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RED CROSSBILL (*Loxia curvirostra*) CALL TYPES IN KANSAS DURING THE PAST DECADE (2010 - 2020), WITH COMMENTS ON IDENTIFICATION OF HISTORICAL SPECIMENS

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ABSTRACT

We discuss the occurrence of Red Crossbill (*Loxia curvirostra*) call types in Kansas during the past decade, from 2010 through spring 2020, with emphasis on the large irruptions of 2012-13 and 2017-18. Both irruptions took place over the course of approximately one year (one summer into the next) peaking during late fall and early winter. Red Crossbills were detected at approximately 45 locations during the 2012-13 irruption and at approximately 90 during the 2017-18 irruption. Type 2 crossbills predominated during both irruptions. Smaller numbers of Type 3 crossbills were present during the 2012-13 irruption with single records of Types 4 and 5, the latter being a first record for Kansas. During the 2017-18 irruption, small numbers of Type 4 augmented the Type 2, and there was a single record of Type 3. Additional commentary is provided on a smaller movement of Type 3 crossbills during the 2015-16 season, and of Types 2 and 4 during the 2019-20 season. Analysis of specimens collected in Kansas since 1885 further supports the notion that Type 2 crossbills predominate with smaller numbers of Types 3 and 4 occurring.

INTRODUCTION

The Red Crossbill (*Loxia curvirostra*) is a widely distributed finch (family Fringillidae) found throughout the coniferous forests of North America and Eurasia. As currently recognized (Clements et al. 2018, Gill and Donsker 2019), this species is comprised of more than 20 cryptic forms or ecotypes, differing in morphology, genetics, vocalizations, and ecology. With further study, a few of these forms may be elevated to species (Groth 1993, Benkman 1993, Young and Spahr 2017). We focus solely on North American forms.

The taxonomy of Red Crossbill forms has proven challenging for systematists due to diversity in bill morphology combined with extreme plumage similarity (Griscom 1937, Benkman and Young 2019). Further complicating taxonomic understanding of this complex is the nomadic and opportunistic nature of breeding. Most crossbill forms breed primarily during two periods, provided there is an adequate supply of conifer seeds: from January to April and July to September (Benkman and Young 2019).

In North America, understanding of this complex increased substantially with landmark research by Groth (1993) which linked diagnostic vocalizations to bill morphology in eight forms, hereafter referred to as types. Benkman (1993) established that bill depth is the most heritable of morphological characteristics distinguishing the types, and posited that many of the types were adapted to feeding upon key conifer species within a core area of occurrence (Benkman 1993, Young and Spahr 2017). Subsequent to Groth's work, three additional types were identified: Type 9 (Benkman et al. 2009), Type 10 (Irwin 2010), and Type 11, also known as *L. c. mesamericana* (Young and Spahr 2017). Type 9 was elevated to species status by the American Ornithological Society's North American Checklist Committee (Chesser et al. 2017) and is now known as the Cassia Crossbill (*Loxia sinesciuris*). In contrast to other types, Cassia Crossbill is a range restricted permanent resident, known from only the South Hills of Idaho (Benkman et al. 2009).

Red Crossbills are well known for their nomadic non-breeding season movements called irruptions, which occur when there are inadequate cone/seed crops in their core area of occurrence. Documentation of these irruptions has traditionally been limited to sight records, specimens, and photographs, making identification of the types involved difficult because auditory analysis is generally required for type identification. However, within the last 10-15 years, a more detailed understanding of type-specific movements has been enabled by the proliferation of mobile phones and compact audio recording equipment, combined with the widespread adoption of eBird (Young and Spahr 2017). For an introduction to the call types and their identification see eBird (2012).

In Kansas, the Red Crossbill is an irruptive and rare, but annual to near annual transient and winter visitant with most observations between October and May (Thompson et al. 2011, eBird data). In a non-irruption year, there are normally one to several records within this period, usually of lone individuals or small-sized flocks, typically feeding in conifers or visiting bird feeders. Irruption years that produce dozens of records are infrequent. In this paper, we summarize Red Crossbill occurrence in Kansas, from 2010 through the spring of 2020, focusing upon documented call types. A synopsis of a detailed analysis of Kansas specimen data from 1885 to present is also provided.

METHODS

King collected and analyzed data on occurrence of the Red Crossbill in Kansas from 2010 through spring 2020, encompassing 10 complete fall through spring

seasons. Occurrence data was taken from the following sources: eBird (<https://ebird.org/home>), *The Horned Lark* (http://www.ksbirds.org/kos/HOLA_archive.html), the *Kansas Ornithological Society Bulletin* (<http://www.ksbirds.org/kos/bulletin/Bulletin.htm>), KSBIRD-L (<https://listserv.ksu.edu/cgi-bin/wa?A0=KSIBRD-L>), and ksbirds.org (http://ksbirds.org/kos/Crossbills17_18.htm). Auditory data for type identification came primarily from eBird and the Macaulay Library (<https://www.macaulaylibrary.org>), and secondarily through communication with observers. Young verified audio type identifications.

Robbins examined study skins ($n = 229$) taken in Kansas from 1885 through 2012, housed in the following collections: University of Kansas Biodiversity Institute, Sternberg Museum (Fort Hays State University), and Emporia State University. Measurements of bill length (anterior nares to tip) and wing length (chord) of 90 specimens were used for type identification (data available from Robbins); identifications were based primarily upon Groth (1993) but also specimens of known type that had been audio-recorded by Robbins. In a small subset of specimens ($n = 12$), bill width (maxilla) measurements (at nares) were taken to clarify identification of difficult to identify specimens.

RESULTS and DISCUSSION

During the past eleven years (2010 to 2020), Red Crossbills were recorded in Kansas annually. In eight of ten complete seasons (fall through spring, 2010-2020) that could be considered non-irruption years, Red Crossbills were recorded sparingly, with records known from only one to six unique locations (defined by a separation of 1.6 km or more). Most of these records involved only one or two individuals. Larger irruptions with records from dozens of locations occurred during 2012-13 and 2017-18. In contrast to previous irruptions, documentation of vocalizations during these two recent irruptions allowed for unequivocal identification of the call types.

The initial irruption occurred between the summers of 2012 and 2013. A small flock in Osborne, Osborne County, on 8 July 2012 was the earliest, and an individual in Meade County on 17 June 2013 was the latest. The second irruption took place between the summers of 2017 and 2018, also stretching for approximately one year. A record from Garden City, Finney County, on 6 August 2017 was the earliest, whereas an individual with an injured eye at a Garden City residence on 17 June 2018 was the latest. The onset of these two irruptions corresponds with the time of year in which Red Crossbills sometimes seek newly developed cone crops outside their normal areas, especially when cone production of key conifer species has failed (Benkman and Young 2019).

In addition to duration, the irruptions of 2012-13 and 2017-18 were similar in other respects. During both irruptions, Red Crossbills were first detected during late summer in west and central Kansas, remaining largely undetected in east Kansas and adjacent Missouri until late fall. During both irruptions, the number of locations

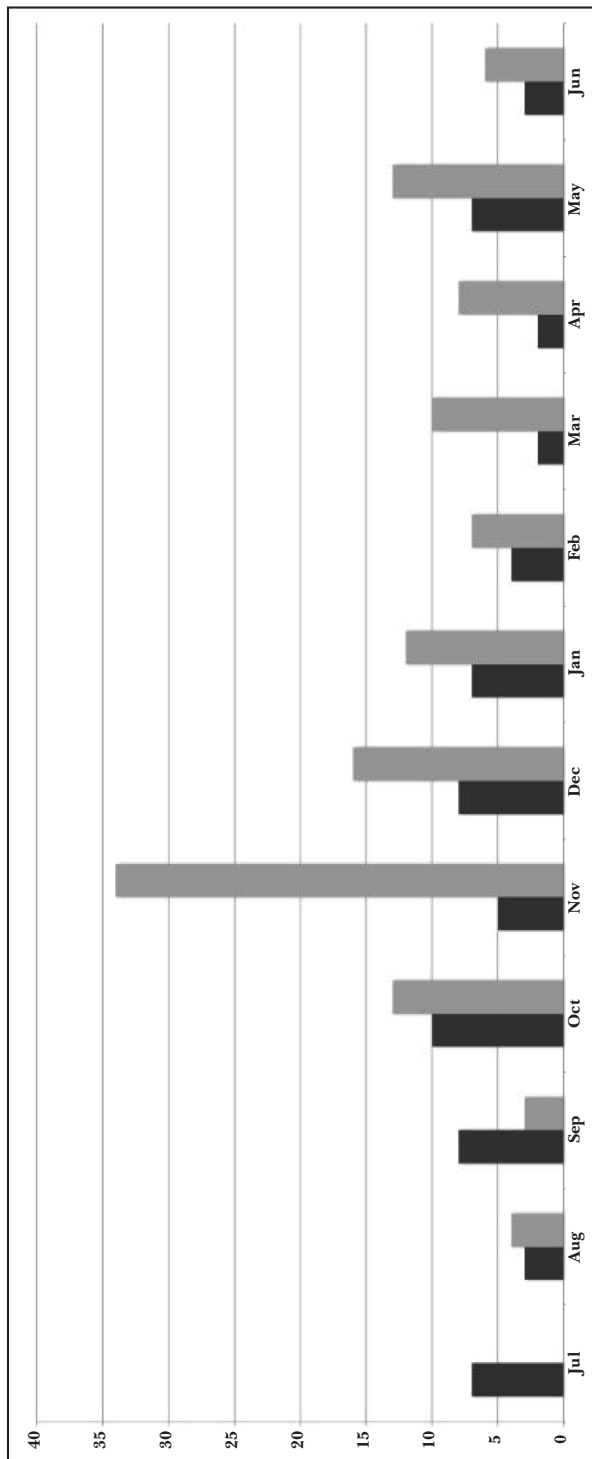


Figure 1. Estimated number of unique locations (separate by at least 1.6 km) where Red Crossbills were detected in each month during the irruptions of 2012-13 (black) and 2017-18 (gray).

where Red Crossbills were detected peaked during late fall and early winter and secondarily late spring (Figure 1). The spring peak is suggestive of return movement, when birds are presumably seeking to return to their core areas of occurrence after having wintered elsewhere. During both irruptions, Red Crossbills were typically observed in small numbers (i.e., ≤ 10 individuals per locality). Lastly, a temporal shift in food selection seemed to occur during both irruptions based upon quantitative review of records with associated photographs and commentary. Specifically, Red Crossbills observed during late fall and winter appeared to feed primarily upon seeds of several species of introduced pine (*Pinus*), spruce (*Abies*), and arborvitae (*Thuja*), in addition to sunflower seeds at bird feeders. Those observed during late spring and early summer however, seemed to feed largely at bird feeders with sunflower seeds, presumably because pine and arborvitae seed crops had been depleted by that time. In recent decades, Red Crossbills have been increasingly detected at bird feeders in the Rocky Mountains (Benkman and Young 2019) and Kansas (Thompson et al. 2011).

Although these two irruptions were similar in many respects, the type composition differed notably between them, and the latter irruption seems to have involved larger numbers of crossbills than the former. Indeed, Red Crossbills were reported from approximately 90 unique locations during the 2017-18 irruption versus approximately 45 unique locations during the 2012-13 irruption. Moreover, large counts (i.e., 19-40 individuals per locality) were made at nine locations during the 2017-18 irruption versus only three during the 2012-13 irruption. To what extent differences in observer effort and communication might account for these differences in irruption extent remains unclear. However, we do not believe that observer effort and participation in communication networks (e.g., eBird, KSBIRD-L) changed enough between irruptions to explain doubling of the number of records at unique locations between these irruptions.

There were notable differences in type composition between the 2012-13 and 2017-18 irruptions (Tables 1 and 2). These differences correspond to broad-scale continental patterns seen during each irruption (see eBird interactive range maps; <https://ebird.org/map>). On a continental scale, the 2012-13 irruption was characterized by the largest documented west to east movement of Type 3 on record in North America. Type 3 were extensively documented in many eastern US states with much smaller numbers recorded in the Great Plains states. Apparent first state records of this type were established for Kansas and Arkansas (Smith et al. 2015). Type 3 are found primarily in the Pacific Northwest, where they most commonly feed upon Western Hemlock (*Tsuga heterophylla*) and are known for making eastward incursions approximately every 2-5 years (Young 2011). During the 2012-13 irruption, the central US was the only region away from their core area where Type 2 was the most frequently encountered type. Type 2 is the most widely distributed form across the United States, and it is most common in the lower elevation Ponderosa pine (*Pinus ponderosa*) forests of the Rocky Mountains. In addition to the extensive movement of Type 3 into eastern North America, and of Type 2 into the Great Plains, smaller movements of “eastern” type 10 (Young and Spahr 2017) occurred in the northeast down the east coast to the Mid-Atlantic (eBird data, Young

pers. obs., Kolbe and Brinkley 2013), and isolated records of Type 5 were also reported for the first time ever in some central US states such as Kansas, Oklahoma, Missouri (Robbins 2018) and Arkansas (Smith et al. 2015). Type 5 was first confirmed east of the Rockies in 2006 (Young 2010).

In Kansas, auditory documentation was obtained during the 2012-13 irruption at four of the approximately 45 unique locations where Red Crossbills were recorded. Type 2 crossbills was the most frequently documented (three locations) followed by Type 3 (two locations) . Reports without audio documentation (approximately 10) that were identified to call type also suggested that Type 2 was most frequent. Types 4 and 5 were both audio-documented for the first time in Kansas during the 2012-13 irruption; individuals of each type were recorded at the Kansas State University Agricultural Research Center in Hays, Ellis County (Table 1). Type 4 normally inhabits coastal Douglas fir (*Pseudotsuga menziesii* var. *menziesii*) forests of the Pacific Northwest, but commonly moves to the Rocky Mountains every few years in small numbers, where it often feeds on inland Douglas fir (*P. m.* var. *glauca*) (Benkman and Young 2019). Very few Type 4 were reported east of the Rocky Mountains during the 2012-13 irruption. Small numbers of Type 5, which associates with lodgepole pine (*Pinus contorta*), moved eastward into the central US.

Table 1. Red Crossbill call type records in Kansas during the 2012-13 irruption documented with audio recordings. A Macaulay Library reference number or eBird checklist number are provided in the documentation column. If audio documentation was not archived at Macaulay Library or in eBird, then initials of the expert performing the verification are given (M. A. Young = MAY).

| Type | Location | County | Date | Documentation |
|------|----------|---------|-------------------|---------------|
| 2 | Osborne | Osborne | 9 July 2012 | MAY |
| 2 | Elkhart | Morton | 22 September 2012 | MAY |
| 2 | Hays | Ellis | 23 December 2012 | ML516411 |
| 3 | Hays | Ellis | 23 December 2012 | ML516410 |
| 3 | Russell | Russell | 4 May 2013 | S14847751 |
| 4 | Hays | Ellis | 11 November 2012 | S12026803 |
| 5 | Hays | Ellis | 23 December 2012 | ML516408 |

The 2017-18 irruption was characterized by significant movement of three types (2, 3, 4) on a continental scale. Large numbers of Types 2 and 4 moved into the Great Lakes region (Brady et al. 2019), with moderate to small numbers elsewhere. Type 3 appeared in the Great Lakes region in small numbers (Brady et al. 2019) and the Northeast in moderate numbers (Spahr and Young 2019), and sparingly elsewhere. Type 5 were detected on several occasions in the Great Lakes and central US (see eBird range map). In Kansas, auditory data were obtained during the 2017-18 irruption at 16 of approximately 90 locations. Type 2 clearly predominated (16 locations) with smaller numbers of Type 4 present (five locations). Additionally, there was a single documented record of Type 3 from Reno County (Table 2). The

latter was one of few observations away from the western and northern US states during the 2017-18 irruption. Approximately 15 identifications of Type 2 crossbills that lacked audio-documentation were also made by birders, apparently most by auditory means.

Beyond the 2012-13 and 2017-18 irruptions, relatively little is known about which types occurred in Kansas during the past decade. During the 2015-16 season, there seemed to have been a small movement of Type 3 into the Great Plains and Midwest with little to no involvement of Type 2 (see eBird interactive range maps). A few Type 3 seem to have reached Kansas during that event. Three Type 3 were documented at Sharon Springs, Wallace County, on 12 May 2016 (ML 73519241) and additional small-billed birds possibly, attributable to this type, were photographed in Dodge City, Ford County (ML 22999021) and Leavenworth County (ML 24035141). More recently during the 2019-20 season, Types 2 and 4 moved into the northern Great Plains and Upper Midwest. However, only a few Type 2 and 4 reached the southern Great Plains and the adjacent states of Missouri and Arkansas. Kansas had two Red Crossbill reports during the 2019-20 season, neither of which were audio recorded.

Taxonomic treatment of the Red Crossbill in Kansas' ornithological literature is confusing, although several researchers clearly recognized that large-billed types predominate with lesser numbers of small-billed types occurring (Goss 1891, Long 1940, Tordoff 1956, Johnston 1965). Examination of 229 crossbill study skins taken in Kansas from 1885 through 2012 (see Methods) documents that Type 2 has been the predominant Red Crossbill taxon recorded. Type 3 has also been recorded during several years throughout that entire time frame as well. With the caveat that Types 2 and 5, and to a much lesser extent type 4 overlap in measurements, 171 specimens can be assigned to Type 2 and 42 very likely assigned to Type 3. A few of these Type 3 might be Type 4. There are approximately 16 specimens that cannot be identified to type, and several of these likely are assignable to Type 4, although measurements are inconclusive because of the overlap between Types 4 and 1 (Groth 1993). Since the primary area of movement is from the west, and Type 1 is primarily from Appalachia (Young et al. 2011) and has not been recorded in this region, these specimens are far more likely Type 4. Interestingly, measurements (bill length and depth, and wing chord) of one specimen (KU 31714) indicate that the bird is either an exceeding large individual of Type 2, or of the very large-billed taxon, Type 6 (*L. c. stricklandi*), found in the southwestern United States and Mexico; genetic analysis will be necessary to identify this individual. Intriguingly, an 1896 specimen taken in Nebraska was reported as "definitely" *stricklandi* (Sharpe et al. 2001), which would be exceptional but still in-line with museum records measured as "*stricklandi*" in Colorado (Spencer 2009).

Table 2. Red Crossbill call type records in Kansas during the 2017-18 irruption documented with audio recordings. A Macaulay Library reference number or eBird checklist number are provided in the documentation column. If audio documentation was not archived at Macaulay Library or in eBird, then initials of the expert performing the verification are given (M. A. Young = MAY).

| Type | Location | County | Date | Documentation |
|------|-----------------|----------|-------------------|---------------|
| 2 | Lake Parsons | Neosho | 28 October 2017 | ML73337631 |
| 2 | Gardner | Johnson | 29 October 2017 | ML74003301 |
| | | | 4 November 2017 | |
| 2 | Hillsdale Lake | Miami | 2-3 November 2017 | ML74003241 |
| 2 | Lenexa | Johnson | 2 November 2017 | ML74389241 |
| 2 | Menokken | Shawnee | 2 November 2017 | ML74012991 |
| 2 | Pittsburg | Crawford | 4 November 2017 | ML7790119 |
| | | | 11 November 2017 | |
| 2 | Pomona Lake | Osage | 5 November 2017 | ML74287891 |
| 2 | Sim Park | Sedgwick | 11 November 2017 | ML75076091 |
| 2 | Scott Lake | Scott | 23 November 2017 | ML76075121 |
| 2 | Hays | Ellis | 16 December 2017 | ML78551991 |
| 2 | Glenwood | Mitchell | 27 December 2017 | ML79564351 |
| 2 | Cimarron N. G. | Morton | 28 December 2017 | ML79734941 |
| 2 | Goodland | Sherman | 4 January 2018 | ML81540851 |
| 2 | Wellington Lake | Sumner | 20 January 2018 | ML82804411 |
| 2 | Wilson Lake | Russell | 13 March 2018 | ML89680421 |
| 2 | Dodge City | Ford | 16 April 2018 | MAY |
| 3 | Partridge | Reno | 16 December 2017 | ML78310671 |
| 4 | Pittsburg | Crawford | 29 October 2017 | ML73907641 |
| 4 | Lenexa | Johnson | 2 November 2017 | MAY |
| 4 | Gardner | Johnson | 4 November 2017 | ML74234071 |
| 4 | Hays | Ellis | 16 December 2017 | ML78552031 |
| 4 | Cimarron N. G. | Morton | 28 December 2017 | ML79734931 |

It is not surprising that Type 2 was the most frequently encountered type during the 2012-13 and 2017-18 irruptions given the proximity of Kansas to the Rocky Mountains where Type 2 is common. It is interesting however, that Type 2 is the most common in Kansas while the other type inhabiting the southern Rocky Mountains (Type 5) is far less frequent. Ecological comparison of Types 2 and 5 offers some explanation for this. Type 2 is the most widespread type, and is highly adaptable and nomadic, likely because ponderosa pine crops fail every few years. In contrast, lodgepole pine, which serves as the primary food source for Type 5, produces one of the most reliable food crops of any conifer in the world (Benkman and Young 2019). As a result, Type 5 is often resident in many western montane areas, whereas Type 2 is forced to move in search of food every few years. In addition to Types 2, 3, 4, and 5, several additional types might eventually be documented in Kansas with further audio recording effort. Types 1, 6, and perhaps 7 are possibilities, although any of these would be extremely rare. Type 1, an

adaptable medium-billed type, has been recorded in nearby Colorado, (<https://ebird.org/checklist/S65864417>, David Dowell), and has nested in northwest Arkansas (Anant Deshwal Pers. Comm.). Type 6 possibly occurs in Colorado and Kansas based upon specimen evidence, and should be looked for as well. Much remains to be learned about the status, breeding, and distribution of Red Crossbill call types in Kansas.

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LITERATURE CITED

American Ornithologist's Union. 1957. Check-list of the Birds of North America, 5th ed. American Ornithologist's Union, Baltimore, Maryland.

Benkman, C. W. 1993. Adaptation to Single Resources and the Evolution of Crossbill (*Loxia*) Diversity. *Ecological Monographs* 63:305-325.

Benkman, C. W., J. W. Smith, P. C. Keenan, T. L. Parchman, and L. Santisteban. 2009. A New Species of Red Crossbill (Fringillidae: *Loxia*) from Idaho. *Condor* 111:169-176.

Benkman, C. W., and M. A. Young. 2019. Red Crossbill (*Loxia curvirostra*), version 2.0. In *The Birds of North America* (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. <https://doi.org/10.2173/bna.redcro.02>.

Brady, R.S., N. M. Anich, and M. A. Young 2019. Wisconsin's Red Crossbill Irruption 2017-18: Distribution, Abundance, and Breeding Behavior of Multiple Call Types. *Passenger Pigeon* 81:215-240.

Clements, J. F., T. S. Schulenberg, M. J. Iliff, D. Roberson, T. A. Fredericks, B. L. Sullivan, and C. L. Wood. 2018. The eBird/Clements checklist of birds of the world: v2018. <http://www.birds.cornell.edu/clementschecklist/download/>.

Chesser, R. T., K. J. Burns, C. Cicero, J. L. Dunn, A. W. Kratter, I. J. Lovette, P. C. Rasmussen, J. V. Remsen, Jr., J. D. Rising, D. F. Stotz, and K. Winker. 2017. Checklist of North and Middle American Birds. American Ornithological Society. Online. <http://checklist.aou.org/taxa/>.

eBird. 2012. North American Red Crossbill Types: Status and Flight Call Identification. <https://ebird.org/news/recrtype/> (Accessed: 5 March 2021).

Gill, F., and D. Donsker (Eds). 2019. IOC World Bird List (v9.1). doi: 10.14344/IOC.ML.9.1.

Goss, N. S. 1891. History of the Birds of Kansas. Geo. W. Crane and Co., Topeka, Kansas.

Griscom, L. 1937. A Monographic Study of the Red Crossbill. Proceedings of the Boston Society of Natural History 41:77-210.

Groth, J. G. 1993. Evolutionary Differentiation in Morphology, Vocalizations and Allozymes Among Nomadic Sibling Species in the North American Red Crossbill (*Loxia curvirostra*) Complex. University California Publications in Zoology 127:1-143.

Kolbe, S. R., and N. Brinkley. 2013. The 2012-2013 Irruption of Finches (Fringillidae) as Monitored at Kiptopeke State Park, Northampton County, Virginia. Raven 84:32-46.

Long, W. S. 1940. Check-list of Kansas Birds. Transactions of the Kansas Academy of Science 43:433-456.

Johnston, R. S. 1965. A Directory to the Birds of Kansas. University of Kansas Museum of Natural History Miscellaneous Publications 41:1-67.

Irwin, K. 2010. A New and Cryptic Call Type of the Red Crossbill. Western Birds 41(1):10-25.

Robbins, M. B. 2018. The Status and Distribution of Birds in Missouri. University of Kansas Libraries. doi: <https://doi.org/10.17161/1808.26287>.

Sharpe, R.S., W. R. Silcock, and J. G. Jorgensen. 2001. Birds in Nebraska. Their Distribution and Temporal Occurrence. University of Nebraska Press, Lincoln, Nebraska.

Smith, K. G., J. C. Neal, and M. A. Young. 2015. Red Crossbill Invasion of Northwestern Arkansas During 2012-2013. Journal of the Arkansas Academy of Science 16:Article 17. Available at: <http://scholarworks.uark.edu/jaas/vol69/iss1/17>.

Spahr, T., and M. A. Young. 2019. 2017-18. Red Crossbill Irruption in New Hampshire. New Hampshire Bird Records 36(4):32-34.

Spencer, A. 2009. Specimens of Rare Red Crossbill Types from Colorado. Colorado Birds 43(3):187-191.

Thompson, M. C., C. A. Ely, B. Gress, C. Otte, S. T. Patti, D. Seibel, and E. A. Young. 2011. Birds of Kansas. University of Kansas Press, Lawrence, Kansas.

Tordoff, H. B. 1956. Check-list of the Birds of Kansas. University of Kansas Museum of Natural History Publications 8:307-359.

Young, M. A. 2010. Type 5 Red Crossbill (*Loxia curvisrotra*) in New York: First Confirmation East of the Rocky Mountains. *North American Birds* 64:343-346.

_____. 2011. Red Crossbill (*Loxia curvirostra*) Call Types of New York: A Closer Look at Their Taxonomy, Flight Call Vocalizations, and Ecology. *Kingbird* 61:106-123.

Young, M. A., K. Blankenship, M. Westphal, and S. Holzman. 2011. Status and Distribution of Type 1 Red Crossbill (*Loxia curvirostra*): An Appalachian Call Type? *North American Birds* 65:554-561.

Young, M., and T. Spahr. 2017. Crossbills of North America: Species and Red Crossbill Call Types. eBird [online].
<https://ebird.org/news/crossbills-of-north-america-species-and-red-crossbill-call-types>.

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