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PREDATION ON THE FREE-TAILED BAT BY THE GREAT HORNED OWL

BY R. K. CHESSEY AND M. L. KENNEDY

The bat caves of Oklahoma, especially those of the western third of the main body of the state, have received much attention during the past decade or so. A common bat of these caves is the Mexican Free-tailed Bat (*Tadarida brasiliensis*). Predation on young free-tailed bats by the Great Horned Owl (*Bubo virginianus*) at Conner's Cave in Major County, northwestern Oklahoma, was reported by Perry and Rogers (1964, *Southwest. Nat.*, 9: 205). The finding of skeletal parts of at least 46 free-tailed bats in 24 Great



REED CAVE, SOUTHWESTERN OKLAHOMA

Entrance to chamber in which two Great Horned Owls roosted in September, 1972. Just above center is a feral Rock Dove (Columba livia)—possibly the first ever to have been photographed in Oklahoma. Photographed on 4 February 1973 by W. K. Reisen.

Horned Owl pellets (and several pellet fragments) at Reed Cave in Greer County, southwestern Oklahoma, was reported by Taylor (1964, J. Mammal., 45: 300-301). Predation on free-tailed bats by hawks and owls at Vickery Bat Cave, in Major County, was discussed by Looney (1972, Bull. Oklahoma Orn. Soc., 5: 1-4) and by Hardin (*ibid.*, pp. 4-5). Perry (1965, Oklahoma State University Doctoral Dissertation, p. 27) estimated the free-tailed bat population of Reed Cave at four million in the summer of 1963.

Tadarida brasiliensis is strongly migratory. Its winter home is in central and tropical Mexico (there are winter records, too, for Central America and northern South America). Breeding takes place in February and March, so when the hordes return to their summer home in the north, most of the females are pregnant. Thousands of young bats are born each summer in the above-mentioned caves. A female free-tailed bat, banded as a baby in Oklahoma in the summer of 1968 and recaptured at Estación Tamuín, San Luis Potosí, Mexico, on 14 November of that year, had travelled about a thousand miles in reaching its winter home in the tropical lowlands just south of the Tropic of Cancer (Barbour and Davis, 1969, Bats of America, p. 206).

The main mouth of Reed Cave faces south and is about 40 feet wide and 20 feet high. A few feet to the east of this entrance, and approximately 20 feet above it, is a smaller opening that faces west and leads into a passageway that is about 11 feet high and 11 feet wide. This chamber narrows sharply about 8 feet back from its mouth. On its floor on 16 September 1972, we collected 28 pellets and seven pellet fragments, all of which had, presumably, been regurgitated by the two Great Horned Owls that were roosting there. One owl was noticeably smaller than the other. The owls must have been roosting there regularly, for we flushed them from the same chamber on three occasions subsequently. Whenever anyone approached their roost they flew out and away, but returned shortly if not disturbed.

All of the pellets and pellet fragments except one contained free-tailed bat remains. The exception appeared to be a very old pellet. The pellets contained the remains (chiefly fur, skulls, and larger wing and leg bones) of at least 95 free-tailed bats. The 78 skulls were of both young and adult animals. Eight was the largest number of skulls that we found in any one pellet. We did not find identifiable remains of any other bat than *T. brasiliensis*, though several other bat species are known to inhabit southwestern Oklahoma (Hall and Kelson, 1959, The mammals of North America, 1: 157-203). Most of the pellets and pellet fragments contained bat remains only, but four contained also the remains of small rodents and a fifth contained also the remains of a lizard. We found no bird remains in any of the pellets. At no time during the summer and fall of 1972 did we see any other bat species than *T. brasiliensis* in Reed Cave.

Obviously the two owls that we continued to flush from their roost chamber had been preying principally on free-tailed bats during a period when

vast numbers of the animals were readily available. We had no way of knowing, of course, how long a period the pellets and pellet fragments represented, whether the two owls regurgitated all of their pellets at that particular roost, or just where the owls caught the bats — i.e., whether in the cave or while the bats were flying out of, or into, the cave.

When free-tailed bats have left Oklahoma for the winter, such important predators as the Great Horned Owl must turn their attention toward other sources of food. Now that we know something about the summer food habits of the Great Horned Owls that roost (and perhaps even nest) in free-tailed bat caves, these same birds should, if possible, be studied carefully during winter and spring. The owls are believed to be non-migratory. At this writing we can only assume that they continue to use the caves as roosts in winter, faring forth to obtain food other than bats outside the caves.

We wish to thank Dr. Charles C. Carpenter for identifying the lizard remains for us, and Kathy Nipper and Cecil R. Chesser for their assistance in obtaining the pellets.

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ON THE FEEDING BEHAVIOR OF THE RED CROSSBILL

BY GEORGE M. SUTTON

The Red Crossbill (*Loxia curvirostra*) visits Oklahoma irregularly in winter, presumably when coniferous trees west and north of Oklahoma fail to produce cones. It does not feed on seeds of conifers exclusively while here, but if it is known to be in a given area it certainly is to be looked for in that area's coniferous trees. Since moving to Oklahoma in 1952, I have seen the Red Crossbill chiefly in Cleveland County, in the central part of the state, though during this same period it has been reported from several other counties. In 1955-56 (17 November to 9 February), 1960-61 (5 November to 3 April), 1966-67 (13 October to 14 May), and 1972-73 (25 October to 1 May), I saw it almost daily on the University of Oklahoma campus in the city of Norman.

The species was especially common in 1966-67 and 1972-73. As a rule the ten to 30 birds that I continued to see during those winters were in a loose flock. They fed regularly in the 20-some fairly large Austrian pines (*Pinus nigra*) growing on the campus between the Zoology Building (Richards Hall) and Lindsey Street; but I saw them from time to time also in pines on the old golf course just east of the campus, in pines among dormitories just south of Lindsey Street, in a ragged stand of wild sunflower at the corner of Asp and Lindsey, and, toward the end of their stay during each period, on the ground under two large red cedars (*Juniperus virginiana*) at the northeast corner of

the Stovall Museum of Science and History on Asp Avenue.

The fact that I nearly always observed the crossbills feeding during the middle of the day (1100 to 1300) has led me to wonder whether warming of the air caused the mature pine cones to "open up" at that time. On cool mornings I often heard or saw the birds flying about rather than feeding. Their clearly enunciated *chi-chi*, *chi-chi-chip* callnotes were readily identifiable. Flying flocks did not bunch tightly except when suddenly flushed from a tree: a bird at the front of a flock moving from one feeding spot to another was often 20 yards or so from the other end of the flock.

While busy feeding, the birds were remarkably quiet. On many occasions I would not have known that they were above me had I not heard cracking sounds overhead or seen the light brown, paper-thin seed-wings floating to the ground. When a bird changed position from one branch to another it usually fluttered downward. When shifting thus, it sometimes gave a single or double *chip*, but while climbing from cone to cone on a given branch, a procedure that required no fluttering of wings, it almost invariably remained silent.

The birds were unsuspecting or "tame," at times astonishingly so. On 14 January 1973, while I was standing on a sidewalk watching a feeding flock, a student whom I did not know stopped to ask what I was looking at. I explained that crossbills were above us in the pine. Even as I spoke, a grayish olive bird fluttered down to a cone on a branch just above our heads, looked at us briefly, and started working at the cone. Saying to the student that the crossbills were "very tame," I reached my hand toward the bird. When my fingers had approached it to within about a foot, it looked closely at them, but not until I had grasped the needles and shaken the tip of the branch a little, did it depart. "I'd never have believed that," was the student's comment.

Precisely how crossbills use their bills in feeding has long been of interest to me. Until watching the birds closely here in Norman I have been under the impression that a feeding individual pushed its closed bill between the scales of a cone with head turned to one side, then brought its head to an upright position, thus prying the scales apart with the tips of the mandibles. I am now convinced that the usual procedure involves pushing the slightly opened bill straight in between the scales, thus prying them apart without a turning of the head, then opening the bill a little more, thus reducing the pressure on the scales and allowing them to return almost to their original position, at the same time permitting the strong, spoon-tipped tongue to move forward, scoop the seed from the thin, translucent "wing" that holds it, and bring it back into the mouth for swallowing. Judging from what I observed of the living birds (rather than from anything found in the gullet or stomach of specimens collected), the seed itself needs no husking, cracking, or "masticating" before being swallowed. The seed-wing floats off after the seed has been scooped from it. An interesting and readily perceptible phenomenon is the drifting ground-

ward of seed-wings from a tree in which crossbills are feeding. On more than one occasion I have watched the falling seed-wings, heard low cracking sounds and chipping overhead, seen a bird crawling or fluttering from one cone to another, and eventually counted up to twenty or more birds quietly feeding in the one tree.

Often I have watched one or more feeding birds only four or five feet away. Such birds did not twist their heads when forcing their bills between the scales of cones, nor did they twist their heads after pushing their bills in. Their jaw muscles are powerful, a fact that is instantly apparent to anyone who skins a specimen, but opening the bill after it has been pushed between the scales must not require much force since the returning to their original position of the pried-apart scales probably aids the opening of the mandibles as the bird moves its tongue forward.

The feeding behavior of captive Red Crossbills has been described in detail by Tordoff (1954, *Condor*, 56: 348), who states that the scales of a cone are "raised by lateral abduction of the lower mandible, that is, toward the side to which the mandible is deflected; this motion is produced by the powerful, asymmetrically developed muscles on this side of the skull." My never having witnessed this "lateral abduction of the lower mandible" may well have resulted from the fact that the tips of the mandibles are completely hidden while the scales are being pried apart. My observations do not agree with Tordoff's in one particular: the long axis of the heads of feeding birds observed by me was often parallel to the long axis of the cone. It occurs to me that the prying apart of scales may be accomplished in more ways than one. A direct pushing toward the cone's center with bill closed or slightly opened certainly could pry the scales apart. Perhaps the procedure varies with the "open-ness" of the cones.



TONGUES OF RED CROSSBILLS

Eight times actual size. The drawing, made by Martin T. Jensen, shows the remarkable distal modification that permits the bird to scoop seeds from cones or seed-heads into the mouth.

Tordoff states that his captive crossbills "fed adeptly" on sunflower seeds "only after considerable practise." Red Crossbills that I watched on 2 November 1972, while they were feeding on wild sunflower seeds, seemed to be having no difficulty. The seeds were not as large as commercial sunflower seeds, of course. It appeared to me that each bird was scooping the seeds from the seed-heads with its saliva-covered tongue, lifting or pulling each seed back into the mouth with the tongue, and, again using the tongue, working the seed into position between the tomia, where it was cracked.

As stated at the first of this paper, the crossbills did most of their feeding in the pines, but when the supply of pine seeds was exhausted the birds subsisted to a considerable extent on red cedar seeds picked up on the ground under the trees. The stomachs of crossbills collected while they were on the ground feeding held not the whole juniper berries, pulp and all, but only the seeds.

STOVALL MUSEUM OF SCIENCE AND HISTORY, UNIVERSITY OF OKLAHOMA, NORMAN, OKLAHOMA 73069, 1 APRIL 1975.

GENERAL NOTES

Scaled Quail in Custer County, Oklahoma.—On 17 January 1976, shortly after flushing a covey of about a dozen Bobwhites (*Colinus virginianus*) 4½ miles west and 1 north of Butler, Custer County, west-central Oklahoma, Russell Blanchard, Jr. shot a Scaled Quail (*Callipepla squamata*). The bird was by itself in moderately grazed short-grass pastureland that had little brush in it. Blanchard had no way of knowing whether it had been with the Bobwhites, but he was fairly certain that every bird in the covey that he had flushed was a Bobwhite. Head and chest feathers of the Scaled Quail have been preserved for reference. These do not appear to have come from a hybrid individual.

It is doubtful that *Callipepla squamata* has ever before been seen or taken in Custer County. Though the species is known to have ranged eastward irregularly as far as "Alfalfa, Woodward, Dewey, Caddo, and Jefferson counties" (Sutton, 1967, Oklahoma birds, p. 142), and though the map in Schemnitz (1959, Southwest. Nat., 4: 150) shows southwestern Custer County to be within the Scaled Quail's range, no actual sighting or capture within the county's borders has been reported, so far as I know.—J. Brent Giezantner, *Washita National Wildlife Refuge, R.R. 1, Box 68, Butler, Oklahoma 73625, 19 January 1976.*

Third specimen of Glaucous Gull for Oklahoma.—About noon on 27 December 1974, I saw a very large white-looking gull near a duck blind along the east shore of Lake Hefner in the northwestern part of Oklahoma City, Oklahoma County, central Oklahoma. The gull was at the water's edge, not standing on its toes, but "sitting" with its bill pointed backward and tucked in between the scapulars and back feathers. I thought it was asleep, so approached it cautiously. To my surprise, I found that it was dead.

I showed the specimen to my friend Jack S. Roberts, who confirmed my belief that it was an immature Glaucous Gull (*Larus hyperboreus*) probably in first winter feather. Its plumage was largely white but mottled and suffused with pale buff throughout. Its bill was dark, almost black, at the tip, but pinkish flesh-color otherwise. Its legs, feet, and eyelids were pinkish flesh color, its eyes light brown.

On skinning it, I found it to be thin. In its stomach was a single item—a small quartzite pebble. The prepared skin is now in the bird collection at the University of Oklahoma (male, UOMZ 7913). It is the third specimen of *Larus hyperboreus* for Oklahoma. The first was taken along the Red River south of either Jefferson County or

Cotton County on 17 December 1880 (Sutton, 1967, Oklahoma birds, p. 137). The second was collected by Bertin W. Anderson along the Salt Fork of the Arkansas River below the Salt Plains Reservoir dam on 5 February 1971 (1971, Bull. Oklahoma Orn. Soc., 4: 31). This third specimen may well have been the very bird seen "sitting" among the rocks of the Lake Hefner dam by Jack Roberts and V. J. Vacin on 22 December — Christmas Count day. That day the bird had appeared to be sluggish.—Mark Ports, 2924 Lakeside, Oklahoma City, Oklahoma 73120, 4 February 1975.

Say's Phoebe in southwestern Oklahoma.—Say's Phoebe (*Sayornis phoebe*), a "transient and summer resident in western Oklahoma" known to breed "in small numbers in Black Mesa country of Cimarron County" (Sutton, 1967, Oklahoma birds, p. 339), has heretofore been reported only twice from southwestern Oklahoma. The one specimen from this part of the state, a male with unenlarged gonads (UOMZ 3298), was collected on 22 March 1958 by Sutton himself along Cave Creek in Greer County 4 miles south of Reed. The only other record is of a single bird seen 14 February 1973 on a fence near the North Fork of the Red River a few miles south of Headrick, Jackson County (Carlton, 1974, Bull. Oklahoma Orn. Soc., 7: 8).

In the spring of 1974, Say's Phoebe was seen at three new localities in southwestern Oklahoma. On 21 March (sunny day; afternoon high 45° F.), Buford W. Mauck, William R. Miller, Robert E. Morgan, and Charles M. Scott watched a single bird at close range for several minutes near Rush Lake in the Wichita Mountains Wildlife Refuge. This was the first sighting on record for Comanche County, despite the fact that bird observations had been recorded at the refuge for many years.

At 1900 on 26 March (calm day; temperature about 60° F.), Brad Carlton again found a Say's Phoebe in Jackson County, this time a single bird hawking for insects from a large cholla cactus (*Opuntia imbricata*) back of an abandoned farmhouse 4½ miles east and 4 north of Duke. Carlton approached the bird to within about 10 feet.

At 1400 on 12 April (sunny day with light south breeze and clear sky; temperature 80° F.), during a natural history field trip, my students and I happened upon a Say's Phoebe perched on a barbed wire fence near a small stock pond 3½ miles east and 4 south of Lawton, Comanche County. This bird was busy catching insects midair. We noted its pale rusty underparts, black tail with white edging, and gray upperparts. We saw the bird again at 1630 as it flew off high in the air.

The above-reported sightings convince me that *Sayornis saya* migrates through southwestern Oklahoma regularly in spring, perhaps in considerable numbers. The possibility that it breeds in the area must not be forgotten.—Jack D. Tyler, *Department of Biology, Cameron University, Lawton, Oklahoma 73501, 16 May 1974.*

Cape May Warbler in Alfalfa County, Oklahoma.—The Cape May Warbler (*Dendroica tigrina*) is rare in Oklahoma. Sutton (1967, Oklahoma birds, p. 501) reported four records, all for spring, two for Tulsa County, one for Greer County, and one for Cimarron County. One of the Tulsa County sightings was confirmed by collection of the specimen—a male (Tomer, 1956, Wilson Bull., 68: 320).

About noon on 27 April 1973, Mildred Tewell and I observed a singing male Cape May at the Salt Plains National Wildlife Refuge in Alfalfa County, north-central Oklahoma. In a roadside park along the north edge of the refuge's main reservoir that day, we had decided to eat lunch. The trees near the table were alive with Cedar Waxwings (*Bombycilla cedrorum*), which drifted away soon after we had sat down. Several small birds that remained in the trees puzzled me until one or two of them sang: they were Ruby-crowned Kinglets (*Regulus calendula*). Twice I heard what I took to be a warbler's song, first at a distance, then close by. The song was unmusical and all on one note. Without my binocular, which I had left in my car, I could not tell what the singer's colors were, but Mrs. Tewell said she could see that its underparts were yellow, heavily streaked with black.

After lunch, I had good looks through my binocular. I saw the yellow on the rump and at each side of the neck as well as the chestnut cheek-patch. The bird was seldom

still and it was sometimes partly or wholly hidden by leaves, so I did not see the white wing-patch at all clearly.

In Sutton's "Check-list of Oklahoma birds" (1974, p. 36), Alfalfa is mentioned among the counties from which *Dendroica tigrina* has been reported. The above account makes clear what the Alfalfa County sighting was. The species has not thus far been seen in Oklahoma in fall.—Zella Moorman, *Route 2, Box 55, Perkins, Oklahoma 74059, 25 May 1973*.

Rufous-crowned Sparrow in northeastern Texas.—In the western part of the Juniper Point Recreation Area, about 5 miles north of Gordonville, Grayson County, northeastern Texas, a small population of Rufous-crowned Sparrows (*Aimophila ruficeps*) inhabits the juniper- and oak-clad bluffs along the south shore of Lake Texoma. Large numbers of campers, boaters, and fishermen visit the area in summer and additional campsites were cleared in 1971, but the sparrows survive. During the past four years I have seen them in every month except November and December.

I first saw the species there on 7 September 1969. On that date James Beach III and I heard a Rufous-crown singing several times. It was in a dead tree about 30 feet up. While it was singing, a duller bird with streaked breast, obviously a juvenal, flew to its side, perching there while the singing continued. Neither did it beg for food nor did the adult seem to pay any attention to it. Presently the adult flew off, alighted out of sight, and started singing again. The young bird followed it.

On four dates in May 1970 I saw a single singing bird in the area. On each of six visits in June 1970 I saw a pair of birds. On one of these visits (21 June) I observed one bird on the ground, searching for nest material, while another, probably its mate, sang whisper-songs from an exposed perch about 40 feet overhead. Though the day was calm, I could barely hear this song. I moved so as to get a better look: the singing bird did not, so far as I could tell, open its bill at all. The bird on the ground was not wary. When it flew off, it had dry grass in its bill. Though I followed it, I did not see it again.

On 28 July 1970 I located a singing bird at the top of a short dead juniper. After singing briefly, it flew down to a fallen tree and disappeared in the tangle of branches. Presently a streaked-breasted young bird, with wings quivering and beak open, moved into sight and the adult, having found a caterpillar, fed its offspring.

On 11 September 1971, I "squeaked" a family group of four birds close. The two young birds, with streaked breasts, approached to within about 15 feet. The adults stayed farther off, calling *teer, teer, teer* continually, until all four birds slipped away.

In Oklahoma, where *Aimophila ruficeps* is regularly two-brooded, it may, during exceptionally dry seasons, nest in the fall: a singing male with greatly enlarged testes was collected on 11 September 1953 in the Arbuckle Mountains about 50 miles north of the Juniper Point Recreation Area (Sutton, 1967, Oklahoma birds, p. 614). My observations reported above may indicate a slight recent eastward extension of range. Wolfe, in his "Check-list of the birds of Texas" (1956: 78), states that the species ranges "east to Cooke County," the county just west of Grayson. On 2 July 1954, George M. Sutton collected a male Rufous-crowned Sparrow in juvenal plumage (UOMZ 1250) among rocks along the shore of Lake Texoma near Willis, Marshall County, south-central Oklahoma, in an area directly north of Grayson County, Texas.—Karl W. Haller, *Box 1615, Austin College, Sherman, Texas 75090, 12 August 1972*.

FROM THE EDITOR: The death of Zella Moorman in late January dealt a blow felt by every member of the Oklahoma Ornithological Society, especially by those of us who have been concerned with the *Bulletin*. Miss Moorman was herself a tireless and careful observer; more than this, she encouraged her friends to watch birds closely, to take notes carefully, and to report their findings. She has contributed several excellent notes to the *Bulletin*. One of these appears in this issue.

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