

Fringillidae: split *Loxia bifasciata* (Two-barred Crossbill) from *Loxia leucoptera* (White-winged Crossbill)

Background

The Two-barred Crossbill *L. leucoptera* is in AviList recognized as a Holarctic species containing two subspecies, *bifasciata* occurring in taiga in Eurasia and *leucoptera* in North America (the latter also recorded accidentally a few times in Iceland). This single-species treatment is also adopted by eBird/Clements, BirdLife International and Howard & Moore, as was in IOC 15.1. Handbook of Western Palearctic Birds states the following: “Possibly better treated as separate species, but kept together until better studied /.../ Although such a change would probably be reasonable, morphological and vocal differences are relatively small, and we prefer to await the results of a genetic analysis and more comprehensive study of vocalisations and behaviour.” The Swedish Taxonomic Committee separated *bifasciata* as a separate species in 2018, before aligning with AviList taxonomy in 2025.

Closely related to the White-winged Crossbill is the highly localised and endangered Hispaniolan Crossbill *L. megaplaga*, now confined to mountains of Hispaniola but historically also in the Bahamas, where it was extirpated after the Pleistocene–Holocene transition. During the cooler climates of the Pleistocene, *megaplaga* may have had a much broader distribution across the Caribbean (Steadman and Franklin 2017).

The Hispaniolan Crossbill was previously included in *leucoptera*. Since 2003 it is recognised as a separate species (Banks et al. 2003), being isolated since at least the Pleistocene (Woods et al. 1992) and at most 680,000 years based on mitochondrial DNA analyses (Parchman et al. 2007). Furthermore, *megaplaga* has a much larger bill, closer to Red Crossbill (Benkman 1994, Parchman et al. 2007). Hispaniolan Crossbill is recognised by all the major world lists, including AviList.

Genetics

Using mitochondrial-DNA, Parchman *et al.* 2007 studied the genetics of the White-winged Crossbill, including *megaplaga*. The results place *megaplaga* as sister to North American *leucoptera*—*although with mediocre support (posterior probability 0.82 and bootstrap support 67%)*—with Eurasian *bifasciata* Eurasian as sister to the two (see figure). Since 2007, there have been no studies published that include nuclear data or additional mitochondrial data.

Addendum on genetics, May 2026 (not available at the time of voting for RAG-Pal)
Craig Benkman has provided input based on genomic analyses which have not yet been peer-reviewed and may not be published in their current form, but which have been included in his 2025 book on crossbills (Benkman 2025). An extract of pages 9–10 from the book is included as **Appendix 2**. The phylogeny, based on GBS data analyzed by Chad Brock, surprisingly recovers *bifasciata* as sister not to *leucoptera* and *megaplaga*, but to all all-red (non-wingbarred) species! Whole-genome resequencing will eventually confirm whether this topology is indeed the true reflection of crossbill evolution (in which case the proto-crossbill had wingbars). Either way, this indeed confirms that *L. l. leucoptera* and *L. megaplaga* are sisters and lends strong support to the notion that *bifasciata* should be split from *leucoptera*.

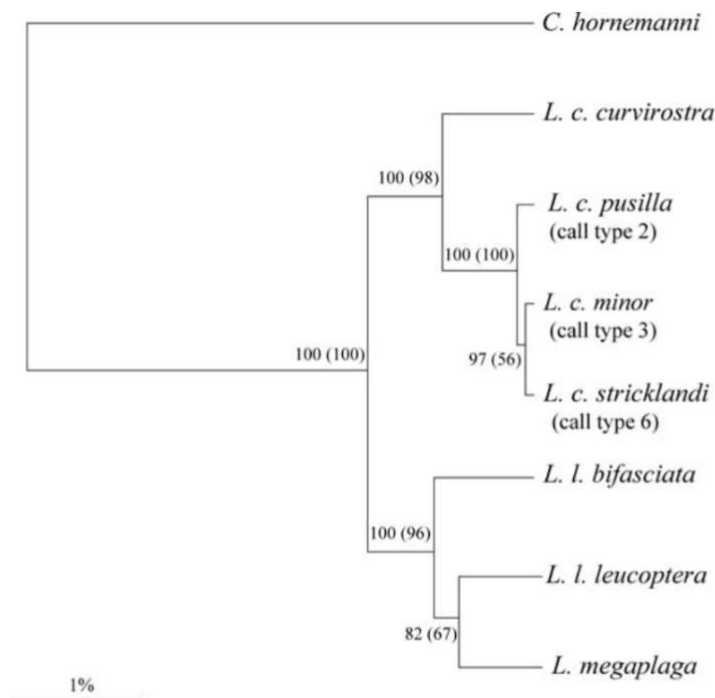


Figure 4. Bayesian phylogenetic tree with a molecular clock enforced. *Loxia leucoptera bifasciata* and *L. c. curvirostra* are Old World crossbills, whereas *L. megaplaga* (the Hispaniola crossbill), *L. l. leucoptera*, *L. c. pusilla*, *L. c. stricklandi*, and *L. c. minor* are New World crossbills, with *Carduelis hornemanni* as an outgroup. The bar in the lower left represents 1% sequence divergence. Values at the nodes represent posterior probabilities from Bayesian analyses and those in parentheses represent bootstrap support based on 1000 replicates in parsimony analyses.

Morphology

There are pronounced and consistent differences in morphology between the Nearctic and Palearctic birds. Birds of the World states “Palearctic and Nearctic populations differ in the extent of black dorsally (on adult males, at least), in body size (large in the Palearctic), and bill size and shape (small and narrow in the Nearctic).”

Furthermore: “*leucoptera* has a smaller bill than *L. l. bifasciata* /.../ has a particularly slender upper mandible relative to other subspecies and species of crossbills; narrow mandibles critical for foraging efficiently on slightly open black spruce cones.” *Bifasciata* has “less black on the mantle and lesser wing coverts; in bill size and shape it resembles large-billed forms of *L. curvirostra* in North America.” Lastly, Birds of the World states that there is negligible geographic variation across the species’ ranges within North America or within Eurasia.

According to HWPB, *leucoptera* s.s. is smaller, with a proportionally smaller head and thinner bill (8-9 mm vs. 9-10.3 mm). Streaking is heavier and darker, plumage of males “rather darker red, not as warm scarlet, invariably more carmine (colder bluish-tinged red)”.



Male and female *Loxia leucoptera leucoptera*. Photos: John Harrison ([male](#)), Miguel Mejias ([female](#)).



Male and female *Loxia leucoptera bifasciata*. Photos: [David Cooper](#).

Roselaar (in Cramp & Perrins 1994) gives mean bill depth of 10.3 mm for 18 males (range 9.7–11.0) and of 10.1 for 14 females (range 9.4–10.7) of *bifasciata*. For *leucoptera*, mean bill depth is given as 8.4 for eight males (range 7.8–8.8) and 8.2 for 10 females (range 7.6–9.0). Other measurements also given by Roselaar in Cramp & Perrins (1994) confirm that *leucoptera* is indeed a considerably smaller bird and it is mentioned that the white on the tips of the greater coverts and tertials is narrower.

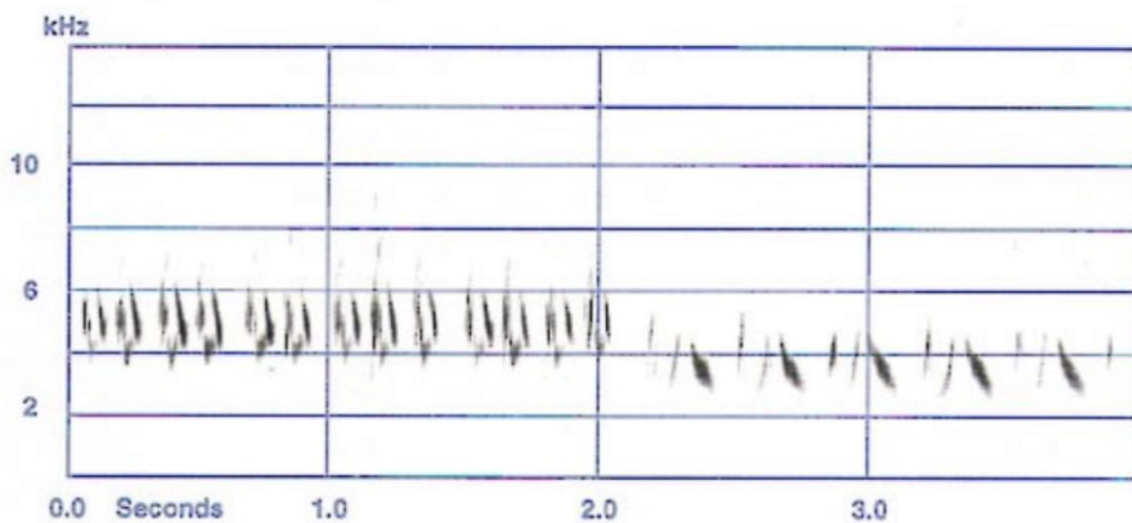
In Robb & van der Berg (2002), Magnus Robb is described as spending a week watching and sound-recording *leucoptera* in Algonquin Provincial Park, Ontario, Canada, where he notices *leucoptera* looks strikingly different from *bifasciata*. He also examined two road-killed adult males showed more contrasting black lores and a blacker rear edge to the ear-coverts, as well as a deeper-black wing compared to *bifasciata*. Parts of the plumage, especially the crown, had quite scaly appearance, due to the coloured feathers having extensive black central parts of which only a small part shows. The hidden base of these feathers is grey while the coloured part is only the very tip of the feather. In *bifasciata*, dark parts of the red-tipped feathers are less black and more greyish.

Also see the **Appendix 1**.

Bioacoustics

Elmberg (1993) describe the [song](#) of *leucoptera* as more monotonous than *bifasciata*, somewhat reminiscent of a European Greenfinch *Chloris chloris*, a calling Redpoll *Acanthis flammea* or a singing Arctic Warbler *Phylloscopus borealis*. *Bifasciata*, on the other hand, has a song described as “rich and varied, consisting mainly of clear (metallic) and slurred whistles, but also of chatters and wheezes”, frequently interspersed with any of the three basic flight calls and more reminiscent of the song of Parrot Crossbill *L. pytyopsittacus* or Red Crossbill *L. curvirostris* than of *leucoptera*.

In Birds of the World, the song is described as “a series of trills interspersed with chirps and warbles”, with no reference to differences between Palearctic and Nearctic birds (but presumably referring to *leucoptera* s.s.). The following included sonogram is from Austin (1968), most definitely *leucoptera* s.s.:



We've found no clearcut sonogram depicting the song of *bifasciata*.

In HWPB, it is stated that *leucoptera* s.s. is “said to have a different song, but this requires further study; available recordings convey fairly similar songs”.

There are surprisingly few recordings on Xeno-canto and therefore hardly more than anecdotal comparisons can be made out of that material. However, just based on these below, we find there's a discernible difference, in line with Elmberg:

Call & song *leucoptera*: <https://xeno-canto.org/157634>

Call & song *bifasciata*: <https://xeno-canto.org/175957>

In Robb & van den Berg (2002), *leucoptera* is described as having “a strikingly different vocal repertoire”, citing Elmberg 1993 and Magnus Robb (pers obs).

While we found a somewhat meager material on vocalizations, Matthew Young and Tim Spahr of the Finch Research Network (FiRN) write more extensively about differences in flight calls, excitement calls and song in the **Appendix**, in support of our proposal.

Biogeography

In Birds of the World, it is stated that “large differences in bill structure between *L. l. leucoptera* and *L. l. bifasciata* imply the taxa are ecologically distinct”. Robb & van den Berg (2002), describe *leucoptera* differing from *bifasciata* “various aspects of ecology”, although without details. Apart from a handful of accidental records in Iceland, the two taxa are wholly allopatric.

Steadman and Franklin (2017) speculate that the continental *leucoptera* may represent a sister lineage or ancestor of *megaplaga* (although they did not seem to have comparative material from *bifasciata*).

Recommendations

HWPB does find the vocal and morphological differences to be small and prefer to wait for more comprehensive studies. We acknowledge that this is definitely not a slam dunk, as nuclear studies are not available and more formal vocal studies are lacking. We have reached out to crossbill researchers to establish whether any nuclear results are around the corner. While indeed the *Loxia leucoptera* complex is being targeted for whole-genome sequencing, samples/sequences of *Loxia l. bifasciata* are currently lacking.

It will be TaxCom’s prerogative to determine whether a decision should be postponed, in favour of better genetic material in the future, or whether acting on the presently compiled data is preferable. One could argue the evidence at hand to be compelling enough to recommend a split, based on genetics, song, morphology, ecology and plumage, as had STC. Several previously Holarctic taxa have subsequently been split in two (Whimbrel, Northern Goshawk, Northern Harrier, Common/Wilson’s Snipe, etc.) and the Two-barred Crossbill would certainly follow that pattern. The differences are consistent and the populations are wholly allopatric with presumably zero gene flow.

Although the genetic results are solely mitochondrially based, it would certainly be biogeographically reasonable (and more sensible) for the Hispaniolan Crossbill to be more closely related to *leucoptera* s.s. than to *bifasciata* (or the two). One could easily imagine *megaplaga* to have evolved from overshooting dispersals from the erratically occurring *leucoptera*, turning residents in the Caribbean.

The bird has for a long time been called White-winged Crossbill in America and Two-barred Crossbill in Eurasia. Therefore, it would be reasonable to let *leucoptera* s.s. be called White-winged and Two-barred be reserved for *bifasciata*.

References

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Voting and RAG comments

All members of RAG Palearctic voted on this proposal, with 7 members voting YES (Markus Lagerqvist, Martin Stervander, Gustav Asplund, Erling Jirle, Min Zhao, Paul Donald, Pierre-André Crochet) and 1 NO (Manuel Schweizer). See <https://github.com/aviantaxonomy/RAG-assessments/issues/62>.

Submitted by: Gustav Asplund and Markus Lagerqvist, Erling Jirle, Martin Stervander (co-authors)

Date of Proposal: 30 April 2026 (amended with Craig Benkman’s genomic data 16 May 2026)

APPENDIX 1

Finch Research Network (FiRN) notes in support of a split of White-winged Crossbill (*Loxia [leucoptera] leucoptera*) and Two-barred Crossbills (*Loxia [leucoptera] bifasciata*).

**Matthew Young and Tim Spahr
30 April 2026**

The Finch Research Network (FiRN) is a nonprofit whose goal is to improve knowledge of the biology of finch species around the world. While the group currently specializes in Red Crossbills and Evening Grosbeaks, we also support research in honeycreepers, Pine Siskins and Purple Finches. Some of the motivation for the founding of FiRN goes all the way back to the early study of finches in Ontario by Ron Pittaway and Ian Newton. After founding in 2020, our initial efforts were to study North American crossbill vocalizations, with Tim and Matt having listened to easily over 20,000 recordings each. FiRN has taken on a bigger scope with interests in all Fringillidae finches but assessing the question of whether Two-barred and White-winged should be split is core to what we do. Here is a primer that we’ve written for eBird and the Finch Research Network on the Crossbill complex in North America: <https://finchnetwork.org/crossbills-of-north-america-species-and-red-crossbill-call-types>

White-winged Crossbill (*Loxia [l.] leucoptera*; WWCR) and Two-barred Crossbill (*Loxia [l.] bifasciata*; TBCR) have plumage differences, vocal differences and are geographically isolated. Our main focus below will be on the vocal differences.

Flight Calls

The flight calls of WWCR and TBCR are quite different and easily separated by ear. Both are scratchy, complex and polyphonic, but TBCR is less polyphonic. TBCR flight calls have a somewhat flatter sound, vaguely similar to those of Type 4 Red Crossbill, while flight calls of WWCR have a much more obviously polyphonic sound. Close examination of spectrograms shows much more complexity, especially at frequencies above 5 kHz, for WWCR.

Excitement/Trumpet Calls

TBCR's excitement calls are longer in duration and slightly lower-pitched than those of WWCR. This difference is easy to separate by ear.

Song

TBCR has a much simpler, slower song with discrete phrases separated by pauses. WWCR has a dramatic, rambling run-on song of chatters, trills and warbles with fewer pauses between phrases. The TBCR's song is also less musical and flatter sounding. The halting delivery can be more reminiscent of the song of the Red Crossbills than to that of WWCR.

Morphology

TBCR populations has less black on the mantle and wing coverts, while WWCR has black lores and a blacker rear edge to the ear-coverts than does TBCR. The "red" on TBCR isn't pink but more of a red, and the bill is much larger on TBCR, owing to it largely foraging conifers with much larger cones (Norway Spruce and European Larch) as compared to WWCR (which prefers Black and White Spruce and Tamarack) in North America.

Genetics

Parchman et al. (2007), using mitochondrial-DNA, found Hispaniolan Crossbill *L. megaplaga* to be closer to North American WWCR ssp. *leucoptera* than to Eurasian ssp. *bifasciata*, and such a split between WWCR *L. [l.] leucoptera* and *L. [l.] bifasciata* would be similar to the recently described continental geographic splits found with the Northern/American Goshawk and Northern/Hen Harrier.

Yardstick within crossbills

The variation in call types of crossbills (genus *Loxia*) has been the primary area of study of FiRN since its inception, with a special focus on understanding variation in call types, their ecological significance, the movements and distribution of each call type, and their significance to species limits within the genus.

Flight calls are the most measurable and common vocalization given throughout the year, and as a result, many still see them as the most reliable vocalization for identifying crossbills. In the Red Crossbill complex, the differences in sound between Red Crossbill call types can be quite small, especially for Types like type 1 and 2, and the same could be applied across species like Scottish and "Common" Crossbill and Cassia and "Red" Crossbill, but the differences between HICR, TBCR, WWCR are quite noticeable. In our view, the significant differences in flight call, trumpet/excitement call, and also song between American *Loxia [l.] leucoptera* and Eurasian *Loxia [l.] bifasciata* well exceed the differences within taxa (many call types and four current species) of the Red Crossbill

complex. By comparison, the differences in vocalizations between WWCR and TBCR seem to be similar to the scale of the differences between Hispaniolan Crossbill and either taxon. These vocal differences are supported by comparable differences in plumage and size that are consistent across the broad ranges of these taxa and support the notion that, using a 'yardstick' approach, it would be perfectly justified to treat WWCR and TBCR as species.

APPENDIX 2

Extract from Benkman (2025), pages 9–10:

Genomic data (Chad Brock, pers. comm. 2023) suggest that the earliest split among extant crossbills divided the White-winged/Hispaniolan Crossbills from the Two-barred and Red Crossbills, and that this earliest division occurred perhaps 500,000 to 2.5 million years ago (Fig. 1.5). As the Two-barred, White-winged and Hispaniolan Crossbills collectively share a set of 'wing-barred' traits, it is likely that these same traits were present in the shared crossbill ancestor. It seems likely that the ancestor of the Red Crossbills split from their closest relative,

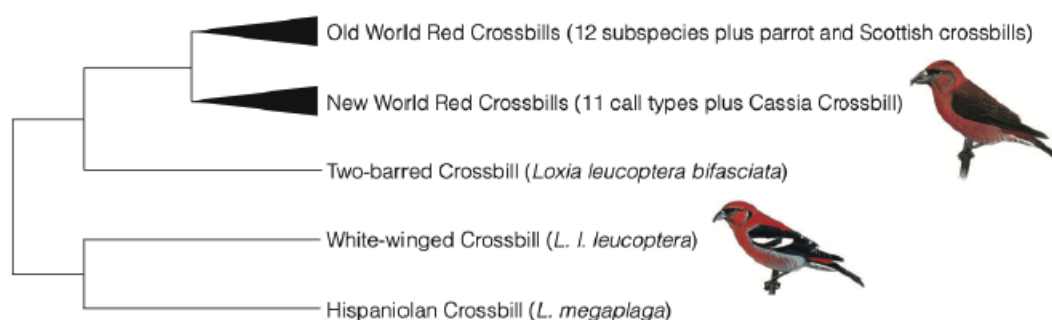


FIGURE 1.5 A phylogeny of crossbills showing the main and most strongly supported splits. A male Red Crossbill *Loxia curvirostra* from North America and a male White-winged Crossbill *Loxia l. leucoptera* are shown to scale. All 'Red Crossbill' taxa are fairly similar in plumage whereas they differ substantially in bill and body size. The three lineages of wing-barred crossbills (Two-barred, White-winged and Hispaniolan) are similar in plumage, and each is represented by a single species or subspecies. The difference between the average bill depths of the smallest and largest taxa is substantially smaller in the wing-barred crossbills (2.30 mm) and New World 'Red Crossbills' (2.80 mm) than in the Old World 'Red Crossbills' (5.92 mm). Bird illustrations from Sibley (2014) with permission from David Allen Sibley.

the Two-barred Crossbill, probably in Eurasia since that is where the Two-barred Crossbill is found. Red Crossbills may have then colonized North America about 160,000 to 550,000 years ago. Alternatively, the split between Two-barred and Reds could have occurred by an initial colonization of North America and then a subsequent colonization of Eurasia by Reds. Regardless of which scenario is correct, independent radiations in each hemisphere resulted in a current total of 26 'Red Crossbill' taxa (Fig. 1.5).