versity of Oklahoma Press for permission to reproduce Fig. 1. Photographs of this bird were deposited with the Oklahoma Bird Records Committee.

LITERATURE CITED

Fjeldsa, J., and N. Krabbe. 1990. Birds of the High Andes. Zool. Mus., Univ. Copenhagen, and Apollo Books, Svendborg, Denmark.

Kaufman, K. 1996. Rare bird report. *Birder's World* 6:82.

Mlodinow, S.G., and M. O'Brien. 1996. America's 100 most wanted birds. Falcon Press, Helena, Montana.

Peterson, R.T. and E.L. Chalif. 1973. A field guide to Mexican birds. Houghton Mifflin, Boston.

Sutton, G.M. 1975. Portraits of Mexican Birds. Univ. Oklahoma Press, Norman.

RT. 2, BOX 140-T, NOBLE, OK. 73068. Received 1 March 1997, accepted 20 April 1998.

NOTES

Bull. Oklahoma Ornithol. Soc. 31:24–25, 1998

Second record of the Green Violet-ear for Oklahoma.—From 30 May 1998 to 13 July 1998, a Green Violet-ear (*Colibri thalassinus*) visited hummingbird feeders in our backyard in Lawton, Commanche County, Oklahoma. Many observers who visited the site during that period noted the bird's emerald green dorsum, violet patches just behind and below the eye, long and slightly decurved bill, extensive violet breast patch, glittering green gorget, light green tail with a dark subterminal band, and dusky wings that extended to the tip of the tail. The bird was about 1.5 times the size of the Ruby-throated (*Archilochus colubris*) and Black-chinned (*A. alexandri*) hummingbirds that also visited these feeders. The Green Violet-ear was aggressive, often chasing Ruby-throated Hummingbirds and Black-chinned Hummingbirds from the feeders. It fed only at feeders in the shade and would not visit ones I moved into direct sunlight. The Lawton bird appeared to represent the nominate race, *C. t. thalassinus*, judging from the prominent violet breast patch. Photographs of this bird by J. Grzybowski were submitted to the Oklahoma Bird Records Committee.

This is the second record of the Green Violet-ear for Oklahoma, the first being a bird reported 2–5 September 1996 in Norman, Cleveland County (Tarbutton, B., and D. Clapp, *Bull. Oklahoma Ornithol. Soc.* 31:21-24, 1998). The Norman bird also appeared to represent *C. t. thalassinus*. Another extralimital Green Violet-ear was reported a week after the Lawton bird was last seen, on 20 July 1998, at Center Point, Kerr County,

Texas, about 500 km due south of Lawton (E. Womack, pers. comm.).—KURT MEISENZAHL, *911 Bob White, Lawton, OK. 73507.* Received 4 September 1998, accepted 4 September 1998.

Bull. Oklahoma Ornithol. Soc. 31:25–28, 1998

Nest defense and prolonged incubation in the Rio Grande Wild Turkey. —The length of the incubation period in birds apparently is a function of inherent rate of development of the embryo, which is genetically fixed (Terres, J. K., Encyclopedia of North American birds, Knopf, New York, 1981). In the event that an egg does not hatch at the expected time, the parent generally continues to incubate, which is a functional response in view of the variability in incubation period. A safety margin of 50–100% in excess of the normal incubation period exists (Skutch, A. F., *Wilson Bull.* 74:115-152, 1962; Holcomb, L. C., *Behaviour* 36:74-83, 1970). Eventually, incubation is terminated whether the egg has hatched or not. Holcomb (1970) suggested that there must be strong selective pressure against prolonging incubation in species in which replacement laying is possible. Prolonged incubation behavior has been documented in a few avian species; however, the behavior is not well understood (Skutch 1962; Holcomb 1970; Drent, R., *Avian Biol.* 5:333-419, 1975). How birds respond in instances where eggs fail to hatch after the normal incubation interval has not been commonly reported. This note documents a case of nest defense and unusually prolonged incubation of an egg by a female Rio Grande Wild Turkey (*Meleagris gallopavo intermedia*) in Oklahoma.

On 14 June 1993, at about 2000, I witnessed a female turkey viciously attacking a black rat snake (*Elaphe obsoleta*) in post oak–grassland habitat approximately 6.5 km west of Stillwater, Payne County, Oklahoma. The hen turkey was preoccupied with the snake and allowed me to stand within approximately 3 m of the action. She continued to peck viciously at the 1.5 m long snake as the snake attempted to climb up nearby sand plum (*Prunus angustifolia*) trees. The hen turkey spred her tail feathers and flapped her wings frequently while pursuing the snake. As the snake sought refuge in the foliage, the turkey repeatedly pulled the snake out of the trees and continued pecking at it. Finally, the snake managed to climb to the top of one of the trees, about 1.8 m high, out of reach of the hen turkey that continued to jump up toward the snake. The confrontation continued until 2020, ending without interference from me. The snake was examined and was found to have a few minor injuries from the attack and an empty stomach. The hen turkey flew a few meters away to the top of a fence post.

The following day, a search of that area turned up the hen turkey's nest. It seems likely that the snake had discovered the nest and that the hen was actively defending it from the snake. The nest was about 2 m from where the fight occurred in a densely vegetated patch directly under

a barbed wire fence. The nest was well concealed by smooth sumac (*Rhus glabra*), eastern red cedar (*Juniperus virginiana*), and grasses. The hen was determined to be a yearling based on plumage characteristics, including the presence of the two most distal juvenal primaries (Williams, L. E., and Austin, D. H., Studies of the wild turkey in Florida, Univ. Florida Press, Gainesville, 1988). Her nest was lined with dead leaves and feathers and found to contain only one egg. It was not known if the clutch size in this case was one or whether other eggs were taken from the nest by predators.

I continued to observe the turkey and her nest on a regular basis throughout the summer, usually from 0800–1000, 1300–1500, and 1700–1900. I established a partially concealed observation area behind some vegetation about 3 m from the nest to minimize disturbance. The hen would leave the nest every day in the late afternoon, usually at about 1530, and return within about an hour. She appeared to be cautious when leaving and returning to the nest. She was never observed turning the egg, a behavior common in Wild Turkeys (Latham, R. M., Complete book of the Wild Turkey, Stackpole, Harrisburg, PA., 1956). She was seen on several occasions flying back into the nest area, landing several meters away from the nest each time. In late August and September, the hen left the nest more frequently, but only for short time periods. She became much more nervous and prone to leave the nest at any disturbance. The hen was last seen incubating the egg on 29 September, 108 days after the nest was discovered. This incubation effort is in excess of four times longer than the normal 26-day incubation period and represents a record for prolonged incubation in the Wild Turkey. Upon collecting the egg, I found that it contained a putrid yellow fluid (about 30–40% full by volume) and no sign of embryonic development, and concluded that the egg was infertile.

It was not possible to determine exactly when this hen turkey initiated nesting and laid her clutch. Nesting in Wild Turkeys generally begins in mid-March in Oklahoma (Latham 1956; Lewis, J. C., The world of the Wild Turkey, Lippincott, Philadelphia, 1973). Egg dates for Wild Turkeys in Oklahoma are from 5 May to 18 July, and dependent young are seen from 8 May to 6 August (Johnsgard, P. A., Birds of the Great Plains, Univ. Nebraska Press, Lincoln, 1979). The Wild Turkey usually lays 10–13 eggs/clutch and does not initiate incubation until the last egg in the clutch is laid (Bent, A. C., Life histories of North American gallinaceous birds, U.S. Nat. Mus. Bull. 162, Washington, DC., 1932; Latham 1956; Lewis 1973; Johnsgard 1979). Incubation period in the Wild Turkey usually is 26 days (Eaton, S. W., WildTurkey, No. 22 *in* The birds of North America, A. Poole, P. Stettenheim, and F. Gill, eds., Acad. Nat. Sci., Philadelphia, and Am. Ornithol. Union, Washington, DC., 1992). On average, 10% of birds' eggs fail to hatch due to infertility and other forms of embryo mortality (Koenig, W. D., *Auk* 99:526-536, 1982). Egg fertility and hatching success generally are high in Wild Turkeys (Vangilder, L. D., Population dynamics, Pp.

144-164 *in* The Wild Turkey: biology and management, J.G. Dickson, ed., Stackpole, Harrisburg, PA., 1992). In Texas, 91% of all eggs examined in early nests (before 5 July) were fertile (Cook, R. L., *Proc. Southeast Assoc. Game Fish Comm.* 26:236-244, 1972).

It is possible that the hen turkey laid only one egg; however, predators, most likely black rat snakes, may have eaten the majority of the hen's clutch of eggs. Normally, Wild Turkey hens readily abandon their nests during the early stages of incubation if disturbed by predators or humans (Latham 1956). Renesting after clutch or brood loss is common in Wild Turkeys (Eaton 1992). Although yearling hens are not known to renest after brood loss, they are known to renest following the loss of eggs (Williams and Austin 1988, Vangilder 1992). It is possible that yearling females lack the experience to recognize infertile eggs or the social status gained over time that is needed to renest. In some populations, immature Wild Turkeys do not nest at all. The yearling hen I observed showed all the major behavioral adaptations necessary to avoid nest predation, including selecting a concealed nest site, minimizing activity near the nest, remaining on the nest when predators approached, flying to and from the nest rather than walking, and not defecating near the nest (Williams and Austin 1988).

Two recent reviews on Wild Turkeys (Eaton 1992; Healy, Behavior, Pp. 46-65 *in* The Wild Turkey: biology and management, J.G. Dickson, ed., Stackpole, Harrisburg, PA., 1992) fail to mention prolonged incubating behavior. Although the Wild Turkey is not listed as a species that incubates infertile or spoiled eggs (Skutch 1962), at least three other recent records of prolonged incubation by wild turkey hens are known. In Alabama, four hens (out of 47) incubated apparently infertile clutches up to 78 days (Exum, J. H., et al., *Bull. Tall Timbers Res. Sta.* 23:1-70, 1987). In Oregon, Keegan and Crawford (*J. Wildl. Manage.* 57:801-804, 1993) reported 13 renesting attempts after brood loss, with four nests containing infertile eggs that were incubated 35–82 days. In Florida, Williams and Austin (1988), over a period of many years and among hundreds of nests, found only two hens that attended infertile clutches (35 and 64 days). In addition, the Northern Bobwhite (*Colinus virginianus*), with a 23-day incubation period, will attend infertile or spoiled eggs up to 56 days (Stoddard, H. L., The Bobwhite Quail: its habits, preservation, and increase, Scribner's, New York, 1946).

The costs involved in incubating an egg well beyond the normal incubation period are substantial, including decreased feeding time (leading to lower body mass and reduced overwintering survival), increased predation risk, and lost opportunity to renest. Because eggs that fail to hatch within a few days of the normal incubation time seldom produce living chicks (Skutch 1962), prolonged incubation offers few benefits. Young Wild Turkey hens, such as the one I observed in Oklahoma, may occasionally exhibit prolonged incubation, especially if they do not have the option to renest.

These observations were made during field work supported by the U.S. Department of Agriculture, the Departments of Entomology and Zoology at Oklahoma State University (OSU), and an OSU Presidential Research Fellowship awarded to the author. I thank S.L. Sheffield and J. Spencer for sharing observations and T.G. Bidwell, C.E. Braun, P.D. Doerr, and an anonymous reviewer for helpful comments on an earlier version of this manuscript.—STEVEN R. SHEFFIELD, *Department of Zoology, Oklahoma State University, Stillwater, OK. 74078 (present address: Department of Environmental Toxicology, The Institute of Wildlife and Environmental Toxicology, Clemson University, P.O. Box 709, One TIWET Dr., Pendleton, SC. 29670).* Received 10 November 1997, accepted 26 January 1998.

Bull. Oklahoma Ornithol. Soc. 31:28, 1998

RECENT LITERATURE

(Editor's Note: With this issue, the *Bulletin* inaugurates a new feature to highlight recent literature on Oklahoma ornithology. I invite readers to submit books for review and notices of journal articles for inclusion.)

Johnsgard, P. A. 1997. A George Miksch Sutton bibliography. *Nebraska Bird Review* 65:46–58.—Johnsgard has prepared a useful bibliography of over 270 Sutton publications, extending from 1913 when Sutton first wrote about a pet Greater Roadrunner (*Geococcyx californianus*) in *Bird-Lore* to 1986 when his last book, Birds Worth Watching (Univ. Oklahoma Press), was published posthumously. The bibliography contains 13 books, 18 monographs and museum publications, 201 journal articles, 12 book reviews, 4 obituaries, 18 popular articles, and 8 essays to accompany paintings. Thirty-five of his publications were in the *Bulletin of the Oklahoma Ornithological Society.*

The Bulletin of the Oklahoma Ornithological Society (ISSN 0474-0750) is published quarterly in March, June, September, and December, at Tulsa, Oklahoma. Editor, CHARLES R. BROWN, Department of Biological Sciences, University of Tulsa, Tulsa, OK. 74104-3189; Editorial board, MARY BOMBERGER BROWN, VICKI BYRE, JEFFREY COX, JOSEPH GRZYBOWSKI, JAMES HOFFMAN, DOUGLAS MOCK, GARY SCHNELL, and JOHN TOMER. Subscription is by membership in the OOS: $5 student, $10 regular, $15 family, $15 or more sustaining, per year; life membership $200. Questions regarding subscription, replacement copies, back issues, or payment of dues should be directed to: WILLIAM A. CARTER, OOS Membership/Circulation Chairman, P. O. Box 65, Ada, OK. 74821-0065.