ERUPTIVE IMPACTS OF MOUNT ST. HELENS ON LOCAL BAT POPULATIONS

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INTRODUCTION

Mt. St. Helens, a volcano in Washington State, USA, erupted after a 123 year dormant period, resulting in displacement of material by landslide and vent explosions. Losses of most wildlife species could not be estimated because pre-eruptive data were non-existent. (USDA 1981). However, pre-eruptive bat data do exist. Here I present data on pre-eruptive locales which were important sites of concentrated bat activity and post-eruptive data and status of the above sites. Sites include nursery colonies, male roost areas and hibernacula.

METHODS

Pre-eruptive records are from Senger (1974), Adler (1976), and Perkins (1979). Post-eruptive data are personal records, USGS and USFS personnel communications, and members of the Oregon Grotto of the National Speleological Society, most notably J. Nieland, A. Purcell and B. Taylor.

Data area is divided into two segments for ease of discussion: (1) winter records from the blast area and south of the mountain; and (2) summer records from the blast area and from south of the mountain.

Site	Location	Use	Pre-erupt. Sp. Noted	No.	Post-erupt. Sp. noted	No.	Status
Mine Tunnel	B	H	UND	UND	-	-	D
Bat Cave	S	H	Pt Me Ml Mv My	80 2 4 19 1	Pt UND UND UND UND	80 UND UND UND UND	UNC UND UND UND UND
Spider Cave	S	H	Pt Ml Mv My	40 3 12 1	Pt UND UND UND	35 UND UND UND	UNC UND UND UND
Flow Cave	S	H	Pt	10	pt	3	UNC
Ape Cave	S	H	Ml Mv My	2 11 9	- - -	- - -	? ? ?
Ole's Cave	S	H	Pt	40	Pt	35	UNC
Little People's Cave	S	H	Pt	1-5	UND	UND	UND
Beaver Cave	S	H	Pt	2	-	0	?

TABLE 1. Pre and post-eruptive winter records of bats on Mt. St. Helens (winter). B=blast area; S=south side of the mountain; H=hibernaculum; UND=undetermined; UNC=unchanged; D=destroyed; MFT=mud flow threatens; MFI=mud flow inundated; Pt=Plecotus townsendii; Me=Myotis evotis; Ml=M. lucifugus; Mv=M. volans; My=M. yumanensis.

Site	Location	Use	Pre-erupt. Sp. Noted	No.	Post-erupt. Sp. noted	No.	Status
USFS Residence	B	NC	Ml	20	-	-	E
YMCA Camp	B	NC	Ml	30	-	-	E
St. Helens Lodge	B	NC	Ef	15	-	-	E
Swift Village	S	NC	My	50	My	55	UNC
Swift Village	S	NC	Mv	35	Mv	30	UNC
Crane Lake	S	NC	My	12	-	-	E
Merrill Lake	S	MR/F	Ln	25	UND	UND	UNC
Kalama Springs Campground	S	MR	Ml	?	UND	UND	UNC
Ape Cave	S	SW	Myotis Ml	500 ?	UND UND	UND UND	UNC UNC
Moss Springs	S	MR/F	Mc Me Ml My Ln	1 4 1 1 1	- - - - -	- - - - -	E E E E E

TABLE 2. Pre and post-eruptive records of bats on Mt. St. Helens (summer). B=blast area; S=south side of the mountain; NC=nursery colony; MR=male roost; F=feeding/drinking area; MFI=mud flow inundated; UND=undetermined; UNC=unchanged; E=extirpated; Me=Myotis evotis; Ml=M. lucifugus; Mv=M. volans; My=M. yumanensis; Mc=M. californicus; Ef=Eptesicus fuscus; Ln=Lasionycteris noctivagans; SW=Swarming area.

RESULTS

Results indicate bat activity sites in the blast/mud flow paths were eliminated.

Mine Tunnel. Entrance to this probable hibernaculum was most likely filled or blocked with debris from ash and tree blowdowns.

Spirit Lake. The three nursery roosts along spirit Lake are presently under three to 60 m of blast material. If bats had arrived prior to May 18, 1980, their survival is highly questionable. If arrival was post-eruption 1980, problems would have occurred in finding an alternate roost site. Present data indicate the colonies were eliminated.

Crane Lake. This site was inundated by mud flows of the same and later dates. Status of the colony, which roosted in a hollow tree is presently unknown. Alternate roosts (buildings, bridges, old growth trees) are available within 8 km of the lake. Survival of this small colony is likely.

Moss Springs. Inundation of this site by mud flows was the second course change for Pine Creek in less than 15 years. The upper flow route was altered by an earthquake in the late 1960s which allowed the formation of Moss Springs. This site was especially rich in bat diversity and roost sites.

Rerouting of water courses north and south of the mountain will probably redistribute remaining non-colony summer bat populations. Survival of these individuals will be heavily dependent on adequate roost sites near new water courses and/or insect populations.

Hibernacula and other bat activity sites outside the blast/mud flow paths are relatively intact. Populations appear to be at pre-eruption level, at least for P. townsendii. Myotis sp. has been at Little Red River Cave since the eruption. No other sightings have been reported to me.

A positive note is the return of a nursery colony of about 20 P. townsendii to Powerline Cave this spring. Red Zone closures probably resulted in a lower disturbance factor allowing the bats to re-occupy the roost which was abandoned about 1967. Continued human exclusion here may result in continued use of this site.

It will be interesting to note if large numbers of Myotis sp. will again swarm at the Ape Cave entrance this fall.

CONCLUSION

Bat losses due to the May 18, 1980 eruption and subsequent activities include at least three nursery colonies, one forage site, and one probable hibernacula. Unaffected were two nursery colonies, two forage sites, and four hibernacula. Further protection of bat populations surrounding the mountain may be necessary for populations to grow enough to repopulate extirpated areas.

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A COMPARISON OF THE TROGLOBITIC HARVESTMEN FROM LAVA TUBES AND LIMESTONE CAVES

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Some of the harvestmen known from lava tubes in the states of Washington and Idaho are comparable to the world's most specialized limestone cave troglobites. These lava tube species include Speleomaster lexi, Speleomaster pecki, and Speleonychia sengeri described by Briggs (1974) and discussed in Peck (1973). In order to apply a measure of cave adaptation to these harvestmen, the important troglomorphisms have been quantified and shown to be reduced or absent in related epigean species.

The harvestmen troglomorphisms selected for this comparison include increased tarsal segment counts, loss of the retina and lens, loss of the eye tubercle, depigmentation, relative lengthening of the second leg, and smoothening of the scute (carapace). All but the latter troglomorphism were applied to Australian cave harvestmen by Hunt (1972). An additional troglomorphism used by Hunt, the elongation of tarsal claws, was not used in this study because claw measurements are seldom reported by taxonomists. A specialization score for a troglobite was obtained by assigning numerical values to the troglomorphisms and selecting the most closely related epigean so that a difference between the sums for these species could be determined. The more objective values used were the sum of the tarsal segments for legs one to four and the ratio of the second leg length to the body length. A less objective score had to be assigned for relative depigmentation, loss of the eye tubercle, and scute smoothness. The maximum score for these troglomorphisms was set as follows: no pigment- 5, no eye tubercle - 20, and smooth scute - 10. Relative loss of eyes was not used in the specialization score because only harvestmen with a complete loss of eyes were considered sufficiently troglobitic for this study. If the related epigean is assumed to resemble the ancestral stock from which the troglobite evolved, subtracting the specialization score for the epigean gives emphasis to derived troglomorphisms.

A world-wide literature search yielded ten cave harvestmen more specialized by this measurement than the least specialized of the above three lava tube species (see Tables 1 and 2). These were found in limestone caves in Europe, Venezuela, Mexico and United States. The European troglobites include: Dinaria vjetrenicae Hadzi, Travunia troglodytes (Roewer), Travunia anophthalma (Absolon and Kratochvil), and Arbasus caecus (Simon), which are redescribed in Roewer (1935); Buermarina patrizii (Roewer[1956]); and Paralola buresi (Kratochvil, Balat and Pelikan [1958]). The venezuelan troglobite is Phalangozea bordoni (Munoz Cuevas [1975]) and the Mexican troglobite is Hoplobunus inops (Goodnight and Goodnight [1971]). From the United States, the troglobites are Phalangodes armata (Tellkampf [1844]), and Tolus appalachius (Goodnight and Goodnight [1942]). The lack of highly specialized harvestmen from Africa, Asia and Australia may be due to insufficient collecting, but the lack from islands is probably related to land mass size and youth. Lava tube harvestmen in this study are listed with locality data and related epigean species.