

TAXONOMIC COMMENTS ON RED-TAILED HAWKS

WITH MAP

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In view of the treatment of the Red-tailed Hawks (*Buteo borealis*) in Peters' "*Birds of the World*" (vol. 1, 1931, pp. 231-232), it seems desirable to review the collection upon which a previous study (Taverner, Museum Bull. 48, Victoria Memorial Museum, 1927) was founded. This material consists of 121 specimens taken across the continent and critical notes made upon nearly as many more in other collections. Many of the birds were collected from the nest, and many of these were accompanied by young in advanced plumage. For the primary conclusions herein reached only breeding birds or those whose residential status can be confidently assumed have been used. The evidence is therefore more dependable than if deduced from migrant or wintering material of uncertain geographic origin. In this discussion the interest is taxonomic rather than nomenclatural and I disregard the specific name *jamaicensis* in favor of the more familiar *borealis*.

There are two recognizably distinct plumages in the species: the juvenile (yearling) and the adult. There are no distinctive sexual differences except those of size. The plumage acquired in the nest is held until the following summer, when it is molted for one which is retained throughout life without material alteration or progressive development. This is shown by some fifteen or more yearlings that are going directly into fully developed adult plumage and adults undergoing their annual mid-summer molt without change in color or pattern. In no case is there perceptible change, except as above, aside from that due to fading and wear. There is no recognizable second year plumage as has been postulated by some students of the species.

Juveniles and yearlings, besides their distinctive first-year plumage, have narrower, more sharply pointed tail feathers than adults, in which latter, the tail tips unless reduced by wear are broadly rounded or nearly square. Young birds in, or lately from, the nest often show the white areas distinctly buffy, but this buffiness is largely evanescent and often quickly fades to pure white before fall. Except for melanistic tendencies in certain strains, the tail coloration is the best indicator of racial affinity. The barring of the thighs (flags) is a less reliable diagnostic character than has been generally supposed. A common tradition that juveniles overmeasure adults is not supported by the evidence; on the average, the contrary is the case.

The breeding adults, arranged geographically, fall into four generalized color groups, highly variable in detail but practically constant in essential characters.

1. An eastern type of moderate depth of coloration, with a plain red tail usually with black subterminal bar. This group is the most variable in size, but is more constant in color than any of the others. Color variants occur but are the exception rather than the rule. This is *Buteo borealis borealis* (Gmelin).

2. A far western type, usually heavily colored, with a black phase and many intermediates between the extremes. Many may be erythro-melanistic—generally black with areas of dull red, especially on the breast (II, 8). References so given refer to color plates and figures in my study of *Buteo borealis* cited previously. The most constant character is a red tail crossed by several more or less sharply defined black bars. Within wide limits of variation it is as constant through a far western range as *borealis* is through an eastern one. This is *Buteo borealis calurus* Cassin.

3. A mid-western type with greatly reduced coloration and tail largely white. Its distinction is its general whiteness. It is as if *borealis* were bleached to partial whiteness, with only the heaviest color masses remaining. The same general character is exhibited by both juvenile and adult. Typical examples are illustrated: the adult in Roberts' "*Birds of Minnesota*", plate 15, the juvenile (I, 1).

This whiteness is highly variable in individuals in both degree and amount. This type has been known as *Buteo borealis kriderii* Hoopes.

4. A northwestern type, possibly, but not certainly, with two phases. It averages slightly larger than the others and the blacks are unusually deep and rich. The tail is figured with specklings, marblings or cloudings of black, gray, red and white in any combination or proportion, with a tendency to longitudinal streaks instead of transverse bars. The unique tail is the only definitely recognizable distinctive character. This bird we have commonly called *Buteo borealis harlani* (Audubon) as per British Museum Catalogue of Birds (vol. 1, p. 191). (Typical examples of tail, I, 16-21.)

With these definitions we find the following breeding distributions.

In eastern Canada, including Ontario, comparatively pure *borealis* (I, 1-3).

In southern British Columbia, practically pure *calurus* (I, 5, 6; II, 8; III, 1).

Besides the above comparatively pure breeding strains we have the following mixed associations.

In southern Manitoba, *borealis*, *calurus* and *kriderii* (II, 6).

In southern Alberta, *borealis*, *calurus*, *kriderii* and *harlani* (II, 2-5; III, 6, 7).

Along the British Columbia-Yukon boundary and in near-by Alaska, *harlani*, *calurus* and *kriderii* (III, 2, 3; I, 1, 12, 23).

Not only are these in close proximity, but in at least one case actual mixed breeding, *calurus* x *harlani* has been collected from the nest (III, 2-5).

In these mixed populations occur many birds of hybrid character. Among the specimens it is easy to pick out specimens which appear to be results of the following matings:

borealis x *kriderii*

borealis x *calurus*

borealis x *harlani*, see Ridgway, Auk, 7, 1890, p. 205.

calurus x *kriderii* (II, 3)

calurus x *harlani* (III, 4, 5)

harlani x *kriderii* (III, 3) also "Buteo cooperi"

In some cases the characteristics of three and even four forms can be recognized in a single individual. There are many peculiar color combinations and the young do not always follow the character details of their parents. For instance, from southern Manitoba and southern Alberta we have parent birds practically pure *borealis* in body plumage but with the white tails of *kriderii* crossed by the bars of *calurus*. The young of these reverse the characters and are *borealis* (or *calurus*) in tails and *kriderii* in body (II, 3, 4, 6, 7). Another female of general *calurus* or *borealis* cast, from southern Alberta, shows *kriderii* strain in a white tail which is strongly streaked with longitudinal markings of *harlani*. Its young shows the *kriderii* influence in crown and face (III, 6, 7). (See fig. 14.)

Similar examples of the erratic inheritance of characters in generations of mixed strains is exhibited in a family of flickers (*Colaptes*) in this museum. The two parents are obviously of mixed blood, one predominantly *cafer*, the other predominantly *auratus*. Of the five nest-mates of this union three are distinctly hybrid of different types, while the other two are, by all external appearance, pure *auratus*. These and the hawks seem to show "relative independence of characters after crossing due to the existence of separate Mendelian genes and their capacity for recombination" (Julian Huxley, Yale Review, 24, 1935, p. 678.). It is practically certain that none of the birds in these mixed populations can be regarded as of pure descent from any one race. The strains are mixed and mongrelized. Even the most typical-appearing individual undoubtedly has recessive genes that may "throw" other racial characters in subsequent generations.

Distributional evidence reveals that only *borealis* and *calurus* have ranges apart

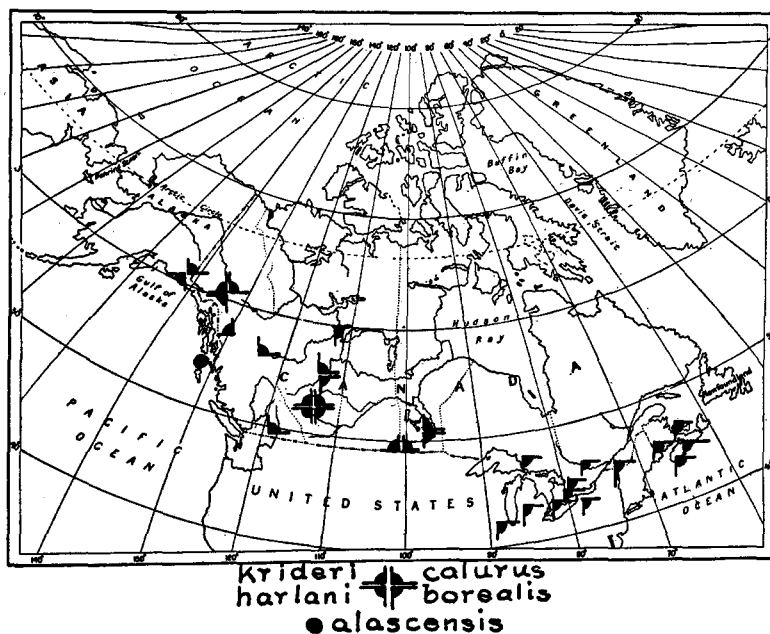


Fig. 14. Map of northern North America showing localities of breeding records for the kinds of Red-tailed Hawks.

from other strains of the species. They are well-marked, fairly consistent and geographically independent, and they can be regarded as valid races or subspecies. *Kriderii* and *harlani* occur only in association with each other or with *borealis* or *calurus*. They therefore cannot be subspecies in the current use of the term. They must be called either dichromatisms or full species.

Kriderii in effect is but a bleached *borealis*. It presents only a dilution, diminution or suppression of color and hence introduces no new factor into the species. It is unstable, no two birds being alike. Completely typical birds are rare and the majority show their *kriderii* natures in different details and in varying degree. It is quite possible to postulate *kriderii* as a distinct species far gone in mongrelization with *borealis* and allied strains. But in view of the fact that dichromatism is a common tradition in the genus *Buteo*, and because there is no new feature introduced and the distinctions are quantitative rather than qualitative, it seems the conservative course to consider the case one of dichromatism.

Harlani presents a different problem. Birds that can be regarded as typical are not uncommon and the characters seem to have some degree of fixity. The increase in darkness of color and the slight average superiority in size may be mere varietal characters, but more important is the tail; and this is unique in the genus. The peculiar mottling of the tail and its tendency towards longitudinal instead of transverse marking is an entirely new color pattern; and it is qualitative in character instead of quantitative. On these considerations it seems logical to regard this as a full species which hybridizes freely with *borealis* in all its forms. That it does hybridize with *calurus* is unmistakably demonstrated by a family from the Mount Logan region, Alaska (III, 2-5). That it crosses with *kriderii* is shown by the southern Alberta bird in which *harlani* markings are plainly superimposed on an

otherwise *kriderii* bird (III, 6). Both *kriderii* and *calurus* can be demonstrated to occur in both these regions.

Whether pure *harlani*, if such a thing exists today, has a light phase or not is uncertain. There are many unmistakably *harlani* birds with extensive white below and with whitened tails, but whether these are normal dichromatisms of the species or the results of matings with *kriderii* individuals, there is no way of deciding. Until evidence is produced to the contrary, it seems most probable that the original stock of *harlani* was all black, with tail marbled with black and gray (I, 20), and that variants from this type denote other blood strains—intermixtures of red from *calurus* or *borealis* (I, 18, 19, 21) and of white from *kriderii* (I, 17; III, 3). Whether this species arose as a mutation from an existing form of *Buteo borealis* or evolved from a coordinate branch of the genus is a question of origin, not of present fact, and hence outside this inquiry.

As said before, *borealis*, except for size which is surprisingly variable, is the most constant form of the species. But even in the apparent centers of its range occasional *calurus*-like birds appear. Whether these are spontaneous variants, the results of occasional previous *calurus* matings, or stray wanderers from the west, is uncertain. Until eastern breeding of such individuals is demonstrated, it seems prudent to call them of the latter category. The birds of the southern prairies of Canada are predominantly *borealis*, more uniform toward the north and more like *calurus* westward toward the mountains.

Calurus is astonishingly variable in color, ranging from solidly black, except tail, like the type specimen of the race (III, 1) and erythrism (II, 8) to birds that might pass as richly colored *borealis*, with every intermediate degree. Even the multiple barring of the tail may be absent in specimens that are otherwise well-characterized *calurus*. If birds occur that are *borealis* in body and *calurus* in tail, and others, conversely, with *calurus* body and *borealis* tail, it seems that the re-shuffling of genes can produce individuals of pure *calurus* descent but inseparable by us from typical *borealis*. There are breeding specimens from undoubted *calurus* communities that would pass anywhere in the east as typical *borealis*. These are converse cases to the *calurus* intrusives in *borealis* territory, mentioned before.

The occurrence of occasional individuals of one race within the established range of another is not peculiar to Red-tailed Hawks, but occurs in many other species. How to designate them, whether to name them by their apparent characters or by their probable genetic descent, is a matter of differing opinion. But with the general constancy of *borealis* in the east and *calurus* in the west, the occurrence of such occasional exceptions to the rule is not sufficient to invalidate either form as a subspecies. The characters are well marked and probably over ninety per cent of the specimens from extensive areas can be unhesitatingly identified.

A form, *Buteo borealis alascensis* Grinnell, has been recognized by Peters and by some other authors, but it is not in the A.O.U. Check-list. The type locality is Glacier Bay, Alaska, and it is presumed to be a coastal form ranging south to the Queen Charlotte Islands. From this latter locality we have eight juveniles of the year and one adult male in erythro-melanistic plumage (II, 8). From the date and from the thickened skin on the throat, the latter can reasonably be assumed to be a local breeder.

(These large hawks in brooding commonly rest their heads upon the rough nest edge. This wears away the feathers and causes a rugose condition of the throat. In fresh birds the corrugations are often pronounced and yellow-tipped like the

cere. In dried specimens the effect is less apparent, but the thickening of the skin is usually in evidence.)

As far as color goes there is nothing distinctive from *calurus* in any of these Queen Charlotte birds. However, all are consistently and distinctly small, the largest female (wing 368 mm.) being smaller than the smallest male in the transcontinental series, except some of the eastern *borealis* variants. They can be described as small *calurus* and as such upon present evidence can be given rather guarded acceptance as a subspecies of *Buteo borealis*.

A subspecies that has lately been described is *Buteo jamaicensis fuertesi* Sutton and Van Tyne (Occas. Papers Mus. Zool., No. 321, Univ. Mich., 1935, p. 1) [= *Buteo borealis fuertesi*] from Texas. The privilege of examining the type series of this race has been available. It strikes one as being *borealis* slightly pale in color and nearly immaculate below and on the flanks. It is quite within the possible range of hybridism between *borealis* and *kriderii*, and similar birds can be expected to occur occasionally wherever these two strains are in contact. However, the constancy of this particular assemblage of characters in some twelve specimens makes one pause before summarily dismissing the race, especially as we have at this time no evidence of *kriderii* breeding in the neighborhood. This series includes breeding birds, so the question of migration does not cloud the issue. But here again we find cross-breeding. One of these birds was mated with a typical light-phased *calurus*, and another shows distinct *calurus* tendency. A survey of the breeding birds from the surrounding territory is desirable to establish that this is not more than a recurrent type of *kriderii* hybrid. In the meantime it may be well to accept it as a recognizable race.

One other bird has come under the purview of the writer, *Buteo cooperi* Cassin. The type and only specimen has aroused considerable speculation. In the light of the above experience there can be no hesitation in regarding it as a hybrid between *kriderii* and *harlani*. In general, it is of *borealis* type, rather pale, with tail largely white and with characteristic *harlani* markings. Its tail is approximately like the bird figured in Plate I, figure 18 (*op. cit.*) but with more white toward the base and with markings about half as extensive.

A key to the adults treated here may be constructed as follows:

- Tail plain red, usually with black subterminal bar. Body moderately colored, below predominantly white to rich cream.
- Dark markings on flank and abdomen pronounced.....*borealis*
 Few or no dark markings on flank and abdomen.....*fuertesi*
- Tail red, usually crossed by several dark bars more or less sharply indicated (rarely as above).
 Body more or less heavily colored, in extreme cases even to solidly black below and above.
- Wing over 368 mm.....*calurus*
 Wing 368 mm. or under.....*alascensis*
- Tail largely white. Body with much white below on flanks, face, crown and intermixed in scapulars. Some of these details may be lacking.....*kriderii*
 Tail curiously speckled, marbled or clouded, with tendency toward longitudinal streaks. Body usually more or less completely rich chocolate black.....*harlani*
- Combinations of above characters show hybridism or intergradations between forms.

This key is a guide to the identification of adults of the species and races, but identification of juveniles is more difficult and probably in some cases impossible. Juvenal *calurus* and *alascensis* are separable (?) by size. Juvenal *calurus* in light phase is so much like corresponding plumage of *borealis* that no definite line can be drawn between them. *Calurus* usually shows more black below, and the ground color of the tail may have more red (I, 7). But these details are not constant; true *borealis* may

show as much black as many *calurus* and the tail may be distinctly rusty. Juvenal *calurus* in complete or partial black phase can of course readily be told from *borealis* but not from *harlani*, which latter may also be more or less solidly black.

Juvenal *harlani*, judging from young birds of known parentage (undoubtedly all of more or less mixed descent), average considerably richer in the blacks than the few equally authenticated similar birds available that we have good reason to ascribe to *calurus*. There is, however, no evidence to justify the conclusion that *calurus* cannot be as richly black as *harlani*. Both are variable in this particular and undoubtedly show considerable overlapping. In the series before me are a number of black juveniles. They can be separated into two groups on various arbitrary criteria, but there is no certainty that the division accords with genetic relationship.

Juvenile *kriderii*, in the less diluted strains, is distinctly recognizable. The ground color of the tail is light, even to almost pure white against which the cross bars common to all juveniles of these species stand in strong contrast. The body below has the black markings much reduced or absent. The crown and face may be largely white, and there may be extensive intrusions of white in the scapulars. Strongly marked birds, in which some or all these characters obtain in definite degree, are easily recognized but are not common. The type specimen (II, 1) is the extreme in this direction. With individual variation, or the intrusion of other blood strains, these characters are weaker and in many cases their presence or absence requires some experience with the species for evaluation.

Fuertesii, as far as seen in the type series, might well be taken for a *borealis* x *kriderii* hybrid, with the *kriderii* influence restricted to the underparts and the flanks. At present, geographic considerations must be important in its identification.

The systematic results of this study divide the birds treated, as follows:

Buteo borealis (Gmelin)

Buteo borealis borealis (Gmelin), with white phase [*kriderii*].

Buteo borealis calurus Cassin, with black phase.

Buteo borealis alascensis Grinnell (?).

Buteo borealis fuertesii Sutton and Van Tyne.

Buteo harlani (Audubon)

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