Type 5 Red Crossbills (*Loxia curvirostra*) in New York: first confirmation east of the Rocky Mountains

MATTHEW A. YOUNG • CORNELL LAB OF ORNITHOLOGY, 159 SAPSUCKER WOODS ROAD, ITHACA, NEW YORK 14850 • (MAY6@CORNELL.EDU)

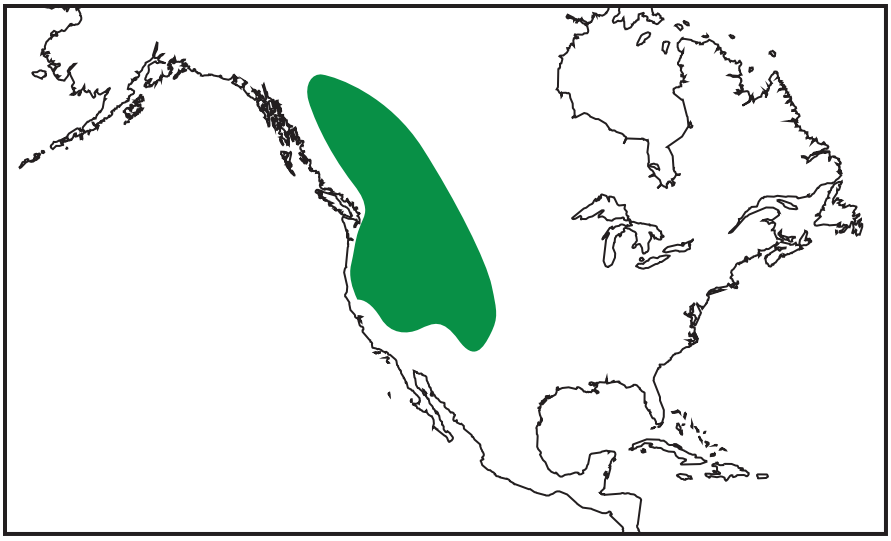


Figure 1. Approximate range of Type 5 Red Crossbill in western North America. *Map adapted by permission from original by Jeff Groth.*

Abstract

This paper provides documentation of Type 5 Red Crossbill (*Loxia curvirostra*) near Pharsalia, Chenango County, New York, where two calling individuals were audiotaped on 5 August 2006. This record is the first of Type 5 verified east of the Rocky Mountains. Identification to Type was confirmed by authorities Jeffrey Groth, Craig Benkman, and Nathan Pieplow. The paper also reviews identification of this Type 5 and others types by audiospectrographic analysis.

Introduction

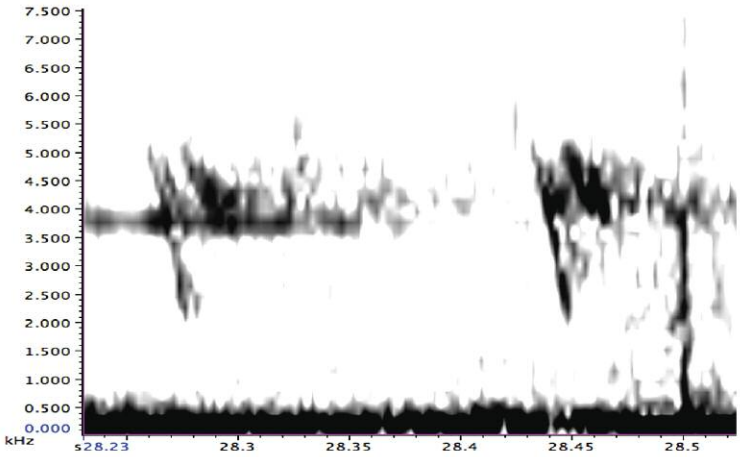
Since the publication of groundbreaking research on the Red Crossbill (*Loxia curvirostra*) complex by Groth (1993; see also <http://research.amnh.org/vz/ornithology/crossbills/nathist.html>), audio-recording Red Crossbills, particularly birds giving flight calls, has become more widespread among amateur ornithologists. Groth (1993), Benkman (1999), and Irwin (2010) have demonstrated that at least ten Red Crossbill call-types (hereafter, Types) are distinguishable in North America. These Types may represent species, or possibly incipient species, and indeed one has already been described as a full species, South Hills Crossbill, *L. sinesciurus* (Benkman et al. 2009). Types are associated with differences in morphology, genetics, and ecological specialization (Groth 1993, Benkman 1993, Parchman et al. 2006). To identify a calling Red Crossbill to Type with certainty, audiospectrographic analysis of recorded calls is required, although some people have demonstrated the ability to distinguish some Types by ear. For non-specialists, computer programs such as Raven Lite (see <http://www.birds.cornell.edu/brp/raven/RavenOverview.html>) can be used to produce spectrographs from sound recordings relatively easily.

Field encounter and confirmation of Type

On 5 August 2006, Greg Budney and I arrived at North Road in Pharsalia, Chenango County, New York at approximately 0930 EDT. Type 1 Red Crossbills were immediately heard and recorded. At 1045 EDT, we moved eastward on the old CCC Trucking Trail, then southward onto Coy Street. After travelling for about one kilometer on Coy Street, we stopped in front of a 160-hectare plantation of Norway Spruce (*Picea abies*), European Larch (*Larix decidua*), and Red Pine (*Pinus resinosa*). A 30-hectare stand of White Spruce (*Picea glauca*) was across the road to the east, and in the general area were scattered Scots Pine (*Pinus sylvestris*), Eastern White Pine (*Pinus strobus*), Eastern Hemlock (*Tsuga canadensis*), and Red Spruce (*Picea rubens*). As we stepped out of the car, we heard Common Ravens (*Corvus corax*) giving an interesting mix of vocalizations from a location about 100 meters to the west, deeper into the larger plantation. Budney decided to record them, while I stayed near the car and observed from a distance. During his last recording, as he was registering data on weather conditions, equipment, location, and time, two Red Crossbills flew over (at 42° 34' 21" N, 75° 41' 10" W). Budney annotated "Red Crossbills" during the recording (Macaulay Library of Natural Sounds #138299).

In July 2008, I listened to Budney's raven recording. Red Crossbill calls had been recorded adequately for audiospectrographic analysis, which I made using Raven Pro 1.3 software. As I analyzed the spectrographs of the crossbills and listened again to the recording, I realized they most closely matched the spectrographs and sounds of Groth's Type 5. I knew that Type 5, widespread in the intermountain West (Figure 1), had never been confirmed east of the Rocky Mountains, where its primary food species occur, namely seeds of Lodgepole Pine (*Pinus contorta latifolia*) and Engelmann Spruce (*Picea engelmanni*) (Groth 1993, Benkman 1993, Kelsey 2008).

I sent the recording and spectrograph made from it (Figure 2) to Jeffrey Groth at the American Museum of Natural History and to Craig Benkman at the University of Wyoming for comments. Groth confirmed them as Type 5, as did Benkman. Because the crossbills had been recording flying while an announcement was being made, the spectrograph has some



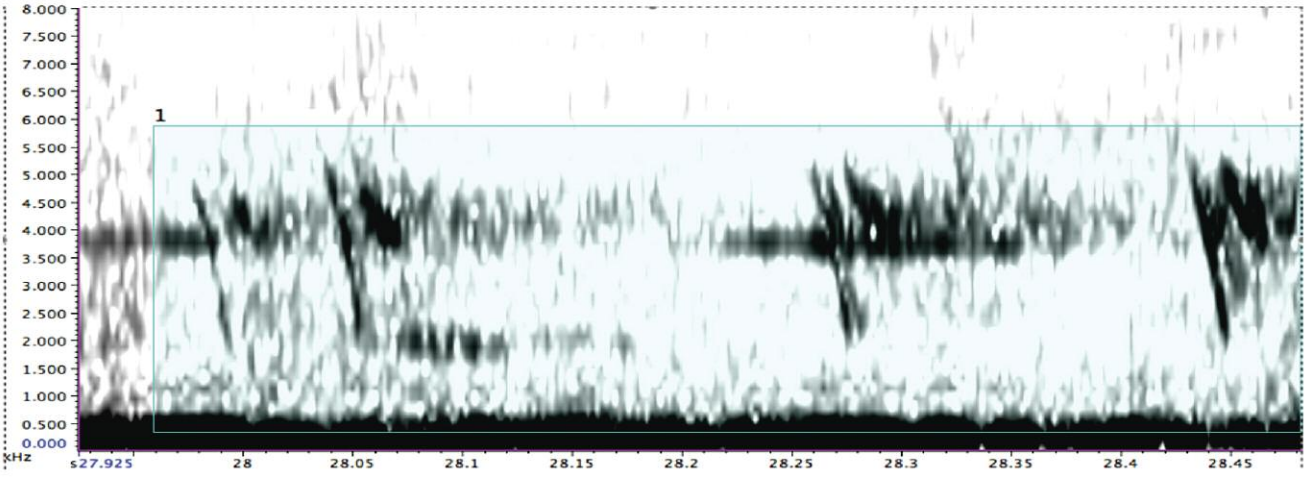


Figure 2. Two spectrographs, using slightly different scales, of Type 5 Red Crossbill (Macaulay Library of Natural Sounds #138299) flight calls recorded near Pharsalia, New York 5 August 2006. *Spectrographs by Matthew A. Young.*

associated noise; however, it does show key characteristics (described below) that confirm the identification as Type 5. Later, in the spring of 2009, Nathan Pieplow at the University of Colorado made an independent audiospectrographic analysis of the calls, also identifying them as Type 5.

Discussion

The flight calls of Type 5 Red Crossbills have two elements that drop in frequency, but the two elements are given in very slightly different frequency domains (Figure 3). The lower element is generally simpler and shows less variation, whereas the upper element usually rises sharply before modulating downward (Groth 1993). The second element starts a fraction of a second after the first element. In the spectrograph, this second element connects with, or nearly connects with, the first element—thus forming a signature that looks similar to a lowercase letter "n" or "h" rotated slightly to the left. The deliveries of these two elements overlap for part of their durations, a texture often called "polyphony" in music theory (Bent 1998). Because both elements modulate differently but over essentially the same time span, Type 5 Red Crossbills probably use both halves of their syrinx simultaneously, much like *Catharus* thrushes (Groth 1993, Pieplow 2007). The overlapping quality of the elements is not detectable by the human ear; instead, we usually perceive a single note, as when two keys of a piano are struck at the same time. To the human ear, Type 5 calls sound relatively dry and "twangy." Viewed as a spectrograph, the flight call of Type 5 shows a distinctive skewed orientation that differs from all other Types' flight calls (Figure 4) and is thus unlikely to be misidentified. A rare variant of Type 1, however, can produce calls polyphonically, and spectrographs of such calls can superficially resemble those of Type 5 flight calls. Nonetheless, spectrographs of Type 5 calls do not show the initial upward component diagnostic of Type 1 calls (Figure 3), and the orientation and sound of Type 5 calls are also quite different from Type 1 variant calls (pers. obs.; N. Pieplow, pers. comm.). In Figure 2, the two elements and their skewed orientation are visible, and there is at least a hint that the two elements are connected. Spectrographs of flight calls of the Red Crossbill Types normally found in the eastern United States are very different from Type 5 flight calls: Types 1 and 2 have downward-modulated calls (Groth 1988, Young 2008), Type 3's call has a zig-zag shape, Type 4 shows "v"-shaped calls, and Type 10 often has checkmark-shaped call. Type 5 produces one of the call types most easily distinguished by ear, but Type 3 can sound similar at times (pers. obs.; N. Pieplow, pers. comm.)

Despite the remarkable variation in vocalizations, morphometrics, and ecological associations in the Red Crossbill complex, the Types appear to fall into two groups in North America: those that follow fluctuations in unstable cone crops (Types 1, 2, 3, 4, 10, and likely 7); and those that occur mostly in areas with more stable cone crops, such as certain pine forests (Types 5, 6, and 9) and/or insular (Newfoundland Type 8) or island-like (South Hills Type 9; see Benkman et al. 2009) geogra-

Figure 3. Spectrograph a flight call of Type 5 Red Crossbill, recorded at Odell Creek, Oregon on 26 July 1988. ***Spectrograph by Jeff Groth.***

phy with relatively stable cone crops. For the most part, smaller-billed Types are more nomadic, following fluctuating cone crops, such as those of Douglas-fir (*Pseudotsuga menziesii*), Western Hemlock (*Tsuga heterophylla*), and Sitka Spruce (*Picea sitchensis*) (Benkman 1993a, Irwin 2010). More sedentary types, which have larger bills, tend to inhabit areas that produce more stable conifer cone crops, such as Lodgepole Pine forests (Benkman 1993a, Benkman 2009). An exception to this pattern is the highly nomadic, large-billed Type 2—most abundant in Ponderosa Pine (*Pinus ponderosa*) forests, which produce highly variable cone crops (Parchman and Benkman 2008). Type 5 has some nomadic tendencies (C. Benkman, pers. comm.), and it stands to reason that Type 5 individuals could wander still more widely during die-offs of Lodgepole Pine, such as have been occurring in the West because of widespread severe Mountain Pine Beetle (*Dendroctonus ponderosae*) outbreaks since 1996 (Safranyik and Carroll 2006).

Each Red Crossbill Type probably occupies what several authors have called a "core zone," an area in which the Type most commonly occurs (Dickerman 1987, Knox 1992, Kelsey 2008). When in their core zone, many Types appear to forage most efficiently on a single key conifer (Benkman 1993), but all Types also feed on seeds of multiple coniferous species and can be seen switching to those conifers that provide the highest energy yields throughout the cone cycle (Benkman 1987). In addition to the regularly used Lodgepole Pine and Engelmann Spruce, nesting Type 5 Red Crossbills have been found feeding on seeds of Douglas-fir and of Blue Spruce (*Picea pungens*) in Wyoming (Kelsey 2008), and Type 5 has been observed occasionally nesting in Sitka Spruce forests in coastal California (K. Irwin, pers. comm.).

Given their propensity for feeding on seeds of Lodgepole Pine and various species of spruce in the intermountain West, the Type 5 Red Crossbills found near Pharsalia were most likely utilizing Norway Spruce, White Spruce, or possibly Red Pine (see Benkman 1987); both Norway and White Spruce at this plantation produced excellent cone crops in summer 2006. At this location in August 2006, nesting Type 1 were utilizing White Spruce and European Larch and, to a lesser extent, Norway Spruce. At this location between April and July 2007, I observed Type 1 Red Crossbills with dependent juveniles utilizing the same Norway Spruce cone crop, as well as a single brood of Type 3 in May 2007. Given the abundant food resources in the area, one wonders whether Type 5 might have nested locally as well.

Observers in the East typically observe small- to medium-billed Red Crossbills (Types 1, 3, 4, and 10), but larger-billed individuals have been reported sporadically for many years and have been the source of much confusion in the literature. Early twentieth-century records of large-billed Red Crossbills in the Northeast were sometimes thought to have come from Newfoundland (see Griscom 1937), where Type 8 is endemic (Groth 1993). However, subsequent studies have strongly suggested that such birds were more likely to have been of Type 2, now known to roam very widely in North America, including in the East (Dickerman 1987, Groth 1988, Benkman 1993a, Groth 1993). For instance, Groth (1988) found them regularly in small numbers in Virginia and North Carolina in the 1980s, and since that time, they have been detected in Ontario (Groth 1993), Maryland, Maine, New Jersey, (Evans and O'Brien 2002, M. O'Brien pers. comm.), New Hampshire (Young, in press), and New York (pers. obs.; Groth 1993). Benkman (1993b) notes that measurements of the large-billed Type 5 almost completely overlap those of Type 2, although the widths of the grooves in their palate used for husking seeds do differ between these Types. Although Type 2 should be considered the most likely large-billed Type in the East, the verification of Type 5 in upstate New York in 2006 means that this Type should be carefully considered as well. Recordings of call-notes given by flying birds permit identification of Red Crossbills to Type and should be submitted to local avian records committees; recordings of Types that are locally unusual should also be archived at the Macaulay Library of Natural Sounds at the Cornell Lab of Ornithology.

Acknowledgments

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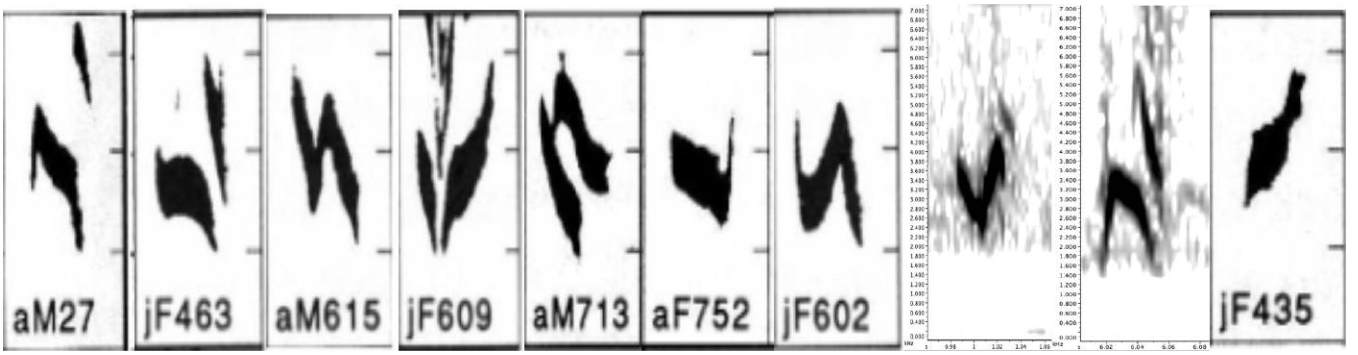

Figure 4. Spectrographs of flight calls of Red Crossbill, Types 1-10 (left to right). Types 1-7 adapted from Groth (1993) with the author's permission. Groth's Type 8 is from the original Jay Pitocchelli recording from Cape Bona Vista, Newfoundland, made in 1981. Type 9 was recorded in the South Hills, Idaho 26 April 2009 by Nathan Pieplow. The spectrograph of Type 10 is also adapted from Groth (1993), though it was described much later by Irwin (2010). The dark marks on the sides of the Groth spectrographs are for kHz lines 3, 5, and 7. ***Spectrographs of Types 8 and 9 by Matthew A. Young.***

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