

BULLETIN OF THE OKLAHOMA ORNITHOLOGICAL SOCIETY

VOL. 33

MARCH 2000

No. 1

Bull. Okla. Ornithol. Soc. 33:1-6, 2000
© Oklahoma Ornithological Society 2000

A history of the Scissor-tailed Flycatcher, the state bird of Oklahoma

By JOHN S. TOMER

The Scissor-tailed Flycatcher (*Tyrannus forficatus*) is the state bird of Oklahoma. Its breeding range on the southern Great Plains encompasses all of Oklahoma, most of Kansas, southwestern Missouri, western Arkansas and Louisiana, and most of Texas (American Ornithologists' Union 1998). It is present in Oklahoma largely from the last week in March until the first week in November (Grzybowski et al. 1992). It winters in southern Mexico and Central America (Regosin 1998). The natural history of the species has been summarized by Bent (1942) and Regosin (1998).

The Scissor-tailed Flycatcher was not the first species chosen as Oklahoma's state bird. In the late 1920's the General Federation of



Fig. 1. The first published illustration of the Scissor-tailed Flycatcher from Daubenton's *Planches Enlumines*, 1765-1780. From the collection of the author.

Women's Clubs under Katherine B. Tippetts, Chairman of the Division of Conservation, conducted a campaign to have each state name a state bird. The Oklahoma chapter, under Mrs. W. A. Campbell and Mrs. Ellen Howard Miller, polled the state and received 69,000 votes, of which the majority were for the Northern Bobwhite (*Colinus virginianus*; Tippetts 1932). However, no action was taken to have the state legislature officially declare the Northern Bobwhite as the state bird, and it was shown on state bird lists as the "unofficial" state bird (Kieran 1948).

In 1947, John and Margaret Galley of the Tulsa Audubon Society, after conferring with M. M. Nice and R. T. Peterson, suggested that the Scissor-tailed Flycatcher be officially named as Oklahoma's state bird. This was submitted to the state legislature in 1950 by the Tulsa Audubon Society and drafted by the Attorney General. The proposal passed the Senate but did not get through the House of Representatives.

At that time Bess Smith, of the Tulsa Audubon Society, gathered forces with sportsmen, garden clubs, and bird clubs of the state, and took the proposal back to the 1951 legislature where Lou Allard of Drumright, who was chairman of a House fish and game committee, drafted House Joint Resolution Number 21 to have the Scissor-tailed Flycatcher named as the state bird (Creager 1952). This time it passed the Senate and House and was signed by Governor Johnson Murray on 26 May 1951, making the species the official state bird (Anonymous 1951).

The Scissor-tailed Flycatcher appeared in literature for the first time in a book published in Paris in 1765–1780 by Louis Jean Marie Daubenton. The book, known as *Daubenton's Plaanches Enlumines*, is a collection of 1008 animal pictures, 973 of which are birds. It has no title page and no text. The plates each have a title, the common name of the bird depicted. Linnaean nomenclature was not used. The illustrations are hand-colored engravings, 48.5 x 34.5 cm., drawn by the French artist Francois Nicolet Martinet (Cowan 1967; Cowan 1968). The Scissor-tailed Flycatcher appears on Plate 677, entitled, "Gobe-mouche a queue fourchue du Mexique" (Fig. 1). It was apparently drawn from a specimen sent to France from Mexico by M. de Boynes, Secretary for the Marine Department, with whom Daubenton communicated (Smellie 1793).

George Louise Buffon used the Daubenton *Plaanches* in the bird volumes 16–24 of his massive 44-volume *Histoire Naturelle Generale* published in 1749–1804 (Mengel 1972–1983). The Scissor-tailed Flycatcher discussion appears in volume 19 from 1778 on pages 564–565. Buffon, simultaneously in 1770–1786, published the bird portion of the *Histoire Naturelle Generale* as the ten-volume *Historie Naturelle des Oiseau*. The Scissortail Flycatcher discussion appears in volume 5 from 1778 on pages 269–70. Both of these publications contained text describing the birds, and they represent the first time the Scissor-tail Flycatcher was described in the literature. The birds were described only under the common name, as Linnaean nomenclature was not used.

After Buffon's first bird publications, John Latham, in 1781–1785, published a three-volume book, *A General Synopsis of Birds*. This was an illustrated bird book with text in English. The Scissor-tailed Flycatcher was described under the name, "SWALLOW TAILED FL." , in part 1, volume 2, 1783, on page 356. It was not illustrated, and again it was not given a Linnaean binomial.

In 1788, Johann Frederick Gmelin included the Scissor-tailed Flycatcher in his 13th edition of Linnaeus's *Systema Naturae*, giving it the Latin name, *Muscicapa forficata*. He also wrote that the species had appeared in the literature as "Moucherolle a queue fourchue du Mexique" in Buffon's *Historie Naturelle des Oiseaux* and as the "Swallow-tailed Flycatcher" in Latham's *A General Synopsis of Birds*. Thus Gmelin was the first to publish a proper scientific name, *Muscicapa forficata*, and is credited with naming the Scissor-tailed Flycatcher.

Since then, the generic name has changed several times (Ridgway 1907). It was changed to *Milvulus* by Swainson (1837) and to *Muscivora* by Oberholser (1901), with the latter change adopted by the A.O.U in 1957. Smith (1966) later suggested changing the generic name to *Tyrannus*, a suggestion supported by Traylor (1977) and later adopted by the A.O.U in their 1983 *Check-list of North American Birds*. The specific name, an adjective, was changed from *forficata* to *forficatus* to agree with the gender of the generic name (Regosin 1998).

The vernacular name of the Scissor-tailed Flycatcher, when it was first published, was "Gobe-mouche a queue fourchue du Mexique" (English translation, "Fork-tailed flycatcher of Mexico") in Daubenton's and Buffon's French publications (Daubenton 1765–1780; Buffon 1749–1804; Buffon 1770–1786). It was the "Swallow-tailed Flycatcher" in the first English publications (Latham 1783). Later the American Ornithologists' Union's first edition of the *Check-list of North American Birds* in 1886 referred to the species as the "Scissor-tailed Flycatcher". This has been the English name of the species in all A.O.U. check-lists since. The A.O.U. has been followed in most subsequent ornithological literature. Conversationally, the species is spoken of as the "Scissortail," and it has also been known as "The Texas Bird of Paradise."

The Scissor-tailed Flycatcher first appeared in American bird books when Charles Lucien Bonaparte added the then recently discovered American species to Alexander Wilson's *American Ornithology* in 1825 (Bonaparte 1825–1833). Bonaparte hired the artist-naturalist, Titian Ramsay Peale as artist. Peale had accompanied the Long expedition to the Rocky Mountains (Poesch 1961). Among the species drawn by Peale was the Scissor-tailed Flycatcher. Bonaparte wrote that Peale had seen and collected the species 24 August 1820 on the Canadian River. On this day the Long expedition was northeast of the present town of Hydro in the southwest corner of Blaine County, Oklahoma (Goodman and Lawson 1995). Peale used this specimen to make the drawing for the Bonaparte book (Fig. 2). It was number 6623 of the Peale Museum in Philadelphia.

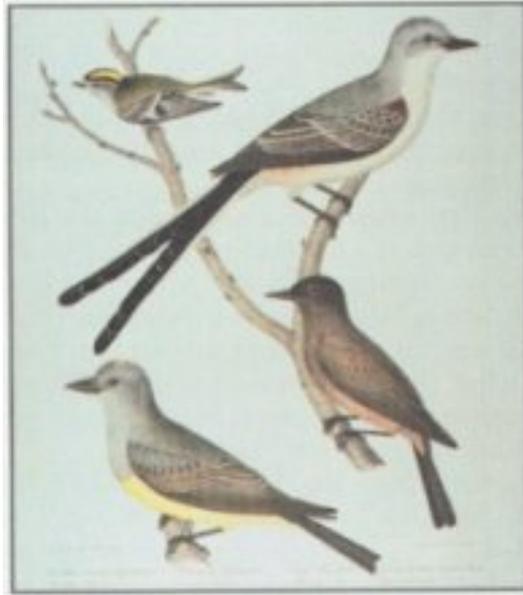


Fig. 2. The Scissor-tailed Flycatcher from a specimen collected on Oklahoma lands in 1820 by T. R. Peale and illustrated by Peale for Bonaparte's *American Ornithology*, 1825–1833. From the collection of the author.

It apparently did not survive through the years, as it was not listed when the remnants of this collection were studied by Faxon (1915).

Students of Oklahoma ornithology have included the Scissor-tailed Flycatcher on every state bird list since the first listing by Woodhouse in 1858 (Tomer 1997). The first record of the Scissortail in Oklahoma, however, was by Thomas Nuttall, who wrote that he had found the species nesting as he traveled south along the Kiamichi River to the Red River in May of 1819 in southeastern Indian Territory, likely in present Pushmataha or Choctaw County, Oklahoma (Nuttall 1832).

For help in accessing rare books in their libraries, I thank Eleanor MacLean of the Blacker–Wood Library of Biology at McGill University, and J. Helyar of the Kenneth Spencer Research Library at the University of Kansas. I also thank J. W. Hoffman for help with library research at the McFarlin Library at the University of Tulsa, and R. B. Clapp for research help in the Division of Birds at the National Museum of Natural History.

LITERATURE CITED

American Ornithologists' Union. 1998. *Check-list of North American Birds*. 7th edition. Am. Ornithol. Union, Washington, D.C.

- Anonymous. 1951. Scissortail named official state bird. *Okla. Game Fish News* 7 (7-8):10.
- Bent, A. C. 1942. *Life Histories of North American Flycatchers, Larks, Swallows, and their Allies*. U. S. Natl. Mus. Bull. 179.
- Bonaparte, C. L. 1825–1833. *American Ornithology; or the Natural History of Birds Inhabiting the United States not given by Wilson*. 4 vols. Samuel Augustus Mitchell, Philadelphia.
- Buffon, G. L. L. 1749–1804. *Historie Naturelle Generale et Particuliere*. 44 vols. Paris.
- Buffon, G. L. L. 1770–1786. *Historie Naturelle des Oiseau*. 10 vols. Paris.
- Cowan, C. F. 1967. "AUB. MISC.," or Daubenton's miscellanea. *J. Soc. Bibliography Nat. Hist.* 4:312–16.
- Cowan, C. F. 1968. The Daubentons and Buffons birds. *J. Soc. Bibliography Nat. Hist.* 5:37–40.
- Creager, J. C. 1952. A long tale. *Scissortail* 2 (1):1–2.
- Daubenton, E. L. 1770–1780. *Planches Enluminees* 4 vols. n.p.
- Faxon, W. 1915. Relics of Peale's Museum. *Bull. Mus. Comp. Zool. Harvard Coll.* 59:119-148.
- Gmelin, J. F. 1788–1793. *Systema Naturae of Linnaeus*. 13th ed. 3 vols. n.p.
- Goodman, G. J. and C. A. Lawson. 1995. *Retracing Major Stephen H. Long's 1820 Expedition: the Itinerary and Botany*. Univ. Oklahoma Press, Norman.
- Grzybowski, J. A., J. W. Arterburn, W. A. Carter, J. S. Tomer, and D. W. Verser. 1992. *Date Guide to the Occurrences of Birds in Oklahoma*. 2nd ed. Okla. Ornithol. Soc., Norman.
- Kieran, J. ed. 1948. State birds. In: *Information Please Almanac 1948*, page 246. Doubleday, New York.
- Latham, J. 1781–1785. *A General Synopsis of Birds*. 3 vols. London.
- Mengle, R. M. 1972–1983. *The Ellis Collection of Ornithological Books*. 2 vols. Univ. Kansas, Lawrence.
- Nuttall, T. 1832. *Manual of the Ornithology of the United States and of Canada*. Hilliard and Brown, Cambridge, Mass.
- Oberholser, H. C. 1901. *Milvulus* versus *Muscivora*. *Auk* 18:193–194.
- Poesch, J. 1961. *Titian Ramsay Peale and his Journals of the Wilkes Expedition*. Am. Phil. Soc., Philadelphia.
- Regosin, J. V. 1998. Scissor-tailed Flycatcher (*Tyrannus forficatus*). In: *The Birds of North America* (A. Poole and F. Gill, eds.). No. 342. The Birds of North America, Inc., Philadelphia.
- Ridgway, R. 1907. *The Birds of North and Middle America*. Bull. U.S. Natl. Mus., no. 50, pt. 4.
- Smellie, W. [trans.]. 1793. *The Natural History of Birds from the French of the Count de Buffon*. Vol. 4. London.
- Smith, W. J. 1966. Communications and relationships in the genus *Tyrannus*. *Publ. Nuttall Ornithol. Club* 6.
- Swainson, W. 1837. *Classification of Birds*. Vol. 2. n.p.

- Traylor, M. A., Jr. 1977. A classification of the tyrant flycatchers, Tyrannidae. *Bull. Mus. Comp. Zool.* 148: 129–184.
- Tippets, K. B. 1932. Selecting state birds. *Nature Magazine* 1932 (April): 229–230.
- Tomer, J. S. 1997. The first listing of Oklahoma birds. *Bull. Okla. Ornithol. Soc.* 30:13–21.

5911 E. 46th ST., TULSA, OK. 74135. Received 14 February 2000, accepted 22 February 2000.

Bull. Okla. Ornithol. Soc. 33:6–12, 2000
© Oklahoma Ornithological Society 2000

Winter habitat of the Smith's Longspur in Oklahoma

BY CHERYL G. ORMSTON

The Smith's Longspur (*Calcarius pictus*) winters primarily in the southern Great Plains and breeds in the arctic (Briskie 1993). Inhabiting grasslands and prairies and often nomadic on the wintering range, the species is difficult to observe and study, and consequently little is known about winter flock composition and site fidelity (Dunn and Dunn 1999). We lack basic information on the winter ecology of the Smith's Longspur, and this has complicated efforts to formulate conservation and management plans for the nonbreeding season (Briskie 1993). The objective of my study was to determine what habitat characteristics are preferred by Smith's Longspurs in Oklahoma in winter.

MATERIALS AND METHODS

I selected study sites based on data provided by J. Hoffman (pers. comm). Based on censuses taken by Hoffman in the winter of 1998–1999, I chose 14 representative sites in northeastern Oklahoma (Table 1) where Smith's Longspurs were known to occur. My measure of longspur use of a site was the maximum single-day count of Smith's Longspurs by Hoffman in the winter of 1998–1999. Most of the study sites were used as hay fields, although cattle had grazed two fields and one was a park area for a subdivision. Each site had a source of water on or near the premises, most often ponds and creeks. Presence or absence of grazing activity by livestock was noted for each site.

I sampled vegetation from early January 1999 through mid March 1999. I used 30 sampling plots at each field. I randomly determined the position of each sample by assigning numbers to the four corners of a field and using a random number table to determine which corner to start from. I used a random numbers table to select compass points at 30-de-

Table 1. Sites containing Smith's Longspurs for which vegetation was sampled, 1998–1999, in northeastern Oklahoma.

Field	Size (ha)	County	Field use	Nearest town
1	19.5	Nowata	grazing	Bartlesville
2	17.8	Tulsa	no cattle	Mounds
3	26.6	Washington	no cattle	Bartlesville
4	22.0	Tulsa	hay	Skiatook
5	9.0	Tulsa	park area	Broken Arrow
6	13.9	Noble	hay	Red Rock
7	19.1	Osage	hay	Pawhuska
8	19.8	Osage	no cattle	Foraker
9	25.3	Tulsa	grazing	Skiatook
10	21.4	Osage	hay	Grainola
11	22.8	Creek	hay	Mannford
12	17.7	Mayes	no cattle	Adair
13	19.9	Mayes	no cattle	Foyil
14	20.2	Osage	no cattle	Foraker

gree intervals and the direction to move for each sequential sample. The distance between each sample was determined by relative field size so as to insure representative coverage throughout the field. For each sample, I delineated a plot area of 0.5 m X 2.0 m (1 m²) by placing rectangularly-shaped conduit frame on the ground. This represented a modified-Whittaker plot that minimizes statistical problems of the Whittaker and Long-Thin designs (Stohlgren et al. 1995). I identified each species present inside the plot and measured the height of the tallest plant of each species. Through a visual estimation, a percentage cover for each species was assigned. The estimations were made in accordance with the system used in the Braun-Blanquet's cover-abundance scale that allows the estimation of both the percentage of area covered by a species and its abundance (Kuchler 1967).

I expressed plant diversity with the Simpson's Index. This index measures the probability that any two individuals drawn at random will be the same (Simpson 1949). This index was selected as opposed to other diversity indices because of its low sensitivity to sample size (Magurran 1988). To improve diversity estimates, for each site I used a jack-knife technique that repeatedly recalculated the diversity index, leaving one sample out of the 30 each time. Each calculation produces a jack-knife

Table 2. Mean (\pm SE_{est}) percent coverage of each plant species and the percentage of fields at which each species was found. Species were identified in accordance with Pohl (1978). Each unidentified plant type ("unknown") represented 5% or less coverage.

Species	Mean	SE	% of fields
<i>Bouteloua curtipendula</i>	0.56	0.94	64
<i>B. gracilis</i>	1.57	3.67	21
<i>Aster</i>	0.70	2.12	29
<i>Panicum virgatum</i>	0.58	1.05	36
<i>Panicum</i> spp.	1.00	1.46	79
<i>Sporobolus</i>	12.03	15.82	93
<i>Cynodon dactylon</i>	6.33	17.27	43
<i>Andropogon virginicus</i>	9.39	17.34	57
<i>Andropogon</i> spp.	0.62	1.45	36
<i>Schizachyrium scoparium</i>	18.42	18.48	79
<i>Setaria</i>	2.55	3.68	93
<i>Senecio</i>	0.55	1.06	64
<i>Aristida oligantha</i>	3.42	4.31	57
<i>Aristida</i> spp.	2.93	10.05	43
<i>Sorghastrum nutans</i>	1.36	1.60	57
<i>Ambrosia</i>	3.40	5.44	64
<i>Taraxacum</i>	0.05	0.07	43
<i>Paspalum</i>	0.20	0.23	57
<i>Hieracium longipilum</i>	0.04	0.07	36
<i>Achillea millefolium</i>	0.06	0.10	36
<i>Eragrostis</i>	0.32	0.88	43
moss	0.17	0.26	43
<i>Gutierrezia</i>	0.38	1.21	14
<i>Rubus</i>	0.14	0.36	21
<i>Buchloe dactyloides</i>	0.19	0.62	14
<i>Chaerophyllum tainturieri</i>	0.08	0.18	21
<i>Sorghum halepense</i>	0.02	0.06	14
unknown	27.26	22.03	86
bare ground	2.36	2.75	71

estimate which is used to obtain a jack-knife pseudo-value (Magurran 1988). This method treats each transect as a sample and uses the diversity values from all samples to arrive at an estimate of diversity for a site (Smith and van Belle 1984). To determine which habitat features were significantly related to the number of birds at a site, I performed a backwards-stepwise multivariate linear regression using the maximum number of longspurs counted at the site as the dependent variable and field characteristics as independent variables. Plant species chosen for inclusion in the regression analysis were ones that tended to occur at most sites or were otherwise suspected to influence longspur use of a site. I used a sequential Bonferroni correction (Rice 1989) to correct significance levels for the likelihood that a large number of tests would produce some significant results simply by chance.

RESULTS

The plant species most common on the study sites (see Table 2) were little bluestem (*Schizachyrium scoparius*; 18.42%), dropseed (*Sporobolus* spp.; 12.03%), broomsedge bluestem (*Andropogon virginicus*; 9.39%), three-awn (*Aristida* spp.; 6.35%), and Bermuda grass (*Cynodon dactylon*; 6.33%). The mean (\pm SE) Simpson's index of plant diversity for the fields ($N = 14$) with Smith's Longspurs was 6.65 (\pm 4.16). The mean (\pm SE) height of the vegetation in the fields was 49.47 (\pm 4.41) cm.

The results of the multiple regression (Table 3) revealed significant associations between the maximum number of birds and the percent coverage of moss ($P < 0.0309$) and panic grass (*Panicum*) species ($P < 0.0013$). A sequential Bonferroni test, however, revealed that only the latter held significance at a table-wide level. Size of the field, plant species diversity, and extent of coverage by most of the more common plants had no effect on relative use of a site by Smith's Longspurs.

DISCUSSION

Smith's Longspurs in Oklahoma seem to occur in areas of relatively low plant species diversity, which is characteristic of most grassland birds in the Great Plains (Zimmerman 1992). Work by Grzybowski (1982) determined that Smith's Longspurs predominantly used heavily grazed areas of three-awn (*Aristida*) species (plant height less than 0.5 m). He also found that grassland bird abundance in general was positively related to abundance of food, which for most of the birds was seed. Bird densities increased on heavily grazed fields because grasses with high seed production were more abundant there (Grzybowski 1982).

My study also indicated that Smith's Longspurs associate with moderately to heavily grazed fields. The mean height of 49.47 cm found here falls into Grzybowski's heavily grazed category, near the threshold of moderately grazed. This height may give the birds enough cover from

Table 3. Results of multiple linear regression for number of Smith's Longspurs counted at a site in relation to habitat variables. Effect that was significant after sequential Bonferroni correction is shown in boldface.

Variable	Regression coefficient	P
<i>Andropogon virginicus</i>	- 0.18903	0.98
<i>Sporobolus</i>	- 0.05932	0.97
field size	0.04851	0.94
diversity index	- 8.18331	0.43
<i>Bouteloua curtipendula</i>	14.42273	0.55
vegetation height	- 3.88730	0.45
<i>Schizachyrium scoparium</i>	0.85296	0.50
<i>Setaria</i>	- 8.80087	0.27
<i>Aristida</i>	3.57449	0.058
moss	180.13793	0.031
<i>Panicum</i>	38.33936	0.001

predators such as the Northern Harrier (*Circus cyaneus*) and coyote (*Canus latrans*; Dunn and Dunn 1999).

In selecting a winter habitat, Smith's Longspurs may cue on the presence of *Panicum*, as I found that longspur numbers tended to increase with the abundance of these plants. Because seeds from *Panicum* make up some of the winter diet of the Smith's Longspur (Briskie 1993), finding more birds in fields containing these species is not surprising. Similarly, both dropseed (*Sporobolus*) and three-awn (*Aristida*), seeds of which are known to be included in the Smith's Longspur winter diet (Briskie 1993), were common in fields used by the birds. The birds appear to associate with sites able to support their preferred winter food.

Another cue for habitat choice could be the presence of moss or a related variable like wetness. Although the Bonferroni test removed the significance of moss in the multiple regression, it may still be of importance to the birds. Smith's Longspurs have been observed to associate with wet or marshy areas (Kemsies 1968). The presence of moss could

reflect damp conditions that promote growth of plant species preferred by the birds.

Based on the results of this study, Smith's Longspurs in winter could best be managed by maintaining tracts of land that support *Panicum* in addition possibly to *Sporobolus* and *Aristida*. As the birds' winter diet contains these species, the presence of these plants seems important. Preferred habitat seems to be moderately to heavily grazed hay fields. Studies of the Chestnut-collared Longspur (*Calcarius ornatus*) on its breeding grounds indicate that this bird also associates with grazed hay pastures containing native grasses (Johnson et al. 1998). Chestnut-collared Longspurs prefer vegetation height < 20–30 cm, but extreme overgrazing can lead to lower densities of birds. Management recommendations for Chestnut-collared Longspurs included protecting open, grazed native prairie and avoiding accumulations of dense vegetation litter. Burning and annual mowing are beneficial to Chestnut-collared Longspurs, as is grazing at moderate to heavy levels (Johnson et al 1998). The same would seem to hold true for Smith's Longspurs in Oklahoma in winter.

ACKNOWLEDGMENTS

Financial support was provided by the Oklahoma Ornithological Society, Beta Beta Beta, and the University of Tulsa. I thank Charles R. Brown for suggestions, guidance, and editorial assistance; Paul Buck for help in identifying plant species; James W. Hoffman for directions to the appropriate sites and providing data on abundance of longspurs; and Susan Ormston for valuable assistance in the field.

LITERATURE CITED

- Briskie, J. V. 1993. Smith's Longspur (*Calcarius pictus*). In: *The Birds of North America* (A. Poole and F. Gill, eds.), No. 34. Acad. Nat. Sci., Philadelphia, and Am. Ornithol. Union, Washington, D.C.
- Dunn, E. H., and R. B. Dunn, Jr. 1999. Notes on behavior of Smith's Longspurs wintering in Oklahoma. *Bull. Okla. Ornithol. Soc.* 32:13–20.
- Grzybowski, J. A. 1982. Population structure in grassland bird communities during winter. *Condor* 84:137–152.
- Johnson, D. H., L. D. Igl, J. A. Dechant, M. L. Sondreal, C. M. Goldade, M. P. Nenneman, and B. R. Euliss. 1998. Effects of management practices on grassland birds: Chestnut-collared Longspur. Northern Prairie Wildlife Research Center, Jamestown, N.D.: Northern Prairie Wildlife Research Center Home Page. <http://www.npwr.usgs.gov/resource/literatr/grasbir/longspur/longspur.htm> (Version 16Oct98).
- Kemsies, E. 1968. *Calcarius pictus* (Swainson), Smith's Longspur. In: A. C. Bent's *Life Histories of North American Cardinals, Grosbeaks, Buntings, Towhees, Finches, Sparrows, and Allies*, Part 3. Pp. 1628–1635. Smithsonian Inst. Press, Washington, D. C.

- Kuchler, A. W. 1967. *Vegetation Mapping*. Ronald Press, New York, NY.
- Magurran, A. E. 1988. *Ecological Diversity and its Measurement*. Princeton Univ. Press, Princeton, New Jersey.
- Pohl, R. W. 1978. *How to Know the Grasses*, 3rd ed. Wm. Brown, Dubuque, Iowa.
- Rice, W. R. 1989. Analyzing tables of statistical tests. *Evolution* 43:223–225.
- Rotenberry, J. T., and J. A. Wiens. 1980. Habitat structure, patchiness, and avian communities in North American steppe vegetation: a multivariate analysis. *Ecology* 61:1228–1250.
- Simpson, E. H. 1949. Measurement of diversity. *Nature* 163:688.
- Smith, E. P., and G. van Belle. 1984. Nonparametric estimation of species richness. *Biometrics* 40:119–129.
- Stohlgren, T. J., M. B. Falkner, and L. D. Schell. 1995. A modified Whittaker nested vegetation sampling method. *Vegetatio* 117:113–121.
- Zimmerman, J. L. 1992. Density-independent factors affecting the avian diversity of the tallgrass prairie community. *Wilson Bull.* 104:85–94.

DEPARTMENT OF BIOLOGICAL SCIENCES, UNIVERSITY OF TULSA, TULSA, OK. 74104. Received 19 January 2000, accepted 23 February 2000.

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, JAMES ARTERBURN, 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: CLAUDIA GLASS, OOS Membership/Circulation Chairman, P. O. Box 2931, Claremore, OK. 74018.