

PREDATION ON BATS BY HAWKS AND OWLS

BY MARY W. LOONEY

MANY A SO-CALLED "bat cave" has very few bats; but Vickery Bat Cave, in western Major County, Oklahoma, truly deserves the name. The cave is inhabited from mid-April to mid-October by Mexican Free-tailed Bats (*Tadarida brasiliensis*). Counts made at dusk at the cave's mouth indicate that from 700,000 to 800,000 bats inhabit the cave in spring and early summer, and that as many as 1,400,000 live there in August and early September. The increase is due not only to the crop of young reared in the cave, but also to the arrival of migrants that stop briefly on their way southward.

The cave's roughly rectangular mouth, which measures about 40 by 40 feet, opens into a narrow canyon that deepens rapidly and curves slightly before widening out some 3000 feet away. In early dusk the bats start to leave the cave in a stream about 2 feet deep and 10 feet wide that moves rapidly down the narrow



MOUTH OF VICKERY BAT CAVE

Photo taken in the fall of 1971 by Craig Rudolph.

canyon to the point where it widens. Here the bats spiral upward, attaining heights so great that they can no longer be seen with an 8-power binocular, before they disperse. The stream of bats continues to flow for at least half an hour and sometimes—in late summer—for an hour and a half.

Birds of prey evidently become aware of regular bat-flights of this sort. Stager (1941, Condor, 43: 137-39) observed Peregrines (*Falco peregrinus*) swooping and screaming near the entrance to a cave in south-central Texas in late afternoon "as if . . . calling the bats to come out." Perry and Rogers (1964, Southwest. Nat., 9: 205) observed two Great Horned Owls (*Bubo virginianus*) that regularly hunted bats at Conner's Cave in Major County, Oklahoma. Near Vickery Bat Cave I repeatedly saw Red-tailed Hawks (*Buteo jamaicensis*) in the evening perching motionless on posts and treetops near the cave mouth just before the exodus of bats started. Marsh Hawks (*Circus hudsonius*) also flew in just before dusk, but they did not perch on the treetops as a rule. On twelve occasions in 1969 I watched the bat-flight—on 26 April (small flight), 17 and 31 May, 21 June, 4 and 5 July, 9, 16, and 17 August, 21 and 22 September, and 5 October (small flight). On eleven of these twelve occasions I saw at least one hawk (one to four Red-tails; one to three Marsh Hawks) attempt to catch a bat. In addition, on 31 May and 4 July, I saw a hawk that I could not identify. The persistence of all these hawks was puzzling: in spite of their repeated efforts to make a capture, not once did I see them succeed.

Barn Owls (*Tyto alba*), on the other hand, often caught bats. Their hunting procedure differed strikingly from that of the hawks. Red-tails invariably soared well above the flying bats for a time, then dropped rapidly, meeting the bats head-on, and grabbing for one. Apparently bewildered by the profusion of prey, they shot through the moving column in a matter of seconds, and the bats avoided them simply by banking or side-slipping. At the end of the dive, close to the ground, each hawk was obliged to follow the canyon a short way before shooting upward and regaining enough altitude for another stoop. On the evening of 5 July I followed one Red-tail for some time with my binocular. The bird made seven passes before giving up. By this time it was so dark that I could hardly see the bats.

Marsh Hawks were no more successful than the Red-tails. These harriers usually flew back and forth over the canyon, keeping close to the ground. Never did they soar above the flying bats or plunge into and follow the narrow stretch of canyon. They approached from the front or side, made a swift pass at the top of the bat stream, and circled briefly, sometimes trying again. They were far less persistent than the Red-tails. Often, after an unsuccessful pass, they left.

Two Barn Owls that probably spent the day between ledges under the outer overhang of the cave-mouth, and that might have had a nest there, used a wholly different technique. Usually they did not appear until dusk—i.e., until

the bat-flight was in full swing. Then, dropping from a ledge only ten feet or so above the bats, and moving swiftly along with them, they often made a capture. Each owl appeared to select one particular bat before starting the chase, and the bats were caught with unerring precision. More than two Barn Owls may have captured bats regularly at the cave's mouth, but I never saw more than two at one time. On the evening of 21 September I witnessed the capture of seven bats by one or more Barn Owls within a 45-minute period.

Only on 16 August did I see what I believed to be a Great Horned Owl. The large bird—whatever its species—made one attempt and caught a bat. It attacked from a ledge, in the manner of the Barn Owls.

One should not conclude, from what I have reported above, that hawks cannot capture bats. The common names of at least two falconiform birds—the Bat-eating Hawk (*Machaeerhamphus alcinus*) of the Old World and the White-throated or Bat Falcon (*Falco albigularis*) of Mexico, Central America, and South America—connote ability to capture bats. The Peregrines observed in Texas by Stager (*loc. cit.*) were highly successful in catching bats not only in the evening but also in the morning when "the incoming column was not as compact as the outgoing stream and was descending at a much greater speed." George M. Sutton informs me that the stomach of a Peregrine collected by him at nightfall near Linares, Nuevo León, Mexico, on 2 March 1941 contained two Free-tailed Bats. Macy and Macy (1939, *J. Mammal.*, 20: 252) witnessed the capture of a bat by a Red-tailed Hawk during the morning return-flight in south-central Kansas. Twente (1954, *Wilson Bull.*, 66: 135-36) watched two Sparrow Hawks (*Falco sparverius*) and a hawk that he tentatively identified as a Rough-leg (*Buteo lagopus*) capture bats released during homing experiments with bats in south-central Kansas. Sutton (1951, *Mexican birds*, p. 63) found a living Free-tailed Bat in the talons of a Sparrow Hawk that he collected at dusk near Monterrey, Nuevo León, Mexico, on 4 February 1938.

The technique used by the bat-catching Peregrines observed by Stager (*loc. cit.*) was quite different from that of the Red-tailed Hawks observed by me. Stager's Peregrines took bats from a 15-foot-diameter column that rose from a cave mouth at an angle of 45 degrees for about 50 feet, then levelled off. The falcons, "darting from above, or on the flank of the column . . . cut into the on-rushing mass of bats with talons set, and they seldom emerged on the opposite side without their prey held fast."

As for the technique used by Barn Owls, Twente (*loc. cit.*) made a surprising discovery. At a cave in Woods County, Oklahoma, he watched an owl that flew into a column of bats head-on from above, stalled with head up, feet down, and wings spread wide, catching a bat that struck it in the chest. Twente assumed that the bats were not using their echo-location apparatus while flying in such a dense mass. One owl that he watched made four successful captures of this sort.

Hawks and owls—indeed all predators—prey heavily on forms of life that are both acceptable as food and readily obtainable. Perry and Rogers (*loc. cit.*) ascertained that in pellets gathered by them “from 50 ft. outside to 50 ft. inside” a cave in Major County, Oklahoma on 30 July, 13 August, and 15 September 1963, “bats remains predominated.” The fact that Taylor (1964, *J. Mammal.*, 45: 300) found bat remains in only one of 119 Barn Owl pellets gathered by him at caves in southwestern Oklahoma probably indicated not that bats were scarce, difficult to catch, or unpalatable, but that other forms of life were more easily obtainable.

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PREDATION BY HAWKS ON BATS AT VICKERY BAT CAVE

BY WARREN D. HARDEN

ON 16 AUGUST 1971 my wife Mary Ann, my mother Merle L. Harden, and I visited Vickery Bat Cave in Major County, Oklahoma, to watch the evening bat-flight. Arriving at about 19:00, we put to flight a molting adult Red-tailed Hawk (*Buteo jamaicensis*) that was perched in a tree just above the cave mouth. The hawk flew across the narrow ravine below the cave, disappearing over a ridge to the southwest.

On investigating the area, I decided that a narrow, heavily eroded ledge directly above the cave mouth would hardly serve as a perch for any large avian predator such as a Great Horned Owl (*Bubo virginianus*)—a species known to feed extensively on bats (Taylor, 1964, *J. Mammal.*, 45: 300). I saw no owls and found no owl pellets about the cave mouth. I did not go into the cave.

The bat-flight began at sundown (20:00). The bats were all dark brown except for one pure white individual that we noted soon after the flight started. I believe the bats were all of one species—the Mexican Free-tail (*Tadarida brasiliensis*)—but other species might, so far as I know, have been present.

When, at about 20:05, the vanguard of the bat-flight had reached a point well above the horizon south of us, two Swainson's Hawks (*Buteo swainsoni*) appeared over the hill to the northwest. The leading hawk was screaming, as if excited at sight of the bats. It glided into the side of the bat-flight and, without changing speed or course, snatched a bat in its talons and retraced its flight northwestward. The second hawk, using the same tactics, easily caught a bat and followed the first hawk over the hill.

At about 20:07 one of the Swainson's returned, caught a bat on its first attempt, and flew back northwestward. At about 20:10 both Swainson's returned. This time one hawk missed on its first attempt, but quickly turned and caught a bat with another try. The second hawk also caught a bat, which it transferred to its bill midair. Suddenly, changing course slightly, it caught another bat in its talons. Carrying the two bats—one in its bill, the other in its claws—it fol-