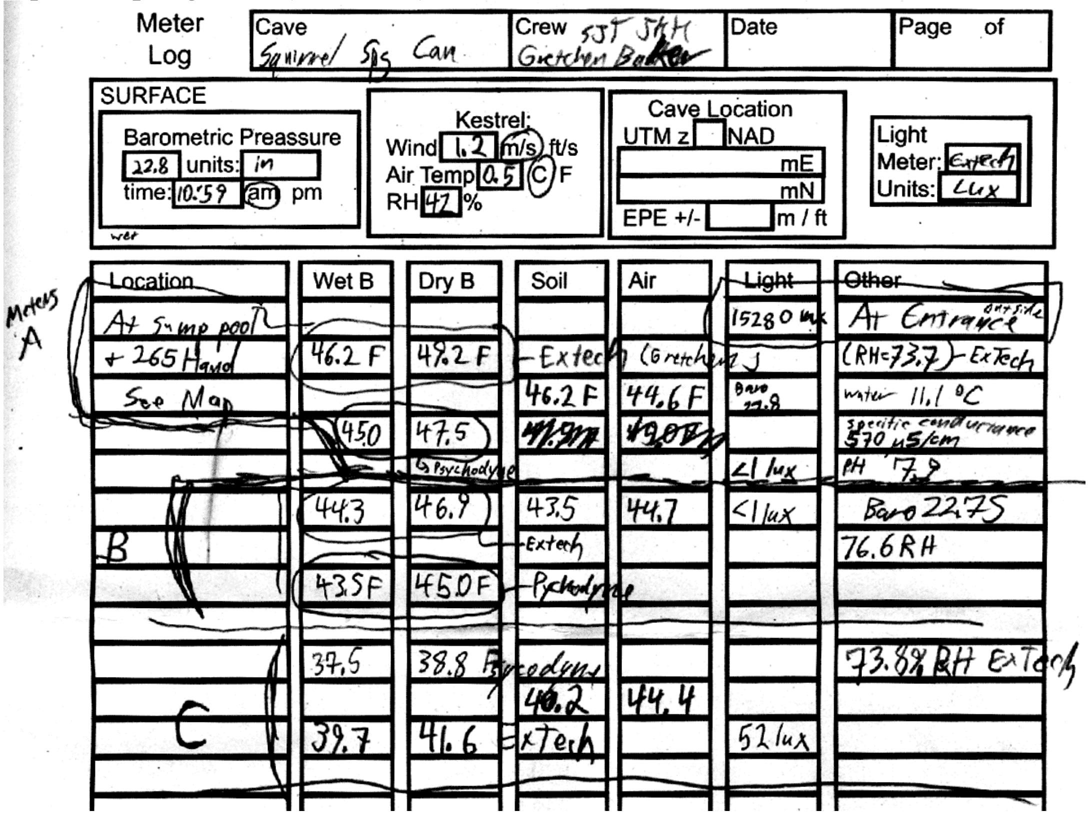


Field Sample Log

Cave Squirrel Spg Cave
Crew SJT JKK Gretchen Baker
Date 27Feb07
Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
265	Hand	Red mite, aquatic ①	clear pool, gravel/sand substrate	At Sump See Map
266	Hand	③ Small Black fly	Silt nr Neotoma guano wall ledge Normal	— See Map
267	Copepod	Trap	Clear sump pool gravel/ sand substrate	Placed in sump ~11:15am
268	Sight	① Mothwings	on dry Bed floor — looking like Bat food	
269	Sight	① small Black fly (same kind)		
269	Sight	① Heleomyzid		
266	Hand	① Mosqaito	Dry Bed Wall	See Map
270	Hand	① Mycerophilid	larva from web — Gretchen photographed	
			Normal Bed Wall wed	
270	HAND	① Mosquito	Flying nr Normal Bed Wall	
271	Hand	① small black leggy fly	— Silt floor dry	
271	HAND	① small black leggy fly	Normal Bed ceiling	
272	HAND	① Chernetid? Pseudoscorpion	under rock normal	
271	HAND	① Mosquito / Mycetophilid	from a web on Bed ceiling	Normal
		↳ Bigger	than all else in vial	
273	Sight	① Mycetophilid larva	in web on N Bed wall	
273	Sight	② small Black flies	on silt wall/ledge Normal	
		↑ same sp. as 266		
270	HAND	① Staphylinid	adult under rock Normal	
270	HAND	① Spider ♀	Brown Pattern on underside of rock Normal	
[illegible]	[illegible]	① spider (same)	— ♀ web on ceiling, Normal	
270	HAND	① Spstail (Surf)	on underside of Rock Normal	
274	SIGHT	① Leafhopper	on underside of Rock Normal	
274	SIGHT	① Spider (same)	leaf litter/ Rock/ Sand Floor Normal	
		↳ still same sp		
274	SIGHT	2 Mammal fur,	stripped (Rocks, Wall, Ceiling)	

Squirrel Spring Cave (continued).



Meter Log

Cave: Squirrel Spg Cav

Crew: SJT SKH Gretchen Baker

Date:

Page of

SURFACE

Barometric Preassure

22.8 units: in

time: 10:59 [✓ am] pm

wet

Kestrel:

Wind 1.2 [✓ m/s] ft/s

Air Temp 0.5 [✓ C] F

RH 42 %

Cave Location

UTM z NAD

mE

mN

EPE +/- m / ft

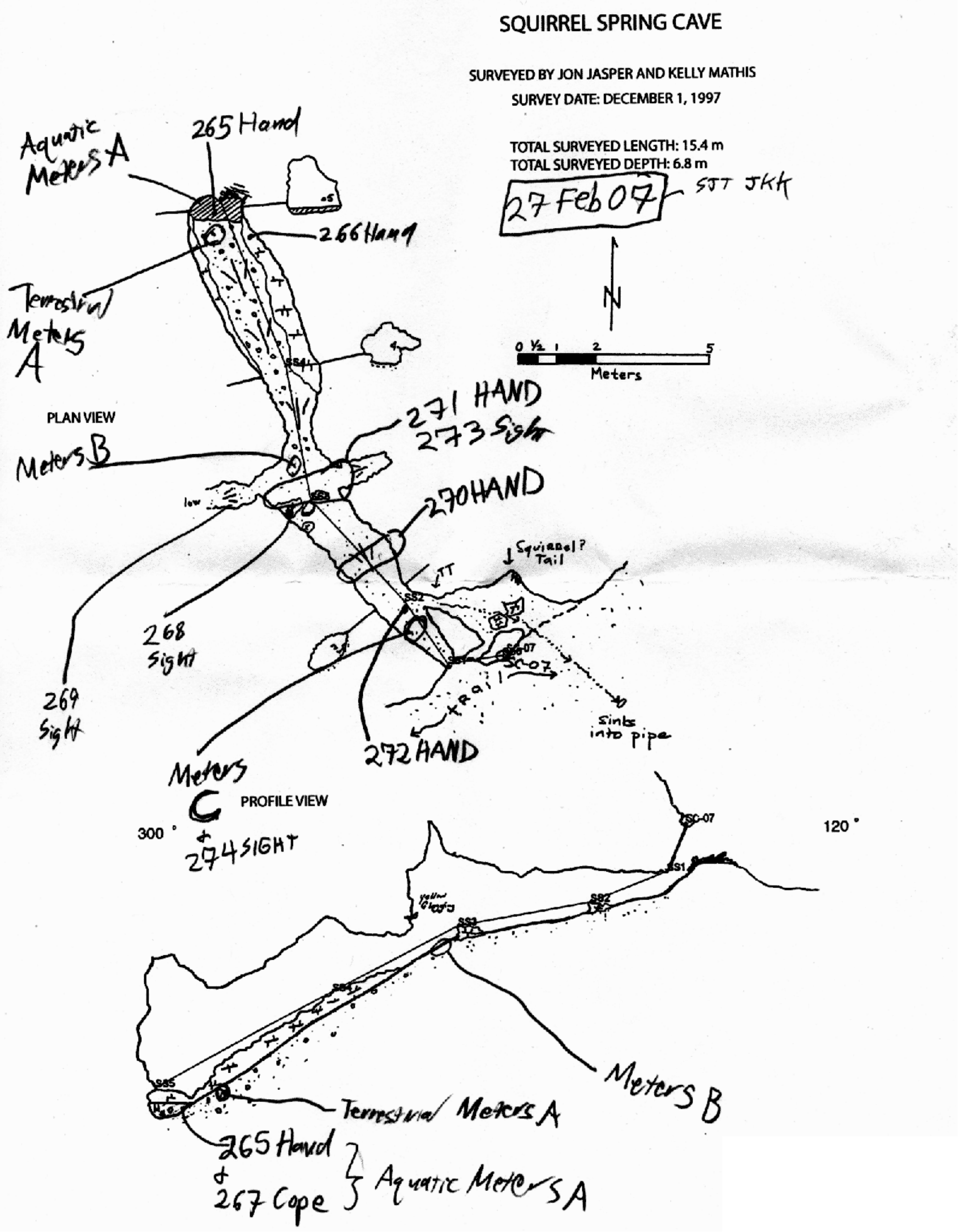
Light Meter: Extech

Units: Lux

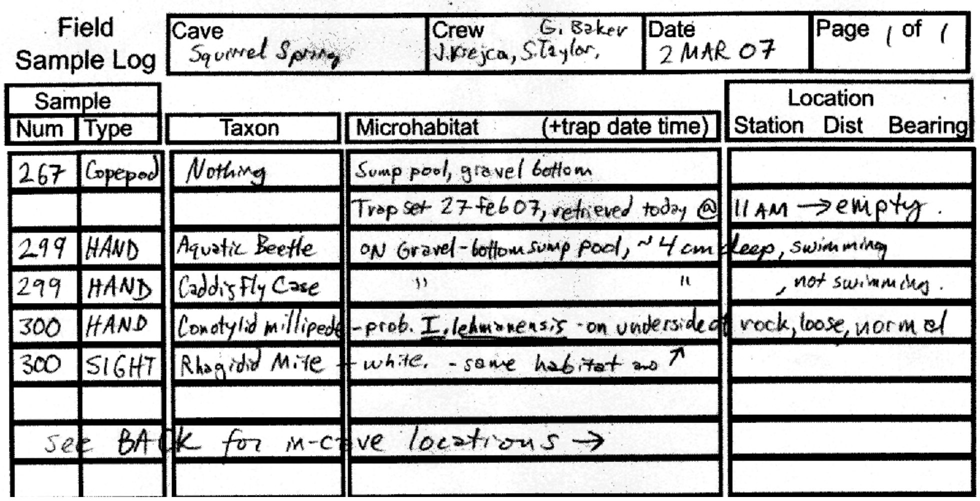
Meters A

Location	Wet B	Dry B	Soil	Air	~~Light~~	~~Other~~
At Sump pool					15280 lux	At Entrance outside
+ 265 Hand	46.2 F	48.2 F	- Extech	(Gretchen)		(RH=73.7) - ExTech
See Map			46.2 F	44.6 F	Baro 22.8	water 11.1 °C
	45.0	47.5	~~[illegible]~~	~~49.0F~~		specific conductance 570 µS/cm
		↳ Psychodyne			<1 lux	pH 7.8
	44.3	46.9	43.5	44.7	<1 lux	Baro 22.75
B			Extech			76.6 RH
	43.5F	45.0F	Pychodyne			
	37.5	38.8 Psycodyne				73.8% RH ExTech
			40.2	44.4		
C	39.7	41.6	ExTech		52 lux	

Squirrel Spring Cave (continued).



Squirrel Spring Cave (continued).



Field Sample Log

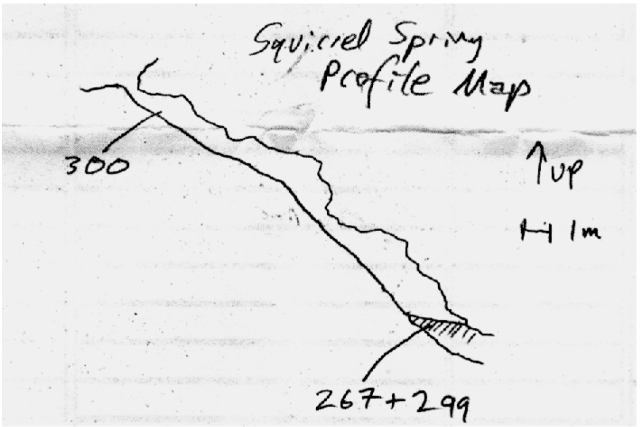
Cave: Squirrel Spring

Crew: G. Baker J. Krejca, S. Taylor,

Date: 2 MAR 07

Page 1 of 1

Sample				Location
Num	Type	Taxon	Microhabitat (+trap date time)	Station Dist Bearing
267	Copepod	Nothing	Sump pool, gravel bottom	
			Trap set 27feb07, retrieved today @	11 AM → empty.
299	HAND	Aquatic Beetle	ON Gravel-bottom sump pool, ~4 cm	deep, swimming
299	HAND	Caddis Fly Case	" "	, not swimming.
300	HAND	Conotylid millipede	-prob. I. lehmanensis -on underside of	rock, loose, normal
300	SIGHT	Rhagidid Mite	-white. -same habitat as ↑	
see BACK for in-cave locations →				

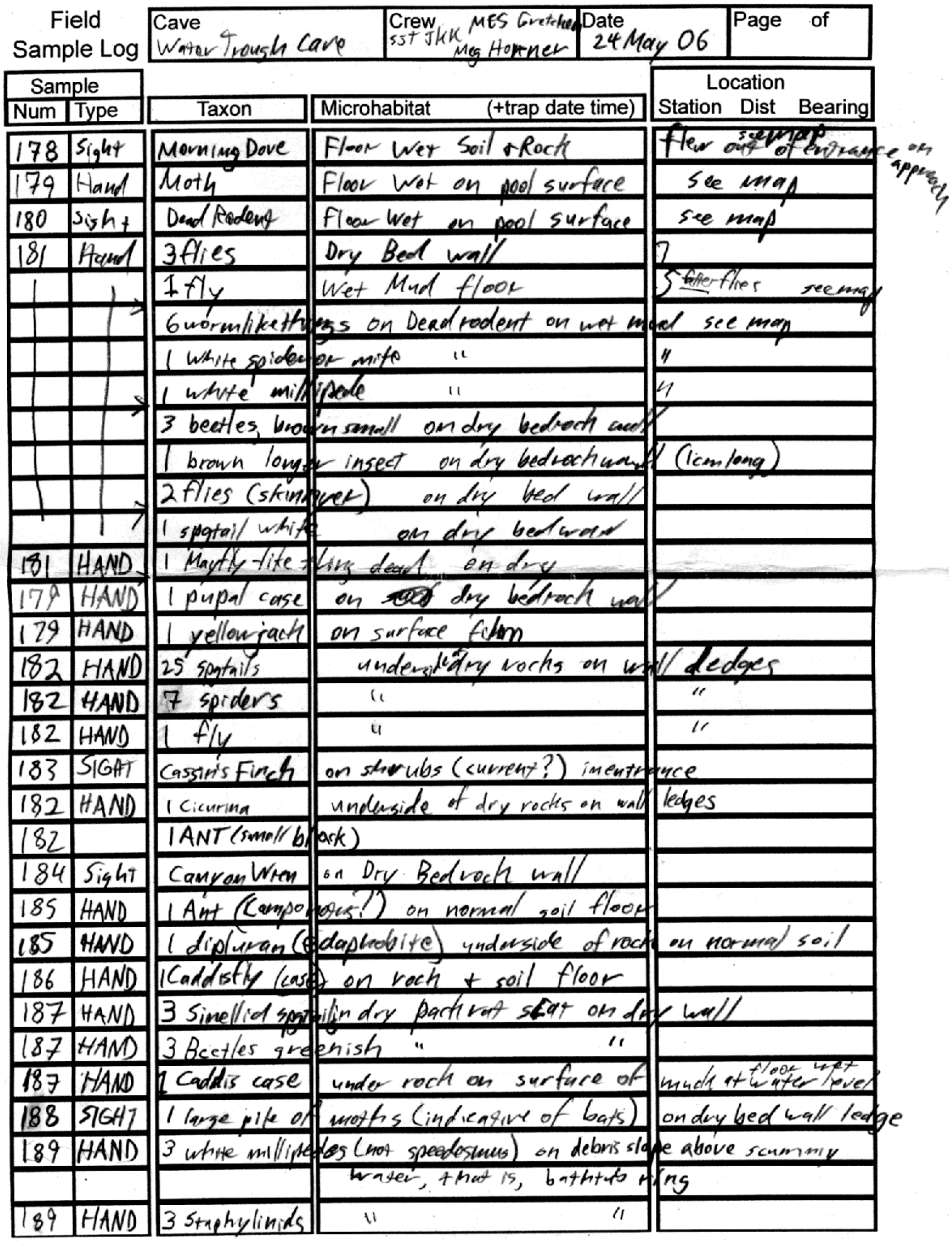


Water Trough Cave

Steven J. Taylor, Jean K. Krejca, Michael E. Slay, Gretchen M. Baker, Meg A. Horner, 24-May-06

Gretchen M. Baker, Meg A. Horner, Ben M. Roberts, RaeJean Layland

8-Nov-06



Field Sample Log

Cave: Water Trough Cave

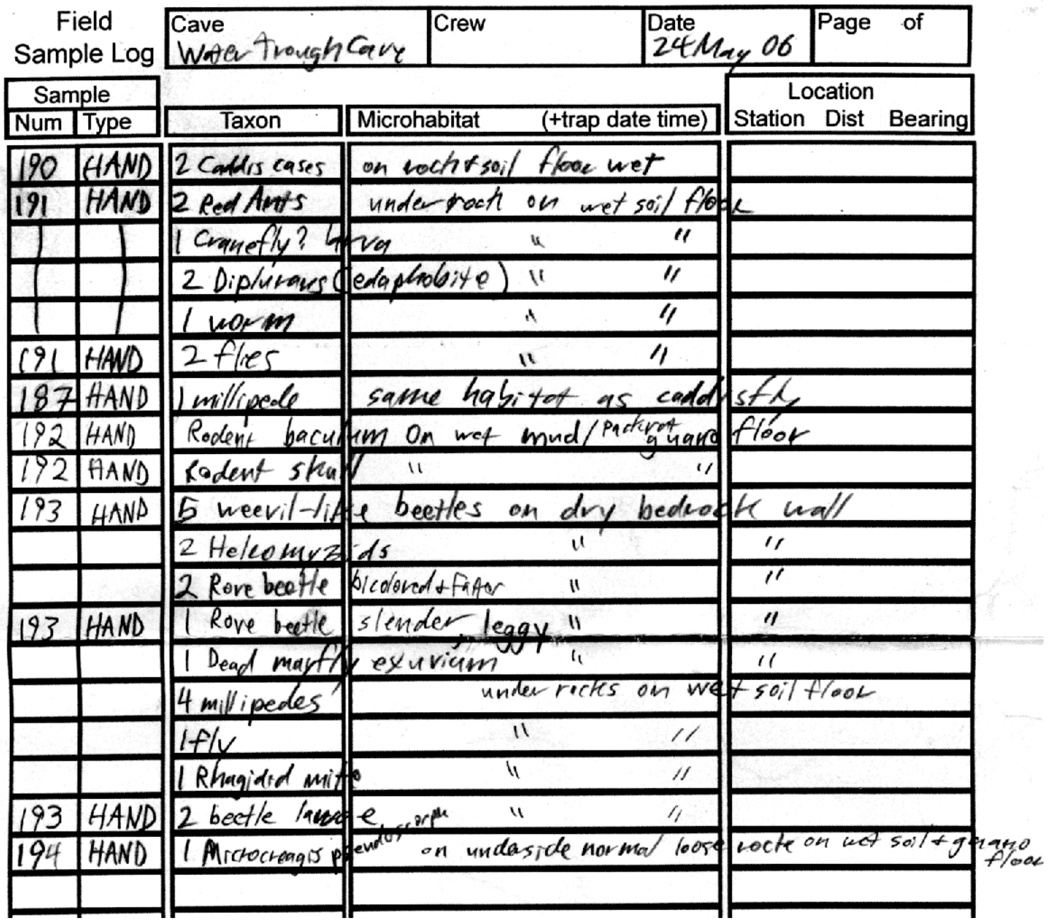
Crew: MES Gretchen SJT JKK Meg Horner

Date: 24 May 06

Page of

Sample Num	Sample Type	Taxon	Microhabitat (+trap date time)	Location Station Dist Bearing
178	Sight	Morning Dove	Floor Wet Soil + Rock	flew out of entrance on approach see map
179	Hand	Moth	Floor Wet on pool surface	see map
180	Sight	Dead Rodent	Floor Wet on pool surface	see map
181	Hand	3 flies	Dry Bed wall	
		1 fly	Wet Mud floor	} flies see map
		6 wormlike things	on Dead rodent on wet mud	see map
		1 white spider or mite	"	"
		1 white millipede	"	"
		3 beetles, brown small	on dry bedrock wall	
		1 brown longer insect	on dry bedrock wall	(1cm long)
		2 flies (skinnier)	on dry bed wall	
		1 springtail white	on dry bed wall	
181	HAND	1 Mayfly-like thing dead	on dry	
179	HAND	1 pupal case	on dry bedrock wall	
179	HAND	1 yellowjack	on surface film	
182	HAND	25 springtails	under dry rocks on wall	ledges
182	HAND	7 spiders	"	"
182	HAND	1 fly	"	"
183	SIGHT	Cassin's Finch	on shrubs (current?) in entrance	
182	HAND	1 Cicurina	underside of dry rocks on wall	ledges
182		1 ANT (small black)		
184	Sight	Canyon Wren	on Dry Bedrock wall	
185	HAND	1 Ant (Camponotus?)	on normal soil floor	
185	HAND	1 dipluran (edaphobite)	underside of rock	on normal soil
186	HAND	1 Caddisfly (case)	on rock + soil floor	
187	HAND	3 Sminthurid springtails	in dry packrat scat on dry wall	
187	HAND	3 Beetles greenish	" "	
187	HAND	1 Caddis case	under rock on surface of	floor wet mud at water level
188	SIGHT	1 large pile of	moths (indicative of bats)	on dry bed wall ledge
189	HAND	3 white millipedes (not speodesmus)	on debris slope above scummy	
			water, that is, bathtub ring	
189	HAND	3 Staphylinids	" "	

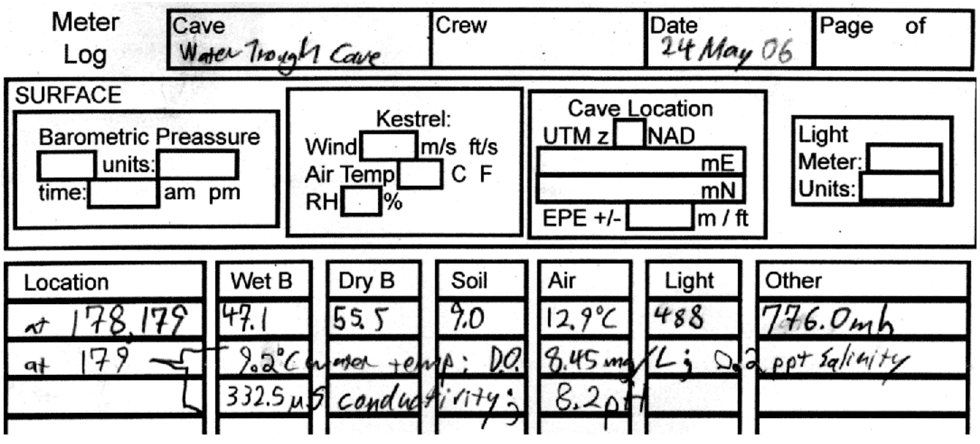
Water Trough Cave (continued).



Field Sample Log

Cave: Water Trough Cave
Crew:
Date: 24 May 06
Page of

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
190	HAND	2 Caddis cases	on rock+soil floor wet			
191	HAND	2 Red Ants	under rock on wet soil floor			
		1 Cranefly? larva	" "			
		2 Diplurans (edaphobite)	" "			
		1 worm	" "			
191	HAND	2 flies	" "			
187	HAND	1 millipede	same habitat as caddisfly			
192	HAND	Rodent baculum	On wet mud/Packrat guano floor			
192	HAND	Rodent skull	" "			
193	HAND	5 weevil-like beetles	on dry bedrock wall			
		2 Heleomyzids	"	"		
		2 Rove beetle	bicolored+fatter "	"		
193	HAND	1 Rove beetle	slender, leggy "	"		
		1 Dead mayfly exuvium	"	"		
		4 millipedes	under rocks on wet soil floor			
		1 fly	" "			
		1 Rhagidiid mite	" "			
193	HAND	2 beetle larvae	" "			
194	HAND	1 Microcreagris pseudoscorpion	on underside normal loose rock on wet soil+guano floor			



Meter Log

Cave: Water Trough Cave
Crew:
Date: 24 May 06
Page of

SURFACE

Barometric Preassure ☐ units: ☐ time: ☐ am pm

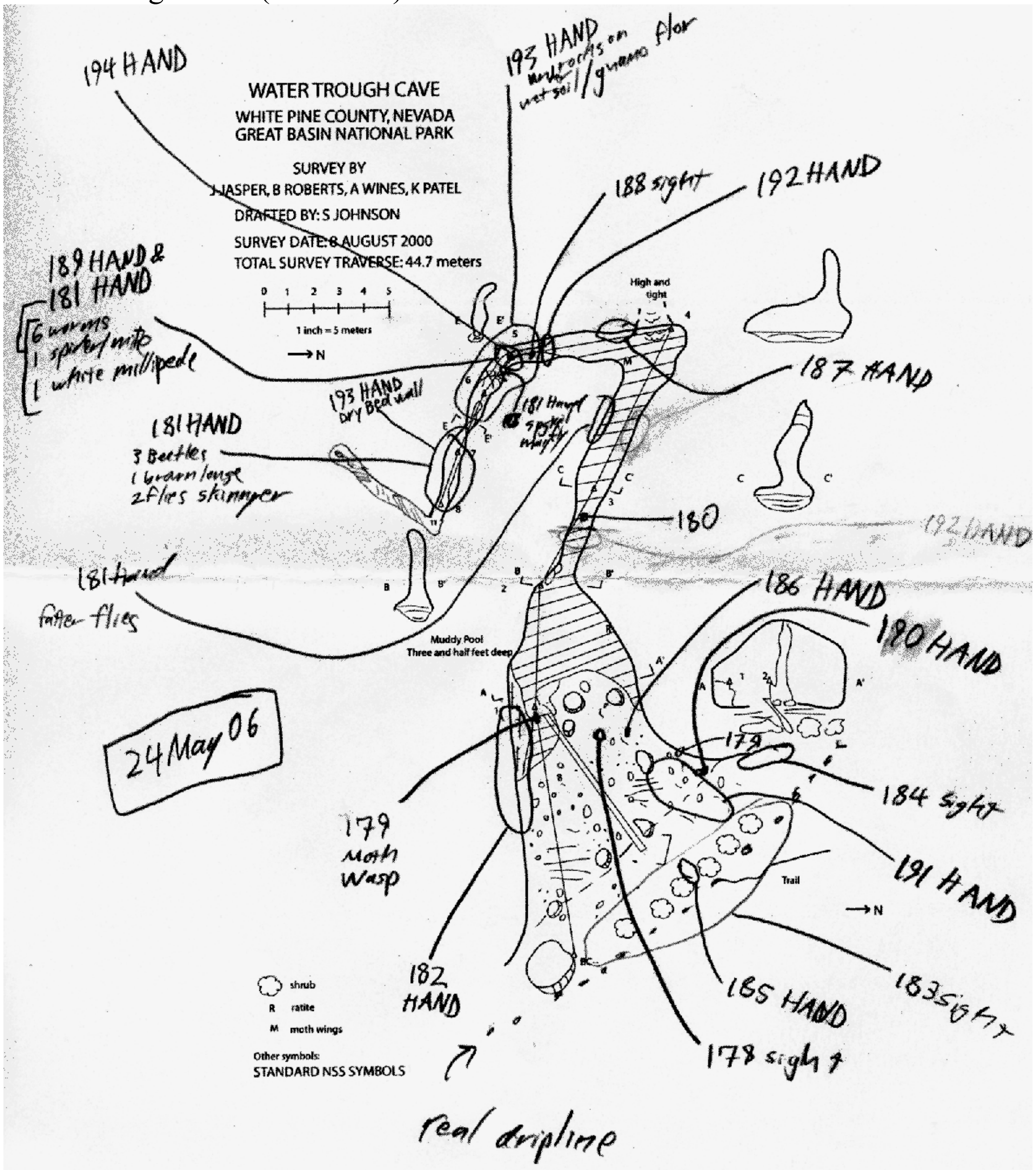
Kestrel: Wind ☐ m/s ft/s Air Temp ☐ C F RH ☐ %

Cave Location UTM z ☐ NAD ☐ mE ☐ mN EPE +/- ☐ m / ft

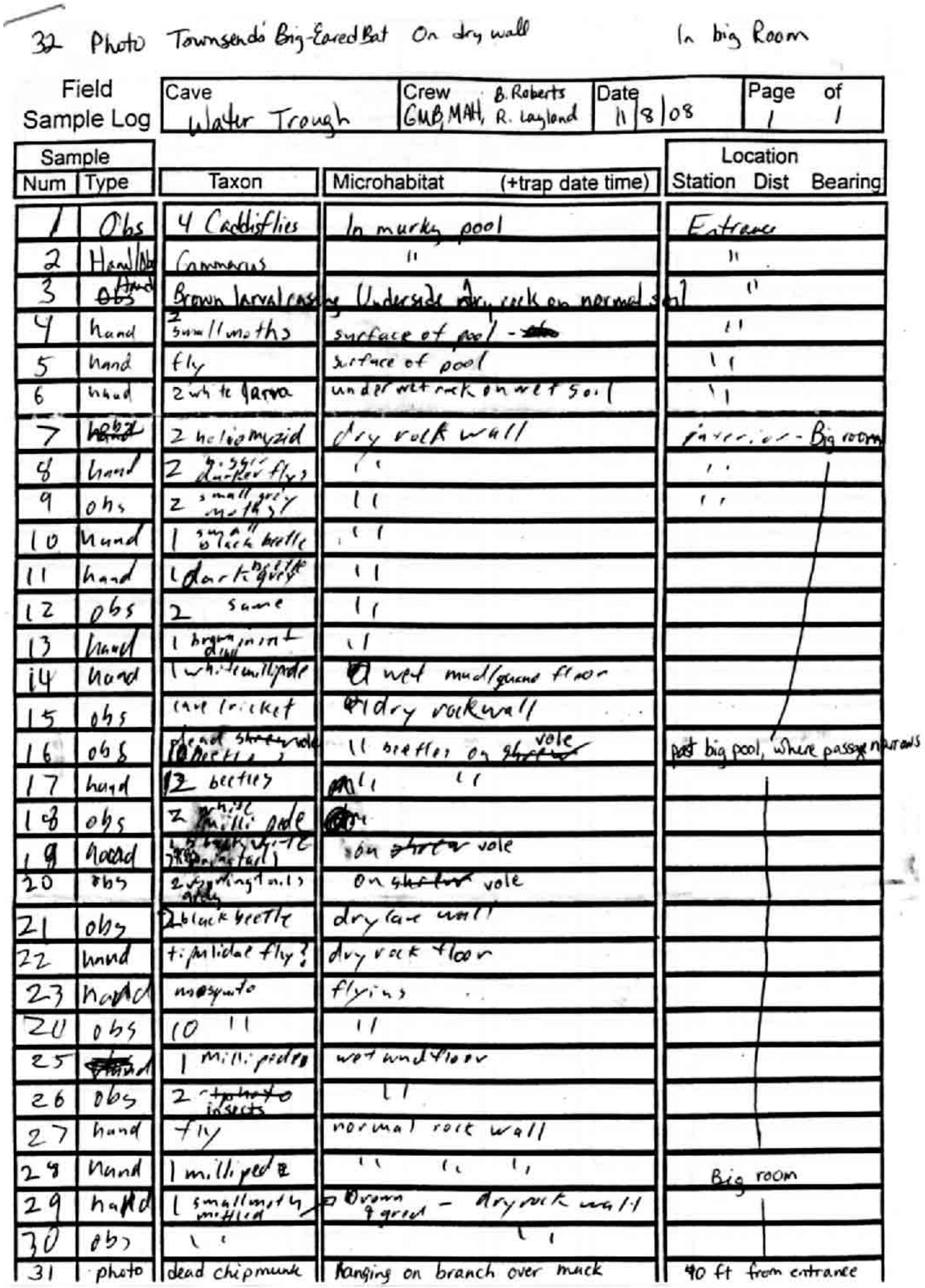
Light Meter: ☐ Units: ☐

Location	Wet B	Dry B	Soil	Air	Light	Other
at 178,179	47.1	55.5	9.0	12.9°C	488	776.0mb
at 179	9.2°C water	temp;	D.O.	8.45 mg/L;		0.2 ppt salinity
	332.5 µS	conductivity;		8.2 pH		

Water Trough Cave (continued).



Water Trough Cave (continued).

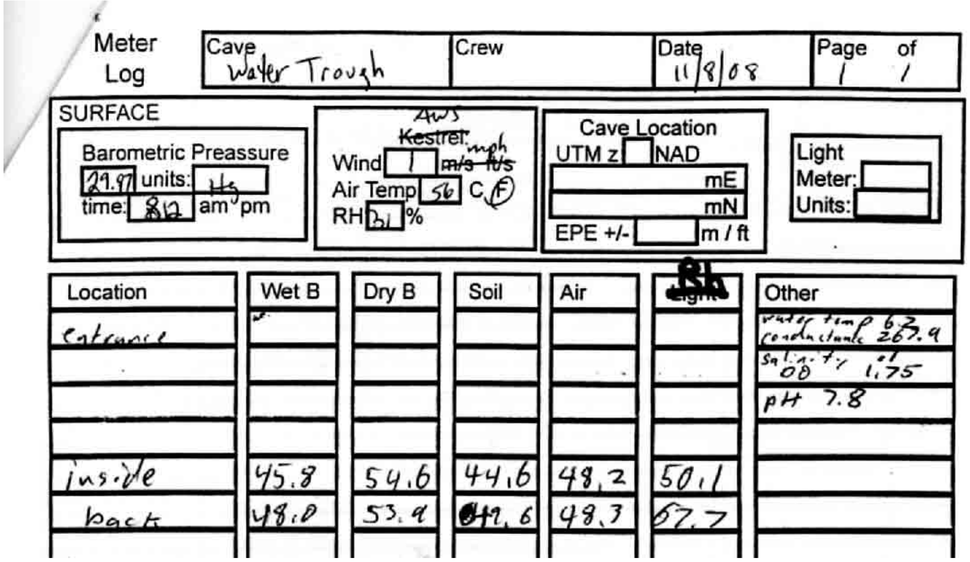


32 Photo Townsend's Big-Eared Bat On dry wall In big Room

Field Sample Log	Cave: Water Trough	Crew: GMB, MAH, B. Roberts, R. Laylond	Date: 11/8/08	Page 1 of 1

Sample				Location		
Num	Type	Taxon	Microhabitat (+trap date time)	Station	Dist	Bearing
1	Obs	4 Caddisflies	In murky pool	Entrance		
2	Hand/Obs	Gammarus	"	"		
3	~~Obs~~ Hand	Brown larval casing	Underside ~~dry~~ rock on normal soil	"		
4	hand	2 small moths	surface of pool -	"		
5	hand	fly	surface of pool	"		
6	hand	2 white larva	under wet rock on wet soil	"		
7	~~hand~~ obs	2 heliomyzid	dry rock wall	interior - Big room		
8	hand	2 bigger darker flys	"	"		
9	obs	2 small grey moths?	"	"		
10	hand	1 small black beetle	"			
11	hand	1 dark grey beetle	"			
12	obs	2 same	"			
13	hand	1 brown insect dull	"			
14	hand	1 white millipede	wet mud/guano floor			
15	obs	cave cricket	dry rockwall			
16	obs	dead ~~shrew~~ vole 10 beetles	11 beetles on ~~shrew~~ vole	past big pool, where passage narrows		
17	hand	2 beetles	" "			
18	obs	2 white millipede				
19	hand	[illegible] black white springtails	on ~~shrew~~ vole			
20	obs	2 springtails grey	on ~~shrew~~ vole			
21	obs	2 black beetle	dry cave wall			
22	hand	tipulidae fly?	dry rock floor			
23	hand	mosquito	flying			
24	obs	10 "	"			
25	~~obs~~ hand	1 millipede	wet mud floor			
26	obs	2 ~~photo~~ insects	"			
27	hand	fly	normal rock wall			
28	hand	1 millipede	" " "	Big room		
29	hand	1 small moth mottled	brown & green - dry rock wall			
30	obs	"	"			
31	photo	dead chipmunk	hanging on branch over muck	40 ft from entrance		

Water Trough Cave (continued).



Meter Log

Cave: Water Trough
Crew:
Date: 11/8/08
Page 1 of 1

SURFACE

Barometric Preassure: 29.97 units: Hg
time: 812 am pm

AWS ~~Kestrel~~:
Wind: 1 mph ~~m/s ft/s~~
Air Temp: 56 C [✓ F]
RH: 31 %

Cave Location
UTM z: NAD:
mE:
mN:
EPE +/-: m / ft

Light Meter:
Units:

Location	Wet B	Dry B	Soil	Air	RH ~~Light~~	Other
entrance						water temp 62 conductance 267.9
						salinity 00 1.75
						pH 7.8
inside	45.8	54.6	44.6	48.2	50.1	
back	48.0	53.9	42.6	48.3	67.7	

Appendix 4. Fauna of Great Basin National Park caves

Mollusca: Gastropoda

Very few mollusks were recorded from Great Basin caves, and these were restricted to lower elevation (2080-2179 meters [6824-7149 feet]) caves with at least seasonally flowing water present. These 13 animals were all snails, mostly (69%) collected from wet floors on or under submerged rocks, the remainder from clay walls. These animals are *accidentals* or possibly *troglophiles*.

Distribution: Model Cave, Ice Cave, and Squirrel Spring Cave

Nematoda

A single nematode was collected. Nematodes are likely more abundant in caves of Great Basin, but most are microscopic, and no attempt was made to include life forms at this scale. *Accidental*.

Distribution: Model Cave

Annelida: Clitellata: Opisthophora

Earthworms were recorded only from lower elevation caves (2080-2337 meters [6824-7667 feet]) with significant water present. Most, if not all, of the specimens probably belong to the family Lumbricidae, the most common of the ~10 families occurring in the United States[14]. Nearly 86% of the 14 specimens were taken in rich, moist soil deposits in Model Cave. These animals are generally considered *edaphobites*, but perhaps they should be classified as facultative *troglophiles* because of their consistent presence in Model Cave.

Distribution: Model Cave, Water Trough Cave

Arthropoda

Nearly 90% (n=1794) of the 1997 specimens recorded from caves in this study were arthropods, making this by far the most important group in cave communities of Great Basin National Park. The majority of specimens (n=1318) are hexapods, but arachnids (n=341) are also a major group.

---

[14] Many earthworms presently found in the United States are non-native species (Reynolds and Wetzel 2004), which have displaced the native fauna (Fender 1995). Whether the specimens collected in the present study are native or introduced is not known at the present time

Arthropoda: Crustacea

Ostracoda

A single seed shrimp was taken in Model Cave, and is an *accidental*. Members of this group of crustaceans are typically aquatic, free living forms.

Isopoda

A single terrestrial isopod, an *accidental*, was recorded from Lehman Caves.

Arthropoda: Arachnida

Acari: undetermined Acari

A wide variety of undetermined mites (107 specimens) were recorded from various caves during this study, over a broad range of elevations (1724-3407 meters [5656-11178 feet]). Undetermined mites were most commonly found in normal (91.9% of 99) moisture conditions (Figure 7), on the floor of the cave (91% of 100) (Figure 8). Habitat for these undetermined Acari includes mainly organics and wood (75.8% of 99) and soil (13.1% of 99) (Figure 9). While many are likely *accidentals* or *edaphobites*, some may be *troglophiles* or even *troglobites*.

<u>Distribution</u>: Bristlecone Cave, Broken Cave, Cave 24, Fissure Cave, Indian Burial Cave (BLM), Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Root Cave, Smith Creek Cave (BLM), Squirrel Spring Cave, and Water Trough Cave.

Acari: Ixodidae

A single tick was taken in Root Cave (elevation 2089 meters [6854 feet]), and is probably an *accidental*, brought into the cave by a human or perhaps a rodent.

<u>Distribution</u>: Root Cave.

Acari: Hydrachnidia

A single water mite (Hydrachnidia) (Figure 71) was collected swimming in a clear, gravel and sand bottom sump pool in Squirrel Spring Cave (elevation 2179 meters [7149 feet]). This animal is eyed, and clearly an *accidental*, suggestive of a possible surface water/ground water connection upstream of the cave.

<u>Distribution</u>: Squirrel Spring Cave.

Acari: Orabatoidea

An orabatoid mite was taken from moist soil in Model Cave (Elevation 2080 meters [6824 feet]). This may be a *troglophile*, *edaphobite*, or *accidental*.

Distribution: Model Cave.

Acari: Rhagidiidae

Rhagidiid mites were fairly abundant (n=36), occurring in caves from 2024 to 3413 meters [6640-11198 feet] elevation mostly on cave floors (96.9% of 32) (Figure 8), most commonly in normal (46.9% of 32) to dry (37.5 % of 32) conditions (Figure 7), predominantly (53.1% of 32) in association with soil/rock/organic, organic/rock, and soil/rocks habitats, but also in a varied of other habitats (Figure 9). Some of these may be *troglobites* or *troglophiles*.

Distribution: Broken Cave, Fox Skull Cave, Ice Cave, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre caves), Model Cave, Mountain View Cave, Pine Cone Cave, Squirrel Spring Cave, Water Trough Cave.

Acari: Trombidiidae

A single trombidiid mite (“red velvet mite”), from dry packrat scat in the entrance of Mountain View Cave (elevation 3413 meters [11198 feet]) is likely an *accidental*. Larvae are parasites and adults are predators (e.g., Tevis and Newell 1962).

Distribution: Mountain View Cave.

Opiliones: undetermined Opiliones

Undetermined Opiliones were recorded from bedrock walls of Cave 24 and Cave 24/Pine Cone Cave (notes unclear), which are adjacent to one another at 3013 and 3020 meters (9885 and 9908 feet) elevation. These harvestmen are likely *accidental*s or unconfirmed *Cyptobunus ungulatus ungulatus*, a *troglobite*.

Distribution: Cave 24, ?Pine Cone Cave?

Opiliones: Phalangiidae: *Oliogolophus*? sp.

Harvestmen in the family Phalangiidae (Suborder Palpatores: Superfamily Phalangioidea), possibly *Oliogolophus* sp., are recorded as *accidental*s from Mountain View Cave (elevation 3413 meters [11198 feet]) from two different collections on dry rock/guano and on soil.

Distribution: Mountain View Cave.

Opiliones: Leiobunidae: *Leiobunum* sp.

Harvestmen of the genus *Leiobunum* are commenly found in cave entrances in western and southwestern North America, where they may be considered *facultative trogloxenes*, roosting in caves during the daytime and foraging, primarily on plant material, on the surface at night. We recorded a few *Lieobunum* from walls, floors, and ceilings (58.3%, 25.0%, and 16.7%, respectively, of 12) (Figure 8) near the entrances of caves, generally associated with dry (83.3% of 12) conditions (Figure 7) and bedrock and breakdown (83.3% of 12), and rock/soil substrates (Figure 9). They were only recorded from lower elevation (1724-2089 meters [5656-6854 feet]) caves, where they were not as abundant as we (SJT JKK) have observed in central Texas caves.

Distribution: Fox Skull Cave, Indian Burial Cave (BLM), Smith Creek Cave (BLM), Squirrel Spring Cave.

Opiliones: Triaenonchidae: *Cyptobunus ungulatus ungulatus*

New records of the Model Cave Harvestman, *Cyptobunus ungulatus ungulatus* (Figure 72), in Cave 24 and Long Cold Cave greatly increase the known elevational range and provides the first distributional records outside of the area of Little Muddy Cave (Krejca and Taylor 2003) and the Baker Creek system for this attractive *troglobite*. Elevations ranged from 2080 meters [6824 feet] to 3013 meters [9885 feet]. Specimens were recorded from cave floors (60% of 10) and walls (40% of 10) (Figure 8), usually under normal (80% of 10) moisture conditions (Figure 7) on soil (60% of 10) or bedrock (40% of 10) substrates (Figure 9). Recent work by Derkarabetian and Hedin (2008) indicates that the genus *Cyptobunus* is merely a highly modified *Sclerobunus* – formal taxonomic recognition of this, however, awaits publication of a peer-reviewed paper covering the topics in Derkarabetian and Hedin (2008).

Distribution: Cave 24, Little Muddy Cave (Krejca and Taylor 2003), Long Cold Cave, Model Cave

Pseudoscorpionida: undetermined Pseusdoscorpion

An undetermined pseudoscorpion, possibly a troglobite, was recorded from Cave 24 (elevation 3013 meters [9885 feet]) on the floor under a rock on soil of normal moisture in the dark zone. If this is a troglobite, and not *Microcreagris grandis*, it would be an undescribed species. The specimen is presently in a -80º freezer (Illinois Natural History Survey) to preserve DNA and is awaiting further examination.

Distribution: Cave 24.

Pseudoscorpionida: undetermined troglomorphic Pseusdoscorpion

An undetermined pseudoscorpion, clearly a *troglobite*, was recorded from under a rock in normal moisture conditions in the dark zone of Broken Cave (elevation 3407 meters [11178 feet]). This specimen undoubtedly represents an undescribed species, especially given the isolation of the alpine location. As such, it is **one of the most**

significant single-specimen discoveries of the entire project. The specimen currently resides in a -80º freezer (Illinois Natural History Survey) to preserve DNA until it can be properly examined.

Distribution: Broken Cave

Pseudoscorpionida: Chernetidae

Three collections of pseudoscorpions from Fox Skull Cave (elevation 2024 meters [6640 feet) on 21 May 2006 were taken from the floor on the undersides of normal rocks on dirt/packrat middens (Figures 7-9). Specimens were identified as belonging to the family Chernetidae using Harvey's (1992) key. In the course of identification it was necessary to dissect off one of the chelicerae (small, anterior mouthparts, not the larger palps that are so evident on even casual examination of a pseudoscorpion) to examine it in a temporary mount on a compound microscope. Figure 73 is a photograph of this structure. This species does not appear to express obvious troglomorphies, and Chernetids are commonly associated with animal dens (including those of rodents), leaflitter, or bark of dead trees (Weygoldt 1969, p109-110), and thus this species is likely an associate of packrat middens, and functions as a predatory *troglophile*.

Distribution: Fox Skull Cave

Pseudoscorpionida: Neobisiidae: *Microcreagris grandis*

Nearly all specimens of pseudoscorpions collected or observed during this study were the large cavernicole *Microcreagris grandis* (Figure 74). This species has been considered a *troglobite* (but see discussion under Lehman Caves study, elsewhere in this report). The records from Fox Skull Cave and Squirrel Spring Cave extend the known range of the species well to the south, and the record from Cave 24 greatly extends the elevational range of this species (2024-3013 meters [6640-9885 feet]), which is, nonetheless, still restricted to caves in the Snake Range and, indeed, to caves in Great Basin National Park. Specimens were recorded from cave floors (86.2% of 29) and walls (13.8% of 29) (Figure 8) in normal (78.6% of 28) to dry (21.4% of 28) conditions (Figure 7), they occurred in a variety of habitats, but especially those including soil and rocks (Figure 9).

Distribution: Cave 24, Fox Skull Cave, Lehman Annex Cave, Lehman Caves, Model Cave, Root Cave, Squirrel Spring Cave, Water Trough Cave.

Araneae

Spiders are best identified using sexually mature males, so much of the material is difficult to place. Spiders are predators, and many are preadapted to the sheltered rocky habitats of cave entrances and twilight zones, where certainly a number of species are *troglophiles*. Not taxa recorded from this study are definitively troglobitic. Further study of the accumulated material by a specialist is expected to yield more complete identifications.

Araneae: undetermined Araneae

Undetermined spiders (Araneae) were recorded from a wide variety of caves and elevations (2024-3413 meters [6640-11198 feet]), mostly from the floor (66.7% of 18) or walls (27.8% of 18) of caves (Figure 8) under mostly dry (57.9% of 19) to normal (31.6% of 19) conditions (Figure 7), often in association with rocks and organic material (Figure 9).

<u>Distribution</u>: Cave 24, Fox Skull Cave, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Mountain View Cave, Pine Cone Cave, Root Cave, Squirrel Spring Cave, Water Trough Cave.

Araneae: Agelenidae: undetermined Agelenidae

An undetermined Agelenid spider was recorded from Lehman Caves (2096 meters [6877 feet] elevation).

Araneae: Agelenidae: *Hololena*? sp.

Several specimens tentatively placed in the genus Hololena were recorded from cave walls (75% of 4) and floors (Figure 8) under normal (75% of 4) to dry moisture conditions (Figure 7), on bedrock (Figure 9). They occurred at a wide range (1724-3020 meters [5656-9908 feet]) of elevations, and were commonly near entrances, including the exit tunnel of Lehman Caves, and may be *troglophiles*.

<u>Distribution</u>: Indian Burial Cave (BLM), Lehman Caves, Pine Cone Cave

Araneae: Amaurobiidae?

Seven spiders identified as possibly Amaurobiidae were collected from Water Trough Cave (elevation 2337 meters [7667 feet]) on the underside of dry rocks on wall ledges.

<u>Distribution</u>: Water Trough Cave.

Araneae: Amaurobiidae: *Callobius*? sp.

One spider from Pine Cone Cave (elevation 3020 meters [9908 feet]), collected from Cedar duff on a normal floor was tentatively identified as *Callobius* sp.

<u>Distribution</u>: Pine Cone Cave.

Araneae: Anyphaenidae: *Anyphaena*? sp.

An anyphaenid spider (Figure 75), possibly *Anyphaena* sp., was collected from Squirrel Spring Cave (elevation 2179 meters [7149 feet]) from floor and ceiling habitats, in association with rocks or bedrock of normal moisture.

Distribution: Squirrel Spring Cave

Araneae: Araneidae: *Hypsosinga*? sp.

An araneid spider tentatively identified as belonging to the genus *Hypsosinga* (Figure 76) was taken at Lehman Caves (2096 meters [6877 feet] elevation), from the wall of the exit tunnel, normal moisture.

Distribution: Lehman Caves

Araneae: undetermined Araneidae

Undetermined araneid spiders (n=11, Figure 77) were recorded from several caves at altitudes ranging from 2024 meters (6640 feet) to 3407 meters (11178 feet). These were taken in dry habitats (100% of 9) (Figure 7) from floors, walls, and especially ceilings (50% of 10) (Figure 8), most often in association with bedrock (77.8% of 9) or rocks (Figure 9).

Distribution: Bristlecone Cave, Broken Cave, Cave 24, Fox Skull Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave

Araneae: Araneidae: *Araneus*? sp.

Araneid spiders identified as belonging to the genus *Araneus* were collected twice, at elevations ranging from 2020 to 3413 meters [9908-11198 feet]).

Distribution: Mountain View Cave, Pine Cone Cave

Araneae: Araneidae: *Neoscona*? sp.

Araneid spiders (n=5) tentatively identified as belonging to the genus *Neoscona* was taken at Indian Burial Cave (1724 meters [5656 feet] elevation), from beneath loose, dry rocks.

Distribution: Indian Burial Cave (BLM)

Araneae: Cybaeidae

A cybaeid spider was taken from one cave at 3020 meters (9908 feet) elevation from normal moisture bedrock wall near a pitfall trap.

<u>Distribution</u>: Pine Cone Cave

Araneae: Dyctinidae?

Spiders tentatively placed in the family Dyctinidae (Figure 78) were recorded from normal to dry moisture (Figure 7) cave floors (Figure 8), mostly on the underside of rocks on dirt/packrat middens (Figure 9), but one from the cement wall of the exit tunnel of Lehman Caves. These eleven spiders were only recorded from relatively low elevations (2024-2096 meters [6640-6877 feet]).

<u>Distribution</u>: Fox Skull Cave, Lehman Caves

Araneae: Gnaphosidae: *Gnaphosa*? sp.

A single gnaphosid spider was taken from a dry breakdown block in the twilight of a high altitude (3013 meters [9885 feet]) cave.

<u>Distribution</u>: Cave 24

Araneae: Linyphiidae: undetermined Linyphiidae

Undetermined linyphiid spiders were taken from caves at a variety of elevations (2024-3413 meters [6640-11198 feet]), mostly from cave floors (88.9% of 9) (Figure 8), in dry to normal (44.4% and 55.6% of 9, respectively) conditions (Figure 7) in a variety of habitats, especially in association with rocks (Figure 9).

<u>Distribution</u>: Cave 24, Fox Skull Cave, Mountain View Cave, Pine Cone Cave

Araneae: Linyphiidae: *Arcuphantes*? sp.

Spiders identified as *Arcuphantes*? spp. (Figure 79) were relatively common (n=21), occurring on cave walls (71.4% of 21) or floors (28.6% of 21) (Figure 8), under dry (61.9% of 21) to normal (38.1% of 21) conditions (Figure 7), mostly in association with bedrock or rocks (Figure 9). These were taken mostly in higher elevation caves, but also from the Baker Creek system (2148-3020 meters [7047-9908 feet]).

<u>Distribution</u>: Cave 24, Ice Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre), Pine Cone Cave

Araneae: Linyphiidae: *Maro*? sp.

Several spiders tentatively identified as *Maro*? sp. (Figure 80) were recorded from Indian Burial Cave (1724 meters [5656 feet]) from under loose rocks on the floor of the cave under normal moisture conditions (Figures 7-9).

Distribution: Indian Burial Cave (BLM)

Araneae: Pholcidae: *Physocyclus*? sp.

Physocyclus sp. (Figure 81) was taken from the entrance tunnel of Lehman Caves (2096 meters [6877 feet]).

Distribution: Lehman Caves

Araneae: Thomisidae: *Xysticus*? sp.

Xysticus? sp. (n=1) was taken from a web on a bedrock wall in Pine Cone Cave (3020 meters [9908 feet]).

Distribution: Pine Cone Cave

Arthropoda: Symphyla:

Scutigerellidae

The Symphyla are a rather obscure group of myriopods (other myriopods include Chilopoda, Pauropoda, Diplopoda) infrequently encountered even by most entomologists. Two specimens were recorded from low elevations (2080-2096 meters [6824-6877 feet]), one from the surface of a dark zone drip pool in the trail at Lehman Caves, possibly belonging to the genus *Hanseniella*, and the other from Model Cave (which was not identified beyond family). These are probably *accidentals* or *edaphobites*.

Distribution: Lehman Caves, Model Cave

Arthropoda: Chilopoda:

Geophilomorpha: Geophilidae

Seven centipedes in this characteristically soil-inhabiting (*edaphobitic*) group were recorded from primarily higher altitude caves (2621-3413 meters [8599-11198 feet]). These were found on floors and walls in normal to dry conditions in a variety of habitats (Figure 7-9).

Distribution: Bristlecone Cave, Cave 24, Lincoln Canyon Mine (Drumming and Miner's Massacre), Mountain View Cave

Lithobiomorpha: Lithobiidae

Centipedes in the family Lithobiidae (n=4) were recorded from three caves (elevation 2337-3020 meters [7667-9908 feet]) on floors and walls under normal to wet conditions in association with organic material, soil, and bedrock (Figures 7-9).

<u>Distribution</u>: Lincoln Canyon Mine (Drumming and Miner's Massacre), Pine Cone Cave, Water Trough Cave

Arthropoda: Diplopoda:

undetermined Diplopoda

Several millipedes (10) recorded from wet floors, mostly in association with rocks and soil (Figures 7-9) were not identified. Elevation ranged from 2337 to 2621 meters (7667-8599 feet). Most of this material is probably *Idagona lehmanensis*.

<u>Distribution</u>: Lincoln Canyon Mine (Drumming and Miner's Massacre), Water Trough Cave

Polydesmida: undescribed Polydesmidae/Macrosternodesmidae

A rather small, white, *troglobitic* milliped (Figures 82, 83) has been discovered in the course of our work at Great Basin National Park (see Krejca and Taylor 2003, "*Speodesmus* n. sp.?", and Figure 17 therein). Correspondence with the taxonomic specialist to whom we sent the first collections (William Shear, email dated 1 May 2008) indicates that this is a new species of currently uncertain placement in or near the families Polydesmidae or Macrosternodesmidae, and may have some relation to the genus *Tidesmus* (see Shear and Shelly 2007) in which "*Tidesmus*" *hubbsi* (from an unnamed cave in Cave Valley, Lincoln County, Nevada) has been removed from that genus, remaining unassigned. Specimens were recorded from cave floors (85.3% of 34) and walls (14.7% of 34) (Figure 8) under normal (54.5% of 33) to dry (45.5% of 33) conditions (Figure 7), primarily in association with bedrock or calcite (38.2% of 33) or soil (23.5% of 33) (Figure 9). The additional records from the present study (n=36) greatly increase the geographic range of this undescribed species, which now includes several lower-elevation (1724-2096 meters [5856-6877 feet]) caves on the eastern side of the Snake Range.

<u>Distribution</u>: Indian Burial Cave (BLM), Lehman Caves, Little Muddy Cave, Model Cave, Snake Creek Cave

Chordeumatida: Conotylidae: *Idagona lehmanensis*

Idagona lehmanensis (Diplopoda: Chordeumatida: Family Conotylidae: Subfamily Idagoninae) (Figure 84) is a millipede which was described by Shear (2007) based on our collections from Water Trough Cave in May 2006. Additional examples of this *troglobite*, reported here, greatly increase its' geographic range and altitudinal range (2080-3407 meters [6834-11178 feet]), so careful attention is given here to the morphology of the more distant material to confirm that it was conspecific, including dissection of gonopods. *Idagona lehmanensis* is distinguished from its congeners, *Idagona jasperi* Shear 2007 and *Idagona westcotti* Buckett and Gardner 1967, by the presence of a distinctive subterminal branch on the anterior gonopod (Figure 85, stb) which bears a narrow, curved, apically bifid subbranch, and by the presence of a broad, trowel-like medial division of the apex and narrower lateral division of the apex (see Figure 85). These characters are unique to *I. lehmanensis*, with the anterior gonopod of the other two species being of a much simpler form (Shear 2007). Dissection of males from Lincoln Canyon Mine (Figure 85, C) and Broken Cave (Figure 85, D), collected during the present study, demonstrates that *I. lehmanensis* is widespread in caves of the Park, and occurs at a remarkable range of elevations. Specimens were recorded from cave floors (66.7% of 57) and walls (33.3% of 57) (Figure 8), under a variety of moisture conditions (Normal 63.0% of 54) (Figure 7), and in a variety of microhabitats, especially in association with berock, rocks, or guano (Figure 9).

Distribution: Bristlecone Cave, Broken Cave, Cave 24, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Pine Cone Cave, Squirrel Spring Cave, Water Trough Cave

Arthropoda: Hexapoda:

Collembola: undetermined Collembola

Collembola, or springtails, comprise a very large and important component of cave communities at Great Basin National Park, and although we had much of our material examined by a specialist, additional specimens remain unexamined (or were not collected). These include some 182 specimens from a variety of caves at varying elevations (2024-3167 meters [6640-10390 feet]). This material was mostly (95.3% of 170) from cave floors (Figure 8), from wet (49.4% of 160) normal or dry conditions (Figure 7). Habitats varied widely with water (24.7% of 170), rocks or substrates including rock (45.9% of 170), and combinations of guano, organic materials and wood (22.9% of 170) being most common (Figure 9).

Distribution: Bristlecone Cave, Cave 24, Fissure Cave, Fox Skull Cave, Ice Cave, Lehman Annex Cave, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Water Trough Cave

Arthropoda: Hexapoda

Collembola: Arrhopalitidae: *Arrhopalites* spp.

Globular springtails (n=45) of the genus *Arrhopalites* (Figure 86)– troglophiles and troglobites – were recorded from several, mostly lower elevation (2030-2621 meters [6660-8599 feet]) caves. These were recorded mostly from cave floors (79.5% of 44) (Figure 8) under normal (59.1% of 44) to wet (40.9% of 44) conditions (Figure 7), with drip pools (36.4% of 44) and soil, soil/organics, and soil/wood (59.1% of 44) making up major microhabitats (Figure 9). This material includes *Arrhopalites caecus*, which was recorded from Snake Creek Cave, and an undescribed species from Model Cave (Douglas Zeppelini, personal communication). These animals are *troglobites* or *troglophiles*.

<u>Distribution</u>: Lehman Annex Cave, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Snake Creek Cave

Collembola: Entomobryidae: *Entomobrya* spp.

Springtails of the genus *Entomobrya* were commonly recorded from several caves (elevation range 1724-2013 meters [8599-9885 feet]) from walls (52.9% of 87) and floors (47.1% of 87) (Figure 8) mostly (73.6% of 87) under dry conditions (Figure 7). Dominant habitat associations included bedrock/rocks (59.7% of 77), and organics, wood, or organics/wood (13.0% of 77), but they were also variously associated with soil and soil/rock combinations(Figure 9). Two species were represented: *Entomobrya* sp. 1 was recorded from Fox Skull Cave, Indian Burial Cave, and Lincoln Canyon Mine (Drumming and Miner's Massacre); *Entomobrya* sp. 2 was recorded from Cave 24, Lehman Caves, Squirrel Spring Cave, and Water Trough Cave. These animals are probably *accidentals* or *troglophiles*.

<u>Distribution</u>: Cave 24, Fox Skull Cave, Indian Burial Cave (BLM), Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Squirrel Spring Cave, Water Trough Cave.

Collembola: Entomobryidae: *Pseudosinella* sp.

A single collection of 14 springtails from a muddy cave wall (normal moisture) represents a species of *Pseudosinella*, likely *accidentals* or *troglophiles*. Model Cave is at an elevation of 2080 meters (6824 feet).

<u>Distribution</u>: Model Cave

Collembola: Entomobryidae: *Sinella* sp.

Two springtail collections (9 specimens) from the floor of Snake Creek Cave (elevation 2030 meters [6660 feet]) are a species of *Sinella* (Figure 87), taken from two normal moisture habitats: calcite and soil, wood on soil. Probably *accidentals* or *troglophiles*.

<u>Distribution</u>: Snake Creek Cave

Arthropoda: Hexapoda:

Collembola: Hypogastruridae: *Acherontiella* sp.

Springtails belonging to the genus *Acherontiella* sp. (n=21) were collected from three low elevation (2096-2235 meters [6877-7333 feet]) caves, and are probably *accidentals* or *troglophiles*. They were found on cave floors (Figure 8), under normal (78.9% of 19) to wet conditions (Figure 7), bedrock/calcite (63.2% of 19), water/ice (21.1% of 19), or wood-wood debris (15.8% of 19) (Figure 9).

Distribution: Ice Cave, Lehman Annex Cave, Lehman Caves

Collembola: Isotomidae: *Desoria* sp. 1

Desoria sp. 1 springtails were collected (n=3) from two caves at mid- to high elevations (2621-3020 meters [8599-9908 feet]). It was recorded from a normal-moisture floor in association with loose rocks mixed with pine cones, and is perhaps a *troglophile* or *accidental*.

Distribution: Lincoln Canyon Mine (Drumming and Miner's Massacre), Pine Cone Cave

Collembola: Isotomidae: *Desoria* sp. 2

Desoria sp. 2 speringtails were collected only from one high elevation cave (3013 meters [9885 feet]) from a normal-moisture floor under rocks on soil in the twilight zone. These probably represent *accidentals* or *troglophiles*.

Distribution: Cave 24

Collembola: Isotomidae: *Folsomia* sp.

Folsomia sp. springtails were collected (n=12) only in two lower elevation (2080-2096 meters [6824-6877]) caves, on the cave floor (Figure 8), usually under wet conditions (83.3% of 6) (Figure 7). It was most commonly encountered in Lehman Caves, where it could be found on the surface of water in the tour trail or in other drip pools (Figure 9).

Distribution: Lehman Caves, Model Cave

Collembola: Isotomidae: *Isotoma* sp.

Isotoma sp. springtails were taken from three caves (elevation range 2148-3167 meters [7047-10390 feet]), and was from cedar duff and the surface of a rock emerging from a cave stream. These are likely accidentals or troglophiles.

Distribution: Bristlecone Cave, Ice Cave, Pine Cone Cave

Collembola: Oncopoduridae: *Oncopodura* sp.

Oncopodura sp. springtails were recorded from two lower-elevation (2080-2096 meters [6824-6877 feet]) caves, were it was found on normal (87.5% of 8) to wet (Figure 7) cave floors (75% of 8) and walls (Figure 8), associated with soil, soil/organics and water habitats (Figure 9).

Distribution: Lehman Caves, Model Cave

Collembola: Onychiuridae: subfamily Tullberginae

There was single collection of an onychiurid springtail of the subfamily Tullberginae from the surface of a drip pool in the tour trail of Lehman Caves (elevation 2096 meters [6877 feet]). Perhaps an *accidental* or *troglophile*.

Distribution: Lehman Caves

Collembola: Onychiuridae: subfamily Onychiurinae

Onychiurid springtails of the subfamily Onychiurinae (see cover photograph of this report) were fairly abundant (n=61) in several caves at Great Basin National Park, occurring at a variety of elevations (2096-3167 meters [6877-10390 feet]). They were taken almost exclusively from cave floors (100% of 53) (Figure 8), under wet (77.4% of 53) to normal moisture conditions (Figure 7), most often on drip pools (77.4% of 53), but also in association with soil/rocks/organic materials, and other habitats (Figure 9). Some material was from the twilight zone, some from the trail (pools in trail) of Lehman Caves, and one sample from moss growing near lights along tour trail of Lehman Caves. *Accidentals* or *troglophiles*.

Distribution: Bristlecone Cave, Cave 24, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre)

Collembola: Tomoceridae: *Tomocerus* sp.

Springtails of the genus *Tomocerus* were collected fairly commonly (N=48) from floors (57.4% of 47) and walls (42.6% of 47) of caves (Figure 8), mostly in dry (50% of 46) to normal (39.1% of 46) moisture conditions (Figure 7) in a variety of habitats, especially bedrock/breakdown/calcite (31.9% of 47) and various combinations of rocks with guano or organic material and soil (31.9% of 47) (Figure 9). These animals were present at a range of elevations (2096-3413 meters [6877-11198 feet]), and may be *troglophiles*.

Distribution: Bristlecone Cave, Broken Cave, Cave 24, Fissure Cave, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Mountain View Cave, Pine Cone Cave

Diplura: undetermined Diplura

Five diplurans, not identified to family level, were recorded from caves ranging from 2080 to 3413 meters (6824-11198 feet) elevation. These were from cave floors, and more than half of these are from the entrance or twilight zones in dry to normal moisture conditions, under rock on normal soil, or in old packrat scat. These are *troglophiles*, *edaphobites*, or *accidentals*.

Distribution: Model Cave, Mountain View Cave, Water Trough Cave

Diplura: Campodeidae: undetermined Campodeidae

A dipluran from a high elevation (3413 meters [11198 feet]) cave from dry packrat guano in the twilight zone was determined to be in the family Campodeidae. This may be a *troglophile* or *accidental*, and, given the high elevation, could possibly be an undescribed species.

Distribution: Mountain View Cave

Diplura: Campodeidae: *Eumesocampa*? sp.

A series of seven dipluran specimens from Root Cave (elevation 2089 meters [6854 feet]) from three different habitats under normal moisture conditions was tentatively identified as belonging to the genus *Eumesocampa* (Figure 88). They were taken under rocks on clay/gravel/roots and on calcite near roots. These are *troglobites*, *troglophiles*, or *edaphobites*, and likely represent an undescribed species.

Distribution: Root Cave

Diplura: Campodeidae: *Metriocampa*? sp.

A single dipluran specimen identified as *Metriocampa*? sp. was collected from beneath a stone on moist soil a cave entrance at 2337 meters (7667 feet) elevation. This is probably an *accidental* or *edaphobite*.

Distribution: Water Trough Cave

Microcoryphia: undetermined Microcoryphia

Two specimens from relatively low elevation (2096-2337 meters [6877-7667 feet) caves were identified as Microcoryphia (bristletails or jumping bristletails). This group is poorly studied, and thus the specimens could be of interest taxonomically.

Distribution: Lehman Caves, Water Trough Cave

Microcoryphia: Machilidae: Petrobiinae: *Pedetontus*? sp.

A jumping bristletail from a high altitude (elevation 3020 meters [9908 feet]) cave possibly belongs to the genus *Pedetontus*. It was taken from cedar duff on a normal moisture floor. The group is poorly known (see Sturm 2001) and about ten species are known from the United States, thus, there is a good possibility that this high-elevation record represents a new species – *edaphobite* or *troglophile*.

Distribution: Pine Cone Cave

Microcoryphia: Meinertellidae: *Hypomachilodes*? sp.

Bristletails tentatively identified as *Hypomachilodes* sp. were collected from two caves (elevation 2024-2621 meters [6640-8599]) on dry bedrock walls and ceilings. These are probably *accidentals* or *troglophiles*, but, again, the group is poorly known, with only a single species described from the United States (*Hypomachilodes texanus* Silvestri 1911), so either this likely represents a new species, or it has been incorrectly assigned to this genus. *Accidentals*, *edaphobites*, or *troglophiles*.

Distribution: Fox Skull Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre)

Ephemeroptera: undetermined Ephemeroptera

An undetermined mayfly was taken from the rise pool (springhead) of the stream resurgence of Model Cave (elevation 2080 meters [6824 feet]) during a period when the springrun, which is only seasonally active, was flowing. This is an *accidental*.

Distribution: Model Cave

Ephemeroptera: Baetidae

Mayflies (n=20) of the family Baetidae were taken at two low-elevation (2080-2148 meters [6824-7047 feet]) caves from springhead rise pool (see above), from ice, and from beneath stones in stream. These are *accidentals*, with the in-cave specimens (Ice Cave) underscoring the importance of surface stream influence on the hydrology of the Baker Creek system.

Distribution: Ice Cave, Model Cave

Ephemeroptera: Heptageniidae

Four mayflies of the family Heptageniidae were taken at two low-elevation (2080-2148 meters [6824-7047 feet]) caves from a net placed in a springhead rise pool (see above) and from beneath stones in stream. These are *accidentals*, again with the in-cave specimens (Ice Cave) underscoring the importance of surface stream influence on the hydrology of the Baker Creek system.

Distribution: Ice Cave, Model Cave

Ephemeroptera: Siphlonuridae

Two mayflies of the family Siphlonuridae were taken at a low-elevation (2148 meters [7047 feet]) cave from a beneath stones in cave stream. *Accidentals*.

Distribution: Ice Cave

Plecoptera

Plecoptera (stoneflies) were recorded from two lower elevation caves (2024-2337 meters [6640-7047 feet]). The record from Fox Skull Cave may reflect transport to the cave by a surface-foraging predator, such as a bat, as there is no water in this cave, which is perched high above the valley floor. The specimen from Water Trough Cave is from a dry bedrock wall above a pool at the cave entrance. Both are *accidentals*.

Distribution: Fox Skull Cave, Water Trough Cave

Orthoptera

A sight record of wings from beneath a rock on dry floor in one cave (elevation 2024 meters [6640 feet]) probably represent transport into the cave by a surface-foraging predator, such as a bat. The only cave-associated orthropterans in this area, Rhaphidophoridae, are wingless. *Accidental*.

Distribution: Fox Skull Cave

Orthoptera: Rhaphidophoridae: *Ceuthophilus* spp.

In areas of the United States, crickets of the genus *Ceuthophilus* (Figure 89) are important trogloxenes, foraging above ground at night and roosting in caves during the daytime (see Taylor *et al*. 2005), but their numbers are relatively low in caves of Great Basin National Park, and thus they serve a less important role. Nonetheless, they are *trogloxenes*, and as such bring nutrients into the caves. Specimens (n=17) were recorded from a broad range of caves and elevations (1947-3020 meters [6338-9908 feet]), and perhaps represent more than one species - most material was immatures, which cannot be identified. *Ceuthophilus* spp. were recorded from cave walls (55.6% of 9) and floors (44.4% of 9) (Figure 8) in dry (66.7% of 9) to normal moisture conditions (Figure 7), in association with bedrock/breakdown/calcite (55.6% of 9) or soil/rock organic, organic/rock, or soil/rocks habitats (Figure 9).

Distribution: Cave 24, Cave Valley Cave (BLM), Lehman Annex Cave, Lehman Caves, Model Cave, Pine Cone Cave, Root Cave, Smith Creek Cave (BLM), Snake Creek Cave

Psocoptera: Prionoglaridae: *Speleketor* sp.

Psocoptera (n=12, book and barklice) of the genus *Speleketor* were taken in several low elevation (2024-2096 meters [6640-6877 feet]) caves from normal moisture (Figure 7) floors (Figure 8), mostly (81.8% of 11) from soil/rock/guano - rock/guano habitats (Figure 9). These are *troglophiles* or *troglobites*, probably functioning as guanophiles. This genus is little-studied (see Gurney 1943), and it is possible that our material represents and undescribed species.

Distribution: Fox Skull Cave, Lehman Caves, Snake Creek Cave

Homoptera

The remains (exuvium) of an unidentified homopteran were taken at a lower elevation (2337 meters, 7667 feet) cave, representing an *accidental*.

Distribution: Water Trough Cave

Homoptera: Cercopidae

A froghopper, or spittle bug, was taken at one lower elevation (2024 meters [6640 feet]) cave from a dry, soil and rock floor. This is an *accidental*.

Distribution: Fox Skull Cave

Homoptera: Cicadellidae

Leafhoppers were collected only at one cave (elevation 2179 meters [7149 feet]), from under a rock on normal soil, and from a plankton net at the cave entrance (when water was flowing from the cave). These are *accidentals*.

Distribution: Squirrel Spring Cave

Homoptera: Cixiidae

Cixiid nymphs live in soil, feeding on plant roots, and some Hawaiian forms are troglobites in lava tubes, where they feed on tree roots. Nonetheless, the single cave (2024 meters [6640 feet] elevation) record from this study, under a rock on dry cave floor, is probably an *accidental*.

Distribution: Fox Skull Cave

Heteroptera: Cydnidae: *Pangaeus* sp.

A single burrowing bug specimen from just inside entrance gate of one cave (elevation 2080 meters [6824 feet] on dry soil floor is an *accidental*.

Distribution: Model Cave

Heteroptera: Thyreocoridae

One negro bug specimen from a web on dry bedrock wall in entrance zone of a high altitude (3407 meters [11179 feet]) cave is an *accidental*.

Distribution: Broken Cave

Coleoptera: undetermined Coleoptera

Undetermined beetles, mostly larvae, were taken at several caves over a range of elevations (2024-3407 meters [6640-11178 feet]), many of these likely represent immatures of more completely identified material, below.

Distribution: Broken Cave, Fox Skull Cave, Model Cave, Pine Cone Cave, Water Trough Cave

Coleoptera: Anobiidae: subfamily Ptininae

Spider Beetles (formerly in their own family, the Ptinidae) are scavengers, feeding on both plant and animal material. We collected 20 specimens from one cave (2337 meters [7667 feet] elevation) in dry conditions (Figure 7) on cave walls (Figure 8) in association with bedrock (68.8% of 16) and packrat guano (Figure 9). These likely are associated with packrat middens, and thus may be *troglophiles*.

Distribution: Water Trough Cave

Coleoptera: Byrrhidae

A Pill Beetle was taken at a high altitude (3413 meters [11198 feet]) cave on dry packrat scat in the cave entrance, and is likely an *accidental*.

Distribution: Mountain View Cave

Coleoptera: Cantharidae: *Malthodes*? sp.

A soldier beetle possibly of the genus *Malthodes* was taken at a single high elevation (3013 meters [9885 feet]) cave. These beetles are typically found on foliage and flowers, and thus this is an *accidental*.

Distribution: Cave 24

Coleoptera: Carabidae: *Bembidion* sp.

A ground beetle of the genus *Bembidion* was taken at a single low-elevation (2148 meters [7047 feet]) cave on a dry bedrock wall. Adults are common, small predators and scavengers along bodies of water, from rapidly flowing mountain streams to lowland ponds. Several species living in more xeric conditions, including deserts. Probably an *accidental* reflecting the proximity of, or groundwater influence from, nearby Baker Creek.

Distribution: Ice Cave

Coleoptera: Carabidae: *Harpalus animosus* Casey

Harpalus animosus Casey, a ground beetle, was taken from normal-moisture cedar duff in a single high elevation (3020 meters [9908 feet]) cave. This predatory beetle is probably an *accidental*. It is known from Nevada, and is a montane species, recorded from subalpine and alpine zones, up to 3400 meters (Noonan 1990), while it is rarely encountered, it is known from Alberta, British Columbia, Arizona, Colorado, Idaho, Montana, New Mexico, Nevada, Oregon, Washington, and Wyoming (Bousquet and Larochelle 1993).

Distribution: Pine Cone Cave

Coleoptera: Carabidae: *Pterostichus* (*Hypherpes*) *protractus* LeConte

The ground beetle *Pterostichus* (*Hypherpes*) *protractus* LeConte was recorded from two high elevation (3013-3020 meters [9885-9908 feet]) caves from cave floors and walls under normal to dry conditions, and in a variety of habitats: soil/pine needles with rocks, under rocks on soil in twilight, and on bedrock wall (Figures 7-9). Data from a recent study (Halaj *et al*. 2008) suggests this beetle does not do well when faced with tree harvest. These are probably *accidentals*.

Distribution: Cave 24, Pine Cone Cave

Coleoptera: Chrysomelidae: subfamily Galerucinae: tribe Alticini

Leaf beetles of the tribe Alticini were taken from one low elevation (2024 meters, 6640 feet) cave from a dry floor on underside of rock on dirt. Alticine leaf beetles, also known as Flea Beetles, are foliage feeders, and thus are certainly *accidentals*.

Distribution: Fox Skull Cave

Coleoptera: Colydiidae

Cylindrical bark beetles were taken at two caves (elevation 2337-3013 meters [7667-9885 feet]). The recorded habitat was under rock on wet soil on floor. Most species are mycetophagous or predacious, often found under bark. This is an *accidental*.

Distribution: Water Trough Cave, Cave 24

Coleoptera: Cryptophagidae

Silken fungus beetles (Figure 90) were recorded from several caves at low elevations (2024-2096 meters [6640-6877 feet]). These very small (<1 mm) beetles are mycetophagus, but found in rotting wood, plant material, fungi and shed fur of animals. Perhaps troglophilic in caves of Great Basin National Park, where they have been recorded from normal-moisture floor on underside of rock on dirt/packrat middens, and on dry bedrock ceiling.

Distribution: Fox Skull Cave, Lehman Caves, Model Cave, Root Cave

Coleoptera: Curculionidae

A weevil was taken from a high altitude (3020 meters [9908 feet]) cave on normal-moisture floor under loose rocks mixed with pine cones. This is an *accidental*.

Distribution: Pine Cone Cave

Coleoptera: Dermestidae

A dermestid, or skin beetle, was recorded from a lower elevation cave (2024 meters [6640 feet]) on dry floor under rock. This is probably an *accidental*.

Distribution: Fox Skull Cave

Coleoptera: Dytiscidae: *Hydroporus* sp.

A predacious diving beetle of the genus *Hydroporus* (Figure 91) was collected from a lower elevation cave (2179 meters [7149 feet]) in a gravel bottom sump pool at back of cave, about 4 cm deep, swimming. The intermittently active stream in this cave floods the cave completely, and the presence of this obviously *accidental* inhabitant of surface waters is suggestive of a surface-stream influence on the groundwater origins of the cave stream.

Distribution: Squirrel Spring Cave

Coleoptera: Elateridae

Click beetles (n=5) were recorded from three of the high elevation (3013-3407 meters [9885-11178 feet]) caves, where they were found in normal moisture conditions on bedrock or soil ledges on bedrock (Figures 7-9). These are likely *accidentals*.

Distribution: Broken Cave, Cave 24, Pine Cone Cave

Coleoptera: Lathridiidae

A mold beetle, was recorded from a low elevation (2080 meters [6824 feet]) cave on a dry bedrock ceiling, just inside the cave gate. This is an *accidental*.

Distribution: Model Cave

Coleoptera: Leiodidae

Leiodid beetles, variously known as round fungus beetles, small carrion beetles, and mammal-nest beetles were recorded from caves at a wide range of elevations (1966-3020 meters [6450-9908 feet]), where they may be *troglophiles*. Several species in the eastern United States have strong cave affinities. Recoded habitats include floor and ceiling, normal and dry, and bedrock and cedar duff.

Distribution: Cave Valley Cave (BLM), Pine Cone Cave, Root Cave

Coleoptera: Leiodidae: subfamily Playtypsyllinae (=Leptininae)

A leiodid of the subfamily Platypsyllinnae (mammal nest beetles, formerly in their own family, the Leptinidae), was recorded from a low elevation (2080 meters [6824 feet]) cave on a dry bedrock ceiling, just inside the cave gate. This is an *accidental* or an associate of packrats, shrews, or mice, or their nests (e.g., see Benton and Peck 1980) and thus possibly a *troglophile*.

Distribution: Model Cave

Coleoptera: Nitidulidae

A sap beetle was recorded from a high elevation (3020 meters [9908 feet]) cave on a normal-moisture, cedar duff floor. This is an *accidental*.

Distribution: Pine Cone Cave

Coleoptera: Scarabaeidae: *Phyllophaga* sp.

Scarab beetles of the genus *Phyllophaga* were recorded from a high elevation (3020 meters [9908 feet]) cave on dry bedrock walls. These are *accidentals*.

Distribution: Pine Cone Cave

Coleoptera: Scolytidae

Two bark beetles were taken from normal soil on a bedrock ledge at the entrance of a high altitude (3047 meters [11178 feet]) cave. This is an *accidental*.

Distribution: Pine Cone Cave

Coleoptera: Staphylinidae

Rove beetles (Figure 92) were fairly commonly encountered (n=34) and were recorded from a wide range of elevations (1724-3020 meters [5656-9908 feet]), caves, and habitats. Records are from cave floors (74.1% of 27) and walls (25.9% of 27) (Figure 8), under dry, normal, and wet moisture conditions (25.9%, 44.4%, and 29.6% of 27, respectively) (Figure 7), and habitats include predominantly soil/rocks/organics (37.0% of 27), breakdown/bedrock/calcite (25.9% of 27), and rocks (22.2% of 27) (Figure 9). These samples include several different genera (undetermined) and some are likely *troglophiles*, while others are *accidentals*.

Distribution: Cave 24, Fox Skull Cave, Ice Cave, Indian Burial Cave (BLM), Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Pine Cone Cave, Squirrel Spring Cave, Water Trough Cave

Coleoptera: Tenebrionidae: undetermined Tenebrionidae

Darkling beetles (undetermined, Figure 93) were recorded from several caves at a wide range of elevations (1947-3020 meters [6388-9908 feet]). These were recorded from cave floors (81.3% of 16) and walls (Figure 8), under dry (56.3% of 16) to normal conditions (Figure 7). Habitats include especially bedrock/calcite/breakdown (43.8% of 16) and soil (18.8% of 16) (Figure 9). Many of these are larvae, but several are adults clearly not belong to the genus *Eleodes* (see below). *Accidentals* and perhaps *troglophiles*.

Distribution: Cave 24, Fox Skull Cave, Pine Cone Cave, Smith Creek Cave (BLM), Snake Creek Cave

Coleoptera: Tenebrionidae: *Eleodes hispilabris sculptilis* Blaisdell

The darkling beetle *Eleodes hispilabris sculptilis* Blaisdell (Figure 93), probably a *troglophile*, was recorded from several caves at both high and low elevations (1724-3020 meters [5656-9908 feet]). It was recorded from cave floors (77.8% of 9) and walls (Figure 8) under dry (77.8% of 9) to normal moisture conditions (Figure 7), especially on bedrock, calcite, and breakdown (66.7% of 9) (Figure 9).

Distribution: Cave 24, Indian Burial Cave (BLM), Pine Cone Cave, Snake Creek Cave

Coleoptera: Trogossitidae

A bark-gnawing beetle was recorded from a high elevation (3020 meters [9908 feet]) cave, collected from a normal bedrock walls. This is an *accidental*.

Distribution: Pine Cone Cave

Trichoptera: undetermined Trichoptera

Caddisflies were recorded from three lower elevation (2148-2337 meters [7047-7667 feet]) caves which have significant water. These are *accidentals*, but for Squirrel Spring (Figure 94) and Ice caves, they may reflect the hydrological connectivity of the surface streams and the caves – or merely the proximity of the cave entrances to the surface streams.

Distribution: Ice Cave, Squirrel Spring Cave, Water Trough Cave

Trichoptera: Limnephilidae

A caddisfly belonging to the family Limnephilidae was recorded from one lower-elevation (2179 meters [7149 feet]) wet cave. Taken from a gravel stream pool, this is an *accidental*.

Distribution: Squirrel Spring Cave

Trichoptera: Rhyacophilidae

A caddisfly belonging to the family Rhayacophilidae was recorded from one lower-elevation (2148 meters [7047 feet]) wet cave. There were taken from in the cave stream on underside of a rock with some organics, and on the surface of a rock emerging from stream. This is an *accidental*.

Distribution: Ice Cave

Lepidoptera: undetermined Lepidoptera

Undetermined moths or moth wings (typically evidence of bats feeding) were recorded from several caves (elevation 2089-3013 meters [6854-9885 feet]). These are a mixture of *accidentals*, *troglophiles*, or *trogloxenes*.

Distribution: Cave 24, Lincoln Canyon Mine (Drumming and Miner's Massacre), Root Cave, Squirrel Spring Cave, Water Trough Cave

Lepidoptera: Acrolophidae

The larva of an acrolophid moth (burrowing webworm moths) was recorded from one cave (elevation 2089 meters [6854 feet]). Larvae of these moths create long tubes in the soil out of silk, where they function as detritovores or feed on fecal material (Hasbrouck 1964). *Accidental* or *troglophilic*.

Distribution: Root Cave

Lepidoptera: Alucitidae

Three many-plumed moths were taken at a single lower elevation (2337 meters [7667 feet]) cave. Larvae of these moths bore into flowers, buds, fruits and stems, and thus these are *accidentals*.

Distribution: Water Trough Cave

Lepidoptera: Noctuidae

Owlet moths were taken in caves at a wide range of elevations (1947-3413 meters [6388-11198 feet]). These were taken on cave walls (63.6% of 11) or floors (Figure 8), usually in either dry (63.6% of 11) or wet conditions (Figure 7), often on bedrock (63.6% of 11) (Figure 9). The biology of this family is diverse, and some may be facultative *trogloxenes*, while others are surely *accidentals*.

Distribution: Ice Cave, Mountain View Cave, Pine Cone Cave, Smith Creek Cave (BLM), Water Trough Cave

Lepidoptera: Nymphalidae: *Aglais milberti* (Godart)

An attractive brush-footed butterfly, Milbert's tortoiseshell*, Aglais milberti* (Godart, 1819) (Figure 95), was recorded from two alpine caves above 11,000 feet (elevation 3407-3413 meters [11178-11198 feet]). These were taken on dry bedrock ceilings (Figures 7-9) in the twilight or dark zones of the caves. This is clearly a facultative *trogloxene*.

Milbert's tortoiseshell is a boreal North American brush-footed butterfly, most closely related to the palearctic butterfly *Aglais urticae* (Linnaeus, 1758) (Nylin *et al*. 2001). It occurs from Alaska to Newfoundland, extending to the south – in the western United States west of the Great Plains – to southern California to New Mexico. In the eastern United States it is less frequently recorded further south than Wisconsin, Minnesota, Michigan, Ohio and west to Pennsylvania and New York.

This butterfly is reported as being a riparian species (Fleishman and Murphy 1999, Fleishman et al. 2000), and occurs in meadows, roadsides, and clearings (Emmel 1964, LaFontaine and Wood 1997). Adults are strong fliers (Fleishman and Murphy 1999), and migrate to alpine habitats to forage in the summer (Scott and Epstein 1987), where they can be common (Klots 1940, Goehring et al. 2007, Spalding 1979). Nectar sources include phlox and bee plant (Johnson and Nixon 1967), and, in the eastern United States, Burdock, Joe-Pye Weed, and Shrubby Cinquefoil (Voss 1954). Adults return to lower altitudes to overwinter, with eggs being laid at lower altitudes in the spring (Scott and Epstein 1987). Larvae feed on herbaceous vegetation, especially *Urtica* sp. (Emmel 1964, Grimble and Beckwith 1992, LaFontaine and Wood 1997, Slansky 1974).

Lepidoptera are not so commonly though of as cave inhabitants, with a few exceptions, such as the moth *Triphosa haesitata* (Lepidoptera: Geometridae) which utilizes caves in California and Nevada (Graham 1962, 1968a, b).

Distribution: Broken Cave, Mountain View Cave

Lepidoptera: Tineidae

Moths of the family Tineidae (cloths moths and allies, Figure 96) were taken in several caves across a wide range of elevations (1724-3413 meters [5656-11198 feet]). Larvae of these moths commonly build cases of silk and debris from their surroundings and in some species larvae are associated with animal dung. The adults were typically found on dry bedrock floors (88.9% of 9) and walls (Figures 7-9). These are likely *troglophiles*.

Distribution: Broken Cave, Indian Burial Cave (BLM), Mountain View Cave, Smith Creek Cave (BLM)

Siphonaptera

Fleas were recorded from three caves, across a wide range of elevations (1724-3013 meters [5656-9885 feet]). These are ectoparasites, and are probably associated with packrats or other rodents. The fleas were taken from damp silt or under rocks on soil in twilight.

Distribution: Cave 24, Indian Burial Cave (BLM), Model Cave

Hymenoptera: Cynipidae

A gall wasp recorded from one cave (elevation 2148 meters [7047 feet]) from a bottle trap in water near ice is clearly an *accidental*, as these wasps produce plant galls.

Distribution: Ice Cave

Hymenoptera: Formicidae: undetermined Formicidae

Unidentified ants were record from several caves across arrange of elevations (2089-3020 meters [6854-9908 feet]), from walls and floors from normal to dry conditions on soil or bedrock substrates. These are *accidentals*.

Distribution: Lehman Caves, Pine Cone Cave, Root Cave

Hymenoptera: Formicidae: *Camponotus* spp.

Ants of the genus *Camponotus* were fairly commonly encountered in cave entrance and twilight zones, being recorded from five caves across a broad range of elevations (2024-3020 meters [6640-9908 feet]). They were most commonly encountered on floors (70.6 of 17) and ceilings (17.6% of 17) (Figure 8) in normal (88.2% of 17) to dry conditions (Figure 7), mostly associated with organic material (56.3% of 16) or bedrock (31.3% of 16) (Figure 9). These are *accidentals*.

Distribution: Cave 24, Fox Skull Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre), Pine Cone Cave, Water Trough Cave

Hymenoptera: Formicidae: *Forelius* sp.

One ant of the genus *Forelius* was collected from the underside of a dry rock on a wall ledge in a lower elevation (2337 meters [7667 feet]) cave. This is an *accidental*.

Distribution: Water Trough Cave

Hymenoptera: Formicidae: *Formica* spp.

Ants of the genus *Formica* were collected from caves at various elevations (2148-3013 meters [7047-9885 feet]) from a variety of habitats, but especially in association with organic materials (56.3% of 16), and moisture conditions, mostly (88.2% of 14) on cave floors (Figures 7-9). These are *accidentals*.

Distribution: Cave 24, Ice Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre), Water Trough Cave

Hymenoptera: Ichneumonidae

Wasps of the large family Ichneumonidae were recorded from three caves (elevation 1947-2621 meters [6388-8599 feet]), but are clearly *accidentals*. They were recorded from a dry bedrock wall and on rocks and ice next to a cave stream.

Distribution: Ice Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre), Smith Creek Cave (BLM)

Hymenoptera: Platygastridae

A single platygastrid wasp was recorded from one site (elevation 2621 meters [8599 feet]). These extremely minute animals are parasitoids, and in the cave environment clearly are *accidentals*.

<u>Distribution</u>: Lincoln Canyon Mine (Drumming and Miner's Massacre)

Hymenoptera: Pompilidae

A spider wasp was recorded from one cave (elevation 3020 meters [9908 feet]). *Accidental*.

<u>Distribution</u>: Pine Cone Cave

Hymenoptera: Vespidae: *Vespula* sp.

A yellowjacket, *Vespula* sp., was recorded from the surface film of a pool of water in the entrance of one cave (elevation 2337 meters [7667 feet]). An *accidental*.

<u>Distribution</u>: Water Trough Cave

Diptera: undetermined Diptera

Fairly large numbers (n=87) of undetermined flies were recorded from a wide variety of caves at varying elevations (1724-3413 meters [5656-11198 feet]). These include a variety of species and developmental stages (larvae, pupae, and adults), and they occurred in a variety of settings on cave floors, walls and ceilings (26.4%, 37.5%, and 36.1%, respectively; Figure 8) in dry, normal, and wet (69.4%, 16.7%, and 13.9% of 72, respectively; Figure 7) conditions, in a range of habitats, but especially on bedrock (70.8% of 72) (Figure 9). These include at least *accidentals* and *troglophiles*.

<u>Distribution</u>: Bristlecone Cave, Broken Cave, Cave 24, Cave Valley Cave (BLM), Fox Skull Cave, Ice Cave, Indian Burial Cave (BLM), Lehman Annex Cave, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Mountain View Cave, Root Cave, Squirrel Spring Cave, Water Trough Cave

Diptera: Chironomidae: undetermined Chironomidae

An adult midge, an *accidental*, was recorded from a dry bedrock ceiling in a lower elevation (2080 meters [6824 feet]) cave.

<u>Distribution</u>: Model Cave

Diptera: Chironomidae: *Eukiefferiella* sp.

A larval midge of the genus *Eukiefferiella* was taken from a cave stream in a bottle trap at 2148 meters (7047 feet) elevation. This is an *accidental*, but may reflect the influence of the nearby surface stream, Baker Creek, on the cave.

<u>Distribution</u>: Ice Cave

Diptera: Chloropidae

An adult frit fly (no, not fruit fly) was collected from on rocks and ice near a stream in a cave at 2148 meters (7047 feet) elevation. This is an *accidental*.

Distribution: Ice Cave

Diptera: Culicidae

An adult mosquito was collected from the underside of a rock on dry dirt in a lower elevation (2024 meters [6640 feet]) cave, and is an *accidental*

Distribution: Fox Skull Cave

Diptera: Dixidae

An adult of the family Dixidae, sometimes known as meniscus midges, was collected while it was flying near a dry bedrock wall in a lower elevation (2179 meters [7149 feet]) cave, and is an *accidental*.

Distribution: Squirrel Spring Cave

Diptera: Drosphilidae

An adult fruit fly was collected from a dry bedrock wall 10-20 feet (entrance zone) inside a mine located at mid elevation (2621 meters [8599 feet]) and is an *accidental*.

Distribution: Lincoln Canyon Mine (Drumming and Miner's Massacre)

Diptera: Empididae

An adult dance fly was collected from a dry bedrock wall 10-20 feet (entrance zone) inside a mine located at mid elevation (2621 meters [8599 feet]) and is an *accidental*.

Distribution: Lincoln Canyon Mine (Drumming and Miner's Massacre)

Diptera: Ephydridae: *Ochthera* sp.

An adult shore fly of the genus *Ochthera* was collected from the surface of a wet rock in a cave at 2148 meters (7047 feet) elevation. Larvae of this genus are predators on larval Chironomidae and other insects (Foote 1995). This is an *accidental*.

Distribution: Ice Cave

Diptera: Heleomyzidae

Adult heleomyzid flies (Figure 97) were commonly encountered (n=141) in Great Basin National Park caves, at elevations ranging from 1724 to 3413 meters (5656-11198 feet). These were recorded mostly from cave floors (53.2% of 124) and walls (34.7% of 124) (Figure 8), mainly under wet (49.6% of 119) or dry (40.3% of 119) conditions (Figure 7) in a variety of habitats, including especially bedrock, breakdown, or calcite (47.2% of 123) and organics, wood, or organics/wood (32.5% of 123) (Figure 9). Heleomyzidae are commonly recorded from caves, and although some cave-inhabiting species are almost never encountered outside of caves, they are considered to be *troglophiles*.

Distribution: Bristlecone Cave, Broken Cave, Cave 24, Fissure Cave, Ice Cave, Indian Burial Cave (BLM), Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Mountain View Cave, Snake Creek Cave, Squirrel Spring Cave, Water Trough Cave

Diptera: Mycetophilidae

Fungus gnats were fairly common (n=29), occurring in caves at elevations ranging from 2024 to 3413 meters (6640-11198 feet). These gnats were most commonly encountered on cave walls (75.9% of 29) (Figure 8) and under dry conditions (51.7% of 29) (Figure 7). They were usually found on bedrock/calcite/breakdown (85.7% of 28), but also in association with guano (10.7% of 28) (Figure 9). These flies are *troglophiles*.

Distribution: Broken Cave, Fox Skull Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre), Mountain View Cave, Pine Cone Cave, Squirrel Spring Cave

Diptera: Phoridae

Scuttle flies were encountered mostly at higher elevation caves, but occurred from 1724 to 3407 meters (5656-11178 feet) elevation. They were recorded from cave floors (50% of 10) and walls (Figure 8), mostly in dry conditions (70% of 10) (Figure 7), most commonly on bedrock/calcite/breakdown (50% of 10), but also in other habitats (Figure 9). These flies are *troglophiles*.

Distribution: Broken Cave, Cave 24, Fissure Cave, Indian Burial Cave (BLM), Lincoln Canyon Mine (Drumming and Miner's Massacre), Pine Cone Cave

Diptera: Sciaridae

Dark-winged fungus gnats (Figure 98) were extremely common (n=172) occurring in many of the caves and at a wide range of elevations (1724-3167 meters [5656-10390 feet]). They were recorded most frequently from cave floors (53.2% of 154) and walls (41.6% of 154) (Figure 8), most commonly in normal moisture conditions (61.3% of 168) (Figure 7), and occurred in a variety of habitats, but most commonly on bedrock/calcite/breakdown (57.6% of 170) (Figure 9). These flies are *troglophiles*, and are also common in caves elsewhere in the United States.

Distribution: Bristlecone Cave, Cave 24, Fox Skull Cave, Ice Cave, Indian Burial Cave (BLM), Lehman Annex Cave, Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Model Cave, Pine Cone Cave, Root Cave, Squirrel Spring Cave, Water Trough Cave

Diptera: Simuliidae

Three larval blackflies were recorded from a low elevation (2148 meters [7047 feet]) cave on the undersides of rocks in the cave stream, in association with some organic material. These are *accidentals*, reflecting the association of Baker Creek with the cave stream.

Distribution: Ice Cave

Diptera: Sphaeroceridae

Small dung flies were occasionally found in caves at a broad range of elevations (1724-3407 meters [5656-11178 feet]). Sphearocerids were recorded from cave walls (71.4% of 14) and floors (Figure 8), usually under normal (50% of 12) or dry (41.7% of 12) conditions (Figure 7), most commonly on bedrock/soil (41.7% of 12) or breakdown, bedrock, calcite (33.3% of 12) (Figure 9). These are *troglophiles*.

Distribution: Broken Cave, Cave 24, Indian Burial Cave (BLM), Lehman Caves, Lincoln Canyon Mine (Drumming and Miner's Massacre), Squirrel Spring Cave, Water Trough Cave

Diptera: Tipulidae

Crane flies were taken at three caves (elevation 2337-3407 meters [7667-11178 feet]), on bedrock in the entrance or twilight, and under a rock on soil. These are *accidentals*.

Distribution: Broken Cave, Lincoln Canyon Mine (Drumming and Miner's Massacre), Water Trough Cave

Diptera: Trichoceridae

Winter crane flies were taken only at high elevation caves (3013-3167 meters [9885-10390 feet]), in normal moisture conditions, on bedrock walls. These are *accidentals* or *troglophiles*.

Distribution: Cave 24, Bristlecone Cave, Pine Cone Cave

Chordata

Unidentified bones were more commonly seen than noted, as our faunal survey focused especially on invertebrates. However, vertebrates, especially packrats, commonly den in caves, and provide a major source of nutrients for cave communities. A vertebra of unknown affinities was recorded from Water Trough Cave.

Chordata: Reptilia

Squamata

Three dead snakes (Figure 99), including a possible gopher snake, and a dead lizard were recorded from the base of the entrance pit at one low elevation (1724 meters [5656 feet]) cave, where there appears to be a fairly regular “rain” of vertebrate bodies feeding the invertebrate biota of the cave. These are all accidentals.

Distribution: Indian Burial Cave (BLM)

Squamata: Viperidae: *Crotalus viridis lutosus*

Although rattlesnakes probably commonly den in entrances of low-elevation caves of central Nevada, the Great Basin Rattlesnake was only encountered at one cave (elevation 2235 meters [7333 feet]) on a dry bedrock and grate wall ledge (Figure 100), just inside the entrance gate. *Accidental* or facultatively *trogloxenic*.

Distribution: Lehman Annex Cave

Chordata: Aves

A bird bone from dry dirt and rock floor (cave elevation 2235 meters [7333 feet])

Distribution: Lehman Annex Cave

Apodiformes: Trochilidae: *Selasphorus platycercus*

A broad-tailed hummingbird was observed flying and feeding on *Huechera* sp. blooms about 10 feet inside of mine entrance (elevation 2621 meters [8599 feet]), *accidental*.

Distribution: Lincoln Canyon Mine (Drumming and Miner's Massacre)

Columbiformes: Columbidae: *Zenaida macroura*

A mourning dove flew off of a wet soil and rock floor as we approached the cave (elevation 2337 meters [7667 feet]). A reliable water source and sheltered location make this cave’s entrance suitable for a variety of incidental vertebrates.

Distribution: Water Trough Cave

Passeriformes: Fringillidae: *Carpodacus cassinii*

A Cassin's finch was seen on shrubs (perhaps Currant) just inside the entrance (elevation 2337 meters [7667 feet]) of a cave.

Distribution: Water Trough Cave

Passeriformes: Troglodytidae: *Catherpes mexicanus*

A canyon wren was briefly observed on a dry bedrock wall just inside the entrance (elevation 2337 meters [7667 feet]) of a cave.

Distribution: Water Trough Cave

Chordata: Mammalia

undetermined Mammalia

Evidence of unidentified mammals was common in caves of Great Basin National Park, but not always noted. Bones were the most common evidence, fur, feces, and footprints also pointed to the presence of mammals in the caves. Particular note of such evidence was made at four lower elevation (1724-2235 meters [5656-7333 feet]) caves, where bones were observed on dry to normal floors and fur was observed on rocks, walls, and ceiling of one cave. Some probably represent facultative *trogloxenes*.

Distribution: Fox Skull Cave, Indian Burial Cave (BLM), Lehman Annex Cave, Squirrel Spring Cave

Rodentia: undetermined Rodentia

A dead rodent was observed floating in pooled water in the entrance of one lower elevation (2337 meters [7667 feet]) cave. This is probably a packrat (a facultative *trogloxene*).

Distribution: Water Trough Cave

Rodentia: Cricetidae

A rodent skull (normal floor, on calcite covered breakdown) and a dead mouse (on dry breakdown floor) were recorded from lower elevation (1724-2096 meters [5656-6877 feet]) caves, and are facultative *trogloxenes*.

Distribution: Indian Burial Cave (BLM), Lehman Caves

Rodentia: Cricetidae: ***Peromyscus*** sp.

Mice of the genus *Peromyscus* were recorded from two caves (elevation 2089-2235 meters [6854-7333 feet]) under dry to normal conditions on floors and walls. These are likely much more common as facultative *trogloxenes* than our data indicate, but they are not easily observed.

Distribution: Lehman Annex Cave, Root Cave

Rodentia: Cricetidae: ***Neotoma*** sp.

Woodrats, or packrats, were seemingly present at nearly every cave, as evidenced by their bones, guano and middens, but no live specimens were ever observed. We generally did not record their presence, as certainty in identification of their feces and bones was outside our area of expertise. They occurred from the highest elevation caves (i.e., Mountain View Cave, Broken Cave) down to the lowest (Smith Creek Cave, Indian Burial Cave), thus spanning a wide range of elevations (1724-3413 meters [5656-11198 feet]). At some sites, midden deposits were quite pronounced, such as at Snake Creek Cave, Water Trough Cave, and Smith Creek Cave. These animals clearly play a very important role in providing energy input into the cave systems, and function as facultative trogloxenes. Understanding their habitat needs should be considered a relevant component of the management of cave biotic resources at Great Basin National Park.

Lagomorpha: Leporidae: Lepus californicus deserticola

A black-tailed jack rabbit (Figure 101) was found dead on dry breakdown and loose rock at the bottom of the entrance pit of a low elevation (1724 meters [5656 feet]) cave. It had not been present several days before, and the area at the base of the entrance drop is littered with the bones and corpses of many animals, which, no doubt, play an important role in providing energy to this cave. Prior to development of Lehman Caves, a similar configuration was present – that is, the historical entrance of Lehman Caves probably served as a natural pitfall trap for many vertebrates which, in turn, served as a source of nutrients for the cave community. This animal is an obvious *accidental*.

Distribution: Indian Burial Cave (BLM)

Carnivora: Canidae: Vulpes macrotis nevadensis

A dead kit fox (Figure 102) was found on dry breakdown at the bottom of the entrance pit of a low elevation (1724 meters [5656 feet]) cave. See discussion under *Lepus californicus deserticola*, which also applies to this animal, which is an *accidental*.

Distribution: Indian Burial Cave (BLM)

Chiroptera: Vespertilionidae: undetermined Vespertilionidae

Several dead bats (Figure 103) were recorded from the floor of a low elevation (1724 meters [5656 feet]) cave on dry to normal breakdown or soil floors. These are *trogloxenes*.

Distribution: Indian Burial Cave (BLM)

Chiroptera: Vespertilionidae: *Myotis evotis evotis*

Dead long-eared *Myotis* were recorded from two lower-elevation (1724-2096 meters [5656-6877 feet]) caves on dry floors of breakdown or soil, rocks and organics. These are *trogloxenes*.

Distribution: Indian Burial Cave (BLM), Lehman Caves

Chiroptera: Vespertilionidae: *Corynorhinus townsendii pallescens*

Western (=Townsend's) big-eared bats (Figure 104) were observed on bedrock ceilings and wall habitats, and on underside of cement at the historic entrance gate (=ceiling) at Lehman Caves. The caves where this bat was recorded are, with the exception of Long Cold Cave (3011 meters [9879 feet]), at lower-elevation (1724-2096 meters [5656-6877 feet]). These are *trogloxenes*.

Distribution: Indian Burial Cave (BLM), Lehman Caves, Long Cold Cave (NPS-GRBA pers. comm. [2008]), Snake Creek Cave

Appendix 5. Specimen data from field collections.

Missing NPS numbers represent only bookkeeping issues which could not be resolved in time for inclusion in this report.

Cave	Date	Sample Number	Sample Type	NPS Number	count	Phylum	Class	Order	Family	Genus	Species	Microhabitat	Moisture	Position	Substrate
Bristlecone Cave	11-Jul-07	411	hand	7324	1	Arthropoda	Arachnida	Acari				rock wall		wall	bedrock
Bristlecone Cave	21-Jul-07	418	pit	7253	1	Arthropoda	Arachnida	Acari							
Bristlecone Cave	11-Jul-07	412	hand	7321	1	Arthropoda	Arachnida	Araneae	Araneidae			pocket in bedrock wall		wall	bedrock
Bristlecone Cave	21-Jul-07	520	hand	7297	1	Arthropoda	Chilopoda	Geophilomorpha	Geophilidae			under rock near pitfall trap	normal	floor	rocks
Bristlecone Cave	11-Jul-07	414	hand	7313	1	Arthropoda	Chilopoda	Geophilomorpha	Geophilidae			organic debris on wall		wall	bedrock/organic
Bristlecone Cave	11-Jul-07	405	hand	7315	1	Arthropoda	Chilopoda	Geophilomorpha	Geophilidae			in debris pile on wall		wall	bedrock/organic
Bristlecone Cave	21-Jul-07	523	hand	7292	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	under normal rock on normal gravel/pinecone floor	normal	floor	organic/rock
Bristlecone Cave	21-Jul-07	522	hand	7290-7291	2	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	under normal rock on normal gravel floor	normal	floor	rocks
Bristlecone Cave	21-Jul-07	520	hand	7293-7296	4	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	under rock, sitting on top of pitfall trap, twilight	normal	floor	rocks
Bristlecone Cave	21-Jul-07	505	hand	7337-7338	2	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	underside of rock, loose	normal	floor	rocks
Bristlecone Cave	21-Jul-07	504	hand	7333	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	bedrock wall	dry	wall	bedrock
Bristlecone Cave	21-Jul-07	504	hand	7334-7336	3	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	bedrock wall	dry	wall	bedrock
Bristlecone Cave	11-Jul-07	406	hand	7319	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on normal wall	normal	wall	bedrock
Bristlecone Cave	21-Jul-07	524	hand	7288	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on bedrock wall with organic debris stain	wet	wall	bedrock/organic
Bristlecone Cave	11-Jul-07	416	hand	7327	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	rock wall		wall	bedrock

Bristlecone Cave	21-Jul-07	404	pit	7262-7263	2	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	"pulled at 1230pm 21 July 2007"			
Bristlecone Cave	11-Jul-07	415	Sight		1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona?	sp.	rock wall		wall	bedrock
Bristlecone Cave	11-Jul-07	419	Sight		1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona?	sp.	rock wall		wall	bedrock
Bristlecone Cave	21-Jul-07	521	sight		2	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona?		under rock near pitfall trap	normal	floor	rocks
Bristlecone Cave	21-Jul-07	528	sight		1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona?		on bedrock wall	dry	wall	bedrock
Bristlecone Cave	21-Jul-07	525	sight		1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona?		on rock wall	normal	wall	bedrock
Bristlecone Cave	11-Jul-07	407	Sight		1	Arthropoda	Hexapoda	Collembola				on normal wood	normal	floor	wood
Bristlecone Cave	11-Jul-07	408	Sight		2	Arthropoda	Hexapoda	Collembola				on normal wood	normal	floor	wood
Bristlecone Cave	11-Jul-07	409	Hand		1	Arthropoda	Hexapoda	Collembola				on normal wood	normal	floor	wood
Bristlecone Cave	21-Jul-07	404	pit	7259-7264	6	Arthropoda	Hexapoda	Collembola	Isotomidae	Isotoma	sp. 1	"pulled at 1230pm 21 July 2007"			
Bristlecone Cave	21-Jul-07	404	pit	7254-7258	5	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onyciurinae			"pulled at 1230pm 21 July 2007"			
Bristlecone Cave	11-Jul-07	410	hand	7323	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			on normal wood	normal	floor	wood
Bristlecone Cave	21-Jul-07	525			1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	on underside of normal rock on normal gravel floor	normal	floor	rocks
Bristlecone Cave	21-Jul-07	527	hand	7264	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	on underside of normal rock on normal floor	normal	floor	rocks
Bristlecone Cave	11-Jul-07	413	hand	7325	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	rock wall		wall	bedrock
Bristlecone Cave	21-Jul-07	503	hand		1	Arthropoda	Hexapoda	Diptera				bedrock wall	normal	wall	bedrock
Bristlecone Cave	21-Jul-07	503	hand	7265	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bedrock wall	normal	wall	bedrock
Bristlecone Cave	21-Jul-07	526	hand	7289	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on rock wall	normal	wall	rocks
Bristlecone Cave	21-Jul-07	503	hand	7267-7287	21	Arthropoda	Hexapoda	Diptera	Sciaridae			bedrock wall	normal	wall	bedrock
Bristlecone Cave	11-Jul-07	417	hand	7306-7307	2	Arthropoda	Hexapoda	Diptera	Sciaridae			rock wall		wall	rocks
Bristlecone Cave	21-Jul-07	503	hand	7266	1	Arthropoda	Hexapoda	Diptera	Trichoceridae			bedrock wall	normal	wall	bedrock
Broken Cave	16-Jul-	442	hand	6992	1	Arthropoda	Arachnida	Acari							

	07														
Broken Cave	16-Jul-07	439	sight		1	Arthropoda	Arachnida	Acari	Rhagidiidae			packrat guano on floor, dark	normal	floor	guano
Broken Cave	16-Jul-07	445	hand		2	Arthropoda	Arachnida	Pseudoscorpiones				underside of rock, dark	normal	floor	rocks
Broken Cave	16-Jul-07	435	hand	7011	1	Arthropoda	Arachnida	Araneae	Araneidae			bedrock wall, in web, entrance	dry	wall	bedrock
Broken Cave	16-Jul-07	440	hand	6999-7005	7	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	packrat guano on floor, dark	normal	floor	guano
Broken Cave	16-Jul-07	441	hand	7015	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	underside rock, dark	normal	floor	rocks
Broken Cave	16-Jul-07	433	hand	7012	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	under rock on soil/gravel with needle litter, packrat/porcupine guano, twilight	normal	floor	soil/rock/organic
Broken Cave	16-Jul-07	444	sight		3	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on packrat guano, floor, dark	wet?	floor	guano
Broken Cave	16-Jul-07	434	hand	7025	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	bedrock wall, twilight	dry	wall	bedrock
Broken Cave	9-Jul-07	393	hand	7330	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on dry rock wall	dry	wall	bedrock
Broken Cave	16-Jul-07	438	hand	7030	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	bedrock wall, twilight	normal	wall	bedrock
Broken Cave	16-Jul-07	446	sight		1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on bed breakdown wall, twilight	normal	wall	bedrock/rocks
Broken Cave	16-Jul-07	442	hand	6991	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	soil on bed ledge, entrance	normal	wall	bedrock/soil
Broken Cave	16-Jul-07	443	hand	7009	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	breakdown, floor, entrance	dry	floor	breakdown
Broken Cave	16-Jul-07	433	hand	7014	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	under rock, twilight	normal	floor	rocks
Broken Cave	16-Jul-07	442	hand		4	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	soil on bed ledge, entrance	normal	wall	bedrock/soil
Broken Cave	16-Jul-07	442	hand	6995-6996	2	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	soil on bed ledge, entrance	normal	wall	bedrock/soil
Broken Cave	16-Jul-07	435	hand	7010	1	Arthropoda	Hexapoda	Heteroptera	Thyreocoridae			bedrock wall, in web, entrance	dry	wall	bedrock
Broken Cave	16-Jul-07	435	hand		1	Arthropoda	Hexapoda	Coleoptera				bedrock wall, entrance	dry	wall	bedrock
Broken Cave	16-Jul-07	442	hand	6990	1	Arthropoda	Hexapoda	Coleoptera	Elateridae			soil on bed ledge, entrance	normal	wall	bedrock/soil
Broken Cave	16-Jul-07	442	hand	6994	2	Arthropoda	Hexapoda	Coleoptera	Scolytidae			soil on bed ledge, entrance	normal	wall	bedrock/soil
Broken Cave	16-Jul-	436	hand	6997	1	Arthropoda	Hexapoda	Lepidoptera	Nymphalidae	Aglais	milberti	bedrock ceiling,	dry	ceili	bedrock

	07											twilight		ng	
Broken Cave	10-Jul-07	396	Sight		1	Arthropoda	Hexapoda	Lepidoptera	Nymphalidae	Aglais	milberti	on dry rock wall	dry	wall	bedrock
Broken Cave	10-Jul-07	395	hand	7300	1	Arthropoda	Hexapoda	Lepidoptera	Nymphalidae	Aglais	milberti	on dry rock wall	dry	wall	bedrock
Broken Cave	16-Jul-07	443	hand	7006-7008	3	Arthropoda	Hexapoda	Lepidoptera	Tineidae			breakdown, floor, entrance	dry	floor	breakdown
Broken Cave	16-Jul-07	434	hand	7023	1	Arthropoda	Hexapoda	Diptera				bedrock ceiling, twilight	dry	ceiling	bedrock
Broken Cave	16-Jul-07	433	hand		1	Arthropoda	Hexapoda	Diptera				none given	none		
Broken Cave	16-Jul-07	434	hand	7016-7022	7	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bedrock ceiling, twilight	dry	ceiling	bedrock
Broken Cave	16-Jul-07	437	hand	7026-7029	4	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bedrock wall, entrance	dry	wall	bedrock
Broken Cave	10-Jul-07	394	hand	7309	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on dry rock wall	dry	wall	bedrock
Broken Cave	16-Jul-07	434	hand	7024	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			bedrock ceiling, twilight	dry	ceiling	bedrock
Broken Cave	16-Jul-07	442	hand	6993	1	Arthropoda	Hexapoda	Diptera	Phoridae			soil on bed ledge, entrance	normal	wall	bedrock/soil
Broken Cave	16-Jul-07	442	hand		2	Arthropoda	Hexapoda	Diptera	Sphaeroceridae			soil on bed ledge, entrance	normal	wall	bedrock/soil
Broken Cave	16-Jul-07	434	hand		2	Arthropoda	Hexapoda	Diptera	Tipulidae			bedrock ceiling, twilight	dry	ceiling	bedrock
Broken Cave	16-Jul-07	433	hand	7013	1	Unknown						under rock, twilight	normal	floor	rocks
Cave 24	17-Jul-07	451	hand	7127	1	Arthropoda	Arachnida	Acari				under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	455	hand	7109	1	Arthropoda	Arachnida	Acari				under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	9-Jul-07	373	Sight		1	Arthropoda	Arachnida	Opiliones				on dry limestone wall	dry	wall	bedrock
Cave 24	9-Jul-07	401	hand	7322	1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus	on dry rock wall	dry	wall	bedrock
Cave 24	17-Jul-07	467	hand	7078-7079	2	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus	bed walls, twilight	normal	wall	bedrock
Cave 24	17-Jul-07	462	hand	7093	1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus	breakdown, wall, twilight	normal	wall	breakdown
Cave 24	17-Jul-07	454	hand	7086	1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus				
Cave 24	9-Jul-07	371	hand	7320	1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus				

Cave 24	9-Jul-07	372	hand	7326	1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus				
Cave 24	17-Jul-07	460	hand		1	Arthropoda	Arachnida	Pseudoscorpiones				under rock on soil, dark	normal	floor	soil/rocks
Cave 24	17-Jul-07	455	hand	7106	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	459	hand		1	Arthropoda	Arachnida	Araneae				floor, soil/pine needles/rocks	dry	floor	soil/rock/organic
Cave 24	17-Jul-07	459	hand	7076	1	Arthropoda	Arachnida	Araneae				floor, soil/pine needles/rocks	dry	floor	soil/rock/organic
Cave 24	9-Jul-07	373	Sight		1	Arthropoda	Arachnida	Araneae				on dry loose soil with small rocks	dry	floor	soil/rocks
Cave 24	17-Jul-07	461	hand		1	Arthropoda	Arachnida	Araneae				under rocks on soil w/fresh rodent scat, fresh branches/needles, twilight	normal	floor	soil/rock/guano
Cave 24	9-Jul-07	377	Sight		2	Arthropoda	Arachnida	Araneae				on dry limestone wall	dry	wall	soil/rocks
Cave 24	9-Jul-07	375	hand	7310	1	Arthropoda	Arachnida	Araneae	Araneidae						
Cave 24	17-Jul-07	458	hand	7050	1	Arthropoda	Arachnida	Araneae	Gnaphosidae	Gnaphosa spp.	big dark male spider	breakdown, wall, twilight	dry	wall	breakdown
Cave 24	17-Jul-07	464	hand	7143	1	Arthropoda	Arachnida	Araneae	Linyphiidae		spider in web	on rock loose at pit 381, twilight	normal	floor	rocks
Cave 24	17-Jul-07	463	hand	7089	1	Arthropoda	Arachnida	Araneae	Linyphiidae			under loose rocks on loose soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	457	hand	7137-7138	2	Arthropoda	Arachnida	Araneae	Linyphiidae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	457	hand	7136	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	463	hand	7087-7088	2	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	under loose rocks on loose soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	452	hand	7128-7129	2	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	no	collection#	7096	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	bed wall, entrance	dry	wall	bedrock
Cave 24	17-Jul-07	458	hand	7051-7052	2	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	breakdown, wall, twilight	dry	wall	breakdown
Cave 24	17-Jul-07	466	hand	7110	1	Arthropoda	Chilopoda	Geophilomorpha	Geophilidae			soil/old guano, floor, twilight	normal	floor	soil/guano

Cave 24	17-Jul-07	457	hand	7134	1	Arthropoda	Chilopoda	Geophilomorpha	Geophilidae						
Cave 24	17-Jul-07	374	pit	7041	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	normal dirt floor twilight	normal	floor	soil
Cave 24	17-Jul-07	461	hand		1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	under rocks on soil w/fresh rodent scat, fresh branches/needles, twilight	normal	floor	soil/rock/guano
Cave 24	17-Jul-07	no	collection#	7097	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis				
Cave 24	17-Jul-07	448	hand	7098	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis				
Cave 24	17-Jul-07	450	hand	7103	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis				
Cave 24	17-Jul-07	466	hand		2	Arthropoda	Hexapoda	Collembola				soil/old guano, floor, twilight	normal	floor	soil/guano
Cave 24	17-Jul-07	459	hand	7077	1	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	floor, soil/pine needles/rocks	dry	floor	soil/rock/organic
Cave 24	17-Jul-07	451	hand	7115-7125	10	Arthropoda	Hexapoda	Collembola	Isotomidae	Desoria sp. 2		under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	455	hand	7108	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Desoria sp. 2		under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	370	pit	7044-7048	5	Arthropoda	Hexapoda	Collembola	Isotomidae	Desoria sp. 2		Not covered on data sheet			
Cave 24	17-Jul-07	466	hand	7112	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			soil/old guano, floor, twilight	normal	floor	soil/guano
Cave 24	17-Jul-07	457	hand	7142	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	461	hand		1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	under rocks on soil w/fresh rodent scat, fresh branches/needles, twilight	normal	floor	soil/rock/guano
Cave 24	17-Jul-07	457	hand		3	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	457	hand	7139-7140	2	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	448	hand	7099	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.				
Cave 24	17-Jul-07	457	hand		1	Arthropoda	Hexapoda	Orthoptera	Rhaphidophoridae	Ceuthophilus	sp.	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	457	hand	7135	1	Arthropoda	Hexapoda	Coleoptera	Cantharidae	Malthodes	sp.	under rocks on soil, twilight	normal	floor	soil/rocks

Cave 24	17-Jul-07	459	hand	7071	1	Arthropoda	Hexapoda	Coleoptera	Carabidae	Pterostiches (Hypherpes)	protractus LeConte	floor, soil/pine needles/rocks	dry	floor	soil/rock/organic
Cave 24	17-Jul-07	457	hand	7130	1	Arthropoda	Hexapoda	Coleoptera	Carabidae	Pterostiches (Hypherpes)	protractus LeConte	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	no	collection#	7095	1	Arthropoda	Hexapoda	Coleoptera	Colydiidae						
Cave 24	17-Jul-07	457	hand	7131	1	Arthropoda	Hexapoda	Coleoptera	Elateridae						
Cave 24	17-Jul-07	448	hand	7100	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	450	hand	7102	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	455	hand	7104-7105	2	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	451	hand	7113-7114	2	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	462	hand		1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			breakdown, wall, twilight	normal	wall	bedrock
Cave 24	17-Jul-07	370	pit	7042-7043	2	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			Not covered on data sheet			
Cave 24	9-Jul-07	378	Sight		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on dry rock in soil/packrat scat	dry	floor	soil/rock/guano
Cave 24	17-Jul-07	468	hand	7331-7332	2	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae	Eleodes	hispilabris sculptilis Blaisdell 1909	bed wall, entrance	dry	wall	bedrock
Cave 24	9-Jul-07	380	Sight		2	Arthropoda	Hexapoda	Lepidoptera				on dry rock wall	dry	wall	bedrock
Cave 24	17-Jul-07	456	hand	7101	1	Arthropoda	Hexapoda	Siphonaptera				under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	459	hand	7072	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	dead, with foraging trail of golden ants feeding on it	dry	floor	
Cave 24	17-Jul-07	457	hand	7132	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	462	hand	7092	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	breakdown, wall, twilight	normal	wall	breakdown
Cave 24	17-Jul-07	459	hand	7053-70	8	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Formica	sp.	floor, soil/pine needles/rocks, feeding on Camponotus	dry	floor	soil/rock/organic

Cave 24	17-Jul-07	466	hand	7111	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Formica	sp.	soil/old guano, floor, twilight	normal	floor	soil/guano
Cave 24	9-Jul-07	379	Sight		2	Arthropoda	Hexapoda	Diptera				on dry bedrock wall	dry	wall	bedrock
Cave 24	17-Jul-07	462	hand		1	Arthropoda	Hexapoda	Diptera				breakdown, wall, twilight	normal	wall	breakdown
Cave 24	17-Jul-07	370	pit	7049	1	Arthropoda	Hexapoda	Diptera				Not covered on data sheet			
Cave 24	17-Jul-07	459	hand	7075	1	Arthropoda	Hexapoda	Diptera	Cecidomyiidae			floor, soil/pine needles/rocks	dry	floor	soil/rock/organic
Cave 24	17-Jul-07	455	hand	7107	1	Arthropoda	Hexapoda	Diptera	Cecidomyiidae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	457	hand		2	Arthropoda	Hexapoda	Diptera	Heleomyzidae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	9-Jul-07	376	Sight		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on dry limestone wall	dry	wall	bedrock
Cave 24	17-Jul-07	467	hand	7080	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bed walls, twilight	normal	wall	bedrock
Cave 24	17-Jul-07	462	hand		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			breakdown, wall, twilight	normal	wall	breakdown
Cave 24	17-Jul-07	no	collection#	7091	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae						
Cave 24	17-Jul-07	459	hand	7073-7074	2	Arthropoda	Hexapoda	Diptera	Phoridae			floor, soil/pine needles/rocks	dry	floor	soil/rock/organic
Cave 24	17-Jul-07	457	hand	7141	1	Arthropoda	Hexapoda	Diptera	Phoridae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	no nmbr		7094	1	Arthropoda	Hexapoda	Diptera	Sciaridae			soil & old packrat guano floor normal twilight	normal	floor	soil/guano
Cave 24	17-Jul-07	453	hand	7090	1	Arthropoda	Hexapoda	Diptera	Sciaridae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	451	hand	7126	1	Arthropoda	Hexapoda	Diptera	Sciaridae			under rocks on soil, twilight	normal	floor	soil/rocks
Cave 24	17-Jul-07	467	hand	7085	1	Arthropoda	Hexapoda	Diptera	Sciaridae			bed walls, twilight	normal	wall	bedrock
Cave 24	17-Jul-07	459	hand		1	Arthropoda	Hexapoda	Diptera	Sphaeroceridae			floor, soil/pine needles/rocks	dry	floor	soil/rock/organic
Cave 24	17-Jul-07	465	hand	7144	1	Arthropoda	Hexapoda	Diptera	Trichoceridae			on bed wall at pit 381, twilight	normal	wall	bedrock
Cave 24	17-Jul-07	467	hand	7081-7084	4	Arthropoda	Hexapoda	Diptera	Trichoceridae			bed walls, twilight	normal	wall	bedrock
Cave Valley Cave	30-Sep-06	45		7562	1	Arthropoda	Hexapoda ?								
Cave Valley Cave	30-Sep-06	33		7558	1	Arthropoda	Hexapoda	Orthoptera	Rhaphidiophoridae	Ceuthophilus					

Cave Valley Cave	30-Sep-06	44		7561	1	Arthropoda	Hexapoda	Orthoptera	Rhaphidiophoridae	Ceuthophilus					
Cave Valley Cave	30-Sep-06	28		7556-7557	2	Arthropoda	Hexapoda	Coleoptera	Leiodidae						
Cave Valley Cave	30-Sep-06	38-39		7559-7560	2	Arthropoda	Hexapoda	Diptera							
Fissure Cave	16-Jul-07	447	hand	7040	1	Arthropoda	Arachnida	Acari							
Fissure Cave	16-Jul-07	447	hand		1	Arthropoda	Hexapoda	Collembola				"possibly not collected"	none		
Fissure Cave	16-Jul-07	447	hand		2	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	dry bedrock wall; "label just says Fissure Cave"	dry	wall	bedrock
Fissure Cave	16-Jul-07	447	hand	7036-7038	3	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	dry bedrock wall; "label just says Fissure Cave"	dry	wall	bedrock
Fissure Cave	16-Jul-07	447	hand	7031-7035	5	Arthropoda	Hexapoda	Diptera	Heleomyzidae			dry bedrock wall	dry	wall	bedrock
Fissure Cave	16-Jul-07	447	hand	7039	1	Arthropoda	Hexapoda	Diptera	Phoridae			dry bedrock wall	dry	wall	bedrock
Fox Skull Cave	21-May-06	109	Hand	7502-7505	4	Arthropoda	Arachnida	Acari	Rhagidiidae			on underside of rock on dirt	dry	floor	soil/rocks
Fox Skull Cave	21-May-06	113	Hand	7476	1	Arthropoda	Arachnida	Acari	Rhagidiidae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	7493	1	Arthropoda	Arachnida	Acari	Rhagidiidae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	111	Hand	6423	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea: Family Leiobunidae: Leiobunum sp. (immature) - obviously accidental or entrance	Lieobunum	sp.	on bedrock	dry	ceiling	bedrock

Fox Skull Cave	21-May-06	114	Hand	6440	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea: Family Leiobunidae: Leiobunum sp. (immature) - obviously accidental or entrance	Lieobunum	sp.	bedrock	normal	ceiling	bedrock
Fox Skull Cave	21-May-06	109	Hand	7501	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea: Family Leiobunidae: Leiobunum sp. (immature) - obviously accidental or entrance	Lieobunum	sp.	on dirt under rock	dry	floor	soil/rocks
Fox Skull Cave	21-May-06	113	Hand	7446	1	Arthropoda	Arachnida	Pseudoscorpiones	Chernetidae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	7455-7462	8	Arthropoda	Arachnida	Pseudoscorpiones	Chernetidae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	7488-7489	2	Arthropoda	Arachnida	Pseudoscorpiones	Chernetidae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	115	Sight		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	bedrock	dry	wall	bedrock
Fox Skull Cave	21-May-06	113	Hand	7472	1	Arthropoda	Arachnida	Araneae				on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	110	Hand	6432	1	Arthropoda	Arachnida	Araneae	Araneidae			under rock	dry	floor	rocks
Fox Skull Cave	21-May-06	113	Hand	7447	1	Arthropoda	Arachnida	Araneae	Dyctinidae?			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull	21-	113	Hand	7471	1	Arthropoda	Arachnida	Araneae	Dyctinidae?			on underside of	normal	floor	soil/rock/gu

Cave	May-06											rock on dirt/packrat middens			ano
Fox Skull Cave	21-May-06	113	Hand	7479-7486	8	Arthropoda	Arachnida	Araneae	Dyctinidae?			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	110	Hand	6430-6431	2	Arthropoda	Arachnida	Araneae	Linyphiidae?			under rock	dry	floor	rocks
Fox Skull Cave	21-May-06	113	Hand	7487	1	Arthropoda	Arachnida	Araneae	Linyphiidae?			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	110	Hand	6428-6429	2	Arthropoda	Hexapoda	Collembola				under rock	dry	floor	rocks
Fox Skull Cave	21-May-06	113	Hand	7492	1	Arthropoda	Hexapoda	Collembola				on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	7448-7450	3	Arthropoda	Hexapoda	Collembola				on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	7451-7454	4	Arthropoda	Hexapoda	Collembola				on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	110	Hand	6425-6427	3	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 1	under rock	dry	floor	rocks
Fox Skull Cave	21-May-06	111	Hand	6422	1	Arthropoda	Hexapoda	Microcoryphia	Meinertellidae	Hypomachilodes	sp.	on bedrock	dry	ceiling	bedrock
Fox Skull Cave	21-May-06	109	Hand	7495	1	Arthropoda	Hexapoda	Plecoptera							
Fox Skull Cave	21-May-06	109	Hand		1	Arthropoda	Hexapoda	Orthoptera				on underside of rock on dirt	dry	floor	soil/rocks
Fox Skull Cave	21-May-06	113	Hand	7494	1	Arthropoda	Hexapoda	Psocoptera	Prionoglaridae	Speleketor		on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	7473-7475	3	Arthropoda	Hexapoda	Psocoptera	Prionoglaridae	Speleketor		on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	109	Hand	7496	1	Arthropoda	Hexapoda	Homoptera	Cercopidae			on underside of rock on dirt	dry	floor	soil/rocks
Fox Skull Cave	21-May-06	110	Hand	6434	1	Arthropoda	Hexapoda	Homoptera	Cixiidae			under rock	dry	floor	rocks
Fox Skull Cave	21-May-06	113	Hand	7469	1	Arthropoda	Hexapoda	Coleoptera				on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano

Fox Skull Cave	21-May-06	109	Hand	7497-7499	3	Arthropoda	Hexapoda	Coleoptera	Chrysomelidae: subfam Galerucinae: tribe Alticini			on underside of rock on dirt	dry	floor	soil/rocks
Fox Skull Cave	21-May-06	113	Hand	7468	1	Arthropoda	Hexapoda	Coleoptera	Cryptophagidae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	110	Hand	6433	1	Arthropoda	Hexapoda	Coleoptera	Dermestidae			under rock	dry	floor	rocks
Fox Skull Cave	21-May-06	110	Hand	6424	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			under rock	dry	floor	rocks
Fox Skull Cave	21-May-06	112	Sight		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on bedrock	dry	floor	bedrock
Fox Skull Cave	21-May-06	113	Hand	7477-7478	2	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on bedrock	dry	floor	bedrock
Fox Skull Cave	21-May-06	113	Hand	7470	1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	115	Sight		3	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			bedrock	dry	wall	bedrock
Fox Skull Cave	21-May-06	114	Hand	6437	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	bedrock	normal	ceiling	bedrock
Fox Skull Cave	21-May-06	114	Hand	6435-6436	2	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	bedrock	normal	ceiling	bedrock
Fox Skull Cave	21-May-06	113	Hand	7467	1	Arthropoda	Hexapoda	Diptera				on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	109	Hand	7500	1	Arthropoda	Hexapoda	Diptera	Culicidae?			on underside of rock on dirt	dry	floor	soil/rocks
Fox Skull Cave	21-May-06	114	Hand	6438	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			bedrock	normal	ceiling	bedrock
Fox Skull Cave	21-May-06	114	Hand	6439	1	Arthropoda	Hexapoda	Diptera	Sciaridae			bedrock	normal	ceiling	bedrock
Fox Skull Cave	21-May-06	113	Hand	7463-7466	4	Arthropoda	Hexapoda	Diptera	Sciaridae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	7490-7491	2	Arthropoda	Hexapoda	Diptera	Sciaridae			on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Fox Skull Cave	21-May-06	113	Hand	6421	1	Chordata	Mammalia					on underside of rock on dirt/packrat middens	normal	floor	soil/rock/guano
Ice Cave	22-May-06	116	hand	6357	1	Mollusca	Gastropoda					on surface of rock emerging from stream	wet	floor	water

Ice Cave	22-May-06	118	Hand	6368	1	Mollusca	Gastropoda					on surface of wet rock	wet	floor	water
Ice Cave	22-May-06	122	Hand	7513	1	Arthropoda	Arachnida	Acari	Rhagidiidae			underside of rock in dirt, many organics nearby	normal	floor	soil/rock/organic
Ice Cave	22-May-06	121	Hand	6367	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	on bedrock wall	dry	wall	bedrock
Ice Cave	2-Oct-06	13-14		7566-7568	3	Arthropoda	Hexapoda	Collembola							
Ice Cave	24-May-06	125	Bottle	6676	1	Arthropoda	Hexapoda	Collembola	Hypogastruridae	Acherontiella	sp.	eddy at ice	wet	floor	water
Ice Cave	22-May-06	116	hand	6346	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Isotoma	sp. 1	on surface of rock emerging from stream	wet	floor	water
Ice Cave	22-May-06	116	hand	6355	1	Arthropoda	Hexapoda	Ephemeroptera	Baetidae			in stream undersides of rocks, some organics	wet	floor	water
Ice Cave	24-May-06	125	Bottle	6678	1	Arthropoda	Hexapoda	Ephemeroptera	Baetidae			eddy at ice	wet	floor	water
Ice Cave	22-May-06	124	Bottle	6679	1	Arthropoda	Hexapoda	Ephemeroptera	Baetidae			stream	wet	floor	water
Ice Cave	22-May-06	116	hand	6352-6354	3	Arthropoda	Hexapoda	Ephemeroptera	Heptageniidae			in stream undersides of rocks, some organics	wet	floor	water
Ice Cave	22-May-06	116	hand	6350-6351	2	Arthropoda	Hexapoda	Ephemeroptera	Siphlonuridae			in stream undersides of rocks, some organics	wet	floor	water
Ice Cave	22-May-06	123	Hand	6370	1	Arthropoda	Hexapoda	Coleoptera	Carabidae	Bembidion		bedrock	dry	wall	bedrock
Ice Cave	22-May-06	120	Hand	6366	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on bedrock wall	dry	wall	bedrock
Ice Cave	2-Oct-06	39511		7564-7565	2	Arthropoda	Hexapoda	Trichoptera			larvae in cases				
Ice Cave	22-May-06	116	hand	6345	1	Arthropoda	Hexapoda	Trichoptera	Rhyacophilidae			in stream undersides of rocks, some organics	wet	floor	water
Ice Cave	22-May-06	116	hand	6356	1	Arthropoda	Hexapoda	Trichoptera	Rhyacophilidae			on surface of rock emerging from stream	wet	floor	water
Ice Cave	22-May-06	117	Hand	6358-6359	2	Arthropoda	Hexapoda	Lepidoptera	Noctuidae			on rocks and ice next to stream	wet	floor	rocks

Ice Cave	2-Oct-06	32		7563	1	Arthropoda	Hexapoda	Lepidoptera	Noctuidae						
Ice Cave	24-May-06	125	Bottle	6677	1	Arthropoda	Hexapoda	Hymenoptera	Cynipidae			eddy at ice	wet	floor	water
Ice Cave	24-May-06	124	Bottle	6680	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Formica	sp.	stream	wet	floor	water
Ice Cave	22-May-06	117	Hand	6360	1	Arthropoda	Hexapoda	Hymenoptera	Ichneumonidae			on rocks and ice next to stream	wet	floor	rocks
Ice Cave	22-May-06	120	Hand	6365	1	Arthropoda	Hexapoda	Diptera				on bedrock wall	dry	wall	bedrock
Ice Cave	24-May-06	124	Bottle	6681	1	Arthropoda	Hexapoda	Diptera	Chironomidae	Eukiefferiella	sp.	stream	wet	floor	water
Ice Cave	22-May-06	117	Hand	6361	1	Arthropoda	Hexapoda	Diptera	Chloropidae			on rocks and ice next to stream	wet	floor	water
Ice Cave	22-May-06	119	Hand	6369	1	Arthropoda	Hexapoda	Diptera	Ephydridae	Ochthera	sp.	on surface of wet rock	wet	floor	rocks
Ice Cave	22-May-06	120	Hand	6362	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on bedrock wall	dry	wall	bedrock
Ice Cave	22-May-06	120	Hand	6363-6364	2	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on bedrock wall	dry	wall	bedrock
Ice Cave	22-May-06	122	Hand	7514	1	Arthropoda	Hexapoda	Diptera	Sciaridae			underside of rock in dirt, many organics nearby	normal	floor	soil/rock/organic
Ice Cave	22-May-06	123	Hand	6371-6372	2	Arthropoda	Hexapoda	Diptera	Sciaridae			on underside of rock over sandy soil	normal	floor	soil/rocks
Ice Cave	22-May-06	116	hand	6347-9	3	Arthropoda	Hexapoda	Diptera	Simuliidae			in stream undersides of rocks, some organics	wet	floor	water
Indian Burial cave	3-Mar-07	308	Hand	6726-6728	3	Arthropoda	Arachnida	Acari				from top of big breakdown block below entrance	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	278	Pit	6712-6714	3	Arthropoda	Arachnida	Acari				damp silt floor	normal	floor	soil

Indian Burial cave	3-Mar-07	308	Hand	6725	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea: Family Leiobunidae: Leiobunum sp. (immature) - obviously accidental or entrance	Lieobunum	sp.	from top of big breakdown block below entrance	dry	floor	breakdown
Indian Burial cave	3-Mar-07	308	Hand	6720	1	Arthropoda	Arachnida	Araneae	Agelenidae	Hololena	sp.	from top of big breakdown block below entrance	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	285	Hand	6764	1	Arthropoda	Arachnida	Araneae	Araneidae	Neoscona ?	sp.	on underside of rock loose	dry	floor	rocks
Indian Burial cave	3-Mar-07	308	Hand	6721-6724	4	Arthropoda	Arachnida	Araneae	Araneidae	Neoscona ?	sp.	on underside of rocks	dry	floor	rocks
Indian Burial Cave	28-Feb-07	283	Hand	6762	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Maro?	sp.	on underside of rock, loose	normal	floor	rocks
Indian Burial Cave	28-Feb-07	279	Hand	6759-6760	2	Arthropoda	Arachnida	Araneae	Linyphiidae	Maro?	sp.	under rocks loose on normal	normal	floor	rocks
Indian Burial Cave	28-Feb-07	279	Hand	6757	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Maro?	sp.	under rocks loose on normal soil	normal	floor	soil/rocks
Indian Burial Cave	28-Feb-07	279	Hand	6758	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Maro?	sp.	under rocks loose on normal soil	normal	floor	soil/rocks
Indian Burial Cave	28-Feb-07	279	Hand	6761	1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on underside of rock loose	normal	floor	rocks
Indian Burial cave	3-Mar-07	308	Hand	6729	1	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 1	from top of big breakdown block below entrance	dry	floor	breakdown
Indian Burial cave	3-Mar-07	301	Hand	6738-6750	13	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 1	on mummified bat on dry soil and rock, loose	dry	floor	soil/rock/organic
Indian Burial Cave	28-Feb-07	281	Pit	6703-6707	5	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 1	damp silt	normal	floor	soil
Indian Burial Cave	28-Feb-07	278	Pit	6709-6711	3	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 1	damp silt floor	normal	floor	soil
Indian Burial Cave	28-Feb-07	279	Hand	6752	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on top of rock	normal	floor	rocks
Indian Burial Cave	28-Feb-07	282	Hand	6763	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on underside or loose rock	normal	floor	rocks

Indian Burial cave	3-Mar-07	305	Hand	6697-6700	4	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae	Eleodes	hispilabris sculptilis Blaisdell 1909	breakdown	dry	floor	breakdown
Indian Burial cave	3-Mar-07	307	Hand	6718	1	Arthropoda	Hexapoda	Lepidoptera	Tineidae			underside of rock loose	dry	floor	rocks
Indian Burial cave	3-Mar-07	307	Hand	6719	1	Arthropoda	Hexapoda	Lepidoptera	Tineidae			on stick	dry	floor	wood
Indian Burial Cave	28-Feb-07	281	Pit	6701-6702	2	Arthropoda	Hexapoda	Siphonaptera				damp silt	normal	floor	soil
Indian Burial Cave	28-Feb-07	279	Hand		1	Arthropoda	Hexapoda	Diptera				on underside of rock loose	normal	floor	rocks
Indian Burial Cave	28-Feb-07	280	Sight		1	Arthropoda	Hexapoda	Diptera				on underside of loose rock	normal	floor	rocks
Indian Burial Cave	28-Feb-07	277	Pit	6717	1	Arthropoda	Hexapoda	Diptera				damp silt floor	normal	floor	soil
Indian Burial Cave	28-Feb-07	280	Sight		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on breakdown	normal	floor	breakdown
Indian Burial cave	3-Mar-07	309	Hand	6751	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on bedrock in bright twilight, at constriction of entrance pit	dry	wall	bedrock
Indian Burial cave	3-Mar-07	308	Hand	6736	1	Arthropoda	Hexapoda	Diptera	Phoridae			from top of big breakdown block below entrance	dry	floor	breakdown
Indian Burial cave	3-Mar-07	308	Hand	6730-6735	6	Arthropoda	Hexapoda	Diptera	Sciaridae			from top of big breakdown block below entrance	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	281	Pit	6708	1	Arthropoda	Hexapoda	Diptera	Sciaridae			damp silt	normal	floor	soil
Indian Burial Cave	28-Feb-07	277	Pit	6715-6716	2	Arthropoda	Hexapoda	Diptera	Sciaridae			damp silt floor	normal	floor	soil
Indian Burial Cave	28-Feb-07	279	Hand	6753-6756	4	Arthropoda	Hexapoda	Diptera	Sciaridae			on underside of rocks loose	normal	floor	rocks
Indian Burial cave	3-Mar-07	308	Hand	6737	1	Arthropoda	Hexapoda	Diptera	Sphaeroceridae			from top of big breakdown block below entrance	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	287	Sight		3	Chordata	Reptilia	Squamata				on breakdown floor	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	287	Sight		1	Chordata	Reptilia	Squamata				on breakdown floor	dry	floor	breakdown
Indian Burial cave	3-Mar-07	306	Sight		1	Chordata	Mammalia					breakdown	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	287	Sight		1	Chordata	Mammalia	Rodentia	Cricetidae			on breakdown floor	dry	floor	breakdown

Indian Burial cave	3-Mar-07	302	Sight		1	Chordata	Mammalia	Lagomorpha	Leporidae	Lepus	californicus deserticola	on breakdown and rocks loose	dry	floor	rocks
Indian Burial Cave	28-Feb-07	286	Sight		1	Chordata	Mammalia	Carnivora	Canidae	Vulpes	macrotis nevadensis	on breakdown floor	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	287	Sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae			on breakdown floor	dry	floor	breakdown
Indian Burial cave	3-Mar-07	304	Sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae			soil loose	dry	floor	soil
Indian Burial Cave	28-Feb-07	280	Sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae			on soil by wall	normal	floor	soil
Indian Burial cave	3-Mar-07	303	Sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae	Myotis	evotis evotis	breakdown	dry	floor	breakdown
Indian Burial Cave	28-Feb-07	284	Sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae	Plecotus	townsendii	on bedrock wall	dry	wall	bedrock
Lehman Annex Cave	25-May-06	200	Hand	7508	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on rock, calcite, and dirt floor	dry	floor	bedrock/soil
Lehman Annex Cave	25-May-06	210	Hand	6400	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on calcite	normal	floor	calcite
Lehman Annex Cave	25-May-06	205	Hand	7510	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on underside of rocks on rock/soil/packrat guano mix	normal	floor	soil/rock/guano
Lehman Annex Cave	25-May-06	209	Sight		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	in fungus on dry bedrock	dry	wall	bedrock/organic
Lehman Annex Cave	25-May-06	205	Hand	7511-7512	2	Arthropoda	Hexapoda	Collembola				on calcite at fungus covered mouse feces	normal	floor	bedrock/organic
Lehman Annex Cave	25-May-06	212	Sight		1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	on calcite next to fungus-covered packrat guano	normal	floor	bedrock/organic
Lehman Annex Cave	25-May-06	207	Hand	6389	1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	on surface of drip pool	wet	floor	water
Lehman Annex Cave	25-May-06	213	Hand	6392-6393	2	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	on surface of drip pool	wet	floor	water
Lehman Annex Cave	25-May-06	211	Hand	6373-6384	12	Arthropoda	Hexapoda	Collembola	Hypogastruridae	Acherontiella	sp.	on calcite next to fungus-covered packrat guano	normal	floor	bedrock/organic
Lehman Annex Cave	25-May-06	213	Hand	6394-6396	3	Arthropoda	Hexapoda	Collembola	Hypogastruridae	Acherontiella	sp.	on surface of drip pool	wet	floor	water
Lehman Annex Cave	25-May-06	216	Hand	6402	1	Arthropoda	Hexapoda	Orthoptera	Rhaphidophoridae	Ceuthophilus	sp.	on soil and rock	dry	floor	soil/rocks

Lehman Annex Cave	25-May-06	200	Hand	7509	1	Arthropoda	Hexapoda	Orthoptera	Rhaphidophoridae	Ceuthophilus	sp.	on rock, calcite, and dirt floor	dry	floor	soil/rocks
Lehman Annex Cave	25-May-06	215	Sight		1	Arthropoda	Hexapoda	Orthoptera	Rhaphidophoridae	Ceuthophilus	sp.	on soil and rock	normal	floor	soil/rocks
Lehman Annex Cave	25-May-06	200	Hand	7507	3	Arthropoda	Hexapoda	Diptera				on rock, calcite, and dirt floor	dry	floor	soil/rocks
Lehman Annex Cave	25-May-06	206	Sight		2	Arthropoda	Hexapoda	Diptera				on bedrock	dry	wall	bedrock
Lehman Annex Cave	25-May-06	201	Hand	6397-6399	3	Arthropoda	Hexapoda	Diptera	Sciaridae			bedrock	dry	ceiling	bedrock
Lehman Annex Cave	25-May-06	208	Hand	6390	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	normal	floor	calcite
Lehman Annex Cave	25-May-06	210	Hand	6401	1	Arthropoda	Hexapoda	Diptera	Sciaridae			inside mouse feces on calcite	normal	floor	rock/guano
Lehman Annex Cave	25-May-06	203	Hand	6403-6404	2	Arthropoda	Hexapoda	Diptera	Sciaridae			under rocks on soil with occasional packrat scat	normal	floor	soil/rock/guano
Lehman Annex Cave	25-May-06	207	Hand	6388	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on surface of drip pool	wet	floor	water
Lehman Annex Cave	25-May-06	211	Hand	6385-6387	3	Arthropoda	Hexapoda	Diptera	Sciaridae			on surface of drip pool	wet	floor	water
Lehman Annex Cave	25-May-06	214	Sight		1	Chordata	Reptilia	Squamata	Viperidae	Crotalus	viridis lutosus	on dry bedrock and grate wall ledge, just inside entrance gate	dry	wall	bedrock
Lehman Annex Cave	25-May-06	202	Sight		1	Chordata	Aves					dry dirt and rock floor	dry	floor	soil/rocks
Lehman Annex Cave	25-May-06	202	Sight		1	Chordata	Mammalia					dry dirt and rock floor	dry	floor	soil/rocks
Lehman Annex Cave	25-May-06	199	Sight		1	Chordata	Mammalia	Rodentia	Cricetidae	Peromyscus		calcite and dirt	dry	floor	soil/rocks
Lehman Annex Cave	25-May-06	204	Sight		1	Chordata	Mammalia	Rodentia	Cricetidae	Peromyscus		on gravel	normal	floor	rocks
Lehman Annex Cave	25-May-06	202	Sight		1	Chordata	Mammalia	Rodentia	Cricetidae	Neotoma	sp.	dry dirt and rock floor	dry	floor	soil/rocks
Lehman Caves	26-Sep-06	16		7569	1	Arthropoda									
Lehman Caves	26-Sep-06	31		7572	1	Arthropoda									
Lehman Caves	27-Apr-06	1		7408	1	Arthropoda	Crustacea	Isopoda							
Lehman Caves	26-May-06	249	Hand	6174	1	Arthropoda	Arachnida	Acari				underside of rock on soil	normal	floor	soil/rocks
Lehman Caves	26-May-06	233	Hand	6168	1	Arthropoda	Arachnida	Acari				underside of wood on wood debris	normal	floor	wood

Lehman Caves	26-May-06	234	Litter	6459	1	Arthropoda	Arachnida	Acari				wood and wood debris	normal	floor	wood
Lehman Caves	26-May-06	233	Hand	6169-6170	2	Arthropoda	Arachnida	Acari				underside of wood on wood debris	normal	floor	wood
Lehman Caves	23-May-06	159	Hand	6239-6240	2	Arthropoda	Arachnida	Acari				on underside of wood	normal	floor	wood
Lehman Caves	26-May-06	234	Litter	6460-6461	2	Arthropoda	Arachnida	Acari				wood and wood debris	normal	floor	wood
Lehman Caves	26-May-06	234	Litter	6586-6653	67	Arthropoda	Arachnida	Acari				wood and wood debris	normal	floor	wood
Lehman Caves	26-May-06	245	Hand	7441?	1	Arthropoda	Arachnida	Acari	Rhagidiidae			on top of stalagmite polished by tourists (probably oils) across trail from station D	normal	floor	calcite
Lehman Caves	26-May-06	245	Hand	7441?	1	Arthropoda	Arachnida	Acari	Rhagidiidae			under rock on organic debris	normal	floor	organic/rock
Lehman Caves	26-May-06	233	Hand		1	Arthropoda	Arachnida	Acari	Rhagidiidae			underside of wood on wood debris	normal	floor	wood
Lehman Caves	26-May-06	230	Sight		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on underside of dry rock on normal dirt floor	dry	floor	soil/rocks
Lehman Caves	23-May-06	175	Hand	7506	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	under rock on packrat guano/soil mix	normal	floor	rock/guano
Lehman Caves	26-May-06	228	Sight		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on underside of rock on rubble next to trail	normal	floor	rocks
Lehman Caves	26-May-06	232	Sight		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	underside of wood on wood debris	normal	floor	wood
Lehman Caves	24-Jul-06	2			1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962				
Lehman Caves	16-Mar-06	6	hand?	7402	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962				
Lehman Caves	22-Aug-06	4		7515	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962				

Lehman Caves	19-Jul-07	498	hand	7339	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	rocks at bait	dry	floor	organic/rock
Lehman Caves	19-Jul-07	499	hand	7340	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	underside of dry rock on normal soil	dry, normal	floor	soil/rocks
Lehman Caves	19-Jul-07	501	hand		2	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	rock, underside	normal	floor	rocks
Lehman Caves	19-Jul-07	501	hand		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	under rock	normal	floor	rocks
Lehman Caves	19-Jul-07	498	hand		2	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	rocks on soil	normal	floor	soil/rocks
Lehman Caves	19-Jul-07	498	hand		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	rocks on soil	normal	floor	soil/rocks
Lehman Caves	19-Jul-07	501	hand	7342	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on normal rocks on normal soil	normal	floor	soil/rocks
Lehman Caves	19-Jul-07	500	hand	7341	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on dirt floor under wood		floor	soil/wood
Lehman Caves	19-Jul-07	501	hand		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	flowstone wall	normal	wall	calcite
Lehman Caves	19-Jul-07	502	hand	7343	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	(crawlway?) between O and B			
Lehman Caves	19-Jul-07	498	hand		1	Arthropoda	Arachnida	Araneae				wood	normal		wood
Lehman Caves	26-May-06	233	Hand	7396	1	Arthropoda	Arachnida	Araneae							
Lehman Caves	22-Aug-06	37		7520	1	Arthropoda	Arachnida	Araneae							
Lehman Caves	25-Jan-06	1		7411	1	Arthropoda	Arachnida	Araneae	Agelenidae						
Lehman Caves	28-Feb-07	????	Hand?	6692	1	Arthropoda	Arachnida	Araneae	Agelenidae	Hololena	sp.				
Lehman Caves	27-Feb-07	276	Hand	6782	1	Arthropoda	Arachnida	Araneae	Araneidae	Hypsosinga?	sp.	on wall of exit tunnel	normal	wall	bedrock

Lehman Caves	23-May-06	144	Hand	6248	1	Arthropoda	Arachnida	Araneae	Dictynidae			on cement wall at internal door of exit tunnel, on tunnel side of door (not cave side)	dry	wall	bedrock
Lehman Caves	27-Feb-07	275	Hand	6781	1	Arthropoda	Arachnida	Araneae	Pholcidae	Physocyclus	sp.	on ceiling in entrance tunnel	normal	ceiling	bedrock
Lehman Caves	26-May-06	256	Hand	6194	1	Arthropoda	Symphyla		Scutigerellidae	?Hanseniella?	sp.	on surface of drip pool in trail	wet	floor	water
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		underside of rock	normal	floor	rocks
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		under normal rock on normal formation	normal	floor	rocks
Lehman Caves	26-May-06	245	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on cement trail	normal	floor	bedrock
Lehman Caves	26-May-06	245	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on cement trail	normal	floor	bedrock
Lehman Caves	26-May-06	235	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on soil and organic debris	normal	floor	soil/organics
Lehman Caves	26-May-06	242	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		under rock on dirt	normal	floor	soil/rocks
Lehman Caves	26-May-06	242	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on woody debris	normal	floor	wood
Lehman Caves	26-May-06	242	Hand		2	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on woody debris	normal	floor	wood
Lehman Caves	26-May-06	246	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on calcite flowstone next to trail	wet	floor	calcite

Lehman Caves	26-May-06	242	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		in woody debris		floor	wood
Lehman Caves	26-Sep-06	1		7570	1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species					
Lehman Caves	19-Jul-07	502	hand		7	Arthropoda	Hexapoda	Collembola				underside of dry rock on dry formation	dry	floor	bedrock/rocks
Lehman Caves	19-Jul-07	498	hand		15	Arthropoda	Hexapoda	Collembola				rocks at bait	dry	floor	organic/rock
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Collembola				calcite floor	normal	floor	calcite
Lehman Caves	19-Jul-07	502	hand		8	Arthropoda	Hexapoda	Collembola				under normal baited rock on normal flowstone	normal	floor	organic/rock
Lehman Caves	19-Jul-07	502	hand		2	Arthropoda	Hexapoda	Collembola				on underside of rock near fungus	normal	floor	organic/rock
Lehman Caves	19-Jul-07	501	hand		1	Arthropoda	Hexapoda	Collembola				under rock	normal	floor	rocks
Lehman Caves	19-Jul-07	502	hand		6	Arthropoda	Hexapoda	Collembola				underside of rock	normal	floor	rocks
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Collembola				top of rock	normal	floor	rocks
Lehman Caves	19-Jul-07	502	hand		5	Arthropoda	Hexapoda	Collembola				bottom of normal rock on normal floor	normal	floor	rocks
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Collembola				under normal rock on normal floor	normal	floor	rocks
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Collembola				under rock	normal	floor	rocks
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Collembola				under rock	normal	floor	rocks
Lehman Caves	26-May-06	245	Hand		1	Arthropoda	Hexapoda	Collembola				under rock with cheese bait	normal	floor	organic/rock
Lehman Caves	26-May-06	228	Sight		1	Arthropoda	Hexapoda	Collembola				on underside of rock	normal	floor	rocks
Lehman Caves	26-May-06	241	Sight		1	Arthropoda	Hexapoda	Collembola				under rock	normal	floor	rocks
Lehman Caves	26-May-06	250	Sight		1	Arthropoda	Hexapoda	Collembola				underside of rock loose	normal	floor	rocks
Lehman Caves	26-May-06	237	Sight		1	Arthropoda	Hexapoda	Collembola				on soil	normal	floor	soil

Lehman Caves	26-May-06	232	Sight		1	Arthropoda	Hexapoda	Collembola				underside of wood on wood debris	normal	floor	wood
Lehman Caves	19-Jul-07	502	hand		12	Arthropoda	Hexapoda	Collembola				under wet rock	wet	floor	rocks
Lehman Caves	19-Jul-07	502	hand		2	Arthropoda	Hexapoda	Collembola				under wet rock	wet	floor	rocks
Lehman Caves	26-May-06	263	Sight		25	Arthropoda	Hexapoda	Collembola				surface of drip pool next to trail	wet	floor	water
Lehman Caves	19-Jul-07	502	hand		9	Arthropoda	Hexapoda	Collembola				under rock with fungus at old bait		floor	organic/rock
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Collembola				sandy soil		floor	soil
Lehman Caves	26-Sep-06	2		7571	1	Arthropoda	Hexapoda	Collembola							
Lehman Caves	25-Jan-06	4		7406-7407	2	Arthropoda	Hexapoda	Collembola							
Lehman Caves	15-May-06	8		7409-7410	2	Arthropoda	Hexapoda	Collembola							
Lehman Caves	26-May-06	259	Hand		1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	caecus	on surface film of large pool	wet	floor	water
Lehman Caves	26-May-06	245	Hand		1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	under rock on organic debris	normal	floor	organic/rock
Lehman Caves	26-May-06	261	Hand	6188	1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	surface of drip pool at edge of trail	wet	floor	water
Lehman Caves	26-May-06	245	Hand	6150	1	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	under rock on organic debris	normal	floor	organic/rock
Lehman Caves	26-May-06	260	Hand	6197-6199	3	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	on moss near light (Lamp #172)	normal	floor	organics
Lehman Caves	26-May-06	248	Hand	6191	1	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	under rock on gravel/rock	normal	floor	rocks
Lehman Caves	26-May-06	233	Hand	6171-6172	2	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	underside of wood on wood debris	normal	floor	wood
Lehman Caves	23-May-06	159	Hand	6241-6245	5	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	on underside of wood	normal	floor	wood
Lehman Caves	28-Feb-07	????	Hand?	6682-6684	3	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2				
Lehman Caves	26-May-06	234	Litter	6446-6448	3	Arthropoda	Hexapoda	Collembola	Hypogastruridae	Acherontiella	sp.	wood and wood debris	normal	floor	wood
Lehman Caves	28-Feb-07	????	Hand?	6688-6689	2	Arthropoda	Hexapoda	Collembola	Hypogastruridae	Acherontiella	sp.				
Lehman Caves	26-May-06	249	Hand	6173	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Folsomia	sp.	underside of rock on soil	normal	floor	soil/rocks
Lehman Caves	26-May-06	259	Hand	6167	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Folsomia	sp.	on surface film of large pool	wet	floor	water
Lehman	26-	257	Hand	6177	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Folsomia	sp.	on surface of drip	wet	floor	water

Caves	May-06											pool in trail			
Lehman Caves	26-May-06	256	Hand	6192-6193	2	Arthropoda	Hexapoda	Collembola	Isotomidae	Folsomia	sp.	on surface of drip pool in trail	wet	floor	water
Lehman Caves	26-May-06	257	Hand	6176	1	Arthropoda	Hexapoda	Collembola	Oncopoduridae	Oncopodura	sp.	on surface of drip pool in trail	wet	floor	water
Lehman Caves	28-Feb-07	????	Hand?	6693-6696	4	Arthropoda	Hexapoda	Collembola	Oncopoduridae	Oncopodura	sp.				
Lehman Caves	26-May-06	257	Hand	6178	1	Arthropoda	Hexapoda	Collembola	Onychiuridae=Tullberginae			on surface of drip pool in trail	wet	floor	water
Lehman Caves	26-May-06	243	Hand	6181	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			on concrete trail	normal	floor	bedrock
Lehman Caves	26-May-06	260	Hand	6195-6196	2	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			on moss near light (Lamp #172)	normal	floor	organics
Lehman Caves	26-May-06	259	Hand	6151-6166	16	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			on surface film of large pool	wet	floor	water
Lehman Caves	26-May-06	261	Hand	6182-6187	6	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			surface of drip pool at edge of trail	wet	floor	water
Lehman Caves	26-May-06	262	Hand	6189-6190	2	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			surface of drip pool next to trail	wet	floor	water
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	under normal rock with bait on normal floor	normal	floor	organic/rock
Lehman Caves	24-Apr-06	no #		7405	1	Arthropoda	Hexapoda	Microcoryphia							
Lehman Caves	23-May-06	144	Hand	6246-6247	2	Arthropoda	Hexapoda	Orthoptera	Rhaphidophoridae	Ceuthophilus	sp.	on cement wall at external door of exit tunnel, inside the tunnel	dry	wall	bedrock
Lehman Caves	16-Mar-06	5		7412	1	Arthropoda	Hexapoda	Orthoptera	Rhaphidiophoridae	Ceuthophilus					
Lehman Caves	28-Feb-07	????	Hand?	6685	1	Arthropoda	Hexapoda	Psocoptera	Prionoglaridae	Speleketor	sp.				
Lehman Caves	23-May-06	159	Hand	6237-6238	2	Arthropoda	Hexapoda	Psocoptera	Prionoglaridae	Speleketor		on underside of wood	normal	floor	wood
Lehman Caves	24-Jul-06	10			1	Arthropoda	Hexapoda	Coleoptera	Cryptophagidae						
Lehman Caves	28-Feb-07	????	Hand?	6686	1	Arthropoda	Hexapoda	Coleoptera	Cryptophagidae						
Lehman Caves	28-Feb-07	????	Hand?	6690	1	Arthropoda	Hexapoda	Coleoptera	Cryptophagidae						
Lehman Caves	22-Aug-06	3		7518	1	Arthropoda	Hexapoda	Coleoptera	Cryptophagidae						
Lehman Caves	25-Jul-06	7			1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae						

Lehman Caves	28-Feb-07	????	Hand?	6687	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae						
Lehman Caves	28-Feb-07	????	Hand?	6691	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae						
Lehman Caves	26-May-06	230	Sight		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on top of rock dry on normal dirt floor	dry	floor	soil/rocks
Lehman Caves	23-May-06	160	Sight		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			calcite flowstone	normal	floor	calcite
Lehman Caves	26-May-06	230	Sight		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			dirt	normal	floor	soil
Lehman Caves	26-May-06	230	Sight		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on top of dry rock on normal dirt floor	normal	floor	soil/rocks
Lehman Caves	22-Aug-06	18		7517	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae						
Lehman Caves	19-Jul-07	501	hand		1	Arthropoda	Hexapoda	Diptera				under rock	normal	floor	rocks
Lehman Caves	26-May-06	231	Hand		1	Arthropoda	Hexapoda	Diptera				underside of rock on dirt	normal	floor	soil/rocks
Lehman Caves	26-May-06	239	Sight		5	Arthropoda	Hexapoda	Diptera				on dirt (trail)	wet	floor	soil
Lehman Caves	26-May-06	236	Sight		1	Arthropoda	Hexapoda	Diptera				on calcite	dry	wall	calcite
Lehman Caves	19-Jul-07	502	hand		1	Arthropoda	Hexapoda	Diptera				flowstone wall	normal	wall	calcite
Lehman Caves	26-May-06	228	Sight		1	Arthropoda	Hexapoda	Diptera	Calliphoridae			on bedrock	dry	wall	bedrock
Lehman Caves	26-May-06	228	Sight		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae				dry	floor	
Lehman Caves	19-Jul-07	501	hand		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			under rock	normal	floor	rocks
Lehman Caves	26-May-06	227	Hand		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on cement, middle of entrance tunnel	dry	wall	bedrock
Lehman Caves	26-May-06	255	Sight		2	Arthropoda	Hexapoda	Diptera	Sciaridae			on bedrock	dry	ceiling	bedrock
Lehman Caves	26-May-06	252	Sight		5	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite covered rock	dry	floor	calcite
Lehman Caves	26-May-06	253	Sight		2	Arthropoda	Hexapoda	Diptera	Sciaridae			bottom of rock on rock	dry	floor	rocks
Lehman Caves	26-May-06	253	Sight		1	Arthropoda	Hexapoda	Diptera	Sciaridae			on cement trail	normal	floor	bedrock
Lehman Caves	26-May-06	244	Sight		1	Arthropoda	Hexapoda	Diptera	Sciaridae			on top of rock	normal	floor	rocks
Lehman Caves	26-May-06	254	Sight		4	Arthropoda	Hexapoda	Diptera	Sciaridae			on underside of rock loose	normal	floor	rocks
Lehman	26-	238	Hand	6179	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on underside of	normal	floor	rocks

Caves	May-06											rock			
Lehman Caves	26-May-06	239	Sight	6180	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on underside of rock	normal	floor	rocks
Lehman Caves	26-May-06	237	Sight		2	Arthropoda	Hexapoda	Diptera	Sciaridae			on soil	normal	floor	soil
Lehman Caves	26-May-06	240	Sight		1	Arthropoda	Hexapoda	Diptera	Sciaridae			under rock on soil	normal	floor	soil/rocks
Lehman Caves	26-May-06	235	Hand	6200	1	Arthropoda	Hexapoda	Diptera	Sciaridae			under roc in normal soil	normal	floor	soil/rocks
Lehman Caves	26-May-06	234	Litter	6449-6455	7	Arthropoda	Hexapoda	Diptera	Sciaridae			wood and wood debris	normal	floor	wood
Lehman Caves	26-May-06	239	Sight		2	Arthropoda	Hexapoda	Diptera	Sciaridae			on dirt (trail)	wet	floor	soil
Lehman Caves	26-May-06	251	Sight		12	Arthropoda	Hexapoda	Diptera	Sciaridae			on surface of pool (Sunken Garden)	wet	floor	water
Lehman Caves	26-May-06	244	Sight		1	Arthropoda	Hexapoda	Diptera	Sciaridae			on bedrock	dry	wall	bedrock
Lehman Caves	26-May-06	238	Hand		1	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	dry	wall	calcite
Lehman Caves	26-May-06	247	Sight		2	Arthropoda	Hexapoda	Diptera	Sciaridae			calcite	dry	wall	calcite
Lehman Caves	26-May-06	250	Sight		5	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	dry	wall	calcite
Lehman Caves	26-May-06	255	Sight		5	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	dry	wall	calcite
Lehman Caves	26-May-06	231	Hand	6175	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite formation	dry	wall	calcite
Lehman Caves	23-May-06	172	Sight		9	Arthropoda	Hexapoda	Diptera	Sciaridae			calcite formations	normal	wall	calcite
Lehman Caves	26-May-06	250	Sight		8	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	normal	wall	calcite
Lehman Caves	26-May-06	258	Sight		16	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	normal		calcite
Lehman Caves	22-Aug-06	3		7519	1	Arthropoda	Hexapoda	Diptera	Sciaridae						
Lehman Caves	19-Jul-07	498	hand		1	Arthropoda	Hexapoda	Diptera	Sphaeroceridae			rocks on soil	normal	floor	soil/rocks
Lehman Caves	23-May-06	169	Sight		1	Chordata	Mammalia	Rodentia	Cricetidae			calcite covered breakdown	normal	floor	calcite
Lehman Caves	26-May-06	229	Sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae	Myotis	evotis evotis	on soil, rocks, & organics	dry	floor	soil/rock/organic
Lehman Caves	19-Jul-07	498	sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae	Plecotus	townsendii	underside of concrete slab at entrance gate		ceiling	bedrock
Lehman	26-	234	Litter	6456-	3	Uncertain						wood and wood	normal	floor	wood

Caves	May-06			6458								debris			
Lehman Caves	26-May-06	234	Litter	6462-6585	123	Uncertain						wood and wood debris	normal	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	368	hand	7329	1	Arthropoda	Arachnida	Acari							
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	360	Sight		3	Arthropoda	Arachnida	Acari	Rhagidiidae			on underside of wet wood on wet mine floor	wet	floor	bedrock/organic
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand		1	Arthropoda	Arachnida	Araneae				on web, dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6968	1	Arthropoda	Arachnida	Araneae	Araneidae			on underside of rock dry entrance	dry	floor	rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6877	1	Arthropoda	Arachnida	Araneae	Araneidae			on web on dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6969	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	on underside of rock dry entrance	dry	floor	rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6943	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	on web on dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6866	1	Arthropoda	Chilopoda	Geophilomorpha	Geophilidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming	15-Jul-07	427	hand	6882	1	Arthropoda	Chilopoda	Lithobiomorpha	Lithobiidae			on wet wood floor twilight	wet	floor	wood

and Miner's Massacre)															
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	367	Sight		1	Arthropoda	Diplopoda					on wet wood	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	431	hand	6951-6952	2	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on wet wood on floor	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	429	hand	6953-6957	5	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	wet wood on rock floor dark; 1 medium on normal rock above pit 352	wet/normal	floor	rocks/wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	432	hand	6884-6885	2	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	wet wood timber floor; bed wall normal	wet/normal	wall	wood/bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	431	hand	6944	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis				
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	368	hand	7328	1	Arthropoda	Diplopoda	Chordeumatida/	Conotylidae	Idagona	lehmanensis				
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand		1	Arthropoda	Hexapoda	Collembola				on wet rocks above water on floor entrance	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	426	hand		3	Arthropoda	Hexapoda	Collembola				on wet wood floor twilight	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's	5-Jul-07	362	Sight		8	Arthropoda	Hexapoda	Collembola				on surface of pool	wet	floor	water

Massacre)															
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	365	Sight		8	Arthropoda	Hexapoda	Collembola				on surface of pool	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	359	Sight		8	Arthropoda	Hexapoda	Collembola				on underside of wet wood on wet mine floor	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	366	Sight		3	Arthropoda	Hexapoda	Collembola				on wet wood	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	364	Sight		8	Arthropoda	Hexapoda	Collembola				on old timbers	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	427	hand		2	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	from water surface twilight	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	424	hand	6869-6870	2	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	from water surface twilight	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6881	1	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 1	on wet rocks above water on floor entrance	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6947	1	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 1	on wet rocks above water on floor entrance	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	363	hand	7316-7317	2	Arthropoda	Hexapoda	Collembola	Isotomidae	Desoria sp. 1					

Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	428	sight	6883	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onyciurinae			on normal gravel floor	normal	floor	rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	350	pit	6861-6862	2	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			Normal soil/rock floor dark	normal	floor	soil/rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	352	pit	6863-6865	3	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			Normal soil/rock floor	normal	floor	soil/rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	424	hand	6868	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			from water surface twilight	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	424	hand	6989	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			from water surface twilight	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	430	hand	6974-6988	15	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae			on water surface on floor	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	363	hand	7318	1	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae						
Lincoln Canyon Mine (Drumming and Miner's Massacre)	5-Jul-07	361	hand	7303-7304	2	Arthropoda	Hexapoda	Collembola	Onychiuridae-Onychiurinae						
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand		1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	on wet rocks above water on floor entrance	wet	floor	water
Lincoln	15-Jul-	423	hand	6880	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomoceru	sp.	on wet rocks	wet	floor	water

Canyon Mine (Drumming and Miner's Massacre)	07									s		above water on floor entrance			
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6964-6966	3	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	on wet rocks above water on floor entrance	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand		6	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6962-6963	2	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6942	1	Arthropoda	Hexapoda	Microcoryphia	Meinertellidae	Hypomachilodes	sp.	dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6878-6879	2	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on underside rock normal entrance	normal	floor	rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand		2	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on wet rocks above water on floor entrance	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	424	hand	6867	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			dead from water surface	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6961	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine	15-Jul-07	421	hand	6871	1	Arthropoda	Hexapoda	Lepidoptera				dry bed wall entrance	dry	wall	bedrock

(Drumming and Miner's Massacre)															
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6940	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6971	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Formica	sp.	on normal rock floor entrance	normal	floor	rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6941	1	Arthropoda	Hexapoda	Hymenoptera	Ichneumonidae						
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand		1	Arthropoda	Hexapoda	Hymenoptera	Platygastridae						
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6972	1	Arthropoda	Hexapoda	Diptera				on underside of rock dry entrance	dry	floor	rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	422	sight		1	Arthropoda	Hexapoda	Diptera				on normal rock floor	normal	floor	rocks
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand		10	Arthropoda	Hexapoda	Diptera				dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	425	hand		2	Arthropoda	Hexapoda	Diptera				on wet flowstone wall	wet	wall	calcite
Lincoln Canyon Mine (Drumming	15-Jul-07	423	hand	6970	1	Arthropoda	Hexapoda	Diptera	Agromyziidae			on underside of rock dry entrance	dry	floor	rocks

and Miner's Massacre)															
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6875	1	Arthropoda	Hexapoda	Diptera	Anthomyiidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6936	1	Arthropoda	Hexapoda	Diptera	Cecidomyiidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6937	1	Arthropoda	Hexapoda	Diptera	Cecidomyiidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6939	1	Arthropoda	Hexapoda	Diptera	Drosophilidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6932-6933	2	Arthropoda	Hexapoda	Diptera	Empididae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	426	hand	6888-6927	40	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on wet wood floor twilight	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	425	hand		15	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on dry bed wall twilight	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's	15-Jul-07	421	hand	6938	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			dry bed wall entrance	dry	wall	bedrock

Massacre)															
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	425	hand	6949	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on wet flowstone wall	wet	wall	calcite
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6874	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6876	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6960	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6928-6931	4	Arthropoda	Hexapoda	Diptera	Mycetophilidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6934-6935	2	Arthropoda	Hexapoda	Diptera	Mycetophilidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	424	hand		4	Arthropoda	Hexapoda	Diptera	Mycetophilidae			on wet flowstone wall	wet	wall	calcite
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	425	hand	6945-6948	4	Arthropoda	Hexapoda	Diptera	Mycetophilidae			on wet flowstone wall	wet	wall	calcite
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6886	1	Arthropoda	Hexapoda	Diptera	Phoridae			on wet rocks above water on floor entrance	wet	floor	water

Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6872-6873	2	Arthropoda	Hexapoda	Diptera	Phoridae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	423	hand	6887	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on wet rocks above water on floor entrance	wet	floor	water
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	429	hand	6958	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on wood debris wet	wet	floor	wood
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	425	hand	6950	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on wet flowstone wall	wet	wall	calcite
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand		3	Arthropoda	Hexapoda	Diptera	Sphaeroceridae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	421	hand	6959	1	Arthropoda	Hexapoda	Diptera	Tipulidae			dry bed wall entrance	dry	wall	bedrock
Lincoln Canyon Mine (Drumming and Miner's Massacre)	15-Jul-07	420	sight		1	Chordata	Aves	Apodiformes	Trochilidae	Selasphorus	platycercus	flying and feeding on Huechera			organics
Little Muddy Cave	29-Oct-07		Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species					
Long Cold Cave	4-Sep-07				1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus				
Model Cave	1-Mar-07	292	Hand	6843-6846	4	Mollusca	Gastropoda					muddy wall	normal	wall	soil
Model Cave	27-Jan-06	4		7425-7428	4	Mollusca	Gastropoda								

Model Cave	2-Feb-06	7		7424	1	Nematoda									
Model Cave	1-Mar-07	291	Sight		6	Annelida	Clitellata (=Oligochaeta)	Opisthopora	Lumbricidae?			on soil	normal	floor	soil
Model Cave	22-May-06	138	Hand	6235	1	Annelida	Clitellata (=Oligochaeta)	Opisthopora	Lumbricidae?			on mud/soil	normal	floor	soil
Model Cave	22-May-06	128	Dnet	6444	1	Annelida	Clitellata (=Oligochaeta)	Opisthopora	Lumbricidae?			rise pool of resurgence	wet	floor	water
Model Cave	1-Mar-07	294	Hand	6783-6786	4	Annelida	Clitellata (=Oligochaeta)	Opisthopora	Lumbricidae?			muddy wall	normal	wall	soil
Model Cave	1-Mar-07	295	Hand	6848	1	Arthropoda	Crustacea	Ostracoda							
Model Cave	1-Mar-07	290	Hand	6818	1	Arthropoda	Arachnida	Acari				on soil	normal	floor	soil
Model Cave	1-Mar-07	290	Hand	6856-6857	2	Arthropoda	Arachnida	Acari				on soil	normal	floor	soil
Model Cave	1-Mar-07	296	Hand	6816	1	Arthropoda	Arachnida	Acari				muddy wall	normal	wall	soil
Model Cave	1-Mar-07	292	Hand	6850	1	Arthropoda	Arachnida	Acari				muddy wall	normal	wall	soil
Model Cave	1-Mar-07	294	Hand	6804-6806	3	Arthropoda	Arachnida	Acari				muddy wall	normal	wall	soil
Model Cave	1-Mar-07	298	Hand	6820-6821	2	Arthropoda	Arachnida	Acari				muddy wall, near dead earthworm	normal	wall	soil
Model Cave	27-Jan-06	6		7420	1	Arthropoda	Arachnida	Acari							
Model Cave	27-Jan-06	5		7422	1	Arthropoda	Arachnida	Acari							
Model Cave	24-May-06	196	Hand	6202	1	Arthropoda	Arachnida	Acari	Orabatoidea			on soil	wet	floor	soil
Model Cave	1-Mar-07	290	Hand	6858	1	Arthropoda	Arachnida	Acari	Rhagidiidae			on soil	normal	floor	soil
Model Cave	22-May-06	139	Hand	7431	1	Arthropoda	Arachnida	Acari	Rhagidiidae			on mud/soil	normal	floor	soil
Model Cave	24-May-06	196	Hand	7432-7439	8	Arthropoda	Arachnida	Acari	Rhagidiidae			on soil	wet	floor	organic/rock
Model Cave	22-May-06	133	Hand	7442-7445	4	Arthropoda	Arachnida	Acari	Rhagidiidae						
Model Cave	1-Mar-07	291	Sight		3	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus	on soil	normal	floor	soil

Model Cave	22-May-06	139	Hand	7397-7398	2	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus	on mud/soil	normal	floor	soil
Model Cave	24-May-06	198	Sight		1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus	soil	wet	floor	soil
Model Cave	2-Feb-06	11		7423	1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus				
Model Cave	2-Oct-06	23		7585	1	Arthropoda	Arachnida	Opiliones	Triaenonychidae	Cyptobunus	ungulatus ungulatus				
Model Cave	22-May-06	137	Hand	7403	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on mud/soil	normal	floor	soil
Model Cave	27-Jan-06	2		7429	1	Arthropoda	Arachnida	Araneae							
Model Cave	2-Feb-06	1		7414-7415	2	Arthropoda	Arachnida	Araneae							
Model Cave	22-May-06	130	Hand	6218	1	Arthropoda	Arachnida	Araneae	Araneidae			bedrock	dry	ceiling	bedrock
Model Cave	22-May-06	129	Hand	6221-6224	4	Arthropoda	Arachnida	Araneae	Araneidae			bedrock	dry	ceiling	bedrock
Model Cave	2-Oct-06	38		7575-7576	2	Arthropoda	Symphyla								
Model Cave	22-May-06	139	Hand		2	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on mud/soil	normal	floor	soil
Model Cave	1-Mar-07	290	Hand	6855	1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on soil	normal	floor	soil
Model Cave	24-May-06	195	Hand		1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on soil	wet	floor	soil
Model Cave	22-May-06	136	Hand	6236	1	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		on bedrock	normal	wall	bedrock
Model Cave	1-Mar-07	294	Hand	6807-6808	2	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternodesmidae	Speodesmus-like new species		muddy wall	normal	wall	soil
Model Cave	1-Mar-07	293	Hand	6851, 6859	2	Arthropoda	Diplopoda	Polydesmida	Polydesmidae - Macrosternod	Speodesmus-like new		soil	normal	wall	soil

									esmidae	species					
Model Cave	1-Mar-07	290	Hand	6852-6854	3	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on soil	normal	floor	soil
Model Cave	2-Oct-06	1 to 4		7577-7580	4	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis				
Model Cave	24-May-06	195	Hand	7400	1	Arthropoda	Hexapoda	Collembola				on soil	wet	floor	soil
Model Cave	27-Jan-06	7		7419	1	Arthropoda	Hexapoda	Collembola							
Model Cave	2-Oct-06	21-22		7583-7584	2	Arthropoda	Hexapoda	Collembola							
Model Cave	24-May-06	196	Hand		2	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	NEW SPECIES	on soil	wet	floor	soil
Model Cave	1-Mar-07	297	Hand	6823-6837	15	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	muddy floor, near dead earthworm	normal	floor	soil/organics
Model Cave	22-May-06	133	Hand		6	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	surface of drip pool	wet	floor	water
Model Cave	1-Mar-07	294	Hand	6803	1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	muddy wall	normal	wall	soil
Model Cave	1-Mar-07	292	Hand	6847	1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	muddy wall	normal	wall	soil
Model Cave	1-Mar-07	296	Hand	6809-6815	7	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.	muddy wall	normal	wall	soil
Model Cave	2-Feb-06	5		7430	1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	sp.				
Model Cave	1-Mar-07	294	Hand	6789-6802	14	Arthropoda	Hexapoda	Collembola	Entomobryidae	Pseudosinella	sp. 1	muddy wall	normal	wall	soil
Model Cave	24-May-06	196	Hand	6201	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Folsomia	sp.	on soil	wet	floor	soil
Model Cave	1-Mar-07	297	Hand	6838-6842	5	Arthropoda	Hexapoda	Collembola	Oncopoduridae	Oncopodura	sp.	muddy floor, near dead earthworm	normal	floor	soil/organics
Model Cave	1-Mar-07	296	Hand	6817	1	Arthropoda	Hexapoda	Collembola	Oncopoduridae	Oncopodura	sp.	muddy wall	normal	wall	soil
Model Cave	1-Mar-07	298	Hand	6822	1	Arthropoda	Hexapoda	Collembola	Oncopoduridae	Oncopodura	sp.	muddy wall, near dead earthworm	normal	wall	soil/organics
Model Cave	22-May-06	133	Hand	6217	1	Arthropoda	Hexapoda	Collembola	Oncopoduridae	Oncopodura	sp.				
Model Cave	2-Feb-06	6		7418	1	Arthropoda	Hexapoda	Diplura							
Model Cave	2-Oct-06	26		7573-7574	2	Arthropoda	Hexapoda	Diplura							
Model Cave	22-May-06	126	Dnet		4	Arthropoda	Hexapoda	Ephemeroptera				rise pool of resurgence	wet	floor	water

Model Cave	24-May-06	128	Dnet	6204-6215	12	Arthropoda	Hexapoda	Ephemeroptera	Baetidae			rise pool of resurgence	wet	floor	water
Model Cave	22-May-06	127	Bottle	6229-6232	4	Arthropoda	Hexapoda	Ephemeroptera	Baetidae			rise pool of resurgence	wet	floor	water
Model Cave	24-May-06	128	Dnet	6216	1	Arthropoda	Hexapoda	Ephemeroptera	Heptageniidae			rise pool of resurgence	wet	floor	water
Model Cave	2-Oct-06	12		7581	1	Arthropoda	Hexapoda	Orthoptera	Rhaphidiophoridae	Ceuthophilus					
Model Cave	24-May-06	197	Hand	6203	1	Arthropoda	Hexapoda	Heteroptera	Cydnidae	Pangaeus		soil just inside entrance gate	dry	floor	soil
Model Cave	2-Feb-06	12		7421	1	Arthropoda	Hexapoda	Coleoptera							
Model Cave	22-May-06	129	Hand	6219	1	Arthropoda	Hexapoda	Coleoptera	Cryptophagidae			bedrock	dry	ceiling	bedrock
Model Cave	22-May-06	129	Hand	6220	1	Arthropoda	Hexapoda	Coleoptera	Lathridiidae			bedrock	dry	ceiling	bedrock
Model Cave	24-May-06	195	Hand	7399	1	Arthropoda	Hexapoda	Coleoptera	Leiodidae: Playtypsyllinae(=Leptininae)			on soil near the middle one of the three pitfalls	wet	floor	soil
Model Cave	2-Oct-06	15		7582	1	Arthropoda	Hexapoda	Siphonaptera							
Model Cave	22-May-06	128	Dnet	6445	1	Arthropoda	Hexapoda	Diptera				rise pool of resurgence	wet	floor	water
Model Cave	2-Feb-06	4		7413	1	Arthropoda	Hexapoda	Diptera							
Model Cave	27-Jan-06	1		7416-7417	2	Arthropoda	Hexapoda	Diptera							
Model Cave	22-May-06	129	Hand	6225	1	Arthropoda	Hexapoda	Diptera	Chironomidae			bedrock	dry	ceiling	bedrock
Model Cave	22-May-06	129	Hand		2	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bedrock	dry	ceiling	bedrock
Model Cave	24-May-06	141	Pit	6443	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on mud/soil	wet	floor	soil
Model Cave	22-May-06	132	Hand	6233-6234	2	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bedrock	dry	wall	bedrock
Model Cave	22-May-06	129	Hand	6226	1	Arthropoda	Hexapoda	Diptera	Sciaridae			bedrock	dry	ceiling	bedrock
Model Cave	24-May-06	134	Pit	6441	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on mud/soil	normal	floor	soil
Model Cave	22-May-06	131	Hand	6227-6228	2	Arthropoda	Hexapoda	Diptera	Sciaridae			on top of soil	normal	floor	soil
Model Cave	22-May-06	141	Pit	6442	1	Arthropoda	Hexapoda	Diptera	Sciaridae			on mud/soil	wet	floor	soil
Model Cave	1-Mar-07	288	Sight		2	Chordata	Mammalia	Chiroptera	Vespertilionidae	Myotis	californicus	on bedrock	dry	wall	bedrock

Model Cave	1-Mar-07	291	Sight		2	Uncertain						on soil	normal	floor	soil
Model Cave	1-Mar-07	290	Hand	6819	1	Uncertain						on soil	normal	floor	soil
Model Cave	1-Mar-07	292	Hand	6849	1	Uncertain						muddy wall	normal	wall	soil
Model Cave	1-Mar-07	294	Hand	6787-6788	2	Uncertain						muddy wall	normal	wall	soil
Mountain View Cave	18-Jul-07	490	sight		1	Arthropoda	Arachnida	Acari	Rhagidiidae			packrat scat on dry rock, twilight	dry	floor	rock/guano
Mountain View Cave	18-Jul-07	493	hand	7247-7248	2	Arthropoda	Arachnida	Acari	Trombidiidae			packrat scat, entrance	dry	floor	guano
Mountain View Cave	18-Jul-07	491	hand	7252	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea: Phalangiidae: possibly Oliogolophus? sp.			packrat scat on dry rock, twilight	dry	floor	rock/guano
Mountain View Cave	10-Jul-07	397	hand	7314	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea: Phalangiidae: possibly Oliogolophus? sp.			in dry loose soil	dry	floor	soil
Mountain View Cave	18-Jul-07	486	hand		1	Arthropoda	Arachnida	Araneae				bed ceiling/wall, twilight	dry	ceiling	soil/rocks
Mountain View Cave	18-Jul-07	no	collection#	7223	1	Arthropoda	Arachnida	Araneae	Araneidae	Araneus	sp.				
Mountain View Cave	18-Jul-07	493	hand	7249	1	Arthropoda	Arachnida	Araneae	Linyphiidae			packrat scat, entrance	dry	floor	guano
Mountain View Cave	18-Jul-07	497	hand		1	Arthropoda	Chilopoda	Geophilomorpha				rock breakdown	dry	floor	breakdown
Mountain View Cave	18-Jul-07	495	sight		1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	packrat guano, twilight	dry	floor	guano
Mountain View Cave	18-Jul-07	490	sight		1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	packrat scat on dry rock, twilight	dry	floor	rock/guano
Mountain View Cave	18-Jul-07	492	hand	7241	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	Under rock in packrat guano, twilight	dry	floor	rock/guano

Mountain View Cave	18-Jul-07	493	hand	7230-7231	2	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	packrat scat, under a rock, entrance	dry	floor	rock/guano
Mountain View Cave	18-Jul-07	489	hand	7242-7243	2	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	packrat scat on dry rock, twilight	dry	floor	rock/guano
Mountain View Cave	18-Jul-07	493	hand	7245-7246	2	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	Under rock in packrat guano, twilight	dry	floor	rock/guano
Mountain View Cave	18-Jul-07	398	pit	7224	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp.	normal crushed packrat poopies twilight	normal	floor	guano
Mountain View Cave	18-Jul-07	488	hand		1	Arthropoda	Hexapoda	Diplura				packrat scat, floor, twilight	dry	floor	guano
Mountain View Cave	18-Jul-07	488	hand	7239	1	Arthropoda	Hexapoda	Diplura	Campodeidae			packrat scat, floor, twilight	dry	floor	guano
Mountain View Cave	18-Jul-07	493	hand	7244	1	Arthropoda	Hexapoda	Coleoptera	Byrrhidae			packrat scat, entrance	dry	floor	guano
Mountain View Cave	18-Jul-07	493	hand	7225	1	Arthropoda	Hexapoda	Lepidoptera	Noctuidae			packrat scat, entrance	dry	floor	guano
Mountain View Cave	18-Jul-07	487	hand	7232-7233	2	Arthropoda	Hexapoda	Lepidoptera	Nymphalidae	Aglais	milberti	bed ceiling, twilight	dry	ceiling	bedrock
Mountain View Cave	18-Jul-07	496	hand	7250	1	Arthropoda	Hexapoda	Lepidoptera	Tineidae			rock breakdown	dry	floor	bedrock/rocks
Mountain View Cave	18-Jul-07	496	hand	7251	1	Arthropoda	Hexapoda	Lepidoptera	Tineidae			rock breakdown	dry	floor	bedrock/rocks
Mountain View Cave	18-Jul-07	492	hand	7240	1	Arthropoda	Hexapoda	Lepidoptera	Tineidae			breakdown, floor, twilight	dry	floor	breakdown
Mountain View Cave	18-Jul-07	486	hand		17	Arthropoda	Hexapoda	Diptera				bed ceiling/wall, twilight	dry	ceiling	bedrock
Mountain View Cave	10-Jul-07	400	Sight		8	Arthropoda	Hexapoda	Diptera				on dry bedrock ceiling	dry	ceiling	bedrock
Mountain View Cave	18-Jul-07	487	hand	7234-7238	5	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bed ceiling, twilight	none	ceiling	bedrock
Mountain View Cave	18-Jul-07	494	sight		3	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on underside of rock	normal	floor	rocks
Mountain View Cave	18-Jul-07	no	collection#	7207-72222	16	Arthropoda	Hexapoda	Diptera	Heleomyzidae						
Mountain View Cave	18-Jul-07	493	hand	7227-7229	3	Arthropoda	Hexapoda	Diptera	Mycetophilidae			packrat scat, entrance	dry	floor	guano
Mountain View Cave	18-Jul-07	493	hand	7226	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			Under rock in packrat guano, twilight	dry	floor	rock/guano
Pine Cone Cave	17-Jul-07	485	hand	7175-7176	2	Arthropoda	Arachnida	Acari	Rhagidiidae			under loose rocks mixed with pine cones	normal	floor	organic/rock
Pine Cone	17-Jul-	478	sight		1	Arthropoda	Arachnida	Acari	Rhagidiidae			cedar duff on floor	normal	floor	wood

Cave	07														
Pine Cone Cave	17-Jul-07	479	hand		1	Arthropoda	Arachnida	Acari	Rhagidiidae			cedar duff on floor	normal	floor	wood
Pine Cone Cave	17-Jul-07	484	hand		1	Arthropoda	Arachnida	Acari	Rhagidiidae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	481	hand		1	Arthropoda	Arachnida	Araneae				cedar duff on floor	normal	floor	wood
Pine Cone Cave	17-Jul-07	476	hand	7162	1	Arthropoda	Arachnida	Araneae				bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	476	hand	7160	1	Arthropoda	Arachnida	Araneae	Agelenidae	Hololena	sp.	bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	484	hand	7182-7183	2	Arthropoda	Arachnida	Araneae	Agelenidae	Hololena	sp.	bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	480	hand	7178	1	Arthropoda	Arachnida	Araneae	Agelenidae	Hololena	sp.				
Pine Cone Cave	17-Jul-07	474	hand	7205		Arthropoda	Arachnida	Araneae	Amaurobiidae	Callobius?	sp.	cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	484	hand	7190	1	Arthropoda	Arachnida	Araneae	Araneidae	Araneus	sp.				
Pine Cone Cave	9-Jul-07	382	hand	7301	1	Arthropoda	Arachnida	Araneae	Cybaeidae			on normal cave wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	471	hand	7193	1	Arthropoda	Arachnida	Araneae	Linyphiidae			bedrock walls and webs; adult male, photo'd	dry	wall	bedrock
Pine Cone Cave	17-Jul-07	470	hand	7150-7156	7	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	bedrock walls and webs; adult male and female	dry	wall	bedrock
Pine Cone Cave	17-Jul-07	484	hand	7185-7186	2	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.	bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	477	hand	7192	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes	sp.				
Pine Cone Cave	9-Jul-07	391	hand	7308	1	Arthropoda	Arachnida	Araneae	Linyphiidae	Arcuphantes		on normal cave wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	477	hand	7161	1	Arthropoda	Arachnida	Araneae	Thomisidae	Xysticus	sp.	web on bedrock wall; photo'd	normal	wall	bedrock
Pine Cone Cave	9-Jul-07	385	hand	7312	1	Arthropoda	Chilopoda	Lithobiomorpha	Lithobiidae			on normal soil	normal	floor	soil
Pine Cone Cave	17-Jul-07	480	hand	7165	1	Arthropoda	Chilopoda	Lithobiomorpha	Lithobiidae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	485	hand	7173-7174	2	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	under loose rocks mixed with pine cones	normal	floor	organic/rock
Pine Cone Cave	17-Jul-07	482	hand	7206	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	bedrock wall	normal	wall	bedrock
Pine Cone	17-Jul-	485	hand	7148	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Desoria		under loose rocks	normal	floor	rocks/wood

Cave	07									sp. 1		mixed with pine cones			
Pine Cone Cave	17-Jul-07	390	pit	7146	1	Arthropoda	Hexapoda	Collembola	Isotomidae	Isotoma	sp. 1	cedar duff normal; (time) 1500	normal	floor	wood
Pine Cone Cave	17-Jul-07	473	hand	7200	1	Arthropoda	Hexapoda	Collembola	Tomoceridae	Tomocerus	sp. 2	cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	479	hand	7191	1	Arthropoda	Hexapoda	Microcoryphia	Machilidae	Pedetontus	sp.	cedar duff on floor	normal	floor	wood
Pine Cone Cave	17-Jul-07	484	hand		1	Arthropoda	Hexapoda	Orthoptera	Rhaphidophoridae	Ceuthophilus	sp.	bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	485	hand		1	Arthropoda	Hexapoda	Coleoptera				under loose rocks mixed with pine cones	normal	floor	organic/rock
Pine Cone Cave	17-Jul-07	480	hand		1	Arthropoda	Hexapoda	Coleoptera				bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	472	hand	7201	1	Arthropoda	Hexapoda	Coleoptera	Carabidae	Harpalus	animosus Casey	cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	480	hand	7179	1	Arthropoda	Hexapoda	Coleoptera	Carabidae	Pterostiches (Hypherpes)	protractus LeConte	bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	485	hand	7172	1	Arthropoda	Hexapoda	Coleoptera	Curculionidae			under loose rocks mixed with pine cones	normal	floor	organic/rock
Pine Cone Cave	17-Jul-07	476	hand	7159	1	Arthropoda	Hexapoda	Coleoptera	Elateridae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	483	hand	7164	1	Arthropoda	Hexapoda	Coleoptera	Elateridae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	484	hand	7184	1	Arthropoda	Hexapoda	Coleoptera	Elateridae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	475	hand	7170	1	Arthropoda	Hexapoda	Coleoptera	Leiodidae			cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	481	hand	7177	1	Arthropoda	Hexapoda	Coleoptera	Leiodidae						
Pine Cone Cave	17-Jul-07	388	pit	7145	1	Arthropoda	Hexapoda	Coleoptera	Nitidulidae			cedar duff normal; (time) 1430	normal	floor	wood
Pine Cone Cave	9-Jul-07	403	hand	7302	1	Arthropoda	Hexapoda	Coleoptera	Scarabaeidae	Phyllophaga	sp.	on dry cave wall	dry	wall	bedrock
Pine Cone Cave	9-Jul-07	403	hand	7305	1	Arthropoda	Hexapoda	Coleoptera	Scarabaeidae	Phyllophaga	sp.	on dry cave wall	dry	wall	bedrock
Pine Cone Cave	17-Jul-07	476	hand	7168	1	Arthropoda	Hexapoda	Coleoptera	Scarabaeidae	Phyllophaga	sp.				
Pine Cone Cave	17-Jul-07	470	hand	7158	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			bedrock walls and webs; adult male and female	dry	wall	bedrock

Pine Cone Cave	17-Jul-07	475	hand	7169	1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	485	hand	7171	1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae	Eleodes	hispilabris sculptilis Blaisdell 1909	under loose rocks mixed with pine cones	normal	floor	organic/rock
Pine Cone Cave	17-Jul-07	473	hand	7194	1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae	Eleodes	sp.	cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	483	hand	7163	1	Arthropoda	Hexapoda	Coleoptera	Trogossitidae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	484	hand	7149	1	Arthropoda	Hexapoda	Lepidoptera	Noctuidae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	476	hand		1	Arthropoda	Hexapoda	Hymenoptera	Formicidae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	475	hand	7166-7167	2	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	473	hand	7195-7199	5	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	472	hand	7203-7204	2	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	cedar duff	normal	floor	wood
Pine Cone Cave	17-Jul-07	471	hand	7202	1	Arthropoda	Hexapoda	Hymenoptera	Pompilidae						
Pine Cone Cave	17-Jul-07	484	hand	7189	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			bedrock wall	normal	wall	bedrock
Pine Cone Cave	17-Jul-07	470	hand	7157	1	Arthropoda	Hexapoda	Diptera	Phoridae			bedrock walls and webs; adult male and female	dry	wall	bedrock
Pine Cone Cave	17-Jul-07	390	pit	7147	1	Arthropoda	Hexapoda	Diptera	Sciaridae			cedar duff normal; (time) 1500	normal	floor	wood
Pine Cone Cave	17-Jul-07	480	hand	7180-7181	2	Arthropoda	Hexapoda	Diptera	Trichoceridae			bedrock wall	normal	wall	bedrock
Pine Cone Cave/ Cave 24	9-Jul-07	402	Sight		1	Arthropoda	Arachnida	Opiliones				on normal cave wall	normal	wall	bedrock
Pine Cone Cave/ Cave 24	9-Jul-07	383	Hand		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on normal soil	normal	floor	soil
Pine Cone Cave/ Cave 24	9-Jul-07	386	Sight		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			on normal soil	normal	floor	soil
Pine Cone Cave/ Cave 24	9-Jul-07	384	Hand		1	Arthropoda	Hexapoda	Hymenoptera	Formicidae			on normal soil	normal	floor	soil
Pine Cone Cave/ Cave	9-Jul-07	387	Sight		1	Arthropoda	Hexapoda	Diptera	Mycetophilidae?			on normal cave wall	normal	wall	bedrock

24															
Root Cave	25-May-06	219	Hand	6341-6342	2	Arthropoda	Arachnida	Acari				in soil/rock/organic debris	dry	floor	soil/rock/organic
Root Cave	17-Oct-06	no #		7550	1	Arthropoda	Arachnida	Acari							
Root Cave	17-Oct-06	no #		7551	1	Arthropoda	Arachnida	Acari	Ixodidae						
Root Cave	25-May-06	217	Hand	6344	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea : Family Leiobunidae: Leiobunum sp.	Lieobunum	sp.	bedrock	dry	wall	bedrock
Root Cave	25-May-06	223	Hand		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on underside of rock on gravel and root floor	normal	floor	rocks/wood
Root Cave	25-May-06	223	Hand	6329	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on underside of rock on normal clay floor	normal	floor	soil/rocks
Root Cave	25-May-06	225	Hand	6334	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on underside of rock on clay	normal	floor	soil/rocks
Root Cave	25-May-06	224	Hand	6335	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	under rocks on clay	normal	floor	soil/rocks
Root Cave	25-May-06	226	Hand	6343	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on calcite (flowstone)	normal	wall	calcite
Root Cave	25-May-06	226	???		1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962				
Root Cave	25-May-06	220	Sight		3	Arthropoda	Arachnida	Araneae				on dry rocks on floor	dry	floor	rocks
Root Cave	25-May-06	225	Hand	6332-6333	2	Arthropoda	Hexapoda	Diplura	Campodeidae	Eumesocampa	sp.	under rocks on clay/gravel/roots	normal	floor	soil/rock/organic
Root Cave	25-May-06	222	Sight	6327-6328	2	Arthropoda	Hexapoda	Diplura	Campodeidae	Eumesocampa	sp.	on calcite near roots	normal	wall	wood/bedrock
Root Cave	25-May-06	223	Hand	6338-6340	3	Arthropoda	Hexapoda	Diplura	Campodeidae	Eumesocampa	sp.	on calcite near roots	normal	wall	wood/bedrock
Root Cave	17-Oct-06	no #		7544-7546	3	Arthropoda	Hexapoda	Orthoptera	Rhaphidiophoridae	Ceuthophilus					
Root Cave	17-Oct-	no #		7548	1	Arthropoda	Hexapoda	Coleoptera	Cryptophagida						

	06								e						
Root Cave	17-Oct-06	no #		7549	1	Arthropoda	Hexapoda	Coleoptera	Leiodidae						
Root Cave	17-Oct-06	no #		7555	1	Arthropoda	Hexapoda	Lepidoptera							
Root Cave	17-Oct-06	no #		7547	1	Arthropoda	Hexapoda	Lepidoptera	Acrolophidae						
Root Cave	25-May-06	218	Sight		1	Arthropoda	Hexapoda	Hymenoptera	Formicidae			bedrock	dry	wall	bedrock
Root Cave	17-Oct-06	no #		7552	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae						
Root Cave	17-Oct-06	no #		7553-7554	2	Arthropoda	Hexapoda	Diptera							
Root Cave	25-May-06	223	Hand	6330-6331	2	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	dry	wall	calcite
Root Cave	25-May-06	224	Hand	6336-6337	2	Arthropoda	Hexapoda	Diptera	Sciaridae			on calcite	dry	wall	calcite
Root Cave	25-May-06	221	Sight		1	Chordata	Mammalia	Rodentia	Cricetidae	Peromyscus		on bedrock just inside entrance gate	dry	wall	bedrock
Smith Creek Cave	21-Jul-07		Hand		1	Arthropoda	Arachnida	Acari				dry bedrock wall	dry	wall	bedrock
Smith Creek Cave	21-Jul-07		Hand		6	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea: Family Leiobunidae: Leiobunum sp. (immature) - obviously accidental or entrance	Lieobunum	sp.	dry bedrock wall	dry	wall	bedrock
Smith Creek Cave	21-Jul-07		Hand		2	Arthropoda	Hexapoda	Orthoptera	Rhaphidophoridae	Ceuthophilus	sp.	dry bedrock wall	dry	wall	bedrock
Smith Creek Cave	21-Jul-07		Hand		1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae			dry packrat guano and dirt floor	dry	floor	soil/guano
Smith Creek Cave	21-Jul-07		Hand		6	Arthropoda	Hexapoda	Lepidoptera	Noctuidae			dry bedrock wall	dry	wall	bedrock
Smith Creek Cave	21-Jul-07		Hand		1	Arthropoda	Hexapoda	Lepidoptera	Tineidae?			dry bedrock wall	dry	wall	bedrock
Smith Creek Cave	21-Jul-07		Hand		1	Arthropoda	Hexapoda	Hymenoptera	Ichneumonidae			dry bedrock wall	dry	wall	bedrock

Snake Creek Cave	21-May-06	107	Hand		4	Arthropoda	Diplopoda	Polydesmida	Polydesmidae-Macrosternodesmidae	Speodesmus-like new species		under and on flat rocks and wet bedrock with organic debris mixed in	wet	floor	bedrock/rocks/organic
Snake Creek Cave	21-May-06	107	Hand		9	Arthropoda	Diplopoda	Polydesmida	Polydesmidae-Macrosternodesmidae	Speodesmus-like new species		under and on flat rocks and wet bedrock with organic debris mixed in	wet	floor	bedrock/rocks/organic
Snake Creek Cave	21-May-06	104	Hand		1	Arthropoda	Hexapoda	Collembola	Arrhopalitidae	Arrhopalites	caecus	on surface of drip pool on calcite floor wet	wet	floor	water
Snake Creek Cave	21-May-06	104	Hand	6406-6408	3	Arthropoda	Hexapoda	Collembola	Entomobryidae	Sinella	sp.	on calcite and soil floor	normal	floor	bedrock/soil
Snake Creek Cave	21-May-06	106	Hand	6409-6414	6	Arthropoda	Hexapoda	Collembola	Entomobryidae	Sinella	sp.	on wood on soil	normal	floor	soil/wood
Snake Creek Cave	24-Oct-06	no #		7516	1	Arthropoda	Hexapoda	Orthoptera	Rhaphidiophoridae	Ceuthophilus					
Snake Creek Cave	21-May-06	103	Hand	6416-6420	5	Arthropoda	Hexapoda	Psocoptera	Prionoglaridae	Speleketor		under rock in loose soil/packrat guano mix	normal	floor	soil/rock/guano
Snake Creek Cave	21-May-06	103	Hand	6415	1	Arthropoda	Hexapoda	Coleoptera	Tenebrionidae	Eleodes	hispilabris sculptilis Blaisdell 1909	soil and packrat guano	dry	floor	soil/guano
Snake Creek Cave	21-May-06	105	Hand	6405	1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			on bedrock	normal	ceiling	bedrock
Snake Creek Cave	21-May-06	108	Sight		1	Chordata	Mammalia	Chiroptera	Vespertilionidae	Plecotus	townsendii	on bedrock ceiling and flying (disturbed by our exit)	dry	ceiling	bedrock
Squirrel Spring Cave	21-May-06	100	Hand	6147-6149	3	Mollusca	Gastropoda					on underside of submerged rock	wet	floor	water
Squirrel Spring Cave	21-May-06	102	Bottle	6655	1	Arthropoda	Arachnida	Acari				submerged in eddy of outflow stream	wet	floor	water
Squirrel Spring Cave	27-Feb-07	265	Hand	6769	1	Arthropoda	Arachnida	Acari	Hydrachnidia			swimming in clear sump pool, gravel & Sand bottom	wet	floor	water
Squirrel Spring Cave	2-Mar-07	300	Sight		1	Arthropoda	Arachnida	Acari	Rhagidiidae			on underside of rock, loose	normal	floor	rocks

Squirrel Spring Cave	21-May-06	100	Hand	6145	1	Arthropoda	Arachnida	Opiliones	Suborder Palpatores: Superfamily Phalangioidea : Family Leiobunidae: Leiobunum sp. (immature) - obviously accidental or entrance	Lieobunum	sp.	on wet rock emerging from stream	wet	floor	water
Squirrel Spring Cave	27-Feb-07	272	Hand	6772	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	under rock	normal	floor	rocks
Squirrel Spring Cave	27-Feb-07	274	Sight		1	Arthropoda	Arachnida	Araneae				leaflitter/sand/rock floor	normal	floor	soil/rock/organic
Squirrel Spring Cave	21-May-06	101	Plankton	6672	1	Arthropoda	Arachnida	Araneae				tethered at entrance, but net about 1 meter out of cave, receiving high flow of water	wet	floor	water
Squirrel Spring Cave	24-Oct-06	no #		7523	1	Arthropoda	Arachnida	Araneae							
Squirrel Spring Cave	27-Feb-07	270	Hand	6770	1	Arthropoda	Arachnida	Araneae	Anyphaenidae	Anyphaena?	sp.	on web	normal	ceiling	bedrock
Squirrel Spring Cave	27-Feb-07	270	Hand	6768	1	Arthropoda	Arachnida	Araneae	Anyphaenidae	Anyphaena?	sp.	on underside of rock	normal	floor	rocks
Squirrel Spring Cave	2-Mar-07	300	Hand	6780	1	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis	on underside of rock, loose	normal	floor	rocks
Squirrel Spring Cave	27-Feb-07	270	Hand	6771	1	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	on underside of rock	normal	floor	rocks
Squirrel Spring Cave	27-Feb-07	274	Sight		1	Arthropoda	Hexapoda	Homoptera	Cicadellidae			on underside of rock	normal	floor	rocks
Squirrel Spring Cave	21-May-06	101	Plankton	6673	1	Arthropoda	Hexapoda	Homoptera	Cicadellidae			tethered at entrance, but net about 1 meter out of cave, receiving high flow of water	wet	floor	water
Squirrel Spring Cave	2-Mar-07	299	Hand	6778	1	Arthropoda	Hexapoda	Coleoptera	Dytiscidae	Hydroporus	sp.	in gravel bottom sump pool, ~4cm deep, swimming	wet	floor	water
Squirrel Spring Cave	27-Feb-07	270	Hand	6773	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			under rock	normal	floor	rocks
Squirrel	21-	100	Hand	6146	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on wet rock	wet	floor	water

Spring Cave	May-06											emerging from stream			
Squirrel Spring Cave	24-Oct-06	no #		7522	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae						
Squirrel Spring Cave	2-Mar-07	299	Hand	6779	1	Arthropoda	Hexapoda	Trichoptera				in gravel bottom sump pool	wet	floor	water
Squirrel Spring Cave	21-May-06	100	Hand	6144	1	Arthropoda	Hexapoda	Trichoptera	Limnephilidae			in gravel, stream pool	wet	floor	water
Squirrel Spring Cave	27-Feb-07	268	Sight		1	Arthropoda	Hexapoda	Lepidoptera				on dry sandy soil floor	dry	floor	soil
Squirrel Spring Cave	21-May-06	101	Plankton	6674	1	Arthropoda	Hexapoda	Diptera				tethered at entrance, but net about 1 meter out of cave, receiving high flow of water	wet	floor	water
Squirrel Spring Cave	21-May-06	101	Plankton	6675	1	Arthropoda	Hexapoda	Diptera				tethered at entrance, but net about 1 meter out of cave, receiving high flow of water	wet	floor	water
Squirrel Spring Cave	27-Feb-07	269	Sight		1	Arthropoda	Hexapoda	Diptera				bedrock	dry	wall	bedrock
Squirrel Spring Cave	27-Feb-07	273	Sight		2	Arthropoda	Hexapoda	Diptera				on silt wall ledge	normal	wall	soil
Squirrel Spring Cave	24-Oct-06	no #		7524	1	Arthropoda	Hexapoda	Diptera							
Squirrel Spring Cave	27-Feb-07	270	Hand	6860	1	Arthropoda	Hexapoda	Diptera	Dixidae			flying near bedrock wall	normal	wall	bedrock
Squirrel Spring Cave	21-May-06	102	Bottle	6656-6671	15	Arthropoda	Hexapoda	Diptera	Heleomyzidae			submerged in eddy of outflow stream	wet	floor	water
Squirrel Spring Cave	27-Feb-07	269	Sight		1	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bedrock	dry	wall	bedrock
Squirrel Spring Cave	27-Feb-07	271	Hand	6765	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			bedrock, from web	normal	ceiling	bedrock
Squirrel Spring Cave	27-Feb-07	266	Hand	6777	1	Arthropoda	Hexapoda	Diptera	Mycetophilidae				dry	wall	
Squirrel Spring Cave	27-Feb-07	270	Hand		1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			from web on bedrock ledge	normal	wall	bedrock
Squirrel Spring Cave	27-Feb-07	273	Sight		1	Arthropoda	Hexapoda	Diptera	Mycetophilidae			bedrock, in web	normal	wall	bedrock
Squirrel Spring Cave	27-Feb-07	271	Hand	6767--in same vial with	1	Arthropoda	Hexapoda	Diptera	Sciaridae			bedrock	normal	ceiling	bedrock

				6766											
Squirrel Spring Cave	27-Feb-07	271	Hand	6766	1	Arthropoda	Hexapoda	Diptera	Sciaridae			silt floor	dry	floor	soil
Squirrel Spring Cave	24-Oct-06	no #		7521	1	Arthropoda	Hexapoda	Diptera	Sciaridae						
Squirrel Spring Cave	27-Feb-07	266	Hand	6774-6776	3	Arthropoda	Hexapoda	Diptera	Sphaeroceridae			silt on wall ledge near Neotoma guano	normal	wall	bedrock/soil
Squirrel Spring Cave	27-Feb-07	274	Sight		1	Chordata	Mammalia					on rocks, walls, ceiling		ceiling	bedrock/rocks
Squirrel Spring Cave	21-May-06	102	Bottle	6654	1	Uncertain						submerged in eddy of outflow stream	wet	floor	water
Water Trough Cave	8-Nov-06	no #		7536-7537	2	Annelida	Clitellata (=Oligochaeta)	Opisthopora	Lumbricidae?						
Water Trough Cave	24-May-06	193	Hand	7364	1	Arthropoda	Arachnida	Acari				under rocks on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	193	Hand	7440	1	Arthropoda	Arachnida	Acari	Rhagidiidae			under rocks on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	194	Hand	7404	1	Arthropoda	Arachnida	Pseudoscorpiones	Neobisiidae	Microcreagris	grandis Muchmore, 1962	on underside of normal loose rock on wet soil and guano floor	normal	floor	soil/rocks
Water Trough Cave	24-May-06	181	Hand		1	Arthropoda	Arachnida	Araneae				on dead rodent on wet wood	wet	floor	organics/wood
Water Trough Cave	24-May-06	182	Hand	6299	1	Arthropoda	Arachnida	Araneae				underside of dry rocks on wall ledges	dry	wall	bedrock/rocks
Water Trough Cave	24-May-06	182	Hand	6251	1	Arthropoda	Arachnida	Araneae	Amaurobiidae?			underside of dry rocks on wall ledges	dry	wall	bedrock/rocks
Water Trough Cave	24-May-06	182	Hand	6300-6305	6	Arthropoda	Arachnida	Araneae	Amaurobiidae			underside of dry rocks on wall ledges	dry	wall	bedrock/rocks
Water Trough Cave	24-May-06	182	Hand	6306	1	Arthropoda	Chilopoda	Lithobiomorpha	Lithobiidae						
Water Trough Cave	24-May-06	181	Hand		1	Arthropoda	Diplopoda					on dead rodent on wet wood	wet	floor	organics/wood
Water Trough Cave	24-May-06	187	Hand		1	Arthropoda	Diplopoda					on rock and soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	189	Hand		3	Arthropoda	Diplopoda					on debris slope above scummy water (i.e., a bathtub ring)	wet	floor	soil/rocks
Water	24-	193	Hand		4	Arthropoda	Diplopoda					under rocks on soil	wet	floor	soil/rocks

Trough Cave	May-06														
Water Trough Cave	8-Nov-06	no #		7532-7534	3	Arthropoda	Diplopoda	Chordeumatida	Conotylidae	Idagona	lehmanensis				
Water Trough Cave	24-May-06	181	Hand		1	Arthropoda	Hexapoda					on bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	193	Hand	7374	1	Arthropoda	Hexapoda					bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	181	Hand	7387	1	Arthropoda	Hexapoda	Collembola				on bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	187	Hand	7344-7350	7	Arthropoda	Hexapoda	Collembola				in dry packrat scat	dry	wall	guano
Water Trough Cave	24-May-06	182	Hand	6252-6297	46	Arthropoda	Hexapoda	Collembola	Entomobryidae	Entomobrya	sp. 2	underside of dry rocks on wall ledges	dry	wall	bedrock/rocks
Water Trough Cave	24-May-06	185	Hand	6320	1	Arthropoda	Hexapoda	Diplura				on underside of rock on normal soil in entrance	normal	floor	soil/rocks
Water Trough Cave	24-May-06	191	Hand	6309-6310	2	Arthropoda	Hexapoda	Diplura	Campodeidae	Metriocampa?	sp.	under rock on soil	wet	floor	soil/rocks
Water Trough Cave	8-Nov-06	no #		7538	1	Arthropoda	Hexapoda	Microcoryphia							
Water Trough Cave	24-May-06	181	Hand	7386	1	Arthropoda	Hexapoda	Plecoptera				on bedrock	dry	wall	bedrock
Water Trough Cave	8-Nov-06	no #		7543	1	Arthropoda	Hexapoda	Homoptera							
Water Trough Cave	24-May-06	181	Hand	7388-7394	7	Arthropoda	Hexapoda	Coleoptera				on dead rodent on wet wood	wet	floor	organics/wood
Water Trough Cave	24-May-06	193	Hand	7359	1	Arthropoda	Hexapoda	Coleoptera				under rocks on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	193	Hand	7366-7373	8	Arthropoda	Hexapoda	Coleoptera	Anobiidae: Ptininae			bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	181	Hand	7383-7385	3	Arthropoda	Hexapoda	Coleoptera	Anobiidae: Ptininae			on bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	187	Hand	7351-7355	5	Arthropoda	Hexapoda	Coleoptera	Anobiidae: Ptininae			in dry packrat scat	dry	wall	guano
Water Trough Cave	8-Nov-06	no #		7539-7542	4	Arthropoda	Hexapoda	Coleoptera	Anobiidae: Ptininae						
Water Trough Cave	24-May-06	193	Hand	7362	1	Arthropoda	Hexapoda	Coleoptera	Colydiidae??			under rocks on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	187	Hand	7356	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on rock and soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	189	Hand	7377-7379	3	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			on debris slope above scummy water (i.e., a bathtub ring)	wet	floor	soil/rocks

Water Trough Cave	24-May-06	193	Hand	7363	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	193	Hand	7375-7376	2	Arthropoda	Hexapoda	Coleoptera	Staphylinidae			bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	191	Hand	6317	1	Arthropoda	Hexapoda	Coleoptera	Staphylinidae						
Water Trough Cave	24-May-06	187	Hand	7358	1	Arthropoda	Hexapoda	Trichoptera				under rock on surface of muck at water level	wet	floor	soil/rocks
Water Trough Cave	24-May-06	190	Hand	6249-6250	2	Arthropoda	Hexapoda	Trichoptera				on rock and soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	186	Hand	6318	1	Arthropoda	Hexapoda	Trichoptera				on rock and soil		floor	soil/rocks
Water Trough Cave	24-May-06	188	Sight		1	Arthropoda	Hexapoda	Lepidoptera				on bedrock ledge (indicative of bats?)	dry	wall	bedrock
Water Trough Cave	24-May-06	179	Hand	6323	1	Arthropoda	Hexapoda	Lepidoptera				on bedrock	dry	wall	bedrock
Water Trough Cave	8-Nov-06	no #		7525-7527	3	Arthropoda	Hexapoda	Lepidoptera	Alucitidae						
Water Trough Cave	24-May-06	179	Hand	6321	1	Arthropoda	Hexapoda	Lepidoptera	Noctuidae			on pool surface	wet	floor	water
Water Trough Cave	24-May-06	185	Hand	6319	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Camponotus	sp.	on soil	normal	floor	soil
Water Trough Cave	24-May-06	182	Hand	6298	1	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Forelius	sp.	underside of dry rocks on wall ledges	dry	wall	bedrock/rocks
Water Trough Cave	24-May-06	191	Hand	6313-6315	3	Arthropoda	Hexapoda	Hymenoptera	Formicidae	Formica	sp.	under rock on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	179	Hand	6322	1	Arthropoda	Hexapoda	Hymenoptera	Vespidae			on surface film of cave pool	wet	floor	water
Water Trough Cave	24-May-06	181	Hand		3	Arthropoda	Hexapoda	Diptera				bedrock	dry	wall	bedrock
Water Trough Cave	8-Nov-06	no #		7528	1	Arthropoda	Hexapoda	Diptera							
Water Trough Cave	8-Nov-06	no #		7529	1	Arthropoda	Hexapoda	Diptera							
Water Trough Cave	8-Nov-06	no #		7535	1	Arthropoda	Hexapoda	Diptera							
Water Trough Cave	8-Nov-06	no #		7530-7531	2	Arthropoda	Hexapoda	Diptera							
Water Trough Cave	24-May-06	191	Hand	6311-6312	2	Arthropoda	Hexapoda	Diptera	Heleomyzidae			under rock on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	193	Hand	7360-7361	2	Arthropoda	Hexapoda	Diptera	Heleomyzidae			bedrock	dry	wall	bedrock

Water Trough Cave	24-May-06	193	Hand	7365	1	Arthropoda	Hexapoda	Diptera	Sciaridae			under rocks on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	181	Hand	7380-7381	2	Arthropoda	Hexapoda	Diptera	Sciaridae			on bedrock	dry	wall	bedrock
Water Trough Cave	24-May-06	182	Hand	6307	1	Arthropoda	Hexapoda	Diptera	Sciaridae			underside of dry rocks on wall ledges	dry	wall	bedrock/rocks
Water Trough Cave	24-May-06	181	Hand	7382	1	Arthropoda	Hexapoda	Diptera	Sphaeroceridae			mud	wet	floor	soil
Water Trough Cave	24-May-06	187	Hand	7357	1	Arthropoda	Hexapoda	Diptera	Sphaeroceridae						
Water Trough Cave	24-May-06	191	Hand	6308	1	Arthropoda	Hexapoda	Diptera	Tipulidae			under rock on soil	wet	floor	soil/rocks
Water Trough Cave	24-May-06	181	Hand	7395	1	Chordata									
Water Trough Cave	24-May-06	178	Sight		1	Chordata	Aves	Columbiformes	Columbidae	Zenaida	macroura	soil and rock, flew out of entrance as we approached the cave	wet	floor	soil/rocks
Water Trough Cave	24-May-06	183	Sight		1	Chordata	Aves	Passeriformes	Fringillidae	Carpodacus	cassinii	on shrubs (current?) in entrance	dry	floor	organics
Water Trough Cave	24-May-06	184	Sight		1	Chordata	Aves	Passeriformes	Troglodytidae	Catherpes	mexicanus	on bedrock in entrance	dry	wall	bedrock
Water Trough Cave	24-May-06	180	Sight		1	Chordata	Mammalia	Rodentia				on pool surface	wet	floor	water
Water Trough Cave	24-May-06	192	Hand	6324	1	Chordata	Mammalia	Rodentia	Cricetidae	Neotoma?		on mud/packrat guano	wet	floor	soil/guano
Water Trough Cave	24-May-06	192	Hand	6325	1	Chordata	Mammalia	Rodentia	Cricetidae	Neotoma?		on mud/packrat guano	wet	floor	soil/guano
Water Trough Cave	24-May-06	191	Hand	6316	1	Uncertain						under rock on soil	wet	floor	soil/rocks