

A REVISION OF THE SUBSPECIES OF *PASSERCULUS ROSTRATUS* (CASSIN).

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Three forms of the large-billed sparrow are at present recognized. These are *Passerculus rostratus rostratus* (Cassin), from southern California and Lower California; *Passerculus rostratus guttatus* Lawrence, from Lower California; and *Passerculus rostratus sanctorum* Ridgway, also from Lower California.

These birds have been of much interest to ornithologists, partly by reason of the illusiveness of the breeding grounds of two of the forms. Moreover, they have always presented a difficult problem for the systematist, and scarcely any two authors have agreed concerning them, as the different arrangements of the forms bear witness. The present writer has for a number of years paid particular attention to these sparrows, and now the identification of a series of specimens of this species from southern California, collected by Mr. E. J. Brown for the United States National Museum, and of another small lot from Lower California, obtained by Mr. Luther J. Goldman for the Biological Survey, has made necessary a further examination of all the other material in the collection of the United States National Museum, including that of the Biological Survey. The types of all the described forms have been available, including the type of *Passerculus rostratus rostratus*, in the Academy of Natural Sciences of Philadelphia, and that of *Passerculus rostratus halophilus*, together with the type series of the latter, now in the collection of Dr. Jonathan Dwight, of New York. In addition to the birds in the above-mentioned collections, we have examined also all the sparrows of this species in the Museum of Comparative Zoölogy, at Cambridge, Massachusetts, the American Museum of Natural History, and the private collections of Mr. William Brewster, Mr. A. C. Bent, Dr. Louis B. Bishop, and Dr. L. C. Sanford. Thus we have worked over altogether 443 specimens, a series apparently adequate to settle most of the perplexing questions that have arisen regarding this group. The study of this extensive material

has resulted in some interesting and rather unexpected discoveries, which seem sufficiently important to present in print. Among these results are some necessary changes in the nomenclature and systematic status of the races of this species.

It may be worth while here also to emphasize the peculiar distribution of *Passerculus rostratus* and its forms. For birds so well subspecifically differentiated, the large-billed sparrow as a species occupies during the breeding season a relatively small geographic area, extending only from the delta of the Colorado River to central western Lower California; and all its subspecies breed, so far as known, in isolated and exceedingly restricted localities. They are, however, numerous there in individuals, as is evident both from the numbers observed in summer and their abundance at various and widely separated places in winter. The most astonishing feature of their life history is the curious migration of at least two of the subspecies, knowledge of which, however, Dr. Joseph Grinnell* and others have already forecasted. In short, both *Passerculus rostratus rostratus* and *Passerculus rostratus guttatus* travel regularly far to the north or northwest of their breeding range to pass the winter; and at the same time other individuals of each form take, for the same purpose, a long southward or southwestward journey. This migration is almost, if not quite, unique, for at least no other North American passerine bird follows even similar routes. Herons and some other birds, as is well known, wander northward and in other directions after the breeding season, but not usually for the purpose of wintering; and we know of no other bird that regularly migrates both north and south from its breeding ground to pass the winter months. The data on which the above conclusions are based, together with the elaboration of the biological phases of this problem, and the discussion of the nomenclatural and other points involved, will be found in the following pages under the different subspecific headings.

* Auk, XXII, No. 1, January, 1905, pp. 16-21; and Pacific Coast Avifauna, No. 11, October 21, 1915, p. 115.

Passerculus rostratus rostratus (Cassin).

Emberiza rostrata CASSIN, Proc. Acad. Nat. Sci. Phila., VI, October (November 1), 1852, p. 184 (seashore at San Diego, California).

Chars. subsp.—Size rather large, upper surface and streaks on lower parts rufescent brown.

*Measurements.**—Male: † wing., 69.09-74.17 (average, 71.88) mm.; tail, 49.53-55.12 (53.34); exposed culmen, 12.19-13.72 (12.95); height of bill at base, 7.37-7.87 (7.62); tarsus, 22.35-23.37 (22.86); middle toe without claw, 15.75-18.03 (17.02).

Female: † wing, 64.01-71.88 (average, 66.80) mm.; tail, 46.48-54.36 (50.55); exposed culmen, 10.67-12.95 (12.19); height of bill at base, 6.35-7.62 (7.37); tarsus, 21.59-23.62 (22.35); middle toe without claw, 15.75-17.78 (16.26).

Type locality.—San Diego, California.

Geographic distribution.—Lower California, southern California, southwestern Arizona, and northwestern Sonora, Mexico. Breeds on Montague Island at the head of the Gulf of California, and on opposite portions of Lower California and Sonora; north along these shores to the mouth of the Hardy River in Lower California, and to the mouth of the Colorado River. Winters regularly south to Guaymas, in Sonora, and along both coasts of Lower California and its islands to Cape San Lucas, Lower California; west to the Pacific Coast of Lower California and of southern California; and north along the coast to Santa Barbara, California. Casual north to Yuma and the Colorado River in southwestern Arizona; Salton Sea, in southeastern California; San Clemente Island and Santa Cruz in central western California.

Remarks.—The type of *Emberiza rostrata* Cassin in the Academy of Natural Sciences of Philadelphia we have examined in the present connection, and it fortunately proves to belong to the race to which authors have commonly applied the name *Passerculus rostratus*. There is, however, in this subspecies, as in all forms of the species, considerable variation in the shade of the upper parts, but typical specimens are very brownish. Birds from the Colorado River, Sonora, opposite the mouth of the Hardy River, are all typical, and in worn plumage as early as the latter part of March, as specimens collected on March 25 and 26, 1894, by Dr. E. A. Mearns show; and these birds were

* Taken from Ridgway, Bull. U. S. Nat. Mus., No. 50, part I, 1901, p. 200.

† Fourteen specimens, from California, Lower California, and Sonora.

‡ Eleven specimens, from California, Lower California, and Sonora.

doubtless on their breeding grounds. Mr. Luther J. Goldman obtained typical specimens in very much worn breeding plumage on May 16, 1915, on Montague Island, Lower California. Their abraded condition and their presence here at such a late date in the spring, together with Mr. Goldman's observations on their habits given below are conclusive evidence that the birds are here on their real nesting ground. There is no record in any other locality of the presence of individuals of any form of the species later than a week beyond the middle of April (and even this is very unusual), except on their breeding grounds. Furthermore, the other races are known to breed regularly in April and even as early as March. Mr. Goldman's notes on the habits of the species as observed by him in the Colorado River delta are given below as of interest in this connection:

Abundant on Montague Island, and with the exception of turkey vultures, the only land bird found. I found them first at the mouth of the Colorado; they range from this point south along the coast as far as my investigations took me, or to a point opposite the south end of Montague Island. The birds were found living near the river only, and frequented the long coarse salt-grass which the Cocopah Indians call "Inpah." I observed them feeding on the seeds of this grass, also working along the mud flats at low tide.

This discovery of the breeding place of *Passerculus rostratus rostratus* solves one of the most puzzling problems of North American ornithology. There are several records of the breeding of this bird in Lower California and in California, but Dr. Grinnell is probably right in considering them all mistakes of identification.* The same discovery also solves the migration mystery of this species, fully as interesting a result. With the data now at hand it is possible to work out the migration of the large-billed sparrow with some degree of certainty. Part of the individuals of the typical subspecies winter in its breeding area, but the great majority begin, by the middle of August, to leave their breeding ground, whence they move in various directions, some of them southeast along the Sonoran coast, others due south into Lower California, others west to the northern part of Lower California, and still others northwest to the coast of southern California, reaching the extremes of their winter range almost simultaneously, and regularly becoming common at Cape San Lucas and in Los Angeles County,

* Auk, XXII, No. 1, January, 1905, p. 16.

California, by at least the first of September. The earliest dates on which *Passerculus rostratus rostratus* reaches various points in its winter range are as follows: Yuma, Arizona, August 15, 1902; Ocean Beach, San Diego County, August 17, 1894; Alamitos Bay, California, August 18, 1908; Santa Cruz, California, August 27, 1895; Rosalia Bay, Lower California, August 16, 1896; San Quintin, Lower California, August 31, 1905; San Jose del Cabo, August 31, 1887; Point Lobos, Sonora, August 20, 1884.

Thus the winter range extends southward, westward, and northwestward like a very short widespread fan, with its axis at the mouth of the Colorado River. The extreme length of the winter range from northwest to southeast is approximately 1150 miles, while the known breeding area is only about 30 miles long.

The greater part of the spring migration takes place usually in late February and the first half or two-thirds of March, though some birds stay until well into April. The latest definite date of a bird known to be outside of its breeding range is that of a specimen taken at Cape San Lucas, April 22, 1859.

Of this subspecies a total of 279 specimens have been examined, from the localities in the following list:

Arizona.—Mouth of Colorado River.

California.—San Pedro, (Nov. —, 1865; Dec. 8 and 13, 1899; October 30, 1901, Jan. 17, 1885); Ocean Beach, San Diego County (Aug. 17, 1894); Sunset Beach, Orange County (Dec. 27, 1916, Oct. 22, 1915, Jan. 10, 23, and 31, 1917); Seal Beach (Dec. 19, 1914); Santa Barbara (Sept. 9, 12 and 13, 1911); Bay City (Nov. 24, 1908); San Diego (Dec. 4 and 8, 1884, Sept. 16, 1893, Nov. 16, 1861, Sept. 22, 1890, Dec. 7 and 18, 1885, March 1, 1885, Nov. 11 and 19, 1886, Sept. 5, 7, and 16, 1893, Oct. 6, 16, 17, and 23, 1893, Feb. 15, 1884, Oct. 6, 12, 14, 15 and 20, 1903, Jan. 25 and 28, 1897, Jan. 31, 1895, Aug. 21, 1893, Feb. 14, 1895, Jan. 22, 1896, Feb. 15, 1896, Dec. 11 and 18, 1894, Oct. 30, 1895); Alamitos Bay (Sept. 8 and 9, 1913, Dec. 23, 1913); Bayleys (Jan. 1, 1908); Pacific Beach, Los Angeles County (Sept. 7, 8, 10, 13, 14, 15, 22, 24, and 26, 1904, Jan. 17, 1905, Feb. 10, 1911); Alamitos, Los Angeles County (Jan. 29, 1909); Balsa Chico, Orange County (Jan. 29, 1909); Newport Landing, Los Angeles County (Feb. 23, 1886); Laguna Beach (Aug. 25, 1887, Sept. 2, 1887); Wilmington (Dec. 14, 1879).

Lower California.—San Cristobal Bay (March 16, 1884); Montague Island (May 16, 1915); Cape San Lucas (Sept. 8 and 29, 1859, Sept. 22, 1859, Oct. 24, 1859, Sept. 25 and 27, 1859, Nov. 12 and 25, 1859); Todos Santos (March 13, 1883); Todos Santos Island, La Paz (Feb. 6 and 12, 1882, Jan. 2 and 11, 1882, Dec. —, 1882, Dec. 15, 1881, Jan. 11, 1888, Feb. 7 and 14, 1887); Santo Domingo (Sept. 26 and 27, 1905); San Quintin (Aug. 31, 1905); San José del Cabo (Jan. 8 and 9, 1906, Oct. 3, 10, 13, and 18, 1887, Sept. 1, 5, 14, 17, 20, 21, 27, and 29, 1887, Aug. 31, 1887, Nov. 4 and 9, 1887); San Lucas, north of Comondu (Oct. 26, 1905); Socorro, 15 miles south of San Quintin (Sept. 1, 1905); Magdalena Island (Nov. 24, 1905); Santa Rosalia Bay, lat. 29° (Aug. 16, 1896); Playa Maria, lat. 29° (Aug. 25, 1896); Carmen Island (March 2, 6, and 7, 1887); San Rogue (March 15, 1911); Mangrove Island (Mar. 20, 1911); San Bartolome Bay (Mar. 13 and 14, 1911); Magdalena Town (Mar. 20, 1911); Abrejos Point (Mar. 16, 1911); Tiburon Island (April 12, 1911).

Sonora.—Colorado River, opposite mouth of Hardy River (Mar. 25 and 26, 1894); Mouth of Colorado River (Oct. 11, —); Guaymas (Feb. 22, 1904, Dec. 9, 1882, Jan. 14 and 18, 1887).

***Passerculus rostratus guttatus* Lawrence.**

Passerculus guttatus LAWRENCE, Ann. Lyc. Nat. Hist. N. Y., VIII, Nos. 15-17, May, 1867, p. 473 (San José del Cabo, Lower California).

Passerculus sanctorum RIDGWAY, Proc. U. S. Nat. Mus., V, April 3, 1883, p. 538 (ex Coues MS.) (San Benito Island, Lower California).

Chars. subsp.—Similar to *Passerculus rostratus rostratus*, but somewhat smaller, with a slenderer bill, the colors above darker, more grayish (less rufescent) and streaks on lower parts deeper, more blackish.

Measurements.—Male:* wing, 63-73.7 (average, 68.4) mm; tail, 47-53.5 (50.4); exposed culmen, 11.2-12.7 (11.5); height of bill at base, 5.6-8.1 (6.8); tarsus, 20.6-22.9 (21.8); middle toe without claw, 15-18 (16.3).

Female:† wing, 62-68.3 (average, 65.8) mm.; tail, 46.5-53 (49.5); exposed culmen, 11.7-13 (12.3); height of bill at base, 6-7.4 (6.6); tarsus, 19.2-22.5 (21); middle toe without claw, 15-16.5 (16).

Type locality.—San José del Cabo, Lower California.

Geographic distribution.—Coastal region of Lower California and southwestern California. Breeds on the San Benito

* Ten specimens, from Lower California.

† Ten specimens, from Lower California.

Islands, central western Lower California. Winters on the coast and islands of western Lower California, south to Cape San Lucas, and to La Paz in southeastern Lower California; and north along the Pacific Coast to Los Angeles County, California.

Remarks.—The present form is now seen to be somewhat smaller than *Passerculus rostratus rostratus*, but there is much individual variation in this as in other respects, so much, in fact, that all the differences between these two forms are fully covered; and consequently *Passerculus rostratus guttatus* is certainly but a subspecies of *Passerculus rostratus rostratus*, though a very distinct one.

The bird described by Mr. Ridgway as *Passerculus sanctorum**, from San Benito Island, off the western coast of Lower California, has commonly been considered a different subspecies, and Mr. William Brewster has indorsed this view in his careful study of the specimens obtained by Mr. M. Abbott Frazar in the Cape region of Lower California.† A re-examination, however, of the types of *Passerculus rostratus guttatus* and *Passerculus rostratus sanctorum*, together with a large amount of new material, particularly from the San Benito Islands, shows that they certainly belong to one and the same form. The type of *Passerculus rostratus guttatus* is a winter bird of rather unusually dark coloration and is possibly a bird of the year. One of the two original specimens of *Passerculus rostratus sanctorum* Ridgway has the bill practically as slender as the type of *Passerculus rostratus guttatus*; in fact, there is much more difference in this respect between the type and paratype (No. 70637, U. S. Nat. Mus.) of *Passerculus rostratus sanctorum* than between the type of *Passerculus rostratus sanctorum* and the type of *Passerculus rostratus guttatus*. Furthermore, *Passerculus rostratus sanctorum* is darker, much more grayish (less brownish) in fresh autumn and winter plumage than in the spring and summer. Accordingly, a series of freshly molted specimens from San Benito Island, collected on September 7, 8, and 9, 1896, so closely resemble the type of *Passerculus rostratus guttatus* that they must be the same. One of these individuals (No. 153975, U. S. Nat. Mus.), taken on September 9, 1896, is as good a match for the type of *Passer-*

* Proc. U. S. Nat. Mus., V, April 3, 1883, p. 538.

† Cf. Bull. Mus. Comp. Zool., XLI, No. 1, September, 1902, pp. 139-141.

culus rostratus guttatus as one could ask for; in fact, they are difficult to distinguish at all, except that the type is somewhat duller, possibly from age. Several others of this same series are exceedingly close. One example, No. 90064, U. S. Nat. Mus., taken at San José del Cabo, Lower California, January 20, 1883, is intermediate between the present race and *Passerculus rostratus halophilus*,* (which, indeed, is a perfectly good subspecies, but it is nearer the present form.

From these facts it is evident that *Passerculus rostratus sanctorum* Ridgway becomes a synonym of *Passerculus rostratus guttatus*, which disposition, it is interesting to note, is the same as that originally made by Mr. Ridgway himself, who really intended to discredit *Passerculus sanctorum* Coues MS., but inadvertently gave it nomenclatural status.† The reverse side of the labels of the two original specimens of *Passerculus sanctorum* bear in Mr. Ridgway's handwriting "*P. guttatus* Lawr.! (R. R.)." A further light on the history of these specimens is furnished by the subsequent notation by Dr. Coues on the back of the label of the specimen which was not chosen as the type, underneath what Mr. Ridgway had written, which reads as follows: "Scarcely! stet *sanctorum*—C."

The juvenal plumage and that of the first autumn are, in so far as the upper parts and pectoral streaks are concerned, much more brownish than adults, and much more closely resemble *Passerculus rostratus rostratus*. Indeed, occasional specimens are difficult to distinguish.

Mr. H. B. Kaeding has recorded‡ *Passerculus rostratus rostratus* as occurring on the San Benito Islands on July 14, 1897, and at San Juanico Bay, June 12, 1897. The former record certainly refers to *Passerculus rostratus guttatus*, being from the breeding region of this form, but the bird from San Juanico Bay, which is some distance south of Abrejos Point on the western coast of Lower California, is most probably the same as *Passerculus rostratus halophilus*. A series of 17 specimens taken by Mr. E. J. Brown at Sunset Beach, Orange County, California, from November 13, 1916, to January 31, 1917, and at Anaheim Landing, Orange County, California, October 5, 1916, some of which are perfectly typical, others

* For the characters distinguishing this subspecies, cf. *postea*, p. 353.

† Proc. U. S. Nat. Mus., V, April 3, 1883, pp. 538-539.

‡ Condor, VII, September, 1905, p. 135.

verging toward *Passerculus rostratus rostratus*, constitute the first record of this subspecies for California; and Mr. Brown has already announced this discovery.*

The present subspecies breeds commonly on the San Benito Islands, where Mr. H. B. Kaeding found fresh eggs as early as March 27-30, 1897.†

The migration of *Passerculus rostratus guttatus* proves to be nearly as astonishing as that of *Passerculus rostratus rostratus*. In this case, however, the line of travel is, so far as known, only northwest and southeast along the coast for about the same distance in each direction from the breeding area, the linear extent of the winter range being about 900 miles. This subspecies is apparently confined to the immediate coast, and in Lower California also to the Pacific Coast, except in the Cape San Lucas region, where it occurs along the Gulf of California as well; but there is no interior record for either Lower California or California.

We have examined 125 examples of this species, from the localities given below.

California.—Sunset Beach, Orange County (Dec. 13, 20, and 27, 1916, Jan. 10 and 31, 1917, Nov. 13 and 20, 1916); Anaheim Landing, Orange County (Oct. 5, 1916); Alamitos Bay (Sept. 9, 1913); San Pedro, Los Angeles County (Oct. 30, 1901).

Lower California.—San José del Cabo (Dec. —, 1859 [type], Jan. 20, 1883, Jan. 8, 1906, Oct. 3 and 10, 1887, Nov. 9, 1887, Sept. 23, 1887); San Benito Island (July 12, 13, and 14, 1897, Sept. 7, 8, and 9, 1896, April 25 and 26, 1906, Mar. 1, 21, and 28, 1897, Mar. 9, 28, 29, 30, and 31, 1911); San José Island (Feb. 12, 1909); West Benito Island (Mar. 9, 1911); Carmen Island (Mar. 6, 1887); Abreojos Point (Mar. 16, 1911).

* Auk, XXXIV, No. 3, July, 1917, p. 340.

† Condor, VII, September, 1905, p. 136.

***Passerculus rostratus halophilus* (McGregor).**

Ammodramus halophilus MCGREGOR, Auk, XV, No. 3, July, 1898, p. 265 (Abreojos Point, Lower California).

Chars. subsp.—Similar to *Passerculus rostratus guttatus*, but upper surface duller, darker, and more greenish (less purely grayish), the dark streaks on pileum and interscapulum less sharply defined; sides of the head, including particularly the supraloral region, more suffused with yellowish; streaks on lower parts heavier, more blackish, and without brownish edgings.

*Measurements.**—Male:† wing, 66.80–70.61 (average, 69.09) mm.; tail, 42.93–52.32 (50.29); exposed culmen, 12.70–12.95 (12.62); height of bill at base, 6.35–7.62 (6.60); tarsus, 20.32–22.61 (21.59); middle toe without claw, 15.49–17.02 (16.00).

Female:‡ wing, 63.50–69.60 (average, 64.77) mm.; tail, 45.21–51.05 (47.50); exposed culmen, 12.19–13.21 (12.70); height of bill at base, 6.10–6.86 (6.35); tarsus, 20.32–22.35 (21.34); middle toe without claw, 14.48–16.76 (15.75).

Type locality.—Abreojos Point, central western Lower California.

Geographic distribution.—The southern half of the western coast of Lower California. Breeds at Abreojos Point, central western Lower California and probably also at San Juanico Bay somewhat farther south. Winters south to Cape San Lucas.

Remarks.—This race differs from *Passerculus rostratus rostratus* so very strongly in its darker, more greenish upper surface and in its slenderer bill that no special comparison is necessary. A careful examination of the type series and also of winter birds from the Cape San Lucas region, and their comparison with both *Passerculus rostratus rostratus* and *Passerculus rostratus guttatus* show that *Passerculus rostratus halophilus* is an excellent subspecies. The three races of this species may be readily distinguished by the color of the upper surface alone, since *Passerculus rostratus rostratus* is a brownish bird, *Passerculus rostratus guttatus* a grayish form, and *Passerculus rostratus halophilus* decidedly greenish. Mr. William Brewster's objections§ to the recognition of *Passerculus rostratus halophilus* have been fully met by the acquisition of a good series of breeding examples of *Passerculus rostratus guttatus*,

* Taken from Ridgway, Bull. U. S. Nat. Mus., No. 50, part I, 1901, p. 202.

† Nine specimens, from Lower California.

‡ Twelve specimens, from Lower California.

§ Bull. Mus. Comp. Zool., XLI, No. 1, September, 1902, pp. 139-140.

so that it is possible to compare both these forms in nuptial plumage; furthermore, the identification of *Passerculus sanctorum* Coues with *Passerculus rostratus guttatus* Lawrence furnishes additional evidence of the distinctness of *Passerculus rostratus halophilus*, since it satisfactorily disposes of the mystery surrounding the breeding place of *Passerculus rostratus guttatus*. The present form, however, is clearly but a subspecies of *Passerculus rostratus rostratus*, since some individuals show vergence toward *Passerculus rostratus guttatus*, and we have already made mention* of the inclination that some specimens of *Passerculus rostratus guttatus* have toward *Passerculus rostratus halophilus*. In breeding plumage the present subspecies becomes very dark on the back, since the abrasion of the plumage more or less obliterates the lighter areas and accentuates the dark markings.

So far as known, *Passerculus rostratus halophilus* is a very local race, breeding certainly only at Abrejos Point on the western coast of Lower California, where Mr. H. B. Kaeding found eggs on April 19, 1897.† He also mentions, under the name *Passerculus rostratus*, sparrows of this species common at San Juanico Bay, on June 12, 1897, which, on geographic grounds, should belong to *Passerculus rostratus halophilus*, but he appears to have collected no specimens there. The only certain wintering ground of *Passerculus rostratus halophilus* is the southern portion of Lower California, but it very possibly migrates also northward from its breeding ground, as do the two other subspecies of *Passerculus rostratus*.

Thirty-nine specimens of this form have been examined, from the localities given below:

Lower California.—Abrejos Point (April 19, 1897 [type], June 17, 1897, March 16, 1911); San Jose del Cabo (Jan. 8 and 9, 1906); Santa Maria Island (March 19, 1911); southern end of Magdalena Bay (March 20, 1911); Mangrove Island (March 20, 1911); Magdalena (March 21, 1911).

* Cf. *antea*, p. 353.

† Condor, VII, September, 1905, p. 136.