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A Six Year Study of Big Brown Bat Survival

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ZOOLOGY

A Six Year Study of Big Brown Bat Survival

This study of bat survival began during the winter of 1951-52 after a chance remark by a fourth grade pupil that there were bats in a storm sewer near his home. Since according to the literature, bats are to be found in the winter only in caves which have a relative humidity of 90 percent or above, the possibility of finding them elsewhere became a challenge.

The construction of the storm sewer from which the bats were collected varies from precast tile to poured concrete and mortar-laid granite blocks. The granite block structure, now about one hundred years old, originally served as culverts for the streets as they were built over a twenty-five foot ravine. All the bats were taken from the mortar-free joints between the granite blocks. Their heads, facing outward, were within three to six inches from the main tunnel. Only water from rains and melting snow pass through this sewer. Its size varies from six feet at the entrance to three feet in diameter in other inner passages.

At the places of collection the temperature varies from 32° to 44° F, while the relative humidity varies from 57 to 92 percent. The movement of air varies from 30 to 68 feet per minute and is dependent upon the differential between the outside and inside temperatures. Thus convection currents of air are set up so that, on cold days, air warmed as it comes inward is discharged through manholes, and on warm days in the spring the current becomes reversed and is discharged from the entrance.

All of the bats collected in this sewer were sexed, weighed, banded, and released in the sewer. With the exception of the first

winter (1951-52), the collecting took place during the last week of December.

Table 1 shows the number of big brown bats collected in each of the six winters included in this study and the percent which were previously banded. It will be noted that in the winter collections of 1954-55 and 1956-57, the percentages of previously banded bats approached closest to the theoretical figure of 60 percent survival rate

TABLE 1.—*Yearly Collection and Percent of Previously Banded Big Brown Bats*

Winter	Number Collected	Percent Previously Banded
1951-52	35	. . .
1952-53	36	36.0%
1953-54	51	35.5
1954-55	51	58.8
1955-56	75	42.0
1956-57	94	54.0
(Theoretical Survival—After Mohr, 1952)		60.0

suggested by Mohr in 1952. The increase in numbers of bats collected during the six year period may be explained by several factors. There may have been less severe weather at such critical periods as during the brooding season or during the time when the bats moved to their winter quarters, or there may have been more abundant food. Undoubtedly, greater percentages of the total populations were collected in the later years.

The following percentages of bats were recovered at yearly intervals following their banding and the theoretical curve of survival suggested by Mohr (1952). From the total of 155 bats banded, 52.2 percent were alive one year after banding; from 111 banded, 43.2 percent were alive two years later; from 90 banded, 35.6 percent were alive three years later; from 58 banded, 31.1 percent survived four years; and from 35 banded the first year, 17.1 percent were alive five years later. It must be remembered that of these 35 banded the first year, about half of them were over one year old; some possibly over six years of age. (cf. Fig. 1)

Evidence from these data suggest the following statements:

1. The big brown bats inhabiting this storm sewer, as winter quarters, tend to return the following winters.

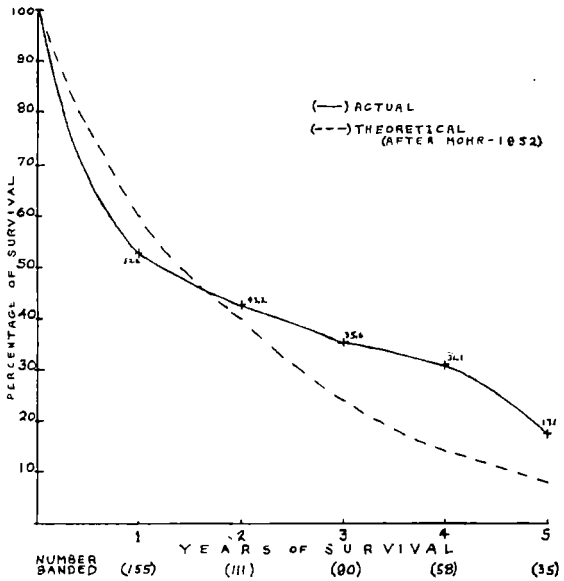

Fig. 1. Percentage of bats recovered after banding. (1/6/57)

2. The population of this sewer has been increasing during the past five years.
3. There appears to be a greater mortality of this species during the first year of life.
4. The survival rate is not constant throughout the life of the big brown bat.
5. From 50 to 60 percent of the winter population of this species are more than one year old.
6. There were 83 females and 115 males taken during the six years of collecting.
7. The survival rate is approximately the same for the female as the male individuals of this species.

LITERATURE CITED

MOHR, C. E. 1952. A survey of bat banding in North America, 1932-1951. *Bulletin 14, The American Carver.*