White-crowned Sparrow

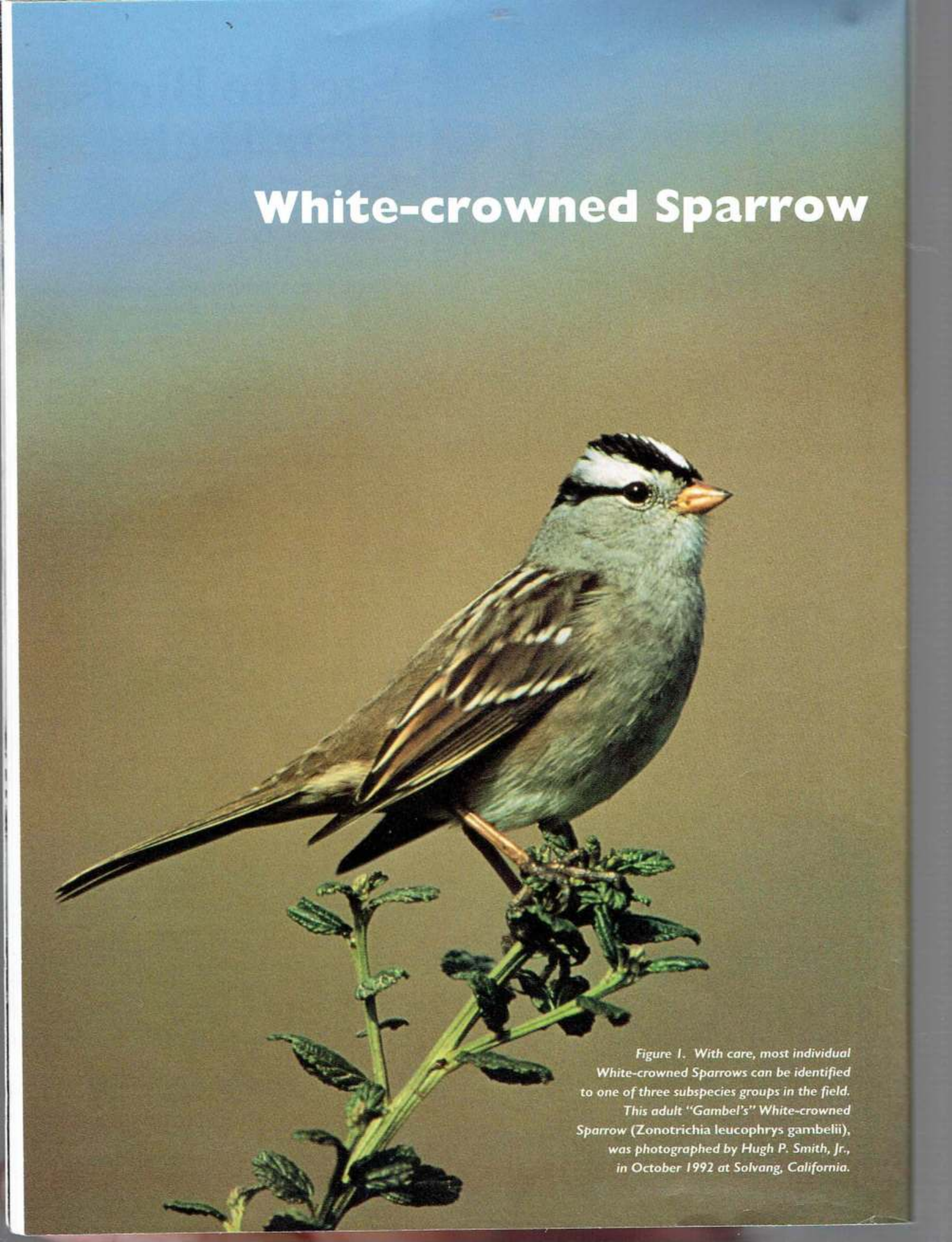

Figure 1. With care, most individual White-crowned Sparrows can be identified to one of three subspecies groups in the field. This adult "Gambel's" White-crowned Sparrow (Zonotrichia leucophrys gambelii), was photographed by Hugh P. Smith, Jr., in October 1992 at Solvang, California.

Subspecies: Identification and Distribution

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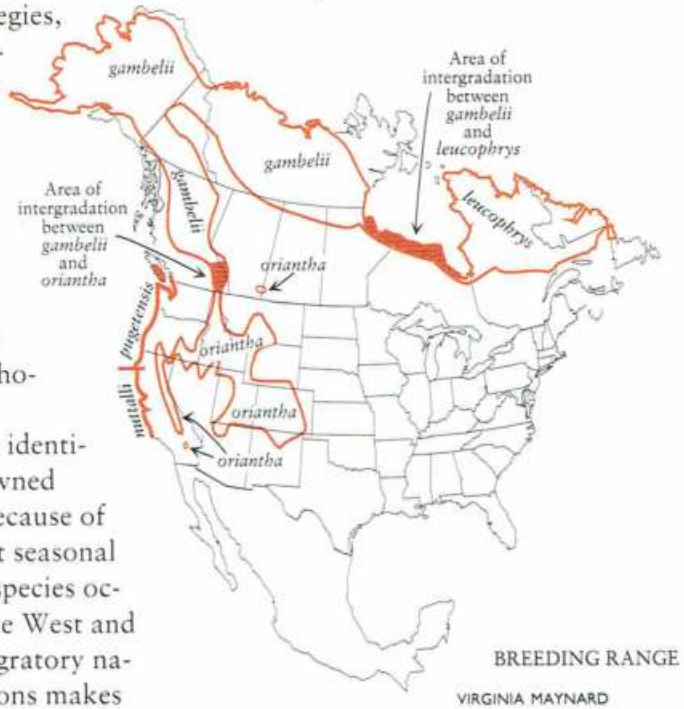
THE WHITE-CROWNED SPARROW *(Zonotrichia leucophrys)* is a familiar North American passerine with a wide breeding distribution from Alaska across the taiga zone of Canada to Newfoundland, and southward in the West along the immediate Pacific Coast and the major mountain ranges. This species is abundant in winter in the West and, especially, Southwest, with additional populations wintering east across the Mississippi Valley and locally farther east; winter distribution and densities are mapped by Root (1988). Species identification in the field is straightforward and adequately covered in the standard field guides (see also Stallcup 1992), but there is little information in the birding literature on subspecific identification, apart from banding worksheets (Mewaldt 1977, Pyle et al. 1987). Popular field guides (e.g., Robbins et al. 1983, NGS 1987, Peterson 1990) do tend to distinguish between dark-lored and pale-lored groups (technically not the "lores"; see page 187); NGS (1987) depicts three subspecies. The photographic guide by Farrand (1983) depicts a black-lored adult but the text reverses the distribution of dark- and pale-lored groups.

There are five subspecies of White-crowned Sparrows recognized by the AOU (1957), and most individuals can be identified at least to one of three subspecies groups (including two pairs of subspecies) in the field, given careful study. This geographical variation in appearance, as well as in vocalizations, habitat preferences, migration strategies, and physiology underscores the reason why the White-crowned Sparrow, particularly in the West, has been the subject of innumerable investigations in avian biology and has earned from some the nickname of ornithology's "white rat."

We have chosen the identification of White-crowned Sparrow subspecies because of the strikingly different seasonal status of the four subspecies occurring regularly in the West and because the highly migratory nature of some populations makes extralimital records possible. To be sure, there are other widespread North American passerines showing even stronger geographical patterns of variation, with the Hermit Thrush *(Cath-*



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arus guttatus), Savannah Sparrow *(Passerculus sandwichensis)*, Fox Sparrow *(Passerella iliaca)*, Song Sparrow *(Melospiza melodia)*, and Dark-eyed Junco *(Junco hyemalis)* being among the most striking examples. Variation in the White-crowned Sparrow, however, is more "manageable" from a birder's standpoint because of the identifiability of subspecies groups. This species is very numerous during winter in much of the West; it is, perhaps, the most abundant wintering songbird in much of California and the adjacent Southwest (e.g., 19,529 recorded on the Parker, Arizona, Christmas Bird Count in December 1980; Rosenberg et al. 1991). This high abundance provides ample opportunities for study. Two to three subspecies can be found in many localities through the course of a year. There is an excellent body of published museum-based work available on the geographical variation of the White-crowned Sparrow, most notably the extensive and detailed study by Banks (1964). We urge readers to refer to that work (available in many museum and university libraries, and sometimes for sale from Buteo Books).

Identification at the Species Level

Adult White-crowned Sparrows are readily told from other "crowned sparrows" *(Zonotrichia)* by a combination of bill color (ranging from yellowish through orangish to dark reddish-pink, but never dusky or gray unless *appearing* that way when dirty or pollen-covered in spring), details of head pattern, and vocalizations. Immature White-crowns in their first fall and early winter lack the black-and-white crown stripes, instead showing brown (rufous-brown to rich dark brown) and creamy stripes. They are somewhat browner on the back and underparts, but otherwise they generally resemble adults of their respective subspecies. These immatures can be confused by novices with the much smaller, slimmer sparrows of the genus *Spizella* (e.g., young Chipping Sparrows, *S. passerina*) or with certain *Aimophila* (e.g., Rufous-crowned Sparrow, *A. ruficeps*). Juvenal-plumaged White-crowns with their streaked underparts can be confused with many other sparrows, but they are not normally seen away from the immediate breeding grounds.

White-crowned Sparrows have hybridized with Golden-crowned Sparrows *(Z. atricapilla;* Miller 1940, plus sight records from California), so occasional individuals appearing to show characteristics of both species should be examined carefully. There is at least one photographic record of a White-crowned × Harris's *(Z. querula)* sparrow, at Death Valley National Monument, California on 5–6 November 1977 (McCaskie 1978).

As with most emberizine sparrows, male and female White-crowns are indistinguishable in the field. Males, on average, are slightly heavier and longer-winged than females, a difference not noticeable in the field.

Molts

The streaky juvenal plumage is normally seen only on the breeding grounds, with hatching-year birds acquiring first basic plumage by the end of August prior to their fall migration (see photo and discussion in Kaufman 1993). The first prebasic molt is partial, involving the replacement of body feathers but not the flight feathers of the wing and tail. Late in their first winter, immature birds begin a prealternate molt that replaces the brown and cream head stripes with black-and-white stripes. This molt proceeds patchily, often from the forehead toward the rear. There is some geographical variation in the extent of this first prealternate molt. In the Pacific Coast races, particularly in *nuttalli* (and especially its more southerly populations), year-old ("second year") birds in summer usually retain some brown in the dark crown stripes (Banks 1964, Pyle et al. 1987). Nominate *leucophrys* and probably also *oriantha* appear to undergo the first prealternate molt later in spring, on average, than does *gambelii*, paralleling their later northward migration. The prealternate molt of adults involves the replacement of some head and body feathers, as well as the central rectrices; this molt does not, however, result in a perceptable difference in appearance. Some of the plumage characters that distinguish the subspecies may become obscured in worn birds in mid- to late summer.

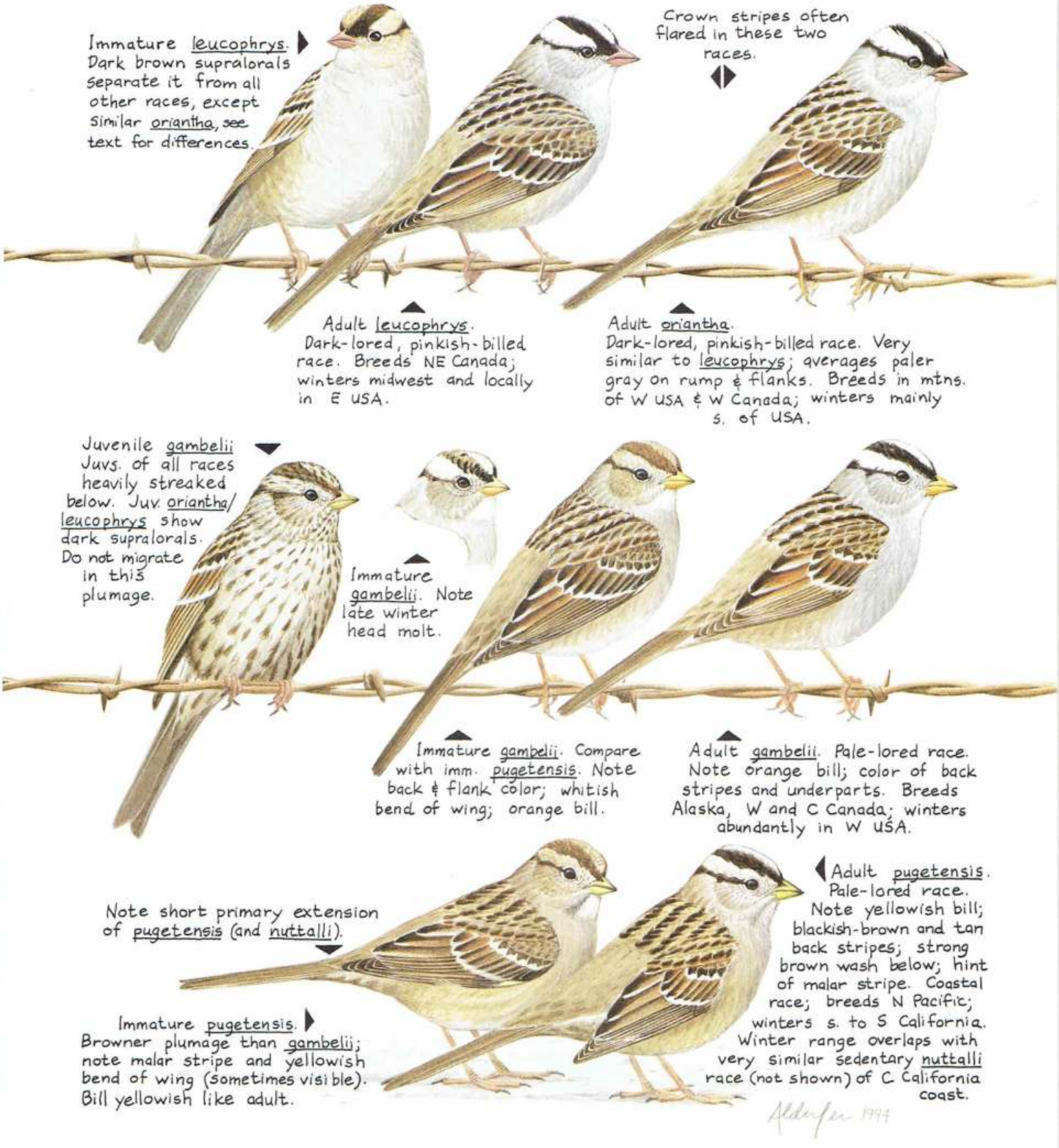
Immature leucophrys. Dark brown supralorals separate it from all other races, except similar oriantha, see text for differences.
Crown stripes often flared in these two races.
Adult leucophrys. Dark-lored, pinkish-billed race. Breeds NE Canada; winters midwest and locally in E USA.
Adult oriantha. Dark-lored, pinkish-billed race. Very similar to leucophrys; averages paler gray on rump & flanks. Breeds in mtns. of W USA & W Canada; winters mainly s. of USA.
Juvenile gambelii. Juvs. of all races heavily streaked below. Juv. oriantha/leucophrys show dark supralorals. Do not migrate in this plumage.
Immature gambelii. Note late winter head molt.
Immature gambelii. Compare with imm. pugetensis. Note back & flank color; whitish bend of wing; orange bill.
Adult gambelii. Pale-lored race. Note orange bill; color of back stripes and underparts. Breeds Alaska, W and C Canada; winters abundantly in W USA.
Note short primary extension of pugetensis (and nuttalli).
Immature pugetensis. Browner plumage than gambelii; note malar stripe and yellowish bend of wing (sometimes visible). Bill yellowish like adult.
Adult pugetensis. Pale-lored race. Note yellowish bill; blackish-brown and tan back stripes; strong brown wash below; hint of malar stripe. Coastal race; breeds N Pacific; winters s. to S California. Winter range overlaps with very similar sedentary nuttalli race (not shown) of C California coast.

Figure 2

Winter Habits

In much of their winter range (particularly the Southwest) White-crowned Sparrows are abundant, occurring in flocks of up to 100 or more birds in brushy areas, hedgerows, broken chaparral, gardens, grainfields, and desert thickets. They will mix with other *Zonotrichia* sparrows, such as Golden-crowned Sparrows in the Far West, Harris's Sparrows in the Plains states, and White-throated Sparrows (*Z. albicollis*) in the Midwest and East; White-crowned Sparrows often flock separately from those species, however, and tend to shun some of the denser habitats often used by Golden-crowned and White-throated sparrows. By spring they are often found well up in trees, foraging at blossoms and catkins of deciduous oaks and other trees.

Overview of White-crowned Sparrow Geographical Variation

For simplicity, White-crowned Sparrow subspecies can be categorized as follows:

1. Pacific Coast birds that are pale-lored, yellowish-billed, tinged with much brown below, tan and blackish on the back stripes, pale rusty-brown on the inner greater secondary coverts and outer webs of the tertials, and with a yellowish bend of the wing (*nuttalli* and *pugetensis*). These two subspecies are collectively referred to as the "Pacific Coast races" in our text.
2. Boreal and montane birds that are grayish below, deep reddish and pale gray on the back stripes, deep chestnut on the inner greater secondary coverts and outer webs of the tertials, and whitish on the bend of the wing. These include the following groups:
   - Pale-lored, orange-billed birds of the western boreal/arctic range of the species (*gambelii*). This group and group 1, together, are referred to as the "pale-lored races" in the text.
   - Dark-lored birds with dark reddish-pink bills (*oriantha* of the western mountains, and *leucophrys* of the eastern boreal/arctic range of the species). These two subspecies are referred to as the "dark-lored races" in the text.

This categorization requires much elaboration and clarification. In addition to obvious differences in head-stripe color, first-basic birds of all races are somewhat browner below than adults, and those of group 2 show more tan (less gray) in the back stripes. Most controversial are the relationships between black-lored and white-lored birds breeding across the Hudson Bay and James Bay regions of Canada. The type series of White-crowned Sparrow, described as "*Emberiza leucophrys*" by Forster in 1772, was obtained at Fort Albany and at Fort Severn at the mouth of the Severn River, Ontario (west of James Bay). These specimens were subsequently lost, and it remains uncertain whether the holotype and paratypes were black-lored, white-lored, or intermediate. Both black-lored and white-lored individuals presently occur in the vicinity of the type locality, and indeed widely through this region of Canada.

The proportion of black-lored birds increases to the east (see Banks 1964, p. 102), with the decided majority of birds on the east coast of James Bay being black-lored. Workers (e.g., Phillips et al. 1964, Rea 1983) who believe that the type specimens came from a predominantly white-lored population argue that what AOU calls *gambelii* should in fact be the nominate subspecies, *leucophrys;* this belief is based on an additional series of specimens from the vicinity of the type locality (Todd 1948). These authors use the name "*nigrilora*" for the black-lored birds of eastern Canada (AOU's nominate birds).

Todd (1963) further restricts *nigrilora* to the consistently black-lored populations of the eastern Labrador Peninsula and applies the name *leucophrys* to the mixed black-lored/white-lored populations around Hudson and James bays; he retains *gambelii* for the consistently white-lored birds farther west. Banks (1964) agreed that the additional specimens from the type locality were essentially white-lored, but argued that they showed some characters of eastern black-lored birds. In the absence of the original type series, he felt that nomenclatural stability was best served by continuing

TABLE 1
COMPARISON OF BODY MASS OF UNSEXED BREEDING ADULTS (DATA FROM DUNNING 1992)

Subspecies	Mean	Range	Sample Size
gambelii	25.5	21.0–28.5	50
leucophrys	29.4	21.6–38.5	162
oriantha	28.4	23.3–33.7	50
pugetensis	25.3	21.4–29.1	50
nuttalli	32.0	27.0–35.5	50

the AOU (1957) treatment. The AOU's nominate *leucophrys* are therefore black-lored eastern Canadian birds and the name *gambelii* is valid for the more westerly white-lored populations, with the two intergrading in the Hudson and James Bay region. For further reading on the complex nomenclatural history of these forms, see Todd (1948, 1953, 1963), Wetmore (1953), and Banks (1964).

Z. l. leucophrys and *Z. l. oriantha* are extremely similar to one another in plumage and structure, but their breeding ranges as described by the AOU (1957) are isolated from one another; each intergrades with *gambelii*. Banks (1964) stresses the similarity of these forms, merging *oriantha* into *leucophrys* (with a disjunct distribution in eastern Canada and the montane west). Godfrey (1965) argues against the merger on the basis of the paler dorsal and ventral color of *oriantha*. Oberholser (1974) restricts *oriantha* to the mountains of Oregon, California, and western Nevada and extends the range of nominate *leucophrys* south to include much of the Rocky Mountains; he then applies a new subspecies name, *aphaea*, to populations in Idaho and adjacent Wyoming. Browning (1974) merges Oberholser's *aphaea* with nominate *leucophrys*, which they resemble more closely than do more westerly populations of *oriantha;* he maintains the name *oriantha* for birds from south-central Oregon south through the Sierra Nevada (and adjacent western Nevada) to the mountains of southern California. Vocalizations (of some populations) and geography suggest, however, the possibility that *oriantha* and *leucophrys* may not be especially closely related within the species. Range-wide genetic studies would be helpful in elucidating the relationships among White-crowned Sparrow populations.

Identification of Subspecies

Observers trying to differentiate subspecies of the White-crowned Sparrow should pay special attention to the characters listed below; some of these characters hold up for all age classes, whereas others are applicable only to adults. The accounts of individual subspecies that follow give further details.

- Bill color (yellowish, orangish, or deep reddish-pink; extent of dark tip). Museum-based studies such as those of Banks (1964) did not use bill color as a racial character, because it cannot be fully assessed from specimens. The distinctive bill colors of the different forms were commented on, albeit not entirely accurately, by Ridgway (1901).
- Bill size.
- Color of "lores" [actually the anterior portion of the supercilium or "supraloral region"; termed the "upper loral area" by Banks (1964) and sometimes called the "fore-supercilia" in the British literature]. Black vs. grayish-white in adults; dark brown vs. creamy in immatures.
- "Cleanness," width, and prominence of crown stripes.
- Darkness of dark crown stripes in immatures.
- Color of back and scapular stripes, especially in adults (deep reddish with black centers and pale gray or gray-brown fringes, or dusky-blackish with tan fringes). See Figure 7.
- Color of inner greater secondary coverts and outer edge of tertials; differences are most evident in adults, but also hold for first-basic birds.
- Color of breast, sides, flanks, undertail coverts (gray, with variable amount of brownish tan wash).
- Color of "bend of wing" (whitish or yellowish); often not visible in the field.
- Vocalizations.
- Wingtip shape (primary projection beyond tertials).
- Overall size (wing length, body mass): in-hand characters only.

In the following sections we outline the status and distribution and summarize the plumage characters of the five subspecies (Figures 1–19). Many of the characters are illustrated in Figure 2. Size differences are generally unimportant for field identification, but, for completeness, body mass and measurement data are summarized in Tables 1 and 2. Vocal characters can be important to subspecies identification and are summarized on page 198.

TABLE 2
MEAN MEASUREMENTS FOR DIFFERENT WHITE-CROWNED SPARROW POPULATIONS * (FROM BANKS 1964)

Subspecies	Wing	Tarsus	Bill
gambelii (Alaska)	76.52	22.30	7.68
leucophrys (eastern Canada)	78.90	23.07	7.96
oriantha (western montane)	79.00	23.37	8.11
pugetensis (northern Pacific coast)	71.26	22.57	7.69
nuttalli (southern Pacific coast)	71.46	23.76	8.11

** Data are for males (females average very slightly smaller); all sample sizes are >80. Sample populations correspond to Banks's geographical groupings; we have provided the subspecies names following AOU (1957).*

"Gambel's" White-crowned Sparrow

Identification. Adult *gambelii* ("Gambel's" White-crowned Sparrow; Figures 1, 3–6) are recognizable in the field by the following characters:

1. The white supercilium continues uninterrupted in front of the eye to the bill, though it is variably clouded with grayish in the supraloral area. This character is shared with the brownish Pacific coast subspecies *nuttalli* and *pugetensis*, but distinguishes *gambelii* from the dark-lored subspecies *leucophrys* and *oriantha*.
2. The back pattern of adults shows dark and light streaks, formed by deep reddish centers (with black shaft streaks) and pale gray edges of the individual back feathers (Figure 7). This gray and reddish pattern is shared with the two dark-lored subspecies, but is quite different from the back stripes of *nuttalli* and *pugetensis*, which are dusky-blackish centrally, with pale tan-brown edges. The inner greater secondary coverts and outer edges of the tertials are deep chestnut.
3. The underparts are clear gray, with only a limited wash of brown on the flanks and undertail coverts; this pattern distinguishes *gambelii* further from *nuttalli* and *pugetensis*, which are extensively washed with brown across the breast, sides, and flanks.
4. The bend of the wing and underwing coverts are whitish. This character also holds for *leucophrys* and *oriantha*, but distinguishes these races from *nuttalli* and *pugetensis* (which are yellowish in these regions).
5. The bill is "candy-corn" orange (but ranging from yellowish-orange to orange-pink), with the dusky tip small or absent.
6. Along with the dark-lored races, *gambelii* shows a long wing-tip, with several primaries projecting well beyond the longest tertials and secondaries.

KIMBALL L. GARRETT

Figure 3. The back stripes of gambelii *(and* leucophrys *and* oriantha*) are formed by dark reddish-brown feather centers and pale grayish-white feather fringes. This adult* gambelii *was photographed 28 November 1992 in the Hualapai Mountains, Arizona.*

LARRY SANSONE

Figure 4. The supraloral area of this adult gambelii*, photographed 19 December 1992 at Palo Alto, California, is pale grayish white, arching slightly upward into the black lateral crown stripe. The bill is "candy corn" orange. Note the long primary projection past the longest tertial, typical of this race and of* leucophrys *and* oriantha.

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Figure 5. This first-basic gambelii *was photographed 22 October 1989 in Death Valley, California. The typical supraloral pattern of this pale-lored race is evident here.*

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Figure 6. The head pattern of this first-basic gambelii *resembles that of an adult, but the dark stripes are reddish-brown, and the pale stripes are creamy. The back is somewhat browner than that of an adult, and the bill is orangish. This individual, photographed 21 January 1995 at Big Sycamore Canyon, California, shows a small amount of black feathering coming in on the forehead.*

There is extensive intergradation between *gambelii* and the two dark-lored subspecies, particularly with *leucophrys* (Banks 1964). Individuals may show a mixture of black and grayish-white in the supraloral area (Figure 8). As an added complication, an adult observed in Orange County, California, in December 1994 appeared to be a typical white-lored *gambelii* on one side of the face, and a black-lored *oriantha*/*leucophrys* on the other side (M. T. Heindel, pers. comm.).

Supraloral pattern can also be used to distinguish first-basic *gambelii* from young *oriantha* and *leucophrys;* this character should be used with caution, however, because first-basic *leucophrys,* at least, can show more pale in the loral region than do adults (D. A. Sibley, pers. comm.; Figure 14). The dark crown stripes of first-basic birds tend to be more reddish in *gambelii* but a darker sepia in *oriantha* and many *leucophrys* (especially in forehead and supraloral region). First-basic *gambelii* lack the rich deep brown tones on the back and the strong brownish ventral tint of young *nuttalli* and *pugetensis*. Thin dark malar streaks are sometimes evident in first-basic *gambelii* (and very rarely in adults), but are rarely as prominent as in the Pacific Coast races. A photograph of a streaked juvenile *gambelii* is presented in Kaufman (1993).

Distribution. The breeding range of *gambelii* stretches west and north to the limits of dense knee-high shrubbery in Alaska, i.e., to the tip of the Seward Pen-

insula, the end of the Alaska Peninsula, and the north slope of the Brooks Range; it has bred at Barrow. It breeds east to northwestern Ontario (west of James Bay), where there is considerable overlap and intergradation with *leucophrys* (Banks 1964). *Z. l. gambelii* breeds south to south–central British Columbia (possibly to Hart's Pass in Okanogan County, Washington), southwestern Alberta, and the northern parts of Saskatchewan and Manitoba, intergrading with *oriantha* in the southern Canadian Rockies. (In Alberta and adjacent Montana there is a north-south gradient from mostly pale-lored *gambelii*-like birds in Jasper National Park to mostly dark-lored *oriantha*-like birds at Glacier / Waterton Lakes.) Its breeding habitat consists mainly of thickets, streamside shrubbery, dwarf woods, and tundra edge.

Spring migration is ten days to two weeks earlier than that of *leucophrys*. Birds have largely disappeared from the southern coastal part of the winter range by the end of April, but lingering birds and spring migrants are found in the interior at these latitudes well into May. Migration south of the breeding range drops off sharply after mid-May. Birds begin to arrive even on the northernmost breeding grounds by the second week of May.

Fall migration is well underway by early August, and most birds have left the breeding grounds by late August, an earlier departure than in *leucophrys*. Birds generally arrive in the southern U.S. beginning in mid-September, exceptionally in early September, but usually are not common until early October.

Z. l. gambelii is widespread in winter from the northwestern U.S. and southern British Columbia south through the western states and northern Mexico; it is abundant in the Southwest. On the immediate Pacific Coast from northern Santa Barbara County, California, north, this subspecies co-occurs with but is outnumbered by *nuttalli* and *pugetensis* in winter. From eastern Kansas and western Missouri, south, through much of Texas and into the border states of eastern Mexico (Tamaulipas, Nuevo Leon, Coahuila), *gambelii* overlaps in winter with *leucophrys*. Along the Mexican border and south into the northern states of Mexico it overlaps in winter with *oriantha*.

JONATHAN ALDERFER

Figure 7. Back feathers of gambelii *(top) and* pugetensis *(bottom).*

Clearly prone to wandering, *gambelii* has been recorded on the islands of the Bering Sea (e.g., Pribilofs, Nunivak, St. Lawrence; but only once in the Aleutians—at Shemya in September 1984) and at least six times in Japan (Brazil 1991). Individuals (including specimens) that represent *gambelii* or *gambelii/leucophrys* intergrades occur sparsely through much of the eastern wintering range of White-crowned Sparrow. Such records occur east to New England, Nova Scotia, Bermuda, and the Bahamas. This has been documented, for example, by black-and-white photographs published from Grand Bahama on 2 November 1993 (Norton 1994), Québec 15 May 1994 (Aubry and Bannon 1994), and Long Island, New York, 15 May 1994 (Boyle et al. 1994). Many of these birds, however, could represent white-lored birds originating from within the breeding range of nominate *leucophrys;* the black-and-white photos cited above do not reveal exact bill color.

"Eastern" White-crowned Sparrow

Identification. Nominate *leucophrys* ("Eastern" White-crowned Sparrow; Figures 9, 10, 14) is similar to the western montane race *oriantha;* these races were synonymized by Banks (1964), and birds from the Rocky Mountains, including Idaho and Wyoming, were merged into nominate *leucophrys* by Browning

(1974). They can also be confused with *gambelii*, with which intergrades occur. Typical adult *leucophrys* can be told from typical adult *gambelii* by the following characters:

1. The supraloral region is black in *leucophrys* instead of whitish; because of this feature, this race and *oriantha* are collectively referred to as the "dark-lored races."
2. The white crown stripes, therefore, start above the eye and often appear broader and more flared than in *gambelii*, but this feature is posture and "mood" dependent.
3. The bill is variably pinkish to deep, dark reddish-pink, unlike the paler orange bill of *gambelii;* the dusky bill tip is usually quite extensive; the bill is slightly larger and more swollen than that of *gambelii*, a difference noticeable only in the larger-billed examples of *leucophrys*.

First-basic birds show nearly as much dark in the supraloral region as adults, but the black is replaced by dark brown. The dark crown stripes and especially the supraloral and forehead region of immatures are often darker, less reddish, than those of *gambelii* and the Pacific Coast races.

Distribution. This is the familiar wintering subspecies of White-crowned Sparrow in the Midwest and, locally, the eastern states. It breeds in thickets, dwarf woods, bogs, fens, burned areas, and tundra edge across eastern Canada from the west shore of James Bay across northern Québec, Labrador, and Newfoundland. West of James Bay there is considerable intergradation with *gambelii*, and white-lored individuals occur in breeding populations even farther east (Banks 1964).

A Cautionary Note on Subspecies

An identification discussion centering on geographical variation within a single species must begin with appropriate caveats. Named subspecies are primarily conveniences by which taxonomists, evolutionary biologists, and museum curatorial staff organize geographical variation found within a species. Ornithological opinion remains divergent as to the philosophical basis and practical applications of the subspecies concept (see Mayr 1982 and the commentaries that follow). Subspecies are defined geographically. Some are distinctive and discrete entities, with disjunct geographic ranges; others represent segments of geographical clines in characters, grading into neighboring subspecies with no discrete breaks. Genetic differences between subspecies may or may not parallel and reflect detectable differences in appearance. Standards for subspecies recognition have been wildly inconsistent through the decades and among schools of thought. Many workers adhere to a "Seventy-five percent rule" (Amadon 1949, Mayr 1969), which holds that a subspecies warrants recognition if 75 percent of its individuals differ from "all" (actually 97 percent) individuals of the previously recognized subspecies from which it would be split.

For the birder, the identification of subspecies in the field is fraught with problems and uncertainty because the differences that characterize many subspecies may be evident only upon examination of a large series of specimens; furthermore, live birds and fresh specimens are not always comparable to the older specimens that make up the bulk of most museum collections (because of post-mortem color changes such as "foxing"). For this reason we suggest that a discussion of subspecies, such as those of the White-crowned Sparrow, be couched in cautionary terms. Thus, a birder might say that an individual "shows the characters" of a certain named subspecies or group of populations; such caution is, of course, sometimes advisable at the species level as well. See Monson and Phillips (1981, xv-xxiii) for an expanded discussion of these pitfalls.

Field diagnosis of subspecies, where possible, can be especially enlightening in species that are migratory. In winter and along migration routes, two or more subspecies will often occur in the same area. Careful evaluation can help elucidate subspecific differences in migration routes, timing, and abundance. Source regions of long-distance vagrants can sometimes by determined when subspecific identifications can be made. Analysis of museum specimens and judicious field collecting remain essential components of any analysis of the distribution of subspecies; we encourage continued collecting to augment available specimen collections and endeavor to point out that many problems simply cannot be resolved without such techniques. In many cases considerable geographical "macro-variation" is relatively easy to see and hear in the field, however, and the input of active field observers in solving problems of subspecific status and distribution can be extremely valuable.

DAVID A. SIBLEY

Figure 8. The supraloral pattern of this adult White-crowned Sparrow from Churchill, Manitoba, 31 May 1986, appears intermediate between that of gambelii *and* leucophrys. *Bill color is that of* gambelii. *See text for a discussion of intergrades in this region of Canada.*

ROB CURTIS

Figure 9. This adult leucophrys, *photographed May 1990 in Chicago, shows more white invading the supraloral region than does the bird in Figure 10; this feature is somewhat variable in* leucophrys, *perhaps in part from intergradation with* gambelii. *Note the deep chestnut on the inner greater secondary covers and the one visible tertial, a feature also typical of* gambelii *and* oriantha.

DOMINIC SHERONY

Figure 10. In adult leucophrys, *the white supercilium stops at the eye, with the supraloral region entirely black. The bill is mostly reddish-pink. This adult* leucophrys *was photographed May 1992 in Rochester, New York.*

ROB CURTIS

Figure 11. Adult oriantha *closely resemble* leucophrys. *Many* oriantha *have darker reddish bills than* leucophrys, *with considerable blackish color on the culmen. This adult* oriantha *was photographed 3 May 1993 at Big Bend National Park, Texas.*

Note that Oberholser (1974) and Browning (1974) consider the breeding birds of the Rocky Mountains also to be *leucophrys*, a treatment that differs from that of AOU (1957). There are mid-summer records of *leucophrys* south to Minnesota, Ohio, Wisconsin, Michigan, New York, and Nova Scotia, and there is a purported 1824 nesting record for Greenland (Clement

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Figure 12. The supraloral region in adult oriantha *is extensively and consistently black. This montane subspecies was photographed 30 May 1993 at Aspendell, California.*

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Figure 13. In adult oriantha *the flaring of the crown stripes is most characteristic (and found to a lesser extent in* leucophrys *and sometimes* gambelii*). The back pattern on this individual, photographed May 1993 at Corn Spring, California, resembles that of* leucophrys *and* gambelii.

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Figure 14. Immature leucophrys*, photographed September 1976 at Lighthouse Point, Connecticut. The head pattern of first basic* leucophrys *is very similar to that of first basic* oriantha*, but many* leucophrys *show more pale feathering invading the dark of the supraloral region.*

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Figure 15. This first-basic oriantha *was photographed October 1993 at Corn Spring, California. As in the adult, the pale supercilium stops at the front of the eye. The lateral crown stripes are darker than in* gambelii*, becoming blackish-brown in the supraloral area and adjacent forehead. Bill color as in adult; note the slight swelling of the sides of the upper mandible.*

1968). This subspecies was once collected amazingly far north in mid-June on an ice island northwest of Ellesmere Island, at a latitude of 82° 37'N (Apollonio 1958)!

Spring migration is somewhat earlier through the Mississippi Valley region than through the eastern Midwest and Northeast, with arrivals in mid-April in the former region and late April in

the latter. Peak spring movement is during the second and third weeks of May, with only a few birds lingering to the end of May. Birds arrive on the northernmost breeding grounds at the end of May or beginning of June.

Fall migrants over much of the East are first encountered during the last few days of September, but as early as mid-September in the Canadian border region. Fall migration peaks in the Midwest and Northeast are usually in mid-October, with some migrants still passing through in early November. Birds generally begin to arrive in the southern portions of the winter range during the second week of October, but exceptionally as early as late September.

In winter, the great majority of White-crowned Sparrows east of the Great Plains belong to this subspecies, but *gambelii* (and intergrades) occur very sparsely over much of the winter range of *leucophrys*. Nominate birds winter sparingly south to Tamaulipas and south Florida, but in general they are sparse on the southern Atlantic coastal plain and peninsular Florida. They are found north to the Great Lakes states and the Niagara Region; they occur rarely in New England north to Massachusetts. Winter populations in the north have increased in recent decades with the planting of Multiflora Rose *(Rosa multiflora)* thickets and an increase in the number of feeding stations (Peterjohn 1989).

Monson and Phillips (1981) cite four Arizona specimens of nominate *leucophrys*, under the name "*nigrilora*." The only other published record of *leucophrys* in the West is a specimen from Alaska (Gabrielson and Lincoln 1959); D.D. Gibson (pers. comm.) and A.R. Phillips examined this specimen and indicate that it is referable to *gambelii*. The close similarity of *leucophrys* to *oriantha*, however, no doubt results in wanderers being overlooked. There are records south to the southern Bahamas, Jamaica, and Cuba. Exceptionally, birds showing the characters of this race have been recorded in Great Britain (Broad and Hawley 1980), The Netherlands (Kleiberg 1984), France, and Iceland (Lewington et al. 1991). Note that both Lewington et al. (1991) and Cramp et al. (1994) reverse illustrations of nominate *leucophrys* and *gambelii*. One in Colon, Panama, in 1982 (Ridgely and Gwynne 1989) could certainly have been ship-assisted, a scenario that might also apply to some European records.

"Mountain" White-crowned Sparrow

Identification. Like *leucophrys*, *oriantha* ("Mountain" White-crowned Sparrow; Figures 11–13, 15) is a dark-lored race; the white supercilium (creamy in immatures) does not reach the bill, instead being interupted by a black supraloral area (dark brown in immatures). The bill color is similar to that of *leucophrys*, but is even more consistently dark reddish-pink (Figure 11). Distinctions from *leucophrys* are subtle, and field identification is certainly not safe. The following average differences apply mainly to populations of *oriantha* breeding in Oregon, California, and western Nevada; birds from Idaho and the Rocky Mountains approach *leucophrys* in appearance even more closely.

1. The underparts of *oriantha* are a cleaner, paler gray; *leucophrys* is slightly darker gray on the underparts and has a stronger and more extensive wash of tawny-brown on the sides, flanks, and undertail coverts.
2. The rump and nape regions are somewhat paler and grayer in *oriantha*.
3. The bill of *oriantha* averages slightly larger than that of *leucophrys*.
4. The supraloral region of adults is more consistently black (*leucophrys* is more variable there). In first-basic birds the forehead and supraloral region is consistently dark sepia brown (Figure 15); in *leucophrys* this region is often more reddish brown and invaded more by a pale creamy color from below (Figure 14).
5. At least some populations of *oriantha* have songs that are easily distinguishable from those of *leucophrys* (see page 198).

Distribution. As defined by the AOU (1957), *oriantha* breeds in the montane West, from southern Alberta and adjacent portions of British Columbia (and locally in the Cypress Hills of southwestern Saskatchewan and adjacent southeastern Alberta) south through the Rocky Mountains, the southern Cascades (though it is curiously absent from montane Washington state), and the Sierra Nevada to the San Bernardino Mountains of southern California, northern Arizona (White Mountains, north rim of Grand Canyon, San Francisco Mountains), and northern New Mexico (San Juan, Jemez, and Sangre de Cristo mountains). Breeding

populations are often small and localized. Some intergradation with *gambelii* occurs in the northern portion of this subspecies' range (see above). Breeding birds occur in stunted timberline vegetation, in high mountain meadows near timberline, and locally in wet meadows within high sagebrush habitats. Breeding elevations are generally above 5000 feet in the northern part of the range, and above 8000 to 9000 feet in the south.

The great majority of *oriantha* depart the U.S. in winter, although a few may winter along the Mexican border from southeastern California to southwestern Texas. Its winter status in Texas is confused by the presence of the very similar nominate race. It has been reported in winter in California northwest to Kern County (Grinnell and Miller 1944, Hardy et al. 1965), and there are winter records attributed to this race north to Utah (Behle 1985) and Idaho (Burleigh 1972). This subspecies winters commonly in the Cape District of southern Baja California and on the northwestern Mexican mainland. Most of the southerly records of White-crowned Sparrows in Mexico (Jalisco, Queretaro) appear to pertain to this subspecies (Miller et al. 1957).

Z. l. oriantha is generally an uncommon migrant, but may be fairly common locally in the intermountain West. It is a relatively late northward migrant in spring, passing through the southwestern deserts in small numbers at the end of April and in May, *well after* the great majority of wintering and migrant *gambelii* have departed. Arrival on the breeding grounds is mainly in May; the initiation of nesting is dependent on snow conditions (Morton 1978). Departure from the breeding grounds may be as late as the beginning of October in Sierra Nevada populations (Morton and Pereyra 1994), but is undoubtedly earlier farther north; the first southbound migrants are usually detected away from the breeding grounds in early September (occasionally in very late August), earlier than *leucophrys*. Beware that *gambelii* is a common migrant through the montane breeding habitats of *oriantha* from mid-September to late October (Morton and Pereyra 1987), often being the only White-crown race in these habitats at this time. Dark-lored birds are of casual occurrence along the Pacific Coast, mainly in fall.

"Puget Sound" White-crowned Sparrow

Identification. Though *pugetensis* ("Puget Sound" White-crowned Sparrow; Figures 16–18) and *nuttalli* ("Nuttall's" White-crowned Sparrow) are virtually identical to each other in the field, these pale-lored races can readily be told from the other three subspecies given reasonable views. The following characters separate both these races from *gambelii* and the dark-lored races:

1. The bill is a dirty yellowish, without pink tones; the dark tip on the

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Figure 16. Note the yellowish bill of this adult pugetensis, *photographed January 1995 at Big Sycamore Canyon, California. The head pattern resembles that of* gambelii, *but the white head stripes are tinged gray. The sides and flanks are extensively washed with brown.*

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Figure 17. In pugetensis *and* nuttalli *the back stripes are formed by blackish-brown feather centers and pale tan edges. In this adult* pugetensis, *photographed 21 January 1995 at Big Sycamore Canyon, California, the extension of the primaries beyond the longest tertials is relatively short. The color showing on the inner greater secondary coverts and tertials is pale rusty brown.*

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Figure 18. The head pattern of this first-basic pugetensis *resembles that of first basic* gambelii, *but note the yellowish bill and more extensive wash of brown on the underparts. Distinct dark malar streaks are typical of first-basic* pugetensis *and* nuttalli, *but sometimes are also shown in* gambelii. *This individual was observed on 21 January 1995 at Big Sycamore Canyon, California.*

bill is usually quite evident but not particularly extensive.

2. The dorsal stripes are dusky-blackish centered with warm tan edges in adults (unlike the gray and deep reddish stripes in adults of other races). The inner greater secondary coverts and tertial edges are pale rusty-brown, unlike the deep chestnut of the preceding races.
3. The gray of the underparts (sides of the breast, sides, flanks, undertail coverts), hindneck, and upper back is strongly washed with brown.
4. The bend of the wing and underwing coverts are strongly washed with yellow (whitish in the other races).
5. The white crown stripes are duller, less clean than in the other races, and do not flare out strongly as they do in the dark-lored races.
6. Thin malar stripes are often present in adults and usually conspicuous in immatures (they are sometimes present in immatures, but only very rarely in adults, of other races).
7. The projection of the primaries beyond the tertials and secondaries is considerably shorter.

Immatures are more similar to *gambelii* but can usually be told by the richer brown upperparts and underparts, yellowish bend of the wing, the presence of thin malar stripes, and the yellowish bill.

Neither of the Pacific Coast races is known to intergrade with either *gambelii* or *oriantha*.

Distribution. This and the following subspecies are restricted to the immediate Pacific Coast region. *Z. l. pugetensis* breeds from coastal British Columbia (Vancouver area and eastern Vancouver Island) south along the coast to Humboldt County in northwestern California. Banks (1964) considers Cape Mendocino, Humboldt County, California, to be the dividing line between the races, with some intergradation to the north

of this line. A few populations occur along river systems some distance inland, especially along the Willamette River in Oregon (Banks 1964).

This race is partially migratory, wintering throughout the breeding range (only rarely as far north as southwestern British Columbia; commonly from coastal Oregon) and thence south to coastal southern California, mainly north of Orange County; Unitt (1984) cites only four specimens from San Diego County, but suggests that it may prove to be of "uncommon" occurrence there. Wintering birds in California are mostly concentrated on the coastal plain, but small numbers range inland on the coastal slope. One was recorded 75 kilometers inland on the desert slope of Los Angeles County in October 1992 (KLG, pers. obs.), and there are records inland from this subspecies' normal range in Oregon and Washington. An early July specimen of *pugetensis* from the east side of Mt. Hood, Oregon (Banks 1964), was thought not to pertain to a breeding bird.

Fall migration along the West Coast averages slightly earlier than that of *gambelii*. Similarly, wintering birds depart slightly earlier in spring. On Southeast Farallon Island, California, White-crowns are rare in winter but show spring migration peaks in early April (almost all *pugetensis*) and again in late April (when *gambelii* outnumber *pugetensis* two to one; DeSante and Ainley 1980). Spring arrivals on the northern coastal breeding grounds are in late March and early April.

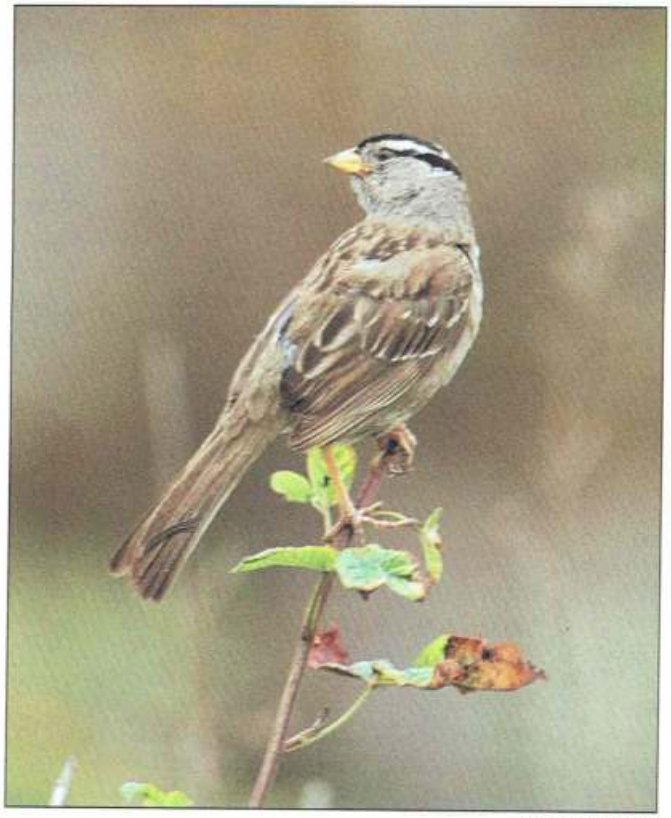

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Figure 19. This adult nuttalli *was photographed July 1987 in Monterey County, California. Adults of all races can appear worn by mid-summer. Note the yellowish bill (as in* pugetensis*) and the short primary projection beyond the tertials.*

"Nuttall's" White-crowned Sparrow

Identification. *Z. l. nuttalli* (Figure 19) differs from all subspecies other than *pugetensis* by the characters listed for that race. Many individuals can be told in the hand from *pugetensis* by their greater body mass, proportionately shorter wing, and longer tarsus. The bill of *nuttalli* averages slightly larger. There is considerable variation in measurements, however, among the populations of *nuttalli*, many of which are well isolated from neighboring populations. In plumage they average somewhat richer brown above than *pugetensis*, but this difference is subtle; the inner greater secondary coverts and outer edges of the tertials may average slightly deeper rusty. The yellow bend of the wing averages brighter. Especially in the southern part of its range, *nuttalli* in first-alternate plumage retain more brown in the crown stripes than does *pugetensis*. Even adult *nuttalli* often show a blending of brown in the posterior portion of the black postocular stripe; *pugetensis*, on average, are cleaner black in this region.

Distribution. This is the sedentary race of the immediate Pacific Coast of central California, from Cape Mendocino, Humboldt County, south to the vicinity of Point Conception, Santa Barbara County (and historically down the coast as far as Goleta; Lehman 1994). There are no records substantially outside of the resident range, but the close similarity of this race to the more widespread *pugetensis* virtually precludes the possibility that extralimital birds would be detected. *Z. l. pugetensis* moves

into much of the range of *nuttalli* in winter.

These resident birds occupy brushy terraces, ridges, and clearings in a narrow coastal strip with persistent summer fog; populations of this race and *pugetensis* have benefited from the extensive clearing of coastal coniferous forests. They occur up to about 20 km inland in Santa Barbara County (Lehman 1994). Birds pair up and show territorial behavior by late February; they nest off the ground, a trait shared with *pugetensis*, but not with the other races, which are ground nesters (DeWolfe 1968).

Vocal Characters

Because *Zonotrichia* sparrows have a welcome habit of singing frequently in migration and on the winter grounds, the song characters discussed below are helpful throughout the year. It should be noted that first-basic birds, as well as adults, sing. During the breeding season birds often sing even on moonlit nights. The literature on song in sparrows of this genus, and particularly the White-crowned Sparrow, is vast and intriguing. Noteworthy are the regional song dialects found in the Pacific Coast and western montane populations. For an overview of regional patterns and development of song in White-crowns, see Baptista (1975, 1977) and Baptista and King (1980). Birders should be cautioned that some individuals may hone the components of song on the winter grounds, and where representatives of widely scattered breeding populations co-occur in winter the potential for learning songs of other populations is great. Thus, even though song can be an important clue in racial identification, it cannot be considered diagnostic.

In general, the song of the White-crowned Sparrow is described as lazy, wheezy, or melancholy. It consists of about four to six buzzy whistles, variably introduced by clearer whistles and often including trills, but generally lacking the consistently pure quality of the songs of White-throated, Golden-crowned, and Harris's sparrows.

Pacific Coast birds (*nuttalli* and *pugetensis*) tend to have a more sprightly and patterned song that usually incorporates one or more rather clear introductory whistles and a pair or more of rapidly-delivered slurred whistles or short trills at or near the end. One such song might be rendered as *zuuuu tsee? sweet-it sweet-it*. To our ears *gambelii* and *leucophrys* are essentially indistinguishable by song; the slight differences result from slightly different patterns of notes, but the quality is similar. Todd (1963) noted slight differences between the songs of Labrador populations (="*nigrilora*") and those of the Hudson Bay region. Both give a song that is lazier, wheezier, and more wavering than those of the Pacific Coast races; *gambelii* / *leucophrys* songs generally lack clear trills, paired whistles, and sprightly patterning. Two renditions for *gambelii* might be: *zuuuu gee'-cha gee'-cha gee?* (with a hard "g" sound) or *zuuuu zeee jeee jeee zee*. Todd (1940) describes the song of *leucophrys* as *hee-zur-se-se-see*. The song of *oriantha* is variable, but in general is clearer and thus more suggestive of the Pacific Coast races than of the boreal/subarctic breeding races *gambelii* and *leucophrys*. Many California populations of *oriantha* sound similar to the coastal subspecies, but other populations (e.g., in eastern Oregon) may approach *gambelii* in song pattern and quality (Baptista and King 1980). Song in Rocky Mountain *oriantha* appears to be poorly studied.

Examples of recorded songs are found on several commercially available collections. The data accompanying these collections, however, are often insufficient to determine the subspecies involved.

The most frequent call note of the White-crown is a sharp *pink* note. There are subtle differences among the races in the quality of this note. Pacific Coast *pugetensis* and *nuttalli* have a somewhat flatter *pink* note that is different from the note of *gambelii*. Montane *oriantha*, at least those we have heard in California and Arizona, give a hard *penk* which is similar to the common call note of Blue Grosbeak (*Guiraca caerulea*); Dunn and G. Rosenberg were consistently able to pick out migrant *oriantha* from among *gambelii* by call notes alone in Arizona in late September 1994.

All races give thin *seep* notes both at rest and in flight. Additional notes include a laughing trill among flocking and pre-

roosting birds, a *tsit* note around the nest, and a dry rattle given by interacting birds.

Summary of Identification Characters

Table 3 presents a summary of the identifying characters of the subspecies of White-crowned Sparrow. Again, we caution that intergradation, individual variation, and microgeographic variation (within named subspecies) confound this simplistic tabular summary. Nevertheless, a great majority of individuals can be confidently assigned to one of three groups in the field given reasonable views and attention to song. We urge observers to critically study White-crowned Sparrows in an attempt to clarify some of the following problems. (1) How consistent are racial differences in bill color? (2) How frequent is *gambelii* in the Midwest and East? (3) What are the interior limits of wintering *pugetensis*, and what are its southern limits in winter? (This race is presently unrecorded in Baja California.) (4) What is the wintering status and distribution of *oriantha* within the U.S., and how much interannual variation in numbers exists? (5) With what frequency does *leucophrys* occur in the West? Ultimate clarification of most of these issues will come through the judicious collecting of specimens.

TABLE 3
SUMMARY OF IDENTIFYING CHARACTERS

	GAMBELII	*LEUCOPHRYS*	*ORIANTHA*	*PUGETENSIS*	*NUTTALLI*
Supraloral Area	pale	dark	dark	pale	pale
General Bill Color	orange	pink to reddish-pink	dark reddish-pink	dull yellowish	dull yellowish
Back Pattern	dark reddish-brown centers, pale gray edges	dark reddish-brown centers, pale gray edges	dark reddish-brown centers, pale gray edges	dusky black centers, tan edges	dusky black centers, tan edges
Inner Greater Secondary Coverts and Tertial Edges	deep chestnut	deep chestnut	deep chestnut	pale rusty brown	pale rusty brown
Bend of Wing	whitish	whitish	whitish	yellowish	yellowish
Sides and Flanks of Adults	very slight brown wash	slight brown wash	very slight brown wash	extensive brown wash	extensive brown wash
Lateral Crown Stripes of Immatures	rufous-brown	rufous-brown to dark brown	dark brown, darkening to blackish-brown in supraloral area	rufous-brown	rufous-brown
Median Crown Stripe and Supercilium of Adults	white	white	bright white	duller grayish white	duller grayish white
Primary Extension	long	long	long	short	short
Song	wheezy, drawled	wheezy, drawled	variable, often clearer, more patterned	clearer, more patterned	clearer, more patterned
Call Note	sharp *pink*	sharp *pink*	metallic *penk*	flatter *pink*	flatter *pink*

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