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TEXAS STATEWIDE SUMMARY OF RED CROSSBILL (*LOXIA CURVIROSTRA*) RECORDS FROM 2017 THROUGH JUNE 2024

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ABSTRACT.—The Red Crossbill (*Loxia curvirostra*) occurs in Texas as a rare resident in the Guadalupe and Davis Mountains of the Trans-Pecos ecoregion. Otherwise it occurs only as an irruptive visitor primarily during the fall, winter and spring months in the northern two-thirds of the state. Researchers have identified eleven distinctive Red Crossbill forms in North America based on the structure of their flight calls. Each of these “call types” occupies a core range in North America. Red Crossbills depend on various conifer seeds as a primary food source, and during years of poor seed production can be driven out of their core range in search of food. This is when Red Crossbills may enter Texas in numbers. We summarized Red Crossbill reports throughout Texas from 2017 through June 2024. This time period includes three incursions where their numbers spiked. Most Red Crossbill reports (99.2 %) were obtained from online eBird checklists. A statewide total of 963 reports from 224 locations across 62 counties was obtained. Seven of the ten Gould ecoregions of Texas reported Red Crossbills. The Trans-Pecos ecoregion had the most locations (48.6%) followed by the High Plains (20.5%). Red Crossbill call type was confirmed for 87 (9%) of the 963 reports. Call types 1 through 5 were identified with the most common being type 2. Various conifer cone seeds accounted for 75.9% of foraging.

INTRODUCTION

The Red Crossbill (*Loxia curvirostra*) is a Holarctic seed-eating finch with a high degree of vocal variation of flight calls. The complex biology and wanderings of the species made attempts to delineate subspecies difficult, especially since the species, due to its vocal variation of flight calls, nomadic behaviors, and at times overlapping ranges, does not really fit the definition of subspecies, which are usually defined occurring allopatrically. Groth (1993b) summarizes efforts to do so. Rather than assigning populations to subspecies, researchers began to identify Red Crossbills based on the structure of their flight calls (Groth 1993b). In North America, eleven distinctive forms have

been identified based primarily on flight call and to a lesser extent bill morphology (Groth 1993b, Irwin 2010, Young and Spahr 2017, Young et al. 2024). Bill depth and palate structure differ among the forms and correspond to the species of conifer seed typically foraged upon (Benkman 1993, 2003; Groth 1993b). Different call types may represent cryptic species with vocal differences great enough to provide the basis for reproductive isolation (Groth 1993b). Multiple Red Crossbill forms may nest in the same area simultaneously while maintaining call type cohesion, providing further evidence of reproductive isolation from one another (Groth 1993a, Smith and Benkman 2007). Cassia Crossbill (*Loxia sinesciuris*) is the first call type

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(formerly type 9) in North America to be formally recognized as a distinct species (Benkman et al. 2009, Benkman and Porter 2018). It is a year-round resident in the South Hills and Albion Mountains in southern Idaho. Eleven call types remain in the Red Crossbill complex of North America with the recent description of type 12 (Young et al. 2024).

Red Crossbill breeding and movements are erratic and appear to be dependent on conifer seed crops (Reinikainen 1937, Bock and Lepthien 1976, Benkman 1990). During times of poor seed production within their core North American range, crossbills may wander widely in search of food. Past irruptive movements have reached into the northern two-thirds of Texas (Lockwood and Freeman 2014). Schaefer (1998) reported ten first-county records for Red Crossbill in the Texas Piney Woods ecoregion during a significant invasion in 1996-1997. Another Texas invasion occurred during the winter of 2011-2012 with crossbills reaching as far east as Kaufman County in the Blackland Prairie ecoregion (Lockwood and Freeman 2014).

Here we present a Texas statewide summary of a major Red Crossbill invasion that began in October 2017 and lasted well into May 2018. Fewer, but regular, sightings continued through August 2022. This was followed by two consecutive incursions from October 2022 through May 2023 and September 2023 through May 2024.

METHODS

We obtained all Texas Red Crossbill reports submitted to eBird for the years 2017 through June 2024. Additionally, a handful of reports were submitted by observers outside of eBird. The number of reports at a given location was highly variable. Thus, we summarized Red Crossbill “locations” rather than “reports”.

Ten vegetational ecoregions within Texas have been delineated by Gould et al. (1960) and later modified by the Texas Parks and Wildlife Department (Fig. 1). We determined the number of Red Crossbill locations and the number of confirmed call types reported for each ecoregion. When multiple recordings were submitted for the same location during the same time frame (eg. same incursion), each confirmed call type for that location was counted only once. Call types confirmed at the same location, but during different time frames, were counted again for each time frame. All submitted sound recordings of Red Crossbill flight

calls were confirmed by experts from the Finch Research Network.

We summarized all reports of Red Crossbill foraging observations. Only written descriptions or photographs of direct foraging observations were counted. If multiple eBird lists contained similar foraging observations from the same location, day, and time, then they were considered to be the same observation and counted only once. If similar foraging observations were reported at the same location and day, but without overlap in the time of observation, then they were considered independent observations, and both were counted. We combined observations of foraging on species of the genera *Thuja* (arborvitae) and *Cupressus* (cypress) due to a few instances of suspected plant identification error by observers.

RESULTS

Nearly all Red Crossbill reports (99.2%) contributing to this summary were obtained from online eBird checklists. A statewide total of 963 reports from 224 locations across 62 counties are included. The monthly number of locations where Red Crossbills were reported throughout Texas from 2017 through June 2024 is shown in Figure 2. Observers reported Red Crossbills in seven of the ten vegetational ecoregions of Texas (Fig. 3). From 2017 through June 2024, the Trans-Pecos ecoregion produced the greatest number of locations (48.6%) followed by the High Plains (20.5%), Cross Timbers (10.7%), Edwards Plateau (9.4%), Piney Woods (4.5%), Rolling Plains (4.5%), and Blackland Prairie (1.8%). The number of Red Crossbill locations during the three incursions are summarized for each ecoregion in Table 1.

Red Crossbill call type was confirmed for only 87 (9%) of the 963 reports. Eight of those reports included recordings with multiple call types, resulting in a total of 96 confirmations among five different call types. After subtracting multiple recordings of the same call type from the same location and time frame, 54 confirmations remain among five different call types (Table 2). The most common was type 2 (74.1%) followed by type 4 (16.7%), type 1 (3.7%), type 5 (3.7%), and type 3 (1.8%).

We gathered 124 foraging observations among the 963 Red Crossbill reports (Table 3). Cone seeds of various pine (*Pinus*) species accounted for 44.4% of observations.



Figure 1. Gould Ecoregions of Texas.

DISCUSSION

Three incursions of Red Crossbills in Texas (October 2017 through May 2018, October 2022 through May 2023, and September 2023 through May 2024) are presumably the result of poor conifer seed crops in the western United States and Canada. The core ranges of Red Crossbill types 2 through 5 are in the Rocky Mountains and Pacific Northwest. Not surprisingly, the Trans-Pecos and High Plains ecoregions, located in western and northwestern Texas, produced the greatest number of Red Crossbill location records. This has also been the pattern with past incursions. The October 2017 to May 2018 incursion was widespread in

Texas with locations coming from seven of the ten vegetational ecoregions. The October 2022 to May 2023 and September 2023 to May 2024 incursions were less widespread, seemingly missing the Piney Woods ecoregion, with the vast majority of locations coming from the Trans-Pecos. We know of no positive Red Crossbill sightings from the Gulf Prairies, South Texas Plains, and Post Oak Savannah ecoregions during 2017 through June 2024 though they undoubtedly occurred at least in the Post Oak Savannah due to its proximity to ecoregions with numerous records. It is unknown if the relatively few Red Crossbill location records from June 2018 through September 2022 pertain to

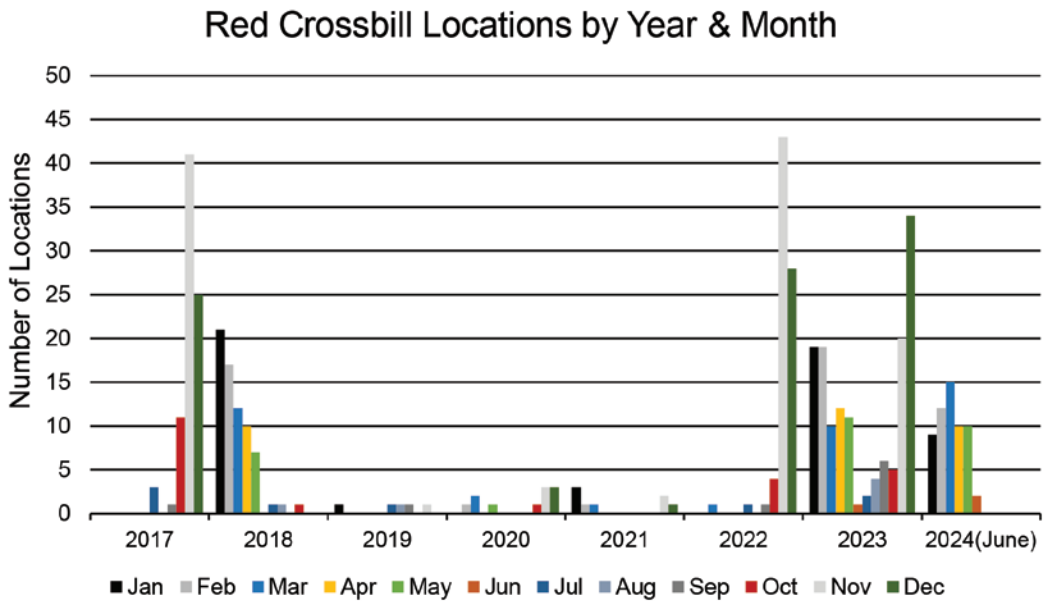


Figure 2. Number of Red Crossbill locations by year and month from 2017 through June 2024.

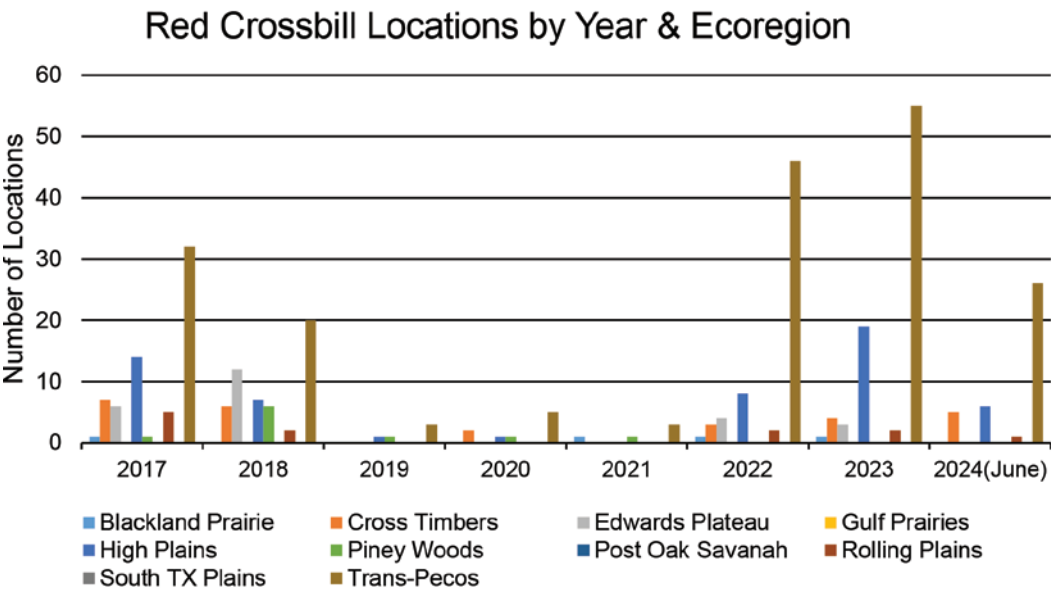


Figure 3. Number of Red Crossbill locations by year in each vegetational ecoregion from 2017 through June 2024.

lingering birds from the 2017-2018 incursion, or if they represent a low-level influx of new birds, or perhaps both. Red Crossbill is a rare resident in the Guadalupe and Davis Mountains of the Trans-Pecos (Lockwood and Freeman 2014). Therefore, some records from those mountain ranges may pertain to

resident birds. During field work for the 1987-1992 Texas Breeding Bird Atlas project, observers found evidence of confirmed breeding for Red Crossbills in the Guadalupe Mountains and probable breeding in the Davis Mountains (Tweit 2005). Flight call types 2 through 5 were confirmed

Table 1. Red Crossbill locations by ecoregion during three incursions.

Ecoregion	Number of Locations (% of Total) for each Incursion		
	Oct. 2017 – May 2018	Oct. 2022 – May 2023	Sept. 2023 – May 2024
Trans Pecos	39 (38.6%)	63 (70%)	53 (66.2%)
High Plains	20 (19.8%)	13 (14.5%)	18 (22.5%)
Cross Timbers	12 (11.9%)	6 (6.7%)	6 (7.5%)
Edwards Plateau	15 (14.9%)	4 (4.4%)	2 (2.5%)
Rolling Plains	7 (6.9%)	2 (2.2%)	1 (1.3%)
Piney Woods	7 (6.9%)	0	0
Blackland Prairie	1 (1%)	2 (2.2%)	0
Gulf Prairies	0	0	0
Post Oak Savanah	0	0	0
South Texas Plains	0	0	0
TOTALS	101(100%)	90 (100%)	80 (100%)

Table 2. Number of individual Red Crossbill flight call types confirmed from 2017 through June 2024 within the listed Texas ecoregions.

Ecoregion	Flight Call Type	# Individuals ^{AB}
Blackland Prairie	2	1
Cross Timbers	1	1
Cross Timbers	2	2
Cross Timbers	4	1
Edwards Plateau	2	3
High Plains	2	6
High Plains	3	1
High Plains	4	2
High Plains	5	1
Piney Woods	1	1
Piney Woods	2	2
Piney Woods	4	2
Piney Woods	5	1
Rolling Plains	2	1
Rolling Plains	4	1
Trans-Pecos	2	25
Trans-Pecos	4	3

^ARecordings of flight call types were confirmed by the Finch Research Network.
^BEach call type was counted only once when multiple recordings were submitted for a given location and time frame.

during the 2017-2018 incursion. The state’s two confirmed type 5 calls came from the High Plains (Lubbock County) and Piney Woods (Houston County), and the single confirmed type 3 came from

the High Plains (Lubbock County) during this time. The 2022-2023 incursion was less diverse with only type 2 having been confirmed. Interestingly, the state’s first record for call type 1 of the Appalachian

region came from the Piney Woods (Montgomery County) during February 2021. Types 2 and 4 were also confirmed at the same site during that time. During the 2023-2024 incursion, most confirmed calls were type 2 followed by fewer type 4, and the second state record for call type 1 was obtained in the Cross Timbers (Denton County). Observers are gradually realizing the importance of obtaining recordings of Red Crossbill flight calls when possible. Prior to 2017, only a few type 2 calls were submitted to eBird for Texas. Call types 1, and 3 through 5, were confirmed in the state for the first time during the 2017 to June 2024 time period. Still, few Red Crossbill vocal recordings were submitted to eBird during that time relative to the 963 sightings. We encourage observers to obtain and submit Red Crossbill recordings regardless of the quality. This will aid in determining movement patterns of the various call types within Texas.

Red Crossbills usually foraged on the cone seeds of planted pines and ornamental arborvitae and cypress trees in the far western and northwestern parts of the state, often located in residential areas, parks, and cemeteries. Cone seeds of native pines, primarily loblolly pine (*Pinus taeda*), were used in the eastern portion of the state. Red Crossbills also foraged on pecan nuts in the Edwards Plateau and High Plains, and on baldcypress cones in the Edwards Plateau. There is a single report from the

Edwards Plateau (Kendall County) of crossbills foraging in ball moss (*Tillandsia recurvata*) growing on baldcypress limbs. It is unknown if they were feeding directly on the ball moss or something else found within the moss clumps. We have five reports in the month of March, two in the Cross Timbers and three in the Trans-Pecos, of crossbills feeding on leaf buds of unidentified hardwood trees. A similar foraging event was reported from the High Plains during late January. A seventh report came from the Cross Timbers (Mills County) during early April where an observer reported crossbills foraging on cedar elm (*Ulmus crassifolia*) leaf buds. There is one early April report of crossbills feeding on the flowers of an unidentified ash (*Fraxinus*) species in the Trans-Pecos (El Paso County), and a single late December report of feeding on the dry seed heads of a species of sunflower in the genus *Helianthus* in the High Plains (Hansford County). Two reports of Red Crossbills eating Texas madrone (*Arbutus xalapensis*) fruits came from the area of the Pine Springs Visitors Center, Guadalupe Mountains National Park, Culberson County. Both reports were from the month of November, one in 2017 and one in 2022.

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Table 3. Red Crossbill foraging observations in Texas from 2017 through June 2024.

Foraging Substrata	# Observations	% Total Observations
Unidentified Pine (<i>Pinus</i>) Species Cones	38	30.9
Arborvitae (Thuja) and Cypress (<i>Cupressus</i>) Cones	32	26.0
Loblolly Pine (<i>Pinus taeda</i>) Cones	14	11.4
Pecan Tree (<i>Carya illinoensis</i>) Nuts	14	11.4
Baldcypress (<i>Taxidium distichum</i>) Cones	6	4.9
Unidentified Hardwoods (Leaf Buds)	5	4.1
Sunflower Seeds (Feeders)	5	4.1
Ponderosa Pine (<i>Pinus ponderosa</i>) Cones	2	1.6
Texas Madrone (<i>Arbutus xalapensis</i>) Fruit	2	1.6
Cedar Elm (<i>Ulmus crassifolia</i>) Leaf Buds	1	0.8
Shortleaf Pine (<i>Pinus echinata</i>) Cones	1	0.8
Douglas-fir (<i>Pseudotsuga menziesii</i>) Cones	1	0.8
Unidentified Ash Tree Species (Flowers)	1	0.8
Helianthus sp. (Dry Seed Heads)	1	0.8
TOTALS	124	100

Crossbill movements and behavior within Texas. Matthew Buckingham (USDI, Fish and Wildlife Service) and Howard Williamson (retired USDA, Forest Service, Southern Research Station) assisted with plant identification from foraging photos submitted to eBird. We also thank Texas Parks and Wildlife Department for permission to use their Gould Ecoregions of Texas map. This paper was written and prepared in part by a U.S. Government employee on official time, and therefore it is in the public domain and not subject to copyright. This research was supported in part by the USDA Forest Service. The perspectives, findings, and conclusions in this publication are those of the authors and should not be construed to represent any official U.S. Department of Agriculture or U.S. Government determination or policy.

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