

History of Arco Tunnel and Bats 1953 -2024

A Lava Tube Cave on Craters of the Moon National Monument and Preserve

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Introduction

Arco Tunnel is the longest known cave on Craters of the Moon National Monument with over 6.397 feet of passages. It is used by bats year-round and is one 23 caves known to be used by bats for hibernation. Other caves (yet to be surveyed or even to be discovered) may harbor greater numbers of bats in the winter but for now, Arco Tunnel is the largest known hibernacula. The high count occurred in March of 2024 when 82 bats were counted. Bats were first documented to hibernate in Arco Tunnel in 1986 (Genter) but regular hibernacula surveys were not begun until 2002. This is not a record of all Arco Tunnel history, only record, events, surveys etc. that may relate to bats, bat use and data relevant to the study of bats.

General History of Arco Tunnel and Records of Bats

- 1953 - Cave “discovered”. First documentation of the cave (*Cave Area Exploration Trip*. Robert Zink, May 1953).

- 1958 – First (partial) cave map is produced (it would be many years before all of the passages would be discovered and mapped) as part of the first survey of geology, mineralogy, biology, climate and water (Exploration of Arco Tunnel, Sanchez 1959). This survey found “neither bats nor their sign”.
- 1960 – First documentation of bat use. “While in the cave on June 8, 1960 a myotis bat was seen in flight” (Arco Tunnel – Additional Observations, Peter G. Sanchez July, 1960). On August 14, “while in the tunnel several myotis bats were seen” (Temperature and Humidity Readings of Arco Tunnel, Peter G. Sanchez, August 1960).
- 1961- Eleven month (Dec- Oct.) study of temperature and humidity in Arco Tunnel. (Temperature and Humidity in Arco Tunnel, David C. Ocshner, 1961).
- 1961 - NPS first controls access by installing a wire gate (about 100 ft. in) and requiring entry permits (in: Environment Assessment: Arco Tunnel Gate, Apel 1999). Keys and permits were available at the Visitor Center. Getting a permit consisted of just asking for one, so while this limited public access and allowed NPS to track people, the cave was not closed.
- 1979 – A record of a bat in Arco Tunnel appears in the CRMO Wildlife Observation Database (Andrews, August 7, 1979. “1 little brown bat”).
- 1980 - The crawlway and passages to the Senate Room and Culvert first appear on a map produced by Scott C. Jex (The Gem Caver. Volume XIII, Number 3, p. 27). This adds over 700 ft. of passages to the cave and makes it the first map to show all the major passages. Only the end points for a few short passages were left unmapped and these all appear as dead ends on subsequent maps adding only tens of feet.
- 1980 – First assessment of bat use (Thornton in: The Gem Caver, Volume XIII, Number 3, p. 27).

“Bats....have been observed in the entrance area and only an occasional bat is found beyond the first crawlway. Visits to the cave during the past several years at various seasons indicate that the cave is neither a hibernation nor a nursery roost for bats”

- 1983 – The original gate which had been vandalized and is in such disrepair that it is “only symbolic” (Scott C. Jex for The Gem Caver. Volume XIII, Number 3, p. 27) is replaced with a new gate. The gate location is moved to “The Crawlway” or “Belly Crawl” about 500 into the cave (Apel, 1999 In: *Environment Assessment for Arco Tunnel Gate*).
- 1984 – A new cave map by Scott C. Jex. dead-ends previously unmapped short sections of several crawls.
- 1986 - The first record of hibernating bats appears in “*Wintering bats of the Upper Snake River Plain: Occurrence in Lava Tube Caves* (David L. Genter, Great Basin Naturalist, 1986, Vol. 46 No. 2). In it he states a “survey of potential bat hibernacula, population size, and species composition was conducted during the winter of 1984-85 at the Idaho National Engineering Laboratory (INEL)”. Arco Tunnel appears in the data table (page 243) of this paper with records of 3 *Myotis leibii* (a synonym of *Myotis ciliolabrum*, the western small-footed myotis).
- 1987 - Two observations of hibernating bats in Arco Tunnel are attributed to Roger Hoffman (University of Idaho) (Wildlife Observations Database: Craters of the Moon National Monument and Preserve 1921-2021). These include; 3 Townsend big eared bats “hibernating?” on April fifth and 3 western small footed myotis “hibernating in Arco Tunnel” on December 27. The Townsend record is curious because in the Craters of the Moon National Monument Baseline Inventory and Monitoring (Wildlife) Final Report (1988) Hoffman wrote “because of the cold, dry conditions in winter, it is

unlikely that (*Myotis lucifugus* and *Plecotus townsendii*) hibernate on the Monument”.

- 1993 - An observation record (Wildlife Observations Database: Craters of the Moon National Monument and Preserve 1921-2021) states 2 big brown bats seen hibernating in the “Senate Room Culvert in Arco Tunnel” (unknown observer).
- 1994 – First surveyed map of all known passages Created by The Idaho Cave Survey. This map was used until 2023 when it was replaced by a map created by the Cave Research Foundation (CRF).
- 1995 – “During the winter of 1995/96 recreational cavers affiliated with the Gem State Grotto of the National Speleological Society (NSS) reported eight Townsend’s big-eared bats (*Corynorhinus townsendii*) hibernating within Arco Tunnel” (J. Apel et. al. *Environmental Assessment for Arco Tunnel Gate*. July 1999. page 6).
- 1996 - When 18 bats were found hibernating (Feb. 5) within the cave (a mix of Townsend’s and *Myotis* sp.) the keys and permits were removed from the front desk and a seasonal closure went into effect between 10/5 and 5/1 (recommended by Inter-agency Bat Conservation Committee). A recommendation was made to census the hibernacula every 2 years (Wolz, Crombie and Snitzler-Neeck, 1996, Report of Arco Tunnel Hibernating Bats). After this Information about Arco Tunnel wasn't volunteered but a small number of permits continue to be issued.
- 1997 – In a letter thanking Douglass Owen (CRMO park geologist), Jim Nieland described “30 some myotis bats roosting in the entry way” on June 2, 1997.
- 1998 – A hibernacula survey was attempted by Apel and Call on March 5, however only the section from the entrance to just beyond the gate was surveyed (this would be the old gate location). A single Townsend’s big-eared bat (*Plecotus townsendii*) was observed just beyond the gate (further survey postponed due to battery problems with lights and difficulty of walking in X-country ski boots) (Apel in

memo to Superintendent March, 1998)

- 1999 – A note on a cave map detailing biological and climatological data that was collected in Arco Tunnel (Elliot et. al. July 15, 1999) states: “Corynorhinus skeleton.”
- 1999 - The old (now the second) gate was removed, and a new gate was installed about 30 ft. from the entrance. The seasonal closure was moved to 9/15 to 5/15 based on the "Habitat Conservation Assessment and Conservation Strategy for the Townsend's Big-eared Bat, 1999." The 1999 Environmental Assessment of the new gate estimated that permits for Arco Tunnel averaged 100 persons a year with most permits issued in the summer (Apel, 1999. in Environment Assessment for Arco Tunnel Gate)
- 2002 - Additional language (beyond a simple season of closure) is found in the Superintendents Compendium. The Compendium restricts permits to one at a time with a maximum of 12 persons per group and restricts what can be brought into the cave (Morris, 2002). The first full, standardized, and documented hibernacula survey was conducted (with locations of bats mapped) in Jan of 2002 (Munts and Parsons). All bats were photographed for ID for the first time as well. Prior to this hibernation records are incidental, incomplete and/or lacking in location information.
- 2003 - Hibernacula Survey conducted in January (Munts and Durbin field map).
- 2007 - Hibernacula Survey conducted in January (Munts and Parsons field map).
- 2009 – Four cavers entered the cave on 29 August for the purpose of inventorying orange spray painted directional marking put in the cave by someone who thought they were being helpful (see 2009 trip report by Armstrong). During this trip the crew noted 2 unknown dead bats.
- 2010 – Hibernacula survey attempted but entrance was snowed in. During a July 8 visit six dead bats were recorded (July Cave visit field map, Muntz).

- 2011 – A hibernacula survey was conducted in January (2011 Hibernacula Survey, Muntz and Lonsinger field map).
- 2013 – This year was the beginning of a 5-year study (2013-2017) of hibernacula on CRMO to try to establish a baseline ahead of the arrival of White Nose Syndrome (WNS). This was the first hibernacula survey in which air temperature and humidity data were collected (using a Kestrel 3000) at each hibernating bat location (at least one reading per zone). The survey start and end times were also recorded for the first time (2013 Hibernacula Survey field map, Stefanic et al).
- 2014 – Hibernacula survey (year 2 of 5-year study). The first hibernacula survey in which in addition to air temp and humidity the wall (or ceiling) temperature immediately adjacent to the hibernating bat was collected using an infrared thermometer (UEI Test Instruments INF 165). Most bat surveyors use these instruments to record temperature. It had been our intention to use them as well, but the infrared thermometers had not yet arrived by the time of the 2013 survey. It was decided to continue to take air temperature alongside wall/ ceiling temp to see if we got a difference and to possibly determine what temperature was more important to a bat selecting a roost site.
- 2015 - Hibernacula survey (year 3 of 5-year study)
- 2016 - Hibernacula survey (year 4 of 5-year study). HOBO data loggers placed in the cave to gather an entire year of climate data.
- 2017 - Hibernacula survey (year 5 of 5-year study). HOBO data loggers collected.
- 2018 – Cave was entered on 9 Jan. with University of Georgetown researchers doing research on cave microbes for NASA using Arco Tunnel as an analog for caves on Mars along with Michael Durham and Todd Stefanic to film footage of CRMO employees doing hibernacula surveys for the new park film. A faux

hibernacula survey was staged for filming. All bats encountered during this trip were recorded to show the cave was occupied by hibernating bats, and to record the disturbance to the cave/ bats.

- 2023 – The CRF produced a new cave map which changed the alignment of various passages and added 591.6 feet to the total length of the cave (making it 6397.2 ft or 1.21 miles of passages).
- 2024 - After a 5-year rest from any winter entries, a hibernacula survey was conducted on 7 March. This survey counted the highest total number of bats (82) and the highest number of *Myotis* species (61) ever recorded hibernating in the cave (Arco Tunnel Hibernacula Survey Field Map, Stefanic). This lends some credence to the belief that this cave had been heavily over disturbed in recent (2013-2018) years. Going forward, the recommendation is that hibernacula surveys be conducted no more frequently than every 3 years to limit disturbance. During the survey bats in the cave showed no signs of White-nose Syndrome.

Summary Table: Arco Tunnel Records of Hibernating Bats (Compiled from CRMO Observation Records, Field Maps, Literature Review and Surveys)																	
	YEAR																
SPECIES	1984-85	1987	1993	1995	1996	1998	2002	2003	2007	2011	2013	2014	2015	2016	2017	2018	2024
<i>Corynorhinus townsendii</i> (Townsend's big eared bat)	0	3		8	(x)	1	19	6	8		11	11	24	20	13	2	21
<i>Myotis lucifugus</i> (Little brown myotis)										5	1						
<i>Myotis evotis</i> (Long eared myotis)									8	2	X						
<i>Myotis ciliolabrum</i> (Western small footed myotis)	3	3							3	5		2			3		
<i>Eptesicus fuscus</i> (Big Brown Bat)			2														
<i>Myotis yumanensis</i> (Yuma myotis)											7						
<i>Myotis californicus</i> (California myotis)																	
<i>Myotis Volans</i> (Long-legged Myotis)											X						
<i>Myotis</i> sp.					(x)		2	10	11	2	12	22	18	10	3	3	61
Unknown bat sp.					18						2	3		2			
TOTAL	3	4	2	18	18	1	21	16	30	14	33	38	42	32	19	10	82