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Geographic Variation in the Juvenal Plumage of the Common Nighthawk (*Chordeiles minor*) in North America

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Few studies of geographic variation have included discussion of variation in the juvenal plumage. Such variation may or may not parallel that in the definitive basic or alternate plumages usually studied. Indeed, the juvenal plumage may have characters of its own (e.g. *Icterus prothemelas praecox*, Phillips and Dickerman 1965). Specimens of juveniles taken just before—or shortly after—fledging, when the plumage is fresh, unworn, and unfaded, are scarce for many species of birds. Therefore such studies, based on whatever material can be assembled, should be of intrinsic interest.

This review of geographic variation in the juvenal plumage of the Common Nighthawk (*Chordeiles minor*) was stimulated by two small nestlings in the collection of the American Museum of Natural History (AMNH) collected along the Cheyenne River, Custer County, South Dakota, 10 and 14 July 1894, by Walter Willis Granger. The older chick is sufficiently feathered to make comparisons of pattern and color. The label bears the notations "*minor?*" and "*minor* or *acutipennis*." I originally considered it to be *C. acutipennis*, and had included both in a study of the juvenal plumage of that species (Dickerman 1981). Subsequently, at the suggestion of Allan R. Phillips, I sought other specimens of nestlings of *C. m. sennetti* for comparison. At that time only two other preflight young of *sennetti* were found among the collections of North America (another was later found in the AMNH collection, labeled "*virginianus* HCO" [see below] in a tray with specimens of uncertain localities!). The juvenal plumage of the young *sennetti* was pale and matched that of the Cheyenne River specimen. Dur-

ing the course of this exercise, I realized that there was considerable variation among juveniles of the species, and I sought additional specimens.

Study of juvenal plumages in this species is complicated by the extent of dispersal of birds while still in this plumage (Laybourne and Post pers. comm.). In so far as possible, therefore, only preflight young—or fledged young that agree well in color characters with preflight young from well within the range of any subspecies—were used for plumage descriptions.

Oberholser (1914) in his revision of *Chordeiles minor* (then called *C. virginianus*) occasionally mentioned the juvenal plumage, but it is often unclear whether he meant the natal, juvenal, or even first basic plumages (cf. nestling descriptions under *sennetti*, p. 53).

Selander (1954) mentioned preflight young in his account of *henryi*, and also recognized the juvenal plumage as important in mapping the nesting ranges of subspecies. He specifically cited two tawny-backed, partially grown "immatures" (i.e. preflight juveniles) from Mesa County in west-central (not "southwestern") Colorado as northern specimens of *henryi*. However, he cited fledged juveniles in his discussion of the distribution of western subspecies, although birds in juvenal plumage may wander far from their hatching site.

Oberholser (1914: pl. 3) presented a map of the nesting ranges of the North American subspecies. Selander (1954: 68) modified the ranges in the western Great Plains and Rocky Mountain regions. I refined the ranges of several subspecies further by the identification of preflight young.

I studied a total of 75 juveniles (some already

fledged) from 30 collections; 44 were of the nominate subspecies group, which most commonly nests on urban rooftops. No juveniles of the two Middle American subspecies (*tropicalis* and *panamensis*) were available. Preflight young are difficult to locate in the field. For example, I found only a single nestling in approximately 24 man-hours in suitable habitat in southwestern South Dakota.

Specimens were borrowed from the following institutions: Academy of Natural Sciences, Philadelphia (ANSP); California Academy of Sciences, San Francisco (CAS); Carnegie Museum of Natural History (CM), Pittsburgh; Cowan Vertebrate Museum, University of British Columbia (CVM); Charles R. Connor Museum, Washington State University, Pullman (CRCM); Cornell University (CU), Ithaca; Delaware Museum of Natural History (DMNH); Field Museum of Natural History (FMNH), Chicago; James Ford Bell Museum of Natural History, University of Minnesota (JFBM), Minneapolis; Manitoba Museum of Natural History (MANM); Moore Laboratory of Zoology, Occidental College (MLZ); Museum of Vertebrate Zoology, University of California, Berkeley (MVZ); Museum of Zoology, University of Michigan (UMMZ); North Carolina State Museum (NCSM); Royal British Columbia Museum, Victoria (RBCM); Texas Cooperative Wildlife Collection, College Station (TCWC); U.S. National Museum of Natural History, Washington (USNM); University of Kansas, Museum of Zoology, Lawrence (KU); University of Wisconsin Zoological Museum (UWZM), Madison; Utah State University, Department of Zoology (USUDZ); and the Washington State Museum, University of Washington (WSM). Six other collections had no preflight young of the species. Both preflight and fledged young judged typical of a subspecies (or intermediate between two subspecies, as noted) are cited under specimens examined.

Chordeiles m. minor and *C. m. chapmani*

The juvenal plumage of *minor* is the darkest among the subspecies, and has the most extensive areas of black in the feathers of the dorsum, especially on the crown and wing coverts. It has generally heavier barring ventrally, including the undertail coverts. The narrow edges of feathers of the crown, interscapular area, tertials, and coverts range from creamy buff to cinnamon. Among the specimens I examined, there was individual variation without defined color phases (Fig. 1). Yet none of the series would be confused with any of the generally paler and less black-marked western subspecies. The most cinnamon (second from left, Fig. 1; UMMZ 67674) specimen is similar to juveniles of *minor* from Washington and British Columbia that represent intergrades with *hesperis* (see below). The palest (rightmost, Fig. 1; UMMZ 106739) specimen approaches *sennetti* or *howelli* in the buffy dorsal edgings, but is so much more heavily marked



Fig. 1. Individual variation within a population of juvenile *Chordeiles minor* from Ann Arbor, Michigan. Individuals selected from a series of twelve. Left to right: UMMZ 204061 (20 July 1980), 67674 (18 July 1931), 134804 (22 July 1953), 134805 (9 July 1953), 106739 (1 July 1940).

with black and more heavily barred below that it has a combination of characters found only in *minor*. Oddly, it has deep cinnamon edgings on the feathers of the crown. The ventral breast band of *minor* is generally darker than in other subspecies, but occasional individuals of *howelli* (Wyoming, USNM 571197) have dark bands, and the above Michigan juvenile has a rather pale band. Young *chapmani* are somewhat paler and more lightly barred ventrally than *minor*, but individual variation within *minor* spans the slight differences.

Nine well-prepared preflight young were available from Minneapolis, Minnesota. Six of these are typically dark *minor*. The other three, although closer to *minor*, are variable and intermediate towards the paler subspecies *sennetti*. Similarly, specimens from Indian River, Ramsey County, northeastern North Dakota (FMNH 138434), Keokuk, Lee County, Iowa (UMMZ 126118), and one of two from Winnipeg, Manitoba (MANM 818), have characters intermediate between *minor* and *sennetti* and help define the ranges of the subspecies (see also discussion of *sennetti*). A fledged young from Bismarck, South Dakota (USNM 240404), is also intermediate, but it was capable of flying and might have originated farther east or north.

Preflight juveniles from Comox (MVZ 101852 and 101853), and "Kitsilano" (CVM 5581), Vancouver Island, British Columbia, were so intensely black on the crown and lesser wing coverts (and the interscapular area of MVZ 101852) that they fall outside of the pattern of variation in *minor*. They may represent an unnamed form based on the juvenal plumage. The terminal edges of the dorsal feathers are much deeper in color than in *hesperis*. Preflight young from Seattle, Washington (WSM 12074 and 14500), are somewhat less black above than the two Vancouver Island birds,



Fig. 2. Juveniles of seven subspecies of *Chordeiles minor*. Top row, left to right—*C. m. hesperis*: Idaho USNM 396145, 396144; *C. m. howelli*: Wyoming USNM 571197, New Mexico USNM 240409; *C. m. sennetti*: South Dakota AMNH 825220, North Dakota USNM 240406, South Dakota AMNH 61220. Bottom row, left to right—*C. m. henryi*: Texas USNM 140390, New Mexico USNM 183624; *C. m. aserriensis* Texas USNM 81570, ANSP 87916; *C. m. chapmani*: Florida DMNH 43912; *C. m. minor*: Michigan DMNH 43905, Minnesota MMNH 21880.

but are matched by only one juvenile *minor* (Washington, D.C., USNM 333119). A third nestling from Seattle (WSM 12874) is paler and matches well typical specimens of *minor*. Adults from Vancouver Island and southwestern British Columbia are generally more richly colored than eastern *minor*. The ranges of *minor* and *hesperis* intergrade in the region.

Specimens examined.—*Chordeiles m. minor*: New Brunswick, AMNH 361168; Pennsylvania, ANSP 74380; Washington D.C., USNM 333119; North Carolina, NCSM 7290, 7291; Michigan, DMNH 43905; UMMZ 53016, 67674, 83473, 83474, 106739, 111505, 111960, 118235, 134804, 134805, 202436, 20406; Minnesota, JFBM 2880, 2879, 9539, 10276, 21880, 32922; Manitoba, MANM 2052; Washington, WSM 10272, 12874, 14500, CRCM 57-22; British Columbia, CAS 32314. *C. m. minor* × *C. m. sennetti*: Minnesota, JFBM 9053, 18665, 32932; North Dakota, FMNH 138434; South Dakota, USNM 240404; Iowa, UMMZ 126118; Manitoba, MANM 818. *C. m. chapmani*: Georgia, CU 3657; Florida: ANSP 31903, 31905, DMNH 43912. *C.*

m. subsp?: British Columbia (Vancouver Island), MVZ 101852, 101853; CVM 5581.

Chordeiles minor sennetti

This subspecies has the palest juvenal plumage of all subspecies. It is very different from the blackish juvenal plumage of *minor*. The black centers of the dorsal feathers are reduced or absent, and the feathers have a fine vermiculation. Feather edges are gray (left hand *sennetti*, Fig. 2) to pale buff (other two specimens). Too few specimens were available to determine if there is a gradual gradient between gray and buff or if there are distinct color phases. Ventral barring is pale, and similar to *hesperis* and *aserriensis*, but less heavy than in *minor* and *chapmani* and in some specimens of *howelli* and *henryi*.

A pale—and finely vermiculated dorsally—nonflying juvenile, from Carberry, Manitoba, and labeled “*virgianus* HCO,” reflects the influence of *sennetti* as extended into southwestern Manitoba, north and east

to Carberry. A nestling from northeastern Kansas (USNM 576014, 70 miles north of Fort Riley, on the Republican Fork) probably represents the southeastern border of the range of *sennetti*.

Specimens examined.—Manitoba, AMNH 57876; North Dakota, FMNH 138431, USNM 240406; South Dakota, AMNH 61220, 825220, USNM 576014; Kansas, UMMZ 134770, USNM 404958, 576014, KU 15971, 22953.

Chordeiles minor hesperis, *C. m. howelli*,
and *C. m. aserriensis*

I cannot separate consistently the juvenal plumages of these three forms. Collectively, they are darker than *sennetti*, with heavier black markings, paler than *minor*, and paler and less cinnamon than *henryi*. *Howelli* is the most buffy and least gray, and *aserriensis* is the grayest of the three. The young vary in the extent of the black centers of the dorsal feathers (Fig. 2). More extensive series of preflight young might yield characters that distinguish the subspecies. Two nestlings from the Texas A&M University Campus, Brazos County, are very different from each other. One is paler and finely flecked with gray, and would be identified as *aserriensis*. The other is darker with more extensive black markings, and I would label it *minor*! Brazos County is where the ranges of the two subspecies probably meet. A young "*aserriensis*" from northern Veracruz may represent an unnamed form with darker adults illustrated by Graber (1955), or it may represent the northern extension of *tropicalis* (Selander and Alvarez del Toro 1955).

Specimens examined.—*C. m. hesperis*: Idaho, USNM 396144, 396145; Oregon, CM 127893, 127875. *C. m. howelli*: Wyoming, USNM 571197; New Mexico, USNM 240409. *C. m. aserriensis*: Texas, ANSP 87916, AMNH 361250 (fledged), 81570; TCWC 10460 (typical), 10962 (towards *minor*); Veracruz, CU 34517.

Chordeiles minor henryi

Juveniles of *henryi* are unique. They have extensive dorsal feather edgings of rich ochraceous to deep cinnamon. The venter is creamy buff, with deep buff to pale cinnamon edgings on the sparsely barred feathers of the breast band. Some *minor* have similar edgings on the breast band, but the feathers are much more heavily barred. One *sennetti* and one *howelli* are as buffy below as *henryi*, but they lack the richer, more differentiated breast band. A richly cinnamon-backed, nonflying juvenile from Henrietta, Texas (USNM 140390), reflects the influence of *henryi* in north-central Texas. No specimens from that region are available to study the extent of individual variation. The specimen label (USNM 140390) bears the notation "*howelli* HCO," and it is so listed in his 1914 revision.

A somewhat worn fledged young from Kirtland, San Juan County, New Mexico (DM22148), is grayer and may represent an intermediate towards *howelli*.

Specimens examined.—Texas, USNM 140390; New Mexico, USNM 183624; Arizona, USNM 235061; Utah USUDZ (no number, intermediate towards *hesperis*, *howelli*, or both), Chihuahua, MVZ 119387, 143693. *C. m. henryi* × *C. m. howelli*: New Mexico, DMNH 22148.

Four subspecies or subspecies-groups were defined. The *C. m. minor*–*C. m. chapmani* (a weakly differentiated subspecies) young are most extensively marked with black and are apparently not distinguishable from each other, although only four young *chapmani* were available. Some preflight young from Vancouver Island, British Columbia, are exceptionally black and may represent an identifiable population based on the juvenal plumage, but more specimens are needed. *Chordeiles m. sennetti* is the palest of all subspecies. Its black markings are reduced to vermiculations. Few young of *C. m. hesperis*, *howelli*, or *aserriensis* were available. These appear to form a cline that is paler than *minor*, darker than *sennetti*, and less cinnamon than *henryi*. Birds grade from buffier in the northwest to grayer in south Texas. A larger series might better define these entities. *Chordeiles m. henryi*, from the most xeric portion of the species range, has deep cinnamon edgings to the dorsal feathers in contrast to all of the other subspecies.

There is recognizable geographic variation in the juvenal plumage of the Common Nighthawk, a species with nearly continuous distribution where habitat is suitable. Although some subspecies intergrade with adjacent populations over short distances, the color of the juvenal plumage of the *hesperis*–*howelli*–*aserriensis* group appears to vary clinally.

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