

per cent of 65 pellets contained partridge remains; for winter, 1933-1934, 11 or 5.9 per cent of 185; spring and summer, 1934, 14 or 10.5 per cent of 133; winter, 1934-1935, 8 or 4.1 per cent of 195; spring and summer, 1935, 11 or 7.3 per cent of 151. The heavier pressure of Horned Owls in the spring and summer of 1934 does not necessarily point to an increase of vulnerability of partridges because of the drought, in as much as the pressure during the preceding winter was correspondingly heavy.

The partridge carcasses found as food items at dens of the red fox (*Vulpes* sp.) rose from 8 or 0.79 per cent of 1010 in 1933 to 59 or 2.07 per cent of 2848 in 1934; only 1 or 0.09 per cent of 1175 spring and summer fecal samples for 1933 contained recognizable partridge remains, compared with 18 or 1.93 per cent of 935 samples for 1934 (Errington, Ecology, vol. 18, 1937, pp. 53-61). The increase in 1934 in representation in the diets of the foxes was thought to be associated both with higher population densities of the partridges and with greater vulnerability due to the drought.

On the whole, we doubt that the adverse conditions of 1934 resulted in any drastic change in the population of the Hungarian Partridge in northwestern Iowa, though they were not without effect. The ecological picture seems to be essentially one of retardation and decreased productivity of the nesting season rather than one of ultimate failure.

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## THE STATUS OF THE FOX SPARROW OF SOUTHWESTERN OREGON

WITH TWO ILLUSTRATIONS

By JOHN E. CUSHING, Jr.

In May and June of 1936, I collected a number of Fox Sparrows (*Passerella iliaca*) in the mountains of southwestern Oregon. On Onion Mountain, 15 miles west of Grants Pass, Josephine County, the birds were plentiful and twenty-six were taken. Near Bolan Lake, Josephine County, and close to the California line, four more were collected. As far as can be told from my reconnaissance of this part of the state, the breeding range of the species probably extends northward along the coastal mountains to the vicinity of Powers, Coos County. The purpose of this paper is to determine the status of the above mentioned specimens and to see if they throw any light on the problem of the summer home of *Passerella iliaca megarhynchus*.

I wish to thank Mr. James Moffitt of the California Academy of Sciences and Dr. Alden H. Miller of the University of California for their valuable suggestions and help in the preparation of this paper. In fact, Mr. Moffitt's advice that I collect Fox Sparrows while in Oregon served to initiate this study.

In identifying the Onion Mountain birds, skins representing the following races were used: *P. i. brevicauda*, *mariposae*, *fulva* and *megarhynchus*. These were in the collections of the Museum of Vertebrate Zoology at Berkeley, and in the California Academy of Sciences, San Francisco. Only adult males were considered, and effort was made to compare birds taken under similar seasonal conditions. Of *megarhynchus*, only winter birds were examined, for breeding individuals, as far as known, have never been collected.

The first character to be considered is that of color. The striking feature of the Onion Mountain birds is their dark pigmentation. Though taken at the end of June, when their feathers were considerably worn, these skins are darker than those of all

other races, resembling most closely skins of *mariposae*. With reference to the other subspecies discussed in this paper, I feel safe in saying that, in general, color plays a minor role as an aid to distinguishing the races. It is worthwhile pointing out that the Onion Mountain series has bluish, heavily pigmented mandibles in contrast to the conspicuously yellow ones of *megarhynchus*. The latter resemble *fulva* and *mariposae* in this respect and also have comparatively light colored feet and claws. The comparison of bill and foot color has been objected to on the grounds that seasonal fluctuations and the age of skins might affect the degree and kind of pigmentation. However, evidence obtained from examination of various skins of *mariposae* tends to invalidate this criticism.

A careful visual comparison of bill size and shape points toward the following relationships. *Brevicauda* has the largest bill of all the subspecies studied. Next, in decreasing order of size, is the Onion Mountain group, followed by *mariposae*, with *fulva* having the smallest of all. This is in close harmony with the actual geographic positions of the various races. In actual size, bills of the Onion Mountain birds seem closest to *mariposae*, although in shape they incline toward the heavier, stubby bill of *brevicauda*. *Megarhynchus*, to the eye, appears to have a bill intermediate in size between that of *mariposae* and that of *fulva*. From this, one can see that the hypothesis that *megarhynchus* is the breeding bird of the southwestern coastal mountains of Oregon is not favored, for the Onion Mountain group does not identify itself with the winter-taken specimens of *megarhynchus* from southern California.

Wing and tail measurements are of small diagnostic value among the northern California *Passerella*, as Swarth has already demonstrated (Univ. Calif. Publ. Zool., vol. 21, 1920, pp. 75-224).

The characters thus far considered have proved of relatively slight importance for racial differentiation. However, with respect to bill measurements, real differences

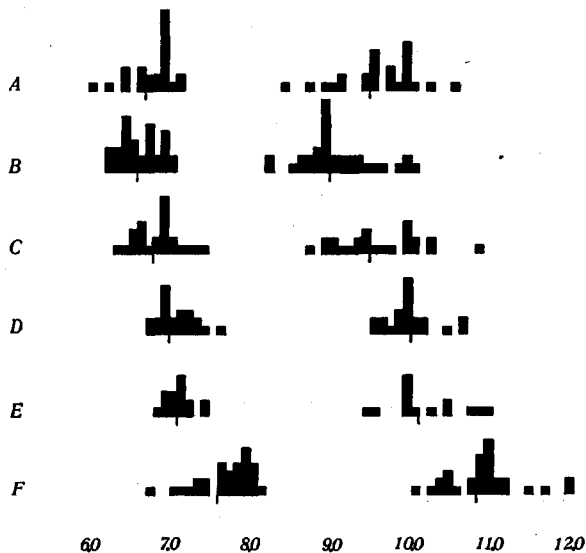


Fig. 27. Histograms representing bill measurements, in millimeters, of races of Fox Sparrow. Bill width on left; length on right. A, *P. i. megarhynchus*; B, *fulva*; C, *mariposae* (Plumas County); D, *mariposae* (Siskiyou County); E, *mariposae* (Josephine County); F, *brevicauda*.

become apparent, and it is chiefly upon this evidence that my conclusions have been based. Three measurements were made: first, the length of the bill, taken from the anterior end of the nostril to the tip of the maxilla; second, the width at the base of the mandible; and third, the depth of the base of the maxilla. These measurements were made upon as large a number of breeding males from each single area as possible. In no case were there less than fourteen individuals from any one region considered. The following is a list of stations from which the specimens whose measurements were used were obtained: for *fulva*, Sugar Hill, Parker Creek, Davis Creek, Willow Ranch, Buck Creek and Cedarville in Modoc County, California; for *mariposae*, Johnsville and Mohawk in Plumas County, Applegate and Blue Canyon in Placer County, Jonesville in Butte County, Weed, Salmon Mountain and Gazelle Mountain in Siskiyou County, California; for the Onion Mountain birds, Onion Mountain, Josephine County, Oregon; for *brevicauda*, Ruth, Yolla Bolly Mountain and South Fork Mountain in Trinity County, and Knob, Shasta County, California; and, finally, for *megarhynchus*, series chiefly from Los Angeles and Tehama counties.

Three graphs of the three kinds of measurements were made, two of which are reproduced here (fig. 27). These show well the interrelationships of the various groups. The Onion Mountain birds, instead of being closest to *megarhynchus*, as Swarth's paper

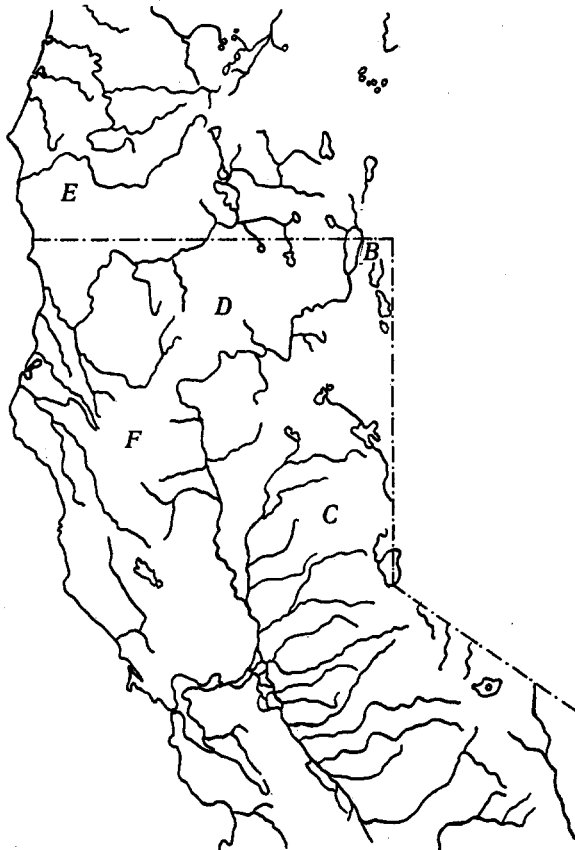


Fig. 28. Map showing regions from which breeding Fox Sparrows were examined. Letters represent the same groups shown in figure 27.

would lead one to suspect, are most closely related to *mariposae* and appear to be a northward extension of this race as well as a connecting link between it and *brevicauda*. The winter-taken *megarhynchus* overlap extensively with *fulva* and their average is intermediate between those of *mariposae* and *fulva*. Further study of the graphs shows that there is a nicely graded blending among the various races of Fox Sparrows, with the least, however, between *brevicauda*, on the one hand, and *fulva* and *megarhynchus* on the other. These facts, coupled with the evidence from the Onion Mountain series, do not agree with Swarth's statement (p. 162) that "*megarhynchus* is most nearly like *brevicauda*."

This disagreement becomes increasingly marked as one considers the geographic correlations of the average bill measurements. On a map (fig. 28), the Onion Mountain group is seen to form part of a chain of groups with increasing bill size, running from the vicinity of Johnsville, Plumas County, north to Onion Mountain and from there south to the vicinity of Yolla Bolly Mountain, Trinity County. *Megarhynchus*, contrary to what had been expected, does not fit into this chain at any point where breeding birds have not been collected, at least as far as can be told from the measurements.

To my knowledge no specimens of *Passerella* have been taken on the western slopes of the southern Cascades in Oregon. As this is the most favorably situated area of large enough size to support a race of Fox Sparrow, it is possible that here may lie the unknown breeding grounds of *megarhynchus*. This falls in with the evidence obtained from measurements, but of course the area needs to be explored in order to obtain necessary factual material.

Another possibility is that the race *megarhynchus* does not exist as such in nature, but instead has been "synthesized" from certain similar variants of other races. Such a mishap is possible, but insufficient work has been done to allow further discussion of it.

To conclude, *megarhynchus* is not the breeding Fox Sparrow of the southwestern mountains of Oregon as was formerly supposed. Instead, this area is occupied by a connectant population of *mariposae* that intergrades between *mariposae* of the Siskiyou area and *brevicauda*. This means that the breeding ground of *megarhynchus* is as yet undiscovered and may lie, if the race exists as a natural population, on the western slopes of the southern Cascades in Oregon.

*San Francisco, California, January 21, 1938.*

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## ENVIRONMENTAL FACTORS AFFECTING WATERFOWL IN THE SUISUN AREA, CALIFORNIA

By JAMES MOFFITT

Upon reading Stoner's record of ducks shot in the years 1882 to 1907 on a gun club near Cygnus, Solano County, California (Condor, vol. 39, 1937, pp. 242-248), some recollections based upon twenty-five years' experience with the ducks of the Suisun marsh area came to mind which I believe should be taken into consideration in analyses of this sort. Nothing that I state here is intended as criticism of Stoner's interesting paper, the thoughts being presented as suggestions to be borne in mind when evaluating data of this kind.

Environmental conditions for ducks have changed greatly in this region since the first shooting club was organized in 1879. No doubt many alterations traceable directly and indirectly to civilized man affected the Ibis Club grounds, of which Stoner writes,