

GENERAL NOTES

Predation on bats by hawks and owls.—In the course of a year's investigation of the cave bats of the gypsum caves of south-central Kansas and northwestern Oklahoma, I made several observations on bat predation by hawks and owls which may be of interest.

On October 2, 1952, I saw a Barn Owl (*Tyto alba*) preying on Mexican free-tailed bats (*Tadarida mexicana*) while the evening flight of the latter was emerging from the entrance of Merrihew Cave ($\frac{3}{4}$ mile south and $\frac{1}{8}$ mile west of the Barber and Comanche, Kansas, county lines in Woods County, Oklahoma). The Mexican free-tails, which occur in this cave in great numbers from April until the middle of October, begin their evening flight shortly after sunset at this time of year. When flying from the cave interior to the outside, they form a steady stream consisting of numerous bats per cubic yard. It seems that they do not utilize echo-location while flying in such a dense flock. At 7:00 p.m., when visibility was still fairly good, a Barn Owl soared into this stream of bats at a height of about 20 feet above the ground and approximately the height of the top of the cave entrance. The bats made no apparent effort to dodge the owl. Approximately 10 feet in front of the cave entrance, the owl threw its head up and feet down and went into a kind of a stall. It was my impression that several bats hit the owl on its wings and breast and that one was picked off the breast with one foot. The owl then wheeled sharply and flew to a knob on the prairie some 75 feet away to devour its prey. Several minutes later the process was repeated. A third soaring attack into the flying stream of bats was unsuccessful and the owl immediately flew into the stream a fourth time, this time catching a bat and carrying it to an elm tree on top of the cave entrance. The owl seemed to use the same technique on each subsequent attack as described for the first. Macy and Macy (1939. *Jour. Mamm.*, 20:252) record two Red-tailed Hawks (*Buteo jamaicensis*) feeding on Free-tails at this same cave in August, 1934.

On the afternoon of December 7, 1952, while making homing experiments, I released 20 cave myotis (*Myotis velifer incautus*) at a wheat field on the state line $\frac{1}{4}$ mile east of the Comanche County line in Barber County, Kansas. The bats upon being released made two or three wide circles several hundred yards in diameter and then flew off $\frac{1}{4}$ to $\frac{1}{2}$ mile and alit on trees or farm buildings. The following events were watched with binoculars. The fifth bat released circled once, then flew south, east and then north at a height of about 50 feet. At this time, a buteonine hawk soared from the north slightly above the bat, turned and struck at the bat from behind with its feet. The bat, however, darted about and began to climb. Although I did not collect this hawk, I tentatively identified it as a Rough-legged Hawk (*Buteo lagopus*) as a large white patch at the base of the tail was conspicuous. The hawk again attacked, the bat dipping to the side at the last moment. The bat continued to climb and the hawk missed twice more. At this point, a Sparrow Hawk (*Falco sparverius*) flew in from the north; this bird made two quick attacks upon the bat, both unsuccessful. The fifth attack by the buteo failed but on the sixth it appeared to throw itself downward, striking the bat with the right wing. The hawk immediately seized the bat with the left foot and flew back in the direction from which it came. The Sparrow Hawk also flew off to the north to a tree approximately $\frac{1}{2}$ mile away.

I released another myotis and within less than a minute the Sparrow Hawk attacked it making four quick strikes the last of which was successful. The bird again flew off to the north. After a few minutes, another bat was released. The Sparrow Hawk again flew quickly after the bat, knocked it to the ground, and dived and captured it.

On February 27, 1953, at 5:00 p.m. while I was releasing bats 200 yards north of the mouth of Merrihew Cave, a Sparrow Hawk dived at a cave myotis as it flew into the cave entrance. The falcon missed and turned sharply aside, not following the bat into the cave. Several minutes later after the falcon had returned to its perch on a cedar tree approximately 100 yards southeast of the cave entrance, I released a second myotis. This time the falcon flew quickly towards the bat and dived at it from five feet above and missed it; the bird immediately flew over the bat again and neatly picked it out of the air with its claws. The Sparrow Hawk then carried its prey to the same cedar tree and there ate it.

On July 17, 1953, at Lost Colony Cave (4 miles south and $3\frac{1}{2}$ miles west of Aetna, Barber County, Kansas) as I was observing the morning flight of cave myotis into the cave I saw a Sparrow Hawk dive on one of the many bats milling above the cave and catch it on the first attempt. This occurred at 4:58 a.m. when the illumination from the sky was less than one foot-candle. At 5:12 a.m. (illumination 13 foot-candles), an unidentified buteonine hawk was seen to make a sally at one of the many myotis returning from the east at this time, but I could not see whether or not a bat had been captured.

In addition to the above observations, I collected owl pellets from wood rat (*Neotoma*) houses near the entrances of caves. Three pellets, tentatively identified by size and shape as of Barn Owl origin, from Merrihew Cave contained remains of four, three, and two Mexican free-tailed bats each; three others contained one bat each of this species. A pellet identified as that of the Great Horned Owl (*Bubo virginianus*) contained six Mexican free-tails. All of these pellets contained only bats.

I have frightened Barn Owls from May's Cave (4 miles south and $\frac{1}{2}$ mile west of Aetna, Barber County, Kansas) at all seasons of the year. This cave is occasionally occupied by the cave myotis and the Bunker bat (*Antrozous bunkerii*). A Barn Owl pellet from this cave yielded the remains of a Bunker bat and parts of a cottontail rabbit (*Sylvilagus*). I found a pile of bones 54 feet within this cave in a shallow concavity of a rock three feet above the cave floor. From the good condition of skulls and jaws, I judged these bones to be remains from owl pellets. Included in these bones were an amphibian jaw, a jaw of the collared lizard (*Crotaphytus collaris*), and remains of many small mammals including 10 cave myotis, three Mexican free-tails, and one Bunker bat.

With the exception of the pellet from May's cave, the identity of the pellets was tentatively determined by either Thane S. Robinson or Harrison B. Tordoff of the University of Kansas Museum of Natural History.—JOHN W. TWENTE, JR., *Department of Zoology, University of Michigan, Ann Arbor, February 13, 1954.*

A wintering concentration of eagles in Oklahoma.—A concentration of 108 eagles was counted on the Salt Plains National Wildlife Refuge near Jet, Oklahoma, on December 26, 1953. More were undoubtedly present in areas of the refuge not censused. It is known that the majority of the adult birds were Bald Eagles (*Haliaeetus leucocephalus*), and adult Golden Eagles (*Aquila chrysaetos*) also were observed. We made no attempt to identify immatures to species; however, on the basis of identifiable adults it is probable that more than 75% of the population were Bald Eagles.

It is common for eagles to winter on the refuge in numbers around 100. In 1953, one Golden Eagle remained for the summer, while two immature Golden Eagles arrived on October 5. On December 10, there was a mass immigration of 50 individuals including both species. Normally, the population decreases in March, and by the latter part of April all eagles have departed.—JOHN B. VAN DEN AKKER, *Salt Plains National Wildlife Refuge, Jet, Oklahoma, January 1, 1954.*