

GEOGRAPHIC VARIATION IN THE NORTHERN WATER-THRUSHES

WITH ONE ILLUSTRATION

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Knowledge of geographic variation in the Water-thrush (*Seiurus noveboracensis*) up to the present has led to a concept of two races within the species. Of these the one breeding in western North America has been characterized by Ridgway (Birds N. and Mid. Am., II, 1902, pp. 645-646) as larger, less yellow beneath, and less olive and more sooty above in contrast to members of the eastern population. Frequently it has been difficult to assort birds from intermediate points and from regions apart from the centers of differentiation into the two subspecies. (See Taverner, Ottawa Nat., XXXIII, 1919, p. 18). As with many other instances of incipient geographic differentiation, even in the geographic centers of one of these races individuals may appear with characters that show a considerable approach to the other race. Geographic segregation and correlation of characters (presumably heritable) are incomplete not only at the borders or zones of intergradation but to some extent throughout each race. The degree of character segregation which shall be set, arbitrarily, as the minimum basis for separate nomenclatural treatment is of little moment and will ever be open to discussion because of varying philosophies of taxonomy and the inflexibilities of our artificial Linnaean classification. We have attempted to make some progress in understanding the trends of geographic variation in *Seiurus noveboracensis* and to determine the extent to which characters are uniform and segregated in the races.

We are indebted to the following persons for opportunity to study water-thrushes either in their personal collections or in collections in their charge: Mr. Ralph Ellis; Mr. Reed Ferris; Mr. Joseph Mailliard; Mr. Kenneth Racey; Mr. H. S. Swarth, of the California Academy of Sciences; and Dr. Alexander Wetmore, of the United States National Museum. With the addition of material in the Museum of Vertebrate Zoology and the McCabe collection, about 150 specimens have been available. We have been especially fortunate to have at hand on loan from the National Museum the type of the Alaskan race, *notabilis*.

The three general characters, color of dorsum, yellow of underparts, and size, which Ridgway treats, are the only ones we have found to be geographically variable. Comparing birds of the Atlantic coast region with those breeding in Alaska we find that in the former the color dorsally of those in fresh plumage (10 specimens) is distinctly greenish (dark greenish olive). This is evidently the olive of the eastern bird to which Ridgway refers (*op. cit.*). The greenish hue is apparent especially in freshly molted July- and August-taken specimens. Fresh plumages of Alaskan birds (11 specimens) are much more neutral, almost lacking in green, and with a faintly reddish hue visible in certain lights; the mass effect is near olive brown. In worn spring plumages these delicate shades of green and red are lost for the most part, and the difference in the two populations impresses one as being chiefly that of differing values of the same color, the Alaskan group being the paler. From these geographic extremes, birds may in all cases be separated as regards color of the back in fresh plumage. In spring plumage there are two or three skins that might be confused; these are specimens, apparently somewhat soiled, in the Alaskan group (21 specimens) that appear practically as dark as the eastern series (10 specimens).

Color of the underparts of Alaskan birds is much whiter in series than is that of Atlantic coast specimens. The character is subject to more individual

variation than is the color of the dorsum. We are not able to detect any orderly change in the yellow as between fresh plumages and worn spring plumages. Possibly there is some paling of the yellow as Dwight has indicated (*Annals N. Y. Acad. Sci.*, XIII, 1900, p. 276), yet in series from the same locality spring plumages are not perceptibly paler. Out of thirty-two Alaskan birds in various plumages we found three that could not be segregated from the eastern group.

AVERAGE MEASUREMENTS IN MILLIMETERS OF *Seiurus noveboracensis*

Group	No.	Males			No.	Females		
		Wing	Tail	Tarsus		Wing	Tail	Tarsus
Atlantic Coast, migrants and summer residents	11	75.22	50.88	20.75	5	72.40	50.18	20.96
Upper Mississippi Valley, migrants	7	74.74	50.85	20.96	6	72.72	50.14	21.23
Lake Athabasca, summer residents	4	74.24	50.78	21.21	3	72.84	48.23	21.24
Mackenzie Valley, summer residents	6	74.74	51.47	21.79	..	.....	.....	.....
Rocky Mts. of United States chiefly migrants	6	77.51	54.13	21.91	..	.....	.....	.....
Alaska, summer residents	16	76.71	53.22	21.44	14	73.53	50.65	21.74
Northern British Columbia, summer residents	6	73.45	51.50	21.67	..	.....	.....	.....
Central British Columbia, summer residents	11	73.65	51.82	21.35	..	.....	.....	.....

Size is perhaps best represented by wing length, although tail and tarsus measurements, as may be seen in the table, show somewhat similar trends of variation.

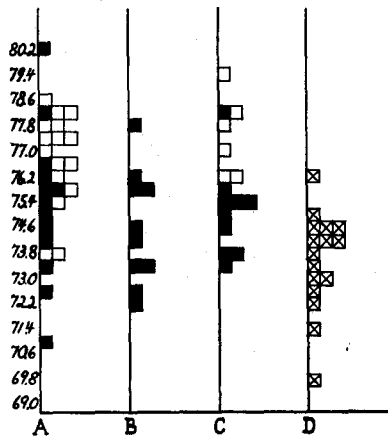


Fig. 43. WING LENGTHS OF MALE WATER-THRUSHES, IN MILLIMETERS. SIZE CLASSES INDICATED AT LEFT OF GRAPH; EACH SQUARE REPRESENTS A SINGLE BIRD. A. SOLID SQUARES, ATLANTIC COAST MIGRANTS AND SUMMER RESIDENTS; OPEN SQUARES, ALASKAN SUMMER RESIDENTS. B. SUMMER RESIDENTS OF LAKE ATHABASCA AND UPPER MACKENZIE RIVER. C. SOLID SQUARES, MIGRANTS FROM THE UPPER MISSISSIPPI VALLEY; OPEN SQUARES, CHIEFLY MIGRANTS FROM ROCKY MOUNTAINS OF UNITED STATES. D. SUMMER RESIDENTS OF CENTRAL AND NORTHERN BRITISH COLUMBIA.

Bill length is not greater in the western populations, contrary to Ridgway's statement (*op. cit.*, p. 645); in our series it is actually, on the average, smaller. The average difference between Alaskan and Atlantic coast groups in wing length amounts to about 2 percent in males. Between the groups from the Mississippi and

Mackenzie valleys (including Lake Athabasca) and those from the Rockies of the United States the difference is about 3.8 percent. The numbers of females available are in most instances too small to warrant a fair comparison. In such a quantitative feature as wing length the degree of segregation geographically of the size groups may be illustrated graphically (fig. 43A).

From this graph, the considerable overlap of eastern and Alaskan groups is obvious. A few widely variant individuals occur in each group; but even apart from these the solid massing of each of the two groups shows a pronounced overlap. Nevertheless, the difference indicated by the averages is also apparent in the higher mode of the Alaskan group.

Our material has permitted of two groupings of individuals from areas intermediate geographically between Alaska and the Atlantic coast. One of these is a series taken in late May and June, and without much doubt breeding, from the vicinity of Athabasca Lake, Alberta, and from the upper (southern) Mackenzie River. Only one fresh plumage from this section is at hand. It is indistinguishable in dorsal coloration from eastern birds, but is as pale below as Alaskan birds. It is of small size. Coloration dorsally and ventrally of the series of spring-taken specimens (12) can only be described as intermediate between the two extremes. Individually many split the slight difference between Alaskan and eastern races and so are to be separated with difficulty from either. Others are entirely inseparable from one or the other of the extremes. The mass effect of the series is that of coloration very close to a point mid-way between extremes. Wing length and tail length, both as to averages and distribution of individuals in size groups, are essentially the same as the eastern population, and no intermediacy is suggested (see fig. 43B). The tarsus, however, is similar to the Alaskan series.

The second geographically intermediate series is a group of mid-western birds (17) chiefly from Illinois and Wisconsin. They all were taken off their breeding grounds, yet many were close to the breeding area. It is to be supposed that they represent birds that breed in Minnesota, Michigan and adjacent parts of Canada. We can distinguish neither the fresh or worn plumages from the Atlantic coast series. The average size and the distribution of size classes correspond with eastern populations (see fig. 43c, solid squares).

The generally accepted view that the water-thrushes breeding in northern Michigan are of the western type we can not concur in, if this sample of migrants is a justifiable criterion. This does not mean, however, that the Mackenzie region contains the only intermediate population. Since summer resident water-thrushes of Minnesota have been spoken of as the western race or as intermediates (Roberts, *The Birds of Minnesota*, Univ. Minn. Press, II, 1932, p. 251) and since Taverner (*loc. cit.*) encountered a mixture of types at Shoal Lake, Manitoba, it is more than probable that the condition of mixed eastern and Alaskan characters prevails through a wide belt in interior Canada. Only at the extremes, then, do we find a segregation of color characters that may be said to constitute a race. The character of size (wing and tail length) does, however, exhibit no intermediacy in this wide interior belt. The shifting of the average from the eastern to the Alaskan figure must take place west of the upper Mackenzie Valley. If our figures for tarsal length are reliable, the slight change in this dimension takes place east of the Mackenzie, possibly beginning in the longitude of Wisconsin.

Water-thrushes are known to breed in northwestern Montana and adjoining parts of Idaho and British Columbia, but an almost complete lack of unequivocal

samples greatly limits our analysis of variation in this area. Only two birds represent the breeding population. One is an immature male taken July 24, 1860, at Camp Mooyie, British Columbia. [This is listed in Ridgway (*loc. cit.*) as Camp Moogie, Washington. The camp was one of those of the Northwest Boundary Survey just north of the United States Boundary opposite the Idaho-Montana line on the Mooyie (now Moyie) River.] The second bird is a male taken June 13, 1878, at Florence, Montana. It is, without any serious doubt, a breeding bird, although the date is not much more than two weeks later than the migratory wave through this region. (See Cooke, *Biol. Surv. Bull.*, 18, 1904, pp. 105-106.) Both birds are large, wings 77.71 mm. and 78.32 mm., respectively, and in coloration match the extreme of pale breast and light olive brown dorsum of the Alaskan series. Six other birds, migrants from the northern Rockies of the United States, match both the Alaskan series and these two summer residents perfectly as to size and color. The distribution of size classes is seen to compare closely with that of the Alaskan group and to stand in sharp contrast to the mid-western migrants (see fig. 43c). The type of *notabilis* from Como [Lake], Carbon County, Wyoming, taken May 19, 1878, is one of this group of migrants. It represents, therefore, either the breeding population of Montana or Alaska, both of which nomenclaturally must be termed *notabilis*.

A priori one might assume that the breeding birds known to occur in interior British Columbia would be of the same sort, that is, *notabilis*. Swarth (*Univ. Calif. Publ. Zool.*, 24, 1922, p. 292) already has suggested that this is not the case. Material recently taken in the loop of the upper Frazer River, in the Itcha Mountains (by Mr. Racey), and in the Bella Coola Valley, proves that birds from the central section of the Province, from the Rockies to the sea, develop different characters and different combinations of characters from those encountered elsewhere in the range of the species.

The backs of this central British Columbian group (9 spring plumages; 5 fresh plumages) are still more neutral in hue than the Alaskan birds, but instead of being paler they are darker in tone than even the eastern birds. The result is a color between olivaceous black and dark grayish olive, becoming more neutral and sooty in extreme wear because of the greater exposure of the especially dark central parts of the feathers. Birds of this sort may have entered into the formulation of Ridgway's description (*loc. cit.*), which was not the original description and which may have been a composite picture, since "grayish sooty" was his characterization of the back. Beneath, these birds are intermediate as a series between Alaskan and Atlantic groups. They do not attain the mass effect of yellow of *S. n. noveboracensis*, yet none reaches the extreme paleness of certain *notabilis*. Thus, as a group, the underparts compare closely with the Mackenzie-Lake Athabasca series. The size is the least of any population thus far discussed (fig. 43d). They segregate in this regard from *notabilis* much better than do eastern and mid-western series. In one dimension, that of tarsus, they are as large as *notabilis*. To summarize, the British Columbia race surpasses *notabilis* in neutrality of color above, and surpasses *noveboracensis* in darkness of tone; in yellow beneath it is intermediate; in size, with the exception of the tarsus, it is the smallest of the species.

Eight specimens from the northern half of British Columbia (Skeena to Dease River) constitute a group which is identical in size and ventral coloration with the central British Columbian series. However, they do not show the extremes

of sooty neutral dorsum. Most could not be separated individually from the population farther south. It appears that diminution of the dorsal coloration occurs to the northward, but the resemblance is still closest to the birds immediately to the southward rather than to *notabilis* or *noveboracensis*.

The problem remains whether there is a continuous breeding range of *notabilis* from Montana to Alaska. It seems at present uncertain that there is. Since the Athabasca and Mackenzie birds are not true *notabilis* and since a different race occupies British Columbia between the Rockies and the coast range, the only chance for continuity is along the east face of the Rocky Mountains. It is a little difficult to believe that such a connectant strip would exist uninfluenced by the dark British Columbian bird on the west flank of the continental divide. As far as present evidence indicates, *notabilis* exists as two separate breeding colonies.

Inasmuch as the geographic variation has been shown to include three distinct groupings of characters it is certainly misleading to use only two subspecific names. Either three subspecific names or none should be employed to suggest conditions known to exist. In using three names it must be emphasized that they can only be applied rightly to representatives of the three areas of differentiation where characters are well segregated and developed to an extreme. We should be reconciled to leave unsettled as to trinomial a vast intermediate population, too unstable for separate recognition as a fourth group, and yet probably as large as any of the definable races. Perhaps one plan of action would be that used in some botanical classifications of designating these non-differentiated individuals by a binomial only, *Seiurus noveboracensis*. Only populations set off by a distinct segregation of characters would bear a third, varietal or subspecific name. To completely abandon simple binomial designations for uniform trinomial treatment in species exhibiting geographic variation has sacrificed a flexibility which a mixed binomial and trinomial usage would give and which might be very serviceable in expressing certain types of geographic variation. Regardless of the manner in which names are to be used, it is necessary to have available, as of equal value with *notabilis*, a name for the bird of British Columbia.

Seiurus noveboracensis *linnaeus*, subsp. nov.

British Columbia Water-thrush

Type.—Male, no. 62881, Mus. Vert. Zool.; Indianpoint Lake, Cariboo District, British Columbia; June 8, 1930; collected by T. T. and E. B. McCabe; orig. no. 520.

Measurements of type.—Wing, 73.31 mm.; tail, 54.35; tarsus, 20.12; middle toe, 12.61; bill, from nostril, 9.97.

Diagnosis.—Summarized from foregoing discussion: dorsum between olivaceous black and dark grayish olive; underparts with yellowish averaging less than in *S. n. noveboracensis* but more than in *S. n. notabilis*; wing and tail averaging small; tarsus as in *notabilis*.

Distribution of breeding population.—Area of differentiation, central interior British Columbia extending with some diminution of characters through northern British Columbia.

In examining wintering birds or those taken in migration far from the breeding area we have been able to match a fair proportion with one or another of the three races. These alone are listed below to indicate something of winter distribution of the extreme types. The equivocal winter-taken specimens are best left without name as an arbitrary or doubtful assignment of race might lead to erroneous concepts of wintering ranges.

IDENTIFICATIONS OF CERTAIN WINTERING AND MIGRANT INDIVIDUALS

32762 Calif. Acad. Sci.	male	<i>S. n. noveboracensis</i>	
X3317 Mailliard coll.	male	Dec. 26, 1929	Bariles, Chiriqui, Panama Alajuela, Costa Rica
		<i>S. n. notabilis</i>	
86269 U. S. Nat. Mus.	female	Feb. 24, 1882	La Paz, Lower Calif.
196892 U. S. Nat. Mus.	female	Feb. 17, 1906	La Paz, Lower Calif.
86268 U. S. Nat. Mus.	female	Feb. 6, 1882	La Paz, Lower Calif.
185930 U. S. Nat. Mus.	female	Apr. 20, 1903	Guerrero, Mexico
196890 U. S. Nat. Mus.	male	Feb. 8, 1906	Espiritu Santo Island, Lower Calif.
90074 U. S. Nat. Mus.	?	Mar. 14, 1883	San Pedro, Lower Calif.
55864 Mus. Vert. Zool.	female	Apr. 3, 1929	San Jose del Cabo, Lower Calif.
55861 Mus. Vert. Zool.	female	Dec. 22, 1928	La Paz, Lower Calif.
130377 U. S. Nat. Mus.	female	Sept. 4, 1892	San Bern. R., Mex. Boundary Surv.
130375 U. S. Nat. Mus.	male	Sept. 4, 1892	San Bern. R., Mex. Boundary Surv.
130374 U. S. Nat. Mus.	female	Sept. 4, 1892	San Bern. R., Mex. Boundary Surv.
235897 U. S. Nat. Mus.	male	Sept. 12, 1886	Fort Verde, Ariz.
235898 U. S. Nat. Mus.	female	May 11, 1887	Fort Verde, Ariz.
		<i>S. n. linnaeus</i>	
32761 Calif. Acad. Sci.	male	Nov. 10, 1929	Puerto Armuelles, Panama
55863 Mus. Vert. Zool.	male	Feb. 17, 1929	La Paz, Lower Calif.
55859 Mus. Vert. Zool.	female	Dec. 2, 1928	La Paz, Lower Calif.
59791 Mus. Vert. Zool.	female	Apr. 30, 1931	San Jorge, Lower Calif.
32 Reed Ferris coll.	male	Aug. 26, 1931	Beaver, Oregon
37720 Mus. Vert. Zool.	female	Aug. 16, 1905	San Bernardino Mts., Calif.
106062 U. S. Nat. Mus.	female	Sept. 25, 1885	Santa Cruz, Calif.

Museum of Vertebrate Zoology, Berkeley, California, June 9, 1933.