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ANNOTATED BIBLIOGRAPHY
OF 40 BIRDS
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CALIFORNIA DESERT

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Completed December 1978

Contract CA-060-CT8-000045



ANNOTATED BIBLIOGRAPHY OF 40 BIRDS IN THE CALIFORNIA DESERT:

1. BLACK-HEADED GROSBEAK (*Pheucticus melanocephalus*)
2. CACTUS WREN (*Campylorhynchus brunneicapillus couesi*)
3. CALIFORNIA THRASHER (*Toxostoma redivivum*)
4. COMMON NIGHTHAWK (*Chordeiles minor*)
5. DOWNY WOODPECKER (*Picoides pubescens turati*)
6. FOX SPARROW (*Passerella iliaca*)
7. GRAY FLYCATCHER (*Empidonax wrightii*)
8. GREAT HORNED OWL (*Bubo virginianus*)
9. GREEN-TAILED TOWHEE (*Pipilo chlorurus*)
10. HAIRY WOODPECKER (*Picoides villosus leucothorectic*)
11. HOUSE FINCH (*Carpodacus mexicanus*)
12. LADDER-BACKED WOODPECKER (*Picoides scalaris cactophilus*)
13. LAWRENCE'S GOLDFINCH (*Carduelis lawrencei*)
14. LESSER GOLDFINCH (*Carduelis psaltria*)
15. LONG-BILLED MARSH WREN (*Cistothorus palustris*)
16. LONG-EARED OWL (*Asio otus*)
17. MOUNTAIN BLUEBIRD (*Sialia currucoides*)
18. MOUNTAIN CHICKADEE (*Parus gambeli*)
19. NORTHERN BROAD-TAILED HUMMINGBIRD (*Selasphorus platycercus* - *S.p. platycercus*)
20. NORTHERN GRAY-HEADED JUNCO (*Junco c. caniceps*)
21. NORTHERN ORIOLE (*Icterus galbula*)
22. PINON JAY (*Gymmorhinus cyanocephalus*)
23. PLAIN TITMOUSE (*Parus inornatus*)
24. POOR WILL (*Phalaenoptilus nuttallii*)
25. RED-TAILED HAWK (*Buteo jamaicensis*)
26. RED-WINGED BLACKBIRD (*Agelaius phoeniceus*)
27. RUBY-CROWNED KINGLET (*Regulus calendula*)
28. RUFIOUS-SIDED TOWHEE (*Pipilo erythrophthalmus*)
29. SAGE THRASHER (*Oreoscoptes montanus*)
30. SOLITARY VIREO (*Vireo solitarius cassinii*)
31. SONG SPARROW (*Melospiza melodia*)
32. TURKEY VULTURE (*Cathartes aura*)
33. VIOLET-GREEN SWALLOW (*Tachycineta thalassina*)
34. WESTERN BLUEBIRD (*Sialia mexicana*)
35. WESTERN FLYCATCHER (*Empidonax d. difficilis*)
36. WESTERN KINGBIRD (*Tyrannus verticalis*)
37. WESTERN MEADOWLARK (*Sturnella neglecta*)
38. WESTERN WHITE-THROATED SWIFT (*Aeronautes saxatalis* - *A. s. saxatalis*)
39. WILSON'S WARBLER (*Wilsonia pusilla*)
40. YELLOW-RUMPED WARBLER (*Dendroica coronata*)



BLACK-HEADED GROSBEAK
Pheucticus melanocephalus

I TAXONOMY

A. Type description

AOU (1957) P. m. melanocephalus: Guiraca melanocephalus Swainson, Phil. Mag., n. s., 1, no. 6, June 1827, p. 438. (Table land. Temiscaltipec = Temascaltepec, Mexico.)

P. m. maculatus: Fringilla maculata Audubon, Birds Amer. (folio), vol. 4, 1837, pl. 373, Figs. 2-4. (Columbia River [, Oregon].)

B. Current systematic treatments

Paynter (1970), recognizes four species in the genus Pheucticus; two subspecies of melanocephalus, both of which occur in California. Order: Passeriformes; Family: Emberizidae (Cardinalinae).

C. Synonomies of scientific nomenclature

P. m. melanocephalus: Dawson (1923), Hedymeles melanocephalus melanocephalus. Ridgway (1901), zamelodia melanocephala. Grinnell and Miller (1944), Habia melanocephala.

P. m. maculatus: Dawson (1923), Hedymeles melanocephalus capitalis. Grinnell and Miller (1944), Cocoborus melanocephalus; Pitylus melanocephalus; Guiraca melanocephala; Goniaphea melanocephala; Zamelodia melanocephala micro-rhyncha; Habia melanocephala; Z. m. maculata.

D. Synonomies of vernacular nomenclature

II DESCRIPTION

A. External morphology of adults

Dawson (1923), H. m. melanocephalus "Adult male in summer: Head above and on sides, and narrowly across chin, glossy black, area of black occasionally invaded by a supra-auricular stripe of orange-tawny; a cervical ring, sides of neck, throat, breast, and sides, rump, and interrupted stripes connecting rump and cervix, orange-tawny..., paling on flanks posteriorly to buckthorn brown; a touch or wash of the lighter shade also on crissum, which is otherwise white; abdomen narrowly white, middle of breast, axillars, and lining of wings pure lemon-yellow; remaining upperparts black, interrupted, as aforesaid, on back by tawny, and on wings by

Pheucticus melanocephalus (con't.)

broad white tips of median coverts, narrower white tips of greater coverts and secondaries; basal portion of remiges, nearly half on primaries, white; the 6th, 7th and 8th primaries (reckoned from within) sharply edged with white on the distal portion; rectrices black, the two outer pairs broadly tipped and the 3rd pair touched with white on inner web; tibiae black tipped with white. Bill dark horn-color, lightening below; feet dark brown. Adult female: Very different; pattern of male preserved only in yellow of axillars and wing-linings, with touches of yellow on breast; in general, above blackish, streaked with white; below fulvous, streaked sharply and narrowly with blackish; pileum blackish, separated by a coronal stripe of white sharply flecked by black; lores and superciliary broadly white; back black, broadly edged with whitish or fulvous; white spotting of wings much restricted; the spots on tail lacking; underparts chiefly whitish, clearest on chin, throat (or else on sides of throat only), and abdomen; elsewhere more or less suffused with pale ochraceous, most intensely on breast, and sharply streaked with dusky."

P. melanocephalus maculatus: "Similar to H. (P.) m. melanocephalus, but bill averages smaller; black of crown more liable to invasion of tawny from behind, especially in post-ocular stripe, and occasionally developing a median crown-stripe." Ridgway (1901), detailed description of adult males and females in summer and winter, including plumage, soft parts, and measurements. Peterson (1961) "Male: Rusty wings, and large pale bill...In flight shows black and white wing and tail pattern, cinnamon rump. Female: Largely brown; streaked. Breast washed with light brown (usually) and lightly streaked on sides."

B. External morphology of subadult age classes

Dawson (1923), "resemble the adult female, but the ochraceous element is stronger both above and below, and the lesser wing-coverts are extensively edged with yellow." Ridgway (1901), detailed description of young, including plumage and soft parts.

C. Distinguishing characteristics

Interspecific - Peterson (1961), "Female Rose-breasted Grosbeak (East) usually has a whiter, more streaked breast."

Intraspecific - Dawson (1923), "There is no doubt that coastal specimens exhibit this ochraceous invasion of the cephalic areas more frequently than do Rocky Mountain specimens; but the latter do show individual examples of the same tendency, and the grounds of separation are probably not valid."

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I GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) Pheucticus melanocephalus in general: "Southern British Columbia, southern Alberta, southern Saskatchewan, and central Nebraska south to northern Baja California, Guerrero and Oaxaca. Fossil, in the late Pleistocene of California."

P. m. melanocephalus: "Breeds from southeastern British Columbia (Okanagan Landing, Creston), northwestern Montana (Flathead Lake), southeastern Alberta (Walsh), southwestern Saskatchewan (Maple Creek), northeastern Montana (Glasgow), and northwestern North Dakota (Charleson) south through eastern Washington and eastern Oregon to extreme eastern California (White Mountains, Clark Mountain), central and southeastern Arizona (Prescott, Huachuca Mountains) and the Mexican Plateau to Guerrero (Amojileca) and Oaxaca (Cerro San Felipe); east to central Nebraska (Greeley) and central Kansas (east to Cloud and Harvey counties), western Oklahoma, western Texas (Midland County), and Tamaulipas (La Joya de Salas)."

P. m. maculatus: "Breeds from southwestern British Columbia (Quinsam Lake, Caquitlam) south along the Pacific coast to northern Baja California (Sierra San Pedro Martir); east in California to Owens Valley and the San Bernardino Mountains." Dawson (1923), P. melanocephalus: "Western North America from the plateau of Mexico north, in summer, to eastern Kansas, southeastern Dakota, Montana, and British Columbia; breeds throughout its range."

B. California distribution of the species

P. melanocephalus melanocephalus: Dawson (1923), "Restricted to the portion lying east of the Sierra-Cascade Mountain system...At least the Colorado River valley during migrations; presumably the breeding bird in mountain ranges east of the Sierras."

P. melanocephalus maculatus: Dawson (1923), "The Pacific Coast district of western North America, broadly; probably includes eastern slopes of Sierra-Cascade system."

C. California desert distribution

Grinnell and Miller (1944), P. m. melanocephalus: "As breeding, mountains of Mono and Inyo counties east of Owens valley, extending south to eastern San Bernardino County."

Pheucticus melanocephalus (con't.)

In migration, Colorado River valley, Colorado and Mohave deserts west to Twentynine Palms, and valleys of eastern Inyo County."

P. m. maculatus: "Breeds throughout State west of southeastern deserts and Owens Valley, with exception, apparently, of coastal islands; in desert mountains of Mono and Inyo counties replaced by H. (P.) m. melanocephalus. In migration appears additionally on islands and in desert areas."

D. Seasonal variations in distribution

P. m. melanocephalus - AOU (1957), "Winters from southern Sonora (Alamos), southern Chihuahua (Chihuahua), Nuevo Leon (Mesa del Chipinque), and Louisiana (Shreveport, Monroe) south to Guerrero and Oaxaca."

P. m. maculatus - AOU (1957), "Winters from southern Baja California (La Paz), southern Sonora (Tesia), and southwestern Chihuahua south to Oaxaca (Mitla)."

Dawson (1923), P. m. maculatus: "casual in winter in the San Diegan district." Grinnell and Miller (1944), P. m. melanocephalus: "a common migrant on eastern deserts, appearing in spring in mid-April and continuing through May." P. m. maculatus: "Summer resident from early April to early September. Migrations occur normally in late March and April, and in late August and September; spring arrival in higher mountains and in northern California two to four weeks later than in other sections, and migration continues through May east of Sierran axis."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), P. m. melanocephalus: "Life zone occupied for nesting, Upper Sonoran and Transition...Pinon woodland primarily, but also mountain mahogany and, where available, firs and rose and willow thickets, the latter apparently preferred."

P. m. maculatus: "Life zones in summer, Lower Sonoran, Upper Sonoran, and Transition...Riparian woodland, oak woodland with associated shrubs, and open coniferous forests of Transition and Upper Sonoran zones, especially where intermixed with deciduous oaks. The range in habitat is thus great and includes plant growths so diverse in type as willows, black oaks, fruit orchards, and juniper trees. Most favored is the willow-cottonwood association." Weston (1947), "may ordinarily be found in the woodland or in riparian

Pheucticus melanocephalus (con't.)

groves and thickets...Most often found in the open woods... Along edges or transitions between grassland and woodland or chaparral, grosbeaks are also common; but they enter chaparral and grassland only infrequently and then only in search of food." Small (1974), "for breeding, open coniferous montane forest, riparian woodland, oak woodland in foothills and lower mountain slopes; otherwise, woodland patches and groves in lowlands." Miller (1951), Upper and Lower Sonoran and Transition life zones. Austin (1968), "in thickets of bushes, small trees, or willows which grow along streams, around the edges of swamps, ponds, or damp places, as well as on the edges of open woods, where the sunlight filters down through the foliage, but almost always not far from water or low ground."

B. Altitudinal range

Dawson (1923), "Ranging from 5000 feet up to 8500 feet," for P. m. melanocephalus. "Range from near sea level at least up to 7500 feet in Warner Mountains of Modoc County and in southern Sierra Nevada," for P. m. maculatus.

C. Home range size

D. Territory requirements

Perch sites - Gander (1929), "seen perched on an electric light wire." Weston (1947), "for singing perches, grosbeaks appear to require fair visibility...best afforded by open woods."

Courtship and mating sites - Weston (1947), "Courtship and selection of mates occurs after the grosbeaks arrive on their breeding grounds."

Nest sites - Dawson (1923), "Externally a bulky...airy assemblage of interlaced twigs or dishevelled weed-stems, or sometimes a generous mass of leaf-bearing twigs plucked green...Placed at moderate heights in the larger bushes, saplings, or small trees, chiefly those of the riparian association. Weston (1947), "Nesting occurs most commonly in streamside bushes and trees and in the live oaks of open woods." Includes descriptions of six different nest sites in Strawberry Canyon, Berkeley, California. In general: "in deciduous bushes and trees bordering streams...Also in bushes or trees away from stream courses in gardens, dense brushland, closed woods and parklands...Placed in trees and bushes, usually at a height of six to twelve feet above the ground."

Pheucticus melanocephalus (con't.)

E. Special habitat requirements

Grinnell and Miller (1944), "Perhaps an important factor is local diversity of plant growth and extensive 'edge' conditions", for P. m. maculatus.

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Dawson (1923), "fruit in season, especially cherries and figs...codling moth, cankerworms, flower-beetles...scale insects." Grinnell and Miller (1944), "food is varied and the species may require several kinds of supply in the nesting area. Insects and buds are sought in the foliage of broad-leaved trees especially, and berries and other fruits are taken in large quantity." Weston (1947), "Insects and other animal matter eaten by grosbeaks amount to more than the bulk of the vegetable food and should probably be regarded as their main food." Fisk and Steen (1976), report this species feeding on nectar from feeders in Arizona. Ivor (1943), reported this species feeding upon ants (in captivity).

B. Foraging areas

Weston (1947), "The extensive peripheral foliage characteristic of open woods is advantageous to grosbeaks in foraging for food...Forage predominantly in trees...May occasionally be seen flying out in midair in pursuit of insects...May also frequent the ground in search of food."

C. Foraging strategies

Gander (1929), "from this perch it would make short fly-catcher-like flights, presumably after insects."

D. Feeding phenology

Weston (1947) "A seasonal shift in food, probably due mainly to change in availability. For several weeks after their arrival on their summering grounds, grosbeaks fed mainly on such soft succulent vegetable matter as leaf buds, flowers and flower buds, as well as on early forming fruits. Worm-like larvae of various lepidopterous insects were also conspicuous in the diet at this time. As the weeks passed, a slow change was discernible. With the maturing of other fruits, the grosbeaks resorted to them in turn and fruit then became predominant in the diet. Early in the summer,

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with the disappearance of many of the fruits, the vegetable diet shifted to one consisting mainly of seeds, found in foraging about on the ground and in the bushes. Except for the seasonal changes in the forms of lepidopterous insects and the accompanying change in the diet, I noticed no appreciable shift in the animal diet of the adult birds."

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Weston (1947), "The males arrive singly rather than in flocks and are solitary for the few days preceding arrival of females. They begin singing upon arrival...Males appeared to be spaced, but I saw no conflicts between them until after the arrival of females...Active competition among males appeared to occur only in the presence of females ...Practically all local species of birds except predators and other grosbeaks are tolerated at the nest." Kroodsma (1974), comparison of species recognition behavior, with regard to territoriality, with that of the Rose-breasted Grosbeak.

C. Courtship and mating behavior

Weston (1947), "lone females arrived six days after the males, and the grosbeaks engaged actively in courtship soon after. Two or even three males would be singing and flying about in the vicinity of one female, occasionally chasing her...The only type of display seen was a nuptial flight. Loud songs were uttered from some exposed perch near a female and then the male would suddenly fly up and out, performing a song-flight in the air above her. Flying forth on a horizontal course, the male would circle out from the summit of a tree, with the wings and tail spread, uttering an almost continuous song. In the air for eight to ten seconds, he would then fly back, usually to the perch just vacated...During the early part of the season the paired birds forage together, and at this time the male is distinctly aggressive."

D. Nesting phenology

Dawson (1923), "May-June; one brood." Davis (1933), reports in Butte Co., California, the first date as 1 May; the last date as 31 May; the average date as 15 May. Weston (1947), "Construction of the nest takes from three to four days... Building of the nest is done by the female."

Pheucticus melanocephalus (con't.)

E. Length of incubation period

Weston (1947) "Continuous incubation normally begins with the laying of the next to last egg. Both sexes incubate ...Lasts 12 days; all eggs hatch within 24 hours."

F. Length of nestling period

Weston (1947), reports twelve days.

G. Growth rates

H. Post-breeding behavior

Weston (1947), "In the latter part of the season the young follow the females, the males having left soon after nesting is over. I have seen females feeding well grown young as late as the early part of August."

I POPULATION PARAMETERS

A. Clutch size

Dawson (1923), reports three or four. Weston (1947) reports from three to four in six nests, although has records of sets of two and five eggs.

B. Fledging success

C. Mortality rates per age class

D. Longevity

Kennard (1975), reports record age of 6 years in 1938 when trapped and released. Banded after hatching year in 1933. Sex unknown.

E. Seasonal abundance

F. Habitat density figures

Gaines (1974), reported 123 and 158 territorial males per square kilometer of clumped cottonwood and willow woodland in Butte County, California; seventy-five territorial males per square kilometer on floodplain gravel bar in Glenn and Butte Counties, California, 1973; 130 per square kilometer in clumped cottonwood and willow woodland, Glenn and Butte Counties, California.

Pheucticus melanocephalus (con't.)

I INTERSPECIFIC INTERACTIONS

A. Predation

Stoner (1933), reports remains of this species in full spring (male) plumage in nesting cavity of Western Burrowing Owls near Benicia, California. Allen (1930), reported observations of Gray Squirrel examining nest of this species containing two eggs. The squirrel was driven off by the adult birds.

B. Competition

Weston (1947), "Wren-tits (Chamaea fasciata) were seen picking at one occupied nest, Bush-tits (Psaltriparus minimus) were seen foraging on a nest, a Pileolated Warbler (Wilsonia pusilla) was seen standing on the rim of another nest, and none caused any apparent alarm on the part of the grosbeaks."

C. Parasitism

Payne (1976), reports this species as a host of Brown-headed Cowbirds in California.

X STATUS

A. Past population trends

Grinnell and Miller (1944), P. m. melanocephalus: "Summer resident of restricted area in central eastern section of State; common."

P. m. maculatus: "Common generally; in some areas abundant."

B. Present population status

Small (1974), "transient and summer visitor."

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

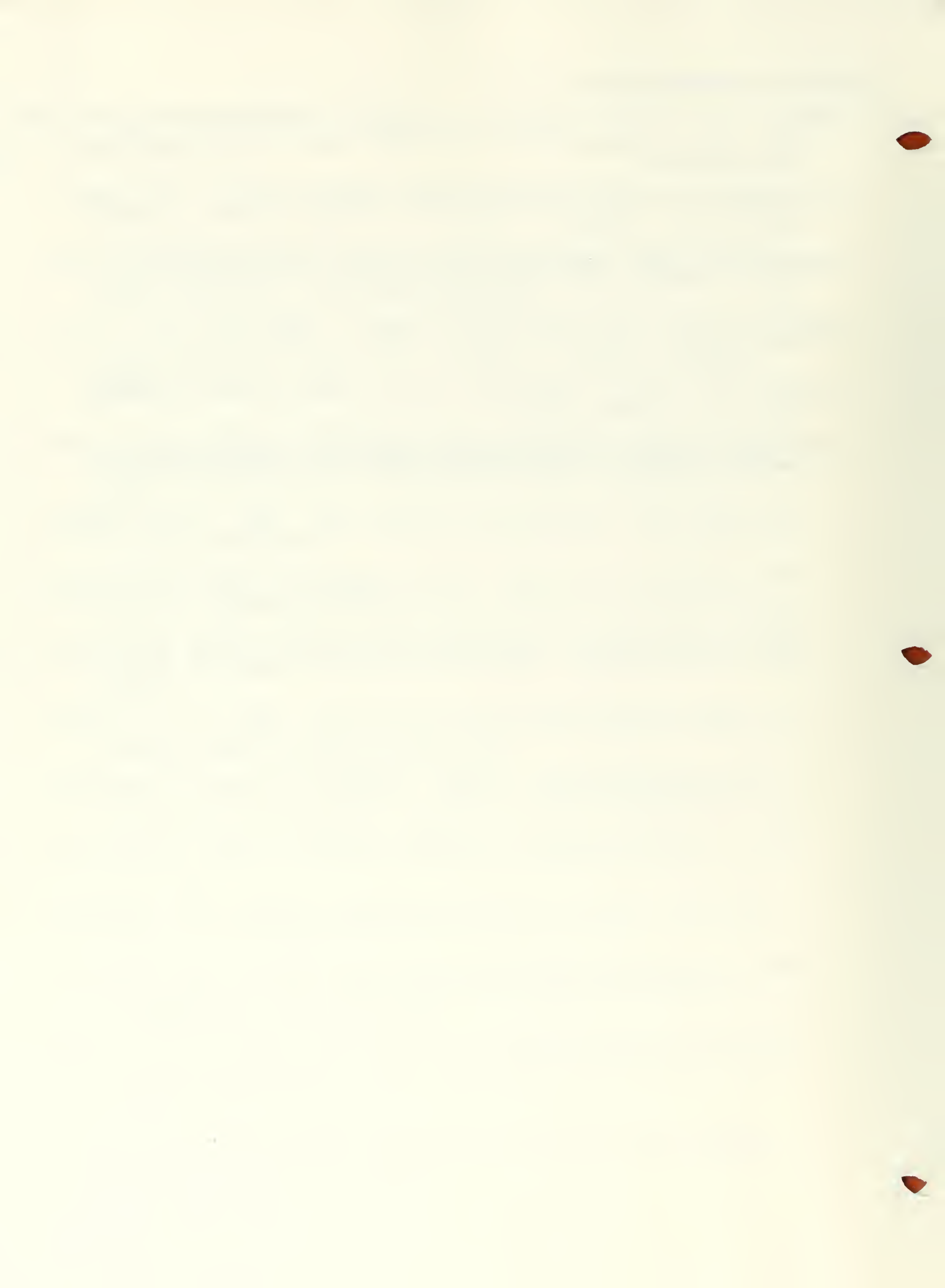
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CACTUS WREN

Campylorhynchus brunneicapillus couesi

I TAXONOMY

A. Type description

AOU (1957), Campylorhynchus couesi Sharp, Cat. Birds Brit. Mus., 6, 1881, pp. 186 (in key), 196. (Larido [=Laredo], Texas)

B. Current systematic treatments

Selander (1964) discussion of relationships within the genus Campylorhynchus.

Paynter and Vaurie (1960) recognize ten species in the genus, seven subspecies of brunneicapillus. Passeriformes: Troglodytidae.

Ridgway (1904), discussion of morphological characteristics and geographic distribution in relation to systematic treatment.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Heleodytes brunneicapillus couesi; Campylorhynchus couesi; H. b. bryanti; H. b. anthonyi; H. b. brunneicapillus; H. affinis.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Brown-headed Wren; California Cactus Wren; Brown-capped Cactus Wren; Bryant Cactus Wren.

II DESCRIPTION

A. External morphology of adults

Dawson (1923) "Pileum and nape warm brown...the former with dusky mesial streaks; back and scapulars, broadly, pale grayish brown, highly varied by mesial white in streaks and stripes, and submesial dusky; flight-feathers...dusky, spotted with white and brownish on outer webs, and broadly with white on inner webs..., tail...blackish, finely and irregularly barred with pale grayish brown; concealed webs of lateral rectrices chiefly black, the outermost pair black and white barred throughout; the remaining pairs with at least a subterminal band of white; a prominent superciliary, continued to bill, white; post-ocular area clear brown; cheeks mingled brown and white; underparts basally white, immaculate on chin and upper throat, tinged with pale

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cinnamon on belly and crissum; the sides of throat, lower throat, and chest heavily spotted with black...; breast, sides of belly, sides, and crissum sharply and rather finely spotted with black." Ridgway (1904), detailed description of adults, including plumage, soft parts, and measurements.

B. External morphology of subadult age classes

Dawson (1923), "more sparingly spotted below, especially on chest." Ridgway (1904), "Essentially like adults, but paler markings of upper parts less sharply defined, pale brownish buff or dull brownish white; pileum and hindneck duller brown; outer webs of primaries and secondaries spotted with pinkish buff instead of white, and blackish spots on throat and chest much smaller, the former almost immaculate."

C. Distinguishing characteristics

Interspecific - Dawson (1923), "largest of American wrens; highly varied (white-striped) upperparts and heavily black-spotted underparts." Selander (1964) examination of the genus Campylorhynchus with a comparison of brunneicapillus with other members of the genus.

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "Southern California, southern Nevada, southwestern Utah, western and south-central Arizona, southern New Mexico, and central Texas south to southern Baja California, Michoacan, and State of Mexico." C. b. couesi: "Resident from southern California (Santa Paula, San Fernando, Mohave, Little Owens Lake, Argus Mountains), southern Nevada (Charleston, Sheep and Muddy Mountains), southwestern Utah (Beaver Dam Mountains, Toquerville), south-central Arizona (Salt River Valley, Globe, Dos Cabezas), southern New Mexico (Silver City, San Marcial, Eagle, Tularosa, Carlsbad), and central and central Texas (Pecos, San Angelo, Lomita, San Antonio Range, Brownsville) south to northern Baja California (Ensenada, Tijuana, El Valle de la Trinidad, eastern base of the Sierra San Pedro Martir), northern Sonora (Puerto Libertad, Pesquero, 12 miles west of Magdalena), central Chihuahua (Chihuahua) central Coahuila (Monclova), Nuevo Leon (Galeana), and northern Tamaulipas (Nuevo Laredo, Matamoros).

Campylorhynchus brunniecapillus (con't.)

B. California distribution of the species

Grinnell and Miller (1944), "Southeastern desert area...the Colorado and Mohave deserts, north from Mexican boundary to Inyo and Kern counties; and also most arid parts of westward drainage slope from San Diego County northwest to Ventura County."

C. California desert distribution

Dawson (1923), "Lower Sonoran deserts of southern California ...north to southern end of Owens Valley; also locally resident in the San Diego district north to Simi." Small (1974), "Southeastern deserts (Colorado, Mojave, Sonoran) and suitable arid habitats north coastal to Ventura County." Miller (1951), Colorado Desert, Mojave Desert, San Diego, Upper Kern Basin.

D. Seasonal variations in distributions

Anderson and Anderson (1973), "territory is used for mating, nesting, and as a feeding ground for the young, and it is also retained as a roosting area for the remainder of the year..., Remained...throughout the winter with extremely slight shifts in territory."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), "Sharply defined as arid terrain grown to thickets, patches or tracts of cactus of the larger, branching types, or of stiff-twiggged, thorny brush or small trees...provide safe refuge...sites for nests that are inaccessible to terrestrial maranders...required food, insects, spiders and, in season, fruits. Besides cholla and tuna cactuses, plants that are used...are yuccas of the arborescent kinds, catclaw, mesquite, screw-bean, iron-wood and palo verde." Small (1974), "deserts with suitable cacti, yuccas, and shrubs for nesting, arid coastal hillsides, arid interior valleys." Miller (1951), Lower Sonoran Life Zone.

B. Altitudinal range

Grinnell and Miller (1944), "from 180 feet below sea level, as around Salton Sea, Riverside, and Imperial counties, up to 5800 feet, in Argus Mountains, Inyo County."

Campylorhynchus brunneicapillus (con't.)

C. Home range size

Anderson and Anderson (1973) "estimate the average size of a territory at 4.75 acres (1.9 ha), the minimum 2.9 acres (1.16 ha), and the maximum 6.9 acres (2.76 ha)," Santa Rita Experimental Range, Arizona.

D. Territory requirements

Perch sites - Anderson and Anderson (1957), "The male sang from most of the available perches in his territory, such as creosote bushes, chollas, mesquites, roof-tops, radio antennas, windmills, and electric power poles and wires."

Courtship and mating sites

Anderson and Anderson (1954), "territory is used for mating, nesting, and feeding ground for the young, and it is also retained as a roosting area for the remainder of the year... territorialism probably assisted in maintaining the pair-band."

Nest sites - Dawson (1923), "a cylindrical mass of dried grasses, heavily lined with feathers; placed horizontally, with entrance at one end, and well-shaded above; in top of cholla cactus, yucca, or at base of sahuaro branch, or, more rarely, in mesquite, or other desert shrub." Anderson and Anderson (1963), "The use of a covered nest that obstructs the direct rays of the sun is of considerable advantage... If the roof...completely shades the nest cavity, and if the walls are sufficiently porous to permit air circulation, the temperature of the inside of the nest approached the standard shade temperatures." Anderson and Anderson (1957) "Cholla cacti were used almost exclusively...Nest heights... were limited to height of the chollas. Average height... was from four to five feet...the nest, when placed in a dense jumping cholla, is almost always at the outer surface of the crown, the entrance pointing outward from the cholla." Ricklefs and Hainsworth (1969), detailed discussion of environmental temperatures of nesting Cactus Wrens. Austin (1974), consideration of nesting success in relation to nest orientation.

E. Special habitat requirements

Dawson (1923), "local range nearly coincident with that of Opuntia cacti...and the tree yuccas."

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F. Seasonal changes in habitat requirements

Anderson and Anderson (1963) "In the normal desert habitat, pools of water are seldom available for any useful length of time...; Provided a steady supply of water in a bird bath saucer...; Drinking by adult wrens from this pool became noticeable in September, increasing to a high in December and January...; Evidently the insect food obtainable in the winter months does not have a sufficiently high water content to satisfy the needs of the wrens... As the days grew warmer the insect population increased, and the wrens seldom came to drink."

V FOOD

A. Food preferences

Woods (1932), "fruit of the cultivated 'spineless' cactus ...sweet corn." Anderson and Anderson (1973) "white flowers of the saguaros...The birds probed their bills deep into the long corollas, apparently to obtain the nectar...Also captured any insects trapped in it...; beetles and Hymenoptera ...grasshoppers...bugs...caterpillars...fruit pulp and weed seeds."

B. Foraging areas

Grinnell and Miller (1944), "Foraging, chiefly on the ground, extends but a few rods radially from [nest sites]." Anderson and Anderson (1973), "Foraged on the ground in autumn and winter, picking up food from the surface and from low vegetation within reach...By the time nesting was well under way, deciduous perennial vegetation leafed out. The wrens spent less time now on the ground, and by midsummer they foraged frequently in the palo verde and mesquite trees, the cholla cacti and saguaros."

C. Foraging strategies

Anderson and Anderson (1963) "obtained relief from midday summer sun by seeking the shade of bushes and trees. In their search for food on the ground, they visited open spaces for only short periods of time or avoided them altogether." Bent (1948), "approaches a leaf or other movable object, inserts its bill carefully under one side, and raises it up, meanwhile peering beneath it in readiness to seize any small creature thus revealed."

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D. Feeding phenology

Ricklefs and Hainsworth (1968a) "as temperatures throughout the environment become progressively hotter, birds select relatively cooler microhabitats by shifting their foraging location, and that after the minimum temperature reaches a critical level of stress, activity decreases...This change in behavior in the absence of changes in food availability suggests that heat stress, rather than insect activity, is the principle determinant of the behavior...During the time of greatest heat stress...must rely exclusively on water obtained from its food." Anderson and Anderson (1973) "pushed the smaller debris aside, or turned it over with their bills to facilitate their search for food. They did not dig."

E. Energy requirements

Ricklefs (1966) "The growth curves...are sigmoid in shape and thus the rate of growth, and hence the required input of energy, is highest during the middle of the growing period and tails off toward both ends. It is possible that while the growth rate is increasing and the parents are becoming increasingly taxed, the energy resources of the young are directed primarily to growth, and behavior is limited to begging and defecation."

VI REPRODUCTION

A. Age at first breeding

Anderson and Anderson (1962), "New nests were started at the average age of 116.5 days [roosting nests]."

B. Territorial behavior

Anderson and Anderson (1963), "Once established, the adult wren remains in its chosen territory for life; it mates for life." Anderson and Anderson (1957), "Territorial intolerance began at least in January. By February...the area was usually cleared of other wrens. Females were most active in driving out other females by chasing and fighting. The male apparently kept out other males. Singing by the male increased as the territory was secured."

C. Courtship and mating behavior

Anderson and Anderson (1957), "Since the sexes are identical in coloration and size, sex discrimination must be by means of distinctive behavior...Females are probably attracted to males upon hearing the song. When they meet, there is a

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threatening display by the male, including the spreading of his wings and tail, accompanied by a growling sound. A female also displays and then she crouches...Pair-formation has not been observed." Anderson and Anderson (1960), "Courtship feeding by the male occurred three to four times a day [during incubation by the female]."

D. Nesting phenology

Dawson (1923), "March, April-June, two broods." Anderson and Anderson (1960), "Incubation was performed entirely by the female. Partial incubation began the night after the first egg was laid; daytime incubation was irregular until the clutch was nearly complete...Hatching of eggs was spread over a period of two or three days...Nestlings are fed small fresh insects from the time they are hatched. Feeding by regurgitation was not observed...The first egg of the second brood was laid in from 0 to 13 days after the fledging of the first brood."

E. Length of incubation period

Anderson and Anderson (1960), sixteen days. Asynchronous hatching. Hensley (1959) "lasted 17 days in two nests."

F. Length of nestling period

Anderson and Anderson (1960) "average time which the nestlings spent in the nest was 20.9 days...range was from 19 to 23 days." Ricklefs and Hainsworth (1968b), "The development of homeothermy...was investigated over the range of ambient temperatures prevailing in their habitat during the nesting season. Thermogenic responses develop later and more slowly than in other species that have shorter nestling periods." Hensley (1959), "for six of the nests ranged from 17 to 20 days."

G. Growth rates

Anderson and Anderson (1962) "Young...attained the average adult weight of 38.9 grams at about the age of 38 days." Anderson and Anderson (1961). Growth and development (morphological and behavioral) monitored daily from age one day to age 18 days, including weights and measurements. "Lowest weight on day of hatching was 2.6 grams...Growth of wings was slow up to the 5th day, at which time, the sheaths pierced through the skin. Then the rate increased with the increments to sheath length until the 13th day, after which the rate dropped again. The tail feathers maintained a steady rate of increase." Ricklefs (1975), detailed presentation of analyses of growth including age and body weight growth; increase in linear measurements of the body,

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limbs and feathers; increase in body constituents with resulting changes in the percentage composition of the body and its caloric density; and increase in weight of major body components and organs and their relative growth rates with respect to the body as a whole. Ricklefs (1966) comparison of behavioral development of Cactus Wren and Curve-billed Thrasher nestlings.

H. Post-breeding behavior

Anderson and Anderson (1962), "The adult shared the feeding duties for a short while...When the female began incubating her next clutch of eggs, the male took care of the brood. Exploratory pecking occurred as soon as the wrens were fledged. Self-feeding began at about the age of 35 days... They became independent of their parents at the age of 50 days...Adults broke up the family bond by gradually ignoring the begging fledglings...Two instances of juvenile wrens feeding fledglings of a latter brood were observed." Anderson and Anderson (1957), "required a covered roosting nest in all months of the year...Usually by the end of the breeding season some of the old nests had deteriorated; others had been relinquished to the immature birds. The adults selected new sites and built again."

VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923), "4 or 5, rarely 6." Anderson and Anderson (1960), "Eggs were laid at a rate of one a day...average eggs per clutch was 3.41...Maximum number of broods raised was three."

B. Fledging success

Anderson and Anderson (1963), "fledged 82 young from 27 successful broods, with an average of 6.83 per year." Austin (1974), "orientation of the nest entrance appears to have an effect on its success, apparently acting at the nestling stage." Includes figures for hatching, fledging, nestling, and nest success in relation to nest-entrance orientation. Ricklefs (1968), of 39 young fledged from 14 nests, only 5 were lost after three to forty days after fledging.

C. Mortality rates per age class

Anderson and Anderson (1973) "evidently the Cactus Wren's most dangerous period is not in the egg or as a nestling. It occurs after fledging."

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D. Longevity

Anderson and Anderson (1973), "The average age of seven males in the Kleindale Road area was 737 days; 16 females averaged 493 days. Five...in the Saguaro National Monument area lived for at least 4 years."

E. Seasonal abundance

Anderson and Anderson (1957), "never observed in such large numbers [flocks of 6 to 30 or more as reported by Howell (1916). Hensley (1959), twenty-two active nests found in the intermountain desert plains in Organ Pipe Cactus National Monument, Arizona. Anderson and Anderson (1973), "The population peak, which was attained in late summer, was produced entirely by the addition of immature birds that had been raised in the vicinity...The population gradually decreased as the immature birds left or vanished, reaching its lowest point in winter."

F. Habitat density figures

Dawson (1923), "tend to colonize in loose association of from ten to twenty pairs." Anderson and Anderson (1973) Santa Rita Experimental Range: "Their population density from 1953 to 1956, excluding the extralimital territories ..., varied from 8.3 to 23.3 pairs per 100 acres (40.5 ha). The average is 13.3 pairs Saguaro National Monument: 18 to 38 pairs per 100 acres.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Anderson and Anderson (1963), "The most dangerous predator was the house cat. Cats, Roadrunners, and snakes were 'mobbed' and followed by the wrens until they left. Shrikes, although apparently innocuous, were harassed whenever they appeared." Bond (1936), "At the nest site [Falco mexicanus] was found...fresh feathers (but no corresponding pellet) of a Northern Cactus Wren." Austin, Yensen, and Tomoff (1972), describe a number of observations of snakes preying upon nestlings (Gopher Snakes and Whipsnakes).

B. Competition

Anderson and Anderson (1963) "Although a direct competition for nesting sites in cholla cacti, the Inca Dove appeared to have little difficulty in maintaining its hold in the vicinity...; While feeding on the ground, the Cactus Wren always gave way at the approach of Curved-billed Thrasher ...both vigorously defended their own breeding nests...

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attack the fledgling thrashers that strayed into their vicinity...Most obvious evidence of conflict was the persistent destruction of the roosting nests...by the Curve-billed Thrashers...Recorded approximately 200 incidents of total or partial destruction...from 1932 to 1961... Thrashers did not attack breeding nests while they were in use...Never defended [roosting nests] against attack...Young [Cactus Wren and Thrasher] fledged sufficiently close together to be in competition for food." Re: Passer domesticus, "observed no competition for cholla nesting sites...filled a niche within the Cactus Wren territory that was not used by the wrens."

C. Parasitism

Anderson and Anderson (1973) "Molothrus ater, observed occasionally in the area, did not parasitize any of the Cactus Wren...nests."

IX STATUS

A. Past population trends

Grinnell and Miller (1944) "Completely resident,...numbers sufficient only very locally such as to merit term 'common' or 'abundant!'" Range on coastal slope of southern California now much restricted as compared with condition in 1880's and 1890's, owing to great reduction of requisite habitat, as also, perhaps, in part, to the attentions of egg collectors."

B. Present population status

Small (1974), "common resident." Anderson and Anderson (1973), "weak intraspecific intolerance permits more territorial 'compressibility' in years of surplus individuals. Their population density is greater, not only because their production is greater, but because the surviving surplus is allowed to crowd in to nest."

C. Population limiting factors

D. Environmental quality: adverse impacts

Dawson (1923), "All proper desert areas west of San Geronio Pass are being threatened sharply by human invasion...The Cactus Wren has receded from many parts of the San Diego-Ventura section already." Anderson and Anderson (1973) "destruction of the Cactus Wren's habitat proceeds at an alarming rate in the vicinity of the every-expanding southwestern desert cities."

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E. Potential for endangered status

Anderson and Anderson (1963), "will probably be able to maintain themselves in limited numbers within the residential sections of the rapidly expanding cities of our southwest."

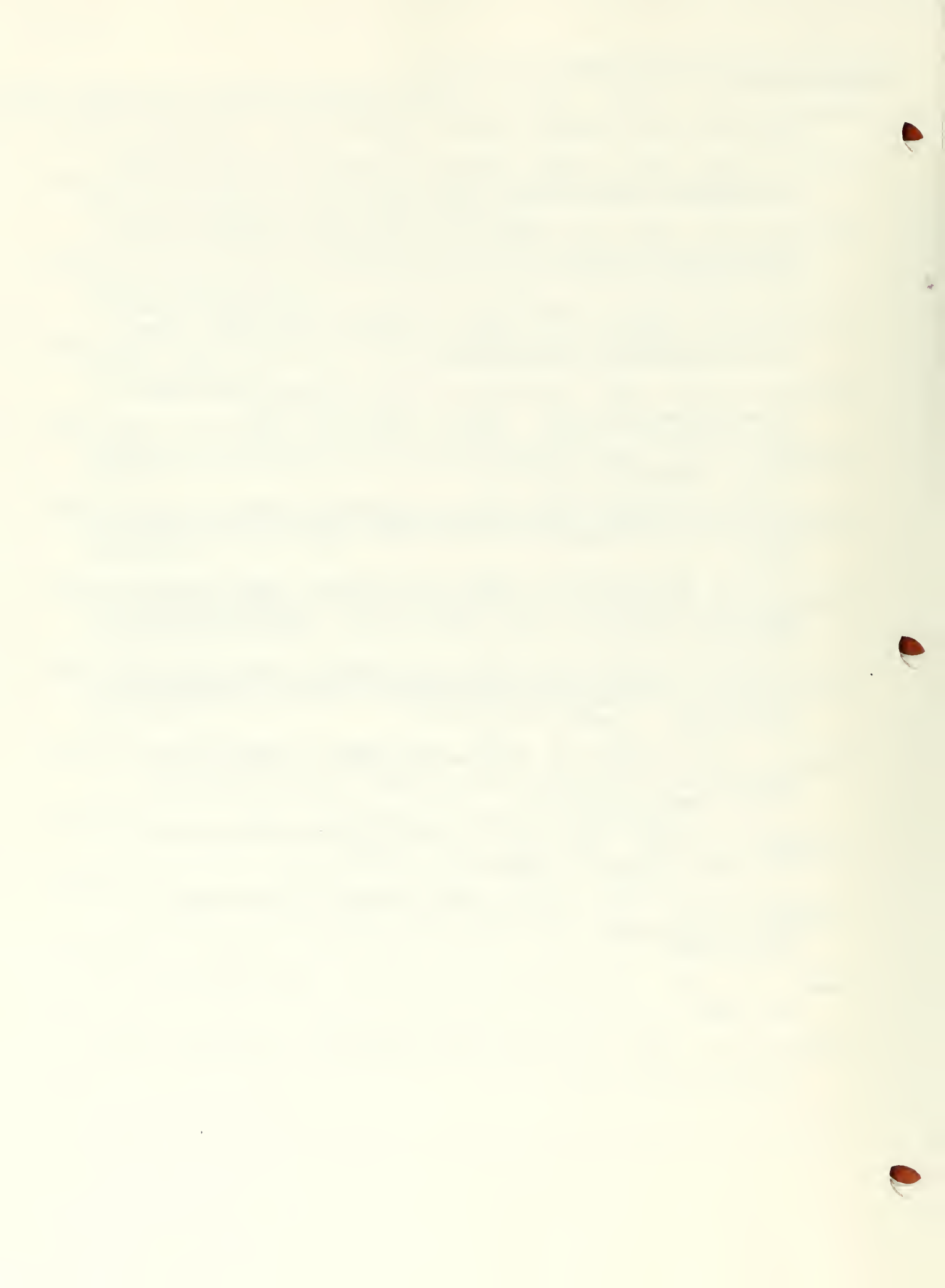
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CALIFORNIA THRASHER

Toxostoma redivivum

I TAXONOMY

A. Type description

Toxostoma r. redivivum - AOU (1957) Harpes rediviva Gambel, Proc. Acad. Nat. Sci. Philadelphia, 2, no. 10, July-Aug. (Dec. 5) 1845, p. 264. (near Monterey, in Upper California.)

B. Current systematic treatments

Hellmayr (1934) recognized 2 races of California Thrasher, including T. r. redivivum; range listed as "Austral Zones of California west of the high Sierra Nevada and South-eastern deserts, from Monterey and Placer cos. through the San Diego district to lat. 30 in Lower California

AOU (1957) considers the California Thrasher (2 races) a member of the avian order Passeriformes, family Mimidae.

Grinnell and Miller (1944) give 2 races of California Thrasher in California, Sonomae (Northern California Thrasher) and redivivum (Southern California Thrasher; Mayr and Greenway (1960) also list sonomae and redivivum as the only 2 races.

Specimens from the interior and southern localities were formerly recognized as T. r. pasadenense (Dawson 1923). Engels (1940) gives very detailed study of relationships within Toxostoma. He states that redivivum is most closely related to T. lecontei and T. dorsale.

Grinnell (1921) eliminated T. r. pasadenense as a race of California Thrasher, leaving only T. r. redivivum in the southern portion of the state.

Oberholser (1918) concluded that 3 races of California Thrasher existed: T. r. redivivum (southern California); T. r. sonomae (northern and central California); and T. r. helvum (Baja California).

C. Synonomies of scientific nomenclature

Hellmayr (1934), Harpes rediviva; Harporhynchus redivivus Pasadenensis; Toxostoma rediviva helva; T. redivivum helvolum; T. r. redivivum. Grinnell and Miller (1944) list the previous names, with the addition of T. redivivum pasadenense.

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D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Curve-billed Thrush; California Mocking Bird; California Thrush; Sickle-bill Thrush; California Mocking Thrush; Bowbill Thrush; California Sickle-bill Thrush; Sickle-bill Thrasher; Pasadena Thrasher.

II DESCRIPTION

A. External morphology of adults

Ridgway (1907) gives detailed account of adult and subadult plumages; "above plain deep grayish brown, the upper tail coverts and tail more...brown." Peterson (1961), "A large dull gray-brown thrasher, with pale cinnamon belly and under tail coverts; tail long, bill sickle-shaped. The eye is dark brown." Robbins et al. (1966)--"note the eye stripe and dark brown body, pale rusty below." Oberholser (1918), "Brown of upper parts decidedly grayish; white of throat with little or no tinge of buffy..."

B. External morphology of subadult age classes.

Ridgway (1907) noted young were "essentially like adults but browner above...sometimes only slightly different."

C. Distinguishing characteristics

Interspecific - Peterson (1961), speaking of the California Thrasher, "This is the only thrasher of this type in California west of the desert divides."

Intraspecific - Ridgway (1907) "Sexes alike; male: wing 102.6 mm, length 284 mm, tail 129.7 mm and female: wing 100.6 mm, length 278 mm, tail 127.2 mm." Oberholser (1918) gives detailed analysis of male and female characteristics of several races.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) gives distribution of T. redivivum as, "Northern California south to northern Baja California."

AOU (1957) gives distribution of T. r. redivivum as, "Resident from central California (Point Lobos, Paicines, El Portal, San Joaquin Valley) south to southwestern California and northwestern Baja California (El Rosario, San Fernando, western slopes of the Sierra San Pedro Martir)."

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Ridgway (1907) gives range of T. redivivum as, "coast and interior valleys of California and northern Lower California; northward to Shasta Co., southward to San Quintin Bay, San Fernando, and San Pedro Martir Mountains."

B. California distribution of the species

Peterson (1961), "Resident in California (west of Sierra, deserts) from head of Sacramento Valley to N. Baja California." Grinnell and Miller (1944) give California range as--"coastal district from Monterey and San Benito counties south to Mexican boundary, including east slopes of mountains of southern California to limits of chaparral...locally on floor of San Joaquin Valley; redivivum and sonomae intergrade in Amador County." Small (1974), "generally west of the Sierra-Cascade crest and west of the deserts; north to Humboldt and Shasta counties; breeds." Dawson (1923) gives California range as foothills and valleys west of the Sierra Nevada. Grinnell (1917) concluded that the range of the California Thrasher in California is determined by a narrow phase of conditions in the chaparral association and within the Upper Sonoran life-zone.

C. California desert distribution

Grinnell and Miller (1944) give several desert sightings, including: near Hesperia, San Bernardino Co.; San Gorgonio Pass, and near Dos Palmas, Santa Rosa Mtns., Riverside Co. Grinnell and Swarth (1913) called them fairly common in the foothills near Banning and Cabezon, but were never seen out in the brush of the lower valleys. Found breeding near Colton, San Bernardino Co. (Willett (1953). Although little mention was given of this species desert distribution, it is apparently resident in the Little San Bernardino Mountains, with records from May (Willett 1951). A sparse population occurs on the western half of Joshua Tree National Monument, centering in the scrub oak and manzanita thickets of the Little San Bernardino Mtns. and extending east to Pinyon Wells; also noted in juniper and willow thickets of Little Morongo Canyon (Miller and Stebbins 1964). The California Thrasher has been found nesting on the desert side of the San Gabriel, San Bernardino, and San Jacinto Mountains (Bent 1948). Hanna (1936) recorded a rare nesting of this thrasher on the desert side of the San Bernardino Mountains: on 3 May 1936 near Hesperia, San Bernardino County. Pemberton (1916) found this species nesting near LeConte's Thrashers near Cabezon, Riverside Co.

D. Seasonal variations in distribution

Grinnell and Miller (1944) call this species a permanent resident throughout its range in California.

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IV HABITAT

A. Biotopic affinities

Peterson (1961) reported chaparral, foothills, valley thickets, parks, gardens, as normal habitat. Grinnell and Miller (1944), "Chaparral of various types; chamise, ceanothus, baccharis and sages..utilization of informally kept gardens which offer cover." Small (1974), "lowland and coastal chaparral, riparian woodland thickets." Grinnell (1908) found the species over much of the Upper Sonoran Chaparral belt of the San Bernardino Mtns. Grinnell (1917) concluded that the California Thrasher is best adapted to life in the Upper Sonoran Zone (chaparral) of California.

B. Altitudinal range

"Altitudes of occurrence from near sea level...up to 5,500 ft. in the San Bernardino Mtns. (Grinnell and Miller 1944)." Dawson (1923), "a fairly uniform distribution up to about 6,000 ft." Seen at 4,900 ft. in the San Jacinto Mtns. (upper limit) by Grinnell and Swarth (1913). Noted in the scrub oak belt between 3,500 and 5,500 ft. in the San Bernardino Mtns. (Grinnell 1908). Willett (1933) noted this thrasher up to 5,000 ft. in southern California mountains. Grinnell (1917), "While sharply delimited...at the upper edge of Upper Sonoran, the California Thrasher is not so closely restricted at the lower edge of this zone."

C. Home range size

Sargent (1940) found that thrashers defended a 0.75 acre territory all year long (Los Angeles Co.).

D. Territory requirements

Perch sites - Dawson (1923), "Song requires the topmost bough of ceanothus or scrub oak." Although it spends much time on the ground, this bird perches on the highest bush or tree to sing. (Martin et al. 1951). Male thrashers seen singing from palms, radio towers, rooftops, and tall trees by Sargent (1940) in Los Angeles County .

Courtship and mating sites - Bent (1948) states that the top of trees and bushes are common song posts.

Nest sites - Peterson (1961), "nest a twiggy cup in a bush." Dawson (1923), "nest...placed at moderate heights in bushes or trees, or well concealed in thickets." Nests are usually placed within a few feet of the ground, well inside a large bush or scrubby tree, according to Bent (1948). Hanna (1936) found a nest on the Mohave Desert (near Hesperia) 2 ft. high in Artemisia tridentata. Grinnell (1917), "The nests...are located in dense masses of foliage, from 2 to 6 ft. above

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the ground, in bushes which are usually part of its typical chaparral habitat. In only exceptional cases is the nesting site located in a...tree."

E. Special habitat requirements

Engels (1940) states the redivivum is rather strictly limited to the upper Sonoran life zone; occupies the chaparral. Grinnell (1917), "The California Thrasher is unquestionably delimited in its range in ultimate analysis by temperature conditions."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Dawson (1923) lists beetles, ants, grubs, berries, and seeds. Engels (1940) notes the taking of spiders, grubs, and crickets. The animal diet consists primarily of beetles, ants and other Hymenoptera, moths and caterpillars, and spiders and myriapods; plant food includes poison-oak, laurel sumac, elderberry and various other berries, buckthorn, oak, wheat, and sorghum (Martin et al. 1951). Bent (1948) states the vegetable matter slightly exceeds animal matter in the diet. Grinnell (1917) stated that 59% of the diet was plant food and 41% animal food.

B. Foraging areas

Dawson (1923), "it seeks its food chiefly on the ground... among the leaves." Engels (1940), "all species of Toxostoma do much of their foraging on the ground"; gives detailed account of foraging behavior. Martin et al. (1951) also described the usually feeding area as the ground around manzanito and other chaparral on hill slopes. California Thrashers, "dig and whisk the bill in leaf litter and humous layers beneath or at the edge of chaparral" (Miller and Stebbins 1964). In a Los Angeles County study, Sargent (1940) noted all foraging on the ground except for trips to a balcony feeder. Grinnell (1917) stated that over two-thirds of the foraging is done on the ground.

C. Foraging strategies

"When feeding on the ground, this species...holds their tail...erect...digs with curved beak rather than scratching with its feet (Robbins et al. 1966). Engels (1940) states that the feet are not used for scratching; redivivum digs with the bill, using it like a pick, or as a tool with which to whisk litter from side to side. Bent (1948) states that most of its animal food is obtained by raking away fallen

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leaves or by digging in the soil." Salt (1953) described this thrasher as a member of the ground-insect foraging guild in Los Angeles County. Cander (1931) notes that "during the ten minutes or so that I watched (feeding), it tried some 15 or 20 different spots, all within the radius of 4 or 5 feet...the beak served...for digging in the soft sand..." Grinnell (1917) noted that, "...the long curved bill, is used to whisk aside litter, and also to dig..."

D. Feeding Phenology

The percentage of plant food and animal food in this species' diet is nearly equal in winter, summer and fall; in spring, however, animal matter accounts for 97% of the diet (Martin et al. 1951).

E. Energy requirements

Moist food, and possibly at times berries, make unnecessary the seeking of water...has made it possible for this thrasher to penetrate the marginal type of chaparral of the Monument (Joshua Tree) (Miller and Stebbins 1964). Dawson (1965) notes that California Thrashers may lose 4.7% of their body weight per day through evaporative water loss.

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

"Members of rival pairs faced each other bill to bill... occasionally rising in an attack...chases varied from a few feet in length to a complete circuit of the yard." (Sargent 1940)

C. Courtship and mating behavior

"Song includes a great variety of phrases, many repeated" (Robbins et al. 1966). The birds apparently remain paired throughout the year (Bent 1948). Male thrashers were observed singing and chasing females in November; male singing continued all year (Sargent 1940). Lack (1942) states that California Thrashers maintain a loose pair-bond during winter and may thus mate for life.

D. Nesting phenology

Dawson (1923) gives season as March to June, with 1 or 2 broods raised. In southern California, breeds mainly in March and April; set taken in December (Los Angeles County)

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(Willett 1933). Breeding season of December to May given for interior southern California by Wheelock (1904). In Los Angeles Co., breeds mainly in March and April (Grinnell 1898); he also noted a set taken in January. Egg-laying in Joshua Tree National Monument given as March and April (Miller and Stebbins 1964). Bent (1948) gives California egg dates as 15 December to 27 June, with the height of the season in April. Sharp (1907) gives the breeding season as 18 February to 13 June, with 2 or 3 broods being raised (San Diego Co.).

E. Length of incubation period

Wheelock (1904) gives incubation period is 14 days; both adults assist in incubation and feeding of young. Bent (1948) also gives a 14 day incubation period.

F. Length of nestling period

"The young thrashers leave the nest when 12 to 14 days old, but are fed by the adults for some time after (Bent 1948).

G. Growth rates

Wheelock (1904) summarizes general development; are fed regurgitated food until fourth day, whole items thereafter.

H. Post-breeding behavior

First young of the year are forced out of the nesting territory by adults when a new nest is constructed (Sargent 1940).

VII POPULATION PARAMETERS

A. Clutch size

Eggs (2-4) pale blue, speckled (Peterson 1961). Reed (1904) gives clutch of 3-4 eggs. Dawson (1923), eggs 3 or 4. Bent (1948) cites clutch as 2-4, usually 3. In San Bernardino County, Hanna (1936) gives an average clutch as 3.07, with 83% of all nests containing 3 eggs (range = 2-4).

B. Fledging success

In Los Angeles County, Sargent (1940) reported the fledging of 5 young from 4 nests.

C. Mortality rates per age class

Sargent (1940) noted the taking of nestlings by house cats.

Toxostoma r. redivivum (con't.)

D. Longevity

Linsdale (1949) recaptured a California Thrasher 6 years after it was banded in California.

E. Seasonal abundance

F. Habitat density figures

California Thrashers are most abundant in the foothill and mesa regions of southern California (Willet 1933). Jehl (1978) reported a breeding population of 2 territorial males on a 20 ha (49.42 acre) scrub oak-desert chaparral study area in Imperial Co., California. Gaines (1975) found a population of 3 territorial male thrashers on a 13.70 ha study area in "serpentine chaparral" in Napa Co., California.

III INTERSPECIFIC INTERACTIONS

A. Predation

Bent (1948) recounts the taking of a California Thrasher by a Sharp-skinned Hawk. He also notes the loss of eggs and young by skunks, banded racers, lizards, cats, and perhaps, the Scrub Jay. House cats were the chief enemies of this species in a study in Los Angeles County by Sargent (1940). Allen (1943) noted the attack of a Sharp-skinned Hawk on a thrasher near Berkeley in November. Edwards (1919) describes the taking of thrasher eggs by jays in southern California.

B. Competition

"Only the...LeConte's (Thrasher) overlaps any part of this bird's U.S. range" (Robbins et al. 1966). Bent (1948) feels that the California Thrasher is able to drive most other species from a food source, including the Scrub Jay. California Thrashers were able to successfully compete with Mockingbirds for nesting sites in a study in residential Los Angeles County (Sargent 1940).

C. Parasitism

Friedmann (1963) does not list this thrasher as a victim of cowbird parasitism.

IX STATUS

A. Past population trends

"Common resident below the Transition Zone in Southern California" (Grinnell 1915). Earlier, Grinnell (1898) called the species a common resident in Los Angeles County. Called, "one of our common residents," by Sharp (1907) in Escondido, San Diego Co.

Toxostoma r. redivivum (con't.)

B. Present population status

Grinnell and Miller (1944) reported them permanently resident; common under favorable conditions in many parts of range. Small (1974) called this species a common resident in California. Miller and Stebbins (1964) describe a resident, but sparse, population at Joshua Tree National Monument.

C. Population limiting factors

"In general, both high mountains and deserts constitute effective barriers to its spread" (Bent 1948). Grinnell (1917), "An explanation of this restricted distribution (of the California Thrasher) is probably to be found in the close adjustment of the bird...to a narrow range of environmental conditions."

D. Environmental quality: adverse impacts

Grinnell and Miller (1944) note that--"informally kept gardens...compensate in limited fashion for some of the reduction in natural habitat brought about by clearing of chaparral." Storer (1933) also felt that clearing of chaparral had reduced needed thrasher habitat in California.

E. Potential for endangered status

Toxostoma r. redivivum (con't.)

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COMMON NIGHTHAWK

Chordeiles minor

I TAXONOMY

A. Type description

AOU (1957), Chordeiles virginianus hesperis Grinnell, Condor 7, no. 6, Nov. 22, 1905, p. 170 (Bear Lake, 6700 feet, San Bernardino Mountains, California).

B. Current systematic treatments

Selander (1954) recognizes five subspecies, giving detailed description of morphology and ranges (minor, hesperis, henryi, howelli, sennetti).

Peters (1940), recognizes four species in the genus Chordeiles, C. minor composed of 8 subspecies (minor, hesperis, sennetti, howelli, henryi, aserriensis, chapmani, vicinus, gundlachii).
Caprimulgiformes: Caprimulgidae.

C. Synonomies of scientific nomenclature

AOU (1957) Chordeiles virginianus hesperis Grinnell

D. Synonomies of vernacular nomenclature

Dawson (1923), Bull-bat. Grinnell and Miller (1944) Pacific Virginia Nighthawk.

II DESCRIPTION

A. External morphology of adults

Peterson (1961), "slim-winged, gray or gray-brown...broad white bar across pointed wing...male has white bar across notched tail; white throat." Ridgway (1914) detailed description of adult, including plumage, soft parts and measurements. Dawson (1923), "Mottled, black, gray, and ochraceous and with white in patches; above, black predominating, especially on crown and back, mottling falling into indistinct bars on upper tail-coverts and tail...a large inverted V-shaped throat patch white, the chest, in sharp contrast, chiefly black." Adult female similar but lacking white band, possessed by male, on notched tail. Selander (1954), in areas where night hawks necessarily are restricted to one or a few habitats,...a correspondingly narrow range of variation, while more environmentally diverse regions are...able to support a wider range of color and pattern types."

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B. External morphology of subadult age classes

Ridgway (1914), "Much like the adult female but without a well defined (if any) white throat-patch, the chin and throat being buffy barred or transversely spotted with dusky--usually, however, with more or less of an indication of the throat-patch of adults in the form of a less heavily spotted or barred (sometimes immaculate) buffy or whitish Λ -shaped area across middle of throat; gentle cast of upper parts decidedly paler, on account of more numerous and smaller pale markings, the wing-coverts especially having pale grayish or buffy grayish largely predominating, and barring of under parts less sharply defined."

C. Distinguishing characteristics

Interspecific - Peterson (1961), larger than lesser night-hawk. White in wing further away from tip. Flies high in the air.

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) "Breeds from northern Washington (east of the Cascade Mountains) and southeastern British Columbia (Trail, Cranbrook) south to northwestern California (rarely to Humboldt Bay), in interior of California from the Sierra Nevada to the San Bernardino Mountains, and through western Montana, northwestern Wyoming (Yellowstone Park), and Idaho to central Nevada (Sharp) and central Utah."

B. California distribution of the species

Small (1974), "Cascades, Sierra Nevada, and in the Transition Ranges, the San Bernardino Mountains." Dawson (1923), "Summer resident in high Transition and Boreal zones in northern California from the Warners to the Coast, and south through the Sierras and adjacent highlands to Tulare County. Also in the San Bernardino Mountains.

C. California desert distribution

Miller (1951) San Bernardino region. Grinnell and Miller (1944) San Bernardino Mountains; Lone Pine, Cottonwood Lakes. Death Valley (Inyo County); Pasadena, Los Angeles County.

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D. Seasonal variations in distribution

AOU (1957): "Winter range unknown; presumably in South America. Recorded in migration in Colorado (Estes Park), Kansas (Hamilton), New Mexico (Tres Piedras), Texas (Brownwood), Louisiana, Campeche, and Nicaragua." Small (1974), "summer visitor (California) and transient, April to end of October."

IV HABITAT

A. Biotopic affinities

Peterson (1961), "Treeless plains to mountains, open pine woods." Small (1974), "coniferous forest of Transition and lower Canadian Life Zones." Dawson (1923), "high Boreal and Upper Transition zones." Miller (1951) Transition, Canadian, and Hudsonian zones. Grinnell and Miller (1944), "open type of coniferous forest with exposed, usually rocky or gravelly ground for 'nest sites.' Most frequent associated trees: yellow pine, white fir, and lodge-pale pine."

B. Altitudinal range

Dawson (1923) "July 5, 1911, charging above over the melting snowbanks at the Cottonwood Lakes (el. 11,000 ft.)...Dr. Grinnell took eggs at an altitude of 9000 feet on San Gorgorio Peak." Selander (1954) "altitudinally from tree line down to the lower limits of the Upper Sonoran Zone."

C. Home range size

Armstrong (1965) thirteen neighboring nighthawk breeding home ranges in the center of Detroit, Michigan included on the average 10.4 ha total area...variation in home range size seems best explained by birds settling thickly where flat roofs are numerous...and by birds not settling at all where roofs are scarce, and by home ranges next to such unoccupied areas expanding into them and/or at the expense of neighbors who must defend their entire boundaries.

D. Territory requirements

Perch sites - Rust (1947) "When mated, the male selects a roost in a nearby tree."

Courtship and mating sites - Dawson (1923), description of aerial courtship flight of male.

Nest sites - Dawson (1923)"...on bare ground, often among rocks, sometimes upon a flat rock, or on the gravel roof of a tall building...eggs...practically invisible to the

Chordeiles minor (con't.)

searching eye even though they rest upon the bare ground or upon an exposed and lichen-covered rock ledge." Rust (1947) "low foothills or the extreme ends of the lower ridges or benches in opening not far from trees...on low flats or pasture land free from dense grass or thick weed beds... female invariably selects the nesting area."

E. Special habitat requirements

Caccamise (1974), "feeding is generally done on or near the territory...an effective means of minimizing...time and energy required to travel to distant feeding sites, providing that territories with sufficiently high concentrations of food were available." Cowles and Dawson (1951), "The fact that insects are more abundant near sources of water may serve to restrict Nighthawk populations to nearby areas, thus indirectly limiting them to nesting sites within flying distance to water."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Dawson (1923), "One Nighthawk stomach under examination gave up seventeen species of beetles at one time. Another, nineteen entire grasshoppers. Another, parts of thirty-eight. But if the Bullbat has a speciality, it is flying ants." Caccamise (1974), "often one or two species of insects made up 90-100% of the total food weight...flying ants often make up a large proportion of the diet...are probably selected over most other foods. Knowlton and Harmston (1943) "Four stomachs were examined; one contained nine winged grasshoppers." Blake (1941) "known to feed on termites."

B. Foraging areas

Small (1974), "forages over lakes, valleys, meadows, and rivers." Grinnell (1944) "broad, open fly-ways, over mountain meadows, lakes, larger stream courses, and lower valleys adjacent to mountains."

C. Foraging strategies

Caccamise (1974), "opportunistic feeders, taking that food which is most abundant and most easily captured (on the wings)...may seek...areas where there are high concentrations of insects..." Armstrong (1965) "active, catching flying insects, mostly during twilight and night."

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D. Feeding Phenology

Rust (1947) "The gathering of the nesting Nighthawks from the various nesting locations from all directions for the evening feeding was found to be remarkably regular...shortly after males leave for feeding, they are followed by incubating females, which leave their eggs for a brief period and join the feeding group...if a large swarm of insects is found, all the nighthawks present over the area will concentrate in a close group and move in small circles in a rather slow flight...when insufficient food has been obtained in the air, they will do some feeding on the ground or in the vicinity of their nesting sites.

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Weller (1958), "the territory...seemed well defined and clearly outlined by his flight pattern during the hen's period of incubation...another male frequented an adjacent area, and some chasing occurred when either male strayed into the other's territory."

C. Courtship and mating behavior

Dawson (1923) "After much preliminary shifting and many emphatic bayards he suddenly casts himself head long down the air in a great parabola of flight. As he turns sharply and at break-neck speed, he produces a bud booming 'daw-w'."

D. Nesting phenology

Dawson (1923), June, one brood. Weller (1958), reports that second clutches occur. "The male assumed the responsibility for feeding the young of the first brood while the female incubated the second clutch."

E. Length of incubation period

Rust (1947), 18-19 days.

F. Length of nestling period

Rust (1947), young are able to move around in nesting area after latching. "At the age of 18 days they are able to fly short distances and can fly well at the age of 25-30 days, although the primaries are not yet fully developed."

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G. Growth rates

Rust (1947), measurements of primaries and total length of young up to age 30 days.

H. Post-breeding behavior

Hansen (1950) observed flocks of up to 75 individuals from 20 initially (July through September), discusses daily east-west movements in mornings and evenings (Hovenweep Nat. Monument, Colorado)...feeding flocks, not migrants. Rust (1947) "as soon as the young nighthawks are able to fly well, they begin to appear among the adult birds at feeding time...at certain times in the summer...the young congregate in a large flock in fairly close formation and exercise and feed just above the ground...adults also have a group flight, in which they engage several evenings before the migration flight...similar to that of the young but at much greater heights."

VII POPULATION PARAMETERS

A. Clutch size

Rust (1947), mostly 2 eggs, sometimes one egg.

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Grinnell and Miller (1944), "Summer resident within breeding ranges, elsewhere detected sparingly as a transient, chiefly in September and October."

F. Habitat density figures

Dawson (1923), "While not at any time strictly gregarious, favorable conditions are likely to attract considerable numbers...to a given spot...seen dozens of birds at one time winging noiselessly...over the tranquil waters of an inland lake, and on several occasions companies from one to two hundred...over a well-watered pasture." Evidence that large numbers are not limited to migration. Snyder (1950), reports density of breeding birds in coniferous forest in Colorado as 5 per 40 ha. (average).

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Selander and Preece (1951), "In desert areas where trees or other such roosting sites are not available...birds do not congregate in large roosting flocks. In such regions ...feed in small groups and at sunset have been observed to fly low over the ground and scatter before alighting to roost for the night." Rust (1947), "four sets of eggs or nests were found in one pasture of twenty acres; two sets were found on a low ridge 210 yards apart and two nests were found on a low hillside 52 yards apart."

VIII INTERSPECIFIC INTERACTIONS

- A. Predation
- B. Competition

Caccamise (1974), "the breadth of habitat utilization of C. minor is decreased within the sympatric distribution while that of C. acutipennis seems unchanged...the presence of C. acutipennis precludes use of lowland habitats by C. minor within sympatric distribution...C. minor spends more time excluding C. acutipennis from its territories than excluding members of its own species...the divergence in food niches between sexes is greater for C. minor than for C. acutipennis." Detailed discussion of competitive relationships with acutipennis.

- C. Parasitism

IX STATUS

- A. Past population trends

Grinnell and Miller (1944) "Summer resident within breeding range; elsewhere detected sparingly as a transient, chiefly in September and October. In metropolis, common; even 'abundant' in some favored places."

- B. Present population status
- C. Population limiting factors
- D. Environmental quality: adverse impacts
- E. Potential for endangered status

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DOWNY WOODPECKER
(Picoides pubescens turati)

I TAXONOMY

A. Type description

Picus turati - AOU (1957) Malherbe, Monogr. Picidees, vol. 1, 1860, P. 125 (vol. 3, pl. 29, figs. 5-7). (California ...non loin de Monterey = near Monterey, California.)

B. Current systematic treatments

AOU (1957) calls this species Dendrocopos pubescens turati (Malherbe) and a subspecies of the Downy Woodpecker. Fisher (1902) called it Dryobates pubescens turati, founded on Picus turati of Malherbe. This species was synonymized to Picoides by Morony, et al. (1975) after the genus Dendrocopos recognized by Peters (1948).

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944) in describing Dryobates pubescens turati, "Picus gardineri; Picus gairdneri; Picus meridionalis; Picus turati; Dryobates turati; Picus pubescens gairdneri, part; Picus pubescens; Dryobates pubescens; Dendrocopos pubescens; Dendrocopos gairdneri; Dryobates pubescens oreoecus, part; Dryobates pubescens gairdneri, part." Peters (1948), "Dendrocopos pubescens turati."

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944) in describing the Willow Downy Woodpecker, "Gairdner Woodpecker, part; Little Georgian Woodpecker; Downy Woodpecker; Batchelder Woodpecker; part; Willow Woodpecker."

II DESCRIPTION

A. External morphology of adults

Peterson (1969), "Note the white back, small bill...clear white back...spotted with white on wings; males with a small red patch on back of head; females, without." Udvardy (1977), "Black forehead, crown, and bridle across the eyes contrast with white face, underparts, and central part of back; wings checkered black and white. Male has red patch on nape." Dawson (1923), reports similar to D. villosus orius but smaller with darker underparts - refer to that description. Length 146-158 (5.75-6.25); tail 55 (2.165); bill 16 (.63); tarsus 16.1 (.63).

B. External morphology of subadult age classes

Picoides pubescens turati (con't.)

C. Distinguishing characteristics

Interspecific - Peterson (1969) reports Ladder-backed Woodpecker has black and white striped back while Downy has a white back. Hairy Woodpecker is a larger bird, especially the bill. Hairy has no spots on outer tail feathers. Robbins, Bruun, Zim (1966), "Barred outer tail feathers when sizable are diagnostic (they are rarely unbarred like Hairy's). May be mistaken for a sapsucker, whose white stripe is on the wing, not the back." Udvardy (1977), "A smaller version of the Hairy Woodpecker, with bill proportionately shorter and more slender and with barred outer tail feathers."

Intraspecific - Bent (1939), "Smaller than D. p. gairdneri, with smaller feet; underparts lighter; the elongated superciliary patch and rectal stripe extending over sides of neck, pure white, instead of smoky white of gairdneri; tertials always more or less spotted with white...differs from (D. p. pubescens) in having much less white on the wings, the coverts and tertials of pubescens being conspicuously and often heavily marked with white."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) in describing P. pubescens, "From southeastern Alaska, southwestern Mackenzie, northern Alberta, central Saskatchewan, northern Manitoba, James Bay, southern Quebec, Anticosti Island, and Newfoundland south to southern California, central Arizona, northern New Mexico, south-central Texas, and the Gulf coast from Louisiana to Florida. Recorded in England (Dorset, 1836; Gloucester, 1908)." In describing P. p. turati, "Breeds from north-central Washington (Okanagan County) southward along the east slopes of the Cascades through southwestern Oregon (Josephine, Jackson, and Klamath counties), the greater part of California west of the Sierra divide (except the humid coast belt from Mendocino County northward), including the deserts, and west-central Nevada in the valleys of the Treckee, Carson, and Walker Rivers."

B. California distribution of the species

Grinnell and Miller (1944), "Life-zone, characteristically Upper Sonoran, but at margins of general range...Transition." Lists numerous site and specimen records throughout the birds' California range. Small (1974), "Length of state except eastern slope of Sierras from Lake Tahoe south and entire eastern and southeastern desert areas." Miller (1951) gives various California area locations. Grinnell (1915) gives California locations, also. Dawson (1923),

Picoides pubescens turati (con't.)

"resident in Upper Sonoran and Transition zones of California, except in extreme northwestern and northeastern sections and in the desert mountains." Mailliard (1918) found them in Yosemite Valley.

C. California desert distribution

Small (1974) says they are NOT found in eastern and southeastern desert areas. Grinnell and Miller (1944) give the life-zone as "characteristically Upper Sonoran." Grinnell (1902), "Breeds chiefly in Upper Sonoran zone west of the Sierran divide, except in the extreme northwest humid coast belt." Various sites are given. Willett (1933) also gives locations.

D. Seasonal variations in distribution

Grinnell (1915) reported it as being characteristically associated with willow growths of the valleys in breeding season. Also, that there is a more widely distributed winter population, locally. Grinnell (1902) also reported it as breeding chiefly in Upper Sonoran west of the Sierras. Dawson (1923), "...in winter it may make...excursions into the desert."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), "Markedly restricted to riparian soft-woods, willow and cottonwood...Thus the lowland stream-bottoms constitute the main theaters of activity...Possibly, available water is a factor for presence. But there is some invasion of the oak belts, locally, even of tracts of conifers; and deciduous orchard trees, notably apple, satisfy the birds' needs." Small (1974), "Riparian woodlands." Miller (1951) found them in Lower Sonoran and Transition zones and in coastal forest. Bent (1939), "Downy Woodpeckers were seen most often close to streams and in orchards." Peterson (1969), "Broken or mixed forest, woods, willows, poplars, river groves, orchards, shade trees." Robbins, Bruun, Zim (1966), "Seen in suburbs, orchards, shade trees, and woods." Udvardy (1977), "Broken or mixed forests; often found in conifers but feeds and nests chiefly in young deciduous trees. Also frequents orchards, city parks, and suburban areas." Dawson (1923), "...chiefly confined to deciduous timber, and shows a great preference for wooded bottoms and the borders of streams. Willow trees are everywhere its most natural associations." Bendire (1895), "It is partial to rather open and cultivated country, interspersed here and there with small woods and orchards; and to scattering trees and shrubbery of river and creek bottoms,

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the shade trees along country roads, and along the edges of clearings...it does not seem to care for burnt tracts."

B. Altitudinal range

Grinnell and Miller (1944) give altitudes of nesting from near sea level to 6,100 feet.

C. Home range size

D. Territory requirements

Perch sites - Bendire (1895), "In winter, they dig shallower excavations in dead trees, old stumps, or fence posts in some sheltered situation, in which they spend the nights, and to which they retire in stormy weather."

Courtship and mating sites - Bendire (1895) reported that males drum on resonant dry limbs to attract females.

Nest sites - Grinnell and Miller (1944), "Markedly restricted to riparian soft-woods, willow and cottonwood...some invasion of oak belts...tracts of conifers, and deciduous orchard trees, notably apple...Branches of boles of these trees must be far advanced in decay to be excavatable for nest or shelter purposes." Small (1974), "...nest...on the trunks ...of small trees." Grinnell (1915) reported them as being associated with willow growths in the breeding season. Peterson (1969), "In hole in tree." Udvardy (1977), "...nests chiefly in young deciduous trees...in a hole in a dead tree." Dawson (1923), "A hole excavated by the birds in tree, usually deciduous, as willow, cottonwood, alder, and the like; at moderate heights." Bendire (1895) reported nest at 4-20 feet from ground and usually no higher. Prefers apple, cherry, pear oak, maple poplar, alder, linden, ash, willow and magnolia, especially in dead limbs.

E. Special habitat requirements

Grinnell and Miller (1944), "possibly, available water is a factor for presence." Bendire (1895), "Its breeding sites seem to be confined to deciduous trees, preferably dead ones, or old stumps." Ligon (1970) reports that they need standing dead timber to breed.

F. Seasonal changes in habitat requirements

Grinnell (1915) reported them as being associated with willow growths during breeding. Dawson (1923) reported that areas of increased insect density were required to feed the young birds during nestling season since the adults do not have a large foraging range then.

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V FOOD

A. Food preferences

Bendire (1895) reported that the food was similar to the Downy Woodpecker's diet, i.e., larvae and eggs of insects, occasionally berries and seeds. He also reported that they eat ants and spiders and raw meat.

B. Foraging areas

Small (1974), "Forage...on the trunks...of small trees." In Bent (1939), "Their forage places included the limbs or small trunks of willow, alder, cottonwood, sycamore, valley oak, blue oak, digger pine, and yellow pine trees." Udvardy (1977), "...feeds...chiefly in young deciduous trees." Dawson (1923), "Foraging expeditions are regularly undertaken into neighboring groves of live oak or pine, and...to apple orchards."

C. Foraging strategies

Udvardy (1977), "...the male is larger than the female and has a longer, stronger bill and chisels deep into wood, whereas the female pries under the bark with her shorter bill. Thus, a pair shares the food resource without competing with one another." Bendire (1895), "It begins near the roots and carefully scans every cranny as it hops along, looking now at one side and then on the other." Kisiel (1972) discusses how Hairy and Downy Woodpeckers divide the resources by feeding on different species of trees.

D. Feeding phenology

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Bendire (1895), "Each pair of birds lay claim to a certain range, and intruders on this are driven away." Kilham (1962) describes defense of territories against others of the same species.

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C. Courtship and mating behavior

Bendire (1895) reported that males drum on limbs and attract females. Both sexes build nest and care for young. Kilham (1962) also described drummings and tapping as well as displays used in courtship. Both sexes take part in nest building and incubation. He also describes preening and other courtship-related activities (1972), as well as saying they maintain year-round pair bonds.

D. Nesting phenology

Willett (1933) reported breeding to start in April and May. Dawson (1923), "Nesting - April-May; one brood. Young are hatched some time in May." Bendire (1895) reports nesting starts in mid-April in southern California.

E. Length of incubation period

Dawson (1923), "12 days." Bendire (1895), "about 12 days."

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

Dawson (1923), "One brood." Bendire (1895) reported one brood, normally. Young are also cared for after they leave the nest.

VII POPULATION PARAMETERS

A. Clutch size

Willett (1933) reports 5 and 7 egg clutches. Bent (1939) reports 3-6 eggs, more commonly 4 or 5, sometimes 7. Peterson (1969) reports 4-7, as does Udvardy (1977). Dawson (1923) reports 4 or 5, 7 of record. Bendire (1895), "Four or five eggs...one laid daily."

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Neff (1928) describes them as being more abundant within a given area in winter than in summer, presumably because they tend to associate only in pairs in the other seasons.

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F. Habitat density figures

Koplin (1969) reports that density changes as the amount of prey items change due to fire and floods. E.g., there is a fifty-fold increase in response to insect increase after a fire. Short (1971) states that these birds need smaller territories than Hairy Woodpeckers, and thus have denser populations.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

Ligon (1973) reports competition for food with White-headed Woodpeckers in Idaho, and (1970) competition for nesting sites with the Red-cockaded Woodpeckers.

C. Parasitism

IX STATUS

A. Past population trends

Grinnell (1902) reported this species as a "common resident in suitable localities almost throughout the State," and (1915) as a "common resident locally, chiefly in Upper Sonoran Zone west of the Sierran divide except in the extreme northwest humid coast belt." Willett (1933) reported it as a common resident in willow regions of lower country.

B. Present population status

Grinnell and Miller (1944) reported it as permanently resident. Locally common with about normal marginal vagrancy in autumn. Small (1974) reported it as a resident. Ligon (1970) feels that there are more of this species in open pinelands now than previously.

C. Population limiting factors

Grinnell and Miller (1944) and Ligon (1970) both report that if diggable wood (especially standing dead timber) is reduced, so is the bird population.

D. Environmental quality: adverse impacts

Grinnell and Miller (1944), "Repeatedly, elimination of all such diggable wood in a given neighborhood has been observed to be followed by disappearance of the birds." Ligon (1970) reports that they need dead standing timber to breed, and repeated fires reduce this.

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E. Potential for endangered status

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FOX SPARROW
Passerella iliaca

I TAXONOMY

A. Type description

AOU (1957), Passerella iliaca: Passerella Swainson, Nat. Hist. Class. Birds, vol. 2, July 1, 1837, p. 288. Type by monotypy, Fringilla iliaca Merrem.

Passerella iliaca zaboria Oberholser, Journ. Washington Acad. Sci., 36, no. 11, Nov. 15, 1946, p. 388. (Circle, Alaska.)

P. i. sinuosa Grinnell, Univ. California Publ. Zool., 5, no. 12, Mar. 5, 1910, p. 405. (Drier Bay, Knight Island, Prince William Sound, Alaska.)

P. i. schistacea described as, P. schistacea Baird, in Baird, Cassin, and Lawrence, Rep. Expl. and Surv. R. R. Pac., vol. 9, 1858, pp. xl, 488, 490. (Head of the Platte = South fork of Platte River, about 25 miles east of the northeastern corner of Colorado, in Nebraska.)

P. i. canescens Swarth, Proc. Biol. Soc. Washington, 31, no. 40., Dec. 30, 1918, p. 163. (Wyman Creek at 8250 feet altitude, east slope of White Mts., Inyo County, California.)

P. i. megarhyncha described as, P. megarhyncha Baird, Cassin and Lawrence, Rep. Expl. and Surv. R.R. Pac., vol. 9, 1858, pp. xl, 925. (Fort Tejon, [Kern County, California].)

P. i. monoensis J. Grinnell and T. I. Storer, Condor, 19, no. 5, Sept. 25, 1917, p. 165. (Mono Lake Post Office, altitude 6500 feet, Mono County, California.)

P. i. stephensi Anthony, Auk, 12, no. 4, Oct. 1895, p. 348. ([Tahquitz Valley] San Jacinto Mts., California.)

B. Current systematic treatments

AOU (1957) places the species P. iliaca in the Order Passeriformes, Family Fringillidae, Subfamily Emberizinae, with 18 subspecies. Mayr and Short (1970): "The Fox Sparrow is highly variable. Its variation has been treated by Linsdale (1928a, b), by Oberholser (1946), and by Behle and Selander (1951). Distinctive races include the insular unalaschensis and insularis, as well as various continental races. The Fox Sparrow seems closely related to P. melodia." Martin (1977) discusses Fox Sparrow relationships to other emberizids according to song. Linsdale (1928) suggests that Passerella and Melospiza properly belong in the same genus, as does Paynter (1964) while Parkes (1954) maintains they should be separate.

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C. Synonomies of scientific nomenclature

AOU (1957) lists the two synonomies as above. Grinnell and Miller (1944): for sinuosa, P. i. townsendi, part; P. i. unalaschensis, part; P. i. insularis, part; P. i. meruloides, part; for megarhynchus, P. schistacea, part; P. townsendi var. megarhynchus, part; P. schistacea var. megarhynchus, part; P. i. mariposae; P. i. monoensis, part: for canescens, P. i. schistacea: for stephensi, P. schistacea, part; P. townsendi var. schistacea, part; P. townsendi var. megarhyncha, part; P. megarhyncha, part; P. stephensi, part: and for several others they say, "Inability to verify racial identity of many early records of Fox Sparrows renders a complete listing of names futile."

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), sinuosa: "Oregon Finch, Townsend Sparrow, Shumagin Fox Sparrow, Kodial Fox Sparrow, Yakutat Fox Sparrow." Schistacea, monoensis, "Inability to verify racial identity..." Megarhynchus: "Large-beaked Sparrow, Slate-colored Sparrow, Thick-billed Sparrow, Thick-billed Fox Sparrow, Yosemite Fox Sparrow, Mono Fox Sparrow." Canescens: "Slate-colored Fox Sparrow, Inyo Fox Sparrow, Stephensi: "Slate-colored Sparrow, Thick-billed Sparrow, Stephens Sparrow."

II DESCRIPTION

A. External morphology of adults

Dawson (1923), P. i. sinuosa, "Similar to P. I. insularis, but still darker (as compared with unalaschensis) and less rufescent." P. i. schistacea, "Somewhat similar to P. i. i. but rufous spots somewhat smaller with tail longer - nearly equal to wing; rufous element in plumage greatly reduced; pattern of upper plumage entirely blended; streaking of underparts about equal in quantity but slightly dusky or brownish instead of red. Color of upperparts, brownish gray; more rufescent, dull cinnamon brown, in upper-tail coverts and exposed surfaces of wings and tail; below white, sharply streaked, especially on the chest and sides with spots of dark brown; streaks tend to confluence on sides of throat; those of the sides are prolonged and enlarged posteriorly. Bill slightly smaller and darker, feet darker than iliaca." "P. i. canescens, "From schistacea, canescens may be differentiated by its decidedly more grayish coloration. A dubious candidate for nomenclatural recognition, albeit the tendency toward grayishness does exist." P. i. monoensis, "Similar to P. i. schistacea, but slightly grayer and with much stouter bill - comparable in this regard to

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P. i. fauva, which is a much browner bird. Monoensis is possibly the lightest of the recognizable forms of iliaca. The affinities of monoensis are with mariposae, and it probably does not deserve nomenclatural distinction from it." P. i. stephensi, "Similar to P. i. mariposae in coloration, but size averaging slightly larger and bill at maximum of development, relatively enormous.

Bent (1968) in a description of the western mountain subspecies of P. iliaca says, "In these nine races the tail is at least (rarely) equal to and usually longer than the wing. Grays predominate in their coloration, increasingly so from north to south, and the rather pale uniform gray head and back contrasts with the dull reddish-brown wings and tail. The spots and streaks of the underparts are dull. The bill is large and somewhat swollen, increasingly so from east to west in the California forms." Baird et al. (1905): "General aspect of upper parts foxy-red the ground-color and the sides of the neck being ashy; the interscapular feathers each with a large blotch of fox-red; this color glossing the top of the head and nape; sometimes faintly, sometimes distinctly; the rump unmarked; the upper coverts and surface of the tail continuous fox-red. Two narrow white bands on the wing. Beneath with under-tail coverts and auxillars, clear white, the sides of the head and throat, the jugubum, breast, and sides of body, conspicuously blotched with fox-red. Sometimes the entire head above is continuously reddish."

B. External morphology of subadult age classes

C. Distinguishing characteristics

Interspecific - Robbins et al. (1966) comments that Western Fox Sparrows are deeper brown or gray-brown than eastern races. Peterson (1961): "The many races can be divided into three types: (1) bright rusty Fox Sparrows; (2) dark-brown headed with darker bills; (3) gray-headed with large yellowish bills. The only race identified readily is the Yukon Fox Sparrow (zaboria)." Ridgway (1915) provides a key to some of the races. Phillips et al. (1964) state that the study of the variation of the races has been thrown off track by failure of investigators to take into account seasonal wear, which causes color variations. Wolfson (1955) mentions Linsdale's study (1928) in which individual variation in bone size was found to be slight when compared to geographic variation. Gabrielson and Jewett (1940) state that trying to identify races in the field is hopeless due to the variation, and close relation of subspecies.

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Intraspecific - Robbins et al. (1966): "This may be confused with Hermit Thrush except for the yellow lower mandible and slightly notched tail." Peterson (1961): "Larger than the House Sparrow. Hermit Thrush has a similar reddish tail, but is thin-billed and spotted rather than stripped."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) Passerella iliaca: "Northern Alaska, northwestern and central eastern Mackenzie, northern Manitoba, northern Ontario, northern Quebec, and northern Labrador south on the Pacific coast to northwestern Washington; in the mountains to southern California, central Nevada, central Utah, and central Colorado; and to central Alberta, central Saskatchewan, southern Manitoba, central Ontario, southern Quebec, and Newfoundland."

P. i. zaboria: "Breeds from northwestern and interior Alaska, northern Yukon, northwestern and central eastern Mackenzie, and northern Manitoba south to northern British Columbia, central Alberta, and central Saskatchewan, and southern Manitoba."

P. i. sinuosa: "Breeds in the Kenai Peninsula and Prince William Sound districts (25 miles north of Valdez, Cordova) and on Middleton Island, south central Alaska."

P. i. schistacea: "Breeds from southeastern British Columbia and southwestern Alberta south through the mountains of northern Idaho, north-central and eastern Oregon, and western Montana, to north-central and northeastern Nevada, southwestern Wyoming, and central Colorado."

P. i. canescens: "Breeds in central Nevada and extreme central eastern California (White Mountains)."

P. i. megarhyncha: "Breeds in mountains from southwestern Oregon south through central and northern California and the Sierra Nevada of California to lat. 37° N.; locally to west-central Nevada in the Tahoe district."

P. i. monoensis: "Breeds in the Mono district on the east flank of the central Sierra Nevada in California; locally in adjoining Mineral County, Nevada."

P. i. stephensi: "Breeds in the southern Sierra Nevada of California and in the high mountains in southern California (Mount Pinos, San Gabriel, San Bernardino, and San Jacinto mountains)."

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Phillips et al. (1964): "Fox Sparrows nest clear across the northern part of the continent and extend southward in the west to the Rockies of Colorado and Utah and to the high mountains of southern California." They consider P. i. zaboria an eastern bird due to tail size and coloration, but list Alaska as its breeding range. P. i. schistacea is the only race regularly occurring in Arizona. Banks (1970) lists three subspecies that nest in Oregon; megarhyncha, fulva and schistacea. He reported megarhyncha and fulva both breeding in one locality. Gabrielson and Jewett (1940) list these races for Oregon; altivagans, unalaschensis, insularis, sinuosa, annectens, townsendi, fuliginosa, schistacea, fulva, mariposae.

B. California distribution of the species

Small, (1974) lists P. iliaca as breeding in Klamath Mountains, Cascades, Warner Mountains, Sierra Nevada, northern inner Coast Range, higher Basin and Ranges Mountains, Mount Pinos in Ventura County, Transverse and Peninsular Ranges to Mount San Jacinto, Riverside County.

Grinnell and Miller (1944): P. i. sinuosa, "In winter, all sections of the state except areas east of Sierran brushlands; not yet reported in mid-winter from northern humid coastal strip; found in migration in northeastern plateau district." P. i. megarhynchus, "As breeding, Siskiyou Mountains, southern Cascade range, and Sierra Nevada south to Kings River Canyon, Fresno County, and Kearsarge Pass, Inyo County, but exclusive of Mono Lake Basin. Summer residents of Trinity Alps of northern Trinity County and southern Siskiyou County—and of Siskiyou Mountains are, so far as known in varying degree intermediate toward P. i. brevicauda. In winter chiefly southern districts west of deserts, from Tehachapi Mountains southward; extends to Santa Cruz and Santa Catalina islands; also occurs commonly northward as far as Shasta County, but not east of Sierra Nevada nor in humid coastal belt north of Marin County." P. i. schistacea, "In winter chiefly southern California west of deserts, but also sparsely north along Sierra Foothills to Tehama County; recorded likewise from San Francisco Bay region. Migrates along Sierra Nevada and through Modoc and Inyo regions." P. i. monoensis, "Breeds along eastern flank of Sierra Nevada, extending from northern Alpine County south through Mono County to southern rim of Mono Lake Basin. In winter, known from vicinity of Coulterville, Mariposa County, in western foothills of the Sierra and from scattered localities in coastal southern California, including Santa Catalina and San Clemente Islands." P. i. canescens, "As breeding, White Mountains of Mono and Inyo Counties, from 8000 to 9000 feet. In winter, known from Santa Barbara and Los Angeles counties; once recorded from the Colorado River valley." P. i. stephensi, "As breeding,

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Pacific drainage of southern Sierra Nevada from southern Fresno County, south of Kings River, south through Tulare County; Mount Pinos in Kern and Ventura counties; and San Gabriel, San Bernardino and San Jacinto Mountains. In winter, detected occasionally in Santa Barbara and Los Angeles Counties in foothills and lower mountains."

Dawson (1923): P. i. sinuosa, "Winter resident, apparently well distributed, but no records from southeastern portion of the state." P. i. schistacea, "Scattered records of occurrence in fall and winter in interior and southern California await differentiation from those attributable to P. i. fulva." P. i. megarhyncha, "Winters commonly in the San Diegan district north to Fort Tejon, Kern County, and west to Santa Barbara." P. i. canescens, "Breeds in the White Mountains of California. Winter range undefined." P. i. monoensis, "Breeds in high transition in Mono Lake region. Winter range unknown." P. i. stephensi, "Breeds in the higher mountains of southern California from about latitude 36° in the Sierras. Winter range unknown, presumably the mountains of Lower California."

Grinnell (1928) discusses the distribution of the races in lower California.

C. California desert distribution

Grinnell and Miller (1944): P. i. sinuosa, does not breed. In winter reported in Kern County, Los Angeles County, San Bernardino County, Riverside Valley in San Jacinto Mountains, Riverside County. P. i. schistacea, migrant and winter visitant. Reported in Kern, Los Angeles, San Bernardino, San Diego, Inyo and Riverside Counties. P. i. megarhynchus, breeds in Inyo County. Winter records from Kern, Los Angeles, Riverside, San Diego and San Bernardino Counties. P. i. monoensis, does not breed in the desert. Winter records from Los Angeles, Inyo, Riverside Counties. P. i. stephensi breeds mostly to the north in California. Winter records from Los Angeles and Kern Counties.

Willet (1951) does not list Fox Sparrows in this publication on the birds of the southern California deserts.

D. Seasonal variations in distribution

AOU (1957), P. i. zaboria, "Winters chiefly east of the Great Plains from eastern Kansas and southern Iowa south to southern Texas, Louisiana, Mississippi, Alabama, and northern Georgia; rarely west to Washington, central and southern California, southern Arizona and Colorado." P. i. schistacea, "Winters from northern interior California, central Arizona and northern New Mexico south through southern California to northern

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Baja California, southern Arizona and western Texas." P. i. sinuosa, "Winters from southwestern British Columbia south through western Washington, western Oregon and California to northwestern Baja California." P. i. canescens, "Winters in southern California, northern Baja California, and southern Arizona." P. i. megarhyncha, "Winters in lowlands of central and southern California and northwestern Baja California." P. i. monoensis, "Winters in central interior and southern coastal California and northwestern Baja California." P. i. stephensi, "Winters at lower elevations in southern California."

Stewart et al. (1974) did a study on age ratios of migrating Fox Sparrows in central California.

IV HABITAT

A. Biotopic affinities

Bent et al. (1968), "schistacea seems to prefer willows and rose thickets along the streams in more open country, but in general most abundant close to the foothills of the mountains," in Oregon. In Montana the same race prefers "the thickest and most impenetrable willow thickets in the valleys. In northern Nevada...common in the Transition Zone, especially on rocky slopes..." megarhynchus inhabits "tracts of Ceanothus cordulatus and manzanita, either in... large brush fields or in large clumps...in broken forest. To less extent...aspen thickets and stream side willow and alder tangles in the mountains..." Monoensis "prefers brush composed of Manzanita and ceanothus...stream side thickets of willow and wildrose and low aspen scrub with associated forbs about springs and meadows." Stephessi "occupies in summer, chin apin and ceanothus brush; less commonly brakes, willow thickets, and gooseberry brushes about mountain streams and spring." Grinnell and Miller (1944); sinuosa, "wide variety of chaparral cover or underbush of forest and woodland, but preference is shown for in land areas, and hence the...birds occupy semi-arid chaparral of lower Mountain slopes." Schistacea, "inland chaparral, prevailingly of somewhat arid character as with other races that winter in the interior." Megarhynchus, "tracts of ceanothus cordulatus and manzanita...aspen thickets and streamside willow and alder tangles in the mountains." monoensis, "in summer brush composed of manzanita and ceanothus ...streamside thickets of willows and wild rose and low aspen scrub...about springs and wet meadows." Canescens, "thickets of aspens and birches, with dense ground cover of rose, gooseberry or alder, along streams..." Stephensi, "in summer, chinquapin and ceanothus brush; less commonly brakes, willow thickets and gooseberry about mountain streams and springs."

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B. Altitudinal range

Bent et al. (1968), canescens - above 8,000 feet. Schistacea - breeds in lowlands and at higher altitudes.

C. Home range size

D. Territory requirements

Perch sites -

Courtship and mating sites -

Nest sites - Bent et al. (1968), "Nest locations are either above ground in the rugged, thorny bushes or sunk in the ground at their bases." Schistacea "prefers to nest in willow thickets, next in dense wild rose bushes... Their nests are generally placed some little distance above ground, rarely... greater than 3 feet, and are invariably well hidden." Megarhyncha nests were found on the ground near Lake Tahoe and some were 2-3 feet up in Ceanothus bushes.

E. Special habitat requirements

Oberholser (1974) describes one essential condition for Fox Sparrow breeding; a good supply of dense shrubs for cover. Southwestern racer often find this in Ceanothus.

F. Seasonal changes in habitat requirements

Peterson (1961): "In winter, woodland under growth, chaparral, parks, gardens." Oberholser (1974) reports Fox Sparrows to inhabit wooded bottomlands along rivers and creeks after migrating south in the fall.

V FOOD

A. Food preferences

Bent et al. (1968) refer to all races eating insects. Gabrielson and Jewett (1940) write that Fox Sparrows feed largely on seeds. Oberholser (1974) lists food items as: ragweed, smartweed, and other seeds, and berries.

B. Foraging areas

Bent et al. (1968) states that a requirement of all Fox Sparrows is leaf litter in which to forage. Gabrielson and Jewett (1940): "They feed largely on the ground."

Passerella iliaca (con't.)

C. Foraging strategies

Robbins et al. (1966): "It feeds by scratching, towhee-fashion, with both feet." Gabrielson and Jewett (1940) write that they feed by scratching vigorously on the ground to uncover seeds.

D. Feeding phenology

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Martin (1977) states that song appears to function more as a distant threat. Close threats consisted of "chirping calls" and posturing, followed by vigorous winging after the intruder is driven away.

C. Courtship and mating behavior

Martin (1977) describes males as being extremely vociferous and singing throughout spring and summer. Females may, at times, produce song but softer and more incomplete. The messages encoded in the songs are believed to be sex, location, possession of territory, aggressive and sexual, individual identity.

D. Nesting phenology

E. Length of incubation period

Bent et al. (1968), schistacea - 12 to 14 days.

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961) - 4 to 5. Gabrielson and Jewett (1940) - 3 to 4.

B. Fledging success

Passerella iliaca (con't.)

C. Mortality rates per age class

D. Longevity

Kennard (1975) in a study of band returns found the oldest recorded Fox Sparrow to be 9 years, 9 months.

E. Seasonal abundance

F. Habitat density figures

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

C. Parasitism

Friedmann (1963), "Fox Sparrow is an infrequent victim of the Brown-headed Cowbird. Only in one place has anyone considered it a common host..." in Montana.

IX STATUS

A. Past population trends

Wolfson (1955) reports finding Fox Sparrows in Pleistocene deposits in California.

B. Present population status

Hayward et al. (1976) note a decline in the population of Fox Sparrows in Utah from the 1920's and 30's.

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

Passerella iliaca (con't.)

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GRAY FLYCATCHER
Empidonax wrightii

I TAXONOMY

A. Type description

Empidonax wrightii - AOU (1957) Baird, in Baird, Cassin, and Lawrence, Rep. Expl. and Surv. R. R. Pacific, vol. 9, 1858, p. 200. (El Paso, Texas.)

B. Current systematic treatments

AOU (1957) describes the Gray Flycatcher as a member of the avian Order Passeriformes, Suborder Tyranni, Superfamily Tyrannoidea, and Family Tyrannidae; this species is monotypic. This species was called Empidonax griseus in the fourth edition of the AOU Check-list (1931), while the name E. wrightii was used for the Dusky Flycatcher, which is called E. oberholseri in the fifth edition.

Hellmayr (1927) felt that E. wrightii, E. griseus, E. pulverius, E. fulvipectus, and E. trepidus were all races of the same species; did not want to employ trinominals until more breeding information was gathered. He called E. griseus the "Gray Flycatcher," and E. wrightii the "Wright's Flycatcher."

Johnson (1963) concluded that griseus is synonymous with wrightii, with the former being dropped from useage. He stated that a complex and sometimes bewildering nomenclature has surrounded these flycatchers. For years, wrightii and oberholseri were considered the same species (E. obscurus).

C. Synonomies of scientific nomenclature

Hellmayr (1927) gives Empidonax obscurus. Grinnell and Miller (1944) add E. canescens.

D. Synonomies of vernacular nomenclature

Hellmayr (1927), Wright's Flycatcher. Dawson (1923) adds Little Gray Flycatcher.

II DESCRIPTION

A. External morphology of adults

Ridgway (1907) gives detailed description of plumages; above plain olive, tail deep grayish brown, two distinct wing bands, lower mandible pale, iris brown, legs and feet

Empidonax wrightii (con't.)

brownish black, has a dull white eye ring. Peterson (1961), "...the lower mandible is more abruptly flesh-colored and ...the back is gray with scarcely a hint of olive or brown." Johnson (1963) gives a detailed description of plumages, molts, and age determination in Gray Flycatchers. Russell and Woodbury (1941), "The long narrow bill, almost completely yellow mandible, nearly completely white belly, and the...almost obsolete eye ring help in identification."

B. External morphology of subadult age classes

"Young essentially like adults, but wing bands more buffy ...and under parts more whitish" (Ridgway 1907). Johnson (1963) discussed methods of age determination in this species; "the tips of the juvenile rectrices in wrightii differ in shape from those of the adult in being pointed or rounded." Russell and Woodbury (1941) found that, "In young birds...the white outer web of the outer tail feathers is distinctive."

C. Distinguishing characteristics

Interspecific - Hellmayr (1907), "Similar to E. hammondi, but...bill much longer, and coloration of anterior under parts paler." Peterson (1961) states that this species is similar to Dusky and Hammond Flycatchers...can be safely identified on the breeding grounds by habitat." Phillips et al. (1964) describes methods of distinguishing this species from other small flycatchers--"This species does not jerk the tail, but dips it slowly and evenly downward ...This in combination with its white wing-bars, pale gray color, and frequent occurrence in open country, makes identification possible in the field."

Intraspecific - Ridgway (1907), sexes alike; adult male-- length 129 mm; wing 69.5 mm; tail 62.6 mm and adult female-- length 130 mm; wing 67.4 mm; tail 60.6 mm.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), range of species "Breeds from central Oregon, southwestern Idaho, southwestern Wyoming, northeastern Utah, and central Colorado, south to central eastern California (Inyo Mountains), southern Nevada, central Arizona, and central western New Mexico." Hellmayr (1927) gives range of E. wrightii as "Western United States, breeding from southern British Columbia and southwestern Saskatchewan south to southern California (San Gabriel, San Bernardino, San Jacinto, and Santa Rosa Mountains), Arizona, New Mexico, and western Texas, and east to eastern base of Rocky Mountains, wintering from northern to southern Mexico."

Empidonax wrightii (con't.)

B. California distribution of the species

Grinnell and Miller (1944) gives the California distribution of the Gray Flycatcher as "In general, as breeding, higher Mountain masses of the State; at north, from Warner Mountains, Modoc County, west through Shasta, Siskiyou and Trinity regions as far as south Fork Mountain, on Trinity-Humboldt county line...south from Mount Shasta... over entire Sierra Nevada to their southern terminus near Tulare-Kern County line; to eastward, on White Mountains, in Mono and Inyo counties; recurs on various isolated, higher ranges of southern California; Mount Pinos, San Gabriel, San Bernardino, San Jacinto, and Santa Rosa mountains." Small (1974) lists this species California range as "breeds in northeastern Basin and Ranges Region from Modoc County south to Inyo County; some of population winters in southern California." Willett (1933) describes this species as a summer resident of upper Transition and Boreal zones of mountains, south to San Jacinto and Santa Rosa ranges.

C. California desert distribution

Grinnell and Miller (1944) list records of transient Gray Flycatchers, which include--Death Valley (26 April); near Needles, San Bernardino Co. (19 February); Palm Springs and Cottonwood Springs, Riverside County (April). Johnson et al. (1948) found Gray Flycatchers only as late spring migrants in the Providence Mountains. Grinnell (1914) collected a male Gray Flycatcher near Needles (lower Colorado River Valley) on 19 February; he seldom saw the species in this area. Wauer (1964) found Gray Flycatchers breeding in the pinon-juniper woodlands of the Panamint Mountains in Death Valley (5,000-6,000 feet elevation). Van Rossem (1922) states that the Gray Flycatcher, after passing through the San Diegan district on spring migration, breeds in the desert mountain ranges of California (lists several specimens taken in the White Mountains, Mono and Inyo counties). Van Rossem (1911) noted Gray Flycatchers wintering near the Salton Sea (January-March). Miller and Stebbins (1964) called this species a spring migrant (only) in Joshua Tree National Monument. Willett (1951) found Gray Flycatchers migrating and wintering on the deserts of southern California. Hollister (1908) noted a single Gray Flycatcher near Needles in April in a study of the birds of that region.

D. Seasonal variations in distribution

AOU (1957) states that Gray Flycatchers migrate, in winter, to southern California (Ventura, Needles), central Arizona, southern Coahuila, and central Tamaulipas south to southern

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Baja California, Jalisco, Michoacan--in migration to western Texas. In California, Grinnell and Miller (1944) give the seasonal status of this species as "on breeding ground, summer resident, April to September...elsewhere, a spring transient, sparse; in autumn apparently passes over the southward lowlands nearby or quite unobserved." Small (1974) described seasonal status as "transient and summer resident, April to October." Bent (1963) stated that Gray Flycatchers are found north to southern California and south to Central America during winter. He gives date of fall departure (for much of California population) as 5 November, and early April as date of spring arrival.

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), "Most characteristic, green chaparral with trees scattered through it; in other words, mixed brushland and trees, either deciduous or coniferous ones...green manzanita and chinquapin, with scrub black-oaks, or scattering red or white firs, or lodgepole pines, or Jeffery pines...there is no apparent attraction to water." Small (1974) gives breeding habitat in California as "pinon-juniper woodland, mixed Great Basin sagebrush and pines, arid forests." Van Rossem (1936) found that the summer distribution of Gray Flycatchers in Nevada closely coincides in altitude with that of the yellow pine. In Arizona, Swarth (1904) found this species most abundant below 5000 feet, favoring the foothill regions covered with scrub oak, madrona, and manzanita. Grinnell and Swarth (1913) found Gray Flycatchers breeding between the lowest edge of the Transition Zone up to the higher slopes of the San Jacinto Mountains of California. Johnson (1965) found these flycatchers in "piñon-juniper where scattered ponderosa pine and clumps of mountain mahogany were subdominant" (breeding).

B. Altitudinal range

Grinnell and Miller (1944) give altitudes of occurrence in California as from 4,000 to 11,300 feet. Van Rossem (1936) notes the regular occurrence of this species from 7,500 to 10,000 feet in Nevada. Willett (1933) found two species from 5,500 to 9,000 feet in California. Johnson et al. (1948) found Gray Flycatchers between 5,000 and 6,400 feet during spring migration (May) in the Providence Mountains, California. Grinnell (1908) noted this species breeding at 10,000 feet in Mono County, California.

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C. Home range size

Russell and Woodbury (1941) found that during the breeding season, Gray Flycatchers usually stayed within 100 yards of the nest tree.

D. Territory requirements

Perch sites - Hoffmann (1924) noted Gray Flycatchers singing from small pines in dry, open woodland of Oregon. Bent (1963) recounts the use of small twigs as perch sites while feeding.

Courtship and mating sites - Johnson (1963) describes courtship sites as "the male on a horizontally placed branch 5-20 feet above the ground. The female perches nearby."

Nest sites - Dawson (1923), "placed in upright crotch in bushes, or settled upon branch of evergreen sapling." Grinnell (1908) gave an average nest height of 7.5 feet in the San Bernardino Mountains. Nest sites included willow, cottonwood, black oak, incense cedar, tamarack pine, fir, buckthorn, manzanita, and mountain mahogany; nest heights ranged from 2 to 40 feet. Johnson (1963), "the nests of this species are often placed on horizontal branches of trees as high as 20 feet above the ground (mean height of 17 nests, 12.5 feet)." Walker (1914) found Gray Flycatchers nesting in sagebrush in Oregon.

E. Special habitat requirements

Grinnell and Miller (1944), "The essential elements appear to be low-growing thickets for nesting and much of the foraging, and near by high singing posts and lookout stations." Grinnell (1908) found this species was confined to the less arid parts of the San Bernardino Mountains, but were not dependent upon a nearby water source for breeding. In southern Nevada, Johnson (1965) found that considerable open ground characteristically occurred on occupied territories of this species.

F. Seasonal changes in habitat requirements

Peterson (1961), "Breeds in sagebrush, pinon, junipers. In winter, willow thickets, brush." In winter, Small (1974) states that Gray Flycatchers move into riparian woodlands from their woodland and sagebrush breeding grounds. Russell and Woodbury (1941) state that after nesting, Gray Flycatchers move into sagebrush habitat (August and later).

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V FOOD

A. Food preferences

Russell and Woodbury (1941) found that in Arizona and Utah, the food consisted entirely of insects. It varied in size from tiny beetles to large butterflies, and included grasshoppers, wasps, moths, and ant-lions.

B. Foraging areas

In the San Bernardino Mountains of California, Grinnell (1908) found Gray Flycatchers foraging from willow thickets of canyon bottoms, all the way up into the upper reaches of tall pines. Hollister (1908) noted a Gray Flycatcher feeding "among the higher creosote bushes along a dry wash" during April near Needles, California.

C. Foraging strategies

Oberholser (1974) states that in Texas "It frequently perches atop a bush or low tree from where it flycatches." Salt (1953) lists the Gray Flycatcher as a member of the "air" foraging guild. Bent (1963) recounts the taking of insects from beneath leaves of trees.

D. Feeding phenology

Bent (1963) stated that very little information is available on food habits and phenology, which "probably does not differ materially from that of other western Empidonaces."

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Oberholser (1974), "Song on the breeding territory is vigorous..." Johnson (1963) stated that males of wrightii defend territories both intra- and interspecifically. In disputes between wrightii and oberholseii, the former was usually the dominant bird.

C. Courtship and mating behavior

Wheelock (1944) describes courtship, which lasts for about 2 weeks before nest-building begins. Grinnell (1908) describes the singing of this species during breeding---

Empidonax wrightii (con't.)

"jumble of twitters, with rising and falling inflection... which reminded me of...the Black Phoebe." Johnson (1963) gave a detailed account of courtship and mating behavior, which includes a male solicitation display, a female solicitation display (wing-fluttering prior to copulation), and extensive flight songs.

D. Nesting phenology

Wheelock (1904) gives California breeding season as 15 June to 15 July. Russell and Woodbury (1941) found that 2 broods are usually raised in a season (Utah and Arizona); nesting season extends from mid-May until August. Bent (1963) gives California egg dates as: 65 records, 27 May to 18 July; 33 records, 14 June to 24 June, indicating the height of season.

E. Length of incubation period

Dawson (1923) gives a 13 day incubation period. Wheelock (1904) states that incubation is shared by both adults, and lasts 13-14 days. Johnson (1963) found the incubation period of wrightii to be 14 or 15 days, with the female performing all duties of incubation. Russell and Woodbury (1941) list a 14 day incubation.

F. Length of nestling period

Wheelock (1904) states that young are ready to leave the nest after about 2 weeks from hatching. Russell and Woodbury (1941) found that young usually fledge in 16 days; young are then fed an additional 14 days after fledging by their parents.

G. Growth rates

Wheelock (1904) found that young are fed by regurgitation for the first few days after hatching. Russell and Woodbury (1941) reported that at one week of age, nestlings are about one-third grown and that major feather development has begun. They found that the feathers were near complete growth by 11 days of age.

H. Post-breeding behavior

Following breeding, much of the California population of Gray Flycatcher migrates to Mexico (Bent 1963); birds do winter in southern California.

Empidonax wrightii (con't.)

II POPULATION PARAMETERS

A. Clutch size

Peterson (1961), "Eggs (3-4) white." Wheelock (1940) lists a clutch size of 3-5 eggs. Bent (1963) gives an average clutch as 3 or 4 eggs, sometimes 2.

B. Fledging success

Johnson (1963), "The fates of 25 eggs from...nine nests were as follows: 12 hatched, 10 stolen by predators, and 3 infertile" (California).

C. Mortality rates per age class

Bent (1963) reported that "There is a high mortality among the young...due to sudden and severe wind and storms during the nesting season."

D. Longevity

E. Seasonal abundance

Peterson (1961) called the Gray Flycatcher a "sparse" winter visitor in southern California. Grinnell and Miller (1944), "On breeding ground...common, even abundant for a flycatcher. Elsewhere, a spring transient, sparse."

F. Habitat density figures

Wheelock (1904) reports finding 4 nests within a radius of a quarter mile or less in California pine forest. Willett (1933) calls this species "most plentiful between 6,500 and 9,000 feet" in California. Grinnell (1908) stated that there were "not less than 3760 Gray Flycatchers in the San Bernardino Mountains" during breeding season; called their abundance "remarkable." About 8 breeding territories of Gray Flycatchers were found in an 800 x 600 yard plot in Nevada Co., California; the area was dominated by sagebrush and scattered yellow pine (data calculated from Johnson 1963). Haislip (in Friedmann et al. 1977) found a breeding population of about 25 pairs per 100 hectares in Oregon.

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VIII INTERSPECIFIC INTERACTIONS

A. Predation

Grinnell (1908) felt that chipmunks and jays destroyed nests in the San Bernardino Mountains. Pierce (1916) also noted the taking of eggs by chipmunks in these mountains. Bent (1963) recounts the destruction of eggs by chipmunks, snakes, weasels, and other predators.

B. Competition

Johnson et al. (1948) found that Gray and Hammond flycatchers occupy the same habitat (pinon-juniper) during spring migration in the Providence Mountains of California. In areas of sympatry, Johnson (1963) concluded that Gray and Dusky (E. oberholseri) flycatchers avoided direct competition through ecological separation (different foraging and nesting sites). Beaver and Baldwin (1975) feel, however, that "It remains to be demonstrated that competition for food between E. wrightii and E. oberholseri is eliminated by habitat differences when in sympatry."

C. Parasitism

Friedmann et al. (1977), in recounting the first published records for this species as a cowbird host--"It appears that the Gray Flycatcher is a regular host choice of the Brown-headed Cowbird in central Oregon, and probably is more affected elsewhere than the absence of published records would indicate." They noted that 20 to 30% of Gray Flycatcher nests were parasitized in an Oregon study.

IX STATUS

A. Past population trends

Grinnell (1908) found this species to be very abundant as a breeder in the San Bernardino Mountains. In the San Jacinto Mountains, Grinnell and Swarth (1913) called Gray Flycatchers "abundant breeders."

B. Present population status

Johnson and Garrett (1974), "A major recent southwestward extension of breeding range in California, into formerly unoccupied woodland of mature single-leaf pinyon...from... Tulare County, and from Clark Mountain, eastern San Bernardino County."

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C. Population limiting factors

Bent (1963) felt that the Gray Flycatcher is "confined mainly to the foothills and slopes of the various mountain ranges, at elevations varying with latitude."

D. Environmental quality: adverse impacts

E. Potential for endangered status

Empidonax wrightii (con't.)

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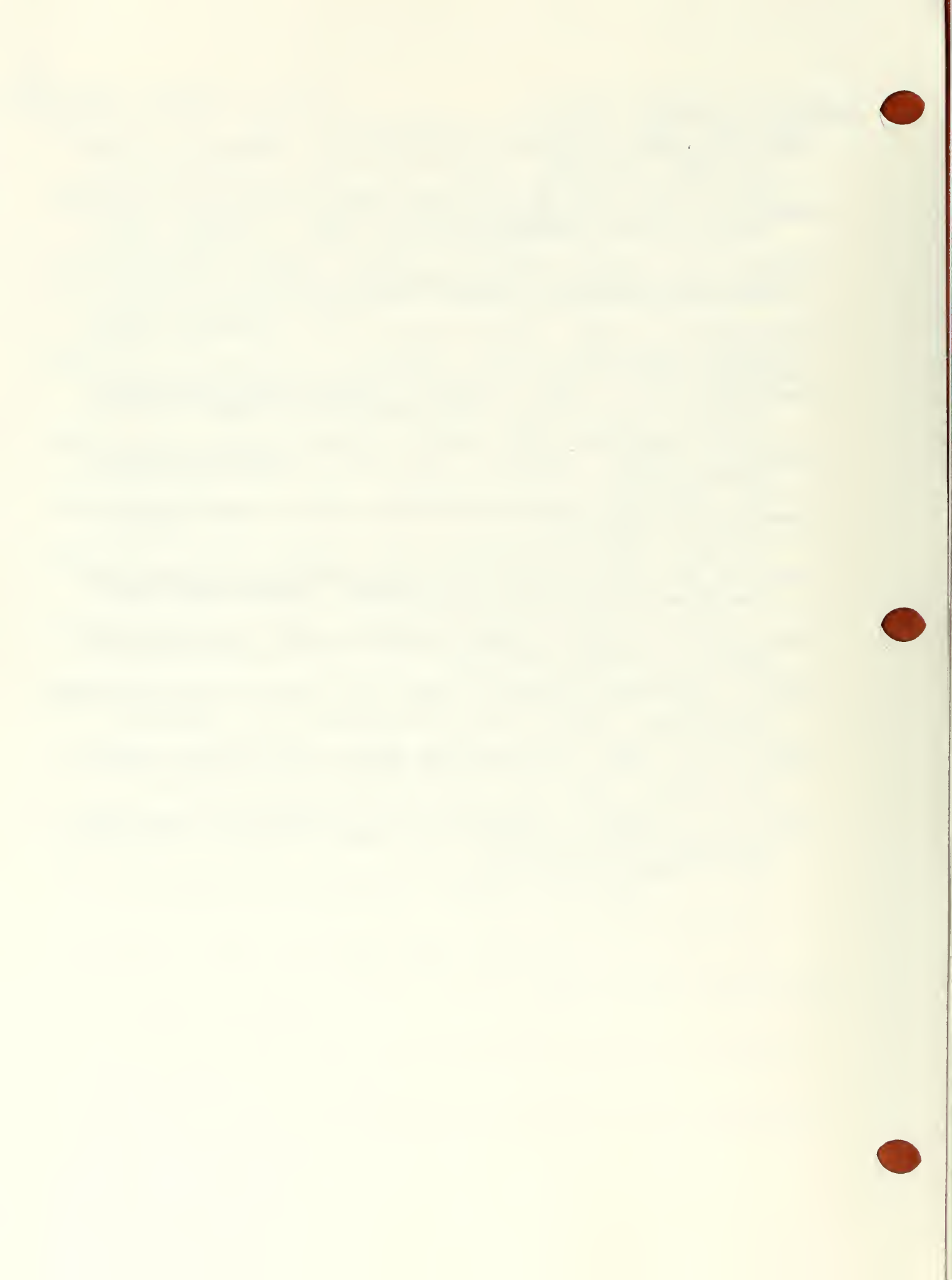
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GREAT HORNED OWL

Bubo virginianus

I TAXONOMY

A. Type description

AOU (1957) B. v. pacificus Cassin, Illustr. Birds California, Texas, etc., pt. 6, (Sept. 12) 1854, p. 178. (The West = Sacramento, California.)

B. v. pallescens Stone, Amer. Nat., 31, no. 363, Mar. 1, 1897, p. 237. (Watson Ranch, 18 miles southwest of San Antonio, Texas.)

B. Current systematic treatments

Peters (1940), recognizes eleven species in the genus Bubo: sixteen subspecies of the species virginianus. Order: Strigiformes; Family: Strigidae.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), B. v. pacificus: Strix virginiana; Bubo magelannicus; B. v. arcticus; B. v. subarcticus; B. subarcticus; Asio magellanicus; A. m. pacificus; A. m. icelus; B. v. icelus; Bubo horribilis; B. v. elachistus. B. v. pallescens: B. v. subarcticus; B. v. pacificus; Asio magellanicus pallescens.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), B. v. pacificus: Pacific Horned Owl; Western Great Horned Owl; Western Horned Owl; Horned Owl; Dusky Horned Owl; California Horned Owl. B. v. pallescens: Western Horned Owl; Pacific Horned Owl; Desert Horned Owl.

II DESCRIPTION

A. External morphology of adults

Ridgway (1914), detailed description of adults and young of B. v. virginianus and comparisons with pallescens and pacificus, including plumage, soft parts, and measurements. Peterson (1961), "the only large N. American owl with ear tufts, or 'horns.' Heavily barred beneath; conspicuous white throat-collar. In flight, as large as our largest hawks; dark (most races), looks neckless, large-headed." Dawson (1923), B. v. pacificus: "Adult: Ear tufts conspicuous, two inches or more in length, black, bordered with ochraceous; entire upperparts dusky or blackish, finely barred and mottled with prevailing whitish and ochraceous,

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the latter color predominant on each feather basally; wing-quills and tail faintly broad-banded; facial disc ochraceous, sharply bordered by blackish laterally, feathers whitish and black-tipped centrally, borders before and over eye blackish; a broad white space on chest; feathers of remaining underparts tawny or ochraceous tawny at base, changing to white on terminal portions (in very variable amount), finely and heavily barred with dusky brown; the sides of breast spotted with the same color; the toes pale tawny, nearly immaculate; iris bright yellow. Bill and toe-nails bluish black."

B. v. pallescens: "Similar to B. v. pacificus, but much paler, the ochraceous tawny element largely replaced by white, sometimes nearly wanting below, the barring of underparts usually narrower and finer."

B. External morphology of subadult age classes

Ridgway (1914), detailed description of plumage and soft parts. Dawson (1923), "Young: Above and below ochraceous, barred with dusky. Chicks are covered with white down."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "Long-eared Owl is much smaller...with lengthwise, streakings, rather than cross-wise barrings, beneath. 'Ears' closer together."

Intraspecific - Ridgway (1914), B. v. pacificus: "Similar to B. v. pallescens but darker throughout, the feet more heavily mottled with dusky, the face usually with more decided tinge or suffusion of tawny; slightly smaller."

II GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "America, exclusive of West Indies, from the limit of trees in the Arctic to the Straits of Magellan."

B. v. pacificus: "California west of Great Basin and desert areas (exclusive of northern humid coast belt) south to lat. 30° N. in northwestern Baja California and east to extreme western central Nevada (Tahoe area)." B. v. pallescens: "Arid regions of southeastern California (from Inyo district), southern Nevada (Clark County), southern Utah (Virgin River), northern New Mexico, and north-central Texas south to extreme northeastern Baja California, northern Sonora (Hermosillo), Chihuahua, Durango, Coahuila, Nuevo Leon, and northern Tamaulipas."

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B. California distribution of the species

Grinnell and Miller (1944), B. v. pacificus: "In general, that major portion of State lying west of the Great Basin and southeastern deserts, and east of the northern and central humid coast belt; north from Mexican line in San Diego County to Oregon line in central Siskiyou County; at extreme north, specimens of this race at hand...from South Fork Mountain and Weaverville, Trinity County, and from Boggs Creek and near Weed, Siskiyou County. Range includes all of Sierra Nevada, Great Central Valley and enclosing foothills, and southern coast range belt northwest on the seacoast through Monterey County and interiorly to Alameda and Contra Costa counties." B. v. pallescens: "In general, Colorado and Mohave deserts. North from Mexican line in Imperial County to Argus and Panamint Mountains, in Inyo County...and even, apparently, to Benton, Mono County... West from valley of Colorado River, Needles to Pilot Knob... to south end of Salton Sea, Imperial County...and to Victorville, San Bernardino County." Dawson (1923), B. v. pacificus: "(chiefly contained within California). --California, except the southeastern portion, the humid coastal strip (narrowly) north of Latitude 35, and (possibly) the extreme northeastern portion, north into south-central Oregon, east to San Francisco Mountains, Arizona, south to northern Lower California." B. v. pallescens: "Resident along the Colorado River, in the Imperial Valley, and in wooded portions of the Colorado and Mohave Deserts. To a limited degree also in the desert ranges."

C. California desert distribution

Grinnell and Miller (1944), B. v. pacificus: reported from Escondido and Sorrento, San Diego County. B. v. pallescens: reported from Death Valley; Yermo and Twentynine Palms, San Bernardino County; San Fernando, Pasadena, and San Antonio Canyon, Los Angeles County; Buena Vista Lake, Kern County. Also, "west from valley of Colorado River, Needles to Pine Knob...to south end of Salton Sea, Imperial County...and to Victorville, San Bernardino County."

D. Seasonal variations in distribution

AOU (1957), no seasonal variations noted.

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), B. v. pacificus: "Of wide variety; perhaps most usual, woodland especially of oaks, or broken type of forest, with open ground included or adjacent. But

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also, cliff-sided canyons; broad washes if with trees such as cottonwood and sycamore containing old hawks' nests; in fact, almost any locality affording sheltered daytime roosting places and nesting sites up from the level ground, whether in trees or in rock walls." B. v. pallescens:

"In different places: rock-walled canyons; pinon and juniper-clothed mountain sides; riparian lowlands where grow cottonwoods and willows of large size; desert washes with bluff-like sides; desert mesas supporting large-sized tree-yuccas." Small (1974), "broken woodland of oaks or coniferous-deciduous forest, thickly-wooded canyons, desert, riparian woodland." Miller (1951), Upper and Lower Sonoran, Transition and Canadian life zones.

B. Altitudinal range

Grinnell and Miller (1944), B. v. pacificus: "occurs from near sea level up regularly, at least in summer, to 7000 feet, exceptionally to 10,500 feet." B. v. pallescens: "from 200 or more feet below sea level, in Death Valley and around Salton Sea, up to at least 6200 feet, in Panamint Mountains, Inyo County."

C. Home range size

Fitch (1947) "Several times a pair was seen at dusk making a flight of a quarter of a mile or more across open fields to hunt on a wooded ridge opposite the one where they had roosted for the day." Baumgartner (1939), concerning birds in New York: "In no case did the size of the feeding range have a radius exceeding one-fourth of a mile in any direction from the nest, but obviously the individual characteristics of the topography and the availability of food in the immediate vicinity are important factors determining the range." Craighead and Craighead (1956), report ranges of four nesting pairs in Wyoming, 1947: 0.62 sq. mi. (1.8 mi. max. diam.); 0.45 sq. mi. (1.4 mi. max. diam.); 1.10 sq. mi. (1.6 mi. max. diam.); 1.11 sq. mi. (1.6 mi. max. diam.).

D. Territory requirements

Perch sites - Cushing (1939), "was seen at night perched upon a telephone pole." Fitch (1947), "Horizontal limbs of larger Digger pines provide perch sites during the night hours of activity...The perches used in actual hunting are lower, so that prey may be more readily detected and pursued at close range...Such perches atop rock piles...fence posts, stumps, and logs." Bent (1938), "A favority perch of the bird is the roof of a building."

Courtship and mating sites -

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Nest sites - Fitch (1947), reports sites of six nests: "25 feet above ground, in depression on top of digger pine stub...15 feet above ground, on bole of cottonwood growing in stream bed...45 feet above ground and about 25 feet out on horizontal limb; an old gray squirrel nest taken over...50 feet above ground in Digger pine, in a shallow depression of trunk where a large limb had broken off... 65 feet above ground in crotch of main trunk of Digger pine...On ground, sheltered by edge of a large boulder." Dawson (1923), "A cranny or inaccessible ledge of cliff, or a deserted nest of Swainson Hawk, Western Redtail, Yellow-billed Magpie, or Western Crow...Rarely in hollow trees." Baumgartner (1938), "In the deserts of the Southwest cactus plants take the place of trees and horned owls often occupy old nests among the thorny branches."

E. Special habitat requirements

Grinnell and Miller (1944), "the requisite elements of the habitat seem to be shaded shelter and places for nesting, out of reach of terrestrial marauders--niches in cliffs, or other birds' nests in trees."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Cunningham (1960), Examination of pellets collected on the U. of California campus, Los Angeles and in the Santa Monica Mountains showed the following prey items: Neotoma fuscipes, Thomomys bottae, Mus musculus, Microtus californicus, Reithrodontomys megalotis, Perognathus sp., Dipodomys agilis, Peromyscus sp., Notiosorex crawfordi, Sylvilagus sp., Sorex ornatus, Scapanus latimanus, Rattus sp., and unidentified birds. Fitch (1947), lists remains of mammals, birds, reptiles, amphibians, and invertebrates found in 654 pellets collected in Madera County, California. Craighead and Craighead (1956), "In 1942 mammals were 40.5 percent and birds 59.6 percent of the Horned Owl diet; in 1948 mammals were 62.1 percent and birds 29.7 percent."

B. Foraging areas

Craighead and Craighead (1956), "Their food is largely crepuscular or nocturnal animals...Are present in all types of country that support their prey...The large mature woodlots which furnished more extensive and perhaps better hunting grounds, and were thus intimately related to food availability."

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C. Foraging strategies

Bent (1938), "While this owl usually remains hidden during the day and does most of its hunting at night, it can see well enough to do some by day, if necessary." Rhodes and Duke (1977), examination of gastric motility and pellet formation. "The muscular stomach of the Great Horned Owl appears to be the site of initial proteolysis; chemical separation of soft tissues from hair and bone is completed there...Gastric motility is also essential for evacuating fluid from the stomach after chemical digestion is complete, and for fermenting and egesting the pellet."

D. Feeding phenology

Craighead and Craighead (1956), "The increased activity of pheasants at the time of dispersion from protective winter roosting areas to crowing territories, when protective cover is at a minimum, made the Ring-necked Pheasant more vulnerable to the Horned Owl at this period. It is significant that this increased vulnerability of adult Ring-necked Pheasants occurs at a time when other prey populations are at or near a seasonal low."

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Miller (1930), B. v. pacificus: "Bubo hoots from a point within his chosen territory. Within that territory he generally responds quickly to the note of a supposed invader. Calls from without his estates do not bring him to the spot though they may rouse him to send out his own challenge. The male bird is the more aggressive and is recognized by the deeper voice and more regular cadence." Baumgartner (1939), "holds a definite territory throughout the nesting season...In many cases the male takes up his station... before the period of courtship and mating begins."

C. Courtship and mating behavior

Bent (1938), "So little is known of the courtship of these big birds." Baumgartner (1938), "Hooting of the males becomes conspicuous about a month before mating begins. Active courtship and mating apparently last less than two weeks...Hooting of the males has a three-fold function--to express physical vigor and vitality; to warn other males of their territorial rights; and to attract a mate...The hooting of the female is chiefly limited to the mating and nesting season."

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D. Nesting phenology

Davis (1933), reports, in Butte County, California, the first date as 8 February; the last date as 1 March; the average date 18 February. Dawson (1923), "February-April; one brood." Baumgartner (1938), reports average dates of completed first sets of eggs throughout the U.S. and Canada.

E. Length of incubation period

Hoffmeister and Setzer (1947), report 34 to 35 days for four observed. Baumgartner (1938), "normally begins with the laying of the first egg...No indisputable data on the exact length of the incubation period has been found... At least twenty-six and probably nearer thirty days."

F. Length of nestling period

Hoffmeister and Setzer (1947), "By the forty-fifth day, the young owls are able to fly short distances and thus are able to leave the site of the nest permanently. At this time they are about three-fourths grown."

G. Growth rates

Hoffmeister and Setzer (1947), regularly recorded weights of 4 developing young (graph included)." During the first four weeks of postnatal growth, each owl gained in weight, daily, an average of 33-1/3 grams or an increase of 11.1 per cent...From the beginning of the fifth week until the time the young left the nest, the three owls gained on the average only 12.7 grams or approximately 1.6 percent in weight daily."

H. Post-breeding behavior

Craighead and Craighead (1956), "young of the previous year were a very small proportion of the spring population. As nesting patterns became fixed, immature...owls were harassed constantly and buffeted from one territory to another... Once settled, they developed a range that often was limited by those of other neighbors." Errington (1932), "were apt to station themselves in the fall in the near neighborhood of old stick nests (hawk or crow) which they would appropriate in the spring."

VII POPULATION PARAMETERS

A. Clutch size

Fitch (1947), reports three nests with three eggs; also three nests with one, two, and three nestlings. Dawson (1923), "2 or 3, rarely 4; rounded ovate, white, lusterless, granular."

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B. Fledging success

Craighood and Craighood (1956), report in Michigan 50% (1942) and 27% (1948) fledgling success (fledglings per eggs laid). In Wyoming: nest success was 89% (fledglings per eggs laid) in 1947.

C. Mortality rates per age class

Craighead and Craighead (1956), report from studies in Michigan: 33% (1942) and 21% (1948) of the clutches were incomplete and nests receiving no eggs; 55% (1948) of the eggs were destroyed, infertile, or failed to hatch; there was 50% (1942) and 40% (1948) mortality in the nest after hatching. In Wyoming in 1947: 25% of the clutches were incomplete or nests failed to receive eggs; 11% of the eggs were destroyed, infertile, or failed to hatch; no mortality of nestlings was observed.

D. Longevity

Kennard (1975) reports a record age of 12 years, 8 months in 1939. Age and sex unknown when banded in 1927.

E. Seasonal abundance

Baumgartner (1939), reports observed nesting populations (one to three pairs per square mile) with winter populations seemingly equally dense, since he observed that resident birds generally remain in the nesting vicinity throughout most of the year.

F. Habitat density figures

Franzreb (1975), reports 14.3 breeding pairs per 100 hectares at Thomas Creek, White Mountains, Arizona, summer, 1973. Fitch (1947), reports census of individuals in 2000 acre area, Madera County, California. Seven counts from 1938 to 1947 revealed from 14 to 25 individuals. Baumgartner (1939), "In optimum range the decided territorial requirements of the males probably determine the nesting density. Populations in such areas seem to average from one to three pairs of nesting owls to the square mile. Over most of the range of the species the nesting density is much lighter."

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VIII INTERSPECIFIC INTERACTIONS

A. Predation

Hoechlin (1976), reports the remains of two adults at one nest of the California Golden Eagle. Miller (1952), recorded the reactions of a number of species (prospective prey) to imitated hoots of this owl. Killpack (1951), found the following remains in a nest in Uintah County, Utah: Short-eared Owl, young muskrat, adult jackrabbit, Ring-necked Pheasant, Black-billed Magpie, Morning Dove, domestic pigeon, American Coot. Placed emphasis upon large size of these items. Fox (1948), reports a young owl of this species feeding on a garter snake (Thamnophis sirtalis infernalis). Carnie (1954) reports remains of seven individuals in nests of Golden Eagles, 1947-1952, in central California. Wiley (1975), reports predation on young Red-shoulder Hawks.

B. Competition

Wiley (1975), discusses interactions between this species and other raptors nesting in close proximity with Horned Owls. Cooper's Hawks vigorously attacked the adult owls. Red-shoulder Hawks were not observed to attack the owls, but the young hawks were preyed upon. American Kestrels regularly attacked the owls. "A pair of Cooper's Hawks, Accipiter cooperi, attempted to use a Great Horned Owl nest after the owl nest had failed. The owl began nesting activity in a stick nest that Cooper's Hawks had built the previous year."

C. Parasitism

Fitch (1947), reports the half-grown young in one nest were attacked by small blood-sucking flies (Eusimulium clarum).

IX STATUS

A. Past population trends

B. Present population status

Small (1974), "resident."

C. Population limiting factors

Baumgartner (1939), "Horned Owl populations are limited chiefly by human molestation and man-made changes in their environment that result in a scarcity of cover and less

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frequently a lack of nesting sites and sufficient food." Craighead and Craighead (1956), "Lack of extensive wooded areas, rather than food supply, apparently was the factor limiting the Horned Owl population."

- D. Environmental quality: adverse impacts
- E. Potential for endangered status

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GREEN-TAILED TOWHEE

Pipilo chlorurus

I TAXONOMY

A. Type description

AOU (1957), Fringilla chlorura Audubon, Orn. Biogr., vol. 5, 1839, p. 336. (No locality given = about 20 miles southwest of Blackfoot, Idaho.)

B. Current systematic treatments

Sibley (1955), discussion of the characteristics illustrating the close relationship with both P. ocai and P. erythrophthalmus (color pattern, ecological preferences, pattern of song, coloration and pattern of markings of the eggs), concluding that C. chlorura and P. ocai are congeneric and that chlorura should be placed in the genus Pipilo.

Paynter (1970), recognizes chlorurus as a monotypic species in the genus Pipilo, which is divided into seven species. Passeriformes: Emberizidae (Emberizinae).

C. Synonomies of scientific nomenclature

Dawson (1923), Oberholseria chlorura. AOU (1957), Chlorura chlorura; Fringilla chlorura. Ridgway (1901), Oreospiza chlorura. Grinnell and Miller (1944), Embernagra blandingiana; E. chlorura; Atlapes chlorurus; Oberholseria chlorura zapolia.

D. Synonomies of vernacular nomenclature

Dawson (1923), Green-tailed Finch; Blanding's Finch. Grinnell and Miller (1944), Blanding Finch; Green Finch; Green-tailed Bunting.

II DESCRIPTION

A. External morphology of adults

Dawson (1923), "Sparrow size; chestnut crown, white throat; greenish coloration of upper parts, especially tail and wings...Adults (sexes alike): Crown and occiput rich chestnut; forehead blackish gray, with whitish loreal spot on each side; cheeks mingled gray and white; a short malar streak white, and a narrow, sharply defined sub-malar streak dark gray; remaining upperparts olive-gray, tinged more or less with bright olive-green. Wings and tail with brighter greenish edgings...; bend of wing, axillars, and under coverts yellow; chin and throat white, sharply defined and with convex posterior outline; sides of head and neck and remaining underparts neutral gray, clearing to white on abdomen, tinged

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with buffy or brownish on sides, flanks, and crissum; under tail-coverts clear cream-buff. Bill blackish above, paler below; legs brown, toes darker; irides cinnamon." Peterson (1961), "rufous cap and conspicuous white throat ...plain olive-green back, gray breast." Ridgway (1901), detailed description of adult male and female, including plumage, soft parts, and measurements.

B. External morphology of subadult age classes

Dawson (1923) "Immature birds are brown above, tinged with greenish and streaked with dusky, but with wings and tail much as in adult. Nestlings show greenish on wings alone, and are otherwise finely streaked above and below." Ridgway (1901), detailed description of plumage.

C. Distinguishing characteristics

Interspecific - Dawson (1923), "chlorura possesses no color character not found in at least one other member of the genus Pipilo; and the very fact that this bird has these characters in common with the others would seem to designate it as a typical and central member of the genus, rather than an aberrant form" Peterson (1961), "Brown Towhee is browner, has buff throat."

Intraspecific -

I GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

Dawson (1923), "Western United States and northern Mexico; breeding from central Oregon and south central Montana to western Texas and southern California." AOU (1957), "Breeds from southwestern and central Oregon...southeastern Washington (Blue Mountains), southern Idaho, southwestern Montana... and northwestern, central, and southeastern Wyoming (Yellowstone Park, Wheatland) south through the interior mountains to southern California (San Jacinto Mountains), southern Nevada (Charleston Mountains), central Arizona (San Francisco Mountains, White Mountains), and southern New Mexico (Black Mountains, Sacramento Mountains)...Casual north to Saskatchewan...and east to Massachusetts...New Jersey... Virginia...South Carolina...and Louisiana." Ridgway (1901) "Mountain districts of Western United States, from more eastern Rocky Mountain ranges to Coast Range of California; north to central Montana and Idaho and eastern Washington; south at least in winter, to States of Guanajuato, Durango ..., and Sinaloa...middle Mexico, and to southern extremity of Lower California."

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B. California distribution of the species

Dawson (1923), "Summer resident in high Transition, chiefly east of the Sierran divide, from the Warner Mountains south to the desert ranges and the San Jacinto Mountains. Also breeds, northwesterly, at least to Sissons..., and southwesterly to Mt. Pinos..., and south centrally along the western slopes of the Sierras. Abundant during migrations easterly; and recorded variously in the northern Coast Range south to Mendocino County, Sierra Nevada south through Mt. Pinos and Transverse Ranges to Mt. San Jacinto in Peninsular Ranges; Great Basin south through mountains of Inyo County." Grinnell and Miller (1944), "As breeding, northern coast ranges, west to interior Humboldt County and south to northern Mendocino County; Cascade Mountains, Sierra Nevada, and high ranges of southern California west to Mount Pinos and southeast to Mount San Jacinto; mountains and high plateaus of Great Basin region from Modoc County south through Inyo County."

C. California desert distribution

Grinnell and Miller (1944), recorded at the following localities: Palm Springs, Riverside County, Mount Waterman, Los Angeles and Pasadena, Los Angeles County; Watch Creek, San Diego County.

D. Seasonal variations in distribution

Dawson (1923) "Has occurred in winter in the San Diegan district...wintering from southern portion of its breeding range south to Cape San Lucas and Guanajuato." AOU (1957), "Winters from southern California (Los Angeles, Casually), southern Arizona (Fort Mohave, Gila River Valley), and western and southern Texas (Sierra Blanca, Brownsville) south to southern Baja California (San Jose del Cabo), Jalisco, Guanajuato..., Morelos (Cuernavaca), Nuevo Leon (Galeana), and Hidalgo (Metztitlan); occasionally north to central California (Marysville); in migration to western Kansas and western Oklahoma (Cimarron County)." Small (1974), "winter visitor in small numbers in southern California." Grinnell and Miller (1944), "In winter, chiefly Pacific slope north to Los Angeles County, exceptionally as far as Sacramento Valley." Willett (1912), "Summer resident of the mountains from 5000 to 9000 feet altitude. Occurs occasionally along the base of the mountains during migrations. Winters in small numbers at least as far north as San Bernardino."

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IV HABITAT

A. Biotopic affinities

Peterson (1961), "dry brushy mountain slopes, low chaparral, open pines, sage, manzanita." Small (1974), "for breeding, mountain chaparral, otherwise, lowland thickets and oases." Grinnell and Miller (1944), "Chaparral types occurring in the Transition and Boreal zones. Most commonly this essential cover is composed of snow bush (Ceanothus cordulatus) and manzanita, or, eastwardly, of Artemisia tridentata and Purshia. Forest is avoided; only scattered trees within the brushland are tolerated, but they may be used as song posts. The brush cover is typically low (2 to 4 feet) and spreading, affording runways between plants and underneath the foliage. Within forested areas, the places occupied are comparatively dry and well insulated; in the Great Basin region the lower, warmer flats are avoided even though grown to sage brush." Miller (1951), Transition and Canadian life zones.

B. Altitudinal range

Grinnell and Miller (1944), "breeding localities range from 2500 feet, as at Nevada City, Nevada County,...up to 10,000 feet in the white Mountains, Mono County."

C. Home range size

Austin (1968) reports that no information is available.

D. Territory requirements

Perch sites - Grinnell and Miller (1944), "scattered trees within the brushland...may be used as song posts."

Courtship and mating sites -

Nest sites - Dawson (1923), "Low in bushes, especially sage (Artemisia tridentata), often well concealed,...of twigs, weed-stems, pine needles, etc.; lined with rootlets, grasses, or, rarely, horse hair."

E. Special habitat requirements

F. Seasonal changes in habitat requirements

Pipilo chlorurus (con't.)

V FOOD

A. Food preferences

Grinnell, Dixon, and Linsdale (1930), "when berries of amelanchier bushes...were turning reddish but were not yet at all ripe, the green-tailed towhees were seeking these eagerly and eating them" Austin (1928) reports them feeding on weed seeds, insects, alfalfa weevil, third-instar Mormon crickets, cracked corn, bread crumbs, birdseed, rolled oats.

B. Foraging areas

Grinnell and Miller (1944) "The sphere of activity is low, foraging taking place on the ground in the leaf litter and in the tangle of branches."

C. Foraging strategies

Austin (1969) "scratching not unlike that of other kinds of towhees." Grinnell and Storer (1924), "the combination of conical bill, long tail, short wings, and stout legs and feet, proclaim the Green-tailed Towhee to be adapted for foraging beneath brush patches."

D. Feeding phenology

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

C. Courtship and mating behavior

D. Nesting phenology

Dawson (1923), "Season: May-July; two broods."

E. Length of incubation period

F. Length of nestling period

G. Growth rates

Austin (1968), "Almost no information is available on parental care or development of nestlings."

Pipilo chlorurus (con't.)

H. Post-breeding behavior

Austin (1968), "Prior to fall migration proper, there is an up-mountain scattering of birds after the breeding season, and immatures are prevalent among these wanderers...There is also evidence of downshape scattering of individuals in late summer."

VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923), "3 or 4; palest bluish or grayish white, finely and almost uniformly sprinkled or spotted with light reddish brown...and purplish gray."

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Huey (1942), "perhaps the most generally distributed winter visitor. While never in concentrated numbers, it was found singly in almost every place where vegetation was dense enough to give it shelter" (Oregon Pipe Cactus National Monument, Arizona).

F. Habitat density figures

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Austin (1968), "while no evidence of predation has come to my attention, probably adults as well as eggs and young of this low-nesting bird occasionally fall prey to mammalian predators."

B. Competition

C. Parasitism

Henshaw (1875), recorded a cowbird egg in a nest of this species in Fort Garland, Colorado. Rockwell (1908), recorded this species as a host of Molothrus ater obscurus in Mesa County, Colorado. Mitchell (1898), reports this species as parasitized in San Miguel County, New Mexico.

Pipilo chlorurus (con't.)

X STATUS

A. Past population trends

Grinnell and Miller (1944), "Present in three seasonal roles: common summer resident from May to early September in mountains, especially those of the interior; winter visitant rarely, in coastal southern section; transient there and elsewhere, except along northwest coastal strip; migrants are most numerous in the interior."

B. Present population status

Small (1974), "Transient and summer visitor, April to October."

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

Pipilo chlorurus (con't.)

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Pipilo chlorurus (con't.)

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HAIRY WOODPECKER

Picoides villosus leucothorectic

I TAXONOMY

A. Type description

Dryobates villosus leucothorectis - AOU (1957) Oberholser, Proc. U.S. Nat. Mus., 40, June 3, 1911, P.. 597 (in key), 608. (Burley, New Mexico)

B. Current systematic treatments

AOU (1957) calls this species Dendrocopos villosus leucothorectic (Oberholser) and a subspecies of the Hairy Woodpecker. Oberholser (1911) called it Dryobates villosus leucothorectic. Morony, et al. (1975) synonymized this species to Picoides after Dendrocopos, the genus recognized by Peters (1948).

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), "Dryobates villosus hyloscopus, part.", in describing Dryobates villosus leucothorectis. Grinnell (1902), describing Dryobates villosus hyloscopus, "Dryobates villosus harrisi, part, Picus harrisi, Picus villosus, Picus villosus harrisi, Dendrocopos harrisi." Peters (1948), "Dendrocopos villosus leucothorectic."

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), "Cabanis Woodpecker, part.; White-breasted Woodpecker; Hairy Woodpecker, part.", in describing the White-breasted Hairy Woodpecker. Dawson (1923), "Southwestern Hairy Woodpecker. Arizona Hairy Woodpecker."

II DESCRIPTION

A. External morphology of adults

Dawson (1923), "Males average: wing 126.8 (4.99); tail 79.4 (3.126); bill 30.8 (1.21); tarsus 21.5 (.846). Females smaller." In describing D. v. orius, a similar race differing only by being slightly larger than D. v. leucothorectis, which also has pure white underparts, "Adult male: Above, in general, black, glossy (at least) on head and nape, paling, brownish dusky, on quills; nuchal feathers slightly lengthened, the anterior ones scarlet-red, forming a short nuchal band; nasal tufts dingy white; a narrow white superciliary and a broad white rictal stripe, curving upward and sometimes nearly meeting fellow on hind nape (rarely connecting with white of back); a black area included on side of head

Picoides villosus leucothorectic (con't.)

continuous with nape; a black malar stripe broadening behind; a lengthened white patch down middle of back, connecting with sides of rump, or not; one to several rounded spots of white on middle wing-coverts, or not; primaries (except usually the first) and the outer secondaries marked with angular white spots on outer webs and with large rounded spots on the inner webs, the spots tending to fall into bars on the closed wing; the two outer pairs of tail-feathers white on exposed portion, and the succeeding pair chiefly white on outer web and tip. Bill and feet plumbeous; iris reddish brown. Adult female: Like male, but without red on head." Peterson (1969), "Note the white back, large bill...clear white back...spotted with white on wings; males with a small red patch on back of head; females, without." Udvardy (1977), "White head with black crown, eyemask, and 'whiskers.' Male has red patch at base of crown; light underparts; white back; black wings with white spots. Tail black with white outer tail feathers. Female similar, but lacks red patch."

B. External morphology of subadult age classes

Dawson (1923) in describing D. v. orius, a similar race, "Like adult, but crown, instead of nape, red (scarlet, grenadine red, grenadine, or even yellowish); the forehead and often the crown finely spotted with white."

C. Distinguishing characteristics

Interspecific - Peterson (1969), "Other woodpeckers have white rumps or white bars on the back, but the Downy and the Hairy are the only common woodpeckers with clear white backs...The Hairy is like a magnified Downy: bill is especially large in relation to Downy's little bill. Downy at close range shows spots on outer tail feathers. Northern Three-toed Woodpecker of boreal forests may have white back." Robbins, Bruun, Zim (1966), "Easily confused with...Northern Three-toed Woodpecker, which has barred sides and a much narrower white eye stripe."

Intraspecific - In Bent (1939), "...much like D. v. monticola but decidedly smaller; wing coverts practically always without white spots." Dawson (1923), "Adults: Similar to D. v. orius, but slightly smaller; the underparts pure white. A very dubious race." Bendire (1895), "...it is distinguishable from the former (D. villosus) by its plain back or much less spotted wing coverts and tertials, and from D. v. harrisii by its lighter-colored underparts and somewhat smaller size."

Picoides villosus leucothorectis (con't.)

II GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) in describing P. villosus, "Central Alaska, middle Yukon, central Mackenzie, northern Manitoba, James Bay, south-central Quebec, and Newfoundland south to northern Baja California, Mexico, central Texas, the Gulf coast, southern Florida, the Bahama Islands, and through the mountains of Central America to western Panama."

In describing P. v. leucothorectis, "Resident in the White Panamint, Coso, Grapevine, and Clark mountains in southeastern California, the higher mountains in southern Nevada and southern Utah, Arizona (except southwestern deserts, and mountains in southeastern part) western and central New Mexico, and the Guadalupe Mountains in western Texas."

B. California distribution of the species

Grinnell and Miller (1944), "Life-zones, Upper Sonoran to Hudsonian." Small (1974), "Length of state except Central Valley and deserts of the eastern and southeastern portions." Miller (1951) found them in Inyo Mountains. Grinnell (1915), gives various California locations and found this to be the representative race in the White and Panamint mountains, in Mono and Inyo Counties, and gives additional locations (1918). Mailliard (1918) found them in Yosemite Valley. Willett (1953) also gives various locations. Dawson (1923), "...at least the White and Panamint Mountains,...the bird is decidedly more abundant in the northern and more elevated portions of its range."

C. California desert distribution

Small (1974) says that this species is not found in eastern and southeastern deserts. Grinnell (1902) says it is found "chiefly in Transition south and east of the northern humid coast belt." Miller (1940) found them at Clark Mountains. Wauer (1962) found them in Death Valley during winter.

D. Seasonal variations in distribution

Small (1974), if the winters are not too severe, "Resident species such as...Hairy Woodpeckers can remain in the montane forests in considerable numbers." Grinnell (1915) reported as "more widespread throughout winter through the interior valleys west of the Sierras." Willett (1933) reported as "quite numerous in oak regions during severe winters..." In Bent (1953), "Breeds commonly throughout the pine belt, often ascending higher in summer...About

Picoides villosus leucothorectic (con't.)

the middle of June, the young leave their nests, and soon make a partial migration downward towards the lower border of the pine belt." Peterson (1969), "...mainly in mountains in southwest United States...Some down-mountain drift in winter." Dawson (1923), "In summer the bird ranges up to timberline, a little above the normal breeding level; and in winter it visits the live oaks and the sycamores or even takes a turn through the chaparral." Bendire (1895), "It is practically a resident wherever found, and its breeding range is coextensive with its geographical distribution. In winter it is often met with in the valleys adjacent to mountain ranges, to which it retires in summer to breed; but these vertical migrations, if they may be called so, are never very extended."

IV HABITAT

A. Biotopic affinities.

Grinnell and Miller (1944), "Broken or scattering forest. Has been found associated with pinon, juniper, white fir, foxtail, limber and hickory pines, mountain mahogany, cottonwood and aspen." Also gives life-zones as Upper Sonoran to Hudsonian. Small (1974), "Montane forest to Transition Life Zone; also broken and mixed coniferous and deciduous forest. Two Hairy Woodpeckers are also found in relatively pure stands of Black Oak (Oak Woodland) in dry valley floors and on small mesas. Miller (1951) found these in Upper Sonoran, Transition, Canadian, and Hudsonian Zones, pinon-juniper formations, riparian woodlands, coastal forest, montane forest, and subalpine forest. Peterson (1969), "Montane forests, woodlands, river groves." Robbins, Bruun, Zim (1966), "Fairly common, especially in mature deciduous or mixed woods." Udvardy (1977), "Deciduous trees; coniferous stands, especially in montane forests and river groves." Dawson (1923), "...favorite resorts are old burns and the edges of clearings, logged-off areas, open, rangy woods, and interrupted groves."

B. Altitudinal range

Grinnell and Miller (1944) reported 6200 to 9000 feet as altitudes of capture of specimens. Bendire (1895), reported it up to 10,000 feet.

C. Home range size

D. Territory requirements

Perch sites -

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Courtship and mating sites - Bendire (1895) reported that males drum on resonant dry limbs to attract females.

Nest sites - Peterson (1969), "In holes in tree stub." Udvardy (1977), "...eggs on wood chips in a previously used tree hole or newly excavated cavity." Dawson (1923), says nests are excavated in trees such as dead firs or pines and sometimes living alders. The nest height is from 4 to 80 feet from the ground and about 10 inches deep.

E. Special habitat requirements

Ligon (1970) reports that they need standing dead timber to breed.

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

In Bent (1939), reports of "small black beetles...wood ants...woodboring larvae, caterpillars, moth pupae, other insects and mast." Dawson (1923) reports worms and larvae from trees. Nearly half of the food is larvae of wood-boring beetles (Cerambycidae and Buprestidae), the rest being caterpillars, wild raspberries and blackberries, cornel berries, acorns, pits of the evergreen cherry. Bendire (1895), "...food, which consists principally of injutious larvae and eggs of insects, varied occassionally with a diet of small berries and seeds,....pinon nuts, pine seeds, and acorns." Also, around slaughterhouses, small bits of meat and fat.

B. Foraging areas

Bendire (1895) and Dawson (1923) both give examples of the trees upon which these birds feed and which include apple trees, oaks, willows, etc.

C. Foraging strategies

Udvardy (1977), "Woodpeckers secure their food by hammering holes through bark and then extracting grubs with their extremely long, flexible tongues." Bendire (1895) describes the feeding behavior of these birds (chiseling at trees with bill while hanging on with sharp claws and using tail as support), and the use of the tongue. Kisiel (1972) discusses how Hairy and Downy Woodpeckers divide the resources by feeding on different species of trees. Neff (1928), reports that they tunnel for insects and probe with their tongues for the larvae.

Picoides villosus leucothorectic (con't.)

D. Feeding phenology

Dawson (1923) reports wild blackberries and raspberries are eaten in summer and acorns, cornel berries, and pits of the evergreen cherry are eaten in winter. Bendire (1895) reports the birds eating pinon nuts, pine seeds, and acorns in winter and insect eggs and larvae and berries at other times. Also, some fat and meat from slaughtered animals in winter.

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Dawson (1923) reports strong defense of the nest, especially by the male. Bendire (1895) reports that they drive other species of woodpeckers from their feeding grounds. Kilham (1960) reports that males and females have separate fall and winter territories, and "mark" them by drumming.

C. Courtship and mating behavior

Bendire (1895) described the male drumming which he believed was to attract a female. He thought they remained paired for life. The female incubates the eggs as well as the male, and both build the nest. Carpenter (1919) believes they remain mated for a number of years as well as Willard (1918). Kilham (1960) reports that the female may attract the male by drumming in her fall and winter territory and join him in display flights.

D. Nesting phenology

Willetts (1933) reported as breeding mostly in April and May. Dawson (1923) reported incubation to begin from the last week in March to the last of May. Bendire (1895) reported that mating season begins in March (latter part). Eggs are laid in April-May.

E. Length of incubation period

Bendire (1895), "2 weeks."

F. Length of nestling period

Bendire (1895) "about 3 weeks."

G. Growth rates

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H. Post-breeding behavior

Dawson (1923) reported only one brood is raised per season. Bendire (1895), reported that they care for the young for some time after they have left the nest.

VII POPULATION PARAMETERS

A. Clutch size

Willett (1933) reported clutches of 3 and 4 eggs. Bent (1939) reported clutches of the same amount. Peterson (1969), "Eggs (3-6)." Udvardy (1977), "3-6 eggs." Dawson (1923) reported 4 or 5. Bendire (1895), 3-6, commonly, 4.

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Neff (1928) found them more abundant in a given area in winter. During the other seasons, they tend to associate only in pairs or singly.

F. Habitat density figures

Koplin (1969) reports that density changes as the amount of prey items change due to fire and floods. For example, there is a 50-fold increase in response to insect increase due to a fire. Neff (1928), "The Hairy Woodpeckers are not especially companionable and seem to prefer the more secluded timber or the wooded mountain sides...Generally, they work in pairs...Only during the winter months do they venture in any numbers." Short (1971), "The Hairy Woodpeckers require much larger territories...hence their populations are less dense than those of pubescens and nuttallii."

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

Bendire (1895), "It does not live in harmony with smaller species of its own kind, and drives them away, when they encroach on its feeding grounds." Ligon (1970) reports competition for nesting and foraging sites with the Red-cockaded Woodpecker.

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C. Parasitism

IX STATUS

A. Past population trends

Grinnell (1902), reported it as "a common resident in suitable localities throughout the State." Grinnell (1915) reported it as a common resident in the Canadian, Transition, and high Upper Sonoran zones except in northwest humid coast belt. Willett (1933) reported it as a common resident of mountains and less common in lower country.

B. Present population status

Grinnell and Miller (1944) reported it as permanently resident. Numbers usually small and individuals widely scattered. Small (1974) reported it as a resident. Ligon (1970) believes the numbers are now greater in open pine land than previously.

C. Population limiting factors

Ligon (1970) reports that reduced standing dead timber decreases the population.

D. Environmental quality: adverse impacts

Ligon (1970) reports that they need dead standing timber to breed, and repeated fires reduce this.

E. Potential for endangered status

Picoides villosus (con't.)

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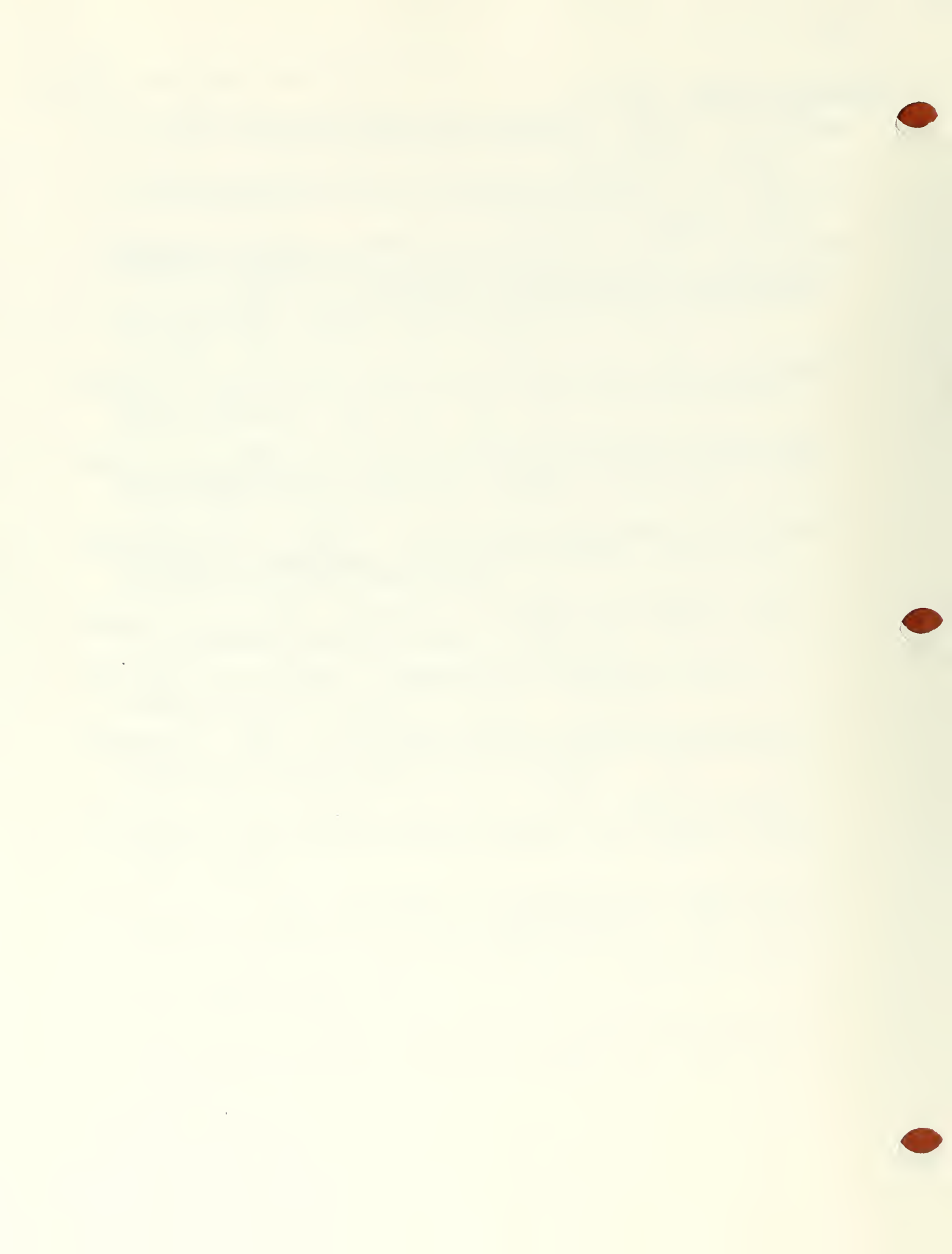
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HOUSE FINCH
Carpodacus mexicanus

I TAXONOMY

A. Type description

AOU (1957), Fringilla frontalis, in Long, Exp. Rocky Mountains, vol. 2, 1823, p. 40 (note). (Arkansas River near the mountains = near Colorado Springs, Colorado.)

B. Current systematic treatments

Howell, Paynter, and Rand (1968), recognize twenty-one species of the genus Carpodacus; twelve subspecies of the species mexicanus. Order: Passeriformes; Family: Fringillidae (Carduelinae).

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Fringilla frontalis; Erythrospiza frontalis; Carpodacus frontalis; Carpodacus familiaris; C. rhodocolpus; C. f. rhodocolpus; C. f. frontalis; C. clementis; C. mexicanus obscurus; C. m. clementis; C. m. solitudinus; C. m. grinnellii.

D. Synonomies of vernacular nomenclature

Dawson (1923), Crimson-fronted Finch; Burion; California Linnet. Grinnell and Miller (1944), Crimson-necked Finch; Crimson-fronted Purple Finch; Purple House Finch; California Purple Finch; Domestic Purple Finch; Red Linnet; House Linnet; Linnet; Red-fronted Linet; California House Finch; Crimson House Finch; San Clemente House Finch; Grinnell House Finch; Desert House Finch.

II DESCRIPTION

A. External morphology of adults

Dawson (1923), "Adult male in highest spring plumage: Head and neck all around, throat, and breast, broadly, and rump, rich red (carmine, light carmine, or napal red), or, rarely, tinged with orange; upper back more or less tinged with the same shade...; remaining upperparts, wings, and tail brownish gray, or fuscous; margins of feathers vaguely paler; remaining underparts whitish finely streaked with brownish gray... Bill horn-color; feet and legs dark brown. In autumn, the reds duller (grayer), more blended, and more widely diffused; the intensity of red, especially, reduced on crown, where varied by darker centers to feathers (pure only on forehead);

Carpodacus mexicanus (con't.)

the wings with many edgings of pinkish, or brownish buffy, not present in spring. In this plumage the appearance of C. m. frontalis very closely approximates that of C. purpureus ...Adult female in spring: Above dull grayish brown, streaked with darker; below dull white, sharply and finely streaked with grayish brown or dusky; wings and tail grayish brown without distinguishing marks. Adult female in fresh fall plumage: Above, plumage more blended; wings with some marginings of lighter (buffy gray); below, streaks broader and less distinct by reason of buffy edgings." Ridgway (1901), detailed description of C. m. mexicanus with comparison with frontalis, including plumage, soft parts, and measurements. Michener and Michener (1931), discussion of color variation in the plumage of males--based upon observations during banding activities. Peterson (1961), "Male: Near size of House Sparrow, brownish with bright red breast, forehead, stripe over eye, and rump...Female: Sparrow-like; gray-brown above; underparts streaked with dusky; face without strong stripings, bill stubby."

B. External morphology of subadult age classes

Dawson (1923), "resemble the female parent, but are more finely streaked with dusky below, and more heavily margined by brownish buffy, especially on wing-coverts and tertials."

C. Distinguishing characteristics

Interspecific - Dawson (1923), "red never so widely diffused above as in C. purpureus californicus)...Female not certainly distinguishable from that of Purple Finch in autumn, but upper plumage rather more blended and grayer, less olivaceous." Peterson (1961), male: "Resemble males of Purple and Cassin's Finches (which do not nest about buildings); is brighter red. Some are almost orange. Narrow dark stripes on flanks and belly are best distinction."

Intraspecific - Ridgway (1901), "Smaller than C. m. mexicanus and C. m. rhodocolpus, but larger than C. m. sonoriensis and C. m. ruberrimus; in coloration, the adult male intermediate between the first named and the rest in extent of the red, this being less restricted and less sharply defined and less intense than in C. m. mexicanus, the crown, occiput, and back often tinged with red, but rarely to the same extent as in C. m. rhodocolpus; C. m. sonoriensis, and C. m. ruberrimus; female rather grayer and more distinctly streaked above than that of C. m. mexicanus."

Carpodacus mexicanus (con't.)

I GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

Dawson (1923), "Western United States from Oregon, southern Idaho, and southern Wyoming, east upon the plains to Kansas, and south throughout Lower California and to southern border of the tableland of Mexico." C. m. frontalis: As above, excepting the southern half of Lower California and the southern portion of old Mexico." AOU (1957), "Breeds, and largely resident, from southwestern and south-central British Columbia (Victoria, Williams Lake, Okanagan Landing), central western and southern Idaho (Moscow, Boise, Pocatello), central northern and southeastern Wyoming (Big Horn Valley, Tarrington), and western Nebraska (Kimball County, Haigler) south through California, including the northern Channel Islands, to central Baja California (Todos Santos Islands, Cedros Island, Santana), central Sonora (Tiburón Island, San Pedro Martir Island, Oposura), northwestern Chihuahua (Chihuahua), and western and south-central Texas (Boquilla, Somerset, Austin). Introduced in Hawaii, and on Long Island, New York, where now (1956) breeding in southern Nassau and southwestern Suffolk counties; breeding also in Greenwich Township, Fairfield County, southwestern Connecticut."

B. California distribution of the species

Dawson (1923), "Abundant resident throughout the State below Transition." Grinnell and Miller (1944), "Breeds in all sections of State, exclusive of high montane areas and coastal islands from Santa Barbara Island southward, where replaced by the race clementis; of but scattered occurrence within northwest coastal belt. Life-zones, Lower Sonoran and Upper Sonoran; locally in Transition." Keeler (1890), "In California it resorts chiefly to the valleys, both of the coast and interior region, but it occurs in the mountains to the height of at least three thousand feet."

C. California desert distribution

Smyth and Coulombe (1971) report this species frequenting desert springs for drinking, Upper Carrizo Spring, Riverside County.

D. Seasonal variation in distribution

AOU (1957), "In winter to the Gulf coast of southern Texas. Casual north to Alberta (Topaz Lake) and Montana (Santon Lake), east to northeastern Texas (Fort Worth), and south to southern Sonora (Chinobampo)." Grinnell and Miller (1944),

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"Wanders to some degree, especially in late summer, but definite migratory movements not apparent. Evidently departs in winter from some higher points in breeding range, especially along eastern flank of Sierra Nevada." Salt (1952), "Throughout much of their range house finches move up into the mountain valleys in the late summer after the breeding season and return to the lowlands with the onset of colder weather." Keeler (1890), "Its distribution in winter does not differ essentially from its summer range, as its migrations are caused merely by local influences, such as scarcity of food or a cold spell."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), "Open places and sunshine are favored and in the foothill districts, great interior valleys and coastal plains the House Finch is the predominant avian species in fields and orchards, and about scattered trees and ranch buildings." Small (1974), "open woodland, edges of forest, woodland, and chaparral; desert cities, towns, suburbs, gardens, parks, farms, ranches, agricultural land, savannah." Miller (1951), Upper and Lower Sonoran and Transition life zones.

B. Altitudinal range

Grinnell and Miller (1944), "Altitudes of nesting range from -200 feet as in Death Valley, Inyo County, up rarely to 8000 feet, as at Mammoth, Mono County...May occur even higher in late summer."

C. Home range size

Gullion (1960), "highly mobile species, capable of moving considerable distances from one food supply to another."

D. Territory requirements

Perch sites - Salt (1952), "Any structure will do: the ridge pole of a house, a telephone pole, or the top of a tree."

Courtship and mating sites -

Nest sites - Thompson (1960a), "in dense foliage and often build in ivy under the eaves of a building, if such a site is available. In the absence of dense foliage or a man-made structure, they may nest in crannies on cliffs." Robertson (1931a), "The loose bark of the blue gum seems to have been designed especially for Linnets...to nest in. They build

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behind slabs of bark on the trunks or larger limbs, or in accumulations of bark in the crotches." Dawson (1923), "nest almost anywhere...Caught in vines, or placed on timbers, under cornices, in bird-boxes, mail boxes." Bergtold (1913), "in vines about houses, in sheltered corners and awnings of buildings...in any place of vantage about a building ...In globes, when partly broken, surrounding incandescent lamps."

E. Special habitat requirements

Grinnell and Miller (1944), "Habitat--Remarkably varied, the following apparent requirements being met by a great diversity of situations: (1) water, at least within a fairly wide daily cruising radius, fruits perhaps forming a satisfactory substitute; (2) open ground of limited or great extent thus affording growths of low seed-producing plants, especially composites; (3) sources of fruits and berries during part of year (possibly not essential); (4) trees, cliffs and earth banks, or man-made structures for roosting and placement of nests above ground in sites often partly enclosed. These requisites are not met in forest associations or continuous chaparral, although they may be found in woodland formations, in forest and chaparral edges and on treeless plains and deserts; low temperatures in summer and high rainfall and heavy wet fogs either hold low the number of individuals or seem to account for the absence of the species in some areas."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Thompson (1960a) "primarily seedeaters...but they also eat fruit, and are considered a pest by fruit growers...Ripe thistle...other composites." Fisk and Steen (1976), report this species feeding on nectar (at feeders in California). Bergtold (1913), "will eat almost anything vegetable, though it prefers seeds."

B. Foraging areas

Thompson (1960a) "Large numbers...are attracted to fields of blooming and fruiting wild mustard (Brassica campestris) and radish(Raphanus sativus) in the spring."

C. Foraging strategies

Salt (1952), "either forage directly on the ground, or they may pick the seeds and flowering heads from the plants while hanging onto the stems or branches."

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D. Feeding phenology

Salt (1952), "rely throughout the year more on ground feeding...During the breeding season about three-fourths of their food consists of seeds of annual grasses and forbs...As in some other fringillids, the food preferences of this species changes from one species of plant to another during the course of the growing season, depending upon the time at which the seeds develop." Bergtold (1913), "In winter when the ground is unusually deeply covered by snow, these birds wander far and wide over the prairie and vacant city lots, eating weed seeds."

E. Energy requirements

Partin (1933), detailed study of daily and seasonal fluctuations in body weight; adult males and females and young.

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Thompson (1960a), "In early spring when pairs are forming, aggressive behavior reaches a peak. Increasingly, males become intolerant of other males perched near them. Males, when they have secured a mate, defend the area around the female...The peak of aggressive activity continued through the selection of a nest site and the construction of the nest, but it begins to wane by the time the nest is completed. The area around the nest is defended rather sporadically and weakly. Vigorous displays are rarely observed in territorial defense. Usually the defender merely flies to a perch near the intruder and sits until the latter moves away." Thompson (1960b), detailed discussion of aggressive behavior.

C. Courtship and mating behavior

Thomson (1960a), "The first evidence of pair formation in captive House Finches is billing, accompanied by soft twittering...Later the male accompanies this mock feeding with regurgitating movements of the throat, but no food passes into the female's open mouth...The female usually begins to big from the male...At about the time of nest building, the male actually feeds the female regurgitated material...Copulation in the House Finch normally occurs at the invitation of the female."

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D. Nesting phenology

Davis (1933), reports in Butte County, California the first date as 16 April; the last date as 9 May; the average date as 28 April. Dawson (1923), "March to July; 2 or 3 broods."

E. Length of incubation period

Evenden (1957), "The average incubation period for the 11 nests was 13.27 days...Extremes of 12 and 14 days." Bergtold (1913), "The average length of incubation is 14 days."

F. Length of nestling period

Evenden (1957) "residence of individual young varied from 11 to 19 days within one nest, with nest averages ranging from 13.2 to 17.0 days; the overall average was 15.1 days." Bergtold (1913), "The young remained about fourteen days in the nest."

G. Growth rates

Evenden (1957), "it was noted that growth rates varied from young to young, nest to nest, month to month, and year to year." Keeler (1890), "The growth of the young bird is rapid and constant. In ten days the chord of the culmen had grown from four to eight millimeters, the gape had increased from five and a half to eleven millimeters, and the tarsus from five to fourteen millimeters."

H. Post-breeding behavior

Thompson (1960a), "It is not known what happens to the young just after they leave the nest, but they probably do not join large feeding flocks during the several weeks when they are fed by both parents. Later on juveniles and adults may assemble where food is plentiful..." Austin (1968), "With the close of the nesting season in late summer, house finches of all ages begin to gather in flocks and search out the larger tracts of maturing weeds, whence they flush and circle in clouds."

VII POPULATION PARAMETERS

A. Clutch size

Evenden (1957), "completed clutches averaged 4.4 eggs." Thompson (1960), "The nests examined in Strawberry Canyon averaged 4.7 eggs per clutch, with a range of three to six."

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B. Fledging success

Evenden (1957), "There was a 52 per cent fledging success based on 110 eggs laid, and a 70 per cent fledging success based on 80 young hatched."

C. Mortality rates per age class

Bergtold (1913), "Over forty per cent of the eggs laid were ultimate failures, the largest factor in the loss being destruction of the eggs and young by the English Sparrow ...About ten per cent loss is caused by late spring storms, climatic conditions lasting but a short time."

D. Longevity

Michener and Michener (1933), report ages of birds based upon banding records. Of known-age individuals when first banded, recaptured individuals, 7 males were 4 years and 8 months old; two were 5 years and 7 months old; one female was 6 years and 8 months old. Of individuals whose ages were not known when first banded (as adults), five were at least 5-1/2 years old; one was at least 6-1/2 years old; two were at least 8-1/2 years old.

E. Seasonal abundance

Austin (1968), "Even in the mildest regions of coastal California, the numbers of the house finch are distinctly less in winter, though some remain throughout the year in almost all localities."

F. Habitat density figures

Gaines (1974), reports 35 territorial males per square kilometer in clumped cottonwood and willow woodland, Glenn and Butte Counties, California.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Bond (1936), reported two pellets of the Prairie Falcon containing remains of this species, San Luis Obispo, California. Evenden (1957), "Neighborhood cats accounted for almost the entire loss of young." Sumner (1928), reports a headless immature in the nest of Screech Owls."

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B. Competition

Evenden (1957), "Competition between House Finches and House Sparrows for nesting sites was particularly strong early in the season." (Sacramento, California). Thompson (1960a), "It is more often the somewhat larger and heavier House Sparrow which wins fights between the two species." Bergtold (1913), "The loss of nests, eggs and young of the House Finch through direct destruction by the English Sparrow is very large. It was 16% in some of the nests studied... the English Sparrow overcomes, and is superior to, the House Finch in the biologic struggle."

C. Parasitism

Hanna (1933), reports on incident of the nest of this species containing 3 eggs of the finch and one of the Dwarf Cowbird. The nest was deserted. A nest of a Black Phoebe contained four eggs of the House Finch and one of the phoebe; the phoebe at this time was building a new nest a few feet away. Robertson (1931b), reports finding cowbird eggs in the nests of this species. Evenden (1957), "Brown-headed Cowbirds (Molothrus ater) were present but did not parasitize finch nests in this area."

X STATUS

A. Past population trends

Grinnell and Miller (1944), "Permanent resident. Abundant generally, except in situations marginal from the standpoint of zone and habitat."

B. Present population status

Small (1974), "common resident."

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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LADDER-BACKED WOODPECKER
Picoides scalaris cactophilus

I TAXONOMY

A. Type description

Dryobates scalaris cactophilus - AOU (1957) Oberholser, Proc. U. S. Nat. Mus., 41, June 30, 1911, P. 140 (in key), 152. (Tucson, Arizona)

B. Current systematic treatments

Oberholser (1911) split Dryobates scalaris into 15 subspecies, one of which was D. s. cactophilus. AOU (1957) calls this same species Dendrocopos scalaris cactophilus (Oberholser), and a subspecies of the Ladder-backed Woodpecker. Morony, et al. (1975) synonymized this species to Picoides after the genus Dendrocopos recognized by Peters (1948).

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944) in describing Dryobates scalaris cactophilus, "Dyctiopicus lucasanus; Picus scalaris, part; Dryobates scalaris; Dendrocopos scalaris; Dryobates scalaris bairdi; Dryobates scalaris lucasanus; Dendrocopos lucasanus; Dryobates scalaris yumanensis; Dryobates scalaris mojavenis." Grinnell (1915), "Dryobates lucasanus." Peters (1948), "Dendrocopos scalaris cactophilus."

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), in describing the Cactus Ladder-backed Woodpecker, "Barred Woodpecker; Arizona Woodpecker; Ladder-backed Woodpecker, part; Texan Woodpecker, Mojave Ladder-backed Woodpecker." Peterson (1969), "Mexican Woodpecker."

II DESCRIPTION

A. External morphology of adults

Peterson (1969), "The only black and white "zebra-backed" woodpecker with a black and white striped face in the arid country...Males have red caps." Robbins, Bruun, Zim (1966), "Note the distinct black and white on side of head." Dawson (1923), "Adult male: Extreme forehead and nasal tufts snuff-brown, shading into sooty brown of forehead, thence through black of crown, narrowly tipped with scarlet-red and broadly subtipped with white, to nearly pure scarlet-red on sides of occiput and nape, the fore-crown thus speckled with white and red in varying proportions; cervix (narrowly),

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upper tail-coverts, and tail from above, black; back and wings sooty brown or brownish dusky, heavily and equally barred or spotted with white, the spotting of wings involving flight-feathers arranged in rows, equivalent to bars when in repose; sides of head and neck, including superciliaries and remaining underparts, pale buffy brown fading to white on sides and crissum; included area of sides of head black, invaded by malar streaks of buffy brown or whitish; the sides of breast sharply and heavily spotted with brownish black; the sides, flanks, and crissum indistinctly barred with dusky; the under (outer) feathers of the folded tail equal-barrred black-and-white. Bill and feet dusky horn-color; iris brown. Adult female: Like male, but without red on crown or nape, glossy black instead, shading to sooty brown on forehead; forehead sometimes sparingly speckled with white. Length of adult male: 158.75-184.2 (6.25-7.25); wing 104 (4.09); tail 60.8 (2.39); bill 22.7 (.89); tarsus 18.1 (.71). Females' average slightly less."

B. External morphology of subadult age classes

Bent (1939), assumes young are hatched naked (as in other woodpeckers). Juvenile plumage is acquired before young leaves the nest, and is like that of an adult male, but the sexes are not alike. Male: Forehead, sides of occiput, and nape are uniform black. Crown is scarlet, more or less dotted with white. Female: has much less scarlet on crown. In both, back is barred with dull black and grayish white. Underparts are "vinaceous-buff," faintly spotted on the sides and flanks. Plumage is softer and markings are not as clearly defined as in adult." Dawson (1923), "Young male: Like adult male, but nape and sides of occiput black, the red carried forward and prevailing on crown; plumage softer and pattern slightly blended. Young female: Like young male, but red of crown somewhat reduced."

C. Distinguishing characteristics

Interspecific - Peterson (1969), "Nuttall's Woodpecker is found only in California, west of Sierra, not in the desert. There are minor differences in the amount of black on upper back, pattern on face. Downy Woodpecker has white back. Robbins, Bruun, Zim (1966), "Told from Gila and Golden-fronted by the dark rump, finely spotted sides, and lack of white wing patch in flight." Udvardy (1977), "Zebra-backed like Nuttall's Woodpecker, but with slightly smaller black ear patch and face stripe, usually separated from black of nape and back of white band. Male's red cap usually more extensive than Nuttall's."

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Intraspecific - Bent (1939), "Much like D. s. eremicus, but smaller, particularly the tail and bill; lower surface lighter, laterally almost always streaked with black; upper parts lighter - the black bars on back and scapulars narrower; wing quills with larger spots and broader bars on white; outer long rectrices with exterior webs barred throughout with black; black bars on posterior lower surface narrower." As compared with D. s. symplectus, "slightly larger, with black bars on back, etc., decidedly broader."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) in describing P. scalaris, "From southeastern California, southern Nevada, southwestern Utah, and southern Colorado south through Mexico (including Baja California, the Tres Marias Islands and Cozumel Island, Quintana Roo) to Chiapas and British Honduras."

AOU (1957) in describing P. s. cactophilus. "Resident in the desert areas of southeastern California, southern Nevada, southwestern Utah, central Arizona, central New Mexico, and western Texas, south to the Colorado River Delta, in northeastern Baja California, to about lat. 20°N. in Sonora (including Tiburon Island), Chihuahua and northern Durango."

B. California distribution of the species

Grinnell and Miller (1944), lists numerous site and specimen records throughout the birds' California range. States, in general, Colorado and Mojave deserts. Life-zone, Lower Sonoran. Small (1974), "Colorado and Mohave deserts." Miller (1951) gives locations. Bendire (1895) reported that a mated pair was found in San Gorgonio Pass and also some in the Colorado desert.

C. California desert distribution

Grinnell and Miller (1944), "Colorado and Mojave deserts" Lower Sonoran life-zone. Small (1974) also give this. Grinnell (1902) reported them as common to deserts of the southeastern corner of California, recorded west to Hesperia and San Gorgonio Pass. Grinnell (1915) reported them as a "common resident locally on the Lower Sonoran deserts of southeastern California," and goes on to give various localities. Willett (1933) gives locations, especially in the Colorado Desert. Bent (1939) reports that this species frequents the deserts or borders of deserts and lower slopes of the mountains in the Sonoran Zone. Dawson (1923), "The southeastern deserts, broadly; hence, occasionally invading

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the domain of nutalli through Walker and San Gorgonio Passes." Carter (1937) reported them at Twentynine Palms. Hoffmann (1922) found them near Banning.

D. Seasonal variations in distribution

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), "Almost any kind of desert terrain providing fair-sized shrubby vegetation and also diggable woody stems or trunks of sufficient diameter for nesting excavations...commonly by the trunks of tree-yucca ...cottonwood and willow...also telegraph poles." Small (1974), "Low and high deserts, pinon-juniper woodlands." Found also in desert scrub. Miller (1951) found them in the Lower Sonoran areas, desert scrub, pinon-juniper formations and riparian woodlands. Peterson (1969), "Deserts, canyons, cottonwoods, arid brush, prairie groves." Robbins, Bruun, Zim (1966), "Fairly common in deciduous woods and mesquite, less common in cactus." Udvardy (1977), "Deserts and their borders; also mesquite, pinon-juniper woodland, and scrub oaks." Bendire (1895), "It prefers the lowlands and river bottoms."

B. Altitudinal range

Grinnell and Miller (1944) states that they are found from 200 feet below sea level to 6,000 feet and up to 6800 feet as a vagrant. Bendire (1895), "...rarely found at altitudes above 4000 feet."

C. Home range size

D. Territory requirements

Perch sites

Courtship and mating sites

Nest sites - Grinnell and Miller (1944) state that almost any type of desert terrain containing fair-sized shrubby vegetation and diggable woody stems or trunks of sufficient diameters will do. Bent (1939) repeats findings of nests being from 2-30 feet off the ground in cavities in various wooden structures and plants. Peterson (1969), "In hole in tree, post, yucca, agave." Udvardy (1977), "...in the tall (up to 30 feet high) dry stalk of a century plant or agave; occasionally in a hole chiseled in a yucca, a cottonwood tree, or even a fence post." Dawson (1923), "Nest: A

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hole at moderate height in giant cactus, Joshua-tree, willow, or other tree." Also, the dried stalks of the agave and lesser yucca and willows, as well as mesquite and telephone poles. Bendire (1895), reported that it prefers mesquite trees.

E. Special habitat requirements

Dawson (1923), "...requires something of more ample girth for a nesting site (than creosote or cholla).

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Bent (1939) reports larvae of woodboring beetles, coddling moths, and other Lepidoptera. Udvardy (1977) reports larvae of the agave beetle. Dawson (1923) reported that they eat the ripened fruit of the giant cactus. Bendire (1895) reports this also.

B. Foraging areas

Grinnell and Miller (1944) state that foraging occurs in trunks of the tree-yucca, trunks or dead flower stalks of other yuccas, cottonwood and willow trunks, telegraph poles, cactus clumps, various bushes and desert trees such as mesquite, palo verde, and ironwood. Udvardy (1977) reports century plant flower stalks. Austin (1978) has found that males and females forage in different areas (on different species of plants), and that the species they feed on change during the year. Females feed mainly on mesquite throughout the year, while males switch between cholla, mesquite, and others.

C. Foraging strategies

Bent (1939) reports that it gleans larvae from trunks and branches of trees, usually at low elevations on small trees, shrubs, cacti. Also, it sometimes feeds on the ground.

D. Feeding phenology

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

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C. Courtship and mating behavior

D. Nesting phenology

Dawson (1923), "Season: March 25-May, rarely June." Bendire (1895), "...full sets of fresh eggs are sometimes found by the middle of April...but (usually) the first week of May."

E. Length of incubation period

Bendire (1895), "about 13 days."

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

Dawson (1923), "One brood." Bendire (1895), one brood, rarely two, maybe.

VII POPULATION PARAMETERS

A. Clutch size

Bent (1939) gives clutch size as 2-6 eggs, usually 4 or 5. Peterson (1969), and Udvardy (1977), say 4 or 5. Dawson (1923), usually 4. Bendire (1895), 2-5, usually 4 or 5.

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Bendire (1895), reports gregariousness in winter. In December, 1885, flocks of 4-12 birds were encountered frequently at 3,000 feet.

F. Habitat density figures

Bendire (1895) reported flocks of 4-12 on plains at 3,000 feet in December, 1885.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

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B. Competition

Bent (1939) reports that in the regions where it is found, there are no other species of woodpecker. Gila Woodpeckers and Mearn's Gilded Flickers replace it in giant cactus (Saguaro) regions. Short (1971) saw conflicts between these and Nuttall's Woodpeckers.

C. Parasitism

IX STATUS

A. Past population trends

Grinnell (1902) reported them as "common resident in deserts of southeastern corner of the State." Grinnell (1915) reported them as a "common resident locally on the Lower Sonoran deserts of southeastern California." Willett (1933) reported them as a common resident of the Colorado Desert west to San Gorgonio Pass.

B. Present population status

Grinnell and Miller (1944) reported that they are permanently resident and common with the degree of abundance dependent on availability of nest sites. Small (1974) reported them as resident.

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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LAWRENCE'S GOLDFINCH

Carduelis lawrencei

I TAXONOMY

A. Type description

AOU (1957) Spinus lawrencei: Carduelis lawrencei Cassin, Proc. Acad. Nat. Sci. Philadelphia, no. 5, Sept.-Oct. (Dec. 7), 1850, p. 105, pl. 5. (Sonoma and San Diego, California.)

B. Current systematic treatments

Mayr (1968), recognizes C. lawrencei as a monotypic species in a genus in which there are twenty-four species. Passeriformes: Fringillidae (Carduelinae).

C. Synonomies of scientific nomenclature

Dawson (1923), Astragalinus lawrencei. Small (1974), Spinus lawrencei. Grinnell and Miller (1944), Chrysomitris lawrencei; C. lawrencii; Astragalinus lawrencii.

D. Synonomies of vernacular nomenclature

II DESCRIPTION

A. External morphology of adults

Dawson (1923), "Adult male in spring: General color neutral gray, paling on underparts posteriorly; pileum, face, and throat, narrowly, black; breast dark yellow..., everywhere sharply outlined against the surrounding gray; rump yellow; back touched with yellow centrally; the wings black, heavily edged with yellow; the tertials bordered with white; tail black, the three or four outermost pairs of feathers heavily blotched with subterminal white on inner web. Bill light; feet brownish. Adult male in autumn: as in spring, but back and sides of hind neck brownish olive. Adult female in spring: Like male in spring but without black on head and throat; duller. In autumn: Above brownish olive." Ridgway (1901), detailed description of adult male and female, including plumage, soft parts, and measurements. Peterson (1961), "yellow wing-bars. Male: Gray-headed, with black face...; some yellow on breast and rump...No seasonal change. Female: Lacks black face. Gray color, 2 yellow wing bars."

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B. External morphology of subadult age classes

Dawson (1923), "Young birds are like adult female in autumn, but yellow element is almost or quite confined to wing, where also largely replaced by buffy brown edgings; breast faintly streaked." Ridgway (1901), "Similar to adult female, but colors duller, with yellow, especially on breast, less distinct, and under parts obsoletely streaked."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "only U.S. goldfinch with a black chin...2 yellow wing-bars distinguish it (female) from other goldfinches."

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "Breeds in California west of the Sierra Nevada (Hyampom southeast to Santa Rosa Mountains) and in northern Baja California (Sierra Juarez, Sierra San Pedro Martir). Dawson (1923), "California and northern Lower California; in winter east to Arizona (but chiefly at Colorado Valley points) and New Mexico (Fort Bayard)." Ridgway (1901), "California and northern Lower California (breeding south to San Pedro Martir Mountains); in winter to Arizona."

B. California distribution of the species

Dawson (1923), "Of very local occurrence in summer west of the Sierras, perhaps chiefly in the southwestern coast districts, but also north through Great Valley to McCloud River, in Shasta County and east to Weldon, Kern Co., Raymond, Madera Co., and Oroville, Butte Co.; breeding chiefly in Upper Sonoran life zone; perhaps casual breeder in Lower Sonoran (Indian Wells, Colorado Desert...). Perhaps casual on Catalina Island, but a regular breeder on Santa Cruz Island." Small (1974), "West of Cascades and Sierra Nevada and south of the northern mountains; coast-wise (from about Sonoma County) and interiorly south through Central Valley to Mexican border."

C. California desert distribution

Grinnell and Miller (1944), "Breeds in coastal districts from Sonoma County south to Mexican boundary and interiorly, west of Cascade-Sierran axis, from Shasta and Trinity counties southward; extends eastwardly through mountains of southern

Carduelis lawrencei (con't.)

California onto western edge of Mohave Desert in vicinity of Victorville...In winter...in moderate numbers in coastal southwestern California and in Coachella, Imperial, and Colorado River valleys." Recorded at following sites: Weldon and Mt. Pinos, Kern Co.; Hesperia, Grapevines, and Twentynine Palms, San Bernardino Co.; Azusa, Los Angeles, and Pasadena, Los Angeles Co.; Escondido, Volcan Mts., and San Diego, San Diego Co.; Mecca, Riverside Co.; March and the Alamo River near Brawley, Imperial Co. Carter (1937), noted several among the Lesser Goldfinches at Twentynine Palms. Miller (1951), Kern Basin and San Diego.

D. Seasonal variations in distribution

AOU (1957), "Winters from north-central California (San Francisco, Margsville), central Arizona (Fort Mohave, near Prescott, Phoenix, Paradise), and southwestern and central southern New Mexico (Fort Bayard, Las Cruces) south to northern Baja California (20 miles south of San Quintin, Cocopah Mountains), northern Sonora (Tecoripa), and western Texas (El Paso). Dawson (1923), "Winters irregularly in San Diego district and east of the desert divide to the Colorado River." Grinnell and Miller (1944), "Summer resident from April through September. A small part of the population remains through winter in the breeding range; also appears then in otherwise unoccupied areas southeastwardly."

IV HABITAT

A. Biotopic affinities

Peterson (1961), "open oak or oak-pine woods, dry chaparral, edges." Small (1974), "riparian woodland, oak woodland, open forest, montane forest of a more arid nature, piñon-juniper woodland." Grinnell and Miller (1944), "as breeding, usually oak woodland and open or broken forest of the arid Transition Zone. Coutlee (1968), "restricted to wooded areas bordering permanent water sources." Miller (1951), Upper and Lower Sonoran and Transition life zones.

B. Altitudinal range

Grinnell and Miller (1944) "nesting stations extend(s) from near sea level as at Laguna Beach, Orange County, up to 6500 feet, as in the San Bernardino Mountains; vagrants have been taken up as high as 8500 feet."

C. Home range size

Coutlee (1966), reports territories about 10-15 meters in diameter.

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D. Territory requirements

Perch sites - Jaeger (1947), "on creosote twigs." Gander (1930) "Some fifty or more roosted nightly in a large clump of lemonade berry bush (Rhus integrifolia) in the center of a grassy patch in a nearby canyon" (January and February, East San Diego). Coutlee (1968) "singing loudly from the tops of the trees." Linsdale (1950), "the whole flock would fly up to a fence or to a nearby, isolated blue oak."

Courtship and mating sites -

Nest sites - Dawson (1923), "A rather loosely woven cup of highly varied materials,--grasses, wool, weed-stems, and feathers; placed at any height in a cypress tree, or at moderate height (2 to 15 feet) in weeds, artemesia, elderberry bush, or small tree, as live oak."

E. Special habitat requirements

Grinnell and Miller (1944), "Water sources probably are necessary." Linsdale (1950), "Birds that feed so exclusively on dry seeds as the goldfinches do apparently have greater need for water to drink than other kinds. Between feeding periods they assemble at watering places where they drink, sing, bathe, preen, rest, and sun themselves."

F. Seasonal changes in habitat requirements

Linsdale (1950), "We see the species in winter in the chamisal and where there is water along intermittent creeks. In spring it ranges over open ground where abundant small seeds are produced. In the nesting season the birds go to the hills where there are oaks." Linsdale (1957), "Search for particular kinds of seeds takes the bird to varied kinds of habitat."

V FOOD

A. Food preferences

Culbertson (1946) reports birds feeding on seed fleas or jumping galls (Neuroterus siltatorius). Examination of droppings of the birds revealed only the hulls of the galls, suggesting that the birds feed only upon the insects inside. Ortega (1945), observed feeding on one egg of two in a Mourning Dove's nest. Gander (1930), "seen feeding daily on the seeds of the greasewood (Adenostoma fasciculatum)." Linsdale (1950) "special predilection for seeds of the Boraginaceae." Coutlee (1966) "feed almost exclusively on seed-bearing chaparral plants, although a few insects (mostly Aphidae) may be taken during the breeding season."

Carduelis lawrencei (con't.)

B. Foraging areas

Grinnell and Miller (1944), "Grassland, growths of tall annuals, and chaparral are plant formations where suitable and workable seed supplies may be found, often at some distances from the nest." Linsdale (1957) "It is fitted to live where the seeds it eats and the water it requires may be far from the trees where it nests."

C. Foraging strategies

Linsdale (1957) "They search in flocks for patches of low herbaceous plants and shrubs that bear seeds."

D. Feeding phenology

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Dawson (1923), "colonize to some extent...found as many as ten nests at once in two adjoining trees." Coutlee (1966), "is much less active in his defense than is the male psaltria. He often sings while perched near the nest when he comes to feed the female. No elaborate circling flight displays or song flights are given...The territory is usually defended solely by high intensity singing if a strange male enters it. In only a few instances was a resident Lawrence's male seen to fly toward a strange male." Includes detailed analysis of vocalizations and comparisons with C. psaltria. Linsdale (1950), reports incidents where resident males did chase: "The male was quick to chase other males. The female pursued other females and sometimes strange males."

C. Courtship and mating behavior

Coutlee (1968), "initially large flocks...break up as each male becomes less tolerant of other males and spends more and more time singing loudly from the tops of the trees... Noisy groups of five or six individuals are common in the tops of oaks" (mixed males and females). Coutlee (1966), "The male lawrencei are subordinate to the females and approach them only hesitantly...It is...the female who initiates billing and courtship feeding by flying to and perching near the male...Feeding of the female by the male is continued throughout nesting. Coutlee (1971), detailed analysis of vocalizations.

Carduelis lawrencei (con't.)

D. Nesting phenology

Dawson (1923), "Extreme dates: Shandon, April 8, 1916, 5 fresh eggs; Claremont, July 5, 1903, 4, inc. begun...In the more elevated stations of southern California, the seasons may be prolonged into June, or even July."

E. Length of incubation period

Coutlee (1966), "The female is in almost continuous attendance of the nest during the 12-13 days of incubation." Shepardson (1915), "lasts from ten to twelve days."

F. Length of nestling period

Linsdale (1950), "the young birds hatched on July 2...they left on the 13th or 14th day after hatching." Coutlee (1966), "The young remain in the nest for 12-15 days before fledging." Shepardson (1915), "the young birds remain in the nest about two weeks." Linsdale (1957), description of nestling period up to 11 days after hatching, whereupon the young fledged.

G. Growth rates

Coutlee (1966), description of the development of vocalizations and motor patterns in hand-reared birds.

H. Post-breeding behavior

Coutlee (1966), "By the end of the first week or so after fledging...the young birds accompany the adults to foraging areas and are fed whenever they give the insistent begging calls. These small family groups do not return to the nesting territory and remain together until the end of the season when large flocks are again formed as migration begins."

VII POPULATION PARAMETERS

A. Clutch size

B. Fledging success

C. Mortality rates per age class

D. Longevity

Carduelis lawrencei (con't.)

E. Seasonal abundance

Culbertson (1949), "a flock of about thirty continued to appear everyday" (August, Fresno, California). Gander (1930), reports small flocks of from eight to twenty, January and February, East San Diego. Linsdale (1950), "From 50 to 200...were present daily for nearly a month, beginning in the middle of March." Coutlee (1966), "Both the Lesser and Lawrence's Goldfinches are highly social and form loose flocks of 20-30 birds during the non-reproductive season...May include members of both species of goldfinches or even of other passerines."

F. Habitat density figure

Dawson (1923), "found as many as ten nests at once in two adjoining trees."

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Coutlee (1968), "Jays, squirrels, and cowbirds were chased from nest sites."

B. Competition

Coutlee (1966), "Since nest sites are often similar in both species (C. lawrencei and C. psaltria), some interspecific competition is apparent."

C. Parasitism

Friedmann (1943), reports one nest containing four eggs of the goldfinch and one of the Dwarf Cowbird (Gilroy, California); another clutch containing one egg of the goldfinch and two of the cowbird (collected in Ventura Co., California).

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Fairly common in general, but numbers often variable from year to year in any given locality, and distribution notably discontinuous and movements erratic." Willett (1912), "Common summer resident of the mesas and foothills up to 7000 feet...Rare in winter."

Carduelis lawrencei (con't.)

B. Present population status

Small (1974), "resident in southern half of the state; summer visitor elsewhere." Linsdale (1950), "the population of Lawrence Goldfinches is greater now than it was before the development of agriculture in its range and that probably its range has been extended somewhat by that development."

C. Population limiting factors

Linsdale (1950), "the kind and amount of seeds produced each year are important in determining the numbers of goldfinches and the length of their stay."

D. Environmental quality: adverse impacts

E. Potential for endangered status

Carduelis lawrencei (con't.)

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LESSER GOLDFINCH
Carduelis psaltria

I TAXONOMY

A. Type description

AOU (1957), Spinus psaltria hesperophilus: Astragalinus psaltria hesperophilus Oberholser, Proc. Biol. Soc. Washington, 16, Sept. 30, 1903, p. 116. (San Bernardino, California.)

B. Current systematic treatments

Mayr (1968), recognizes twenty-four species in the genus Carduelis; five subspecies in the species psaltria (witti, hesperophila, psaltria, jouyi, columbiana). Passeriformes: Fringillidae (Carduelinae).

C. Synonomies of scientific nomenclature

Dawson (1923), Astragalinus psaltria hesperophilus. Peterson (1961), Spinus psaltria. Grinnell and Miller (1944), Chrysomitris psaltria; C. mexicanus; also under subspecies arizonae.

D. Synonomies of vernacular nomenclature

Dawson (1923), Green-backed Goldfinch. Peterson (1961), Dark-backed Goldfinch. Grinnell and Miller (1944), Arkansas Siskin; Western Goldfinch; Arkansas Finch; Arkansas Goldfinch; Mexican Goldfinch; Arizona Goldfinch.

II DESCRIPTION

A. External morphology of adults

Dawson (1923), "Adult male (no seasonal change): Pileum, broadly, glossy black; sides of head and upper parts olive-green, ...more yellow on rump, sometimes faintly streaked with darker, or blackish, on back; upper tail-coverts chiefly black; wings black; the middle and greater coverts and tertials (variably) tipped with white; both webs of inner primaries crossed about midway with white, forming a conspicuous blotch in flight; tail black, the two or three outermost pairs of feathers extensively white on inner web; underparts lemon-yellow, paling posteriorly, shading on sides. Bill horn-color; feet and legs brownish. Adult female: Like male but much paler and duller, without black. Above dull olive ...; below olive-yellow, paling posteriorly." Peterson (1961), "Male: a very small finch with a black cap, black or greenish backs and bright yellow underparts; bold white marks on wings. The black cap is retained in winter...Female: Very similar to female American Goldfinch but smaller, more greenish; had dark rump."

Carduelis psaltria (con't.)

B. External morphology of subadult age classes

Dawson (1923), "Immature males are like adult females but brighter, with early indications of black cap."

C. Distinguishing characteristics

Interspecific - Dawson (1923), "coloration not definitely gray, and chin not black, as distinguished from A. (C.) lawrencei." Peterson (1961), "The black cap is retained (by males) in winter (male Americans become brownish and lose caps)...American Goldfinch always shows white near rump. Summer male has yellow back."

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), Spinus psaltria in general: "Southwestern Washington, western Oregon, northeastern California, northern Nevada, northern Utah, northern Colorado, northwestern Oklahoma, and central Texas south through Mexico, Central America, and northwestern South America to northwestern Peru, central Colombia (San Agustin), and northern Venezuela. Introduced in western Cuba (Habana, Banza)." C. p. hesperophilus: "Resident from southwestern Washington (Vancouver), western Oregon (Portland; Coos County), northeastern California (Modoc County), northern Nevada (Santa Rosa Mountains), and northern Utah (Tooele, Morgan, and Uintah Counties) south through California and central Arizona (Flagstaff, Grand Canyon) to southern Baja California (Sierra de la Laguna) and southern Sonora (Guirocoba), Casual to eastern Oregon (Riverside), south-central New Mexico (San Antonio), and northwestern Durango." Dawson (1923), C. p. hesperophilus: "Southwestern United States from central northern Texas, northern Colorado, southern Idaho, and southern Oregon, south through Mexico to northern South America."

B. California distribution of the species

Dawson (1923), C. p. hesperophila: "An abundant breeder below the Transition zone and locally within that zone; most abundant along the southern coasts and in the central interior; rare or wanting in the humid Northwest; apparently absent from the central region east of the Sierras, at least above the head of Owens Valley and its tributaries (White Mountains above Bishop..., Hilton Creek, Long Valley..., near Mammoth Camp...), although reappearing in Lassen and Humboldt Counties (Goose Lake..., Surprise Valley..., Eagleville...); of local distribution in the deserts; of limited

Carduelis psaltria (con't.)

occurrence on some of the Santa Barbara Islands (Santa Cruz) and casually on the Farallons." Grinnell and Miller (1944), "The entire State, except small districts in high mountains and heavily timbered areas; may appear even in such places as a vagrant, especially in late summer. Most abundant and most continuously distributed in southern and central California west of the Sierra Nevada."

C. California desert distribution

Dawson (1923), "of local distribution in the deserts." Grinnell and Miller (1944), recorded in following areas: Buena Vista Lake, south fork of Kern River, and Walker Basin, Kern Co.; Los Angeles, Los Angeles Co.; Cabezon, Riverside Co.; Escondido and San Diego, San Diego Co.; Inyo, Panamint, Grapevine and Argus Mountains, Owens and Death Valleys, Inyo Co.; Mecca, Riverside Co. Carter (1937), reports various sized flocks and individuals often observed at Twentynine Palms, California. Miller (1951), Kern Basin, San Diego, Inyo, Modoc, Mojave regions and Channel Islands.

D. Seasonal variations in distribution

Grinnell and Miller (1944), "probably leaves northeastern section in winter." Willett (1912), "Abundant summer resident of the Mesa and foothill regions and up to 3000 feet in the mountain canyons. Less common in the lower country and up to 6400 feet in the mountains. In winter, distributed in flocks over the whole lower country."

IV HABITAT

A. Biotopic affinities

Small (1974), "riparian woodland, open forest, savannah, open areas with trees nearby." Peterson (1961), "open brushy country, open woods, wooded streams, gardens." Grinnell and Miller (1944), "Open terrain with scattered trees or bushes. Brush land may be occupied if open land and edge situations are present in the vicinity. Of the four members of the genus Spinus,...shows the widest range of tolerance with respect to rainfall, humidity and temperature. It appears to be the most water-seeking of all the gold finches." Miller (1951), Lower and Upper Sonoran and Transition life zones. Coutlec (1966), breed mainly in chaparral and oak woodland...Found in dry chaparral to distances of as much as one-half mile from water." Linsdale (1957), "In the dry seasons these birds concentrate about supplies of water in streams and springs."

Carduelis psaltria (con't.)

B. Altitudinal range

Grinnell and Miller (1944), "extends from -200 feet at Mecca, Riverside County, up to 9800 feet on Mount Tallac, Eldorado County; probably does not breed much above 6500 feet, as in San Bernardino Mountains and at Mono Lake." Dixon (1943), one observed in September, Kings Canyon National Park, at 11,000 feet.

C. Home range size

Coutlee (1966), reports territories about 30 meters in diameter.

D. Territory requirements

Perch sites - Jaeger (1947), "on creosote twigs." Coutlee (1968), "stations himself near the top of a tall tree and makes himself conspicuous by perching in the open and uttering occasional short songs."

Courtship and mating sites - Coutlee (1968), "As courtship progresses, the following flights develop into high-intensity chasing flights, the male following the female at a distance of two meters or less and the two birds darting rapidly in and out through dense foliage."

Nest sites - Dawson (1923), "Placed at any height but usually moderate, and in almost any host,--tree or bush or even rank weeds; live oaks and sycamores favorites;...of twisted grasses and weed fibers, deeply capped, lined with fine grasses or horsehair; settled firmly into concealing bunch of leaves or branching twigs, or sometimes artfully incorporated with immediate setting."

E. Special habitat requirements

Linsdale (1957) "Availability of water is important in the nesting season and afterward when water becomes scarce. The distribution of water helps determine where the goldfinches live."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Dawson (1923), "96 per cent...consists of weed-seed...Napa Thistle. Gander (1929), reports feeding on seeds of various species of Eucalyptus in Balboa Park, San Diego. Coutlee (1966) "feed almost exclusively on seed-bearing chaparral

Carduelis psaltria (con't.)

plants, although a few insects (mostly Aphidae) may be taken during the breeding season." Linsdale (1957), "plant materials, including buds, leaves, fruits, and seeds."

B. Foraging areas

Grinnell and Miller (1944), "Activity centers near the ground in foraging--on low-growing composites, for example, the seed heads on bush tops; seldom, as with the American Goldfinch and Pine Siskin, does it feed in the crowns of trees."

C. Foraging strategies

Dawson (1923), Napa Thistle: "cracks each brittle shell and, aided no doubt by its tongue, extracts...the starchy kernel." Ross (1924), "while seeding a batchelor button head, bent the slight stem to a horizontal position. When through with it, the bird reached deliberately out with one foot and grasped a nearby spray and pulled it under his feet on the original stem and ate from the new supply of seeds." Linsdale (1957), "forage in flocks through most of the year. They move through the bushes and trees that provide the major part of their food, and they sometimes concentrate on the lower herbaceous plants."

D. Feeding phenology

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Coutlee (1966), "he perches atop the highest branches of the trees within his territory...and gives very loud advertising song...Although given at fairly regular intervals throughout the day, song is characteristically triggered by song from other males or the presence of another male near the territory. If a strange male enters the territory, the resident male flies toward it with the 'song flight display'." Includes detailed analysis of vocalizations and comparisons with C. lawrencei.

Carduelis psaltria (con't.)

C. Courtship and mating behavior

Coutlee (1966), "small flocks broke up into pairs over a period of only one week. After this time they were found perching or flying in pairs, the male and female usually about a meter apart...Repeated chasing between the two members of a pair...characterizes the initial stages of courtship...This, in turn is replaced by 'billing' as members of the pair become more tolerant of one another... Billing develops into true 'courtship feeding' in which the female actually takes regurgitated food from the males bill...Feeding of the female by the male is continued throughout nesting." Coutlee (1971), detailed analysis of vocalizations.

D. Nesting phenology

Dawson (1923), "April to June, or occasionally in autumn; two or three broods." Grinnell and Miller (1944), "In south and west-central California, occasionally nests in fall."

E. Length of incubation period

Dawson (1923), "lasts eleven or twelve days." Coutlee (1966) "continuous incubation is begun before the clutch of three to five eggs is complete...the female is in almost continuous attendance at the nest during the 12-13 days of incubation."

F. Length of nestling period

Coutlee (1966), "the young remain in the nest for 12-15 days before fledging."

G. Growth rates

Coutlee (1966), description of development of vocalizations and motor patterns in hand-reared birds.

H. Post-breeding behavior

Coutlee (1966), "By the end of the first week or so after fledging...the young birds accompany the adults to foraging areas and are fed whenever they give the insistent begging calls. These small family groups do not return to the nesting territory and remain together until the end of the season when large flocks are again formed as migration begins."

Carduelis psaltria (con't.)

I POPULATION PARAMETERS

A. Clutch size

Dawson (1923), "4 or 5, ovate, pale bluish green, unmarked."

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Dawson (1923), after Carpodacus mexicanus, "possibly the most abundant numerically of the breeding birds of central and western California...about thirty million of them per annum in California." Carter (1937), "around April 27, 1934, flocks of 2 or 3 dozen frequented beds of a small yellow composite in the swamp." Coutlee (1966), "Both the Lesser and Lawrence's Goldfinches are highly social and form loose flocks of 20-30 birds during the non-reproductive season...May include members of both species of goldfinches or even of other passerines."

F. Habitat density figures

Gaines (1974), reports 35 and 43 territorial males per square kilometer in clumped cottonwood and willow woodland, Butte County, 1972 and 1973, respectively.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Coutlee (1968), "On one occasion a Cooper's Hawk called and alighted in an area where psaltria nests were abundant. About 20 psaltria gathered in a loose flock about the hawk--both in the same tree and in adjacent trees--and gave continual, drawn-out Hawk calls...Jays, squirrels, and cowbirds were chased...usually both male and female participating."

B. Competition

Coutlee (1966), "There is some competition for nest sites (with C. lawrencei) probably due in part to the highly social nature of both species and their attraction to nest building activities."

Carduelis psaltria (con't.)

C. Parasitism

Plath (1919), reports an average of 61% of the nests examined held young infested with larvae of Protocaliphora azurea; a total of 13 nests examined. Woods (1930), "found... incubating three of its own eggs and one of the cowbird's (Molothrus atea). The eggs were later abandoned before they had hatched."

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Resident, but there is considerable local movement and vagrancy...common to abundant."

B. Present population status

Small (1974), breeding resident.

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

Carduelis psaltria (con't.)

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32:126.

LONG-BILLED MARSH WREN

Cistothorus palustris

I TAXONOMY

A. Type description

AOU (1957), Telmatodytes palustris plesius: Cistothorus palustris plesius Oberholser, Auk, 14, no. 2, Apr. 1897, p. 188. (Fort Wingate, N[ew]. M[exico].). Telmatodytes palustris aestuarinus: T. p. aestuarinus Swarth, Auk, 34, no. 3, July (June 30), 1917, p. 310. (Grizzly Island, Solano County, California.)

B. Current systematic treatments

Paynter and Vaurie (1960), recognize four species in the genus Cistothorus; eleven subspecies of palustris. Passeriformes: Troglodytidae.

Ridgway (1904), discussion of morphological characteristics and geographic distribution in relation to systematic treatment.

C. Synonomies of scientific nomenclature

C. p. plesius, Grinnell and Miller (1944): Troglodytes palustris; Telmatodytes palustris plesius, Cistothorus palustris paludicola, Telmatodytes palustris paludicola.

C. p. aestuarinus: Telmatodytes palustris paludicola; C. p. paludicola.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), C. p. plesius: Tule Wren, Western Marsh Wren. C. p. aestuarinus: Tule Wren; Suisun Marsh Wren.

Dawson (1923), C. p. aestuarinus: Swarth's Marsh Wren, San Joaquin Marsh Wren. C. p. plesius: Interior Marsh Wren.

II DESCRIPTION

A. External morphology of adults

Dawson (1923), C. p. plesius: "Adult: Crown blackish; forehead warm brown...color sometimes spreading superficially over entire crown; hind-neck and scapulars a lighter shade of brown; rump bright brown; a triangular patch on back blackish, with prominent white stripes and some admixture of brown, wings and tail fuscous or blackish on inner webs, brown with black bars on exposed surfaces; upper and under

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tail-coverts usually more or less distinctly barred with dusky; sides of head whitish before, plain brown or punctate behind; a white superciliary line; underparts white, tinged with ochraceous buff across breast, and with pale cinnamon-brown on sides, flanks, and crissum. Bill blackish brown above, paler brown below; feet and legs brownish."

C. p. aestuarinus: "Like T. (C.) p. paludicola, but larger and somewhat darker; like T. (C.) p. plesius in size, but much darker."

C. p. paludicola: "Similar to T. (C.) p. plesius, but smaller and with coloration decidedly darker."

Ridgway (1904), detailed description of adults including plumage, soft parts, and measurements, as compared with T. p. palustris.

B. External morphology of subadult age classes

Ridgway (1904) concerning T. p. palustris: "Essentially like adults, but pattern of coloration less distinct, the pileum and hindneck uniform dull blackish, the back very indistinctly, if at all, streaked, and the whitish superciliary stripe less distinct (sometimes nearly obsolete)."

C. Distinguishing characteristics

Interspecific - Phillips (1975) "Short-billed Marsh Wren... has these upper tail coverts boldly barred and the crown streaked with whitish, not solidly dark." Peterson (1961), "known from other small wrens with white eye stripes by the white stripes on back."

Intraspecific - Phillips (1975) "The migratory eastern races ...lack the faint dusky bars on the upper tail-coverts."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), Telmatodytes palustris: Central British Columbia, northern Alberta, south-central Saskatchewan, southern Manitoba, southern Ontario, southwestern Quebec, southern Maine, and eastern New Brunswick south to northern Baja California, south-central Mexico, the Gulf coast, and southern Florida.

T. p. plesius: "Breeds from central British Columbia (Tachick Lake, Springhouse, Lac la Hache, Okanagon Landing), central

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and eastern Washington (Loomis, Kettle Falls, Spokane), Idaho (Lake Pend d'Oreille), western Montana (Forine, Swan Lake, Big Lake), northwestern Wyoming (Tower Falls), north-eastern Utah (Jensen), northwestern Colorado (Lag), south-eastern Wyoming (Laramie, Torrington, Cheyenne), and south-western Nebraska (Pine Bluffs, Crescent Lake Refuge) south to northeastern and central eastern California (Tule Lake, Pitt River, Rolands Marsh, Lake Tahoe), central Nevada (Yerington, Ruby Lake), south-central Utah (Margsvale), central New Mexico, and southwestern Texas (El Paso, Pena Creek)."

T. p. aestuarinus: "Resident in Sacramento, San Joaquin, and Imperial valleys of California, and the Colorado River Valley from southern Nevada (Search light, St. Thomas) south to southern California (Salton Sea, Alamo Duck Preserve), northern Baja California (Cerro Prieto, mouth of the Hardy River), northwestern Sonora (Colorado River Delta), and south-western Arizona (Mittry Lake, California Swamp).

B. California distribution of the species

Grinnell and Miller (1944), C. palustris plesius: "As breeding, northeastern plateau region, in Modoc, eastern Siskiyou and Lassen counties, and Tahoe area.

C. p. aestuarinus: "Sacramento and San Joaquin valleys from at least Glenn and Butte counties south to Kern County, and Imperial Valley and valley of lower Colorado River, in Imperial County."

C. California desert distribution

Dawson (1923), C. p. plesius: "interior birds, breeding at high levels east of the Sierras, are obliged to retire in winter to...southeastern deserts, and the...overflowed margins of the Colorado River and 'New' River...Many spill over at this season into the San Diego district."

Small (1974), "for breeding, coastally, length of state; also Central Valley, Imperial Valley and Modoc Plateau."

D. Seasonal variation in distribution

AOU (1957), T. p. plesius: "Winters throughout breeding range and south to southern California (including Santa Cruz and San Nicolas Islands), southern Baja California (San Jose del Cabo), Michoacan, Mexico, central Veracruz, and southern Texas (San Antonio, Fort Brown, Corpus Christi)."

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T. p. aestuarinus: "Found in winter in southern Utah." Dawson (1923), C. p. aestuarinus: "Winters irregularly south to the San Diego district." Small (1974), "some withdrawal of birds from northeastern section during fall and winter."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), C. p. plesius: "Typically, especially in nesting season, thick tracts of tall, straight-stemmed marshland vegetation as comprised of cattail, tule, and bulrush."

C. p. aestuarinus: "Fresh-water or brackish marshland, typically as grown to beds of cattail, tule, or bulrush." Similar to C. p. plesius. Small (1974), "fresh-water marshes, ponds, streams, and lakes grown with cattail, tule, bulrush." Miller (1951), Lower and Upper Sonoran and Transition Life Zones.

B. Altitudinal range

Grinnell and Miller (1944), C. p. plesius: "altitudes 4000 to 6200 feet."

C. p. aestuarinus: "altitudes of known nesting stations, all below 500 feet."

C. Home range size

Verner (1965a), C. p. plesius: in Washington, 2500-9600 square feet. Welter (1935), "A single monogamous male occupied a territory of from 13,000 to 15,000 square feet...In the grass association this was extended to approximately 30,000 square feet." Kale (1965), comparison of mean territory sizes among study areas and in different years.

D. Territory requirements

Perch sites - Kale (1965) "down in the dense grass or near the tops of tall dead flower stalks remaining from the previous year's crop of Spartina." Miller (1906), "cattail blade or a dead stalk."

Courtship and mating sites - Verner (1965a), "After establishing a breeding territory the male begins building "courting" nests...grouped in a small area...Number of nests...ranges from one partial to four or five complete nests...As the season progresses more courting centers are built, often overlapping others. Most songs are delivered from the courting center and little foraging is done there."

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Nest sites - Grinnell and Miller (1944) "Nests...above water, a greater measure of security against terrestrial marauders being thus probably secured." Verner (1965a) "usually placed in cattails (preferably in stands of moderate density), but occasionally...in bulrushes. A colony...placed their nests in the Spiraea, no cattails being available. Nest height...in direct relation to the height of supporting cover."

E. Special habitat requirements

Verner and Engelsens (1970), "cattail is the preferred nesting cover only if it has standing water. The importance of water could be in protection of the nest from predation and/or provision of a highly important food source.

F. Seasonal changes in habitat requirements

Grinnell and Miller (1944) C. p. plesius: "In migrations and in winter any sort of low vegetation growing in water or on damp ground suffices for foraging and concealment... In its winter range, when its elevated and interior summer grounds are largely uninhabitable, this wren finds in southern California the wet season on, with...plenteous fresh water and the lush plant growths that are to its liking." Verner and Engelsens (1970), "Bulrush typically grows in deeper water than cattail...Selection favored those males whose territories contained some bulrush because they were less likely to be forced to abandon their territories in mid-season." [See "Special habitat requirements"] Swarth (1917) "Especially numerous winter visitant in the San Diegan district of southern California. In this region summer is the dry season, a period of such excessive aridity that birds with the needs...of the marsh wrens are closely limited as to habitat, being restricted to extremely circumscribed areas about the few suitable permanent streams and sloughs. In winter this is all changed. Abundant rains often transform what were dry fields and pastures into ponds and marshes."

V FOOD

A. Food preferences

Verner (1964) "an almost exclusively animal diet, especially aquatic forms and terrestrial forms with aquatic life stages." Welter (1935), "There is no actual selection of types of insects by the species but the food taken depends upon its predominance and accessibility. Beetles...aquatic larvae...Coleoptera and Diptera." Miller (1906), "insects, their egg and larvae."

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B. Foraging areas

Verner (1965b), "normally forage on or near the marsh floor."
 Verner (1964), "Much food for Seattle young was obtained from willow thickets...the importance of bulrushes for foraging may result from their being more thoroughly broken down during the winter than is cattail, thus allowing more light to penetrate to the water surface and promoting higher production there...The greater proportion of foraging took place in it [bulrush]." Welter (1935) "Much of the food is obtained near or from the surface of the water...Upon the stems and leaves of the cattails and other plants."

C. Foraging strategies

Verner (1965b) "For an insectivorous species...food species would be less active, hence less conspicuous, at lower temperatures. They would also be more easily seen in bright than in dull light...The most efficient period for a Marsh Wren to forage is probably during the afternoon, when ambient temperature reaches a maximum." Welter (1935), "The elongated bill and natural agility of the bird are important."

D. Feeding phenology

Verner (1965b) "Young birds were fed on larger and larger items as they grew older, whereas the adults continued to eat very small items, such as aphids and mites." Welter (1935), "By the time the birds arrive in the spring there is an abundance of insect food...As the season advances insect food becomes more plentiful."

E. Energy requirements

Verner (1965b), "If it takes adult wrens nearly half their available time just to meet their own energetic demands, they must be seriously pressed to feed four or five young as well...Must also store enough energy to pass the night ...Enough energy must be stored to meet unexpected exigencies during the night, such as sudden temperature drops or disturbance from a roost."

VI REPRODUCTION

A. Age at first breeding

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B. Territorial behavior

Verner (1965a), C. p. plesius: "territorial limits were largely determined by the distribution of marsh vegetation, and birds utilized all of the areas they occupied." Welter (1936) "A male approaching too closely to the boundary of another's area is challenged by the song of the rightful owner...Several song perches are selected in different parts of the territory and the owner continues to go from one to another singing enroute." Kale (1965), "T. p. griseus delimits his territory by singing at one end of it for several minutes and then moving to the other end and singing there."

C. Courtship and mating behavior

Verner (1965a), "After establishing a breeding territory the male begins building "courting" nests...Female approaches a male's territory, he immediately flies toward her, delivering a rapid volley of songs with his tail cocked...Female examines and often enters one nest after another, being escorted to each by the male...Male practically ceases singing during courtship, resorting instead to display...After a female selects a mate, she either selects one of his courting nests for breeding and lines it...or she initiates a new nest, which is constructed chiefly by the male...A day or two before laying begins or shortly thereafter...shifts to another part of his territory...and starts building a new courting center from which he advertises for additional mates." Verner (1964) discussion of polygamy in different populations in Washington State. Welter (1936), description of courtship by male and a discussion of the song of the male.

C. Nesting phenology

Verner (1965a), "high degree of synchrony in the initiation of nest construction by males...males build a number of nests that are never used for breeding purposes...breeding nests differ from non-breeding nests by having a substantial lining." Welter (1936) description and discussion of multiple nests built by the male."

E. Length of incubation period

Verner (1965a), "Eggs...deposited at a rate of one per day... Incubation performed solely by the female." Mean incubation ranged from 14 to about 17 days near Seattle, Washington. Kale (1965) range of 12-14 days for 35 nests; mean of 13.1 days.

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F. Length of nestling period

Verner (1965a), "undisturbed nest often contained young 15 or 16 days old...continued to feed fledglings for 12 or more days." Kale (1965) reports 12 or 13 day. "If left undisturbed the young may remain in the nest 13-15 days."

G. Growth rates

Welter (1935), "The average weight for the newly arrived wren is 0.87 of a gram but by the end of the twelfth day this has been increased to an average of 11.08 grams. During this time the gain is from 1 to 1.7 grams per day...During the period of greatest feather growth the gain in weight drops off markedly." Includes graph of weight vs. age in days.

H. Post-breeding behavior

Verner (1965a), "As the young aged and became progressively more dependent the males' rates of singing and nest building once again increased. Welter (1935), "The family group remains together for some time and it is not unusual in mid-September to see four, five, and six birds of an age still keeping together. The young do not remain in the territory of their parents but wander from place to place."

VII POPULATION PARAMETERS

A. Clutch size

Verner (1965a), reports six as average; range of 4-8 eggs.

B. Fledging success

Kale (1965), "The number of eggs fledged in 1958 was 74 out of a total of 178 laid, or a nesting success of 42%. In 1959, 86 eggs fledged out of 421 laid, or a nesting success of only 20%. In 1960...success of 7%. In 1961... 15%."

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Grinnell and Miller (1944), C. p. plesius: "summer resident in elevated northeastern corner of State; winter visitant (September to March) in southern half, chiefly; transient there and elsewhere."

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C. p. aestuarinus: "Subject to fall and winter wandering of some individuals considerably out of breeding range." Welter (1935) "There is no marked exodus of birds from the marsh at a given time in the fall...As the time of departure approaches, there is an apparent flocking together of young birds, usually near the water's edge...Twenty-five or thirty birds may be observed together feeding near the surface of the water. The next day the numbers may be greatly reduced and in a short time only a few birds remain." Swarth (1917), "In winter...plesius is perhaps the most abundant of any form of the species, occurring in numbers over a large part of the state...May occasionally be found in winter at any point along the coast...both on the deserts and in the San Diegan region."

F. Habitat density figures

Welter (1935), "In an area 400 by 650 feet...eight males took up residence." Kale (1965), "The ecological density of 45-56 pr/ha (18-23 pr/acre) represents the number of birds in relation to the available wren habitat." Comparison of different methods of calculating population densities.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Bond (1939), six remains found in pellets of Barn and Horned Owls at Petroglyph Cliffs, California. Welter (1935), "The chief enemies...are some of the smaller mammals that reside in the marsh...No specific case has been observed but the appearance of the nest leads one to this conclusion ...Hawks and owls have a poor chance of adding this species to their diet as they are never very conspicuous and can easily hide in the dense vegetation." Kale (1965), reports Rice Rat, racoon, and mink prey on eggs and young (Georgia). Suspect Fish Crows and Boat-tailed Grackles.

B. Competition

Dawson (1923) "had constructed a sham nest hard against a completed structure of the Yellow-headed Blackbird, and to the evident retirement of its owner." Welter (1935) "it is apparently not unusual to find a colony of [bumble bees] in a nest of this species." Allen (1914), describes destruction of fifty-one nests of Red-winged Blackbirds.

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C. Parasitism

Welter (1935), flea (Ceratophyllus garei) and louse (Philopterus m. mirinotatus) recorded; hippobascid flies observed. "The alimentary tracts of more than fifty birds were examined carefully without obtaining a single cestode or nematode."

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Common to even abundant where conditions of habitat are most favorable."

B. Present population status

Small (1974), "common resident but some withdrawal of birds from northeastern section during fall and winter."

C. Population limiting factors

Kale (1965), "discussion of factors which may possibly limit the wren population (food, high tides, predation, territoriality and social behavior).

D. Environmental quality: adverse impacts

E. Potential for endangered status

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LONG-EARED OWL

Asio otus

I TAXONOMY

A. Type description

AOU (1957), Asio otus tuftsi Godfrey, Can. Field-Nat., 61, no. 6, Nov.-Dec. 1947 (Feb. 13, 1948), p. 196. (South Arm, Last Mountain Lake, Saskatchewan.)

B. Current systematic treatments

Peters (1940), recognizes six species in the genus Asio; three subspecies of the species otus. Order: Strigiformes; Family: Strigidae.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Otus wilsonianus; Otus vulgaris wilsonianus; Otus brachyotus var. wilsonianus; Asio americanus; Nyctalops wilsonianus; Asio wilsonius; Asio otus wilsonianus.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), American Long-eared Owl.

II DESCRIPTION

A. External morphology of adults

Ridgway (1914), detailed descriptions of adults and young, including plumage, soft parts, and measurements. Peterson (1961), "A slender, medium-sized, grayish owl with long ear tufts...Face dark rusty." Dawson (1923), "Adult: Above finely mottled white and dusky, with apparently half-concealed ochraceous on subterminal margins of feathers, the design broadened on wings,--ochraceous, white, and dusky in patches; the wing-quills and tail distinctly barred--dusky with ochraceous basally, dusky with gray terminally; ear-tufts conspicuous, an inch or more in length, black centrally, with white and ochraceous edges; facial disc tawny; region about base of bill, or at least chin, white; blackish about eyes on inner sides, the edges, especially on forehead, finely mottled with black and white; tibiae, tarsi, and feet pale tawny, immaculate; remaining underparts white, ochraceous, and dusky, in bold, free pattern, and upper breast distinctly and heavily streaked, the sides and flanks distinctly barred, the belly exhibiting a combination of the two types; lining of wing pale tawny, unmarked basally, save for a dusky patch on tips of coverts, heavily barred distally. Bill and toe-nails blackish. The folded wings exceed the tail, and the bill is nearly concealed by black and white bristles."

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B. External morphology of subadult age classes

Ridgway (1914), detailed description of plumage and soft parts. Armstrong (1958), description of plumage changes as observed regularly to 59 days of age. Dawson (1923), "Everywhere, except on head and linings of wings, finely barred dusky and gray or ochraceous."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "much smaller than Horned Owl, streaked lengthwise, rather than barred, beneath. 'Ears' closer together, toward center of forehead, giving a different aspect...Screech Owl is smaller, has shorter ears, lacks rusty face...In flight, Long-eared Owl's ear tufts are depressed; then grayer color, habitat distinguish it from Short-eared Owl."

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "British Isles, western Europe from lat. 66°N., Siberia from lat. 60°N., and Japan south to the Azores, Canary Islands, Morocco, Tunisia, southern Europe, Palestine, Afghanistan, the Himalayas, Manchuria, Korea, and Formosa; southern Alaska, southern Mackenzie, southern Manitoba, central Ontario, southern Quebec, and Nova Scotia south to northwestern Baja California, southern Arizona, Oklahoma, Arkansas and Virginia." A. o. tuftsi: "Breeds from southern Mackenzie (Fort Simpson, Fort Providence), central British Columbia (Nulki Lake), and Saskatchewan south to southern California (including Catalina Island), northwestern Baja California (to lat. 30°N.), southern Arizona (Bates Well, Pima County, Santa Rita Mountains), New Mexico (Santa Fe), and western Texas."

B. California distribution of the species

Grinnell and Miller (1944), "Entire length of State east of northern humid coast belt; three centers of abundance, in northeastern Great Basin territory, in central valleys, and in San Diegan district. Peripheral stations: northernmost in coast belt, Bodega and Sebastopol, in Sonoma County...Northeasternmost, Goose Lake and Surprise Valley, Modoc County...to eastward on southern deserts, chiefly or perhaps entirely." Dawson (1923), "Locally resident, chiefly in interior valleys, on the oak-covered foothills, and along wooded streams of the Upper Sonoran zone, south (at least formerly) to San Diego. Sparingly resident on the Santa Barbara Islands...An occasional invader of the higher mountains."

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C. California desert distribution

Grinnell and Miller (1944), "in winter: Mohave River near Yermo, San Bernardino County...Palm Springs, Riverside County ...Palo Verde, Imperial County." Dawson (1923), "Numbers augmented in winter, at least in San Diego district and on the edges of the deserts."

D. Seasonal variations in distribution

AOU (1957), Asio otus in general: "In winter south to Egypt, Iraq, northwestern India, and southern China, and to Baja California, central Mexico, Texas, and Florida. Fossil, in the Pleistocene of California and Nuevo Leon." A. o. tuftsi: "Winters from southern Canada south to Northern Baja California, Sonora (Tiburón Island), and Durango."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), "Typically, bottomlands grown to tall willows and cottonwoods; but also, west of Sierran divides, belts of live oaks, especially as paralleling stream courses." Armstrong (1958), "either coniferous or deciduous nesting habitats." Small (1974), "riparian woodlands and stands of live oaks along watercourses." Miller (1951), Lower and Upper Sonoran and Transition life zones."

B. Altitudinal range

Grinnell and Miller (1944), "ranges normally up to 2000 feet west of Sierras, up to 7000 feet east of Sierra Nevada; exceptionally has reached 9000 feet on San Jacinto Peak, Riverside County...and 10,500 feet on White Mountains, Mono County."

C. Home range size

Craighead and Craighead (1956), during nesting season in Wyoming, 1947, reported ranges of three nesting pairs: 0.13 sq. mile (maximum diameter of 0.7 mile); 0.41 sq. mile (maximum diameter of 1.0 mile); 0.10 sq. mile (maximum diameter 0.5 mile).

D. Territory requirements

Perch sites - Marti (1976), "It does require small, dense trees for nesting and roosting." Randle and Austing (1952), "roosted at a height of six to twelve feet, close to the

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trunk. In three places where the owls had a choice between trees taller than twenty feet and those smaller than fifteen feet in contiguous groves they chose the smaller trees." Peterson (1961), "Usually seen 'frozen' close to trunk of dense tree."

Courtship and mating sites -

Nest sites - Armstrong (1958), "Nests in Michigan have been recorded from ground level to a height of 40 feet." Dawson (1923), "Usually a deserted nest of crow, magpie, heron, etc.; sometimes in rock-rifts or even on the ground... Nests regularly in live oaks and evergreens."

E. Special habitat requirements

Udvardy (1958), "The only bird that in North America is largely dependent on the deciduous woods is Asio otus." Grinnell and Miller (1944) "Open land productive of mice is requisite, as also presence of old nests of crows, hawks or magpies for breeding purposes."

F. Seasonal changes in habitat requirements

Wilson (1938), "During the late summer, fall and winter months they inhabited the coniferous woods and during their nesting and brooding seasons from March until June, they were found in the hard woods." (Michigan)

V FOOD

A. Food preferences

Errington (1932), "Total vertebrate kills from pellets and stomachs (quantitative data) amount to 3273: juvenile cotton-tail, 1; Norway rat, 3; meadow mouse, 2732; deer mouse, 497; shrew, 14; small bird (mostly finches), 26." Graber (1962), "The detailed record of pellet contents...indicates that Long-ears usually consume voles and deer mice entirely, while house mice are more often only partly eaten." (Illinois). Marti (1976), "feed upon small, nocturnal mammals that live in open lands, i.e., farmlands, grasslands, marshes and deserts." Includes detailed discussion of diet.

B. Foraging areas

Marti (1976), "This is a strictly nocturnal species...and apparently feeds almost exclusively in open lands." Getz (1961), Washtenow County, Michigan: "fed primarily on the meadow vole, and hunted in an old-field habitat. They apparently did not utilize a near-by marsh, although it

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contained more voles than the old field. The use of the old field appears to be related to a lesser amount of cover in this habitat than in the marsh. Timbered areas nearer the roost than the old field and having a greater abundance of small mammals were not utilized...Therefore, apparently prefer open, grassy areas to timbered areas."

C. Foraging strategies

Marti (1976), "compared to many other North American owls this species has rather light wing-loading, which indicates efficiency of hunting on the wing." Dawson (1923), "strictly nocturnal in habit."

D. Feeding phenology

Errington (1932), reports the following from analysis of pellets and stomachs: Fall, winter, early spring, 1929-30, 99.66% mammals, 0.34% birds; Late spring, early summer, 1930, 87.62% mammals, 12.38% birds; Late summer, 1930, 92.6% mammals, 7.4% birds; Fall and early winter, 1930, 99.24% mammals, 0.76% birds; Late winter and early spring, 1931, 100% mammals, (Wisconsin). Graber (1962), "With the passing of winter into spring, there was a marked increase in frequency of house mice and least shrews in pellets at both roosts."

E. Energy requirements

Graber (1962), "Standard (basal) rate: 26 kcal./bird/day (105 kcal./ig./day), aviary existence: 109 kcal./bird/day (357 kcal./kg./day), natural existence: 159 kcal./bird/day (532 kcal./kg./day)."

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Bent (1938), "is normally so inactive and retiring during the daytime that we have learned very little about its behavior, except what we have seen of it when its nest or brood of young is disturbed." Dawson (1923), describes individuals feigning prey capturing as a method of distracting attention from the nest.

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C. Courtship and mating behavior

Armstrong (1958), "The courtship pattern consisted of competitive calling, aerial performance, non-competitive calling, nest selection and copulation...Flights were sporadic and irregular and consisted of turning, twisting, diving, and wing slaps. An owl would suddenly disappear in a swoop or dive to the pines, and on several occasions, a cracking noise was heard, evidently made with the wings slapping each other."

D. Nesting phenology

Dawson (1923), "February-May; one brood."

E. Length of incubation period

Armstrong (1958), "lasted from 23 to 26 days...from 22 to 26 days."

F. Length of nestling period

Armstrong (1958), "When young were 25 or 26 days old, their wings were developed sufficiently to permit them to leave the nest." Whitman (1924), "The oldest left the nest when about four weeks old, but the younger ones...began crawling around in the branches long before they could fly."

G. Growth rates

H. Post-breeding behavior

Wilson (1938), "offspring remained with the parents until January of the next mating season when all but the mated adults disappeared."

VII POPULATION PARAMETERS

A. Clutch size

Whitman (1924), reports a nest containing four eggs and two newly hatched young. Dawson (1923), "3 to 6; subspherical, white (or not infrequently red-spotted with nest-marks).

B. Fledging success

Craighead and Craighead (1956), report in Wyoming, 1947: 93% nesting success based upon number of fledglings (8) per total eggs laid.

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C. Mortality rates per age class

Craighead and Craighead (1956), report for Wyoming, 1947: 7% of the clutches were incomplete or nests failed to receive eggs; 7% of the eggs were destroyed, infertile, or failed to hatch; no mortality in the nest after hatching was observed.

D. Longevity

E. Seasonal abundance

F. Habitat density figures

Randle and Austing (1952), "Where more than one bird was found in the same group of trees, roosting was communal. In one place twenty-seven birds flushed from a clump of four fifteen-foot pines. In a second place five birds were in a twelve-foot pine and six in two neighboring trees. On another occasion eight were discovered in two intermingling trees."

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Marti (1976), detailed analysis of prey items of this species. Armstrong (1958), examination of predation on mouse population near nesting sites of this species in Michigan. Sutton (1926), reports this species preying upon Ruffed Grouse in Cameron County, Pennsylvania. "It seems hardly possible that so light a creature as the Long-eared Owl should customarily kill creatures so much heavier than itself."

B. Competition

Wilson (1938), "Occupied and hunted the same areas used by Marsh Hawks (Circus hudsonius), and the Red-shouldered Hawk Buteo lineatus." (Michigan)

C. Parasitism

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Resident within State, but with markedly irregular wanderings of individuals and groups. In general, numbers are so large as to warrant term 'common,' even 'abundant' locally. Reduction of late years is apparent, in the main probably as result of clearing of bottomlands for farming."

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B. Present population status

Small (1974), "resident but populations shift about in unknown pattern."

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

Asio otus (con't.)

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55:187-197.

MOUNTAIN BLUEBIRD
Sialia currucoides

I TAXONOMY

A. Type description

Sialia currucoides - AOU (1957) Motacilla s. Sylvia Currucoides "Borkh," Bechstein, in Latham, Allgem. Ueb. Vogel, vol. 3, pt. 2, 1798, p. 546, pl. 121. (Virginien = western America.).

B. Current systematic treatments

AOU (1957) considers this species a member of the avian Order Passeriformes, Family Turdidae (Thrushes, Solitaires, and Bluebirds); listed as monotypic.

Peters (1964) lists the Mountain Bluebird as a member of the Subfamily Turdinae, Family Musicapidae; also considered monotypic

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Sialia arctica. Ridgway (1907) adds, Erythaca arctica; Sylvia arctica; Sialia macroptera.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Arctic Bluebird; Rocky Mountain Bluebird.

II DESCRIPTION

A. External morphology of adults

Ridgway (1907) gives detailed description of plumages and measurements of all age classes and sexes. Describes adult male as "above plain rich turquoise...bill, legs, and feet, black; iris, dark brown." Miller and Stebbins (1964), "A bluebird without any rich brown areas...Male light azure blue above and below, except belly, which is white.

B. External morphology of subadult age classes

Ridgway (1907) details subadult plumages--"Young male... light brownish gray or drab-gray...indistinctly streaked with white. Young female, similar to the young male, but blue of wings and tail much duller." Wheelock (1920), "Young: Grayish, indistinctly streaked or mottled with white; wings and tail blue."

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C. Distinguishing characteristics

Interspecific - Peterson (1961), "Similar species: (1) Other bluebirds have red breasts. (2) Male Blue Grosbeak has a thick bill, brown wing bars. (3) Male Indigo Bunting is smaller, very much darker."

Intraspecific - Ridgway (1907) states that the female is "plain mouse gray or smoky gray, sometimes faintly tinged with greenish blue...turquoise or light cerulean blue." Adult male--length 169 mm; wing 117 mm; tail 72 mm, and female--length 166 mm; wing 112 mm; tail 68 mm. Miller and Stebbins (1964), "Male light azure blue...Female dull brownish with pale, dull blue rump, tail, and wings."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) gives the range of the Mountain Bluebird (Sialia currucoides) as "Breeds from central Alaska, southern Yukon, southern Mackenzie, southern Saskatchewan, and southwestern Manitoba south along eastern slopes of the coast ranges, and in the Sierra Nevada and the Rocky Mountains to northwestern and central southern California (South Yolla Bolly Mountains, Mt. Sanhedrin, Panamint Mountains, San Bernardino Mountains) central and southeastern Nevada, northern Arizona, southern New Mexico, western Oklahoma, Colorado, western Nebraska, South Dakota, and northeastern North Dakota. Winters from southern British Columbia and western Montana south to northern Baja California, Sonora, southern Chihuahua, Guanajuato, central Nuevo Leon, and southern Texas; extending to the Pacific coast and offshore islands, and to western Kansas, western Oklahoma, and western Texas." Peters (1964), "Breeds from central Alaska, southern Yukon, southern Mackenzie, and southwest Manitoba south in the mountains to southern California, northern Arizona, southern New Mexico, and in plains of Dakotas; winters from southern British Columbia south to Baja California, Sinaloa, Michoacan, Guanajuato, Nuevo Leon, and southern Texas."

B. California distribution of the species

Grinnell and Miller (1944) list range as "Breeds along Cascade--Sierra Nevada Mountain system and on high plateaus and mountains to eastward from Warner Mountains south to Panamint Mountains, Inyo Co.; also in inner northern coast ranges from Siskiyou Co. south to Mt. Sanhedrin, Mendocino Co., and in San Bernardino Mountains of southern California. In winter, throughout state at lower levels." Small (1974) gives range as "for breeding, Sierra Nevada and Cascades,

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Warner Mountains, inner Coast Range south to Mendocino County, San Bernardino Mountains; in winter sometimes common in San Joaquin Valley, Carrizo Plain in eastern San Luis Obispo County, Antelope Valley, and Imperial Valley." Wheelock (1920), "On the higher Sierra Nevada, from Mt. Shasta to the San Bernardino Mountains."

C. California desert distribution

Grinnell and Miller (1944) summarize winter desert records, including--Death Valley, Twentynine Palms, Needles, and Brawley. At Joshua Tree National Monument, Miller and Stebbins (1964) called this species a "Winter visitant in moderate numbers. Recorded from: Upper Covington Flat, March 10; Quail Spring, January 27; Twentynine Palms, November 16...March 24." Willett (1951) stated that although they do not remain to breed, these bluebirds are found on southern California deserts during winter. Wauer (1964) found Mountain Bluebirds breeding in the limber pine association between 8,000 and 9,000 feet in the Panamint Mountains, Death Valley. Gilman (1935) noted the presence of this bluebird in Death Valley (Furnace Creek Ranch; Eagle Borax Works) from January to mid-April. Carter (1937) noted Mountain Bluebirds, often in mixed flocks of Western Bluebirds, at Twentynine Palms between January and mid-March. Van Rossem (1911) noted this species near the Salton Sea during winter. Lamb (1912) discovered only four Mountain Bluebirds between December and March on the Mohave Desert near Daggett (San Bernardino Co.). During winter in the lower Colorado Valley, Price (1899) found these bluebirds to be "Common about alfalfa fields in the river bottom." Grinnell (1904) noted this species wintering near Palm Springs, Riverside Co. Near Victorville during winter, Mailliard and Grinnell (1905) encountered several flocks of these bluebirds "out on the desert quite a distance from the (Mojave) river."

D. Seasonal variations in distribution

Grinnell and Miller (1944) found in California that "Winter occurrence in lowlands irregular as to date and variable from year to year; noted chiefly from November to March." Small (1974) gives seasonal status in California as "summer visitor in mountains and northeastern plateau; winter visitor in some lowland areas." In California, Willett (1933) noted "Breeds in higher mountains, mostly on eastern slope, south to San Bernardino Range; more or less common in lower country in winter."

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IV HABITAT

A. Biotopic affinities

In California, Grinnell and Miller (1944) give habitat as "Widely open terrain, the ground covered with short grass, alpine turf, stunted or widespread bushes, or even rock shingle. At Joshua Tree during winter, Miller and Stebbins (1964) noted Mountain Bluebirds on "open desert."

B. Altitudinal range

In California, altitudes of known nesting range from 4,000 to 12,000 feet (Grinnell and Miller 1944).

C. Home range size

In Montana, Power (1966) found "The smallest territory... was only approximately 100 yards wide, while other territories had no clear boundaries, and the resident bluebirds occasionally flew...from their nests, up to about one-quarter mile away."

D. Territory requirements

Perch sites - "Perches may be provided by rocks, bush tops, or scattered trees or small or moderate stature" (Grinnell and Miller 1944). Haecker (1948) noted these bluebirds feeding from a wire, usually 8 to 15 feet above ground.

Courtship and mating sites - Power (1966), "The male chased his mate and nearly caught her in flight...both perched next to one another on a wire fence...while on an elevated perch, males simply flew up to their mates and mounted them."

Nest sites - Grinnell and Miller (1944), "For nest sites dead trees usually are present, but rock crevices and man-made structures may be used." Peterson (1961), "In hole in tree, stub, cliff, bird box." Wheelock (1920), "In old woodpecker holes or in natural cavities of dead trees." In Wyoming, Calder (1970) noted a Mountain Bluebird pair nesting in an old Dipper (Cinclus mexicanus) that was placed under a bridge.

E. Special habitat requirements

On the California desert (Joshua Tree), Miller and Stebbins (1964) noted that this species "frequents the desert only in the coldest months."

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F. Seasonal changes in habitat requirements

Small (1974), "for breeding, subalpine forest of Canadian and Hudsonian life zones...in winter not uncommon in certain open plains and grasslands and more arid agricultural lands." Peterson (1961), "Open terrain with scattered trees; in winter, also treeless terrain."

V FOOD

A. Food preference

Martin et al. (1961) describe animal food as--beetles, particularly ground beetles, and weevils are the major items in the diet, followed by grasshoppers and crickets, ants, caterpillars, and bugs. Plant food includes grapes and elderberries. In California, Wheelock (1920) noted "Crickets, grasshoppers, beetles, butterflies, and worms are their menu, with a few berries."

B. Foraging areas

"The insects for which these bluebirds forage may be taken either on the ground or in the air" (Grinnell and Miller 1944). Grinnell and Storer (1924) noted this species foraging on grasslands and meadows in Yosemite. In Arizona, Phillips et al. (1964) found this bluebird foraging in open country, farmlands, grasslands, and open berry-bearing woods and brush.

C. Foraging strategies

Grinnell and Miller (1944), "Open tracts of ground and snow banks are searched over from the wing by cruising out from distant resting places. High tolerance of wind and light exposure is shown." Miller and Stebbins (1964) found that on California deserts (winter), this bluebird's insect food is taken chiefly from the open ground. Wheelock (1920) "they have all the habits of flycatchers...flying out after insects, or skimming the air like swallows, and hovering like hummingbirds." Power (1966), "Mountain Bluebirds have three distinct types of foraging behavior, used in the following order of frequency: Perch-feeding, hovering, and flycatching."

D. Feeding phenology

Martin et al. (1961) notes the taking of grapes and elderberries by bluebirds, especially during summer, fall and winter.

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E. Energy requirements

While wintering on California deserts, Miller and Stebbins (1964) felt that the insect food of these bluebirds provided adequate moisture.

VI REPRODUCTION

A. Age at first breeding

Power (1966) reported that a young banded in 1962 returned to nest in 1963 in a Montana study (no sex given).

B. Territorial behavior

Power (1966) described this species territory as "a large breeding area wherein courtship, copulation, nesting, and food-seeking occur...Nesting territories were defended by both sexes." Details of the mechanisms of territorial defense, including advertising song and fighting behavior, are discussed.

C. Courtship and mating behavior

Power (1966) noted that "Pair formation occurred quickly, after females arrived and joined territorial males...Early coition attempts by males were repulsed. In precopulatory displays, females on an elevated perch held their bodies horizontal with heads raised, wings slightly lowered, and tails raised."

D. Nesting phenology

In California, Wheelock (1920) reported the breeding season as May to July. Power (1966) found that 50% of all pairs that successfully raised first broods attempted second broods (Montana). In southwestern California, this species nests "mostly in May" (Willett 1933). Bent (1964) gives California egg dates as "34 records, April 5 to July 17; 17 records, June 9 to June 18, indicating the height of the season."

E. Length of incubation period

Wheelock (1920) reported a 14 day period. In Montana, Power (1966) listed incubation as lasting 13 days. Haecker (1948) gave a 13 or 14 day period (Wyoming).

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F. Length of nestling period

Power (1966) found that "Young normally fledged between 22 and 23 days of age...Fledglings began feeding themselves at about 33-34 days of age...Fledglings became completely food independent at 22-28 days after leaving the nest (44-51 days of age)."

G. Growth rates

Wheelock (1920) found that "On the second day down begins to appear..on the fourth or fifth day the eyes show signs of opening; on the sixth day they open, and the down is well spread...The young bluebirds double their weight every 24 hours for the first weeks."

H. Post-breeding behavior

Small (1974) states that after breeding, these bluebirds frequently range upwards into Arctic Alpine Life Zone in California. Grinnell and Storer (1924) noted the formation of "small scattering companies" during fall and winter in California mountains. Power (1966) noted that "By late August flocks were composed of birds "of all ages and sexes."

II POPULATION PARAMETERS

A. Clutch size

Peterson (1961), "Eggs (4-6; 8) pale blue." Bent (1964) gives a range of 4 to 8 eggs per clutch, with sets of 5 and 6 the commonest.

B. Fledging success

Power (1966) found hatching success was 76.6%, and nest success (those fledging at least one young) was 68.7% in a Montana study.

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Wauer (1962) noted that in Death Valley, wintering Mountain Bluebirds are "sporadic in occurrence; they are common some winters and absent others."

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F. Habitat density figures

In a Sierra Nevada conifer forest, Bock and Lynch (1970) found 15.2 breeding pairs per 100 acres of Mountain Bluebirds. In Wyoming, Finzel (1964) noted 6-7 bluebirds per 40 acres. In a Wyoming aspen forest, Salt (1957) found about 30 Mountain Bluebirds per 100 acres during summer.

III INTERSPECIFIC INTERACTIONS

A. Predation

Marti and Braun (1975) found that Mountain Bluebirds made up 5.6% of a nesting Prairie Falcons diet on the tundra of Colorado (above 11,000 feet). In north-central Colorado, Marti (1974) noted this bluebird was taken only once in over 4,000 kills by a Barn Owl. Power (1966) noted that "The only probable predators observed were a Marsh Hawk, a Sparrow Hawk, and a group of Common Crows" (Montana). In British Columbia, Munro (1940) found Sharp-skinned Hawks taking this bluebird for food.

B. Competition

Power (1966), in a Montana study, found "nest-site competitors were Tree Swallows, House Wrens, Mountain Chickadees, Red-shafted Flickers, and two rodents." Munro (1943) noted the unsuccessful attempt by a pair of Mountain Bluebirds to take a nest hole from Hairy Woodpeckers.

C. Parasitism

Friedmann (1963) and Friedmann et al. (1977) noted that cowbird parasitism of Mountain Bluebirds is extremely rare.

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Common summer resident in the mountains; but rated as very common or abundant in north-east section."

B. Present population status

Johnson (1974) reported an apparent increase in the breeding population of this bluebird since a 1940 study in the Grapevine Mountains, Death Valley National Monument, Nevada. Arbib (1976) concluded that the Mountain Bluebird is decreasing in the mountain regions of the western United States.

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C. Population limiting factors

In Montana, Power (1966) concluded that "highly specialized nesting requirements have produced a relatively unadaptable species, whose population has declined as a result of environmental changes of recent decades." Haecker (1948) felt that lack of nesting cavities was the main deterrent to range expansion of this species. In northern California, Grinnell et al. (1930) noted that the presence of this species was largely determined by the availability of suitable nest holes.

D. Environmental quality: adverse impacts

E. Potential for endangered status

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MOUNTAIN CHICKADEE

Parus gambeli

I TAXONOMY

A. Type description

AOU (1957) Parus gambeli baileyae Grinnell, Condor, 10, no. 1, Feb. 1, 1908, p. 29. (Mount Wilson, 5500 feet altitude, Sierra San Gabriel, Los Angeles County, California.)

Penthestes gambeli inyoensis Grinnell, Univ. California Publ. Zool., 17, no. 17, May 4, 1918, p. 509. (Panamint Mountains (northern part), 3 miles east of Jackass Spring, 6200 feet altitude, Inyo County, California.)

B. Current systematic treatments

Behle (1956), recognizes seven subspecies of Parus gambeli (gambeli, grinnelli, abbreviatus, baileyae, atratus, inyoensis, wasatchensis). Detailed discussion of racial characters and comparisons; geographic distribution; localities, and geographic variation and intergradation.

Snow (1967) recognizes 43 species in the genus Parus; five subspecies of gambeli. Passeriformes: Paridae.

Ridgway (1904) discussion of morphological characteristics and geographic distribution in relation to systematic treatment.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), P. g. inyoensis: Penthestes gambeli; Penthestes gambeli baileyae; P. g. baileyae: Parus montanus; Penthestes gambeli baileyae; Penthestes gambeli gambeli.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), P. g. inyoensis: Inyo Mountain Chickadee; Bailey Mountain Chickadee. P. g. baileyae: Rocky Mountain Chickadee; Mountain Titmouse; Bailey Chickadee; Bailey Mountain Chickadee.

II DESCRIPTION

A. External morphology of adults

Ridgway (1904), detailed description of plumage, soft parts, with measurements, adults spring and summer versus autumn and winter. Udvardy (1977), "White eye-stripe, black cap and bib; pale gray flanks."

Parus gambeli (con't.)

B. External morphology of subadult age classes

Ridgway (1904), "Young.--Similar to adults but the back of the head and neck duller, white superciliary streak much less distinct (pale gray rather than white) and edgings of greater wing-coverts and tertials faintly tinged with pale brownish buff."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "Similar to Black-capped Chickadee, but black of cap interrupted by white line over each eye. Sides lack buff."

Intraspecific - Behle (1956), "The race inyoensis can be distinguished from baileyae by its much paler, buffy, less plumbeous appearance, narrower bill, and longer tail."

II GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "Resident in the Rocky Mountains, the Sierra Nevada, and the inner coast ranges from northwestern British Columbia and southwestern Alberta to northern Baja California, central and southeastern Arizona, central and southeastern New Mexico, and southwestern Texas.

B. California distribution of the species

AOU (1957), Parus gambeli baileyae: "Resident in the mountains of southern California (San Lucia Mountains, Mount Pinos, and the San Bernardino, San Jacinto, and Laguna Mountains)."

Parus gambeli inyoensis: "Resident in the Great Basin from southcentral Idaho...through central and eastern Nevada... and western and central southern Utah...south to eastern California (White, Inyo, and Panamint Mountains, Clark Mountains), and southern Nevada." Grinnell and Miller (1944), P. g. inyoensis: "Higher mountain masses lying east and southeast of Sierra Nevada...southern Great Basin ranges ...from vicinity of Mono Craters and eastward to include White Mountains, in Mono County, south along Inyo Mountains to and including Grapevine, Panamint, and Argus mountains, in Inyo County, and Clark Mountain, eastern San Bernardino County."

P. g. baileyae: "Higher Mountains of southern California... southeast from high parts of Santa Lucia Mountains, Monterey County, interruptedly, to Tejon Mountains, Kern County, and through mountainous parts of intervening counties as far as Cuyamaca and Laguna mountains, in San Diego County."

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C. California desert distribution

Dawson (1923) P. g. baileyae: Mt. Wilson, Los Angeles County; San Bernardino Mountains.

P. g. inyoensis: "from the vicinity of Mono Craters in the White Mountains, in Mono County, south to the Panamint Mountains, in Inyo County."

Behle (1956) P. g. baileyae: "In winter chickadees of this race are known to occur in the lower valleys at the bases of the mountains, having been recorded from Pasadena and in the desert along the Mohave River at Victorville."

Jaeger (1947), observation of individual foraging creosote bush in Lucerne. Miller (1951) P. g. inyoensis: Inyo Mountains. P. g. baileyae: San Bernardino, San Jacinto, San Diegan Mountains.

D. Seasonal variations in distribution

Small (1974), "small numbers descend to lowlands during fall and winter." Dixon and Gilbert (1964), "adult(s)... are sedentary on their breeding grounds, and that in winter months they form stable social groups in which the sexes are approximately equal... Altitudinal movements are performed largely if not solely by first-year birds. Udvardy (1977), "frequently descends to the lowlands in winter. In November an occasional flock can be found near sea level in desert oases containing conifers such as Palm Springs, California, while other flocks, will still be at 8500 feet in the subalpine forest of adjacent Mount San Jacinto."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), P. g. inyoensis: "Coniferous trees, from pinons, even where fairly open, up to stunted limber pines at timber line (on White Mountains); also tracts of mountain mahogany."

P. g. baileyae: "Coniferous trees, especially as growing in open stands. These may be mixed with such deciduous trees as black oak; used also for foraging and even nesting, but coniferous trees must also be within daily cruising radius." Small (1974), "montane forest and lower portions of the subalpine forest in the Transition and Canadian Life Zones." Miller (1951), Transition, Canadian, and Hudsonian Life Zones. Dixon (1961), discussion of distribution and niche relationships of Parus.

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B. Altitudinal range

Grinnell and Miller (1944), P. g. inyoensis: "6500 feet up to 11,500 feet on White Mountains. Descends to at least 5600 feet in autumn as near Benton, Mono County."

P. g. baileyae: "of known nesting, 3000 feet in Santa Lucia Mountains up to 10,600 feet on San Bernardino Peak, San Bernardino County."

C. Home range size

Laudenslayer and Balda (1976), mean territory size of 1.5 ha.

D. Territory requirements

Perch sites -

Courtship and mating sites - Dixon, Stefanki and Folks (1970) "terminal solicitation and coition occurred in leafless aspens interspersed among the conifers."

Nest sites - Barlow (1901) "Rotten stubs...particularly where the core of the tree has rotted away, leaving a cavity...A majority were in pine or spruce stubs with the entrance at the top." Also, deserted woodpecker holes.

E. Special habitat requirements

Grinnell and Miller (1944), "coniferous trees must also be within daily cruising radius. For nesting, the pines or other trees must be, at least in part, dead or decaying... must afford suitable-sized cavities, woodpecker-excavated or natural...low rotting stumps often suffice."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Dawson (1923) "moths' eggs, spiders, wood-boring grubs."

B. Foraging areas

Bock (1969) "predominantly in ponderosa pine...largely on the needles and smaller twigs." Bent (1946) reports that nothing specific has been published on the food of any of the races of the Mountain Chickadee. "But its feeding habits are similar to those of other chickadees; it has repeatedly been observed examining the twigs, foliage, and crevices in the bark of trees, where it doubtless finds a variety of insect food. Laudenslayer and Balda (1976) "foraged in

Parus gambeli (con't.)

pinyon pines 45.5% of the time compared to 9.0% usage of the ponderosa pine...latter figure is surprisingly low for species that normally reach their highest densities in the ponderosa pine forest." (Arizona).

C. Foraging strategies

Laudenslayer and Balda (1976) "used the hanging posture in addition to standing."

D. Feeding phenology

Dixon (1965) "are exceedingly active birds and seldom remain in one site for more than a few minutes, even though food may be abundant there..."

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

C. Courtship and mating behavior

Dixon, Stefanski, and Folks (1970), discussion of precopulatory behavior, including spectrographs of vocalizations. Courtship feeding was not observed." The male solicitation calls...may be adaptive in attracting the attention of the mate in dense foliage of conifers."

D. Nesting phenology

Barlow (1901) "begins nest-building early, being but little influenced by the elements." Weydemeyer (1975) reports earliest date for young in nest as 28 May (1938); young left nest, 17 June (1973) in Lincoln County, Montana.

E. Length of incubation period

Bent (1946) reports no information on the period of incubation

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

Minock (1971), examination of dominance hierarchy in wintering flocks. Found that at intraflock level site-related dominance does not seem to be operating although it is important between flocks.

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II POPULATION PARAMETERS

A. Clutch size

Dawson (1923), "four white eggs." Barlow (1901), reports from seven to nine young in nests, eight eggs in another.

B. Fledging success

C. Mortality rates per age class

D. Longevity

Dixon (1975), reports 10 year old male feeding nestling (identified by bands), Cache County, Utah. Two additional males of ages 7 years, 11 months; 7 years, 9 months. One female recorded at age 5 years, 7 months.

E. Seasonal abundance

Winternitz (1976), "The most numerous species [Crow Gulch, Pikes Peak, Colorado] were the Mountain Chickadee and... Junco caniceps. These two represented less than 10% of the species present in any one year but contributed about 25% of the breeding pairs."

F. Habitat density figures

Miller (1940), reports three pairs upon 40 acres of Transition Zone timber. Franzreb (1975) reported 71.5 breeding pairs per 100 hectares, Thomas Creek, White Mountains, Arizona, summer 1973. Franzreb (1976), discussion of method of predicting avian densities. Calculates 105.6 breeding birds per 100 hectare and 111.8 breeding birds per hectare using two different methods (study site in White Mountains, Arizona).

II INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

Minock (1972), detailed description of observations of dominance interactions between Black-capped and Mountain Chickadees at winter feeding stations. "Black-capped Chickadees usually were dominant over Mountain Chickadees. However, since Mountain Chickadees won a substantial number of contests, an analysis of several factors bearing on the outcome of encounters is made. The ones having the greatest effect are sex of the participants, individual differences in birds and site of encounters in relation to Black-cap

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winter ranges." Franzreb (1976), observation of unsuccessful attempt by a pair of violet-green Swallows to displace a pair of Mountain Chickadees from nest (with nestlings) in an Aspen tree. The Swallows were able to drive the owners away and enter the nest cavity for a short while, but the chickadees were able to regain possession.

C. Parasitism

IX STATUS

A. Past population trends

Grinnell and Miller (1944), P. g. inyoensis: "Resident. Locally common."

P. g. baileyae: "Resident. Usually common, sometimes abundant. There is a slight, irregular, down-mountain spread of individuals in fall and winter; the low country is occasionally reached."

B. Present population status

Small (1974) "common resident."

C. Population limiting factors

Winternitz (1976), "because woodpeckers are responsible for the holes in which non-drilling species nest, the nesting activities of Downy and Hairy Woodpeckers, Williamson's Sapsucker and Common Flickers are potentially limiting to the Mountain Chickadee."

D. Environmental quality: adverse impacts

E. Potential for endangered status

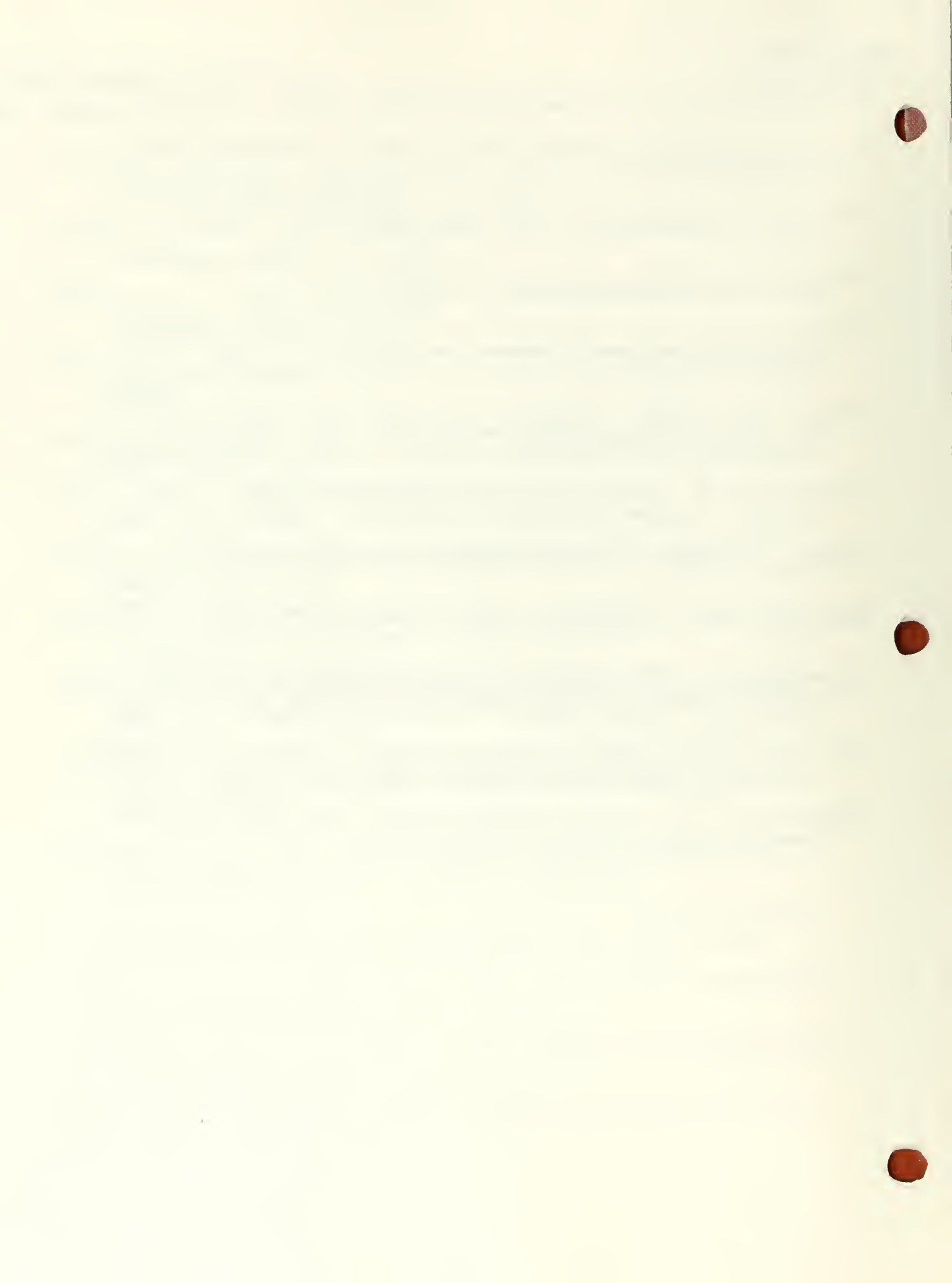
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NORTHERN BROAD-TAILED HUMMINGBIRD

Selasphorus platycercus

S. p. platycercus

I TAXONOMY

A. Type description

AOU (1957), Trochilus platycercus Swainson, Phil. Mag., n.s., 1, no. 6, June 1827, p. 441. (No locality given = Mexico).

B. Current systematic treatments

Peters (1945) recognizes eight species in genus Selasphorus; two subspecies of S. platycercus (platycercus, guatemalae). Apodiformes: Trochilidae.

C. Synonomies of scientific nomenclature

AOU (1957), Trochilus platycercus Swainson.

D. Synonomies of vernacular nomenclature

II DESCRIPTION

A. External morphology of adults

Ridgway (1911), detailed description of adults, including plumage, soft parts and measurements. Peterson (1961) "Male: Black-green; throat bright rose-red. Female:... sides tinged with buffy; touch of rufous at sides of tail (near base when spread)." Dawson (1923), describes gorget of male as aster purple to amaranth purple. Upper parts shining green with brassy reflections; tail chiefly black, with violet reflections. Adult female similar but without purple gorget and lacking the shining green of breasts and sides. Also, female averages slightly larger.

B. External morphology of subadult age classes

Ridgway (1911), "Young male--similar to adult female but feathers of upper parts (especially rump and upper tail-coverts) indistinctly margined terminally with pale brownish buff or cinnamon, and lateral rectrices with much less of cinnamonaceous on basal portion. Young female--similar to young male but rectrices as in adult female."

C. Distinguishing characteristics

Interspecific - Peterson (1961) Male recognized by shrill trilling of wings as it flies. Lacks rufous coloration of

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male Rufous and Allen's; lacks red crown of male Anna's; lacks orange-red throat of Ruby-throated. Female larger than female Black-chin.

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) "From east central California, northern Nevada, northern Wyoming, eastern Colorado, New Mexico, and southwestern Texas to southern Mexico and the highlands of Guatemala." S. p. platycercus: "Breeds from the mountains of east-central California (Inyo region), northern Nevada, northern Utah, and northern Wyoming (Yellowstone National Park, Midwest) south to southeastern California (Clark Mountain), northeastern Sonora (Sierra de Oposura). Guajuato, Mexico, Distrito Federal, and southwestern Texas (Chisos Mountains)."

B. California distribution of the species

Small (1974) "this Rocky Mountain and Great Basin hummingbird is normally found only in the White, Panamint, Clark and New York Mountains along the eastern border of the state." Males sighted in Inyo County and in the San Bernardino Mountains, both in May, indicate they may breed elsewhere in California. Johnson and Garrett (1974), reports sightings in San Bernardino Mountains. "Although occurrence ...could be strictly casual, the species may be preparing to colonize."

C. California desert distribution

Dawson (1923), "Summer resident in the timbered desert ranges of eastern California--at least the White Mountains and the Inyo range, probably the Panamints, Argus, Amargosa, etc." Miller (1951) Inyo Mountains. Grinnell and Miller (1944), "White and Inyo Mountains in Mono and Inyo Counties; the Grapevine Mountains, Inyo County; and Clark Mountains, San Bernardino County."

D. Seasonal variations in distribution

AOU (1957), "Winters from central Mexico southward...recorded south to Oaxaca."

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IV HABITAT

A. Biotopic affinities

Small (1974), "pinon-juniper woodland." Miller (1940), "especially numerous in the tangles of Garrya flavescens from 6000 ft. upward on both north and south slopes of the mountain." Bent (1940) "lodge-pole pine forest... close to mountain streams." Miller (1951) Upper Sonoran and Transition zones. Grinnell and Miller (1944), "Upper Sonoran belt of pinon, juniper, and mountain mohogany, those trees of usual open stand, with xerophilous shrubbery interspersed. Especially favored is the vicinity of thickets, as of willow Garrya, along wet or dry stream courses."

B. Altitudinal range

Hall (193), one collected 7800 ft. in Snake Mountains, White Pine Co., Nevada. Wauer (1964), observed at 6000 ft. Panamint Mtns.

C. Home range size

D. Territory requirements

Perch sites - Woodbury and Sugden (1938), "on twigs on the sides of either trees or bushes (never on top)...favorite perches were located on the inner sides of trees around the border of the area (of territory), or on bushes from which he could see the surrounding trees."

Courtship and mating sites - Miller (1946) "Where this plant (Garrya flavescens) formed thickets over digwater courses, males were stationed and diving over females."

Nest sites - Dawson (1923), "A cup of felted plant-downs, often white, not otherwise lined, but covered externally with lichens, dead leaves, or bark-shreds, held in place by cobwebs; placed 3 to 20 feet high on twigs, horizontal branches, or variously, in bushes or trees, usually near water."

E. Special habitat requirements

Lyon (1973), "hummingbird territorial systems are often organized around food resources, usually nectar."

F. Seasonal changes in habitat requirements

Bendire (1895), "By the time the young are large enough to leave the nest the majority of the flowers have ceased

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blooming, and as the country begins to dry up...retire to higher altitudes in the mountain parks where everything is now as green and bright looking as it was in the lower valleys two or three months earlier."

V FOOD

A. Food preferences

Waser (1976), reported that nectar of Delphinium nelsoni (Green), D. barbeyi Huth., Ipomopsis aggregata (V. grant) and Castilleja miniata (Dougl.) Cottam (1941) "seen feeding on oozing maple sap from holes that had been recently drilled by a Red-naped Sapsucker." Bent (1940) "small spiders and minute insects of the orders Diptera, Hymenoptera, Hemiptera, Coleoptera...which it finds in the flowers."

B. Foraging areas

C. Foraging strategies

Linsdale (1938) "feeding upon flying insects caught in the air...after a poise the bird would dart 3 feet after an insect, then poise and go after another. This was repeated half a dozen times, the bird being about 10 feet above the ground."

D. Feeding Phenology

Bent (1940) "The young are fed at first on regurgitated, semidigested food, but as they grow older they are given an increasing amount of minute insects."

E. Energy requirements

Calder and Booser (1973) "high ratios of surface (heat dissipating) to volume (heat producing), intense metabolism, and slight insulation...energy reserves of a hummingbird must be sufficient to meet the costs of nocturnal maintenance and the resumption of foraging at daybreak. A limited supply can be conserved by entry into hypothermic torpor, wherein the normal 38° to 43°C range in body temperature is abandoned and heat production is reduced during the nocturnal fast." Reports of incident of hypothermic torpor by incubating female at night. Discussed ecological significance of this strategy.

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

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C. Courtship and mating behavior

Woodbury and Sugden (1938), "male...dancing in the air with her (female), occasionally touching bills, but more often performing his characteristic dives, in which he would spiral up about as high as the tree tops and then dive rapidly toward the ground making a sweeping curve at the bottom and come up again on rapidly beating wings. The descent was generally marked by a peculiar rattling sound which gave way at the bottom to a decided duck just as the sweep reversed and he started to rise." Knox (1944), "The female would sit quietly on a branch somewhere, and a male would suddenly zoom up past her, so close as nearly to knock her from her perch, and straight on upwards until he was a speck in the sky..." "Occasionally...he would do a series of figure-eights and double loops."

D. Nesting phenology

Dawson (1923), May, June, July, two broods. Waser (1976), work in Gothic, Colorado, showed that 1) the start of hummingbird reproduction corresponds in time and space with flowering of the earliest nectar source, 2) peak brooding activity at these nests corresponds with peak density of other main food sources, 3) total duration of summertime flowering of the main food plants is implicated as a force that compresses the initiation of nesting toward the earliest possible date.

E. Length of incubation period

Bent (1940) "about 14 days"

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

Bendire (1895) "By the time the young are large enough to leave the nest...retire to higher altitudes in the mountain parks...raise their second broods under nearly similar conditions as the first."

VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923), two eggs; two broods.

B. Fledging success

Waser (1977) "observed mean productivity of 1.15 chicks per nest in 52 nests in 1971, 1972, 1973."

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C. Mortality rates per age class

D. Longevity

Waser (1977), based on banding records of local population at Rocky Mountain Biological Laboratory, estimate mean minimum life span equal to 30 months.

E. Seasonal abundance

F. Habitat density figures

Miller (1940) "especially numerous in the tangles of Garrya flavescens...as many as five males were counted in one patch of brush 200 yards long." Franzreb (1975), reports 14.3 average breeding birds per 100 hectares, Thomas Creek, White Mountains, Arizona, summer 1973.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

Lyon (1973) "Displays and overt aggression were usually directed towards conspecifics, but bees feeding on Iris, especially Bombus and Xylocopa, were frequently attacked and often successfully ejected from the territory. Feeding butterflies often appeared to be deliberately supplanted but were never pursued." Dunford and Dunford (1972), describes territorial encounter S. rufus at cluster of Penstemon. Calder (1972), observed S. platycercus removing materials from nest of Contopus sordidulus; Vireo gilvus removing materials from nest of S. platycercus.

C. Parasitism

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Summer resident. Sparse."

B. Present population status

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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NORTHERN GRAY-HEADED JUNCO

Junco c. caniceps

I TAXONOMY

A. Type description

Junco caniceps caniceps - AOU (1957) Struthus caniceps Woodhouse, Proc. Acad. Nat. Sci. Philadelphia, Nov.-Dec. 1852 (Feb. 7, 1853), p. 202. (San Francisco Mountain, New Mexico (=Arizona).)

B. Current systematic treatments

AOU (1957) considers the Gray-headed Junco a member of the avian Order Passeriformes, Family Fringillidae (grosbeaks, finches, sparrows, and buntings), Subfamily Emberizinae.

Hellmayr (1938) makes note of the close relationships between J. phaeonotus (=caniceps) and J. oreganus (=hyemalis). He lists the race caniceps as a race of the species J. oreganus. Paynter and Storer (1970) also consider caniceps to be a race of J. hyemalis, although they state that "there remains much to be understood" in this complex. Johnson (1965) noted interbreeding of J. oreganus thurberi and J. c. caniceps in southern Nevada; this hybrid has been described as a race (J. o. mutabilis). Miller (1939) gives a detailed discussion of hybridization in J. caniceps.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Junco phaeonotus. Miller (1941) lists Struthus caniceps; Junco annectens; J. cinereus caniceps; J. hiemalis caniceps; J. oreganus caniceps.

D. Synonomies of vernacular nomenclature

Ligon (1961), Red-backed Junco; Mexican Junco.

II DESCRIPTION

A. External morphology of adults

Miller and Stebbins (1964), "A sparrow with the white lateral tail feathers of the junco group. Head and flanks light, uniform gray, the flanks somewhat paler. Back gray, except for well defined rust-red patch in center; belly white; orbital area blackish." Ridgway (1901) adds that the bill is "pinkish in life, iris brown; tarsi pale yellowish brown, toes darker." Miller (1941) gives a detailed description of most races within the Genus Junco, including caniceps.

Junco caniceps (con't.)

B. External morphology of subadult age classes

Young in first winter are essentially like adults, but the gray of chest and other parts decidedly paler; reddish brown of back duller (Ridgway 1901).

C. Distinguishing characteristics

Interspecific - Bent (1968), "Juncos usually are distinguished from other small birds occurring in their range by ...white outer tail feathers and the characteristic "tic" notes...in flight." Peterson (1961), "similar species: (1) Oregon Junco has rusty or pink-buff sides, rusty wings; male has blackish hood. (2) Mexican Junco has yellow eye. (3) Hybrids occur (Gray-headed X Oregon)."

Intraspecific - Ridgway (1901) described adult caniceps as "sexes alike"; adult male, length 152.4 mm; wing 84.58; tail 72.14; and adult female, length 114.78 mm; wing 78.74; tail 66.55." Ligon (1961), "6-6.5 inches long. Color pattern of sexes alike."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) gives the overall range of the Gray-headed Junco as "North-central Nevada, northern Utah, and southern Wyoming south to central Arizona, southern New Mexico, and western Texas. Winters in breeding range and south to southern California, northern Sinaloa, and northern Durango."

The range of Junco c. caniceps was described by the AOU (1957) as "Breeds in mountains from southern Idaho, Nevada, Utah, and southern Wyoming south through central and east central Nevada, the White Mountains of California, Utah, and western and central Colorado to northern Arizona and northern New Mexico."

B. California distribution of the species

Grinnell and Miller (1944) describe range as "In summer, two mountain areas on southern Nevada border: Clark Mountain, eastern San Bernardino County...(and) Grapevine Mountains, Inyo County. In winter, coastal district from Los Angeles County to San Diego County." Small (1974) also gives Clark and Grapevine Mountains as California breeding areas; calls this junco a "very rare winter visitor elsewhere." Cardiff (1949) noted the rare occurrence of a Gray-headed Junco on the west slope of the San Gabriel Mountains (6 November 1948). Dickey (1922) felt that Gray-heads are normally present in the San Bernardino Mountains during winter. Kaeding (1899) discusses the occurrence of Junco in California; only one record of caniceps was listed at that time.

Junco caniceps (con't.)

C. California desert distribution

Miller and Stebbins (1964) called this junco a "rare winter visitant" in Joshua Tree National Monument. Recorded from Upper Covington Flat (4 Nov.) and Pinyon Wells (15, 16 Oct.). In the Providence Mountains, Johnson et al. (1948) reported that a "small area on the northwest side of Clark Mountain appeared to be the only suitable breeding place for juncos of any kind." Van Rossem (1936) collected an immature caniceps in the Charleston Mountains near Death Valley, California, in October. Wauer (1964) found an apparent hybrid Gray-headed X Oregon junco nesting at 10,500 feet in the Panamint Mountains. Miller and Russell (1956) took non-hybrid J. c. caniceps during breeding season in the White Mountains. They noted, however, that introgression between J. caniceps and J. oreganis thurberi is taking place in this location. Monson (1949) collected an immature male Gray-head near Topock on the lower Colorado, "the first record for the Colorado Valley" (15 October 1946). Miller (1945) found J. c. caniceps breeding on Clark, Potosi and Charleston Mountains.

D. Seasonal variations in distribution

AOU (1957) states that Junco c. caniceps "Winters in lower mountains and plains of breeding area, north to northern Utah, northern Colorado; and from western Nebraska and eastern Colorado south to northern Sonora, northern Sinaloa, northern Durango, and western Texas; rarely to southern California (Pasadena, San Diego R., Potholes)."

Miller and Stebbins (1964), "This...junco occasionally migrates southwest into southern California, although chiefly it is found east of the lower Colorado River Valley in winter." Although the study was based on Oregon Juncos, Wolfson (1942) gives a detailed study of migration in juncos.

IV HABITAT

A. Biotopic affinities

In California, Small (1974) gives California habitat as "piñon-juniper woodland, montane forests of white fir." Miller (1941) noted that "Associations in which it breeds includes coniferous forest types dominated either by spruce (Picea), Pseudotsuga, Pinus contorta, P. ponderosa, P. flexilis, or fir (Abies). It also breeds in pure stands of aspen and of mountain mahogany." In Colorado, Winternitz (1976) noted these juncos in aspen-willow (28% of observations), ponderosa pine (24%), and Douglas fir (21.3%) during breeding season.

Junco caniceps (con't.)

B. Altitudinal range

Bent (1968) noted breeding in various western states from about 6,000 to 10,000 feet. In New Mexico, caniceps nests from 6,500 to 9,500 feet (Ligon 1961). In Colorado, Johnston (1943) found gray-heads nesting from 8,000 feet to timberline.

C. Home range size

In Colorado, Rockwell (1910) found several nests of caniceps which were usually placed about 100 yards apart.

D. Territory requirements

Perch sites -

Courtship and mating sites - Bent (1968) reported that during courtship "The male always chose the top of a tall pine as a singing post."

Nest sites - "The Gray-headed Junco is with rare exceptions a ground nester" (Bent 1968). In Colorado, Johnston (1943) found nests "on the ground and well-concealed, but in a variety of cover."

E. Special habitat requirements

Bent (1968) recounts that "The spotted distribution of this junco must be emphasized. It inhabits...a series of mountain-top islands above 7,000 feet." In Idaho, Burleigh (1972) noted that caniceps "has rather exacting requirements...it occurs...only on the higher ridges (between 6,000 and 7,000 feet) characterized by stretches of stunted junipers and extensive thickets of mountain mahogany."

F. Seasonal changes in habitat requirements

Grinnell and Miller (1944) found that this race drops down from the mountains and is in association with other juncos in such places as open oak woodlands.

V FOOD

A. Food preferences

Bent (1968) noted that these juncos feed on all available plant seeds, grasses, herbs, and shrubs; insects are also taken while feeding on the ground.

Junco caniceps (con't.)

B. Foraging areas

Bent (1968), "Juncos are mainly terrestrial and obtain practically all of their food on or very near the ground."

C. Foraging strategies

"Juncos, like many other members of the sparrow family, are primarily ground-feeding seed eaters" (Martin et al. 1951).

D. Feeding phenology

Martin et al. (1951) reported that juncos "are partial to seeds of common weeds. In summer, insects constitute about half or more of their diet."

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Bent (1968) noted that "observations of territorial conflict between Gray-headed Juncos are few."

C. Courtship and mating behavior

Bent (1968) noted that "the mating behavior of the Gray-headed Junco probably differs little, if at all, from that of the better known Oregon and Slate-colored juncos... Considerable activity, consisting chiefly of pursuit and nest-building, was observed." In New Mexico, Tatschl (1967) reported singing males between 19 March and 27 July.

D. Nesting phenology

Bent (1968) gives Colorado egg dated as: 45 records, 8 May to 18 July; 24 records, 16 June to 4 July. In northern Arizona, Hargrove (1936) recorded 3 broods raised in one season (one brood hatched in early June, another in late July, and the last in late August).

E. Length of incubation period

Bent (1968) lists a 11 or 12 day incubation period. Miller (1938) gave an incubation period of 12 days for a set of eggs from a Gray-head X Oregon junco mating in captivity.

Junco caniceps (con't.)

F. Length of nestling period

Bent (1968) recounted that the young spend 10-13 days in the nest after hatching.

G. Growth rates

The development of young was summarized by Phillips (in Bent 1968): at 3 days, the 4 young weighed 27.5 grams (still nearly naked, eyes not open); at 5 days, weight 44.5 grams; at 6 days, eyes opening, weight 48.0 grams; at 7 days, eyes open, feathers of belly tracts becoming prominent, weight 60.5 grams; at 10 days, weight 70 grams, young began to fledge.

H. Post-breeding behavior

"After completing their breeding activities the northern caniceps form small groups, presumably of adults and the young of the season, and start a southward movement" (Bent 1968).

VII POPULATION PARAMETERS

A. Clutch size

Bent (1968), "The Gray-headed Junco lays from 3 to 5 slightly glossy eggs." Ligon (1961), "Eggs: 4; greenish white, marked with lilac and reddish brown around larger end."

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

In Wyoming, Finzel (1964) noted an increase of Gray-headed Juncos from 1.0 individuals per 40 acres in breeding season to 3.0 individuals per 40 acres immediately following breeding.

F. Habitat density figures

In a Colorado study, Winternitz (1976) found an average of 12.0 pair of caniceps breeding per 40 ha (montane study area). In a Colorado Douglas fir-ponderosa pine study, Snyder (1950) found 36 breeding pairs of Gray-heads per 40 ha; this species was twice as common as the next most numerous species. The breeding density dropped to 5 pairs per 40 ha in lodgepole pine, however. At 9,700 feet in Colorado, McHugh (1948) recorded 3-4 breeding pairs on a 22 acre study

Junco caniceps (con't.)

plot. On Clark Mountain (San Bernardino County, California), Miller (1940) found 2 pairs breeding in the 40 acres of Transition Zone timber on the mountain.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Bent (1968) stated that the Gray-headed Junco falls prey to those predators common to other small birds. Screech and Pygmy owls, Sharp-skinned Hawks, and Northern Shrikes take juncos.

B. Competition

In Colorado, Hering (1948) noted that "two breeding pairs remained near each other throughout the season. The males of the...two pairs sang rather often, but both families fed ...without any apparent conflict."

C. Parasitism

Neither Friedmann (1963) nor Friedmann et al. (1977) list caniceps as a victim of cowbird parasitism. However, J. hyemalis is listed as a cowbird victim.

IX STATUS

A. Past population trends

Grinnell and Miller (1944) described this race in California as a "rare summer resident...along eastern border. Occasional winter visitant to coastal southern section."

B. Present population status

C. Population limiting factors

Concerning J. c. caniceps, Miller (1939) felt that "Its breeding range is limited almost completely by unfavorable desert or plains regions."

D. Environmental quality: adverse impacts

E. Potential for endangered status

Junco caniceps (con't.)

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NORTHERN ORIOLE

Icterus galbula

I TAXONOMY

A. Type description

AOU (1957) Icterus galbula bullockii (Swainson): Xanthornus bullockii Swainson, Phil. Mag., n.s., 1. no. 6, June 1827, p. 436. (Table land = Real del Monte, Hidalgo, Mexico.)

Icterus galbula parvus: Icterus bullockii parvus van Rossem, Occ. Pap. Mus. Zool. Louisiana State Univ., no. 21., Oct. 25, 1945, p. 237. (Jacumba, San Diego County, California.)

B. Current systematic treatments

AOU (1957) places I. galbula in the Order Passeriformes, Family Icteridae, with three subspecies. Dawson (1923) refers only to I. bullockii in California. Bent (1958) list I. b. bullockii and I. b. parvus. Robbins et al. (1966) list I. galbula as the eastern and central species and I. bullockii as the western species. Mayr and Short (1970), I. galbula: "This species is comprised of three morphologically distinct groups, the galbula, bullockii, and abeillei (Mexico). These interbreed to form hybrid zones in the Great Plains (galbula, bullockii) and in Durango Mexico (bullockii, abeillei). All are considered conspecific."

C. Synonomies of scientific nomenclature

AOU (1957), I. galbula bullockii - Icterus bullockii, Xanthornus bullockii; I. g. parvus - I. bullockii parvus. Grinnell and Miller (1944), I. g. bullockii - Hyphantes bullockii, Xanthornis bullockii, Yphantis bullockii, I. b. bullockii.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944) - Bullock's Oriole, Western Oriole. Bent (1958) - Baltimore Oriole.

II DESCRIPTION

A. External morphology of adults

Baird et al. (1905): "Icterus. Head all round deep black, sharply defined against the yellow of the nape; wings black, with or without white markings. Body generally, including lesser wing-coverts, deep greenish-yellow. I. bullockii. Head mainly black, with an orange or yellow superciliary stripe, and a broader one beneath the eye, cutting off the black of the throat with a narrow stripe; tail orange or yellow, the feathers with black at ends; greater coverts

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with outer webs wholly white, and middle coverts entirely white, producing a large conspicuous longitudinal patch on the wing; tertials and secondaries broadly edged with white, primaries more narrowly striped with the same. Rump grayish orange; sides and flanks deep orange; forehead and auriculars orange; a broad supraloral stripe of the same. Xanthic tints deep orange, with a reddish tinge on the breast. Tail very slightly graduated.

Dawson (1923): "Adult male - Black, white and orange; bill, lore a line through the eye, and throat (narrowly) jet black; pileum, back, scapulars, lesser wing-coverts, primary coverts, and tertials, chiefly black, or with a little yellowish skirting; remiges black edged with white; middle and greater coverts, continuous with edging of tertials and secondaries, white forming a large patch; tail chiefly cadmium-yellow but central pair of retrices black on exposed area, and remaining pairs tipped with blackish; remaining plumage, including supraloral areas continuous with superciliaries, orange, most intense on sides of throat and chest, shading on lower breast to cadmium-yellow posteriorly; rump washed with olivaceous. In younger adults the orange is less intense, and the tail is more extensively black. Bill black above and bluish below; feet and legs dusky-horn color. Adult female - above drab-gray, clearest on rump and upper tail coverts; washed with yellow on head; wings fuscous with whitish edging; pattern of white in coverts of male retained, but much reduced in area; tail nearly uniform dusky-orange; sides of throat and chest wax-yellow chin and throat and remaining underparts sordid white or pale creamy-buff; the under tail coverts usually tinged with yellow.

Sibley and Short (1964) give extensive color descriptions and measurements for Baltimore and Bullock's Orioles. Corbin and Sibley (1977) describe the hybridization of Bullock's and Baltimore Orioles.

B. External morphology of subadult age classes

Baird et al. (1905): "Young male with black replaced by greenish-yellow, that on the throat persistent; female without this. Dawson (1923): "Immature - like adult female; yellow of head and throat stronger." Bent (1958) says young obtain adult winter plumage in July after their first year, but the feathers of the back are narrowly edged with dull orange which is not present in older birds.

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C. Distinguishing characteristics

Intraspecific - Bent (1958) describes I. g. parvus as being smaller than I. g. bullockii. Peterson (1961) describes the differences between Baltimore and Bullock's Orioles. Mistra and Short (1974) report on the hybridization of I. g. bullockii and I. g. galbula in the Great Plains. Ridgway (1915) provides a key to the Icterids. Rising (1973) discusses morphological variation of Baltimore and Bullock's Orioles.

Interspecific - Dawson (1923): "Top of head black and undersides of tail yellow as contrasted with the Arizona Hooded Oriole. Note slender, blackish bill of female, as contrasted with heavy, light-colored bill of Western Tanager." Willett (1951): "Bill shorter and less curved than (Hooded). Male with black back, top of head, and throat patch, a large white wing-patch, and bright orange underparts."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), I. g. bullockii: "Breeds from southern British Columbia, east of the coastal ranges, northwestern Montana, southern Alberta, southwestern Saskatchewan, northeastern Montana, southwestern North Dakota, western South Dakota, western Nebraska, western Kansas, western Oklahoma, and central Texas south to central and southern interior California, southern Nevada, southwestern Utah, central and central-southern Arizona, northeastern Sonora, probably northern Chihuahua, central Coahuila, and southern Texas."

I. g. parvus: "Breeds from central western and southern California, extreme southern Nevada, and western Arizona, south to northern Baja California and northwestern Sonora."

B. California distribution of the species

Dawson (1923): "Abundant summer resident in many parts of the state - from the Nevada line to the seacoast, and from the Oregon line to the Mexican boundary. Of least abundance in the northwest coastal belt and on the Santa Barbara Islands. Centers of abundance are the interior valleys north of Tehachapi." Grinnell and Miller (1944), I. bullockii: "As breeding, all sections of the state except the islands, in coastal fog belt north of Sonoma County and areas of continuous Montane forest." Small (1974): "Ranges in California for breeding - length of state except humid coastal coniferous forest, mountain forests."

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C. California desert distribution

Grinnell and Miller (1944) give records from Inyo, Kern, San Diego, San Bernardino Counties. Willett (1951) lists 3 orioles as resident in the southern California desert; California Hooded (I. cucullatus californicus), Bullock's (I. bullockii) and Scott's (I. parisorum). Wauer (1964) reports Bullock's and Hooded Orioles breeding in the upper canyons of the Panamint Mountains.

D. Seasonal variations in distribution

AOU (1957), I. g. bullockii: "Winters from southern Sinaloa, Mexico, and Puebla south, west of the continental divide, to northwestern Costa Rica; casually north to central California, southern Texas and southern Louisiana."

I. g. parvus: "Winter range largely unknown, possibly winters sparingly in southern California and Arizona; probably in central-western Mexico south to Guerrero."

Bent (1958) gives a report from Alexander Skutch saying that I. bullockii arrives on its wintering grounds in Central America during the second week in September, and departs in April. I. g. bullockii winter range is given as above. Phillips et al. (1964): "On migration prefers the same-broad leaved trees in open country, especially in the Lower Sonoran Zone."

IV HABITAT

A. Biotopic affinities

Dawson (1923): "Of very general zonal and faunal preferences: breeds from Lower Sonoran up through Transition, and from riparian association on the deserts to the San Francisco Bay region. Grinnell and Miller (1944): "Riparian oak woodland, especially where trees are large and well spaced." Phillips et al. (1964): "Breeds commonly in cottonwood-willow association of the Sonoran Zones." Walcheck (1970) reported orioles nesting in cottonwood forest in Montana, and not in sagebrush shrubland, sagebrush grassland or pine-juniper woodland. Gullion et al. (1959) note the occurrence of I. bullockii in the desert valleys and in the cottonwoods about springs in the desert ranges in Nevada. Wauer (1964) reports Bullock's and Hooded Orioles in the upper and lower canyons of the Panamint Mountains; in trees in the sidewashes and in the area just below the pinon-juniper woodland which is well watered compared to many other localities in these mountains.

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B. Altitudinal range

Dawson (1923) says they occur from Lower Sonoran up through Transition. Wauer (1964) found Bullock's Orioles breeding 1,000 to 4,000 feet in the Panamint Mountains.

C. Home range size

D. Territory requirements

Perch sites

Courtship and mating sites

Nest sites - Dawson (1923): "...deciduous trees, usually at moderate heights." Bent (1958) describes the usual nesting site as near the top of some fair sized tree, as a maple, white elm, apple, mesquite, birch. Grinnell and Miller (1944): "Sycamores, cottonwoods, willows, and deciduous oaks seem to be especially favored, but live oaks, orchard trees and occasionally conifers are used." Nests are placed 6 or more feet up, often in the middle area of trees. Schaefer (1976) found the placement and structure of nests to vary geographically, mainly because of differences in vegetation.

E. Special habitat requirements

Grinnell and Miller (1944) state that they seem to need a nearby water source. Gabrielson and Jewett (1940): "It is primarily a bird of river bottoms and farming districts.

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Bent (1958) reports caterpillars forming over 1/3 of the food supply. They also eat web worms, moth larvae, beetles, ants, wasps, spiders, snails, june berries, mulberries, blackberries, some seeds. Some problem has been noted with their pea-eating habit.

B. Foraging areas

Bent (1958) describes them feeding trees and sometimes on the wing as they chase an insect. Grinnell and Miller (1944) says they use adjacent open fields next to nesting trees, grass or brush covered, in addition to foraging in the crown of trees.

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C. Foraging strategies

D. Feeding phenology

Bent (1958) says during the winter they are found feeding in Central America on a considerable variety of animal and vegetable food.

E. Energy requirements

Bent (1958) writes an account of young being fed by regurgitation about every 20 minutes.

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Bent (1958): "...he defends his territory with great vigor and daring." The males arrive on their breeding grounds in full song and sing all day until incubation is underway when they subside.

C. Courtship and mating behavior

Bent (1958) describes the male sitting on a limb next to a female and bowing, spreading his tail and raising his wings while uttering "supplicating and seductive" notes. The female whistles 2 or 3 notes like the males during the nesting season.

D. Nesting phenology

Bent (1958): "...arrives in southern New England...about 10 May." Gabrielson and Jewett (1940): "Eggs are laid primarily from 16 May to 15 June," in Oregon. Gullion et al. (1959) report I. bullockii to arrive in Nevada as early as 16 April and leave in the beginning of September.

E. Length of incubation period

F. Length of nestling period

Bent (1958) - 11 to 14 days.

G. Growth rates

H. Post-breeding behavior

Bent (1958) comments that I. bullockii becomes quite quiet in August so even when they are still present it is hard to

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find them. "Apparently old males do not remain with their families very long after the breeding season.

VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923) - usually 5. Bent (1958) - 4 to 6.

B. Fledging success

C. Mortality rates per age class

Bent (1958) says that young are comparatively safe for the first 2 weeks of life when they remain concealed in their hanging basket nest.

D. Longevity

Kennard (1975) found the oldest I. galbula to be 7 years in a study of band returns.

E. Seasonal abundance

F. Habitat density figures

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Bent (1958) list predators as: crows, Screech Owl, squirrels. Ashman (1977) noted a Northern Oriole eating a hummingbird on South Farallon Island. He did not know if the Oriole killed the hummingbird.

B. Competition

Bent (1958) reports I. bullockii nesting in the same tree with a wood peewee, an orchard oriole, kingbirds and other I. bullockii. It will battle with other species in actual physical combat. Whitmore (1977) in a study of habitat partitioning in a community of passerine birds and found Bullock's Oriole associated with Yellow and Audubon's Warblers, and Black-headed Grosbeaks in the high canopy.

C. Parasitism

Friedmann et al. (1977): "Experiments involving the addition of foreign eggs to nests that contained 2 or more oriole eggs demonstrated that this oriole is a rejecter species, though sometimes they do raise a cowbird.

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IX STATUS

A. Past population trends

Bent (1958) gives an account of the spread of I. bullockii, allowed by the cutting of forests by settlers and subsequent growth of bushes. Anderson (1971) discusses the increase in number and range of I. g. galbula and I. g. bullockii caused by man's changes to the prairie in South Dakota.

B. Present population status

Weber (1976) comments on the increasingly common occurrence of I. g. galbula in northeastern British Columbia. I. g. bullockii has always been fairly common there.

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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PINON JAY

Gymnorhinus cyanocephalus

I. TAXONOMY

A. Type description

Gymnorhinus cyanocephalus - AOU (1957) Weid, Reise Nord-Amer., vol. 2, 1841, p. 22. (am Maria-River = between the Marias and Yellowstone rivers, Montana.).

B. Current systematic treatments

Hellmayr (1934) describes the Pinon Jay as a monotypic species, with a general range of "...from central Washington, Idaho, and central Montana south to northern lower California." Mayr and Greenway (1962) also consider this species monotypic.

AOU (1957) considers the Pinon Jay a monotypic member of the avian order Passeriformes, family Corvidae, subfamily Corvinae.

Mayr and Short (1970) state that the relationships of this species remain obscure; no further comment given.

Austin and Rea (1976) do not advocate recognition of races in the Pinon Jay. Ligon (1974) summarizes the taxonomic relationships of Gymnorhinus in a detailed manner; states that this species should be considered a "specialized and perhaps early offshoot of...New World jays." Miller and Stebbins (1964) feel that the Pinon Jay in Joshua Tree National Monument should be considered a distinct race, Gymnorhinus cyanocephalus rostratus.

C. Synonomies of scientific nomenclature

Hellmayr (1934), Cyanocephalus cyanocephalus; C. wiedi; Cyanocorax wiedi. Grinnell and Miller (1944), Gymnokitta cyanocephala; Gymnorhinus cyanocephalus rostratus.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Maximilian Jay. Ligon (1961), Blue Crow. Goodwin (1976) adds Pinon Crow to the previous names. Dawson (1923) includes Pine Jay in his list of synonomies. Also called the nutcracker by Wheelock (1904).

II DESCRIPTION

A. External morphology of adults

Ridgway (1904) gives detailed account of all plumages; "adult male...dull grayish blue, paler on posterior under

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parts...adult female similar." In appearance and actions like a small dull blue crow...with a long sharp bill (Peterson 1961). Phillips et al. (1964), "the Pinon Jay looks like a small blue crow, and like it, walks rather than hops." Ligon (1961), 10-11.5 inches long. Ligon and White (1974) give detailed account of plumage and size characteristics; the crown in adults is deep blue...color change due to wear occurs.

B. External morphology of subadult age classes

Ridgway (1904) noted young were duller than the adult female, without any blue except on wings and tail...plain gray. Bailey (1928) gives similar description. Goodwin (1976), "first year plumage...grey, the adult blue plumage not be attained till the second summer molt." Juvenile body feathers are gray with no hint of blue...the whitish throat patch of first-year and adult birds is lacking; mouth color is white (Ligon and White 1974).

C. Distinguishing characteristics

Interspecific - "Easily told from Scrub Jay by its short tail, uniform blue coloration, and crowlike flight; from Steller's Jay by lack of crest (Peterson 1961). Robbins et al. (1966): "told from other jays by its uniform steel-blue color, short tail, and long beak."

Intraspecific - Ridgway (1904) states that although sexes are similar in coloration, the female is smaller and duller than the male; young are similar to adult female, but still duller. Male: wing 154 mm, length 272.5 mm, tail 114 mm and female: wing 144.5 mm, length 254.5 mm, tail 104 mm. Color pattern of sexes alike (Ligon 1961). Dawson (1923), "adult female like male...with increase of gray." Adult male Pinon Jays are significantly larger than adult females, according to results of a detailed study by Ligon and White (1974).

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) gives distribution of G. cyanocephalus as, "Resident from central Oregon, east-central Montana, and western South Dakota, south through eastern California to northern Baja California, central Nevada, central and central eastern Arizona, central New Mexico, and western Oklahoma

Ridgway (1904) gives range as, "Pinyon and juniper woodlands of western United States; north to southern British

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Columbia, Idaho, ect., south to northern lower California, Arizona, New Mexico, and western Texas; east to eastern side of Rocky Mtns." Peterson (1961): "Resident from Oregon, Idaho, Montana...through eastern California (east of Sierra) to northern Baja California, Nevada, Arizona, New Mexico, Oklahoma."

B. California distribution of the species

Grinnell and Miller (1944), "...resident...parts of elevated Great Basin area, west to east base of Cascade-Sierra Nevada ...south along this system to vicinity of Walker Pass, Kern Co.; also south along all higher desert ranges as far as Providence Mtns., San Bernardino Co." Small (1974) called California distribution "complex"; Basin and Range Region south to Walker Pass; south along higher desert ranges to Providence Mtns.; north side of San Gabriel and San Bernardino Mtns.; Mt. San Jacinto area, near Lake Hemet, Riverside Co. Dawson (1923), "common resident locally of arid upper Sonoran and Transition, chiefly along the eastern base of the Sierra Nevada." In southern California, this jay is a resident, locally, of upper Sonoran and Transition Zones, mostly on the desert side of mountain ranges, south to Baja California (Willett 1933) Wheelock (1904) describes the California breeding range as, "in the pinyon belts of the desert ranges, southeast of the Sierra Nevada...locally the whole length of the Sierra Nevada...to the San Bernardino Mountains." Jordan (1956) reported that the occurrence of this species on the western slope of the central Sierra Nevada was a rare sighting in the fall. Wall (1915) stated that Pinon Jays seldom occur in the San Bernardino Valley; a sighting in October (1914) was the first in 25 years.

C. California desert distribution

Desert locations given by Grinnell and Miller (1944) include - White, Inyo, Grapevine, Panamint, Argus and Coso Mountains in Mono and Inyo Counties; San Bernardino and San Jacinto Mountains. Dawson (1923) noted this species on the desert mountain ranges of the Inyo district. Johnson et al. (1948) found Pinon Jays to be widespread near the New York and the Providence Mountains in both summer and winter; frequented pinyon and juniper woodlands. Grinnell and Swarth (1913) noted large flocks near Kenworthy and Hemet Lake between June and August. Willett (1933), in describing the southern California distribution--"noted in San Bernardino Mtns.; found abundant in Hemet Valley, San Jacinto Mtns. (summer); also noted in Pasadena; nests on the deserts slopes of the San Jacinto range." Noted in the desert ranges of the Inyo district by Grinnell (1915). Willett (1951) only noted the bird as a straggler out onto the desert in winter (from nearby desert ranges). Wauer (1964) found Pinon Jays nesting in the pinyon-juniper woodlands of the Panamint Mountains,

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Death Valley. Gullion et al. (1959) noted the erratic occurrence of Pinon Jays on southern Nevada deserts (Joshua tree, oak chaparral) during all seasons. Several birds found wintering near ponds in Death Valley by Gilman (1936).

D. Seasonal variations in distribution

Robbins et al. (1966)--"in winter, it wanders erratically to farmlands." Wanderings... seem to be influenced by lack of a dependable source of food... rather than by set, seasonal migratory movements (Ligon 1961)." Johnson et al. (1948) noted movement down into Joshua trees during winter in the Providence Mtns. In Nevada, this jay is a common fall and winter visitor to the pinyon-juniper belt, and in the fall is noted in the pines up to 8,700 ft. by Rossem (1936). "But the species is disposed to undertake wanderings, when flocks appear sporadically in remote places irrespective of season" (Grinnell 1915). Called an "irregular visitant" in Los Angeles Co., mostly in the higher mountains--will descend into the foothills in fall and winter (Grinnell 1898). Bent (1946) states that the species is not really migratory, but undertakes seasonal wanderings depending upon local conditions. Miller (1915) describes the winter movements of this species as erratic; noted a flock in Los Angeles from December to March, 1914-15.

IV HABITAT

A. Biotopic affinities

Peterson (1961) describes habitat as, "pinyon pines, junipers; ranges into sage." Grinnell and Miller (1944), "essentially characterized by presence of pinyon and juniper." Small (1974), "pinyon-juniper woodland; lower portions of montane forest in Transition Life Zone." Phillips et al. (1964) describes this jay as characteristic of pinyon and juniper woodlands, though they often wander into the pine belt. Goodwin (1976) states that the species inhabits the foothills and lower mountain ranges where pinyon and juniper are the dominant vegetation. Grinnell and Swarth (1913) found jays foraging in sagebrush during June in Hemet Valley. In Joshua Tree National Monument, Miller and Stebbins (1964) found Piñon Jays confined to the pinyon-juniper belt of the upper levels of the western section. They did not see them in lower desert vegetation.

B. Altitudinal range

Grinnell and Miller (1944) note breeding range from 4,500 ft. (San Jacinto Mtns.) up to 7,500 ft. (Inyo Mtns.). Ligon (1961) gives 5,500 to 7,400 ft. range in New Mexico. Dawson (1923) gives an upper range of 9,000 feet in California.

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Pinon Jays noted between 5,000 and 8,200 ft. in Nevada (Lindsdale 1936). Ligon (1971) reported this species nesting in mature pinyon pines at 7,200 ft. in New Mexico. Found breeding in a Joshua Tree and juniper woodland at 4,800 ft. at Joshua Tree National Monument by Miller and Stebbins (1964). Noted breeding between 5,500 and 6,500 ft. in the Panamint Mountains, Death Valley (Wauer 1964).

C. Home range size

Balda et al. (1972) studied a flock of about 250 Pinon Jays on a home range of 8 square miles near Flagstaff, Arizona.

D. Territory requirements

Perch sites - Roost sites in Arizona ranged from 3-16 m above ground with a mean height of 7.4 m; all roosts were in ponderosa pine (Balda et al. 1977).

Courtship and mating sites - Balda and Bateman (1972) describes courtship and mating sites in detail. The first stages of courtship take place on the ground, but as the nesting season approached, trees were used more often. Pairs select a branch or crotch of a tree on the breeding ground where courtship reaches its height of activity.

Nest sites - "A bowl of twigs in pinyon, juniper, scrub oak; in colony (Peterson 1961). Bailey (1928), "nests in colonies, in pinyon pines, junipers, or oaks, generally 5 to 12 feet from ground." Ligon (1961) reported nests, one per tree, in 10 to 15 feet oaks. Dawson (1923), "placed at moderate height in pinyon or juniper." A nest in the Joshua Tree National Monument was 7 ft. up in a juniper (Miller and Stebbins 1964). Bent (1946) reports nests in juniper from 3 to 18 ft. high, with nests in ponderosa pine up to 85 ft. (Oregon). Johnson (1902) gives nest sites as pinyon pine, scrub pine, juniper, and mountain mahogany. Balda and Bateman (1972) found nests that ranged from 5.5 to 78 ft. high in a ponderosa pine forest in Arizona.

V FOOD

A. Food preferences

Grinnell and Miller (1944) call this species omnivorous, supplementing their pinyon seed diet with insects. Bailey (1928), "principally pinyon nuts in their season, but also yellow pine and black pine nuts. cedar and juniper berries, small seeds, various wild berries, and insects." Dawson (1923) gives favorite food as pinyon nuts; berries also taken. Food given to nestlings in New Mexico included numerous insect larvae and nymphs, several adult beetles,

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a lizard, but few pine seeds (Ligon 1971). Animal food includes beetles, grasshoppers, caterpillars, and ants; pine seeds, especially pinyon pine, wheat, cedar, and corn constitute the main plant foods taken (Martin et al. 1951). Bateman and Balda (1973) give a detailed account of food habits (Arizona); terrestrial insects formed the major part of the diet during the breeding season.

B. Foraging areas

Robbins et al. (1966): "is often seen on ground around sagebrush." Johnson et al. (1948) noted a flock of jay foraging on the ground through junipers and pinyons on a sagebrush flat in the Providence Mtns. When settled into an area to feed, a flock of about 250 birds occupied an area of about 2 acres during the morning and evening, and up to 6 acres during the afternoon when feeding was not so intense; the flock spent about 80% of its time in pine forest and 10% in open meadow and woodland (Balda and Bateman 1971). Bateman and Balda (1973) noted that most food for nestlings was gathered by adult males, who foraged together in small flocks (6-8 birds) in open parts of the ponderosa pine forest in northern Arizona.

C. Foraging strategies

Bailey (1928), "in feeding...their method of spreading out and working zigzag over the ground in search of insects... large flocks...engage in catching insects on the wing." Were also noted both picking seeds from the ground and extracting them from cones. Wheelock (1904) noted the taking of insects "on the wing." When feeding in forest and woodland, about 40% of the flock foraged on the ground by probing for insects and/or pine seeds. Piñon Jays often cache seeds; at 21 cache-sites the number of seeds varied from 6 to 31 (Balda and Bateman 1971). Foraging flocks, "moved along in a rolling fashion, the members at the rear flying over and past those ahead of them on the ground" (Miller and Stebbins 1964).

D. Feeding Phenology

Dawson (1923), "in summer they feed largely on insects of all kinds, especially grasshoppers." The only plant food taken in great amounts during spring are pinyon pine seeds; other grains are also taken in winter when insects cannot be found (Martin et al. 1951). Balda and Bateman (1972) found that Piñon Jays harvest and cache seeds of both ponderosa and pinyon pines in the fall and early winter.

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E. Energy requirements

Balda and Bateman (1976) recount the eating of nestlings by adult Pinon Jays; they felt that such actions were a result of a severe energy drain on the adults due to cold (-17°C to 1°C) temperatures and a heavy snow cover. Ligon (1974) states that nestling Pinon Jays cannot survive on a diet composed exclusively of pinyon seeds. Pinon Jays often eat snow, which at times is their only source of free water, according to Balda and Bateman (1971). They also stated that this jay relies heavily on pinyon seeds for reproductive energy. Balda et al. (1977) found that roost sites were selected, in part, for thermal economy; birds roosted within a trees foliage in a south (sun) facing direction.

VI REPRODUCTION

A. Age at first breeding

Goodwin (1976), "first-year birds do not usually breed."

B. Territorial behavior

"Often in large noisy flocks; gregarious" (Peterson 1961). Ligon (1961), "the birds' social instinct is clearly reflected in colony nesting;" two colonies of 50 nests each and one of 13 nests reported. During breeding, the adult male performs most territorial defense; the female does not leave the nest to attack predators (Balda and Bateman 1974).

C. Courtship and mating behavior

"The male usually initiates nest site selection, enticing his mate to the site by carrying sticks to it and feeding her...both sexes bring nest lining material to the site for 3 to 5 days before serious building starts (Goodwin 1976)." Feeding of potential mates is low in October but shows a marked increase in November and December; courtship occurred most often from mid-morning to mid-afternoon (Balda and Bateman 1971). Balda and Bateman (1972) give a detailed account of courtship behavior, which include silent food transfer, courtship begging, silent sitting, stick manipulation, and display flights.

D. Nesting phenology

Bailey (1928) gives nesting season as from February to June. Reed (1904) noted nesting during April or May. Ligon (1961) reports fresh eggs from February to October. Dawson (1923) --season, April to May 10; one brood. "Probably nests mostly

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in late March and early April in southern California" (Willetts 1933). Wheelock (1904) gives California breeding season as March 15 to May 15. Pairs not successful in their first nesting attempt form a second nesting colony ...pairs failing in the second nesting attempt may try a third time (Balda and Bateman 1971). By late December some male jays are in breeding condition; if conditions are suitable, the birds may breed in early February, although breeding may be delayed several months if food is scarce (Ligon 1971). Bent (1946) gives California egg dates as April 9 to 21.

E. Length of incubation period

Goodwin (1976) gives 16 day incubation, which is performed only by the female. Wheelock (1904) gives a 16 day incubation period. Ligon (1971) reported a 17 day incubation period in New Mexico. Bent (1946) listed the period as 16 to 18 days. Bateman and Balda (1973) found a 17 day period in northern Arizona.

F. Length of nestling period

"The young fledge at about 3 weeks (Goodwin 1976)." Wheelock (1904) states that the young fledge in about 22 days. Nestling period of about 20 days in New Mexico at 7,200 ft. (Ligon 1971). In northern Arizona, Bateman and Balda (1973) found Pinon Jay young fledging at 21-22 days of age.

G. Growth rates

Bateman and Balda (1973) give a detailed description of growth rates--"At 10 days of age young Pinon Jays averaged 9.2 times as heavy as on the day of hatching (6.26 g versus 78.00 g). During the latter half of the nestling period (days 11-21) increase in weight was greatly reduced while plumage growth was pronounced.

H. Post-breeding behavior

Young unite with other families in large flocks after fledging, and forage from place to place with the roving habits of their species (Wheelock 1904). Upon leaving the nest, young and parents form tightly knit feeding aggregates that remain near the nests for 8-12 days; by late April, these feeding groups increased in size and consisted of 25-50 young and adults (Balda and Bateman 1971). Richards (1924) noted the wintering behavior of a large flock in northern California which, "divided into three or four flocks, which were much in evidence...(until) the first of April, when the birds began to leave." At 4 weeks of age, Bateman and Balda (1973) found that young jays were still fed by their parents. After 8 weeks of age young were able to fly well and feed themselves; they joined their parents flock.

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VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961) - Eggs (3-4; 5), speckled. Bailey (1928) - eggs usually 4-5. Read (1904) gave clutch of 3-5 eggs. Ligon (1961), "eggs usually 4, rarely 5." Dawson (1923) lists usual clutch as 4 or 5. Bent (1946) gives the highest clutch as 6 eggs. Balda and Bateman (1972) gave an average clutch as nearly 4 eggs.

B. Fledging success

In New Mexico, Ligon (1971) reported only 4 of 13 nests successful; these 4 nests produced a maximum of 13 young. He felt that such low nest success may be usual for the species. Balda and Bateman (1972) found that nest success was dependent upon placement within the colony. Nests near the center of the colony lost fewer eggs than those towards the edge. Overall nest success was highly variable, and ranged between 17 and 50%.

C. Mortality rates per age class

Ligon (1961) reports a large number of nestlings dead in the nest after cold rains. Balda and Bateman (1972) found that early nesting attempts often failed (80% nest destruction in one year) due to severe weather conditions. Predators took 41-68% of all nests in their study.

D. Longevity

Pinon Jays may have a life expectancy of 6 years or more, based on band returns (Whitney 1963).

E. Seasonal abundance

Pinon Jays are seen most often in flocks, even in the nesting season. Flocks are much larger in winter than in summer (Linsdale 1936). Jensen (1926), "...it is not unusual, during fall and winter, to see flocks of hundreds..."

F. Habitat density figures

Johnson et al. (1948) noted flocks of up to 400 jays during summer and winter in the Providence Mtns. Grinnell (1908) found flocks of about 100 birds on the arid slopes of the San Bernardino Mtns. A colony of at least 100 nests was found in a pinyon-juniper woodland in Nevada (Linsdale 1936). A flock of 75 birds in March near San Onofre, San Diego Co., is a rare spring record for this area (Willetts 1933). Balda and Bateman (1971) located 6 Pinon Jay flocks

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within a 15-mile radius of Flagstaff, Arizona, an area dominated by ponderosa pine, pinyon pine, and juniper. A flock of about 50 birds spread their nests about within a few hundred yards of each other in a Joshua Tree-juniper woodland (Joshua Tree Nat. Monument) (Miller and Stebbins 1964). They noted groups of 125 to 175 birds in October, with groups of 50 to 100 seen in late summer and fall. Gabrielson (1949) saw an unusually large flock of "several thousand birds" during the winter in Nevada. Jensen (1923) studied a colony in northern New Mexico which contained 17 nests covering about 10 acres. Balda and Bateman (1972) found that a flock of 250 jays in Arizona used an area covering 240 acres for nesting, although their total home range covered 8 square miles. In each year of their study the colony averaged one nest per 2.3 acres.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Potential predators of all age classes, including eggs and young, in New Mexico listed as Bobcat, Cooper's Hawk, Barn Owl, Great Horned Owl, and Scrub Jay (Ligon 1971). Bent (1946) recounts the taking of nestlings by a pair of Northern Shrikes. Bond (1940) reported finding Pinon Jay feathers in a Nevada Goshawk nest. Enderson and Craig (1974) noted Peregrine Falcon attacks upon Pinon Jays in the Rocky Mountains. Balda et al. (1972) describe the anti-predator behavior of Pinon Jays, which was directed against Sharp-skinned, Cooper's Red-tailed, and Rough-legged hawks, and Great Horned Owls in Arizona.

B. Competition

Pinon Jays and Starlings found together in Colorado by Beidleman and Enderson (1964); no further comment given.

C. Parasitism

Friedmann (1963) does not list the Pinon Jay as a victim of cowbird parasitism.

IX STATUS

A. Past population trends

Called a "common" resident by Grinnell (1915).

B. Present population status

Grinnell and Miller (1944), "resident within state..irregular, local shiftings of population. Because they are gregarious...

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usually considered common or even abundant." Small (1974), "resident, but populations move...depending upon local food conditions and weather." Called a "locally common, permanent resident," in Joshua Tree National Monument (Miller and Stebbins 1964).

- C. Population limiting factors
- D. Environmental quality: adverse impacts
- E. Potential for endangered status

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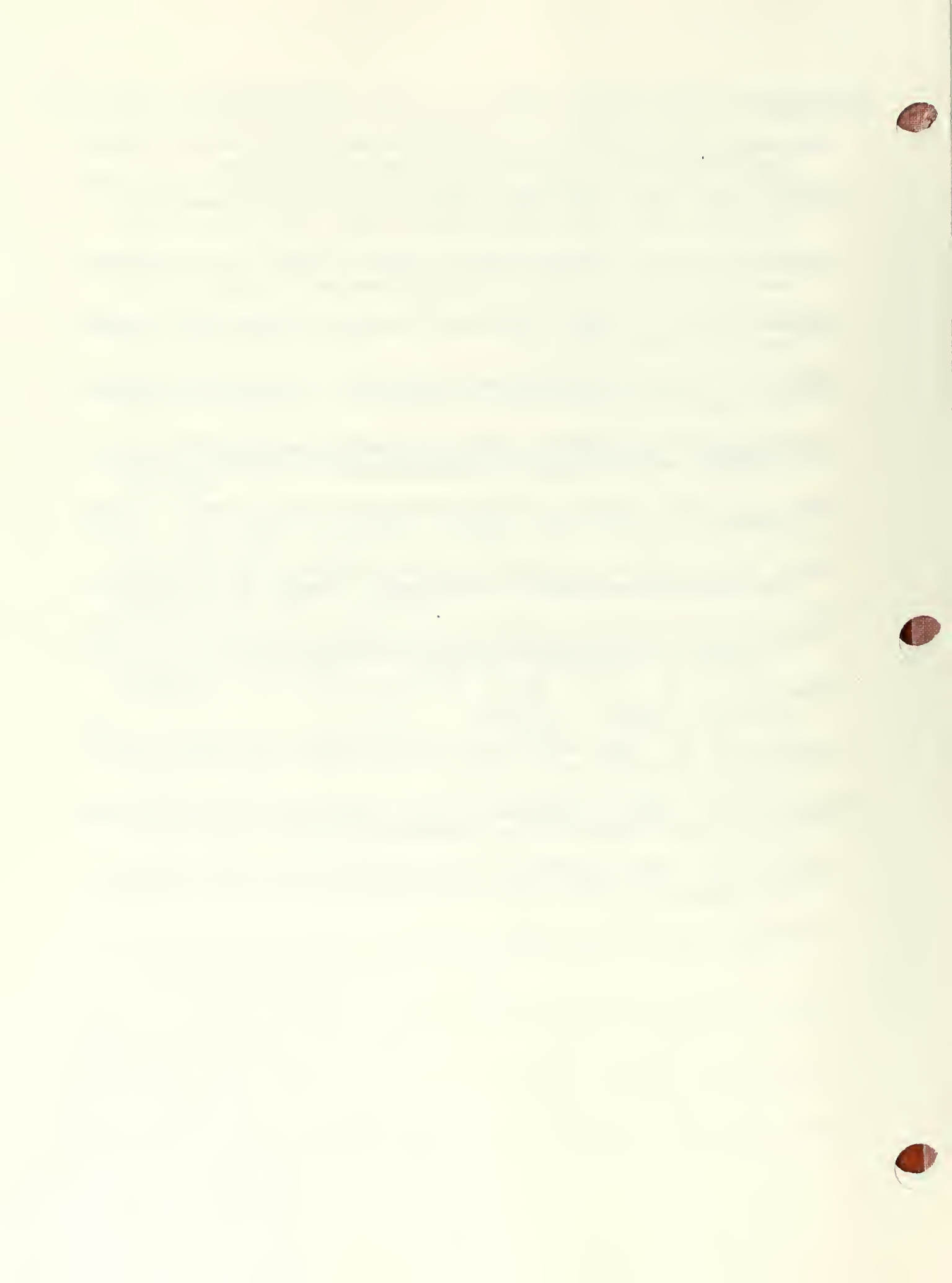
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PLAIN TITMOUSE

Parus inornatus

I TAXONOMY

A. Type description

AOU (1957) Parus inornatus transpositus: Baeolophus inornatus transpositus. Grinnell, Condor, 30, no. 2, Mar. 15, 1928, p. 154. (Mount Wilson, Los Angeles County, California.)

P. i. mohavensis: A. H. Miller, Condor 48, no. 2, Apr. 2, 1946, p. 76. (Pinyon Wells, 4000 feet, Little San Bernardino Mountains, Riverside County, California.)

P. i. kernensis: Baeolophus inornatus kernensis Grinnell and Behle, Condor, 39, no. 5, Sept. 15, 1937, p. 226. (Rankin Ranch, 3300 feet, Walker Basin, Kern County, California.)

P. i. zaleptus: Baeolophus inornatus zaleptus Oberholser, Sci. Publ. Cleveland Mus. Nat. Hist., 4, no. 1, Sept. 19, 1932, p. 7. (rim of Warner Valley northwest of Jacobs Ranch, Twenty Mile Creek, 9 miles south of Adel, Oregon.)

P. i. ridgwayi: Richmond, Proc. Biol. Soc. Washington, 15, June 20, 1902, p. 155. New name for Lophophanes inornatus griseus Ridgway, 1882, preoccupied. (Nevada, Utah, and Colorado to New Mexico and Arizona = Iron City, Utah.)

P. i. inornatus: Parus inornatus Gambel, Proc. Acad. Nat. Sci. Philadelphia, 2, no. 10, July-August (Dec. 5) 1845, p. 265. (Upper California = Monterey.)

B. Current systematic treatments

Snow (1967) recognizes 43 species in the genus Parus; ten subspecies of inornatus. Passeriformes = Paridae.

Ridgway (1904), discussion of morphological characteristics and geographic distribution in relation to systematic treatment.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), P. i. zaleptus: Parus inornatus griseus; Baeolophus inornatus zaleptus; Baeolophus inornatus griseus; P. i. ridgwayi.

P. i. ridgwayi: Baeolophus inornatus griseus.

P. i. kernensis: Lophophanes inornatus; Baeolophus inornatus kernensis.

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P. i. transpositus: Lophophanes inornatus; Baeolophus inornatus murinus; P. i. murinus; B. i. inornatus; B. i. transpositus.

P. i. inornatus: Lophophanes inornatus; Baeolophus inornatus restrictus; B. i. inornatus; B. i. ridgwayi.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), P. i. zaleptus: Warner Plain Titmouse; Gray Titmouse; Warner Valley Titmouse.

P. i. ridgwayi: Gray Titmouse; Gray Plain Titmouse.

P. i. kernensis: Kern Plain Titmouse; Gray-tufted Titmouse; Kern Basin Plain Titmouse.

P. i. transpositus: Plain Chickadee; Plain-crested Titmouse; Gray-tufted Titmouse; San Diego Titmouse; Plain Titmouse.

P. i. inornatus: Plain Chickadee; Plain-crested Titmouse; Gray-tufted Titmouse; San Francisco Titmouse; Gray Titmouse; Plain Tit; Plain Titmouse.

II DESCRIPTION

A. External morphology of adults

Dawson (1923), "Adults (sexes alike) and immature: Crested; upperparts plain hair-brown with olivaceous reflections on rump and on wing-edgings, shading on sides into dull grayish white or pale brownish gray, the brownish element strengthening posteriorly. Bill grayish horn-color with paler tomia; feet and tarsi bluish gray." Ridgway (1904), detailed description of plumage and soft parts, with measurements, of Baeolophus inornatus inornatus; B. i. murinus, and B. i. griseus.

B. External morphology of subadult age classes

Dawson (1923), "Young birds are buffier (than adults), especially posteriorly."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "young black-crested Titmouse (P. atricristatus), which have short gray crests... are virtually indistinguishable."

Intraspecific - Price (1936), "The sexes...are similar in appearance and cannot be distinguished in the field...The male does not have (a) brood patch and thus the sexes can be distinguished in the hand (during the breeding season)." Miller (1946), discussion of variation among subspecies (murinus, cineraceus, kernensis, mohavensis, transpositus,

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ridgwayi). Grinnell and Behle (1937), "Compared as to coloration with B. i. inornatus, dorsum grayer, less brownish, and flanks and underparts generally slightly less buffy, clearer whitish; compared with B. i. transpositus, less olivaceous dorsally, and paler gray below; less clearly gray dorsally, but pale below, than in zaleptus. In size characters, closest to inornatus; bill decidedly shorter, less massive, than in zaleptus, and less massive even than in transpositus."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "Southern Oregon, Nevada, southeastern Idaho, southwestern Wyoming, and southcentral Colorado south to northern Baja California, central and southeastern Arizona, southwestern and central New Mexico, and western Texas. Also resident in extreme southern Baja California."

AOU (1957) P. i. transpositus: "Resident in southwestern California from Santa Barbara County of the Mexican boundary (Palmdale, Hesperia, Santa Rosa Mountains, Campo)."

P. i. mohavensis: "Resident in the Little San Bernardino Mountains of southeastern California."

P. i. kernensis: "Resident in California in southern Tulare and Kern counties (Basin of the Kern River, Walker Basin) and an adjacent eastern slopes of the Sierra Nevada (Inyo County)."

P. i. zaleptus: "Resident from central southern Oregon... northeastern California (Clear Lake, Secret Valley, Manton), and western Nevada (the Peavine and Virginia Mountains, Carson City) south to central eastern California (Benton; White, Inyo, and Panamint Mountains)."

P. i. ridgwayi: Resident in the mountains from northeastern Nevada...southeastern Idaho...southwestern Wyoming...southcentral Colorado...and western Oklahoma...south to southeastern California (Clark, New York, and Providence Mountains), central and central southern Utah...northeastern Arizona...central New Mexico...and western Texas."

P. i. inornatus: "Resident in central western California from Mendocino County and the Sacramento Valley south to Santa Barbara and Tulare counties."

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B. California distribution of the species

Grinnell and Miller (1944), P. inornatus zaleptus: North-eastern and eastern and portions of the state, entirely east of the Cascade-Sierran divides...Modoc region from near Nevada line west at least to Clear Lake and south from Oregon line at least to Secret Valley, Lassen County ...Inyo region from "head of Owens River" and Benton, Mono County, south to White, Inyo, Grapevine and Panamint Mountains of Inyo County."

P. i. ridgwayi: "Providence Mountains (in broad sense, inclusive of "New York Mountains") and Clark Mountains, in extreme eastern San Bernardino County."

P. i. kernensis: "Drainage basin of Kern River, within southeastern rim of San Joaquin Valley, in Kern County and extreme southern Tulare County, and adjacent eastern slopes of Sierra Nevada, Inyo County."

P. i. transpositus: "Southern California, chiefly west of the desert divides, southeast from Santa Barbara and Ventura counties (where intergrading with race inornatus) to Mexican boundary."

Grinnell and Miller [continued] (1944), P. i. inornatus: "Western California below about the 3000 foot level, from Mendocino County and head of Sacramento Valley south to Santa Barbara and Tulare Counties....Intergrades southward with P. i. kernensis in westward foothills of Sierra Nevada in Fresno and Tulare Counties; in coast belt with P. i. transpositus in Santa Barbara and Ventura Counties."

Miller (1946), P. i. mohavensis: "Little San Bernardino Mountains, San Bernardino and Riverside Counties...Extends from Morongo Valley eastward to vicinity of Little San Bernardino Mountain, north of Mecca. Not found on Eagle Mountain to eastward."

Dawson (1923), P. i. inornatus: "chiefly in the oak association of the Upper Sonoran zone west of the Sierra divide and north of the Tehachipe, north to Mendocino and Siskiyou Counties." Wholly within California.

C. California desert distribution

Small (1974), "absent from San Joaquin Valley and eastern and southeastern desert region." Miller (1946), P. i. mohavensis: Quail Spring...San Bernardino County; Pinyon Wells...Riverside County.

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D. Seasonal variations in distribution

Dixon (1949), "There are in the literature a number of records of occurrence...outside the breeding range of this species in late fall and winter, usually in marginal habitat ...those individuals which do survive may move back into adjacent areas suitable for nesting and fill vacancies which have opened during the winter months."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), P. i. zaleptus: "sharply limited to tracks of pinon and (or) juniper of rather old growths, whether these be on nearly level terrain, as in Modoc County, or on steep mountain sides, as in Inyo County."

P. i. ridgwayi: "Normal stands of pinon and juniper, typically where...intermixed."

P. i. kernensis: "Primarily, open oak woods of mountain sides, but also often where oaks are mixed with digger pines or even with pinons."

P. i. transpositus: "Open woodland where consisting chiefly of oaks, whether on level terrain or on mountain sides."

Grinnell and Miller [continued] (1944), P. i. inornatus: "open-type woodland of which oaks of one kind or another are exclusive or dominant constituents. Most frequented species of oaks are blue oak, live oak and valley oak." Miller (1951), Upper Sonoran life Zone. Dixon (1961), discussion of distribution and niche relationships of Parus.

Dawson (1923) "West of the Sierras the range...is nearly coextensive with that of oak trees...occasionally ventures up into the pines of the Sierran foothills--even nests there...excursions into the chaparral." Small (1974), "oak woodlands, pinon-juniper woodlands." Dixon (1949) "dry woodlands of small, chiefly evergreen trees characteristic of the southwest. The coastal races...inhabit woodland in which oaks predominate, whereas those of the Great Basin and desert mountain ranges frequent...pinons and junipers." Miller (1946), P. i. mohavensis: "Resident of pinon-juniper-scrub oak association."

B. Altitudinal range

Grinnell and Miller (1944), P. i. zaleptus: "from 4400 feet near Alturas, Modoc County, to 7500 feet at Waucoba Pass, Inyo Mountains."

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P. i. ridgwayi: "4500 to 6500 feet."

P. i. kernensis: "2400 up to 6700 feet."

P. i. transpositus: "close to sea level, as at San Onofre, San Diego County, and 6000 feet, as on San Bernardino and Santa Rosa Mountains."

Miller (1946), P. i. mohavensis: "3600-4500 feet, San Bernardino County; 4000-4300 feet, Riverside County."

C. Home range size

Dixon (1949) "twelve territories averaged 6.3 acres in size ...Has a large territory relative to that of other small passerine species, averaging...about 135 meters...in diameter."

D. Territory requirements

Perch sites - Dixon (1949), "Rarely does a bird take a conspicuous exposed perch while making its declaration of territory, either during autumn or winter boundary disputes or during spring singing...takes place most frequently from a perch well protected by the canopy of foliage or by twigs of deciduous trees." Hardy (1945) "in the larger branches and on the trunk of these [pigmy conifers] same trees."

Courtship and mating sites

Nest sites - Grinnell and Miller (1944), P. i. ridgwayi: "Nesting crevices often are provided in the partly decayed, split and twisted trunks of junipers, near the ground." Dawson (1923), "old woodpecker holes...wind crevice, incipient decay." Price (1936), "readily nesting in bird houses or nesting boxes."

E. Special habitat requirements

Dixon (1949), "The open spacing of the trees and the general absence of foliage beneath the canopy enable the birds to detect the approach of enemies from beneath."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Dawson (1923) "mixed diet. Insects of many kinds...black olive-scale...Vegetable food...57 per cent. Fruit...eaten chiefly...when other forage fails. Weedseeds, leaf-galls, and poison oak seeds. Chief staple article of diet is the acorn." Jordan (1925), noted feeding on sunflower seeds.

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Davis, Davis, and Davis (1973), discussion of seed size, seed pattern, and seed color preferences.

B. Foraging areas

Bent(1946) "oak-clad, sunny slopes of the foothills, where the foliage of the evergreen oaks provides shelter and a good food supply all the year around."

C. Foraging strategies

Dixon (1949), "devote a large share of their food-gathering time to bark gleaning."

D. Feeding phenology

E. Energy requirements

Davis, Davis, and Davis (1973), "The preference for larger over smaller seeds is undoubtedly advantageous in saving time and energy by transporting the same amount of food in fewer trips...the addition of energy needed to carry the heavier seeds would be almost exactly offset by the increased amount of food carried in the larger kernel."

VI REPRODUCTION

A. Age at first breeding

Dixon (1949), settle territory by age one year. Price (1936), "In one case the new mate was known to be a juvenile of the year before."

B. Territorial behavior

Dixon (1949), "Detection of titmice intruding on territories correspondingly is most often by auditory means..Visual stimuli...used at shorter distances. Action against an intruder may consist of scolds, calls, or song, often in combination with wing vibrations...No patterns (plumage) to be brought into prominence, and hence physical expressions, such as puffing out of feathers in aggressive display, are lacking. A threatening posture...appears to be an attitude of potential movement toward the intruder...Year-round defense of a 'retreat' territory." Dixon (1969), analysis of patterns of singing.

C. Courtship and mating behavior

Dixon (1949), "In the earliest phases of 'courtship,' song may be followed by an 'approach-threat' directed toward the female and often accompanied by use of the 'dominance

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note'...The female may take flight rather than shift her perch...There ensues a pursuit...the male attempts to overtake and mate with the female...Females were observed giving ...an invitational or begging display...He may respond by feeding her...The frequency and intensity of this invitational display...apparently is an index to the physiological state of the female...Pair formation occurs in a majority of cases in young birds soon after family flocks break up in early summer. This pairing may take place prior to establishment on a territory, or a wandering young bird may mate with an established, widowed adult."

D. Nesting phenology

Dixon (1949), "Nest site selection appears to be a function of the female alone, as is construction of the nest...Courtship feeding occurs from the beginning of nest construction until the young are hatched. Incubation is by the female."

E. Length of incubation period

Dixon (1949), "approximately 14-16 days."

F. Length of nestling period

Dixon (1949), "The nestlings remain in the cavity for about three weeks, during which they are fed by both parents. The family brood remains together for from three to four weeks."

G. Growth rates

H. Post-breeding behavior

Dixon (1962), "Even though the period of the annual molt in the population...studied does not intrude appreciably upon the period of fledgling dependency [fledglings were about two weeks out of the nest], it begins earlier in the calendar date than is the case in most passerines." Dixon (1949), "After the young leave the nest, they remain with their parents in a family flock for about a month. Subsequently they leave the area or are driven out by the adults which continue to occupy the area...Winter flocking does not appear to be the rule. Following the break up of family groups in late summer, pair formation may occur among immature birds."

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VII POPULATION PARAMETERS

A. Clutch size

Price (1936), average for 62 sets found to be 6.75 eggs; range 3 to 9. Dixon (1949), "variable."

B. Fledging success

Dixon (1949) "Eight birds of the 24 fledged survived." This involved seven breeding pairs.

C. Mortality rates per age class

Dixon (1949), Adults: "survival of five of the twelve adults from the 1947 breeding season is only 41.6 per cent of that total." Young: "Eight birds of the 24 fledged survived... death rate of 66 per cent among young birds fledged."

D. Longevity

Dixon (1949) of 22 breeding individuals, one each were 5 and 6 years, three were 4 years, seven were 3 years, six were two years, and four were one year. "Average life expectancy of an established adult appears to be about three years." Price (1936) "The oldest titmouse recorded...banded as adult in 1928 and was recaptured in the same box in 1934 when it must have been at least seven years old."

E. Seasonal abundance

Hardy (1945) "found in a family group of a half dozen or so for a short time in the period after the young leave the nest."

F. Habitat density figures

Dixon (1949) "The breeding population of the study area [144 acres] was stabilized at a density of seven pairs." Gaines (1974), reports from 26 to 66 territorial males per square kilometers; 26, 43, and 30 per km² in clumped cottonwood and willow woodland; 68 and 66 per km² in riparian oak woodland.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Price (1936), "Jays [Aphelocoma californica] are often seen about the nesting boxes containing young titmouses and sometimes perch on the box and peer inside. When young birds leave the nest the jays often dive at them and kill them."

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B. Competition

Davis, Fisher, and Davis (1963), noted that 3 of 44 attacks by two territorial pairs of western Flycatchers were directed at P. inornatus. Dixon (1954), detailed discussion of interactions between Chestnut-backed Chickadees and Plain Titmice. "Study of foraging habits suggests only partial overlap in foraging sites in winter. During the period when fledglings were being fed, size of food items taken appeared to differ."

C. Parasitism

IX STATUS

A. Past population trends

Grinnell and Miller (1944), P. i. zaleptus: "Resident. Distribution much interrupted and population usually sparse."

P. i. ridgwayi: "Resident. Under optimal conditions of habitat, common."

P. i. kernensis: "Resident. Where most favorable habitat conditions prevail, common."

P. i. transpositus: "Resident. Common, even abundant locally."

B. Present population status

Small (1974), "common resident."

C. Population limiting factors

D. Environmental quality: adverse impacts

Grinnell and Miller (1944), "Retraction of range has taken place locally, where oaks have been felled to clear for agriculture; on the other hand, tree-planting, even in suburbs of towns, has brought favoring conditions in previously unoccupied neighborhoods."

E. Potential for endangered status

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POOR WILL

Phalaenoptilus nuttallii

I TAXONOMY

A. Type description

AOU (1957), P. n. nuttallii: Caprimulgus nuttallii, Audubon, Bds. Am. octavo ed., 7, 1844, p. 350, pl. 495.

P. n. hueyi: P. n. hueyi, Dickey, Condor, 30, 1928, p. 152. (Bard, Imperial County, California.)

B. Current systematic treatments

Peters (1940) monospecific genus with four subspecies: P. n. nuttallii; P. n. californicus; P. n. hueyi; P. n. dickeyi. Caprimulgiformes: Caprimulgidae.

C. Synonomies of scientific nomenclature

Peters, J. L., 1940, Checklist of Birds of the World, Vol. 4, p. 193, Mass.: Harvard U. Press Caprimulgus nuttallii (Audubon). Grinnell and Miller (1944), P. n. nuttallii: Antrostomas nuttallii; P. nuttallii nyctophilus. P. n. hueyi: P. nuttallii nitidus.

D. Synonomies of vernacular nomenclature

Dawson (1923), Nuttall's Poorwill. Grinnell and Miller (1944), P. n. nuttallii: Nuttall Poor-will; Nuttall Whip-poor-will; Frosted Poor-will. P. n. hueyi: Frosted Poor-will; Huey Poor-will.

II DESCRIPTION

A. External morphology of adults

Peterson (1961), "rounded wings (no white bar). Its short rounded tail has white corners." Ridgway (1914), detailed description of adults including plumage, soft parts, and measurements. Dawson (1923), "Adult: a central patch of pure silky white across lower throat; below this, in abrupt contrast, a band of black...the three outer pairs of tail feathers tipped broadly but decreasingly with white or buffy whites; remaining plumage...black centers of feathers with buffy intermingled dusky marginings." Selander (1954), "do not show pronounced color phases."

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B. External morphology of subadult age classes

Ridgway (1914), "Young--not essentially different from adults, but markings in general less sharply defined, especially on underparts, and throat patch buff instead of white. Downy young--Downy covering vinaceous-buff, paler on underparts, feathers appearing on upper parts dull buffy white minutely stippled and vermiculated with grayish and with small spots and narrow bars of black; those on middle underparts dull white barred, more or less distinctly, with grayish or dusky.

C. Distinguishing characteristics

Interspecific - Peterson (1961), "smaller than a nighthawk, has more rounded wings (no white bar)...short rounded tail with white corners."

Intraspecific - Dawson (1923), "P. n. nuttallii paler than californicus; darker than nitidus." Grinnell (1928), P. n. hueyi, "nearest in color to the light type of P. n. nuttallii ..., but averaging very much lighter. Backs...are a pinkish tan, almost devoid of the silver frosting...the size of the dark dorsal "owl's eye" marking greatly reduced, in many cases practically obsolete."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957): "From southern interior British Columbia, southeastern Montana, northwestern South Dakota, Nebraska, and southwestern Iowa south on the Pacific coast from central California to southern Baja California and through eastern Kansas and central Texas to central Mexico (Guanajuato). Winters from central California, southern Arizona, and southern Texas southward." P. n. nuttallii: Breeds from southern interior British Columbia (Clinton), southern Alberta, southern Montana (Valley, Gallatin, Fergus, and Prairie counties), northwestern South Dakota (Slim Buttes), and Nebraska south through eastern Washington, eastern Oregon, and eastern California (east of the Cascade Mountains and the Sierra Nevada) to the Mohave Desert, central and southeastern Arizona, Sonora, Coahuila (Saltillo), east to eastern Kansas (Lawrence), northwestern Oklahoma (Woods and Cimarron counties), and southern Texas (San Antonio); casual in Southwestern Iowa (Pottawattamie County)." P. n. hueyi: "Breeds in valley of lower Colorado River in southeastern California, southwestern Arizona, northeastern Baja California, and extreme northwestern Sonora."

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B. California distribution of the species

Small (1974), "length of state except humid northwestern portion and Central Valley." Dawson (1923), "summer resident of Upper Sonoran and Transition areas east of the Sierras, from Death Valley northward, and through the northern counties west at least to Yreka, Siskiyou County."

C. California desert distribution

Jaeger (1949), "Chuckawalla Mountains of the Colorado Desert, California." Cardiff (1956), reported on two occasions near Westmoreland. Carter (1937), heard frequently at night during April and May; often seen in October--Twentynine Palms, San Bernardino County. Abbott (1940), reports nest of P. n. hueyi in May, 1940, at eastern end of Salton Sea. Bickford (1929), reported as resident in Napa County. Gilman (1935), reported in Death Valley in November. One dead found in January. Bent (1940) "San Diego, Escondido, Ojai Valley." Miller (1951) Modoc, Inyo, Shasta Valley, Mojave (P. n. nuttallii) Colorado Desert (P. n. hueyi). Grinnell and Miller (1944), P. n. nuttallii: White, Inyo, Grapevine, Funeral, Panamint, and Argas Mountains; Cosa Valley, Death Valley (Inyo County). Mission Valley, San Diego County. Colorado River Valley, Riverside Mountain, Riverside County, to near Picacho, Imperial County. P. n. hueyi: "Valley of Colorado River, from Needles, San Bernardino County, at least to Bard, Imperial County... Imperial Valley, as at eastern end of Salton Sea... Intergrades with P. n. nuttallii occur in Providence Mountains, area, San Bernardino County."

D. Seasonal variations in distribution

AOU (1950) P. n. nuttallii: "Winters from eastern California (Death Valley), southern Arizona (Tucson), and southern Texas (El Paso, Kerrville) south to Sonora (Tiburón Island), Guanajuato, and Coahuila." Small (1974), "primarily a summer visitor (California), April to November in the northern half of the state; some may overwinter by hibernating." Dawson (1928), "Winters in the southern portion of its range and irregularly southward over the deserts and in the valley of the Colorado." Culbertson (1946), discusses reports of individuals presumably in torpor, including own sighting in Fresno County in February. "It is well to note that none of the winter records of the occurrence of the Poor-will in the Sierran foothills are of birds in flight...flushed in the daytime or found in an inactive state."

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IV HABITAT

A. Biotopic affinities

Peterson (1961), "Stony arid hills, open piñon-juniper, sparse brush." Small (1974), "Chaparral, piñon-juniper woodland, brushy slopes, desert washes and desert floor with scattered bushes." Orr (1948) "high transition forest ...composed principally of Jeffrey pine (Pinus ponderosa var. jeffreyi), sugar pine (Pinus lambertiana) and white fir (Abies concolor)...a rocky knoll strewn with large granite boulders...huckleberry oak (Quercus vaccinifolia) ...clumps of brush, consisting of tobacco brush (Ceanothus velutinus), green manzanita (Arctostaphylos patala) and bush chinquapin (Castanopsis semipervirens)." Bendire (1895) "open prairie...almost barren and arid regions of the interior, which are covered only here and there with stunted patches of sage (Artemisia) and other desert plants. The climate does not seem to affect it much, as it inhabits some of the hottest regions of the continent, like Death Valley, in southern California, as well as the slopes of the Rocky and Blue Mountains in Oregon, where it reaches altitude of from 6,000 to 8,000 feet." Miller (1951) Upper and Lower Sonoran and Transition Zones. Grinnell and Miller (1944), P. n. nuttallii: "rocky or gravelly terrain grown scatteringly to bushes or trees. Often associated with sage-brush, antelope-brush, piñon pines, or junipers." P. n. hueyi: "gravelly or stony desert floor or wash bottoms sparsely grown to bushes or small trees."

B. Altitudinal range

Wauer (1964) noted at 3000-6000 ft., Panamint Mtns. Salt (1953), reports as resident of Boca Springs (6000 ft.), May through August. Miller (1955) "common along rocky canyon walls at 5000 ft. but not noted higher up." Grinnell and Miller (1944), P. n. nuttallii: "1800 to 8300 feet." P. n. hueyi: "below 1000 feet."

C. Home range size

D. Territory requirements

Perch sites - Wetmore (1932) "rest during the day on the ground, though after night, when feeding or calling, may seek higher perches on stones or posts or on low branches."

Courtship and mating sites -

Nest sites - Orr (1948) "pine-needle-matted earth on which two eggs were deposited." Bent (1940), "The two eggs are laid on the bare ground, without any semblance of nest building; a slight hollow may be scraped in the bare earth ...on hard gravelly ground...on a flat rock."

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- E. Special habitat requirements
- F. Seasonal changes in habitat requirements

Jaeger (1949), "the Poor-wills are rock seeking, hibernating birds in the winter."

V FOOD

- A. Food preferences

Brauner (1954) "Birds collected...had from 20-61 large beetles and noctuid moths in their stomachs." Stanford and Knowlton (1942) "Stomach contained 6 adult Lepidoptera; 1 mirid bug; 2 leafhoppers; 4 Diptera; and 1 click beetle." Bent (1940) "entirely of insects, mostly the smaller, night flying species, such as moths, beetles, chinch bugs, and locusts."

- B. Foraging areas

Grinnell and Miller (1944), "seeks sandy riparian ground or even mud-bars in the river."

- C. Foraging strategies

Bent (1940), "insects are caught on the wing in the capacious mouths...many are also picked up on the ground."

- D. Feeding Phenology

Brauner (1952) "length of period of activity is apparently affected by weather conditions and phases of the moon. On days following or during a rainy period, the numbers of moths decreased and the period of Poor-will activity was longer. Under normal weather conditions moths were plentiful and the period of feeding was short."

- E. Energy requirements

Jaeger (1948, 1949), describes torpor of presumably same individual for three successive winters, including body and ambient temperature measurements. "Known period of profound hibernation torpidity for the 1947-1948 season was about 85 days." (1949). Brauner (1952), "Prior to the period of torpidity the food supply available to Poor-wills under natural conditions is limited. It is at least possible that the onset of torpidity is associated with reduced food supply." Report includes body and ambient temperatures of captive individual. Marshall (1955), reports torpidity related to amount of food available. Ambient and body temperatures, respiration rates, and activity cycles under captive conditions. Bartholomew, Howell, and Cade (1957),

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calculations of energy reserves, based upon measurements of oxygen consumption of captive individual active and in torpor. Arousal rates slow. "Reduced body temperature and torpor provide a means of energy conservation and are associated with...survival during long periods of fasting." Bartholomew and Howell (1959) reports on temperature, metabolic rates, and behavior for entry-torpor-arousal cycle in captivity. Howell and Bartholomew (1959), further studies on torpor in captivity. Bartholomew, Hudson, and Howell (1962), further studies of physiology related to temperature regulation and torpidity.

VI REPRODUCTION

- A. Age at first breeding
- B. Territorial behavior

Mengel, Sharpe, and Woolfenden (1972), "The exact behavioral functions of wing clapping are uncertain at present...suggests that such behavior is involved in territorial defense." Includes descriptions of wing-clapping.

- C. Courtship and mating behavior
- D. Nesting phenology

Dixon (1934), found 2 eggs (June 6) in nest on steep, well wooded western slope, 7000 ft. Snow on nearby ground 2 inches deep. Eggs on pebbles on ground.

- E. Length of incubation period
- F. Length of nestling period
- G. Growth rates
- H. Post-breeding behavior

VII POPULATION PARAMETERS

- A. Clutch size
 - Orr (1948), two eggs
- B. Fledging success
- C. Mortality rates per age class
- D. Longevity
- E. Seasonal abundance

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F. Habitat density figures

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

C. Parasitism

IX STATUS

A. Past population trends

Grinnell and Miller (1944), P. n. nuttallii: "Summer resident to northward and at higher altitudes; winter visitant at low altitudes at south common." P. n. hueyi: "Resident. Locally, fairly common."

B. Present population status

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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RED-TAILED HAWK
Buteo jamaicensis

I TAXONOMY

A. Type description

Buteo jamaicensis calurus Cassin. (337b) - AOU (1957)
Buteo calurus Cassin, Proc. Acad. Sci. Philadelphia, 7,
Jan.-Feb. (May 22), 1855, p. 281. (Fort Webster [Rio
Mimbres], New Mexico.)

B. Current systematic treatments

AOU (1957) Order Falconiformes, Suborder Cathartae, Superfamily Cathartoidea, Family Cathartidae, subfamily Buteoninae, Genus Buteo, with 8 species; 7 subspecies of jamaicensis.

Mayr and Short (1970), "The red-tailed 'buzzards' comprise a cosmopolitan group of allopatric, closely related species including B. jamaicensis, B. buteo, B. ventralis, B. oreophilus, and B. brachypterus. These are believed to comprise a super species. Of these buteo and ventralis have been considered conspecific with jamaicensis and this may prove to be correct. We follow various authors in merging the western, melanic harlani as a race of jamaicensis."

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Buteo borealis; Buteo harlani; B. montanus; B. calurus; B. borealis calurus; B. b. socorroensis; B. jamaicensis borealis; B. j. fuertisi. Knowlton (1909) refers to B. j. calurus as B. borealis calurus. Grinnell (1915) same as Grinnell and Miller (1944), Bent (1937) calls this subspecies B. borealis calurus.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Red-tailed Buzzard; Harlan Hawk; Red-tailed Hawk; California Red-tail; Western Red-tail; Black Red-tailed Hawk; Western Hen Hawk; Texas Red-tailed Hawk. May (1935), Hen Hawk, Chicken Hawk, Squealing Hawk, Buzzard Hawk.

II DESCRIPTION

A. External morphology of adults

Dawson (1923) Above dark brown or sooty brown, color nearly pure on back and minor wing coverts, elsewhere much varied by lighter grayish brown, tawny, and outcropping white; long scapulars and tertials dusky and white, and double-tawny barred; wing when folded usually, but not always,

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2 inches short of tail; tail rich orange-rufous, crossed near tip by narrow black band; underparts white and variously broad-marked or washed, except on throat, with pale cinnamon-rufous most heavily on sides of breast; throat and breast sparingly marked with blackish shaft streaks; bill plumbeous; tarsus yellow, very stout; claws black. The adults do have a melanistic phase in which the entire plumage, except tail and its coverts, is chocolate brown or blackish, rich deep rusty usually warming on the breast, and lighter rufous appearing on the shanks. Many gradations exist between these two plumages. Peterson (1961) - Large, broad-winged hawk; rufous underside of the tail can be seen in flight. From beneath, adults have whitish tails. Underparts are "zoned" (light breast, broad band of streakings across belly). There is much variation. Black adults usually show red tails (unlike other Buteos). Robbins et al. (1966) say the best field marks are the uniformly colored tail, reddish above, light pink beneath, and the dark belly band. May (1935) says the Western Red-tail is especially noted for the wide variation in its colors. Friedmann (1950) gives sizes for adults and young and descriptions of plumage. Snyder and Wiley (1976) give sizes of all North American hawks and owls.

B. External morphology of subadult age class

Dawson (1923) - above much as in adult, but showing less of tawny and more outcropping of white; tail entirely different, grayish brown crossed by ten or twelve brace-shaped or waved bands of dusky; upper tail coverts lighter, dusky and whitish barred, with a mixture of ochraceous; underparts white or pale ochraceous buffy, heavily streaked, spotted, and posteriorly barred with brown except on breast which is nearly immaculate. Immatures frequently show strong melanistic tendency, in which case the spotting of the underparts invades the breast and increases elsewhere nearly to the point of confluence. Robbins et al. (1966), "The tail of the immature is finely streaked." May (1935): "Young Red-tails usually lack the 'wrist-mark' and the dark tips of the flight feathers are less marked than in the adult."

C. Distinguishing characteristics

Interspecific - Dawson (1923), stouter proportions and more regal bearing than B. swainsoni, but not always distinguishable from that species in the field. Peterson (1961), Red-shouldered has a banded tail and is more uniformly patterned below, also is chunkier with wider wings, shorter tail. May (1935)

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say young Red-tails are very difficult to tell from young Red-shoulders in the field, also the flight of Red-shouldered is more rapid, buoyant and owl-like. The American Rough-leg and the Ferruginous Rough-leg are slightly larger. Phillips et al. (1964), "...it does not gather into flocks as does swainsoni."

Intraspecific - Brown and Amadon (1968), "Adults and young tend to be more heavily marked below" than other races. Baird et al. (1905), "Adult. Similar to borealis, but darker, with more rufous and blackish in the plumage." The young Red-tails, according to Baird et al. (1955), of the var. calurus have numerous heavy transverse spots on the tibia while those of the var. borealis are almost perfectly white.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), Breeds from central interior Alaska (Circle, Tanana River), Yukon, (Forty Mile), west-central Mackenzie and Saskatchewan south to Baja California, Sonora, and western New Mexico, ranging east to Colorado, Wyoming, and Montana and to northeastern Manitoba, south-central Ontario, central and eastern Quebec, Prince Edward Island, and Cape Breton Island, Casual in Illinois, southern Ontario, Mississippi, Pennsylvania, and New Jersey. Grinnell and Miller (1944), Well-nigh universal: from most arid to rainiest belts; from below-sea-level "sinks" to at least 12,000 feet altitude on Sierra Nevada; on deserts and on most islands. Has actually been found nesting under such extreme conditions as are affordable in the following places: Colorado desert; Mohave desert; Lava Beds National Monument, Siskiyou County; Lake Tahoe; Humboldt County; Anacapa Island; Santa Catalina Island; Santa Cruz Island. Breeding metropolis, however, seems to lie in Upper Sonoran and Transition Life-Zones. Dawson (1923), Western North America, except the coastal district of southeastern Alaska, from central Yukon and western Mackenzie south to Cape San Lucas and central America; east to the western borders of the Great Plains and casually to Ontario. Gullian et al. (1959) say that Red-tails are common spring and fall migrants in Nevada but scarcer in July and in the winter. Bent (1937), "From the western edge of the Great Plains westward...from southeastern Alaska and central western Mackenzie southward to Mexico."

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B. California distribution of the species

Dawson (1923), "Common resident of the widest distribution. Breeds from Lower Sonoran deserts to the limits of Upper Transition." Grinnell (1915), "Common resident almost throughout the state. Recorded from deserts, islands, lowest valleys and highest mountains, from most arid to rainiest belts." Baird et al. (1905), "...stated to be common in all parts of the state not destitute of trees, and to reside permanently wherever found, pairing only during the breeding season." Small (1974), "Common resident; small numbers are transient...length of state; breeds in almost any suitable habitat with cliffs or tall trees for nesting or roosting." Bent (1937) reports Red-tails occurring on the Farallons during migration.

C. California desert distribution

Willet (1951) calls calurus a permanent resident of the southern California desert. Phillips et al. (1964) do not list California desert distribution but do say that Red-tails nest in desert areas in Arizona, using saguaros or low shrubs for nest sites. Wauer (1964) says that the cliffs at the canyon mouths of the Panamint Mountains and the side washes provide nesting sites for the Red-tails. They utilize the high cliffs and ledges. Hensley (1959) reports Red-tails nesting in the Sonoran Desert.

D. Seasonal variations in distribution

AOU (1957), Winters from southwestern British Columbia to southern Minnesota and south and southwest across its breeding range to Guatemala and northern Nicaragua; east to Louisiana. Brown and Amadon (1968), "In the more northern parts of its range it is quite migratory...nevertheless, many winter in areas that are often snowbound." Bent (1937) says the Red-tail is migratory in its northern range, leaving the Yellowstone Park area in the middle of October and returning again in late March, early April.

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), Terrain affording food ordinarily in the form of rodents, and nesting sites in trees or cliffs more or less inaccessible to potential spoilers. Perhaps nearest ideal: interspersed woodland and open grassland, the latter in predominance. Dawson (1923), "Possesses great adaptability, so that it is able to maintain itself as well upon the Colorado and Mohave deserts as upon the

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middle slopes of the Sierras and the jutting cliffs of the boundless chaparral country. Baird et al. (1905) published a report from Mr. Dresser who says in Texas they prefer heavily timbered country. Wauer (1964) says Red-tails are rarely observed above the pinon woodlands during the colder winter days. Mader (1978) found Red-tails nesting in flatlands, grasslands, woodland, mountainous desert.

B. Altitudinal range

Grinnell and Miller (1944) and Dawson (1923), breeds up to the limits of the Upper Transition zone and wanders in to the Boreal. Wauer (1964) report a nest at 2500 feet in the Panamint Mountains.

C. Home range size

Braun and Amadon (1968), "The nesting range of a pair varies from about a third to two and a half square miles." Fitch et al. (1946) reported territories of 80 to 200 acres in the San Joaquin area of California. Most territories were oval or circular. Frequently a ridge limited a range extension.

D. Territory requirements

Perch sites - Brown and Amadon (1968), "Night roosts in winter are in thick conifers. High perches are favored. May (1935) says they perch for hours at a time, usually in a dead tree or on a mountain ledge. Fitch et al. (1946) found Digger pines to be the most popular perch sites in the San Joaquin area, favored because of their great heights and open crowns. Live oaks were generally not suitable due to the dense outer foliage.

Courtship and mating sites - Brown and Amadon (1968) describe courtship in the air, as do Grossman and Hamlet (1964). It appears from these two references that part of the courtship takes place at the nest, during an extended construction period when the birds are very sensitive to disturbance. Fitch et al. (1946) describe a pair soaring and calling loudly during courtship. The male will often fly above the female and dangle his legs near her. Flights usually last from 5 to 10 minutes.

Nest sites - Dawson (1923), crannies or ledges of cliff or high in trees made of sticks lined with bark strips or grass. Knowlton (1909); "placed in a tree, usually 50 or 60 feet from the ground. Brown and Amadon (1968), "...are often placed in commanding positions in trees, but in the

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desert may be in cactus 12 or 15 feet from the ground, occasionally on rock pinacles, ledges or even a steel tower." Grossman and Hamlet (1964) state that Red-tails nest in the highest trees they can find; 35 to 70 feet from the ground. Phillips et al. (1964), "Common nest sites are crotches of tall trees or saguaros." Wiley (1975) found 71.7% of nests in sycamores, 17.0% in oaks, 7.5% in Eucalyptus, and 3.8% on cliff faces in Orange County, California. Sycamores were the most common tree. Seidensticker and Reynolds (1971) found 74% of 55 nests in cottonwood trees, 4 in Doublas fir, 3 on cliffs, 3 in dead snaps, 2 in aspen, 1 in Engelmann spruce and 1 in limber pine. Cottonwoods were the only common tall trees growing on the river. Fitch et al. (1946) and others report that old nest sites are reused.

E. Special habitat requirements

Brown and Amadon (1968) say that adequate perches and nesting trees are vital. Usually they perch on dead snaps, although in hot weather they may seek shade. Fitch (1946) believes perch sites to be the most essential feature of a territory.

F. Seasonal changes in habitat requirements

Brown and Amadon (1968) state that territories are still defended in winter against other pairs of the same species.

V FOOD

A. Food preferences

Knowlton (1909), "It occasionally makes off with a meal of young poultry, or a game bird...its food consists principally of mice and other small rodents...reptiles, frogs and insects, and only rarely of poultry or game birds." Brown and Amadon (1968), "The Red-tail sometimes kills a snake, rabbit or ground squirrel." In winter they eat mostly mice in some areas, also catch lizards and sometimes small birds. Small and medium-sized rodents and rabbits are the staple items. The Socorro Island race feeds on land crabs and birds. In May (1935) there is a report on a study done by the Bureau of Biological Survey which found in 850 stomach samples taken in nearly all parts of the United States 86% mammal remains, 12% poultry or game bird remains, 8% other birds, 8% reptiles and 15% insects. Fitch et al. (1946) found of 625 prey items; 23 species, the major area of which were, 380 ground squirrels, 79 pocket gophers, 62 cottontails, 13 wood rats, 10 kangaroo rats and 8 chipmunks. They do cast pellets and these generally do not contain bone, which is digested, but consist of hair, feathers or scales. They describe prey items from various times of the year and localities.

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B. Foraging areas

Robbins et al. (1966), "...feeds in open country." Baird et al. (1905), "It is said to generally descend upon its prey from some fixed position, as a branch of a tree. It is a cautious bird and rarely ventures near a house for poultry except when the dwelling is isolated and near its own haunts."

C. Foraging strategies

Brown and Amadon (1968), "Pairs fly from hunting perch to hunting perch in their territories, not always together. When leaving the night roost they may have a warm-up flight of up to one hour before beginning to feed. More strikes at prey are unsuccessful than successful. In some areas most prey is sighted from a lookout, often a high one. The hawk often smashes recklessly through small brush for its prey. It also hunts on the wing, gliding low over hillsides and swooping down." Baird et al. (1905) says Red-tails rarely dart down to catch a prey while flying, and after catching a prey they fly off with it a ways to eat it. Snyder and Wiley (1976) discuss sexual differences in food eaten by North American accipiters. Grier (1971), "The change to alert posture in a relaxed bird that would attack was very noticeable...changes of tail angle. The time required for a bird to leave its perch...depend largely on the birds familiarity with the situation." Snyder (1975) determined that Red-tails choose the larger prey item when given a choice of two. Fitch et al. (1946) describe two methods of foraging; waiting on a high perch and dropping upon a prey with a direct swoop, and quartering back and forth in low flight to drop on an animal in the open. The first method is most common.

D. Feeding phenology

Brown and Amadon (1968), "In winter in some areas it lives almost exclusively on meadow mice (Microtus), especially the young hawks of the year. It also takes medium or fairly large birds, chiefly caught on the ground. Grossman and Hamlet (1964) suggest that Red-tails feed more on birds during the fall migration when many small birds are visible. May (1935) reports that W. L. Finley (1905) says when the Columbia River overflowed, a pair of Western Red-tails fed their young on carp and catfish. May (1935) also has a report from F. H. Chittenden (1911) that Red-tails eat potato bugs at times. Snyder and Wiley (1976) discuss breeding season food habits of North American accipiters and the relationship between prey populations and timing of breeding. Hofner (1974), "...it appears that males

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occur as prey of Red-tailed Hawks exclusively during winter and spring." Fitch et al. (1946) say that prey items are clearly influenced by the season and what is available. Hensley (1959) found the most active feeding times to be 8 to 9 a.m. and 5 p.m.

E. Energy requirements

Brown and Amadon (1968), "In captivity in winter a Red-tail will eat about 135 grams per day." The adults often bring more food to nestlings than they can eat. Snyder and Wiley (1976) discuss the division of labor between sexes in accipiters and the amounts of food required and also feeding rates at nests with different brood sizes.

VI REPRODUCTION

A. Age at first breeding

Luttich et al. (1971) believe it takes 6 years from hatching for a Red-tail to produce a young.

B. Territorial behavior

Brown and Amadon (1968), Territories are defended even in winter. Grossman and Hamlet (1964); After returning to breeding grounds in late February or early March, they begin to make sounds and movements around the nesting territory of last year, becoming more belligerent in boundary disputes as the days pass.

C. Courtship and mating behavior

Knowlton (1909) notes that Red-tails circle about in the air chasing each other and high, shrill calls. Brown and Amadon (1968); "...the pair soar about, screaming frequently, the male often somewhat behind the female...the female sometimes rolling over in mock combat and presenting her talons. The male sometimes performs a series of shallow dives, and flights may terminate by a series of dives ending at a perch; or he may pull up from a dive to continue soaring. The flights may occur at any time of year in fineweather, but are regular only at the onset of breeding. Mating follows such flights. Presumably courtship feeding occurs." Conner (1974) reports an unusual addition to the normal courtship flight of the Red-tail. A pair in Virginia performed the typical dives and ascents as they swirled in a thermal and then the male, while above the female, reached down and grasped her back with its claws. The contact lasted 2 seconds.

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D. Nesting phenology

Dawson (1923), "February 15th-May 1st, according to latitude and altitude; one brood." Brown and Amadon (1968), "Nests may be built as early as January in regions where incubation does not begin until March.: Phillips et al. (1964) say that young hatch around April 9-12 on deserts in Arizona. Snyder and Wiley (1976) state that a factor contributing to early reproduction in some raptors preying on mammals may be the susceptibility of their young to predation by other raptors. Wiley (1975) gives laying dates in Orange County as from 5 March to 21 April, hatching dates from 6 April to 23 May, fledging dates from 16 May to 1 July. Seidensticker and Reynolds (1971): 1st egg hatched 29 March, last brood fledged 20 June, whole season in 1967 was 125 days. Mader (1978) says that Red-tails began nesting in the Sonoran desert in late December through February. Laying occurred from 25 February through 2 April. Fledging centered around the last week in May and 1st week in June. Luttich et al. (1971) report Red-tails first appearing in their northern breeding range in early April and departing by mid-October. The first incubation begins during the second week in April.

E. Length of incubation period

Brown and Amadon (1968), 28-32 days, usually 30. Grossman and Hamlet (1964), 34 days. Bent (1937), 28 days.

F. Length of nestling period

Brown and Amadon (1968), about 45 days. Grossman and Hamlet (1964), about 6 weeks. Wiley (1975), "41 days," in Orange County, California. In nests that were not disturbed during the later part of the nesting stage fledging dates averaged 47 days. Luttich et al. (1974) give a nestling stage of 44 days. Fitch et al. (1946), 45 or 46 days.

G. Growth rates

Brown and Amadon (1968), "On its second day the chick is very active when awake, bouncing around, flapping the wings. At 6 or 7 days it pecks at prey. At 10 days the young whistles back at its parent screaming above. At 16 days feathers are appearing, the young become aggressive." Grossman and Hamlet (1964); "At 17 days their wing quills appear, closely followed by...the tail." Fitch et al. (1946), "At 16 days the nestlings begin to acquire feathers. Within a month or more of age the young begin to flap and stretch their wings..."

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H. Post-breeding behavior

Brown and Amadon (1968), "After leaving the nest the young gradually learn to hunt." Grossmann and Hamlet (1964) state that new-flying hawks are fairly inactive in summer since they require little food for their bodies to maintain normal temperatures. In the late summer they spend most of their days and nights in the cool, shaded forest. Snyder and Wiley (1976) say that long periods of fledgling dependence are known for some raptors eating mainly mammals, including Red-tails. Mader (1978) says that young may be dependent on their parents for 30 to 70 days after fledging.

VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923), 2 or 3, rarely 4, 5. White or pale bluish white, lightly stained, spotted, blotched, or smeared with reddish brown. Brown and Amadon (1968), 1 to 3, even 4, with some geographical variation. Both sexes incubate, although the female does most. Mader (1978) gives 2.32 eggs per nest. Luttich et al. (1971) give 2.1 eggs per nest.

B. Fledging success

Brown and Amadon (1968) report that 38 eggs produced 16 fledglings in California, and in 1 year in Wisconsin, 48 young were produced in 27 nests. Wiley (1975) found overall nest success in Orange County, California, to be 73.6% and states that other reports ranged from 50% to 74%. Seidensticker and Reynolds (1971) found fledging success to be 1.7 ± 0.2 per successful nest. Mader (1978) had 81% of 42 nests successful. Luttich et al. (1971) reported 1.4 young fledged per hatched clutch.

C. Mortality rates per age class

Brown and Amadon (1968), "Young sometimes fall out of the nest and die." Snyder and Wiley (1976) state that reproductive losses early in the breeding cycle are generally uncommon in North American accipiters. In 1971, a year of bad drought and thus low food supply, many pairs failed to lay or deserted eggs." Generally losses early in the nestling season involved the runts of broods." There is almost no loss of young late in the season. Wiley (1975) reported 25% of the nests he was observing in Orange County, California, failed before or during incubation, 75% failed during the nestling period. No young were fledged from 60.0% of the nests in that area. Land development and farming disturbances were responsible for the high failure

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rate. Luttich et al. (1971) consider an adult mortality rate of 20% annually to be normal and believe a 1st year rate of 51% is normal.

D. Longevity

Kennard (1975) lists the oldest banded Red-tail as 13 years 7 months

E. Seasonal abundance

F. Habitat density figures

Dawson (1923), "...after the American Kestrel, the Western Red-tail is still the commonest hawk in California," Brown and Amadon (1968), "In southern Wisconsin, nesting populations averaged 0.29 pairs per square mile in one year, 0.41 in another, only one-fifth as many as in optimum habitat in California where breeding ranges maybe as little as..." 2 pairs per square mile. "A 37 square-mile tract in Michigan had 2 nesting pairs in one year, but had 5 when checked a year later. In Wyoming there were 12 pairs on a 12 mile square tract." Wiley (1975), in Orange County found distances between adjacent nests to be 150 m to 2.09 km (average, 0.84 km). Seidensticker and Reynolds (1971) found internest distances to range from 3.1 miles to 0.2 mile (average 1.3 miles). Luttich et al. (1971) in Alberta found a habitat density of one pair per 2.7 square miles. Fitch et al. (1946) found one pair to a half square mile in the San Joaquin area.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Brown and Amadon (1968) give a report of Scrub Jays (Aphelecoma) annoying incubating adult Red-tails until they desert their nests, then sucking the eggs dry. Blood Sucking flies swarm in wet years and kill some downy young. Barney (1959) reports a Red-tail dive-bombing a new born lamb and killing it. Fitch et al. (1946) record one instance of a California Jay robbing a nest.

B. Competition

Schnell (1968), "The winter ranges of the Rough-legged and Red-tailed Hawk overlap to some extent across much of the U.S. These species are congeneric, similar in size and anatomy, and have roughly similar food habits."

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C. Parasitism

Seidensticker and Reynolds (1971) found blood sucking dipterous larva on almost all hawk nestlings, but could attribute no mortality to these larvae. Fitch et al. (1946) reported 7 nestlings being killed by blood-sucking flies in the San Joaquin area.

IX STATUS

A. Past population trends

B. Present population status

Grinnell and Miller (1944), "Common and widespread; numbers holding up, probably close to normal save in lowland area thickly settled by humans, where marked reduction or even, locally, elimination has taken place." Knowlton (1909) remarks that Red-tails are deserving of protection since they eat the destructive rodents from farmer's fields. Seidensticker and Reynolds (1971), "Henny and Wight (in press) reported Red-tailed Hawk populations in the U.S. maintaining themselves." Luttich et al. (1971) believe their population in Alberta is not maintaining itself.

C. Population limiting factors

May (1935) says that farmers have killed Red-tailed Hawks because sometimes the hawks will acquire a taste for chickens after finding and eating a few strays. The good they do by eating rodents in fields far outweighs the bad. Phillips et al. (1964), "...many are shot by the ignorant, who suppose they are all killers of chickens." Fitch et al. (1946) and others comment on nest desertion caused by investigators to the extent that this appears to be a real problem. Fitch et al. (1946) say that food supply for the young is not a limiting factor.

D. Environmental quality: adverse impacts

Seidensticker and Reynolds (1971) found no build up of chlorinated hydrocarbons in breast muscle of newly hatched young or fledglings but there was a decrease in eggshell thickness from pre-DDT levels.

E. Potential for endangered status

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RED-WINGED BLACKBIRD

Agelaius phoeniceus

I TAXONOMY

A. Type description

Agelaius phoeniceus nevadensis - AOU (1957), A. p. nevadensis Grinnell, Proc. Biol. Soc. Washington, 27, May 11, 1914, p. 107. (Quinn River Crossing, Humboldt County, Nevada.)

Aeglaius phoeniceus aciculatus - AOU (1957), A. p. aciculatus Mailliard, Condor, 17, no. 1, Jan. 30, 1915, p. 13. (Isabella, Kern County, California.)

Agelaius phoeniceus sonoriensis - AOU (1957), A. p. sonoriensis Ridgway, Man, North Amer. Birds, 1887, p. 370. (Southern California and Arizona to Mexico = Old Camp Grant, lower San Pedro River, Arizona.)

B. Current systematic treatments

AOU (1957) considers A. phoenicens a member of the Order Passeriformes and recognizes 14 subspecies. It is in the Family Icteridae.

Mayr and Short (1970) say that a study is needed on the continent wide variation of this species. Phillips et al. (1964) publish a new spelling for sonoriensis which they say is correct; sonorensis.

C. Synonomies of scientific nomenclature

A. p. nevadensis - Grinnell (1944), A. gubernator, part; A. p. neutralis, A. p. californicus, A. p. aciculatus, A. p. fortis, A. p. mailliardorum.

A. p. sonorensis - Grinnell (1944), A. gubernator, A. p. longriostriis, A. p. neutralis, A. p. thermophilus.

D. Synonomies of vernacular nomenclature

A. p. nevadensis - Grinnell (1944), Crimson-shouldered Blackbird, Bicolored Blackbird, San Diego Redwing, California Bi-colored Blackbird, Nevada Redwing, Kern Red-winged Blackbird, Great Basin Red-winged Blackbird, Thickbilled Red-winged Blackbird.

A. p. aciculatus - Grinnell (1944), Kern Red-winged Blackbird.

A. p. sonoriensis - Grinnell (1944), Red-shouldered Blackbird, Red-winged Blackbird, Sonoran Redwing, San Diego Redwing.

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II DESCRIPTION

A. External morphology of adults

A. p. sonoriensis - Dawson (1923), Plumage glossy black, Tesser wing coverts red; middle of coverts ochraceous orange (male in spring). Female: general plumage streaked dusky and white; above bordered with dusky and grayish and dull ochraceous; below heavily streaked or striped dusky and white, clearing on chin and upper throat. There may be faint bluish or greenish reflections in the back of the male. Bill and feet are black. The middle coverts of the male which are largely hidden are ochraceous buff to ochraceous tawny, often shading on tips to whitish.

A. p. nevadensis - Dawson (1923), in shape of bill and general characters closely similar to sonoriensis; male scarcely distinguishable, but female conspicuously darker colored on account of the great relative breadth of the black streaking both above and below.

A. p. aciculatus - Dawson (1923), similar to A. p. neutralis, but of larger size, feet averaging somewhat larger, but chiefly characterized by a longer and more slender bill than any other form of this genus in the United States.

Ridgway (1915) provides a key to the subspecies of Red-wings.

B. External morphology of subadult age classes

Dawson (1923) only gives a description for the immature age classes for A. p. neutralis. Immature male: like adult male in autumn, but with strong increase of marginal edgings of ochraceous; markings heavier above, lighter below, but only throat, crissum, and tail immaculate; the lesser wing coverts orange or tawny with skirtings of black; middle coverts entirely black, tipped with buffy white. Increasing age is marked by increasing redness of the lesser wing coverts, so that only the older males achieve spectrum redness. Immature female: like adult female and not certainly distinguishable.

C. Distinguishing characteristics

Interspecific - Robbins et al. (1966), The red-shouldered male can be confused only with the western Tricolored Blackbird.

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Intraspecific - A. p. sonoriensis - Dawson (1923), similar to A. p. neutralis but male slightly larger and with a more slender bill. The adult female lighter with streaks more strongly contrasted above, those of lower parts rather narrower and not so dark, the upper parts more extensively dusky. Bent (1928), of the slender-billed nevadensis-caurinus chain. Bill longer and more slender than nevadensis. Female is lightest of California races.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) - A. phoeniceus: Northwestern British Columbia, southeastern Yukon, central Mackenzie, northern Saskatchewan, north-central Manitoba, northern Ontario, southern Quebec, Prince Edward Island, and central Nova Scotia south to southern Baja California, Costa Rica, western Cuba, the Isle of Pines, and the northern Bahamas.

A. p. nevadensis - AOU (1957), Breeds from central southern and southeastern British Columbia (Kamloops Newgate) south through central Washington (Conconully, North Dalles), northern Idaho (Coeur d'Alene, Lewiston), eastern Oregon (Gateway, Prospect), and central northern and eastern California (Seiad Valley, Yosemite, Little Lake) to southeastern California (Victorville, Death Valley) and southern Nevada (Ash Meadows).

A. p. aciculatus - AOU (1957), Breeds in the mountain valleys of east-central Kern County, south-central California (Bodfish, Isabella, Weldon, Onyx).

A. p. sonoriensis - AOU (1957), Resident from southeastern California (Indio), southern Nevada (opposite Fort Mohave, Arizona), central western, central, and southeastern Arizona (Fort Mohave, Wikieup, Safford) south to northeastern Baja California (Colorado Delta) and northern Sonora.

B. California distribution of the species

A. p. nevadensis - Grinnell (1944), Breeds from Modoc Plateau, west to Shasta Valley and upper Klamath River drainage and in western edge of Great Basin south through Mono and Inyo Counties to Owens Valley; also disconnectedly on the Mohave Desert to the Mohave River, San Bernardino County. Occurs along some stream courses in the Sierra Nevada and Cascade Mountains; on the Pacific slopes of these mountains at middle levels. Grinnell (1915), common resident in suitable parts of Modoc and Inyo areas. Dawson (1923), The plateau region of northeastern California and the eastern slopes of the Sierras south to Lane Pine.

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A. p. aciculatus - Grinnell (1944), In nesting season, restricted area in the mountain valleys of east-central Kern County. Life-zone, Upper Sonoran. Dawson (1923), east-central Kern County.

A. p. sonoriensis - Grinnell (1944), Colorado River Valley from Nevada line to Mexican border and irrigated parts of Imperial and Coachella Valleys north and west to vicinity of Indio, Riverside County. Dawson (1923), Resident in the Imperial Valley, on the Colorado Desert west to Mecca, and in the valley of the Colorado River north to Needles. Bent (1958), southeastern California.

C. California desert distribution

A. p. nevadensis - Grinnell (1944), through Inyo area to Owens Valley; also disconnectedly on the Mohave Desert, to the Mohave River, San Bernardino County. Has been reported in Inyo, Mono, Los Angeles, San Bernardino, Kern and Riverside Counties. Willett (1951), resident of damp localities on Mohave Desert, south of Mohave River.

A. p. aciculatus - Grinnell (1944), restricted area in the mountain valleys of Kern County. A single specimen of doubtful identity was taken in Riverside County. Willett (1951) doesn't list this subspecies as a resident of southern California deserts. Bent (1958), east-central Kern County, California, in the Walker Basin.

A. p. sonoriensis - Grinnell (1944), in irrigated parts of Imperial and Coachella Valleys, north and west to the vicinity of Riverside County. Northwestern record station, 7 miles west of Indio, Riverside County. Stragglers reported from San Bernardino and San Diego Counties. Willett (1951), Resident Colorado River, Imperial, and Coachella Valleys.

D. Seasonal variations in distributions

A. p. nevadensis - Grinnell (1944), Move southward and westward from breeding range. Fairly common in winter, west of the Sierra Nevada. Found in winter in coast districts of San Francisco Bay southward.

A. p. aciculatus - Grinnell (1944), moves away from nesting grounds in winter.

A. p. sonoriensis - Grinnell (1944), There is much local shifting of populations in winter and some wandering to points outside the breeding range takes place.

Meanley (1965) reports that several geographic races may roost together after the breeding season.

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IV HABITAT

A. Biotopic affinities

A. p. nevadensis - Grinnell (1944), Life-zones in summer, Lower Sonoran, Upper Sonoran, Transition. In summer found around fresh-water marshes and margins of ponds, lakes and slow moving streams grown with dense sedges, cattails, willows.

A. p. aciculatus - Grinnell (1944), Marshy meadows and lagoons which support growth of cattails and sedges.

A. p. sonoriensis - Grinnell (1944), Life-zone, Lower Sonoran. For nesting, willow thickets, patches of tules and cattails, crowns of tall cottonwoods and the non-native tamarisk trees in the vicinity of water.

B. Altitudinal range

C. Home range size

Orians (1973) found territories varying in size from 1,022 square m to 4,343 sq. m, with a mean of 2,361 square m.

D. Territory requirements

Perch sites - Meanley (1965) discusses Redwing roosts, saying they form roosts during every month of the year. After the breeding season they congregate mainly in wetland habitat. A source of water is important at a roost site. Redwings use dry sites as well as wetlands for roosting though; deciduous thickets, coniferous stands, canebrakes.

Courtship and mating sites - Bent (1958) considers Redwings polygamous, as do Goddard and Board (1967) and others.

Nest sites - Bent (1958), "...nests being placed low down in tufts of grass, in marsh vegetation, in various shrubs near water, or as high as 5 to 10 feet from the ground in willows." He also reports them in tules. Peterson (1961) Breeds in marshes, swamps, hayfields. Nests are built in tules, reeds, deep grass, bush. Holcomb (1966) in a study of Redwings in Toledo, Ohio, found them using a great variety of nest sites. 53% were in goldenrod, but others were found in dogwood, blackberry, elm, oak, willow and grapevine. Stowers et al. (1968) report that predominant sites in Florida are small shrubs or grasses in marshy areas or upland fields. Peek et al. (1972) found that females show a strong attachment to nest site. Brown and Goertz (1978) found nests in northern Louisiana in 30 species of plants.

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Major plants used for nest support were buttonbush, willow, rush, bulrush, cattail, common alder, sweetgum, dock and grasses. Ratios of plant use changed from one habitat to another, as did plant occurrence. Holcomb and Twiest (1968) discuss nest site selection in upland nesting Redwings in Ohio.

E. Special habitat requirements

Phillips et al. (1964) say that Redwings are adaptable and where there are no cattails, will nest in willows, mesquite, or elderberry. Francis (1971) reports higher nest success in relatively sturdy shrubs than in herbs and grasses, but species and growth stage have relatively little effect. Height did not seem to be significant in his study. Coccamise (1977) found no relation between nest success and species of shrub used for nesting. Robertson (1972) believes that the commencement of nesting is partially dependent on when vegetation in a particular area becomes suitable. Holcomb and Twiest (1968) found Redwings to adapt to nesting in a variety of habitats.

F. Seasonal changes in habitat requirements

Meanley (1965) reports that fall roosts are of several types: (a) those used for short stops by in transit birds; (b) late summer roosts that continue to be used throughout the fall and sometimes into winter; (c) roosts formed in the fall and used until early spring.

V FOOD

A. Food preferences

Bent (1958) reports they eat alfalfa weevils, pea aphids (Macrosiphum pisi), and peach aphids (Myzus persicae). Goddard (1969) in a study done in Oklahoma found that 93% of Redwings examined in the fall and winter had eaten grain sorghum, 75% had eaten ragweed, 36% insects, 36% Johnson grass, and lower percentages of about 12 other species. Beasley and Carothers (1974) reported Redwings eating young leopard frogs and pursuing mice but not being able to catch them. Orians (1973) found Redwings eating primarily noctuid larvae in Costa Rica in July. Meanley (1961) found dotted smartweed to make up 38% of the total volume in Redwing stomach sample taken after the breeding season in a fresh water marsh, wild rice 24%, corn 12%, and Walter's Millet 11%. Dolbeer et al. (1978): "Corn (38%) and weed seeds (36%) were the dominant foods for redwings."

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B. Foraging areas

Orians (1973) studied Redwings in Costa Rica that foraged in local marshes and fields. Cattails had few insects and were rarely used as foraging areas. Meanley (1961) did a study on food of Redwings feeding in a fresh water marsh. Dolbeer et al. (1978) found daily foraging areas to vary primarily in response to weather. Redwings were commonly recorded in soybean fields and corn fields.

C. Foraging strategies

Beasley and Carothers (1974) call Redwings opportunistic generalists able to use several food sources and forage by various means.

D. Feeding phenology

Orians (1973) reported nestling blackbirds being fed 89.9% spiders, orthopterans, and lepidopteran larvae. Seasonal differences in food fed to young were insignificant. Meanley (1961) noted Red-wings moving into a marsh to feed as the wild rice developed, at the end of the breeding season. During the breeding season they fed more on corn. Dolbeer et al. (1978) recorded increased use of feedlots for feeding as winter progressed.

E. Energy requirements

Brenner (1966) found mean existence energy requirements to be 24.8 kcal/bird-day. "The existence energy requirements increased from a mean of 25.8 kcal/bird-day at 15 hours of light and 21 C to a mean of 45.5 kcal/bird-day at 9 hours of light and 11 C. The gross energy intake and excrement energy loss also increased as the photo-period and temperature decreased. The variation in photoperiod and temperature did not influence significantly the efficiency of metabolism by the birds." Orians (1973) reported nestlings being fed at the rate of 1.7 items/nestling/hour in 1966, and 2.2 items/nestling/hour in 1967, in a tropical marsh. Dunson (1965) discusses physiological aspects of the onset of molt. Meanley and Bond (1970) found Redwings in Maryland to undergo their most critical molt period during the time of greatest food availability after breeding. Brenner (1967) discusses fat deposits in Redwings at various times of the year. He found average temperature to affect the breeding cycle, and higher fat deposits present at the beginning of breeding.

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VI REPRODUCTION

A. Age at first breeding

Holcomb (1974a) found brood patches on first year females. Meanley and Bond (1970) believe that first year males usually do not breed and first year females usually do.

B. Territorial behavior

Peek (1971) says that trespass by conspecific males upon occupied territory reaches a peak in mid-April and then decreases significantly. Territorial males pay little attention to immature males. Muted and epaulet-colored males were unable to maintain territories. Early in the season intraspecific defense is important to achieve spacing of breeding populations, later interspecific defense and protection of female are important. Strosnider (1960) observed a male defending his territory with "song spread", "bill tittling," and attack when necessary. Each female defends a small area around her nest. Nero (1963) describes Yellow-headed Blackbird territorial behavior and compares it with Redwing behavior. Robertson (1972) discusses various aspects of territorial behavior in detail. Nero and Emlen (1951) found territorial boundaries to be sharply defined but not paying particular attention to vegetation or terrain. Males were found to defend their territory against other males, alien females and fledged young. Trespassing by males rarely occurred. Females generally restricted their movements to a fraction of their mate's territory.

C. Courtship and mating behavior

Goddard and Board (1967) describe courtship as beinging when a female enters a male's territory. Coccamise (1977) "...aggressive interactions between females play an important role in the mating system..." Strosnider (1960) reported a male mated with three females. Nero (1963) compares Redwing behavior with Yellow-headed Blackbird behavior. Orians (1961) mentions that males chase females during courtship. Blakley (1976) suggests that the staggered breeding of females among polygynous Redwings may avoid problems. Younger females are more often polygynous.

D. Nesting phenology

Goddard and Board (1967) found the first nest in their study area in Oklahoma on 22 April. Redwings are persistent renesters. Orians (1973) noted 6 young already fledged on 6 July, 1966, in Costa Rica. Nest construction had begun

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on 12 June. There were still some nests under construction on 20 June. Brown and Goertz (1978) found active nests with eggs from 7 April to 2 August in northern Louisiana. Robertson (1972) reported nest activity to begin 17 April in marshes and 8 May in uplands. Young (1963) says that Blackbirds are persistent renesters after failure. Holcomb and Twiest (1968) report nest building to take 3 days. Orians (1961) says territorial defense begins in January in north-central California. In mid-March males begin to feed in the area and by April they spend the bulk of the day in their territories. Faulkhauser (1964) found all redwings at nests with eggs before May 21 that did not raise a brood successfully renested. Three cases of second nesting were found. Dolbeer (1976) in a study done in Ohio found the first eggs laid on 30 April and the last young fledged on 6 August.

E. Length of incubation period

Holcomb (1974b) - 11 days. Orians (1973) - 11 to 13 days. Brown and Goertz (1978) - 11 to 13 days.

F. Length of nestling period

G. Growth rates

Holcomb and Twiest (1970) did a detailed study on growth of nestlings. Males grew somewhat faster than females. Sex can generally be determined by weight by day eight.

H. Post-breeding behavior

Orians (1973) reports Redwings in Costa Rica forming large flocks during the non-breeding season and roosting in dense, herbaceous vegetation. During the last 2 weeks of September the adults were in full molt and during this period territorial behavior was reduced to a minimum. During December territorial behavior increased and there was sexual chasing. Orians (1961) says Redwings are highly gregarious in the non-breeding season but that sexes are often segregated. Dolbeer et al. (1978) in a study in Tennessee found redwings to use a post-breeding roost from early November to early March.

VII POPULATION PARAMETERS

A. Clutch size

Bent (1958) - 4 to 5. Peterson (1961) - 3 to 5. Goddard and Board (1967) 1 to 5. Orians (1973) - 2 to 4, with a mean of 2.96 in 1966 and 2.67 in 1967. Brown and Goertz (1978) - 3.82 average, range 3 to 5. Holcomb (1971) discusses the effect of artificial manipulations on clutch size.

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B. Fledging success

Goddard and Board (1967) found young fledged from 65 of 243 active nests, but they had removed eggs and young from these nests. They had .87 young fledge per early nest and .69 per later nest. Orians (1973) recorded fledging success for 18 nests in a tropical marsh: 13 fledged 3, 3 fledged 2, and 2 nests fledged 1 each. In 1967 only 20 out of 93 nests fledged any young. Brown and Goertz (1978) reported 2.77 young fledged per nest from 65 successful nests over an eight-year period. Dolbeer (1976) reported 5.5 young fledged per territory and 13.3 per hectare annually. Knox and Stickley (1974) discuss hand rearing of Redwings.

C. Mortality rates per age class

Goddard and Board (1967) say that early nests tend to be more successful than nests started after 1 June. Many of the nests initiated after this were renesting. Holcomb (1966), "Young (1963) found that mortality...is greatest in nestlings. Nestlings begin crowding each other at 8-11 days of age..." and some are crowded out of the nest. "One factor influencing age specific mortality in nestlings may be their ability to grasp and balance. Robertson (1972) found mortality rates in nestlings to be uniform up to day 19, when they dropped significantly. Starvation was the single factor most responsible for mortality of nestlings. Young (1963) discusses causes of egg and nestling mortality. Most eggs and young were lost to predation. Faukhouser (1967) did a study of band returns and found approximately 50% survival per year. Coccamise (1976) found that nestling mortality increased with age.

D. Longevity

Kennard (1975) found the oldest banded Redwing to be 14 years, 5 months.

E. Seasonal abundance

Meanley (1961) reports thousands of Redwings invading a tidal marsh immediately after the breeding season. Meanley (1964): "As the redwings approach the completion of molt in the latter half of September, they begin to move toward the wintering grounds," dispersing over a wide area.

F. Habitat density figures

Robertson (1972) believes that habitat density is kept at low levels due to territoriality. Density was 10 times higher in marsh than in upland habitat in his study. Whitmore (1977) discusses habitat partitioning of redwings and other passerines.

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VIII INTERSPECIFIC INTERACTIONS

A. Predation

Orians (1973) reported 47 young taken during 524 potential nestling days in a tropical marsh. Snakes were seen taking young but he believes that few are taken by avian predators. Robertson (1972) did a study comparing nesting success in upland vs. marsh habitat and found less predation in marshes, but that predation was the most common cause of nest failure. Young (1963) found the most common loss of eggs and young to be predation. Coccamise (1976) gives a detailed discussion of predation. He found predation while the prime cause of mortality was less in more dispersed nests.

B. Competition

Bent (1958) does not discuss competition but tells of Redwings attacking ravens, magpies and even sparrows. Goddard (1969) reported Redwings eating grain sorghum in large quantities and damaging farmer's crops. The Redwings competed with ducks for sorghum. Burt and Giltz (1977) report that starlings, grackles, Redwings and Brown-headed Cowbirds roost together in the non-breeding season.

C. Parasitism

Friedmann et al. (1977) report most records of parasitism by the cowbird are from the central U.S. and Canada. 2.3% of the Red-wing clutches in the Western Foundation of Vertebrate Zool. are parasitized. Brown and Goertz (1978) found 12 of 755 nests parasitized by the Brown-headed Cowbird.

IX STATUS

A. Past population trends

B. Present population status

Goddard and Board (1967) attribute the upward trend in the number of Red-winged Blackbirds nesting in Oklahoma to the increased number of farm ponds and flood dams.

C. Population limiting factors

D. Environmental quality: adverse impacts

Graber et al. (1965) discuss the adverse impact on nesting Redwings in a field sprayed with dieldrin. Dolbeer et al. (1978) found Redwings to have little impact on agricultural crops. Tanner and Tolbert (1975) discuss the effect of chlorinated hydrocarbons on Redwing eggshells.

E. Potential for endangered status

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RUBY-CROWNED KINGLET

Regulus calendula

I TAXONOMY

A. Type description

AOU (1957) Regulus calendula cineraceus Grinnell, Condor, 6, No. 1, Jan. 15, 1904, p. 25. (Strain's Camp, Mount Wilson, Los Angeles County, California.)

B. Current systematic treatments

AOU (1957) considers the Ruby-crowned Kinglet a member of the Order Passeriformes, Family Sylviidae, Subgenus Corthylio, with 4 subspecies. Dawson (1922): "There are probably few problems more fascinating or difficult than the distribution of the races of Corthylio calendula [R. calendula] and the key to a solution lies in a study of the songs "

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944) - Regulus calendula calendula, Corthylio calendula cineraceus, Corthylio c. calendula. Baird (1905), referring to R. calendula - Motacilla calendula.

D. Synonomies of vernacular nomenclature

Dawson (1923) - Ashy Kinglet. Grinnell and Miller (1944) Ruby-crowned Wren, Ruby-crowned Kinglet, Ashy Kinglet, Eastern Ruby-crowned Kinglet.

II DESCRIPTION

A. External morphology of adults

Peterson (1961): "Note the conspicuous broken white eye-ring, which gives the bird a big-eyed appearance. A tiny birdlet, olive-gray above, with 2 pale wing-bars; male with a scarlet crown patch (erected when excited). Occasional males have yellow crowns."

Dawson (1923): "Similar to Corthylio (Regulus) calendula calendula, but larger and much less olivaceous; the color tone of the foreparts ashy or grayish olive, decided olive-green often not appearing above the middle of the back; probably also without increase of olivaceous in fall and winter."

Baird et al. (1905), describing R. calendula: "Above dark greenish olive, passing into bright olive-green on the rump and outer edges of the wings and tail. The underparts are

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grayish-white tinged with pale olive-yellow, especially behind. A ring around the eye, two bands on the wing coverts, and the exterior of the inner tertials white. Male. Crown with a large concealed patch of scarlet feathers, which are white at the base. Female without red on the crown."

Ridgway (1915): "Above grayish olive, the head not darker than back; adult male with crown-patch bright medium-red, or scarlet-vermillion. Length 3.75-4.60, wing 2.20-2.30, tail 1.85-1.90, bill from nostril .20-.22, tarsus .75."

B. External morphology of subadult age classes

Baird et al. (1905) referring to R. calendula: "Young without red on the crown."

C. Distinguishing characteristics

Interspecific - Peterson (1961): "Any kinglet not having a conspicuous crown patch is of this species. The stubbier tail distinguishes it from any of our warblers, as does the dark bar bordering the rear wing-bar. Similar species: Golden-crowned kinglet and Hutton's Vireo." Robbins et al. (1966): "Told from the Golden-crown by eye-ring and from vireos or fall warblers by its smaller size, short tail, and habit of flicking its wings."

Intraspecific - Dawson (1923): "Similar to R. c. calendula but larger and much less olivaceous." Jewett et al. (1953) says grinnelli is similar to cineraceus but smaller and darker. Godfrey (1966) says cineraceus is grayer and paler than calendula.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), R. calendula cineraceus: "Breeds from south-central British Columbia (probably the mountains of southwestern Alberta) and western Montana southward in the mountains to southern California (to Mount Pinos, and the San Gabriel, San Bernardino, San Jacinto, and White Mountains), central and southern Arizona, east-central Colorado, and central New Mexico." Oberholser (1974) gives the distribution in Texas as: "Taken north to Haskell (May 15) east to Travis and Victoria (May 5), south to Hidalgo, west to Brewster and Culberson Counties." Gullion (1959) says that R. calendula is an uncommon winter visitor in Nevada in the brushy areas, arriving as early as 26 September and remaining as late as 28 April. Hines (1963) reports Ruby-crowns as a common resident of the Alaskan spruce forest. Jewett et al. (1953)

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say that Ruby-crowns are a permanent resident of Washington state, principally east of the Cascade Mountains, wandering to western Washington during migration. Sutton (1967) notes that Ruby-crowns do not nest in Oklahoma, but do migrate through. Gabrielson and Jewett (1940) note than cineraceus breeds from the Cascade Mountains and Blue Mountains of Oregon south to southern California.

B. California distribution of the species

Grinnell and Miller (1944), for R. calendula cineraceus: "As breeding, Siskiyou, Trinity, and Warner mountains in north thence south in Cascade Mountains and Sierra Nevada from Mount Shasta to southern Tulare County; in southern California, on Mount Pinos, San Gabriel, San Bernardino and San Jacinto Mountains." Dawson (1923): "Common breeder in the Boreal Zone from the Warner and Siskiyou Mountains south along the central Sierras to about Long Meadow in Tulare County (Grinnell); also in the San Bernardino and San Jacinto Mountains. Common in winter at the lower levels, especially southerly and southeasterly. Stewart et al. (1974) do not mention R. calendula in this paper on inland and coastal fall migrating passerines in central California.

C. California desert distribution

Grinnell and Miller (1944) give breeding records from these sites; San Bernardino and San Jacinto Mountains, Mohave and Colorado deserts east to Colorado River and from Death Valley south to Mexican line, Kern County, San Bernardino County, San Diego County. Willett (1951) lists R. c. cineraceus as a winter resident only, in the southern California desert.

D. Seasonal variation in distribution

AOU (1957): "Winters from southern British Columbia, Idaho, Nevada, and southern Utah, south to Baja California and the highlands of northern Mexico." Grinnell and Miller (1944): "Winter visitant in western lowlands and on southeastern deserts from late September to mid-April. In winter wide tolerance of conditions is shown." Sutton (1967) says Ruby-crowns are found in Oklahoma during migration, primarily from mid-September to 1 December and from mid-March to 6 May.

IV HABITAT

A. Biotopic affinities

Peterson (1961): "Conifer forests; in winter other woodlands, thickets. Grinnell and Miller (1944): "In breeding season coniferous forests either of moderately dense type or where

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trees are open and broken. Robbins et al. (1966): "Prefers conifers." Godfrey (1966): "In nesting season, coniferous forests and woodlands, muskegs, also mixed woods." Sutton (1967) says that during the Ruby-crown's migration through Oklahoma they inhabit all kinds of woods, showing no preference for evergreens.

B. Altitudinal range

Grinnell and Miller (1944): "Extreme altitudes of nesting range from 1500 feet to 10,000 feet."

C. Home range size

D. Territory requirements

Perch sites

Courtship and mating sites

Nest sites - Grinnell and Miller (1944) say they nest in concealing needle tufts at middle heights in lodgepole pines, mountain hemlock and firs. Godfrey (1966): "In coniferous trees at almost any height but most often well up."

E. Special habitat requirements

F. Seasonal changes in habitat requirements

Godfrey (1966) says that during migration they are found in all kinds of woodland; also in thickets of tall shrubs such as alder and willow.

V FOOD

A. Food preferences

Baird et al. (1905) says they eat chiefly insects, but also eat the stamens of blossoms of trees. Robertson (1959) had Ruby-crowns feeding at his hummingbird feeder. Hespeneide (1962) give a description of Ruby-crowns feeding on insects caught in the cracks of buildings.

B. Foraging areas

Grinnell and Miller (1944) say they forage in the terminal foliage.

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C. Foraging strategies

Baird et al. (1905) report them to be very active in the pursuit of insects. Jewett et al. (1953) say they spend most of their waking hours searching the foliage for insects. They often make flycatcher-like excursions into the air, snapping their beak and returning to their perch.

D. Feeding Phenology

Baird et al. (1905): "They are chiefly met in the spring among the tree tops, where the insects they prefer abound... In the fall of the year...they are more commonly met among lower branches, and among bushes near the ground."

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

C. Courtship and mating behavior

D. Nesting phenology

Dawson (1923) just gives "June" as the season.

E. Length of incubation period

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961) - 6 to 9. Dawson (1923) - 5 to 9. Godfrey (1966) - 5 to 11. Sutton (1967) - as many as 11.

B. Fledging success

C. Mortality rates per age class

D. Longevity

Kennard (1975) did not find any banding records indicating the banded Ruby-crowns live longer than four years.

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- E. Seasonal abundance
- F. Habitat density figures

III INTERSPECIFIC INTERACTIONS

A. Predation

Gabrielson and Jewett (1940) publish an account of a Rocky Mountain Jay taking eggs from a Western Ruby-crowned Kinglet nest in Oregon.

B. Competition

C. Parasitism

Friedmann et al. (1977): "In spite of its diminutive size, the Ruby-crowned Kinglet must be rated as a regular...host choice of the Brown-headed Cowbird."

IX STATUS

- A. Past population trends
- B. Present population status

Grinnell (1933): "Common summer visitant to the Canadian zone from Warner and Siskiyou Mountains along Sierra Nevada south to Tulare County. Also sparingly in southern California on San Gabriel Mountains, San Bernardino Mountains and San Jacinto Mountains."

- C. Population limiting factors
- D. Environmental quality: adverse impacts
- E. Potential for endangered status

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RUFOUS-SIDED TOWHEE
Pipilo erythrophthalmus

I TAXONOMY

A. Type description

AOU (1957), P. e. montanus: Pipilo maculatus montanus Swarth, Condor, 7, no. 6, Nov. 22, 1905, p. 172. (Miller Canyon, Huachuca Mountains, Arizona.)

P. e. curtatus: Pipilo maculatus curtatus Grinnell, Univ. California Publ. Zool., 7, no. 8, Aug. 24, 1911, p. 309. (Big Creek Ranch, alt. 4350 feet, base of Pine Forest Mountains, Humboldt County, Nevada.)

P. e. megalonyx: Pipilo megalonyx Baird, in Baird, Cassin, and Lawrence, Rept. Expl. and Surv. R. R. Pac., vol. 9, 1858 pp. XLI, 511, 515. (Fort Tejon, Cal[ifornia].)

B. Current systematic treatments

Swarth (1913), for historical importance, a treatment of the California forms of the species, at that time recognizing (megalonyx, falcifer, falcinellus, curtatus, clementae).

Paynter (1970), recognizes seven species in the genus Pipilo; twenty-four subspecies in the species erythrophthalmus. Passeriformes: Emberizidae (Emberizinae).

C. Synonomies of scientific nomenclature

P. e. megalonyx: Dawson (1923) - P. maculatus megalonyx. Grinnell and Miller (1944), Fringilla arctica; P. arcticus; P. maculatus atratus.

P. e. curtatus: Dawson (1923) - P. maculatus curtatus. Grinnell and Miller (1944), P. m. falcinellus.

P. e. montanus: Dawson (1923) - P. maculatus montanus.

D. Synonomies of vernacular nomenclature

P. e. megalonyx: Dawson (1923) - Spurred Towhee; San Diego Spotted Towhee. Grinnell and Miller (1944), Arctic Ground Finch; California Ground Robin; Southern Pipilo; California Finch; Long-spurred Towhee.

P. e. curtatus: Dawson (1923) - Spurred Towhee; Mountain Towhee; Nevada Spotted Towhee. Grinnell and Miller (1944), Long-clawed Towhee Bunting; Long-spurred Towhee, Sacramento Towhee; Nevada Towhee.

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P. e. montanus: Dawson (1923) - Arizona Spotted Towhee; Mountain Towhee.

II DESCRIPTION

A. External morphology of adults

Dawson (1923), P. e. megalonyx: "Adult in spring and summer: Head and neck all around and breast glossy black, the black of remaining underparts dulling posteriorly, especially upon rump and remiges; the scapulars heavily marked with longitudinal spots of white, included or else occupying entire outer web of feathers...Outer pair of rectrices narrowly margined and broadly tipped with white...Underparts centrally pure white, the sides and flanks tawny...Irides red; bill black; feet and tarsi dark brown. Fall and winter specimens have feathers of upperparts slightly washed or tipped with pale tawny, especially upon rump. Female in spring: Similar to male, but duller, the black veiled with olivaceous gray, the ground color strongest on throat and chest and persisting centrally on pileum and notaeum; the white tips of scapulars, rectrices, etc., more restricted, the tibia dusky." P. e. curtatus: "Similar to P. m. (e.) megalonyx, but black of upperparts less pure, grayer; white markings notably increased and carried clear across the back; tawny of sides, etc., paler and more restricted, apical white spots of 3rd pair of rectrices more extended; hind claw notably weaker." P. e. montanus: "Similar to P. m. (e.) megalonyx, but paler every way; back and rump with admixture of gray; white markings more extended and diffuse; apical spotting of tail more extended; hind claw weaker." Ridgway (1901), P. maculatus megalonyx: detailed description of adult males and females, including plumage, soft parts, and measurements. Peterson (1961), "Male: head and upper parts black; rows of white spots on back and wings; sides robin-red; belly white. Flashes large white spots in tail corners. Female: Similar, but dusky brown where male is black."

B. External morphology of subadult age classes

Dawson (1923), P. e. megalonyx: "highly streaked appearance, not unsuggestive of a female Redwing (Agelaius phoeniceus): Upperparts blackish, margined with cinnamon-buff...white spotting of adult much restricted; underparts mingled blackish, whitish, and cinnamon-buff...Throat, chest, and sides of breast finely streaked." Peterson (1961), "in summer are streaked below like large slender sparrows but have the tail pattern of this towhee." Baumann (1959), detailed description of skin, other soft parts, and extent of down from day 1 to day 8.

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C. Distinguishing characteristics

Interspecific - Peterson (1961), "smaller and more slender than Robin."

Intraspecific - Dawson (1923), "As compared with the easterly races of maculatus, megalonyx shows clearer black upon the back and restriction of white spotting." Borror (1975), analysis of the nature and amount of geographical variation in the local repertories of the subspecies occurring in the U.S.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) P. erythrophthalmus in general: "Southern British Columbia, central Alberta, central Saskatchewan, southern Manitoba, northern Minnesota, northern Michigan, southern Ontario, northern New York, northern Vermont, central New Hampshire, and southwestern Maine south to southern Baja California through Mexico to Guatemala, and western Texas, northern Oklahoma, northern Arkansas, central southern Louisiana, the eastern Gulf coast, and southern Florida... Fossil, in the late Pleistocene of California."

P. e. montanus: "Breeds from central eastern California (Benton), southern and central eastern Nevada (Grapevine Mountains, Lehman Creek), northern Utah (Stansbury Island, Uinta Mountains), and northwestern and central northern Colorado (Boulder) south to southeastern California (Providence Mountains), central western and central southern Arizona (Harquahala Mountains, Baboquivari Mountains), northeastern Sonora (San Jose and San Luis Mountains), northwestern Chihuahua (Sierra Madre, south to lat. 29°N.), and central southern and northeastern New Mexico (Mesilla Park, Sierra Grande)...Casual in Nebraska (North Platte) and Kansas (Morton County), and accidental in New Jersey (Metuchan)."

P. e. curtatus: "Breeds from central southern British Columbia (Lilloet, Okanagan Landing, Robson) and northern Idaho (5 miles west of Cocolalla) south, east of the Cascades, to northeastern California (south to Mono Lake), western and central Nevada (Tybo), and southeastern Idaho (Craters of the Moon)." P. e. megalonyx: "Resident in southwestern California (Monterey and west slope of Walkers Pass south to Santa Cruz Island, Little San Bernardino Mountains, and San Diego County) and northwestern Baja California (south to about lat. 32° N.). Casual on San Miguel Island, California."

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B. California distribution of the species

Dawson (1923), P. e. megalonyx: "Resident in the Pacific Coast district of southern California and northern Lower California, north along coast to San Luis Obispo County, east to southern Sierras (northern Kern County). Also Santa Cruz Island and...Santa Rosa." P. e. curtatus: "northeastern California...breeds in the Warner Mountains of Modoc County." P. e. montanus: "Known only from the Panamint Mountains in Inyo County, where breeding." Grinnell and Miller (1944), P. e. curtatus: "breeding, northeastern section from Oregon line south to Mono Lake; limited to westward by high-zone forests of Cascade-Sierran system." P. e. montanus: "Mountain ranges of Inyo district from southeastern Mono County south to northern San Bernardino County and from east side of Owens Valley to Nevada line." P. e. megalonyx: "Coastal districts from Monterey County west of lower (northern) Salinas Valley south to Mexican boundary; interiorly, from Kern County, southward, Included are the Kern River basin northeast to Walker Pass and the interior coast ranges north to extreme western Fresno County. Occurs also on Santa Rosa and Santa Cruz islands. Intergradation with adjoining races to the northward is notably gradual."

C. California desert distribution

Dawson (1923), P. e. montanus: "south of the Great Basin to the desert ranges of eastern California, ...Panamint Mountains, Inyo County, where breeding." Small (1974), "absent only from higher mountain areas and southeastern deserts." Grinnell and Miller (1944), P. e. curtatus: reported in Potholes, Imperial County. P. e. megalonyx: reported at Pasadena, Los Angeles County; San Bernardino, San Bernardino County; Escondido, San Diego County; Palm Springs, Riverside County. Cardiff (1956), reported P. m. megalonyx collected on the New River northwest of Westmoreland. Willett (1912), reports two fresh eggs of P. e. megalonyx near Claremont, Los Angeles County. Miller (1951), P. e. megalonyx: Kern Basin and San Diego. P. e. curtatus: Modoc and Inyo regions. P. e. montanus: Inyo and Mojave regions.

D. Seasonal variations in distribution

AOU (1957), P. erythrophthalmus in general: "Winters from southern British Columbia, Utah, Colorado, Nebraska, Iowa, the southern Great Lakes area, and Massachusetts southward." P. e. montanus: "Winters from southern Utah (Beaverdam Mountains), central Colorado (Golden), and western Texas (Palo Duro Canyon) south to northern Sonora (Sierra Carrizal, Nacozari), central Chihuahua (Chihuahua), and central Texas (Del Rio; Kendall County); casually farther southeast in

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Texas (Victoria, Eagle Lake)." P. e. curtatus: "Winters in part in breeding range and south to southeastern California (Potholes), northwestern Sonora (Sonoyta), and southeastern Arizona (Huachuca and Chiricahua Mountains)." Peterson (1961), winters mainly from S. B. C., Utah, Colorado south." Grinnell and Miller (1944), P. e. curtatus: "Summer resident in Great Basin region from late March to early October; partly migratory, some birds wintering far to southward in State."

IV HABITAT

A. Biotopic affinities

Small (1974), "chaparral and forest undergrowth, riparian thickets." Peterson (1961), "brush, chaparral, undergrowth, forest edges, city shrubs." Grinnell and Miller (1944), P. e. curtatus: "Basic requirements much as in race montanus ...Brush cover inhabited includes willow thickets, artemisia and rabbit brush. In winter, in Colorado River valley, occurs in thickets of arrowweed and in atriplex bushes. P. e. montanus: "Large, stiff-branched shrubs, particularly in bottoms of ravines and canyons and along bases of rock outcrops...Purshia, willow thickets and tall artemisia bushes commonly provide the necessary cover." P. e. megalonyx: "Principally river bottom thickets and chaparral. Tangles of blackberry, wild grape, willow thickets, poison oak, scrub oak, ceanothus and manzanita are prominent plant associates, but any brush cover appears to serve if it is fairly tall and produces abundant leaf litter either by reason of the plant types involved or because of favorable topography of the ground beneath." Miller (1951), Upper and Lower Sonoran and Transition life zones.

B. Altitudinal range

Grinnell and Miller (1944), P. e. curtatus: "from 4000 feet in Honey Lake Valley, Lassen County up to 8000 feet on Warner Mountains." P. e. montanus: "4300 feet to 8000 feet; may wander up to 10,000 feet in late summer." P. e. megalonyx: "from near sea level, as at Laguna Beach, up to 7000 feet in San Bernardino Mountains; late summer vagrants range up to 9000 feet."

C. Home range size

D. Territory requirements

Perch sites - Grinnell and Miller (1944), P. e. montanus: "piñons, junipers or mountain mahoganies which afford exposed elevated song posts essential for the males." Davis (1958)

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"highly variable...may sing from the ground while foraging or from as high as 50 feet up in tall trees. By far the greatest number of singing perches noted were in trees, especially in live and valley oaks, but to some extent in willows and sycamores...May sing from exposed perches, such as bare limbs or the tops of trees or shrubs, but usually they sing from leafy cover where they are at least partly concealed."

Courtship and mating sites - Baumann (1959) "After singing in one place for a while, the birds often flew to a different location, sang there for a period of time, and then passed to another site. In this way they regularly covered most of their territory (courtship and territorial singing by males)."

Nest sites - Dawson (1923), "Placed on the ground, or, rarely, very low in bushes, and usually sunk deeply in loose leaf-waste or trash; composed of grasses, barkstrips, dried leaves, lined with fine grasses." Davis (1960), "Since nests were flush with the ground, or nearly so, surrounding vegetation...provided sufficient lateral screening." Baumann (1959), "generally...on the ground."

E. Special habitat requirements

Grinnell and Miller (1944), "For desert areas, the brush required is relatively dense and tall...Only in such brush is deep leaf litter likely to accumulate, protected from wind scattering, where these towhees can forage."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Dawson (1923) "insects...fallen seeds." Davis (1960) reports adults feeding insect larvae to nestlings. Graskin (1950), stomach contents included ants.

B. Foraging areas

Grinnell and Miller (1944), "Although foraging is chiefly on the ground, in summer and fall berries are taken from bush tops." Woodbury (1933), "If the visible food supply on the surface is not sufficient for its needs, the towhee takes to turning over the leaves and scratching among the trash with its feet." Davis (1957a), "sheltered soil cover in which the birds may find their food by scratching... Rarely forage in areas which are not screened from above by overhanging vegetation, and even more rarely do they search for food in bare or sparsely covered soil."

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C. Foraging strategies

Dawson (1923), "scratching for food...by a succession of backward kicks, executed...by both feet at once, and assisted by a compensatory flash of the wings." Woodbury (1933) describes bilateral scratching behavior used when foraging. Davis (1957a), "involve gleaning exposed food items, mainly weed seeds and insects, from the soil surface or obtaining food located by scratching in soil cover or in the upper layers of exposed soil...The nature of foraging, whether predominantly by scratching or by pecking at the surface, is determined by the nature of the terrain traversed." Includes a detailed discussion of comparative foraging with the Brown Towhee; foraging behavior, osteology and myology of the hind limbs, methods of locomotion and foraging.

D. Feeding phenology

Davis (1960), "nestlings in early nests are fed mainly larvae, whereas nestlings in later nests are fed mainly grasshoppers, the shift coinciding with the relatively greater abundance of larvae in the spring and the relatively greater abundance of grasshoppers in the early summer." Davis (1961), "The short bill and long intestinal tract of birds taken in winter apparently correlate with the vegetable diet utilized at that season; the long bill and short intestinal tract of birds taken in summer apparently correlate with increased consumption of insect material in the summer period." Davis (1957a), "ate coffeeberries (Rhamnus californica) between August 22 and December 24...The preponderance of September records...suggests that coffeeberries are also an important source of water during this hot, dry month."

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

Davis (1958), "Throughout the period of spermatogenesis there is a definite tendency for adults to precede first year birds in the attainment of (first primary spermatocytes in synapsis, predominance of primary spermatocytes in synapsis, first spermatids, breeding)."

B. Territorial behavior

Bauman (1959), "From fall until late winter there seemed to be no evidence of territoriality...However, in February, the males began to sing vigorously in a given area, and to spend more of their time there. Foreign males were chased away, but paired or unpaired females were not disturbed... Males maintained their territories from the time pairing began to the end of the breeding season."

C. Courtship and mating behavior

Davis (1958) detailed discussion of singing behavior with respect to breeding season. Baumann (1959), "after pairing takes place, the song of the male becomes less frequent and insistent than the calls and songs of the unpaired males."

D. Nesting phenology

Dawson (1923), "Season: May, June; one or two broods." Davis (1960), "at Hastings Reservation in coastal California occurs between about April 20 and June 20...Most pairs apparently raise one brood. Nests are built solely by the female."

E. Length of incubation period

Davis (1960), reports about 12 days, Hastings Reservation. Baumann (1959), reports 13 or 14 days.

F. Length of nestling period

Baumann (1959), "young birds were found to leave the nest when from nine to eleven days of age" (range for five broods).

G. Growth rates

Baumann (1959), detailed description of development of plumage from day 1 to day 8, including photographs. Austin (1968), "In common with most passerines, the growth rate of the young towhees is very rapid. The weight of these nestlings increased about fourfold during the six days of observation."

H. Post-breeding behavior

Baumann (1959), "About one month after leaving the nest the young were independent. The immature birds were undisturbed as they frequented common feeding grounds in the territories of the breeding pairs...About two weeks after appearing at the common feeding grounds, the young birds commenced to disappear, and most left within a month. Within two weeks after the appearance of the first set of immatures, another group appeared in the common feeding ground." Austin (1968), "after the young leave the nest the family stays together near the nesting site all summer. Young of the year in full juvenile plumage are seen regularly in July. As the singing of the males diminishes after the nesting season, the birds become relatively inconspicuous as they forage quietly in the dense cover of their preferred habitat."

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VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923), "3 or 4; white or palest bluish, grayish, or pinkish, finely and heavily and often uniformly sprinkled or spotted with reddish brown."

B. Fledging success

C. Mortality rates per age class

D. Longevity

Linsdale (1949), banding at Hastings Reservation revealed 6 individuals survived to age five; 4 to age six; 1 to age seven. Davis (1957b), discussion of uses of color of primary coverts, shape of rectrices, width of white spot on 4th rectrix, amount of wear on wings and tail, and color of iris to age individuals. Summer (1931), reports, from banding records, two individuals at least seven years of age. Kennard (1975) lists this species with a record age of 12 years, 3 months when banded.

E. Seasonal abundance

F. Habitat density figures

Gaines (1974), reports 92 and 94 territorial males/km² in 1972 and 1973 in clumped cottonwood and willow woodland in Butte Co.; 38 territorial males/km² in brushy field and cottonwood and willow edge, Glenn and Butte counties; 60/km² in cottonwood and willow woodland, Glenn; 62 and 58/km² in riparian oak woodland, Sacramento Co., 1971 and 1972.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Davis (1960), discusses the probability of the Scrub Jay, the king snake, and the California ground squirrel as serious predators. Baumann (1959), "The presence of a jay within their territory would definitely affect the behavior of the towhees." Bond (1939), noted one carcass under a Prairie Falcon nest.

B. Competition

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C. Parasitism

Rowley (1930), reports a nest containing 3 eggs of the towhee and one of the Dwarf Cowbird (Molothrus ater obscurus), the nest still occupied by the towhees. Hanna (1928), reports one Molothrus ater obscurus egg in a nest of P. m. megalonyx. Rockwell (1908), reported parasitized by M. a. obscurus in Mesa Co., Colorado.

IX STATUS

A. Past population trends

Grinnell and Miller (1944), P. e. curtatus: "common on breeding grounds in summer; winter visitants to other areas occur only in small numbers." P. e. montanus: "Resident, so far as known; probably descends from higher mountains in winter. Common." P. e. megalonyx: "Permanent resident. Common; in some areas rated as 'abundant'."

B. Present population status

Small (1974), "primarily resident" (California).

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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SAGE THRASHER
Oreoscoptes montanus

I TAXONOMY

A. Type description

Oreoscoptes montanus - AOU (1957) J. K. Townsend, Journ. Acad. Nat. Sci. Philadelphia, 7, pt. 2, Nov. 21, 1837, p. 192. (Plains of the Rocky Mountains = Sandy Creek, lat. 42 N., long. 109.30'W., Wyoming.).

B. Current systematic treatments

Hellmayr (1934) describes the Sage Thrasher as a monotypic species, with a general range described as "Arid sagebrush plains and foothills of western United States."

AOU (1957) considers the Sage Thrasher a monotypic member of the order Passeriformes, family Mimidae.

Mayr and Short (1970), "given the variation with Toxostoma, Oreoscoptes is doubtfully separable from it."

C. Synonomies of scientific nomenclature

Hellmayr (1934), Orpheus montanos; Oroscoptes montanus.

Grinnell and Miller (1944), Mimus montanus.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Mountain Mockingbird. Dawson (1923) adds "Sage Mocker."

II DESCRIPTION

A. External morphology of adults

Ridgway (1907) gives detailed description of plumages for all age classes; "above light grayish brown, the feathers... producing very indistinct streaks!" Peterson (1961), "gray-backed with a Robin-like bill, heavily streaked breast, white spots at tip of tail, pale yellow eye." Phillips et al. (1964) "the chest spots are dark, and the tail corners are white. The bill is short...the iris yellow." Ligon (1961), 8-9 inches long. Dawson (1923) described this thrasher as towhee size; ashy-brown...abundant spotting.

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B. External morphology of subadult age classes

Ridgway (1907) noted that young were "...light grayish brown ...back, scapulars, and rump rather broadly streaked... streaks on under parts less sharply defined than in adults." Dawson (1923) notes that young birds are browner and more streaked than adults.

C. Distinguishing characteristics

Interspecific - Peterson (1961), "small size (8-9 inches), Shorter tail, shorter bill, striped breast distinguish it from other..thrashers." Phillips et al. (1964), "this is our only thrasher with a fairly definite facial pattern." Grinnell (1904) thought this thrasher could be confused with Cactus Wrens.

Intraspecific - Ridgway (1907) describes adults as nearly identical in plumage, with some size differences; male: wing 98.7 mm, length 197 mm, tail 88.5 mm. Ligon (1961), "color pattern of sexes alike."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

Distribution of O. montanus (AOU 1957) given as, "Breeds from central southern British Columbia, central Idaho, central southern Montana, and northern and southeastern Wyoming, with an apparently isolated colony in southwestern Saskatchewan, south through eastern Washington, eastern Oregon, and eastern California (Macdoel, Eagle Lake, White Mtns., Inyo Mtns.) to central southern California (Buena Vista Lake, Lockwood Valley, Victorville), southern Nevada, Utah, central northern New Mexico, northwestern Texas, and western Oklahoma." Ridgway (1907) gives general range as the arid plains, mesas, and foothills of western United States. Peterson (1961) gives range as, "from British Columbia, Idaho, Montana, Saskatchewan, south to southern California, Nevada, northern Arizona, New Mexico, Texas panhandle, Oklahoma."

B. California distribution of the species

Grinnell and Miller (1944), "As breeding, Great Basin plateau region, east of the Cascade-Sierran axis from the Oregon line south to northern end of Owens Valley and White Mtns., thence irregularly southward at higher levels in mountains around northern, western, and southern margins of Mohave Desert." Small (1974), "breeds in Great Basin Desert south to northern edges of Mojave Desert and Walker Basin, Kern Co.; also...San Joaquin Valley." Dawson (1923), "breeds locally

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in the high upper Sonoran, Sagebrush areas, east of the Sierra Nevada, south to the Panamint Mtns." Wheelock (1904) gives California breeding ranges as, "in upper Sonoran zone southeast of the Sierra Nevada."

C. California desert distribution

Grinnell and Miller (1944) note the winter distribution of this thrasher in the Mohave and Colorado deserts; desert records include: Inyo and Panamint Mtns.; near Walker Pass, Kern Co.; near Bakersfield and Buena Vista Lake, Kern Co.; Lockwood Valley, Ventura Co.; vicinity of Victorville; Death Valley, Inyo Co.; Hesperia and Twentynine Palms, San Bernardino Co. Dawson (1923) notes sporadic nesting near Bakersfield and Walker Pass. Johnson et al. (1948) found wintering thrashers near Cima in the Providence Mtns. at 4,500 ft. Called an April to May transient near Blythe, Calif. (Grinnell 1914). Breeds in some high valleys in northeastern Ventura Co. and along desert slope of San Gabriel and San Bernardino Mountains, south at least to Victorville; noted near Perris, Riverside Co. (Willett 1933). Apparently reaches its highest numbers on the desert in winter, with Willett (1951) calling it the "most common thrasher" in winter. Miller and Stebbins (1964) state that although the species does not breed at Joshua Tree National Monument, there are regular breeders on the Mojave Desert near Victorville. Wauer (1964) found Sage Thrashers breeding on open sage flats and valleys of the Panamint Mtns., Death Valley. Rowley (1928) and Hanna (1930) found Sage Thrashers nesting near Victorville, the most southerly desert locations noted.

D. Seasonal variations in distribution

Grinnell and Miller (1944), "present in two seasonal roles: summer resident in Artemisia tridentata belt of eastern California; winter visitant (late September-April) to deserts and coastal slopes of southern California and to San Joaquin Valley." Small (1974), "summer visitor (on breeding grounds) and transient and winter visitor (September-April) elsewhere; winters south to...Mojave and Colorado deserts." Winters on the southeastern deserts and...in the San Diegan district (Dawson 1923). In winter in southern California, this bird occurs on Pacific slope, north to Ventura Co. and south to Baja California (Willett 1933). "Common winter visitant to the deserts of southeastern California...summer visitant to sagebrush of northeastern California" (Grinnell 1915). The Sage Thrasher is called a rare straggler into Los Angeles Co. from the desert by Grinnell (1898); pair seen in March. Wintering birds usually arrive after mid-September at Joshua Tree National Monument, with the earliest record being September 13 (Miller and Stebbins 1964). Bent (1948) states

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that this thrasher is migratory, spending the winter near or beyond the southern border of the United States. He notes the California winter range to include San Fernando, Twenty-nine Palms, and Death Valley. The species usually departs its more northern breeding range in September. Gullion et al. (1959) calls this species a spring and fall migrant on southern Nevada deserts; most birds migrate north by mid-April. Torrey (1909) found a single Sage Thrasher wintering near San Diego (city park) in 1908. Van Rossem (1911) listed this species as a regular winter visitor in the Salton Sea region (noted in March). Howell and Van Rossem (1915) discovered a single Sage Thrasher wintering (January) in the Lower Colorado River Valley in 1913. Gilman (1907) describes the migrations and habits of Sage Thrashers on southern California deserts.

IV HABITAT

A. Biotopic affinities

Peterson (1961) describes habitat as, "sagebrush brushy slopes, mesas; in winter, also desert." "A common short-tailed desert bird...nests in arid country (Robbins et al. 1966)." Grinnell and Miller (1944), "mesas and slopes of moderate inclination, well covered with Artemisia tridentata. Much less frequently other shrubs of similar growth pattern, such as rabbitbrush, provide the necessary cover for nesting and escape." Small (1974), "for breeding, flat areas vegetated primarily with Great Basin Sagebrush." Ligon (1961), "the Latin designation, montanus, implying that it is a mountain bird, is misleading, since it shuns the higher, heavily forested areas." In southern California, species is most plentiful on brushy foothills and mesas, but occasionally straggling to lowlands (Willett 1933). Grinnell (1904) found Sage Thrashers in creosote brush near Palm Springs, California, during winter.

B. Altitudinal range

Grinnell and Miller (1944), "probable breeding, 300 ft... up to 10,500 ft. on White Mountain." Breeds in New Mexico between 5,000 and 6,000 ft. (Bailey 1928). Rossem (1936) found this thrasher on the desert and up to 5,000 ft. in the Yucca belt. Found nesting (May) at 5,000 ft. in Lockwood Valley, Ventura Co., by Willett (1933). Bent (1948) notes this thrasher up to 4,000 or even 6,000 ft. in juniper woodlands. Wauer (1964) noted nesting Sage Thrashers between 4,000 and 5,000 ft. in the Panamint Mountains, Death Valley.

Oreoscoptes montanus (con't.)

D. Territory requirements

Perch sites - Bent (1948) lists posts and the tops of bushes as favorite perch sites. Pearson (1936) describes the favorite perches of Sage Thrashers as sagebrush and thorny cactus.

Courtship and mating sites - Bailey and Niedrach (1965), "...during spring and early summer...the males perch on the tips of vegetation...singing for the benefit of their mates..."

Nest sites - Nest a twiggy cup in bush (Peterson 1961). Bailey (1928) - nest, on ground or in low bushes, especially sagebrush. Dawson (1923), "nest placed...in sage-bush or greasewood." Nest...placed in sagebrush from 10 inches to 3 ft. from the ground (Wheelock 1904). Bent (1948) gives usual sites as from a few inches to 3ft. above ground, usually in sage, greasewood, or rabbitbrush. Hanna (1930) found nests in cotton thorn (Tetradymia spinosa) near Victorville, Calif., 18 inches from the ground. Gilman (1907) describes several sagebrush nests within 3 ft. of the ground near 6,000 ft. in Colorado.

E. Special habitat requirements

Burleigh (1972) states that the Sage Thrasher has very exacting habitat requirements, being restricted to sagebrush.

F. Seasonal changes in habitat requirements

Grinnell and Miller (1944), "in winter, brushland associations of much wider variety are frequented (than summer range)." Small (1974) noted that Sage Thrashers move into more open country with sparse arid vegetation during winter. Carter (1937) found this thrasher in the mesquite between an oasis and the open desert near Twentynine Palms, San Bernardino Co., during winter.

V Food

A. Food preferences

Bailey (1928) noted food items such as berries, seeds, fruit, beetles, locusts, ants, small wasps, other insects; as high as 62% grasshoppers. Wheelock (1904) mentions the taking of worms and insects. Martin et al. (1951) lists: beetles, grasshoppers and crickets, ants and other Hymenoptera, caterpillars and moths, spiders, bugs, and flies; states that little plant food is taken, although grape, serviceberry, and blackberry have been found in diet. Bent (1948) gives detailed summary of food items; grasshoppers, chinch bugs, leafhoppers, ants, and a few berry seeds. Knowlton and Harmston (1942) gave a detailed summary of Sage Thrasher prey in Utah; grasshoppers were the major prey taken.

Oreoscoptes montanus (con't.)

B. Foraging areas

Grinnell and Miller (1944), "the ground between and beneath bushes, and to some degree the bushes themselves, are searched over in foraging." Wheelock (1904) found most Sage Thrashers feeding below bushes in California. During winter at Joshua Tree National Monument, these birds forage in open desert terrain, although they utilize as retreats the low shrubs and bushes present there (Miller and Stebbins 1964). Pearson (1936) noted that Sage Thrashers are seldom seen far from the ground.

C. Foraging strategies

"He would run to a bush..if bushes were far apart he would sometimes fly from one cover to another, halt, and then forward again" (Gilman 1907). Bent (1948) states that although the majority of feeding takes place on the ground, this thrasher will feed on grapes and berries in low shrubs. Pearson (1936), "it is found on the ground, running about among the clumps of bushes."

D. Feeding Phenology

Feed primarily on berries during the non-breeding season (Dawson 1923). Little plant material is taken by this species; serviceberry and grape are favored in the fall (Martin et al. 1951). Kennedy (1911), "with young independence, habits change greatly. After July, Sage Thrashers feed heavily on grapes" (Washington).

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Bent (1948) states that the Sage Thrasher acts somewhat like the Mockingbird. It frequently raises its tail rapidly, moving its head from side to side at an intruder.

C. Courtship and mating behavior

"Song, given from conspicuous perch or in flight, resembles Brown's (Thrasher), but is more melodious and lacks the pauses between phrases (Robbins et al. 1966)." Ligon (1961), "its song...is somewhat like that of the Mockingbird." During pairing, the males often fluttered their wings and gave a warbling song as they flew; they flew in a zigzag fashion over the sage (Bent 1948).

Oreoscoptes montanus (con't.)

D. Nesting phenology

Dawson (1923) gives breeding season as May 1 to June 15 with 1 or 2 broods raised; the nesting season is very irregular, however. Wheelock (1904) gives California season as March to July. Bent (1948) gives California egg dates as 19 April to 18 July; most nesting begins in mid-April.

E. Length of incubation period

Incubation period of 14 days given by Wheelock (1904).

F. Length of nestling period

Killpack (1970) found an 11 day nestling period in Colorado Sage Thrashers.

G. Growth rates

General account of development given by Wheelock (1904); down more perceptible by second day; eyes open by fifth day. In Colorado, nestlings gained an average of 3.4 (1.5-4.7) g. per day; their average weight was 87% of adult females at fledging (Killpack 1970).

H. Post-breeding behavior

Form large flocks after breeding (Bailey 1928). "At the close of the (nestling) season...the birds...resort in numbers to the hillside springs and brushy draws (Dawson 1923)." In the late summer, family groups band together (Bailey and Niedrach 1965).

VII POPULATION PARAMETERS

A. Clutch size

Eggs (4-5; 7) blue, spotted (Peterson 1961). Bailey (1928) gives clutch as 4 eggs. Reed (1904) gives clutch of 3-4. Ligon (1961), "eggs 4, greenish blue, spotted." Eggs 4 or 5 (Dawson 1923). Bent (1948) reports the normal clutch as 4 or 5 eggs, with 7 being the record.

B. Fledging success

In Colorado, Killpack (1970) stated that nest success was variable. Of 19 eggs laid, 11 young hatched and all 11 fledged.

C. Mortality rates per age class

Wheelock (1904) felt that lizards and snakes took a large number of eggs and nestlings in California.

Oreoscoptes montanus (con't.)

D. Longevity

E. Seasonal abundance

Carter (1937) states that wintering Sage Thrashers near Twentynine Palms, California, vary widely in numbers from year to year, from "quite numerous" to rare. After breeding, family groups form and the birds become fairly numerous around waterholes (Bailey and Niedrach 1965).

F. Habitat density figures

Hoppes (1978) found 2 territorial males on a 12.26 ha "Sagebrush flat" study area in Wyoming. On another sagebrush study area, also in Wyoming, Todd (1974) reported 1 territorial male on an 8.1 ha plot. Jewett (1953) reported a density of 5 pairs per square mile in Washington.

VII INTERSPECIFIC INTERACTIONS

A. Predation

Killpack (1970) noted the taking of eggs by a coyote in Colorado.

B. Competition

C. Parasitism

Friedmann (1963) gives a single record of the Sage Thrasher being parasitised by a cowbird (Utah).

IX STATUS

A. Past population trends

Called "common" by Grinnell (1915). Bent (1948) notes a slight northward range expansion during the early 1940's. Called a common wintering bird along the lower Colorado River (Price 1899). Mailliard and Grinnell (1905) described the thrasher as "unexpectedly rare" on the Mojave Desert in winter. Hollister (1908) called the species "common and in full song in April (1905) near Needles, California.

B. Present population status

Grinnell and Miller (1944), "Common, even abundant locally, on breeding grounds; common in eastern part of winter range." Miller and Stebbins (1964) listed the birds as "fairly common" during winter at Joshua Tree National Monument. Called a "common breeder" in eastern California (McCaskie and De Benedictis.1967).

Oreoscoptes montanus (con't.)

C. Population limiting factors

Bent (1948), "...it is limited almost entirely to the semiarid regions where immense areas are clothed with...sage." Pearson (1936) states that Sage Thrashers appear to be confined very largely to the open areas of the far West.

D. Environmental quality: adverse impacts

Jewett (1953) stated that agricultural activities (irrigation and cultivation) usually drives Sage Thrashers out of an area. However, tracts of sagebrush left adjacent to the agricultural fields will be utilized for nesting.

E. Potential for endangered status

Oreoscoptes montanus (con't.)

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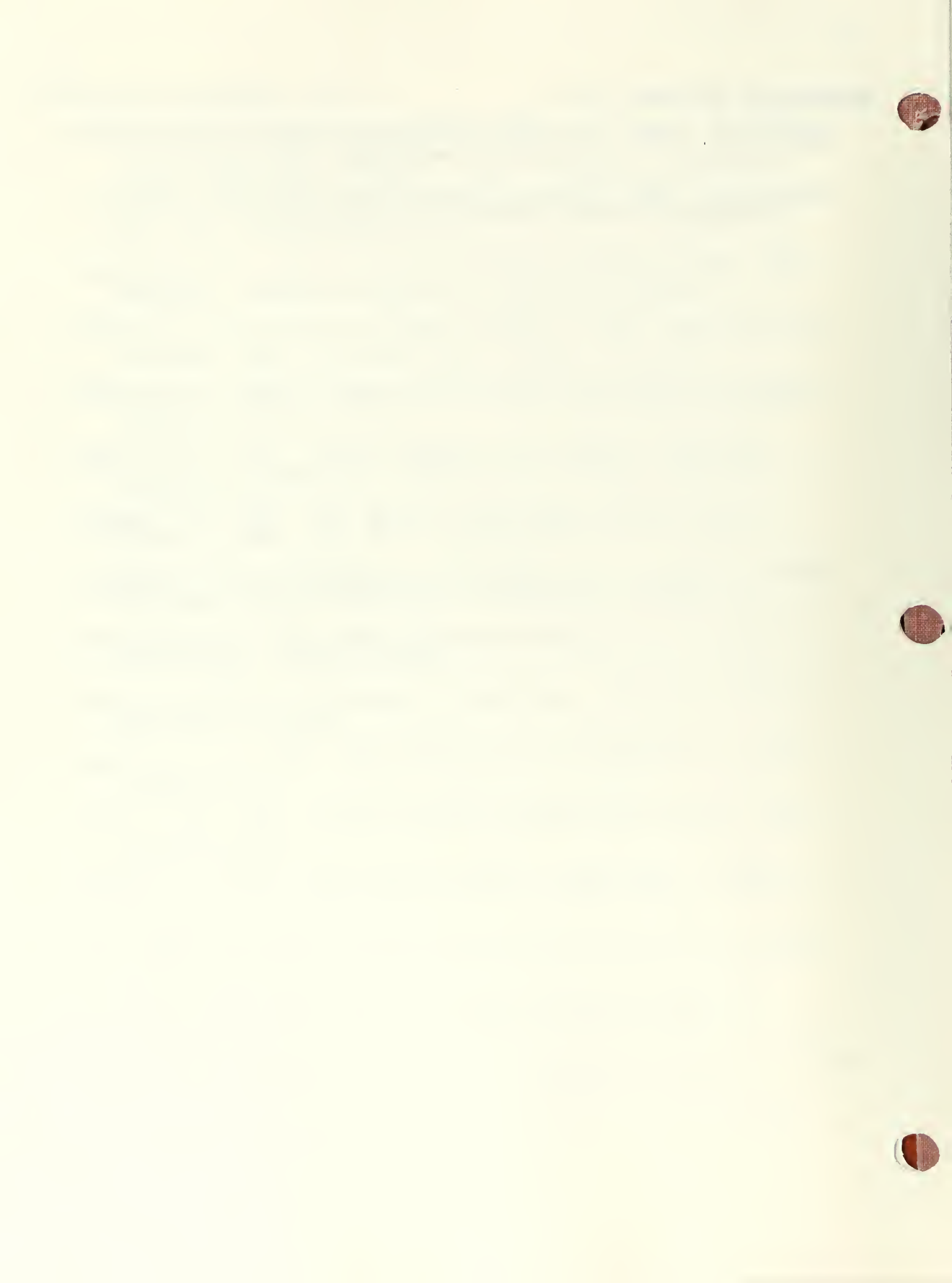
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SOLITARY VIREO

Vireo solitarius cassinii

I TAXONOMY

A. Type description

Vireo solitarius cassinii - AOU (1957) Vireo cassinii Xantus, Proc. Acad. Nat. Sci. Philadelphia, 10, sig. 8, Apr.-May (after May 25) 1858, p. 117. (Fort Tejon, California.)

B. Current systematic treatments

AOU (1957) considers Vireo solitarius a member of the avian Order Passeriformes, Family Vireonidae, Subfamily Vireoninae. Hellmayr (1935) lists 7 races of Vireo solitarius, including cassinii. Hamilton (1962) presents a detailed study of the relationships within the genus Vireo. V. solitarius is most closely related to V. flavifrons, V. atricapillus, and V. huttoni.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Vireo cassinii, Vireosylva solitaria; Lanivireo solitarius; L. cassinii.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Cassin Vireo; Blue-headed Flycatcher; Blue-headed Vireo; Blue-headed Greenlet; Cassin Greenlet.

II DESCRIPTION

A. External morphology of adults

Miller and Stebbins (1964): "A large (14-16 gram) vireo with heavy bill. Gray head marked with conspicuous white eye ring connected with white running to base of bill; two prominent white wing bars on secondary coverts; back and flanks greenish." Ridgway (1904) adds that the "mandible grayish (pale bluish gray in life) with blackish tip; iris brown; legs and feet dusky." Hamilton (1958) gave a detailed analysis of geographic variation in the genus Vireo.

B. External morphology of subadult age classes

Ridgway (1904) described young as: "(in first autumn and winter)--Pileum, hindneck and sides of head and neck varying from olivaceous hair brown to grayish olive, not very different...from color of back; (first plumage)--Wings and tails as in adults; rest of upper parts brownish gray."

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C. Distinguishing characteristics

Interspecific - Peterson (1961), "Similar species: (1) Hutton's Vireo has dull throat; eye-ring broken at top. (2) Bell's Vireo has inconspicuous wing-bars and eye-ring."

Intraspecific - Ridgway (1904), "Adult female--Similar to adult male but duller in color; length 121.7 mm; wing 72.1; tail 52.0; Adult male, length 123.2 mm; wing 72.3; tail 52.3."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) gives the overall distribution of the Solitary Vireo as "Breeds from central British Columbia, southwestern Mackenzie, central Saskatchewan, central Manitoba, northern Ontario, southern Quebec, Newfoundland, and Nova Scotia south to southern Baja California, Guatemala, and El Salvador. Winters from Arizona and South Carolina south to the Cape district of Baja California, southwestern Mexico, northern Nicaragua, and Cuba."

The range of Vireo solitarius cassinii is given by the AOU (1957) as "Breeds from southern British Columbia, northern Idaho, and northwestern Montana south through central northern Washington, northeastern Oregon, central Idaho to the mountains and foothills of California (Humboldt County, Warner Mountains, Campo, Kings Canyon) and southern Nevada (Poyosi Mountain)."

Hellmayr (1935) gives range of cassinii as "Transition zone from British Columbia, southwestern Alberta, Idaho, and western Montana south through California and western Nevada to the Sierra San Pedro Martir, Lower California; in winter south through Arizona to Jalisco, Michoacan, Guanajuato, Oaxaca, and Chiapas."

B. California distribution of the species

Small (1974), "range in California--for breeding, foothills and mountains of most of California east of the deserts and excluding the humid coniferous forest of the northwest coast; in migration, throughout state." McCaskie (1968) called solitarius "a regular migrant and summer visitor between late March and mid-October with stragglers regularly occurring in November." He further notes that the appearance of birds in December may mean that the species now winters in California.

Vireo solitarius (con't.)

C. California desert distribution

Miller and Stebbins (1964) called this vireo a "sparse but regular spring migrant" in Joshua Tree National Monument; recorded from Lower Covington Flat, Smithwater Canyon, Twentynine Palms, Eagle Mountain, and Cottonwood Spring, from March to May. Only one fall record, on 17 September. Willett (1951) calls this species a migrant across the deserts of southern California. Johnson et al. (1948) called cassinii uncommon migrants, with no evidence of breeding, in the Providence Mountains in May. Grinnell (1914) called cassinii a transient during April in the lower Colorado River valley. Grinnell and Swarth (1913) noted that this vireo was "Found in fair abundance in... the Transition Zone" of the San Jacinto area of southern California. Van Rossem (1936) called this vireo "a common late-August migrant" in the Charleston Mountains, Nevada (near Death Valley, California); he could find no evidence of breeding, however. Johnson (1974) found that V. s. cassinii has been replaced by V. s. plumbeus in some areas of southern Nevada (Grapevine and Potosi Mountains). De Benedictis and McCaskie (1967) collected singing male V. s. plumbeus in the White Mountains of California during July; they feel that this race may breed in these mountains. Cardiff (1963) collected a male plumbeus near Needles, San Bernardino County, on 26 November 1960. Miller (1945) found cassinii breeding on Potosi Mountain (South Nevada), but could not find breeders on Clark Mountain (San Bernardino County) or in the Charleston Mountains. At Twentynine Palms, Carter (1937) called cassinii a "casual spring migrant"; was noted between late-March and mid-May.

D. Seasonal variations in distribution

AOU (1957) states that V. s. cassinii "Winters from southeastern Arizona and Nuevo Leon south to Michoacan and Guerrero. Migrates through the Great Basin region through Colorado, New Mexico, and western Texas."

Grinnell and Miller (1944) found that this species is present in two seasonal roles in California: "summer resident, on nesting grounds, from mid-April through August; migrant ...from the first of April through May, and from late August through the first half of October, rarely later." In Joshua Tree, the protracted period of passage through the desert suggests the presence of populations moving both to southern and northern parts of the breeding range of the race (cassinii) (Miller and Stebbins 1964). Small (1974) in California, "transient and summer visitor, late March to October."

Vireo solitarius (con't.)

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944) describe this species California habitat as "oak and conifer forests that offer open branch-work at low and middle levels...Comparatively dry, warm forests are favored...Principal trees frequented in summer are yellow pine, Jeffery pine, incense cedar, black oak, and golden oak; mature willows, cottonwoods and alders also may be occupied." Small (1974) gives California habitat as "for breeding, oak woodlands and mixtures of oaks and conifers; otherwise, lowlands in general where there are thickets, riparian woodlands..." In the Charleston Mountains of Nevada, Van Rossem (1936) found late-August migrants through the Upper Sonoran and Transition Zones. Johnson et al. (1948) found cassinii "in a juniper among rocks on a steep hillside at 6,300 feet on the southeast side of Clark Mountain." During a May study in the Providence Mountains. Hamilton (1962) noted that "The Solitary Vireo appears to be the only vireo sufficiently wide in habitat tolerance to utilize coniferous vegetation...the breeding territories are usually in broadleaved or mixed broadleaf-conifer habitats."

B. Altitudinal range

In California, nesting from 300 feet (Contra Costa Co.) to 7,500 feet (Tulare County)(Grinnell and Miller 1944). Fall migrants were observed from 6,200 to 9,000 feet in Nevada by Van Rossem (1936). In Kings Canyon National Park, Dixon (1943) found cassinii up to 6,000 feet.

C. Home range size

In Arizona, Lauenderslayer and Balda (1976) gave the mean size of a breeding territory as 1.7 ha.

D. Territory requirements

Perch sites -

Courtship and mating sites -

Nest sites - "Nest emplacements usually are in the lower branches of...trees, not uncommonly in exposed, though shaded, situations" Grinnell and Miller (1944). Bent (1950), "it...builds its dainty nest low in bushes or trees." Ligon (1961), "nest: From 5 to 20 feet above ground." In the San Bernardino Mountains, Grinnell (1908) found nests in "golden oaks at lower levels and cottonwoods at higher altitudes... but nests were also found in the incense cedar, silver fir, Jeffrey pine, black oak, and alder."

Vireo solitarius (con't.)

E. Special habitat requirements

During nesting, Grinnell and Storer (1924) found that the distribution of cassinii "closely parallels the range of golden oak and incense cedar, though the bird does not restrict itself exclusively to these two trees."

F. Seasonal changes in habitat requirements

Grinnell and Storer (1924) reported that cassinii is found in blue oaks and chaparral on dry hillsides during spring migration, while in the fall, they wander up in the Hudsonian Zone before leaving for wintering grounds. Phillips and Amadon (1952) found cassinii wintering in mesquite thickets in Sonora, Mexico.

V FOOD

A. Food preferences

Martin et al. (1951) found that "the food of vireos is primarily insects...caterpillars, moths, bugs, beetles, wasps, ants, bees, and flies. Spiders are also taken." Bent (1950) stated that animal matter accounted for 98.0% of the diet--Hemiptera (51.0%), Lepidoptera (23.0%).

B. Foraging areas

Bent (1950) reported that this vireo "lives mainly in trees of the forest and obtains most of its food among the twigs and foliage." Hamilton (1962) described V. solitarius as an "arboreal forager", utilizing the crown-to-shrub area of a woodland.

C. Foraging strategies

The Solitary Vireo was described as a "foliage gleaner" by Bent (1950). Hamilton (1962) noted that Solitary Vireos normally glean broadleaved foliage for insects.

D. Feeding phenology

Bent (1950) reported that although vegetable matter makes up less than 5% of the yearly diet of this species, up to one quarter of the diet may be plant material during winter (January).

E. Energy requirements

Vireo solitarius (con't.)

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

The male apparently wanders about the territory while singing, with no fixed singing post (Bent 1950).

C. Courtship and mating behavior

Bent (1950) recounted that the male "bobs and bows to the female...and sings repeatedly." In New Mexico, Tatschl (1967) noted singing males between 28 April and 26 September.

D. Nesting phenology

Bent (1950) gives California egg dates as "100 records, April 26 to July 9; 52 records, May 20 to June 6, indicating the height of the season."

E. Length of incubation period

Bent (1950) concluded that the incubation period was at least 11 days; both sexes incubate.

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

VII POPULATION PARAMETERS

A. Clutch size

Bent (1950) reported that cassinii lays 3-5 eggs. Ligon (1961), "Eggs: 4; white, lightly spotted around larger end with brown and black,"

B. Fledging success

C. Mortality rates per age class

In southern California, Edwards (1919) noted the frequent destruction of nests and eggs by rain and windstorms.

D. Longevity

Vireo solitarius (con't.)

E. Seasonal abundance

In Oregon, Anderson (1970) located 8 Solitary Vireos per 100 acres between June and February, but only 4 per 100 acres between March and May.

F. Habitat density figures

In white oak stands of Oregon, Anderson (1970) found 4 to 8 Solitary Vireos per 100 acres during all season of the year. In an oak-juniper-pine woodland of southern Arizona, Balda (1970) reported 5 breeding pair per 100 acres. Bock and Lynch (1970) found 0.5 pair of Solitary Vireos breeding per 100 acres in an unburned conifer forest of the Sierra Nevada; this species was not present in a similar, but burned, plot. In a ponderosa pine forest in southeastern Arizona, Balda (1969) recorded a breeding population of 14 pair of Solitary Vireos per 100 acres. Johnston (1949) found a breeding density of 10 to 20 pairs per 100 acres in a Douglas fir dominated area in Idaho. Launderlayer and Balda (1976) found 9.9 pairs per 100 ha in a Arizona pinyon-juniper-ponderosa pine ecotone.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

Hamilton (1962) found that in areas of sympatry, V. solitarius, V. atricapillus, and V. vicinior reduce competition through altitudinal segregation.

C. Parasitism

Friedmann (1963) and Friedmann et al. (1977) found that 6.7% of cassinii nests were parasitized by Brown-headed Cowbirds.

IX STATUS

A. Past population trends

Grinnell and Miller (1944) called cassinii "common" in California. In Oregon, cassinii was called "second in abundance among Oregon members of the family" by Gabrielson and Jewett (1940).

Vireo solitarius (con't.)

B. Present population status

In Montana, Weydemeyer (1975) reported that solitarius "has been dwindling in numbers for the past 15 or 20 years." However, Johnson (1974) noted that in southern Nevada, "Solitary Vireo...either colonized for the first time... or definitely increased in number in both the Grapevine Mountains and on Potosi Mountain." Johnson and Garrett (1974) noted that "the breeding range of V. s. plumbeus has undergone a major westward expansion during the last decade"; race is moving into California.

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

Vireo solitarius (con't.)

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SONG SPARROW
Melospiza melodia

I TAXONOMY

A. Type description

AOU (1957) Melospiza melodia melodia (Wilson); Fringilla melodia Wilson, Amer. Orn., vol. 2, 1810, p. 125, pl. 16, fig. 4. (Canada to Georgia = Philadelphia, Pennsylvania.)

Melospiza melodia montana Henshaw; Melospiza fasciata montana Henshaw, Auk, 1, no. 3, July 1884, p. 224. (Fort Bridger, Utah [= Wyoming].)

Melospiza melodia merrilli Brewster; Melospiza fasciata merrilli Brewster, Auk, 13, no. 1, Jan. 1896, p. 46. (Fort Sherman, Idaho.)

Melospiza melodia fisherella Oberholser, Proc. Biol. Soc. Washington, 24, no. 49, Dec. 23, 1911, p. 251. (Honey Lake, near Millford, California.)

Melospiza melodia cooperi Ridgway; Melospiza fasciata cooperi Ridgway, Auk, 16, no. 1, Jan. 1899, p. 35. (San Diego, California.)

Melospiza melodia saltonis Grinnell, Univ. California Publ. Zool., 5, no. 3, Apr. 9, 1909, p. 268. (One mile southeast of Mecca, Colorado Desert, California.)

B. Current systematic treatments

AOU (1957) places Melospiza melodia in the Order Passeriformes, Family Fringillidae, and lists 31 races. Linsdale (1928) suggests that Melospiza and Passerella properly belong in the same genus, as does Paynter (1964), while Parkes (1954) maintains that they should be separate.

C. Synonomies of scientific nomenclature

AOU (1957) lists the synonomies as above. Grinnell and Miller (1944), M. m. montana - M. m. fallax, part; M. m. virginis; M. m. fisherella, part; M. m. fisherella - Melospiza fallax, M. rufina, M. fasciata, M. cinerea fallax, M. m. mailliardi, Passerella melodia fisherella: M. m. merrilli - M. fasciata guttata, M. f. ingersolli, M. m. ingersolli, M. cinerea merrilli, M. m. morphna: M. m. cooperi - Zonotrichia fasciata, M. heermanni, M. m. heermanni, M. fasciata heermanni, M. f. samuelis, M. f. graminea, M. f. cooperi, M. cinerea cooperi, M. m. santaecrucis: M. m. saltonis - M. fallax, M. m. fallax, M. cinerea fallax.

Melospiza melodia (con't.)

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944) list the following as synonymies for the Song Sparrow: Rocky Mountain Song Sparrow, Modoc Song Sparrow, Virgin River Song Sparrow, Mountain Song Sparrow, Oregon Song Sparrow, Heerman Song Sparrow, Merrill Song Sparrow, Desert Song Sparrow, Modesto Song Sparrow, Tehama Song Sparrow, Californian Song Sparrow, Samuel's Song Sparrow, Santa Barbara Song Sparrow, Arizona Song Sparrow, Western Song Sparrow, Salton Sink Song Sparrow.

II DESCRIPTION

A. External morphology of adults

Baird et al. (1905) describe the species as a whole as follows: general tint of upper parts rufous and distinctly streaked dark-brown, and ashy-gray. The crown is rufous, with a superciliary and median stripe of dull gray, the former lighter; nearly white anteriorly, where it sometimes has a faint shade of yellow, principally in autumn; each feather of the crown with a narrow streak of black forming about six narrow lines. Interscapulars black in the center, then rufous, then pale grayish on the margin, these three colors on each feather very sharply contrasted. Rump grayer than upper-tail coverts, both with obsolete dark streaks. There is a whitish maxillary stripe, bordered above and below by one of dark rufous-brown, and with another from behind the eye. The underparts are white; the jugulum and sides of body streaked with clear dark-brown, sometimes with a rufous suffusion. On the middle of the breast these marks are rather aggregated so as to form a spot. No distinct white on tail or wings. Specimens vary somewhat in having the streaks across the breast more or less sparse, the spot more or less distinct. In autumn the colors are more blended. Peterson (1961): "Note the heavy breast streaks confluent into a large central spot. Many subspecies vary in color and size; those of arid sections are paler; those in humid regions darker. Oberholser (1974) gives measurements for the races. Marshall (1948b) gives detailed descriptions of adults for the races occurring around the San Francisco Bay region.

B. External morphology of subadult age classes

Baird et al. (1905) describes young as having upper parts paler, the streaks more distinct; the lines on the head scarcely appreciable. The underparts are yellowish; the streaks narrower and more sharply defined dark brown. Peterson (1961): "...more finely streaked, often without central spot."

Melospiza melodia (con't.)

C. Distinguishing characteristics

Intraspecific - Bent (1968): "montana is similar to melodia, but wing, tail and tarsi averaging longer, bill smaller and relatively more slender, coloration grayer. Merrilli is very similar to montana but slightly darker and more uniform above, with grayish edges to the interscapulars and scapulars less strongly contrasted with the darker mesial streaks. Fisherella...similar to heermanni but larger; upper surface paler, less rufescent; streaks on lower parts less blackish. Fisherella differs from montana in its darker upper parts, more blackish brown streaks of under surface, heavier bill, and shorter wing. Cooperi...similar to heermanni but slightly smaller and coloration much lighter and grayer; prevailing color of the back, etc., grayish olive, the back broadly streaked with black streaks with little, if any, rusty external suffusion. Saltonis...resembling fallax but very much paler throughout, the ground color being white ventrally and ashy dorsally, with streaking of pale hazel; superciliary stripe wholly white; general size much less than montana. Robbins et al. (1966): "Geographic races vary from rusty to gray and light to dark." Wolfson (1955) describes some races on the Pacific coast and their variation. Marshall (1948a & b) describes race variation in California.

Interspecific - Peterson (1961): "Savannah Sparrow often shows yellow average, has pinker legs, shorter notched tail. Fox Sparrow is larger, more heavily marked." Robbins et al. (1966) add that it lacks a yellow or buffy color.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution

AOU (1957) Melospiza melodia, "Aleutian Islands, southern Alaska, southern Yukon, southern Mackenzie, northern Saskatchewan, northern Manitoba, northern Ontario, central Quebec, and Newfoundland south to south-central Baja California, northern Sonora, Michoacan, and Puebla; and to northern New Mexico, northeastern Kansas, northern Arkansas, southeastern Tennessee, northern Georgia, and northwestern South Carolina.

M. m. montana: "Breeds from northeastern Oregon, central western Idaho, and north-central Montana, south to eastern Nevada, southwestern Utah, central eastern Arizona, and northern New Mexico."

M. m. merrilli: "Breeds from southern interior British Columbia and southwestern Alberta south to eastern Washington, east of the Cascade Range, northern Idaho, and northwestern Montana."

Melospiza melodia (con't.)

M. m. fisherella; "Breeds from northeastern Oregon, east of the Cascade Range and west of the Blue Mountains, and extreme southwestern Idaho south to south-central Oregon, north-central and central eastern California, and western Nevada."

M. m. cooperi: "Resident in the coastal districts of southern California from Santa Cruz County southward to northern Baja California, as far as at lat. 30° N.; east to streams penetrating Mohave and Colorado deserts."

M. m. saltonis: "Resident in lower Colorado River Valley in extreme southern Nevada, southeastern California, western Arizona, northwestern Baja California, and northwestern Sonora, extending northwest through Imperial Valley of California. Casual in desert area of southeastern California, south-central Arizona, and northwestern Sonora."

Bent (1968), M. m. montana: "Northeastern Oregon and north-central Montana to southeastern California, northern Sonora, central Chihuahua, and western Texas."

M. m. merrilli: "Southern interior British Columbia and southwestern Alberta south to southern California, southern Utah, and northern New Mexico."

M. m. fisheri: "Northeastern Oregon and southwestern Idaho south to southern California."

M. m. cooperi: "The San Diego Song Sparrow is resident in the coastal districts of southern California from Santa Cruz County southward to northern Baja California; east to streams penetrating Mohave and Colorado Deserts."

M. m. saltonis: "The Desert Song Sparrow is resident in the lower Colorado Valley in extreme southern Nevada, southeastern California, western Arizona, northwestern Baja California, and northwestern Sonora, extending northwest through Imperial Valley, California."

Phillips (1964) list montana, saltoni, uddi, fisherella, merrilli and rufina as occurring in Arizona. Gabrielson and Jewett (1940) say that fallax merges into fisherella as you go east in Oregon.

B. California distribution

Grinnell and Miller (1944), M. m. montana: "Known principally from Death Valley, Inyo County, and Colorado River Valley south to Fort Yuma, Imperial County; recorded also from Riverside County."

Melospiza melodia (con't.)

M. m. fisherella: "Summer resident in northern interior and eastern sections, and on considerable numbers present there throughout the year. Partial migration in late September and October accounts for appearance of winter visitants to southward and westward. As breeding, Great Basin region from Oregon line southward along eastern flank of Sierras through Owens Valley, and westward through lower mountains and valleys, exclusive of coastal belt, from Klamath River Valley and Shasta Valley south to upper Trinity River System and in Sacramento drainage to Tehama County."

M. m. merrilli: "Chiefly Sacramento Valley, northern San Joaquin Valley, and surrounding foothills, but recorded also from lower and middle elevations in State, generally from Oregon line south to Mohave Desert and Los Angeles County, exclusive of northern coastal strip."

M. m. cooperi: "Valleys of coast ranges from southern Monterey County southward, and Pacific slopes of southern California south to Mexican boundary; extends eastward across desert divides into Mohave drainage and to streams on east side of San Jacinto Mountains of San Diego County."

M. m. saltonis: "Valley of Colorado River from Nevada line to Mexican boundary and waterways of Imperial Valley north to vicinity of Salton Sea in Imperial and Riverside Counties. Twice recorded as a vagrant in the Mohave-Inyo region."

Grinnell (1928) discusses the distribution of cooperi, coronatorium, saltonis and rivularis in Baja California. Marshall (1948a) says there are eleven races breeding in California, and no two of them occur together during the breeding season.

C. California desert distribution

Grinnell and Miller (1944) list montana as occurring in Inyo, Imperial and Riverside Counties. Fisherella occurs in Owens Valley, Klamath River Valley, upper Trinity River System. In winter it is found on the western part of the Mohave desert, rarely to Coachella Valley. These two races are not sharply contrasted in the western part of the Great Basin. Merrilli occurs in the Mohave desert, Los Angeles County, Inyo and San Bernardino Counties. Cooperi extends into the Mohave River drainage and to streams on east side of San Jacinto Mountains, and mountains of San Diego County. Records from San Bernardino, Riverside, San Diego and Los Angeles Counties. Saltonis is found in the Colorado River Valley and waterways in Imperial Valley north to vicinity of Salton Sea in Imperial and Riverside Counties. Twice recorded as a vagrant in Mohave-Inyo region. Records from Riverside, San Bernardino, Imperial and Inyo Counties.

Melospiza melodia (con't.)

Willett (1951) only lists saltonis as being a resident of the California desert. "Resident of watered sections of Colorado River and Imperial Valleys, north to Salton Sea."

D. Seasonal variations in distribution

AOU (1957), M. m. montana: "Winters throughout the breeding range and south to southeastern California, northern Sonora, central Chihuahua, and western Texas; east casually to western Nebraska, western Kansas, and western Oklahoma."

M. m. merrilli: "Winters from southern interior British Columbia and northwestern Montana west to western Washington and south to southern California, southern Nevada, southern Utah and northern New Mexico. Casually to southern Arizona and northern Sonora."

M. m. fisheri: "Winters throughout breeding range south to western and southern California; rarely to northern Sonora and southern Arizona."

M. m. cooperi: Winters throughout breeding range.

M. m. saltonis: Winters throughout breeding range.

Dawson (1923): "California Song Sparrows are sedentary save in the territory east of the Sierras, where increased altitudes and lower temperatures enforce evacuation in winter." Small (1974): "Common resident but birds of Mountains and Great Basin move to lowlands for winter." Marshall (1948a) describes the more northern races as being migratory.

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944) report Song Sparrows breeding in thickets arrowweed, and willows and reeds at the edges of ditches and river courses. Life-zones in summer, Lower Sonoran, Upper Sonoran and Transition. In general they favor riparian growth and damp places, freshwater marshes and garden shrubbery. Reported tule beds and cattails. Saltonis has occasionally been noted in mesquite thickets at some distance from water.

Baird et al. (1905): "The birds are found in almost any cultivated locality where the grounds are sufficiently open. They prefer the edges of open fields, and those of meadows and low grounds, but are rarely found in woods or in thick bushes, except near their outer edges."

Melospiza melodia (con't.)

Bent et al. (1968): "...water-edge vegetation, whether it be marshes around mountain lakes,...in stream-side willows, ...or in boggy areas of cultivated fields and meadows... clumps of dead tule...into sagebrush...dense thickets 6 to 10 feet high along open water." Peterson (1961): "Thickets, brush, marshes, roadsides, gardens, seabeaches." Small (1974): "Streamside thickets, tangles, weed thickets, thickets of willows and reeds at edges of watercourses, marshes, lake borders, brushpiles, gardens, shrubs, edges of marshes."

Phillips, et al. (1964), for song sparrows in Arizona: "Locally common resident of reed-sedge-brush types along major permanent rivers...and on permanent brush-lined streams. Rather common winter resident locally at reedy ponds, brushy streams, and farmlands with brushy, weedy edges." They refer to three types of Song Sparrows by biotopic affinity (1) saltonis, fallax - desert, (2) montana, fisherella, juddi - mountain, (3) merrilli, rufina - northwest.

Marshall (1948a): "...is a characteristic inhabitant of vegetation growing in wet places..." Evidentially fisherella can forage in drier brush than some of the other races.

B. Altitudinal range

Grinnell and Miller (1944) - From near sea level up to 8,000 feet. Bent et al. (1968) - From near sea level to as high as 9,000 feet.

C. Home range size

Marshall (1948a) - 2/3 acre per pair roughly. He goes on to describe reasons for variation in range size which are generally related to food availability. Nice (1931b) has similar data. Suthers (1960) gives a range of 0.30 to 0.65 acre for territory size.

D. Territory requirements

Perch sites

Courtship and mating sites

Nest sites - Grinnell and Miller (1944): "Nests are placed in the vegetation above the mud which marks flood level." Baird et al. (1905): "They nest naturally on the ground," and in bushes above the ground. Bent et al. (1968): "Ground nests appear to be the commonest and are built in grass, alfalfa, in hollows under sage and willows, among ferns under fallen trees."

Melospiza melodia (con't.)

E. Special habitat requirements

Grinnell and Miller (1944): "The presence of water is essential, coupled with cover." Phillips et al. (1964) state that south-central Arizona Song Sparrows have led a precarious existence, depending on water as they do. Marshall (1948a) gives detailed descriptions of habitat used by Song Sparrows in California. Two of the most important factors are moisture and light. Whitmore (1977) discusses habitat partitioning in some passerines saying that song sparrows are high shrub density species with little canopy cover and moderate ground cover.

F. Seasonal changes in habitat requirements

Oberholser (1974) says that Song Sparrows appear restricted in habitat use during migration, using cattails, tall grass or weed patches, and bushes growing near streams or lakes.

V FOOD

A. Food preferences

Baird et al. (1905) - insects, caterpillars, larvae, moths. Bent et al. (1968) give estimated plant food consumption as 60% of total diet. Oberholser (1974) describes Song Sparrows as eating varied food depending on their location; crustaceans, mollusks, seeds.

B. Foraging areas

Grinnell and Miller (1944): "The birds forage short distances out into grassy or weedy places and about root tangles and piles of wood." Bent et al. (1968) report them foraging along open water often with their feet in the water.

C. Foraging strategies

Oberholser (1974) describes Song Sparrows as being the most plastic passerine species in reference to feeding behavior. Marshall (1948a) says that he has never seen them eating seeds off a plant but apparently they must wait for the seeds to fall to the ground. Nice (1940) describes anting in Song Sparrows.

D. Feeding phenology

Oberholser (1974): "Especially in warm months, it gleans beetles, grasshoppers, crickets, caterpillars, and ants."

E. Energy requirements

Melospiza melodia (con't.)

I REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Nice (1934): "Some resident males begin to proclaim their territories in late January or early February, according to the weather." Nice (1936c) reports song sparrows in Ohio to be very "sessile" on territories. The male chooses the territory. The female returns to her previous nesting site or as near as possible. Nice (1931a) in a paper on song sparrows returning to breeding grounds says that males go directly to their territories.

C. Courtship and mating behavior

Martin (1977) discusses the functional aspects of song in the Fox and Song Sparrows. Nice (1933c) describes mate fidelity in song sparrows in Ohio.

D. Nesting phenology

Bent et al. (1968) report the breeding season to begin about 5 February and end about 5 July. Oberholser (1974) says that females commonly raise three broods a year. Nice (1931a) gives arrival dates in spring as 8 February to 26 March. Nice (1931b): "...nesting began in mid-April.

E. Length of incubation period

Nice (1940) - 13 days.

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

Oberholser (1944) reports that Song Sparrows seldom sing on their southern wintering grounds. Nice (1934) says the male usually indulges in singing on his territory after the molt in the fall.

VII POPULATION PARAMETERS

A. Clutch size

Baird et al. (1905) - 4 to 5. Bent et al. (1968) - 3.69 mean. Peterson (1961) - 3 to 5. Gabrielson and Jewett (1940) - 4 to 5. Nice (1933b) - 1 to 5.

Melospiza melodia (con't.)

B. Fledging success

Nice (1933b): "In 1930 the numbers of young fledged per pair by 15 pairs that survived the season were as follows: 0,2,2,3,3,3,4,4,4,4,5,6,7,7,10; an average of 4.3 per pair. She calculated 3.2 young raised per successful nest over a 3-year period.

C. Mortality rates per age class

Nice (1933a) gives mortality for eggs and young in 3 years. Nice (1933c) says that mortality of adult males and females is very high each year. Nice (1931b): "Mortality during the 14 to 18 days of parental care after the young leave the nest is hard to keep track of...3 broods were wiped out... but at least some of 19 broods were reared to independence."

D. Longevity

Kennard (1975) gives the oldest banded song sparrow as 10 years 4 months.

E. Seasonal abundance

Nice (1933a): "It is possible that the weather in October may have something to do with some of the birds staying or leaving."

F. Habitat density figures

Bent et al. (1968): "Population density was approximately 3 individuals per 10 acres." Wolfson (1955) describes an effective breeding unit as an area of about 400 meters' radius and about 150 individuals. Nice (1931a) presents maps of territories for an area in Ohio. Nice (1931b) had 64 pairs living on 50 acres in Columbus, Ohio.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Nice (1931b) lists dogs, cats and rats as nest predators. She also saw a Ring-necked Pheasant empty a nest.

B. Competition

Marshall (1948a) reports that habitat is shared in winter with White-crowned and Lincoln Sparrows. Gorton (1977) found song sparrows to be intensely intraspecifically territorial.

Melospiza melodia (con't.)

C. Parasitism

Friedmann et al. (1977) list these records of parasitism by the cowbird from sets of eggs at the Western Foundation of Vert. Zool.: M. m. montana - 2 sets; M. m. cooperi - 16 sets; M. m. saltonis - 5 sets; M. m. fisherella - 4 sets. They report the Song Sparrow is a common and good host. Nice (1933b) notes cowbird parasitism in some song sparrow nests.

IX STATUS

A. Past population trends

Dawson (1948) describes fossil specimens of M. melodia found at Rancho La Brea.

B. Present population status

Grinnell and Miller (1944) believe that the development of irrigation has increased the total population of saltonis in the last 30 years.

C. Population limiting factors

Dawson (1923): "A young Song Sparrow is the choice morsel for everything that preys--cats, skunks, weasels, chipmunks, foxes, hawks, crows, magpies, jays, snakes."

D. Environmental quality: adverse impacts

E. Potential for endangered status

Melospiza melodia (con't.)

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TURKEY VULTURE

Cathartes aura

I TAXONOMY

A. Type description

AOU (1957), Cathartes aura teter Friedmann, Proc. Biol. Soc. Washington, 46, Oct. 26, 1933, p. 188. (Riverside, California.)

B. Current systematic treatments

AOU (1957) recognizes 3 subspecies of C. aura; 4 species in the Genus Cathartes, Family Cathartidae, Super family Cathartoidea, suborder Cathartae, Order Falconiformes.

Taverner (1926) recognizes one subspecies, C. a. septentrionalis, the Northern Turkey Vulture, in the Family Cathartidae, Suborder Sarcorhamphi, Order Raptores.

Brown and Amadon (1968) don't recognize teter, but put the western United States subspecies under C. a. aura. Wetmore (1964) calls teter C. a. meridionalis, combining the two as one.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Western Turkey Vulture, C. aura; Rhinogryphus aura; Oenops aura; C. aurea; C. a. septentrionalis. Wetmore (1964): C. a. meridionalis.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944): Turkey Vulture; Turkey Buzzard; Red-headed Turkey Vulture; Red-headed Vulture; Northern Turkey Vulture; May (1935): Carrion Crow, John Crow, Red-headed Buzzard.

II DESCRIPTION

A. External morphology of adults

Dawson (1923): Head and neck all naked, livid crimson; above a lustrous black with purple, varied grayish brown edgings of feathers; plumage changing below to more uniform sooty brown, lustrous only on the breast; wing-quills and retrices light to dusky below, with whitish shaft; primaries deeply emarginate; iris brownish gray; bill dull white; cere bright red. Dawson (1923) also give measurements. Taverner (1926) feet resemble those of a chicken rather than a hawk; claws are blunt and foot is poorly adapted for seizing or holding prey. Peterson (1961) sexes alike; 2-toned blackish wings (flight feathers lighter than wing linings); nearly eagle size; soars with wings slightly above horizontal.

Cathartes aura (con't.)

B. External morphology of subadult age classes

Dawson (1923) Similar to adult but dusky on head and neck, with grayish brown feathers; bill blackish.

C. Distinguishing characteristics

Interspecific - Peterson (1961); diminutive head and slimmer tail distinguish Turkey Vultures from eagles. Brown and Amadon (1968); very similar to Yellow-headed Vulture, distinguished by red, not yellow, head and by darker base of wing in flight. Zone-tailed Hawk has a similar flight profile, but its tail has white bars.

Intraspecific - Grossman and Hamlet (1964): Most do not differ noticeably, but populations in the Amazon rain forest are darker; green and bronze-glossed plumage occurs in the Falkland Island race.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957): Breeds from southern British Columbia, central Alberta, Saskatchewan, southern Manitoba, western Ontario, northern Minnesota, and Wisconsin south to southern Baja California, and in the interior of Mexico to Colima, Jalisco, Guanajuato, Michoacan, and Distrito Federal; east to eastern Texas. Grinnell and Miller (1944): In summer seen more or less commonly from Mexican line to Oregon line, and from seashore to Nevada line and up to altitudes of 10,000 feet in Sierra Nevada, as on Mount Dana, Tuolumne County. Breeds chiefly in the upper Sonoran Zone. Dawson (1923): North America from the southern portions of the western Canadian Provinces, southwestern Ontario, southern New York, and New Jersey, south to northern Mexico and southern lower California. Phillips et al. (1964) describe the Turkey Vulture as a common summer resident, except in extensive forested areas, in Arizona. In southern Nevada, Gullion et al. (1959) describe the Turkey Vulture as "primarily spring and fall migrants on the desert."

B. California distribution of the species

Grinnell and Miller (1944): "Sample localities...Modoc County; Requa, Del Norte County; Cape Mendocino, Humboldt County; San Francisco Bay area; Mount Diablo, Contra Costa County; 15 miles northeast of San Jose in Alameda County; Yosemite region; Fresno district, Fresno County; Elk Hills, Kern County; Death Valley, Inyo County; Santa Barbara, Santa Barbara County; Whittier, Los Angeles County; Buena Park, Orange County; San Jacinto Mountains; Colorado River Valley."

Cathartes aura (con't.)

Dawson (1923): Resident south of the Tehachipe and casually north to Vaca Valley, Solano County. Elsewhere found commonly in spring, summer, fall throughout the State (California), gave in the Boreal Zone. Most abundant in warmer sections, and breeding almost exclusively in Upper Sonoran zone. Small (1974), "length of the state. Breeds throughout the State."

C. California desert distribution

Grinnell and Miller (1944): Yosemite region; Elk Hills, Kern County; Death Valley, Inyo County. Willet (1951) refers to calurus as a "migrant, probably resident locally," in the southern California desert.

D. Seasonal variations in distribution

Grinnell and Miller (1944): In winter, only west of the Sierras and at low altitudes; there north to Red Bluff, Tehama County and Ornaun Springs, Mendocino County. Grinnell (1915): remains throughout winter in small number in the San Diegan district, and north interiorly at least to Vaca Valley, Solano County. Dawson (1923): winters easterly in all except the northern portion of its range, but in the West retiring as far as Nebraska and California. AOU (1957): Winters from California and Nebraska south to Ecuador. One winter record for Vancouver Island. Small (1974), "part of the population is resident and part is migratory."

IV HABITAT

A. Biotopic affinities

Dawson (1923) and Grinnell (1915); Upper Sonoran Zone. Brown and Amadon (1968) refer to C. aura as a bird of open plains, desert, forest, jungle and even high barren desert plateau. Small (1974) "...over open country of mountains, grasslands, deserts, savannahs, and agricultural lands."

B. Altitudinal range

Grinnell (1915): Breeds chiefly if not altogether in the Upper Sonoran Zone. Dawson (1923): agrees with Grinnell (1915), and adds that the bird is not a high flier.

C. Home range size

Cathartes aura (con't.)

D. Territory requirements

Perch sites - Grinnell and Miller (1944): When roosting, uses tree with open branch work. Brown and Amadon (1968); "...rather slow in leaving the roost each morning. During the middle of the day there are, except in rainy weather, no vultures near the roost...The roost is sometimes shared with Black Vultures. Neither species nests near the roost, as a rule." Prather et al. (1976) report a roost in Virginia containing 13 Black Vultures and 320 Turkey Vultures.

Courtship and mating sites - Brown and Amadon (1968); "Both birds may roost in the nesting cavity for some time before the eggs are laid."

Nest sites - Grinnell and Miller (1944): prefers shelter of rocks or brush on steep hillsides, or cavities in cliff faces. Dawson (1923): "in hollow trees, stumps, fallen logs, crannies in cliffs; unlined." Taverner (1926); on the ground usually in a hollow log, or under an upturned stump. Brown and Amadon (1968), "eggs are laid in caves, preferably ones with two entrances; in hollow logs or stumps, or on the ground in dense inaccessible briar patches or swamps. Occasionally...well above the ground." No real nest is built.

E. Special habitat requirements

Brown and Amadon (1968); may remain inactive in quiet air, and for the same reason leaves its perch late in the mornings.

F. Seasonal changes in habitat requirements.

V FOOD

A. Food preferences

Dawson (1923); no live food; gleaners and scavengers; nothing is skipped, a dead frog, a snake. Taverner (1926); they do not kill what they eat. Brown and Amadon (1968); eat carrion and offal of all sorts, excrement of sea lions, and exceptionally rotting fruit and vegetables. "It is less apt to kill live young animals than is the Black Vulture, but sometimes takes young herons and ibises from their nests and sucks the eggs."

B. Foraging areas

Grinnell and Miller (1944): over or on more or less open terrain of mountain sides, hills, plains, beaches and deserts.

Cathartes aura (con't.)

Dawson (1923); cattle ranges are not particularly favored; they will resort to seashores. Brown and Amadon (1968) "...it secures much food from animals killed on highways..."

C. Foraging strategies

Dawson (1923); soars overhead watching the open ground. Brown and Amadon (1968), "...its ability to find small bits of food in dense vegetation is fabulous; in this it is aided by a sense of smell." Rarely flies holding food in its bill. "Although numbers may soar together over a potential food source, or descend to eat together, the Turkey Vulture is probably truly social only when roosting." Temple (1969) reported watching Turkey Vultures causing nestling herons to regurgitate, eating that and then returning to its own nest to feed its young. Knowlton (1909); "When they find a dead animal they will often remain near it for days, resting by night in the trees nearby..." until the whole thing is consumed."

D. Feeding phenology

Rea (1973) reports finding Turkey Vultures casting pellets; a phenomenon not previously reported.

E. Energy requirements

Brown and Amadon (1968); "When asleep the body temperature drops from 38°C to 34°C, an adaptation which must be of value in retaining energy in a bird with a precarious food supply." Heath (1962) reports temperature rising in a captive to 41°C. When trying to insert a temperature probe in the Turkey Vulture. The surrounding room temperature was 15°C. He hypothesizes that temperatures are raised to this level during flight.

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

C. Courtship and mating behavior

Brown and Amadon (1968); "A small group have sometimes been seen to perform a rather ritualized display. Both sexes participate in the whole nesting cycle." Loftin and Tyson (1965); "Mating...is often preceded by a gregarious dance ...a number of vultures gather on a cleared area where they go through a series of hops with wings outstretched..." Upon examining the vultures tracks on sand where they had

Cathartes aura (con't.)

been hopping Loftin and Tyson (1965) found that the birds were hopping in a figure-8 pattern.

D. Nesting phenology

Brown and Amadon (1968); return to breeding sites in early to mid-March. "Nesting begins in March in Florida, but in May or June farther north." Wheelock (1904); "...nesting season...in California begins about April 15." The breeding season is given as April 1 to June 15.

E. Length of incubation period

Brown & Amadon (1968); 38-41 days.

F. Length of nestling period

Brown & Amadon (1968); "...70 to 80 days, or even more." Bent (1937) reports that Turkey Vultures must stay in the nest until well over 10 weeks of age.

G. Growth rates

Brown & Amadon (1968); "The young open their eyes from the first and are more alert and move about more easily than young hawks. Bent (1937); "When about 37 days old...young were still covered with down, but the primaries and secondaries and their coverts were about 4 inches long...tail feathers...about 3 inches long...When about 47 days old... about 2/3 grown...about 60 days old...the wings appeared ...fully developed, the back was well feathered, and the plumage was coming in on the sides of the breast, but the neck and the remainder of the underparts were still downy."

H. Post-breeding behavior

Brown and Amadon (1968); migrate south 12th October to 13th November. Phillips et al. (1964) describe migration as taking place in spectacular flocks.

VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961); "1-3, blotched." Brown and Amadon (1968); "invariably 2 in number."

B. Fledging success

C. Mortality rates per age class

Cathartes aura (con't.)

D. Longevity

Kennard (1975) didn't find any band returns for turkey Vultures over 5 years old but the oldest Black Vulture he found was 16 years, 6 months.

E. Seasonal abundance

F. Habitat density figures

Brown and Amadon (1968); "A typical roost might contain thirty vultures but perhaps some are much larger."

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

Grossman and Hamlet (1964) report Turkey Vultures feeding with California Condors. "...Turkey Vultures have the weakest carrion-feeding bills, and generally must wait until others have ripped open a carcass or it has decayed..." Pennycuik (1973) discussed competition between East African vultures and hyena in regards to the speed of slight of vultures.

C. Parasitism

IX STATUS

A. Past population trends

Grinnell (1915): Most abundant in San Diegan district and through the interior valleys. Common in spring and summer throughout the State (California) save in the highest mountains.

B. Present population status

Grinnell and Miller (1944); Present within the state throughout the year, but numbers and distribution vary with seasons. Northerly and at higher altitudes, altogether absent in winter; even at low altitudes, reduced to small numbers in winter where common in summer. Thus where definite migration of a large share of population southward out of state in October and back again in March. Thought to be less numerous now than formerly. Taverner (1926); in many places they are rigorously protected by law for sanitary reasons.

Cathartes aura (con't.)

C. Population limiting factors

Dawson (1923) points out that ranchers put out poisoned carcasses for coyotes which are eaten by vultures which then regurgitate. An increase in sanitary science had made food harder to come by. Bent (1937): Turkey Vultures are dependent on death coming to animals.

D. Environmental quality: adverse impacts

Braun and Amadon (1968); "There has been much debate as to whether this species and the Black Vulture carry bacteria and viruses of anthrax and other diseases of livestock. It is probable that they seldom come into close enough contact with living stock to constitute a hazard. Nevertheless, large numbers of both species have been trapped and killed, especially in Texas, on the grounds that they carry disease and may also attack helpless young livestock." Turkey Vultures are seldom guilty of the latter.

E. Potential for endangered status

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VIOLET-GREEN SWALLOW
Tachycineta thalassina

T. t. lepida - Northern Violet-green Swallow

I TAXONOMY

A. Type description

AOU (1957) T. t. lepida: Tachycineta lepida Mearns, Proc. Biol. Soc. Washington, 15, March 5, 1902, p. 31. (Campbell's ranch in the Laguna Mountains (Coast Range) 20 miles north of Campo, San Diego County, California.)

T. thalassina: Hirundo thalassinus Swainson, Phil. Mag., N. S., 1, no. 5, May 1827, p. 366. (Realdel Monte = Hidalgo, Mexico.)

B. Current systematic treatments

Peters (1960), recognizes six species in the genus Tachycineta; three subspecies in the species T. thalassina (lepida, brachyptera, thalassina). Passeriformes: Hirundinidae.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Hirundo thalassina; Petrochelidon thalassina; Tachycineta lepida

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Green Swallow

II DESCRIPTION

A. External morphology of adults

Dawson (1923), "Adult male: Upper parts, including pileum, hind-neck, back, upper portion of rump, scapulars, and lesser wing coverts, rich, velvety bronze-green, occasionally tinged with purple...wings and tail blackish, glossed with violet or purple; lores grayish; under parts, continuous with cheeks and area over and behind eye, and with conspicuous flank-patch, nearly meeting...across rump, pure white; under wing-coverts pale gray, whitening on edge of wing. Bill black, feet brownish black; iris brown. Adult female: Like male but usually much duller; bronze-green of upper parts reduced to greenish brown, or brown with faint greenish reflections...cheeks brown with white skirtings. Ridgway (1904), detailed description of plumage, soft parts, and measurements, including comments on winter plumage.

Tachycineta thalassina (con't.)

B. External morphology of subadult age classes

Dawson (1923), "plain mouse-gray above, white or pale sooty gray below...inner secondaries tipped with grayish." Ridgway (1904), detailed description of young.

C. Distinguishing characteristics

Interspecific - Peterson (1961), "Separated from Tree Swallow by greener back, white rump patches. White of face partially encircles eye." Dawson (1923), "Smaller ...white-cheeked and white-rumped...as distinguished from the Tree Swallow."

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) Tachycineta thalassina: "Western North America from the Yukon River Valley through southern Alaska, western and southern British Columbia, southwestern Alberta, Montana, southwestern South Dakota, and northwestern Nebraska south to southern Baja California and Sonora in the west, and through Colorado, New Mexico, and western Texas to central Mexico in the east." T. t. lepida: "Breeds from Alaska (Yukon River Valley, McCarthy, Yakutat Bay), southwestern Yukon (Dawson, Selkirk, White horse), British Columbia, southwestern Alberta (Deer Park, Donald), central Montana (Judith Basin, Billings, Big Horn), and southwestern South Dakota (Rapid City, Pine Ridge) south to northern Baja California (San Fernando), southern Arizona (Fort Huachuca, Chiricahua Mountains), and southern New Mexico (Gila Fork Reservation, Sacramento Mountains); recorded in summer in Sonora, Chihuahua and Coahuila."

B. California distribution of the species

Small (1974), "for breeding, length of state west of southeastern deserts." Dawson (1923), "Abundant migrant throughout the state. Breeds in the mountains and throughout the state at Transitional levels; also well down into the Upper Sonoran zone in the coastal valleys, and upon the southern coastal ranges.

C. California desert distribution

Miller (1951) San Bernardino, San Jacinto, San Diegan Mountains, Sierra San Pedro Martir, Inyo Mountains. Grinnell and Miller (1944), "occasional records of wintering extend northwest from vicinity of Salton Sea, in Imperial County to Monterey County."

Tachycineta thalassina (con't.)

D. Seasonal variations in distribution

Small (1934), "transient and summer visitor (California), February to October, some winter in lowland coastal regions." AOU (1957), "Winters from central coastal (Salinas River) and southern California (San Diego, Needles), Sonora, Chihuahua, and Coahuila south to Guatemala (San Mateo, Chichicastenango), Honduras, and El Salvador (Puerto del Triunfo), casually to Costa Rica (Bebedero). Dawson (1923), "Winters sparingly in the Imperial Valley and casually in the San Diegan district, north to Santa Barbara (Dec. 19-24, 1914; Dec. 24, 1919)...most February records and some in January are of returning migrants."

IV HABITAT

A. Biotopic affinities

Small (1974), "open forest or woodland of deciduous, coniferous, or mixed trees when on breeding grounds; elsewhere, open country for foraging." Bent (1942) "partial to such surroundings in the vicinity of streams...lakes...tide water." Miller (1951), Upper Sonoran and Transition zones. Grinnell and Miller (1944) "Vicinity of cliff-faces or precipitous canyon walls...broken or open type of woods, or margins of heavy forest, on either level, rolling or steep-sloping terrain...no special preference for the presence of water. In rock-walled canyons of desert mountains... shade is...sought."

B. Altitudinal range

Wauer (1964), observed 1-4000 ft., Panamint Mtns. Dawson (1923), "altitudinal breeding range from sea-level to about 10,000 (Granite Basin, eastern Fresno County...1913)." Miller (1940) "nesting fairly commonly in cliffs above Transition areas and on shaded cliffs of canyons on the south side of Clark Mountain above 6500 ft."

C. Home range size

D. Territory requirements

Perch sites - Edson (1943) "on wires and roofs" Bent (1942), "often seen perched in long rows on telegraph wires...in the tops of leafless trees." Grinnell and Miller (1944), "dead-topped trees...tips of dead branches."

Courtship and mating sites -

Tachycineta thalassina (con't)

Nest sites - Dawson (1923), "of dried grasses, with or without feathers; placed in cranny of crevice of cliff (especially in vapor holes of volcanic formations), or in old woodpecker holes--laterally and less commonly in bird boxes, or in cranny of building." Nichols (1938), "Great numbers...nesting on the islands (Mono Lake, Ca.), in cracks between loose rocks which make up the steep volcanic rubble heaps." Edson (1943) "readily accept a bird house or a box attached to a building. An aperture in a cornice or a wall...a hole in a tree...a crevice in a stone wall or rocky cliff."

- E. Special habitat requirements
- F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Edson (1943) "gnats and flies." Bent (1942), of 67 stomachs examined, Heminoptera constituted 36%, Diptera 29%, Hymenoptera 23%. "Six stomachs taken on one day were entirely filled with ants...the remainder of the Hymenoptera each were wasps and wild bees." Others of note include moths and beetles.

- B. Foraging areas
- C. Foraging strategies

Bent (1942), "lives entirely on insect food taken on the wing." Grinnell and Miller (1944) "from perches on neighboring dead topped trees the birds range out in rather long cruising radius for aerial foraging, low or high according to wind rate, degree of cloudiness or other factors controlling presence of preferred insects or ability of the swallows to capture them."

- D. Feeding Phenology
- E. Energy requirements

Lasiewski and Thompson (1966), reports torpor of three individuals in the wild, Saratoga Springs, Calif., April, 1965.

VI REPRODUCTION

- A. Age at first breeding
- B. Territorial behavior

Tachycineta thalassina (con't.)

C. Courtship and mating behavior

D. Nesting phenology

Dawson (1923), "May or June, according to altitudes; one brood. Combellack (1954), "a new egg was found each morning, June 14 through June 17...incubation was undoubtedly done only by the female." Edson (1943) "Occasionally eggs are laid before the nest is completed, and the feathers are added while laying is in progress. An egg a day is laid in most cases till the clutch of five is complete."

E. Length of incubation period

Combellack (1954), 13-16 days, asynchronans hatching. Edson (1943), "approximately 15 days...it is not unusual for incubation to be commenced before the clutch is complete."

F. Length of nestling period

Combellack (1954) 23-25 days. Edson (1943) "the brooding period 23-24 days, sometimes even longer."

G. Growth rates

Edson (1943) measurements of length and weight taken daily up to age 13 days. Average length = 4 mm/day. Record of weights for four seasons for comparison. Discussion of possible causes for different rates for different seasons.

H. Post-breeding behavior

Edson (1943) "in the latter half of July, they may be seen flocking with Barn Swallows and others on wires and roofs." Grinnell and Miller (1944) "in post-breeding gathering and in migrations, it may associate with other kinds of swallows."

VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923), "4 to 6; pure white."

B. Fledging success

C. Mortality rates per age class

D. Longevity

Tachycineta thalassina (con't.)

E. Seasonal abundance

Grinnell (1908) "many adults and full-grown young were found congregated about the shore of Bear Lake (San Bernardino Mountains, California)...on the bare branches of one dead pine on the north shore of the lake, July 31, hundreds ...were perching, mostly young-of-the-year."

F. Habitat density figures

Dawson (1923), "favorable circumstances may attract a considerable colony, to a number of a hundred pairs or more." Grinnell and Miller (1944), "solitary or weakly colonial, apparently as according with the number of nesting sites available in any one place."

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Webster (1944) "have, on occasion, seen the amazing feat of a small Prairie Falcon taking...violet-green Swallows."

B. Competition

Franzreb (1976), reports encounter between Mountain Chickadees feeding nestlings in nest while swallow attempting to overtake nest site. Involved aerial and ground combat with physical contact, but chickadee able to retain possession of nest. Edson (1943) reports destruction of nest with eggs by Passer domesticus. "Then the swallows transferred their endeavors to the box in which the sparrows had left a nearly completed nest...they nearly added a lining of feathers, and then three eggs were promptly laid."

C. Parasitism

Edson (1943) "botflies have victimized the nestlings and they were relieved of a number of large maggots. No fatalities resulted but it was detrimental to health and growth."

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Essentially summer resident, March to September. Common; locally abundant. Also transient orderly; and a few, probably not every year, present in mid-winter months, southerly, and coastwise northwest to San Francisco Bay region."

Tachycineta thalassina (con't.)

B. Present population status

C. Population limiting factors

Franzreb (1976) "A hole-nesting species such as the Violet-green Swallow breeding, later in the season may have difficulty in locating suitable nest cavities as most are already occupied by other species...If such sites are in short supply, the number of nest cavities may be an important factor in limiting population densities.

D. Environmental quality: adverse impacts

E. Potential for endangered status

Tachycineta thalassina (con't.)

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WESTERN BLUEBIRD

Sialia mexicana

I TAXONOMY

A. Type description

Sialia mexicana bairdi - AOU (1957) Ridgway, Auk, 11, no. 2, Apr. 1894, pp. 151 and 157. (Camp 110, New Mexico = Cactus Pass, 20 miles east of Kingman, Mohave County, Arizona.).

Sialia m. occidentalis - AOU (1957) Townsend, Journ. Acad. Sci. Philadelphia, 7, pt. 2, (Nov. 21) 1837, p. 188. (Columbia River = Fort Vancouver, Washington.).

B. Current systematic treatments

AOU (1957) considers this species a member of the avian Order Passeriformes, Family Turdidae (Thrushes, Solitaires, and Bluebirds).

Peters (1964) includes Western Bluebirds in the Family Musicapidae, Subfamily Turdinae. He recognized six races of S. mexicana, including bairdi and occidentalis.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Sialia occidentalis; S. caeruleocollis; S. mexicana anabelae; Sylvia occidentalis.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Mexican Bluebird; California Bluebird; Anabel Bluebird; Chestnut-backed Bluebird; San Pedro Bluebird.

II DESCRIPTION

A. External morphology of adults

Ridgway (1907) gives a detailed description of plumages of several races. He describes the species general appearance as "Above plain rich blue, brighter...on the rump, upper tail-coverts, tail, and outer webs of primaries... the blue gradually fading on abdomen...sides of chest and breast and anterior portion of sides chestnut...bill black; iris dark brown; legs and feet black." Miller and Stebbins (1964), "A bluebird marked with rust-brown areas on breast and back."

Sialia mexicana (con't.)

B. External morphology of subadult age classes

Ridgway (1907) describes young as plain sooty gray with wing coverts, remiges, and rectrices blue. Wheelock (1920), "Young: Gray, mottled and streaked with white, darkest on upper parts."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "Similar species: (1) See Eastern Bluebird. (2) Male Lazuli Bunting has white wing-bars. (3) Mountain Bluebird has blue breast."

Intraspecific - Ridgway (1907) states that bairdi is "Similar to S. m. occidentalis, but adult male with whole back and scapulars uniform chestnut, producing a large and conspicuous dorsal patch." Measurements of both races are given. Miller and Stebbins (1964), "Female with blue and brown areas much duller than in male, the throat often nearly gray."

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) lists the overall range of the Western Bluebird (Sialia mexicana) as "From southern British Columbia and central Montana south through the mountains to northern Baja California, Michoacan, Puebla, and central Veracruz." Sialia m. bairdi - AOU (1957), range "Breeds from southern Nevada, central Utah and Colorado south through the mountains to central western and southeastern Arizona, northern Chihuahua, and western Texas. Winters throughout breeding range at lower altitudes; wandering to southeastern California (Little Lake, Victorville, lower Colorado Valley), eastern Sonora, and central Texas." Peters (1964), "Southern Nevada, central Utah, and Colorado south to Arizona, western Texas, northern Sonora, and northern Chihuahua; wintering at lower altitudes in same areas and as far as southeast California." Sialia m. occidentalis - AOU (1957), range "Breeds from southern British Columbia and western and central southern Montana south in eastern Oregon, northern Idaho, and northwestern Wyoming, and through the mountains to southern California (San Diego, San Bernardino Mountains, Walker Pass) and western Nevada. Winters in breeding range at lower altitudes, rarely north to British Columbia, wandering to southeastern California (Death Valley, Potholes, Twenty-nine Palms), and Santa Catalina and San Clemente Islands." Peters (1964), "Southern British Columbia, Montana, eastern Oregon, Idaho, and Wyoming south in the mountains to southern California and Western Nevada; wintering at lower altitudes; wandering to southeast California, Santa Catalina and San Clemente Islands."

Sialia mexicana (con't.)

B. California distribution of the species

Sialia m. bairdi - Grinnell and Miller (1944), "In summer known only from Clark Mountain, 7300 feet, northeastern San Bernardino Co. In winter, Providence Mountains...Colorado River, Needles to Potholes." Sialia m. occidentalis - Grinnell and Miller (1944), "As breeding, entire length of State west of eastern margins of Sierran forests, but including Great Basin plateau south to the vicinity of Lake Tahoe." Small (1974), range in California of S. mexicana (Races combined)--"for breeding, length of state exclusive of eastern and southeastern deserts; in winter, almost statewide."

C. California desert distribution

Grinnell and Miller (1944) list Death Valley, Twentynine Palms, Colorado River Valley, Needles, Little Lake, Victorville, and Oro Grande as areas of winter occurrence. They conclude that "the winter population in this region now appears to us to be composed chiefly of bairdi; occasional individuals apparently represent occidentalis." In Joshua Tree National Monument, Miller and Stebbins (1964) called this species a "Common winter resident." They listed several sightings, including: Morongo Valley (April); Little Morongo Canyon (March); and Twentynine Palms (November through late March). Most birds were occidentalis, although bairdi can be expected. Although they do not breed, Willett (1951) described these bluebirds as winter visitants on southern California deserts. Smyth and Coulombe (1971) noted this species during winter at Upper Carrizo Spring, Riverside Co. Wauer (1964) found breeding bluebirds above 9,000 feet in the bristlecone pine association of the Panamint Mountains, Death Valley. Grinnell (1914) found occidentalis to be a common winter visitor along the lower Colorado River; bairdi not present. Grinnell (1934) noted occidentalis wintering in Death Valley. Gilman (1935) also found this race wintering in Death Valley (Furnace Creek Ranch). Carter (1937) describes wintering flocks of Western Bluebirds at Twentynine Palms, San Bernardino Co., California, from early November to late March. Van Rossem (1911) noted this species wintering near the Salton Sea. Lamb (1912) found Western Bluebirds between November and March on the Mohave Desert near Daggett (San Bernardino Co.). In the lower Colorado Valley during winter, Price (1899) described these bluebirds as "Common in the river bottom, feeding largely on the...mistletoe." Grinnell (1901) noted several flocks of occidentalis near Barstow, San Bernardino Co., in January. Grinnell (1904) found this species wintering near Palm Springs (Palm Canyon) in "great numbers." Near Victorville (Mojave River), Mailliard and Grinnell (1905) described Western Bluebirds during winter as "Abundant along the river bottom where they were feeding largely on mistletoe berries."

Sialia mexicana (con't.)

D. Seasonal variations in distribution

In California, Grinnell and Miller (1944) found that "Migratory movements are irregular as to date and apparently often are local or altitudinal. In many sections these bluebirds are permanently resident." Peters (1964) notes that both bairdi and occidentalis drop to lower elevations during the winter, wandering onto southeast California deserts. Wintering birds in Arizona were found "somewhat irregularly in farmlands and on the desert wherever mistletoe occurs." In southwestern California, Willett (1933) found this species breeding to over 10,000 feet; is more widely distributed over lowlands in winter.

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), "In breeding season, the prime requisite is well spaced, broken timber, providing nest sites and an abundance of exposed lookout posts...mature, scattered groups of willows and cottonwoods along stream courses; typically open stands of wild walnut and sycamore, and of blue, valley and black oaks; yellow and Monterey pine forests, and even conifers of higher zonal type when displaying the requisite spacing." In California, Small (1974) gives habitat as "open forests of deciduous, coniferous, or mixed trees; savannah; edges of riparian woodlands." In Joshua Tree, Miller and Stebbins (1964) found Western Bluebirds wintering in the piñon belt and in the lower, open desert. Peterson (1961) describes habitat as "scattered trees, open conifer forests, farms." In a montane forest of Colorado, Winternitz (1976) found that Western Bluebirds spent 67% of their time in an aspen-willow woodland, 13% in ponderosa pine, 13% in Douglas fir, and 7% in spruce-aspen.

B. Altitudinal range

Grinnell and Miller (1944), "Altitudes of summer residence range from near sea level...up to 10,600 feet in San Bernardino Mountains." In southern Nevada, Johnson (1965) found this bluebird breeding between 7,500 and 9,200 feet.

C. Home range size

D. Territory requirements

Perch sites - Grinnell and Miller (1944) stated that exposed limbs and dead trees are favorite perch sites. Grinnell and Storer (1924), "It ordinarily seeks a perch which will command a wide field of view, as on some upper or outer branch."

Sialia mexicana (con't.)

Courtship and mating sites - Bent (1964) noted a pair of bluebirds mating while perched next to one another.

Nest sites - Peterson (1961) describes nests as "In hole in tree, stub, bird box." Wheelock (1920), "In old woodpecker holes or in cavities of pine trees, usually rather high."

E. Special habitat requirements

Grinnell and Miller (1944) found that this species requires areas of well spaced timber along with abundant dead trees or limbs; the presence of mistletoe (berries) may govern local occurrence during winter.

F. Seasonal changes in habitat requirements

Speaking of bairdi, Grinnell and Miller (1944) found that "In summer, open patches of white fir, interspersed with piñon, on mountain slopes. In winter, yucca, sagebrush and creosote bush associations." Peterson (1961) found that during winter, this species moves from conifer forests out onto semiopen terrain, brush, and deserts. Wheelock (1920), "He is a resident throughout the foothills and lower mountains, coming down to the valleys in winter."

V FOOD

A. Food preferences

In Joshua Tree, Miller and Stebbins (1964) noted wintering birds feeding on insects and mistletoe berries. Martin et al. (1961) describe animal food as--Grasshoppers constitute the largest and most regular item, followed by caterpillars, beetles (particularly ground beetles), and ants. Plant food includes--grape, mistletoe, elderberry, and fig. In California, Wheelock (1920) found "crickets, moths, grasshoppers, caterpillars, ants, and weevils form his diet, varied with fruits."

B. Foraging areas

Grinnell and Miller (1944) found this species feeding in "open patches of grassy, meadowy, or even rocky ground." Pitelka (1941) watched Western Bluebirds feeding "on a south-facing, open, grassy slope" in California.

Sialia mexicana (con't.)

C. Foraging strategies

Grinnell and Miller (1944) noted that feeding is "by the hovering method or from scattered bush tops or weed stalks... some flycatching of insects is indulged in." Miller and Stebbins (1964) noted that "these bluebirds forage on insects, dropping down to the desert floor." Wheelock (1920) noted that "This bluebird, has the habit of darting down from a perch for insects, and often hunting through the grass for them..." Pitelka (1941) noted Western Bluebirds hovering and soaring for food items.

D. Feeding phenology

Grinnell and Miller (1944), "Although most of the food in summer is taken from the ground or the grass tops, some flycatching of insects is indulged in. In winter, mistletoe berries commonly are taken..." Martin et al. (1961) found that animal matter makes up the largest part of this bluebird's diet. They found that plant material accounts for 4% of the diet in summer, 21% in fall, 26% in winter, and 0% in spring. Grinnell and Storer (1924) discuss the important role that mistletoe berries play in the diet of wintering bluebirds in California--"In summer the birds live chiefly upon insects...But in the colder months of the year, when insects are relatively scarce, the bluebirds ...gave their attention to berries."

E. Energy requirements

During winter on the California desert (Joshua Tree), Miller and Stebbins (1964) noted bluebirds drinking from tanks and taking moist food. Smyth and Coulombe (1971) noted the frequent drinking at springs in the California desert during winter by Western Bluebirds.

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Bailey and Niedrach (1965) found that in Colorado, Western Bluebirds seldom show aggressive behavior towards swallows, chickadees, and nuthatches, even though they often nest in the same tree as the bluebirds.

C. Courtship and mating behavior

Bent (1964) gives a brief account of courtship behavior, in which both male and female mounted one another.

Sialia mexicana (con't.)

D. Nesting phenology

In California, Wheelock (1920) gave the breeding season as April through June. Bent (1964) gave California egg dates as "104 records, April 4 to June 20; 58 records, May 2 to May 31, indicating the height of the season."

E. Length of incubation period

Bent (1964) found that "The period of incubation does not seem to have been definitely determined...similar to...the Eastern Bluebird (about 12 days)."

F. Length of nestling period

Bent (1964) could not find reference to the nestling period of Western Bluebirds, but felt that it was similar to that of Eastern Bluebirds (15-18 days).

G. Growth rates

H. Post-breeding behavior

Grinnell and Storer (1924) noted an upward altitudinal shift in the fall (Yosemite). Flocks form by September which include both adults and immatures, numbering from 6 to 25 individuals. In northern California, Grinnell et al. (1930) noted that "Western Bluebirds were observed in small groups, through the winter and as late in the spring as the middle of April."

VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961), "Eggs (4-6; 8) pale blue." Bent (1964) gives a range of 3 to 8 eggs per clutch, with sets of 4, 5, and 6 being the most common.

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

In Nevada, Van Rossem (1936) noted that "In fall, bluebirds became more common, an increase which probably resulted from an increase of migrants." Bent (1964) recounted that "This species is varyingly numerous in lowland areas from late summer to early spring but is usually abundant in the foothill areas around Pasadena (Los Angeles Co., California) and in the more open mountain canyons below snow level."

Sialia mexicana (con't.)

F. Habitat density figures

During winter at Joshua Tree on the California desert, Miller and Stebbins (1964) noted flocks of bluebirds as large as 25 to 50 individuals. In Colorado, Winternitz (1976) found an average of 0.6 pairs per 40 ha breeding in montane forests. In a ponderosa pine forest in Arizona, Balda (1969) reported a breeding population of 20 pairs of Western Bluebirds per 100 acres. Anderson (1970) found a wintering population of 8 to 20 Western Bluebirds per 100 acres in an Oregon white oak forest. Hering (1948) listed 7 pairs of this bluebird nesting on a 75 acre study plot in a Colorado forest. Hosterman and Madding (1978) give a winter density of 40 Western Bluebirds per sq. km. (20/100 acres) in paloverde desert scrub of Arizona, Wilson (1978) found 37 bluebirds per sq. km. (15/100 acres) at Morongo Valley, San Bernardino Co., California during winter. In a Mojavian desert scrub community, Fees (1976) noted 22 bluebirds per sq. km. (9/100 acres) in winter.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Page and Whitacre (1975) noted the taking of a Western Bluebird by a Merlin on the central California coast during winter. Great Horned Owl predation upon Western Bluebirds in California was recorded by Fitch (1947). Mills (1976) recounts the capture of a Western Bluebird by an American Kestrel.

B. Competition

Miller and Bock (1972) concluded that interactions between woodpeckers and bluebirds (Monterey Co., California) suggested that competition for nest sites was high in hole-nesters.

C. Parasitism

Friedmann (1963) felt that this bluebird is a very rare victim of cowbird parasitism.

IX STATUS

A. Past population trends

Grinnell and Miller (1944) called bairdi a "summer resident; rare by reason of greatly restricted breeding habitat along southeastern border...Common winter visitant"; and occidentalis a "Common summer resident over most of the northern and western sections...In winter, widespread in lowlands"

Sialia mexicana (con't.)

(California). Willett (1912) called this species "an abundant breeder in the San Bernardino and San Jacinto Mountains" (California). Sheppardson (1915) felt Western Bluebirds were "much more common lately near the city of Los Angeles than in former years."

B. Present population status

Small (1974) calls Western Bluebirds "common residents" in California.

C. Population limiting factors

In Colorado, Winternitz (1976) concluded that because bluebirds must rely on the hole-drilling activities of woodpeckers for nest sites, the nesting activities (or lack thereof) of woodpeckers are potentially limiting to Western Bluebirds. Grinnell (1934) felt that the scarcity of bluebirds wintering in Death Valley was due to the lack of mistletoe berries.

D. Environmental quality: adverse impacts

In southern California, Ross (1933) felt that removal of dead trees and branches have produced a nesting cavity shortage sufficient enough to force bluebirds to nest on buildings.

E. Potential for endangered status

Sialia mexicana (con't.)

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WESTERN FLYCATCHER
Empidonax d. difficilis

I TAXONOMY

A. Type description

Empidonax d. difficilis - AOU (1957) Baird, in Baird, Cassin, and Lawrence, Rep. Expl. and Surv. R. R. Pac., vol. 9, 1858, pp. xxx, 198. (West coast; Ft. Steilacoom, Shoalwater Bay, Ft. Tejon = Fort Steilcoom, Washington.)

B. Current systematic treatments

AOU (1957) lists the Western Flycatcher as a member of the avian Order Passeriformes, Suborder Tyranni, Superfamily Tyrannoidea, and Family Tyrannidae; this species is polytypic.

Hellmayr (1927) gives 5 races of Western Flycatcher, including E. d. difficilis. Ridgway (1907) states that Western Flycatchers were once considered a race of the Yellow-bellied Flycatchers (E. flaviventris).

Brodkorb (1949) discusses variations in North American Western Flycatchers, including measurements and plumages.

C. Synonomies of scientific nomenclature

Hellmayr (1927) gives Empidonax insulicola; E. bairdi perplexus. Ridgway (1907) adds E. pusillus; E. flaviventris difficilis. Grinnell and Miller (1944) included Tyrannilla pusilla; E. cineritius. Brodkorb (1949) adds E. d. immodulatus.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944) list Little Pewee Flycatcher; Yellow-bellied Flycatcher; Western Yellow-bellied Flycatcher; Baird Flycatcher; San Lucas Flycatcher; Island Flycatcher; Santa Barbara Flycatcher.

II DESCRIPTION

A. External morphology of adults

Ridgway (1907) gives detailed description of plumages; above plain brownish olive, tail grayish brown, wings dusky, two distinct wing bands, a broad orbital ring of yellowish white, mandible wholly yellowish, iris brown, legs and feet dusky brown. Peterson (1961), "Upper parts olive-brown, underparts washed with yellowish, wing-bars whitish, eye-ring white...5.5-6 inches."

Empidonax difficilis (con't.)

B. External morphology of subadult age classes

"Young similar to adults, but color of upper parts much browner...and yellow of under parts paler" (Ridgway 1907).

"Young, similar (to adults), but upper parts browner, with wing-bars rusty buff, the sulphur-yellow of belly replaced by dull white" (Wheelock 1904).

C. Distinguishing characteristics

Interspecific - Ridgway (1907), "...like E. flaviventris (yellow-bellied Flycatcher), but much less greenish; tail longer." Peterson (1961), "Very similar to the other small flycatchers of this group, but underparts more yellowish."

Intraspecific - Ridgway (1907), sexes alike; adult male - length 127 mm; wing 67.5 mm; tail 57.1 mm and adult female - length 123 mm; wing 64.4 mm; tail 55 mm. Brodkorb (1949) also gives detailed description of intraspecific measurements. Johnson (1974) presents an extensive description of molt and age determination in Western Flycatcher.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) gives overall range of E. difficilis as "Breeds from southeastern Alaska, southern British Columbia, west-central Montana, northern Wyoming, and southwestern South Dakota south in the mountains to Baja California, Honduras, and western Texas."

The range of E. d. difficilis (AOU 1957) is given as "Breeds from southeastern Alaska, coastal and central southern British Columbia, northern Idaho, and western Montana south to southwestern California (San Clemente Island, San Jacinto) and central western Nevada."

Hellmayr (1927), "Western North America, breeding from eastern base of Rocky Mountains and western Manitoba to Pacific coast, north to the Alaskan coast, south to Southern California, New Mexico, and western Texas; wintering in Mexico south to Cape San Lucas, Tres Marias Islands, and Oaxaca."

B. California distribution of the species

Grinnell and Miller (1944) describes the California distribution of this species as "In general, nearly entire length and breadth of state. As breeding, more restricted, almost altogether the area west of the main Sierran axis."

Empidonax d. difficilis (con't.)

Small (1974), "length of state west of Sierra Nevada except for Warner Mountains." Willett (1933) calls this species a resident of canyons in foothills and mesa regions and up to about 6000 feet in the mountains.

C. California desert distribution

Grinnell and Miller (1944) state that Western Flycatchers range out onto the California deserts during winter, sometimes remaining until early June. Small (1974) called Western Flycatchers transients through southeastern deserts of California. Willett (1933) recounts the taking of eggs by W. C. Hanna near San Bernardino (16 May to 16 June). Johnson et al. (1948) found migrating Western Flycatchers during spring (late May-early June) in the Providence Mountains. Grinnell (1914) describes this species as a migrant along the lower Colorado River Valley; does not breed (from Needles southward). Wauer (1962) found several Western Flycatchers during the spring and fall of 1960 at Furnace Creek Ranch, Death Valley (listed as uncommon fall migrants). Carter (1937) reported Western Flycatchers as rare during April and May at Twentynine Palms; not breeding. In the Joshua Tree National Monument, Miller and Stebbins (1964) found Western Flycatchers during spring (2 April to 3 June) and fall (25 August to 15 September) migration. Willett (1951) found this species migrating across the deserts of southern California.

D. Seasonal variations in distribution

AOU (1957) lists winter range of E. d. difficilis as "... from southern Baja California, rarely northern Sonora, south to southern Sinaloa and southern Oaxaca." Small (1974) gives seasonal status in California as "transient and summer visitor, March to October." Willett (1933) notes that Western Flycatchers are "Found all over lowlands during migration. Rare in winter" throughout their California range. Bent (1963), "The winter range...is in Western Mexico from southern Baja California and southern Sonora south to southern Guerrero and Oaxaca." He gives date of spring arrival in California as 12 March, and latest date of fall departure as 10 October.

IV HABITAT

A. Biotopic affinities

Peterson (1961) describes this species habitat as "moist woods, mixed or conifer forest, canyons, groves." Grinnell and Miller (1944) give extensive summary of habitat requirements. Characteristically, places that are well shaded by

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tall trees or by steep canyon walls are favored. This species breeding habitat in California was given by Small (1974) as "humid coniferous forest, well-shaded woodlands or forests with running water close at hand, deep, shaded canyons." Johnson et al. (1948) discovered Western Flycatchers in bushes along wash bottoms and ravines in the Providence Mountains, California, during spring migration. Grinnell and Swarth (1913) found this species breeding in small numbers in the high Upper Sonoran and Transition zones of the San Jacinto Mountains, California. In Joshua Tree, Miller and Stebbins (1964) found this species inhabiting pinon, scrub oaks, cottonwoods and willows during migration.

B. Altitudinal range

Grinnell and Miller (1944) give range as from near sea level up to 6000 feet in southern California; Willett (1933) listed a similar range. Johnson et al. (1948) found this species migrating through the Providence Mountains (California) in spring between 4800 and 7300 feet. Bailey (1906) noted Western Flycatchers breeding at 11,000 feet in New Mexico.

C. Home range size

D. Territory requirements

Perch sites - Grinnell and Miller (1944), "look-out and singing posts, even though up to 40 feet above the ground, are still well beneath the leafy canopy and hence shaded." In southern California, Myers (1911) found that male and female Western Flycatchers used tree limbs as perch sites. Verbeek (1975b) reported perch sites were "almost entirely restricted to the middle and lower interior of trees"; mean perch height was 5.05 m (range = 0.25-17m).

Courtship and mating sites - Davis et al. (1963) noted that most pair formation took place within the male's territory.

Nest sites - Grinnell and Miller (1944), "A typical nesting locality...would thus be the bottom of a foothill canyon or ravine carrying running water at least in spring, with more or less over-arching canopy..." They stated that nests are placed in rock crevices, cavities in trees, or near protected beams or posts under bridges and about buildings. Dawson (1923), "placed in any convenient cranny, but chiefly in well-sheltered niches of banks or up-turned tree roots... near streams." Phillips et al. (1964) state that in the absence of natural nest sites, such as crannies of banks or tree cavities, the eaves of buildings have proved an acceptable substitute. Davis et al. (1963) give a detailed

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account of nest sites in Monterey Co., California. "Natural" situations averaged 10.9 feet above ground (0 to 25 feet); all nests were in trees (oaks, sycamores, willows) except one, which was on the shelf of a creek bank. Nests were placed against the trunk of a tree or in a natural cavity. Several nests were also found in buildings. In Texas, Ohlendorf (1974) reported an average tree nest height as being 21.0 ± 3.4 feet; over one-half of the nests were in the middle third of these trees.

E. Special habitat requirements

Peterson (1961) stated that this species requires water and shade in order for it to inhabit an area. In southeast California, the water factor as well as shade limits the range of this species (occurrence of the birds becomes more restricted and spotty) (Grinnell and Miller 1944). VanRossem (1936) felt that the absence of water in much of the mountains of Nevada restricted this species range in that state. In the San Bernardino Mountains of California, Western Flycatchers are restricted (during breeding) to the lower canyons of the Pacific slope.

F. Seasonal changes in habitat requirements

Willett (1933) noted that Western Flycatchers ascend to at least 8000 feet during late summer in California.

V FOOD

A. Food preferences

Prey items taken by this species in Colorado were--Diptera (31%), Coleoptera (25%), Lepidoptera (22%), Hymenoptera 17%), Hemiptera (3%), and Homoptera (1%) (Beaver and Baldwin 1975). Bent (1963) reports that over 99% of the diet is animal matter. Over 38% of the prey items were Hymenoptera, Diptera about 31%.

B. Foraging areas

Grinnell and Miller (1944), "foraging is conducted beneath the crowns of the trees." In a Colorado aspen-conifer forest, Beaver and Baldwin (1975) found these flycatchers feeding mostly from ground level to 9 m. Myers (1911) noted Western Flycatchers feeding "quite near the nest in a damp place under the bank." Verbeek (1975a) found in a California study that "The Western Flycatcher...is strictly a canopy species, preferring the inner parts of trees." Miller and Stebbins (1964) saw this species "foraging under and about the foliage canopy" at Joshua Tree.

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C. Foraging strategies

Dawson (1923) describes foraging behavior; the birds select perches bare of vegetation through the middle heights of a forest where they usually "sally flycatch." Oberholser (1914) notes feeding behavior in Texas--"It flits...through shady openings beneath the tree canopy where it snaps up winged insects from the air and plucks caterpillars from tree trunks." LaRivers (1941) noted that Western Flycatchers were unable to kill large crickets. Verbeek (1975b) found that this species used the "hawking" method to feed 60% of the time, and "gleaning" about 40%.

D. Feeding phenology

Bent (1963) reported that ladybird beetles made up about 7% of the diet in August, but the average dropped to about 2% for the year. Lepidopterans were not present in the diet for March, but totaled about 7% for the year.

E. Energy requirements

Beaver and Baldwin (1975) found that Lepidopterans provide Western Flycatchers with 65% of the total dry weight in their diet, although these insects account for only 22% of all prey items taken.

VI REPRODUCTION

A. Age at first breeding

Johnson (1974) states that first-year Western Flycatchers are known to breed.

B. Territorial behavior

Beaver and Baldwin (1975) found that most interspecific territorial disputes between Western Flycatchers and other species take place early in territory establishment. Davis et al. (1963), "The Western Flycatcher has an alert, aggressive, snappish nature and reacts to intruders with a swift chase, usually accompanied by threat notes..."

C. Courtship and mating behavior

Davis et al. (1963) give a detailed account of vocalization and courtship--"Mated males have only a dawn song. Unmated males sing at dawn and during much of the day as well. Song appears to function primarily in mate attraction."

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D. Nesting phenology

Dawson (1923) states that 2 broods are raised in southern California, one elsewhere; season ranges from April to June. Wheelock (1904) gives California season as 1 May to 15 July. Willet (1933) noted Western Flycatchers breeding mostly in late May and early June in California. Davis et al. (1963) found that in California, the nesting cycle begins in late April or early May and second nestings may continue well into July. California egg dates from Bent (1963): 57 records, 6 May to 17 June, indicating height of season.

E. Length of incubation period

Davis et al. (1963) found that in California "The incubation period is 14 or 15 days, with 15 days the usual period. Incubation is performed by...the female." Rodeck (1947) found that the incubation period lasted as long as 19 days (Colorado). Williams (1942) reported a 15 day period in California.

F. Length of nestling period

Davis et al. (1963), studying the Western Flycatcher in California, found that "The duration of the nestling period ranged from 14.5 to 17.5 days."

G. Growth rates

Wheelock (1904) states the young are fed by regurgitation until they are 4 or 5 days old. Davis et al. (1963) gives a detailed description of the nestling period, including feeding and growth rates. They found that at hatching, young weigh about 1.5 g. Young gain 0.6 to 1.5 g per day through the first 9 days of life, after which the rate slows. Average fledging weight is about 10.0 g.

H. Post-breeding behavior

Swarth (1904), in noting the behavior of this species in Arizona--"After the breeding season they descend the mountains to a lower altitude, and after the first of August young and old are fairly abundant in the oaks of the foothills, and along the washes as in the spring." In California, Davis et al. (1963) found that the final break-up of a family group is the result of a gradual drifting apart as the young move farther and farther away from the original territory; no young were seen on their parents territory 30 days after fledging.

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VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961), "Eggs (3-4) spotted." Davis et al. (1963) found that clutch size "consisted of from three to at least five eggs." Bent (1963) reports a clutch as containing 3 or 4 eggs.

B. Fledging success

In Colorado, Beaver and Baldwin (1975) found that of 28 nestlings, 18 or 64% survived the first week out of the nest. Davis et al. (1963) found in a California study that "13 young were fledged from five nests, an average of 2.6 fledglings per nest."

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

Davis et al. (1963) noted that in California, "there is a noticeable decrease in numbers by the end of August, followed by occasional records in September and early October...records from mid-September on pertain to transients from the North."

F. Habitat density figures

In California, Grinnell and Miller (1944) concluded that the center of abundance of Western Flycatchers lies within the coast belt along the entire length of the State. In an aspen-conifer habitat in Colorado, Beaver and Baldwin (1975) found breeding densities ranging from 1.2 birds per 10 ha to 6.9 birds per 10 ha.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Bent (1963) stated that Empidonax flycatchers, like all other small birds, are preyed upon by many predatory birds and mammals.

B. Competition

"We have shown that differences in foraging microhabitat are probably not sufficient to prevent competition between E. hammondi and E. difficilis in our study area." (Beaver and Baldwin 1975) (Colorado). Verbeek (1975b), in a study

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of Black Phoebes, Western Wood Pewees, and Western Flycatchers in California, showed that "Potential competition among these flycatchers appears to be reduced by interspecific differences in nest site selection, nest height, breeding season, foraging tactics, and the choice of perch sites."

C. Parasitism

Friedmann (1963), "Unknown as a cowbird host until 1934, the Western Flycatcher appears to be in the process of becoming a fairly regular victim in California, where the parasite is extending its range." Friedmann et al. (1963) felt, however, that this species choice of nest sites--cliffs and manmade structures--renders it relatively immune from cowbird parasitism (possibly as low as 3.8% of all nests parasitized). Benson and Russell (1934) noted cowbird parasitism of Western Flycatchers in California.

IX STATUS

A. Past population trends

Grinnell and Miller (1944) called this species "common" throughout its California range.

B. Present population status

Peterson (1961) called this species "The most frequently encountered Empidonax in most parts of western United States."

C. Population limiting factors

Grinnell and Miller (1944) felt that the lack of shade and water prevents these flycatchers from expanding into south-east California.

D. Environmental quality: adverse impacts

E. Potential for endangered status

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WESTERN KINGBIRD
Tyrannus verticalis

I TAXONOMY

A. Type description

Tyrannus verticalis - AOU (1957) Say, in Long, Exped. Rocky Mountains, vol. 2, 1823, p. 60. (Ash River, near Rocky Mts. = near La Junta, Colorado.)

B. Current systematic treatments

AOU (1957) lists the Western Kingbird as a member of the avian Order Passeriformes, Suborder Tyranni, Superfamily Tyrannoidea, and Family Tyrannidae (Tyrant Flycatchers); this species is monotypic. Hellmayr (1927) also lists this species as monotypic. Davis and Webster (1970) feel that the existence of a hybrid Western Kingbird X Scissor-tailed Flycatcher, demonstrates the phylogenetic proximity of the two species.

C. Synonomies of scientific nomenclature

Ridgway (1907), Muscicapa verticalis; Laphyctes verticalis.

D. Synonomies of vernacular nomenclature

Hellmayr (1927), Arkansas Kingbird. Grinnell and Miller (1944) add Arkansas Flycatcher.

II DESCRIPTION

A. External morphology of adults

Ridgway (1907) gives detailed description of plumages; the crown with a large concealed patch of reddish orange; back, wings, and rump plain yellowish gray; tail black, the outer web and shaft of outermost rectrix wholly white; iris brown, legs and feet brownish black. Peterson (1961), "Smaller than Robin, with pale gray head and back, pale yellow belly...8.5-9 inches."

B. External morphology of subadult age class

Ridgway (1907) describes the young as being essentially like adults, but without the crown patch, more drab-gray, and yellow of under parts paler. Wheelock (1904), "Young like adults, but crown patch wanting, and wing-coverts edged with buff."

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C. Distinguishing characteristics

Interspecific - Peterson (1961), "In this species the black tail has a narrow white edging on each side... Ash-throated and Wied's Crested Flycatchers have wing bars, rufous tails." Phillips et al. (1964) calls this species a "paler edition" of the Cassin's Kingbird.

Intraspecific - Ridgway (1907) describes the female as similar to the adult male; adult male--length 206 mm; wing 130.1 mm; tail 93.5 mm and adult female--length 196 mm; wing 122.3 mm tail 86.9 mm.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), range of species - "Breeds from western Oregon, western Washington, east of the coast ranges, southern British Columbia, southern Alberta, southern Saskatchewan, southern Manitoba, and western Minnesota, rarely to southern Wisconsin, southern Michigan, southernmost Ontario, and northwestern Ohio; south to northern Baja California, Sonora, northwestern Chihuahua, southern New Mexico, west-central Texas, northeastern Oklahoma, central eastern Kansas, and rarely, north-central Missouri." Hellmayr (1927), "Western North America, breeding from southern British Columbia, Alberta, and Saskatchewan south to northern Lower California and Chihuahua, east to western Minnesota, western Iowa, central Kansas, and western Texas; wintering from western Mexico to Guatemala..."

B. California distribution of the species

Grinnell and Miller (1944) describe the California range of the Western Kingbird as "In general, almost entire area of State not heavily forested and below 5000 feet in altitude. However, rare, or absent some at migration time, on open deserts and in northern humid coast belt...in migration the species has been recorded from Farallon and most of Santa Barbara Islands." Small (1974) gives range in California as "length of state but absent from northwest coastal forests and southeastern deserts."

C. California desert distribution

Grinnell and Miller (1944) list important California records, including Death Valley (April) and the Salton Sea (summer). Johnson et al. (1948), while working in the Providence Mtns. of California, found Western Kingbirds most numerous near Cima, San Bernardino County (13 May, in pairs). Grinnell (1914) noted the possible nesting of this species

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near Ehrenberg, Arizona (opposite Blythe, California). Grinnell and Swarth (1913) recount sightings of Western Kingbirds in the San Jacinto area, which include -- Kenworthy, Cabezon, and Banning in June, and Hemet Lake in August. Wauer (1964) found this species breeding in the upper canyons between 3000 and 4000 feet elevation on the Panamint Mountains, Death Valley. Carter (1937) noted the Western Kingbird at Twentynine Palms during March, April, and May; not breeding. Pierce and Summer (1927) called Western Kingbirds "an abundant breeder on the desert" near the San Bernardino Mountains. Lamb (1912) found this species nesting near Daggett, San Bernardino Co. During the summer, Stevens (1903) noted Western Kingbirds at Twentynine Palms, Needles, Ehrenberg, and several other California and Arizona desert locations. Miller and Stebbins (1964) described this species as "Transient and also summer resident from late March to early September" in the Joshua Tree National Monument. They called Western Kingbirds scarce and local in the Monument, and list several breeding records (Quail Spring). Willett (1951) found this species breeding along the Colorado River and nearby desert regions of southern California. Hollister (1908) found this species nesting near Needles in May.

D. Seasonal variations in distribution

AOU (1957) states that Western Kingbirds winter in small numbers from the coast of South Carolina to Florida, but chiefly in Middle America from Guerrero and Morelos to northern Nicaragua--migrates in small numbers to the east coast. Grinnell and Miller (1944) describe Western Kingbirds as "summer residents, late March to early September" in California. Small (1974) gives seasonal status as "common transient and summer visitor, late March to September... no satisfactory winter records." Willett (1933) noted that Western Kingbirds usually arrived in California in March and left the state in September. Bent (1963) describes the winter range as "chiefly in the western parts of Central America, north to Sonora, and south to southern Guatemala." He lists date of spring arrival in California as 15 March.

IV HABITAT

A. Biotopic affinities

Peterson (1961) describes the habitat of this kingbird as "Open country with scattered trees, farms, roadsides." Grinnell and Miller (1944), "Dry open situations..Woodlands must be of far-scattered trees, to harbor this kingbird; oaks, cottonwoods, digger pines and tree-yuccas are attractive, if not growing too thickly." Small (1974) gives California

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habitat as "open country such as savannah, agricultural lands bordered by trees, plain." Phillips et al. (1964), "This is the common kingbird of the Lower Sonoran Zone." Willett (1933) called this species a common summer resident of lowlands and mesas in California. Grinnell (1914) found that this species prefers cottonwoods along the lower Colorado River. In Washington, Kennedy (1914) found that agriculture, with the associated increase in irrigation, caused an increase in kingbird numbers.

B. Altitudinal range

Grinnell and Miller (1944), "Altitudes of summer residence extend from below sea level, as near Salton Sea, up to over 6400 feet." Willett (1933) found this species "occasional up to 7000 feet in mountains" of California. Johnson et al. (1948) found Western Kingbirds at elevations between 3300 and 5100 feet in the Providence Mountains, California, during summer.

C. Home range size

D. Territory requirements

Perch sites - Grinnell and Miller (1944) list living and dead trees, derricks, windmills, power poles, and fence-posts as roost sites. Johnson et al. (1948), in the Providence Mountains area of California, gave perch sites as utility poles, fence posts, Joshua trees, and junipers.

Courtship and mating sites - Smith (1966) found that males "have a nest-site-showing display." Bent (1963) recounts several aerial displays performed by male kingbirds.

Nest sites - Dawson (1923), "placed at moderate heights in bushes or trees, or, as frequently, on beams and ledges of barns or other outbuildings." Phillips et al. (1964), "nests primarily in broad-leaved deciduous trees, such as cottonwoods and mesquites. It is not adverse to placing its nests on exposed telephone poles." Johnson et al. (1948) found Western Kingbird nests in Joshua trees in the Providence Mountains of California. Quigley (1944) found a pair of Western Kingbirds utilizing a Northern Oriole nest in Kern Co., California (nest held young kingbirds). Robertson (1931) noted the use of eucalyptus trees as kingbird nest sites in southern California.

E. Special habitat requirements

Grinnell and Miller (1944) conclude that this species requires expansive open areas around perch and nest sites.

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F. Seasonal changes in habitat requirements

Grinnell and Swarth (1913) found that Western Kingbirds moved to higher elevations during late summer in the San Jacinto region of California, with numerous 8000 feet sightings.

V FOOD

A. Food preferences

Tyler (1913) notes that these kingbirds usually prey upon grasshoppers, butterflies, bees, and various other insects in California. In the Chihuahuan Desert of New Mexico, Raitt and Pimm (1976) found that grasshoppers were the most important food source. La Rivers (1941) found this species feeding on crickets in Nevada. Knowlton and Harmston (1943) reported that "of 55 stomachs...48 of them contained 110 grasshoppers...six stomachs contained eight field crickets" (Utah). Martin et al. (1951) found that bees and wasps, grasshoppers, beetles, bugs, and flies were the most important food items taken in the West. In Joshua Tree National Monument, Miller and Stebbins (1964) found that "Large insects flying in the open are the food resource for this kingbird..." In Texas, Ohlendorf (1974) found that in terms of relative frequency, Coleoptera were the most often captured prey, followed by Hymenoptera, Hemiptera, and Orthoptera.

B. Foraging areas

Tyler (1913) found these kingbirds hunting (flycatching) from a wire fence along an alfalfa field in California. Grinnell and Swarth (1913) noted this species feeding in the open meadows surrounding Hemet Lake (southern California) during August. Smith (1966), "T. verticalis was partial to much more open desert shrub and grass areas, and foraged very little along the sides of the canyons."

C. Foraging strategies

Guillion (1948) noted that a Western Kingbird feeding along the edge of an orchard in Oregon was doing most of its flycatching within four feet of the ground. Although it would drop to the ground for an insect, it remained there for only a moment. La Rivers (1941) noted that this species often flew to the ground from a fence or utility pole to capture an insect.

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D. Feeding phenology

Stone (1941) noted Western Kingbirds feeding on elderberries during June in Lake Co., California. Martin et al. (1951) found that elderberries were the only plant food found in appreciable amounts in the stomachs of 139 kingbirds collected mainly in California during summer and fall.

E. Energy requirements

Miller and Stebbins (1964) found that in the deserts of California, Western Kingbirds do not require water, although its presence, as at oasis, probably results in a better food supply. Ohlendorf (1974) showed that although they were not the most frequently captured prey, Orthopterans were the most important food item in terms of expressed as percent of total prey volume (supply most energy to bird).

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Dawson (1923) states that kingbirds show the highest levels of territory defense during courtship; hawks, crows, jays and magpies are often driven away from nests.

C. Courtship and mating behavior

Tyler (1913) noted that these kingbirds often spend several days in "noisy discussion" when choosing a nest site. Smith (1966) gives a detailed account of courtship behavior, including descriptions of vocalizations, tumble flight, wing and tail displays, and various other activities performed by both sexes.

D. Nesting phenology

In California, Dawson (1923) gives laying period as early May to mid-June. California breeding season of 1 May to 25 June given by Wheelock (1904). Willett (1933), "Breeds mostly in May and early June" in California. Tyler (1913) found that it took almost exactly 4 weeks for a pair to complete a nest, lay eggs, and fledge young. California egg dates, as given by Bent (1963), are: 106 records, 17 April to 9 July; 53 records, 10 May to 4 June.

E. Length of incubation period

Dawson (1923) lists an incubation period of 12-13 days. Wheelock (1904) states that incubation lasts 13 days in California. Bent (1963) gives incubation as lasting 12-14 days.

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F. Length of nestling period

A 2 week nestling period was given by Dawson (1923). Wheelock (1904) reports that nestlings begin their first flights at 2 weeks of age.

G. Growth rates

Wheelock (1904), in describing young development, "At first they are fed by regurgitation, but after the third day large insects are torn apart and given fresh."

H. Post-breeding behavior

Grinnell and Miller (1944) state that "Post-breeding movement carries individuals up to 8500 feet" (California).

VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961), "Eggs (3-5; 7) boldly spotted." Bent (1963) gives the average clutch as 3-5 eggs, occasionally up to 6 or 7.

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

In the San Jacinto area of California, Grinnell and Swarth (1913) found that "In late summer they became still more numerous, and more widely spread." Lamb (1912) called this species "Very abundant everywhere during August and September, after which they left to reappear April 2," near Daggett, on the Mojave Desert of California.

F. Habitat density figures

Balda (1970) found a breeding density of 3 pairs of Western Kingbirds per 100 acres in oak woodland (Arizona). Near Buena Vista Lake, Kern Co., California, Lamb and Howell (1913) found one Western Kingbird nest on about every fourth telegraph pole. Stewart and Kantrud (1972) gave an average range of 2.30 to 4.03 pair of Western Kingbirds per square in North Dakota, with a maximum density of 24 pairs/square mile. In a cottonwood-willow habitat of California, Ingles (1950) discovered 7 pair of nesting kingbirds on a 33 acre

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study area. In Montana, Walcheck (1970) found 3 pairs per 100 acres in a pine-juniper woodland, and 13 pairs per 100 acres in a cottonwood forest; kingbirds were absent in sagebrush habitat. In riparian habitat in the Sacramento Valley, California, Gaines (1974) found 26 to 38 territorial male Western Kingbirds per square km.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Hamilton (1941) found the remains of Western Kingbirds at Burrowing Owl nests near Denver, Colorado. Bent (1963) feels that "These kingbirds and their eggs and young are doubtless preyed upon by the ordinary mammalian and avian predators...but they are valiant and often successful in driving their enemies away."

B. Competition

Dawson (1923) states that Western and Cassin Kingbirds often nest close to one another without adverse interactions. Swarth (1904) has noted these two kingbirds migrating together in Arizona. However, DeBenedictis and McCaskie (1967) found that intense fighting may occur between Western and Cassin's Kingbirds, especially near the nest site--"these two species may be as interspecifically territorial as they are intraspecifically territorial." In Arizona, Gilman (1915) found a Bendire Thrasher trying to drive a pair of Western Kingbirds from their nest; the kingbirds kept the site. In Texas, Ohlendorf (1974) showed that between Western and Cassin's Kingbirds, "There was no apparent interspecific defense of feeding areas, although the nest sites were defended." Hespenheide (1964) discusses several factors that prevent serious interspecific competition in kingbirds.

C. Parasitism

Friedmann (1963) notes the infrequent parasitism of Western Kingbird nests by cowbirds. Friedmann et al. (1977) state that although this kingbird has raised cowbird young, it usually "rejects" the eggs. Smith (1972) followed a kingbird pair that fledged one cowbird and one kingbird in Nebraska.

IX STATUS

A. Past population trends

Grinnell and Miller (1944) called this species locally common to abundant in interior valleys of California. Hollister (1908) found this species "abundant along the Colorado River" near Needles, California.

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B. Present population status

Small (1974) describes this species as common in California during summer. Davis and Webster (1970) state that Western Kingbirds have been expanding their breeding range eastward (Texas). Smith (1966) felt that "its recent range expansion has probably been much influenced by the plantings settlers made on the plains."

C. Population limiting factors

Grinnell and Miller (1944) found that "Woodland must be of far-scattered trees to harbor this kingbird."

D. Environmental quality: adverse impacts

E. Potential for endangered status

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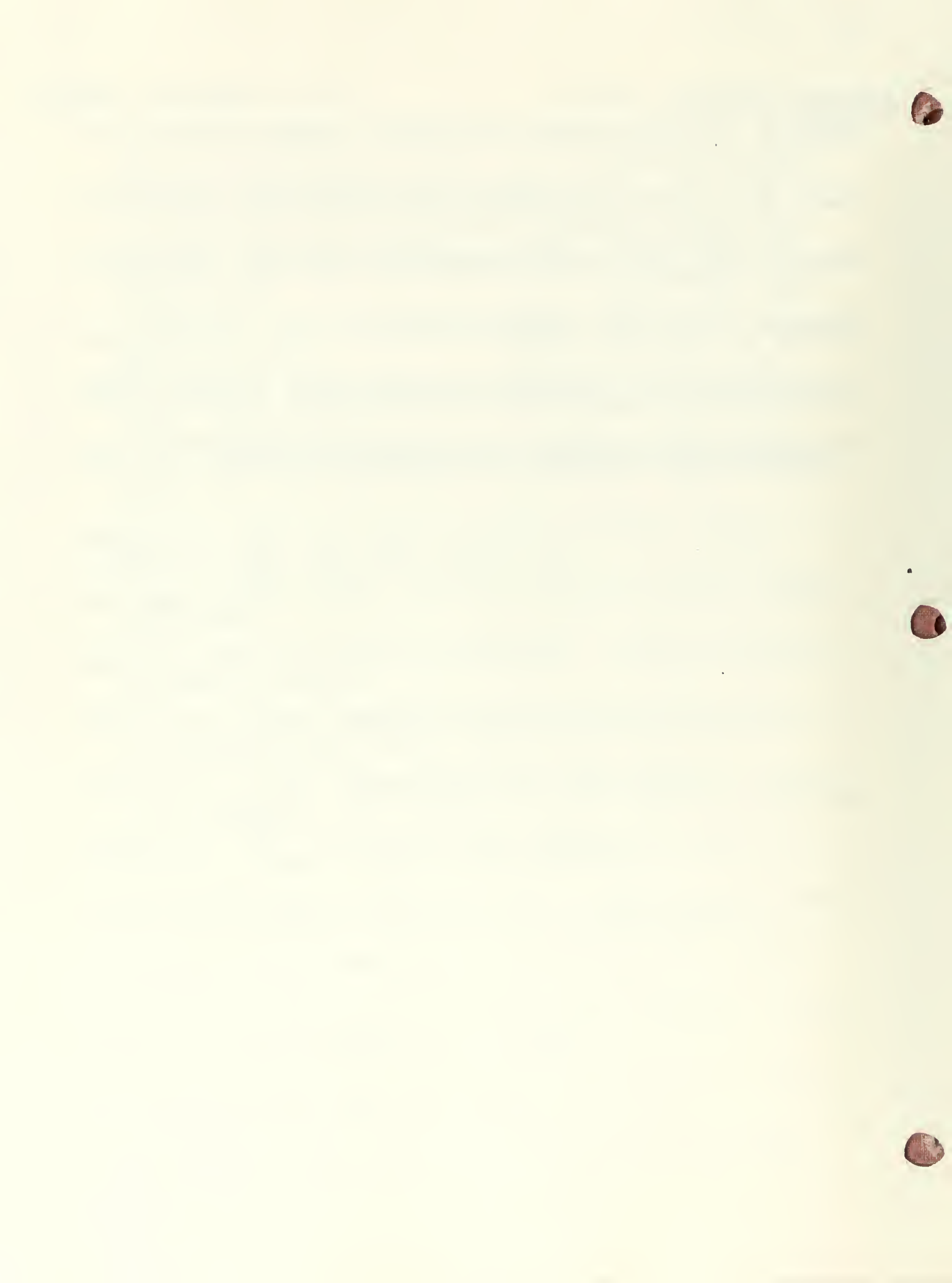
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WESTERN MEADOWLARK

Sturnella neglecta

I TAXONOMY

A. Type description

AOU (1957) Sturnella neglecta confluenta Rathbun, Auk, 36, no. 1, Jan. 1917, p. 68. (Seattle, Washington.)

Sturnella neglecta neglecta: Sturnella neglecta Audubon, Birds Amer. (octavo ed.), vol. 7, 1884, p. 339, pl. 489. (Missouri River about Fort Crogan = Old Fort Union, North Dakota.)

B. Current systematic treatments

AOU (1957) places Sturnella neglecta in the Order Passeriformes. Family Icteridae with two subspecies. Mayr and Short (1970) note that S. neglecta and S. magna hybridize in their zone of overlap and should be further studied to determine their relationship. They are considered sibling species. Oberholser (1974) considers S. neglecta, S. ludoviciana, as does Kincaid (1974). This is based on a name assigned by Brisson, prior to Audubon describing the species.

C. Synonomies of scientific nomenclature

Grinnell and Miller (1944), Sturnella hippocrepus, Sturnella magna neglecta, Sturnella magna. Oberholser (1974), S. ludoviciana. Kincaid (1974), S. ludoviciana.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), Western Meadowlark, Meadow Lark, Missouri Meadowlark, Western Lark.

II DESCRIPTION

A. External morphology of adults

Dawson (1923): "Adult male. General color of underparts black-brown, modified by much tawny and buffy-gray edgings of feathers, which throw the black into stripes and bars with a suggestion of herring-bone pattern; the tawny heaviest on secondaries and upper-tail feathers, where taking the form of partial bands; a median crown stripe and posterior portion of superciliary sordid white or buffy; anterior portion of superciliary, lower cheeks, chin, upper throat, breast, middle belly, and edge of wing, rich yellow; a large black crescent on upper breast; sides and flanks black-streaked,

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and spotted with pale brown on a buffy whitish ground. Bill variegated, tawny black and white. Female. Like male but smaller and paler, with some substitutions of brown for black in streaking; black of jugulum veiled by grayish tips of feathers; yellow of breast, etc., duller."

Baird et al. (1905): "Feathers above, dark brown, margined with brownish-white, with a terminal blotch of pale reddish-brown. Exposed portion on wings and tail with transverse band, which in the latter are completely isolated from each other, narrow and linear. Beneath yellow, with a black pectoral crescent. The yellow of the throat extending on the sides of the maxilla. Sides, crissum, and tibiae very pale reddish-brown, or nearly white, streaked with blackish. Head with a light median and superciliary stripe, the latter yellow in front of the eye; a blackish line behind it. The transverse lines on the feathers above with a tendency to become confluent near the exterior margin.

B. External morphology of subadult age classes

Dawson (1923): "Immature birds resemble parents but are grayer with pale yellow more confined and they lack the jugular crescent." Bent (1958) says the young are practically indistinguishable from the adults once they get their first winter plumage.

C. Distinguishing characteristics

Interspecific - Baird et al. (1905) describes the differences between S. neglecta and S. magna the eastern species. Dawson (1923) describes the eastern species as lacking the yellow on lower cheek. Robbins et al. (1966) say the western species can be told from the eastern by its paler back and tail. Kincaid (1974): "Similar to Lilian's Eastern Meadowlark, S. magna lilianae, but wing and tail longer, sides of head more whitish, yellow of lower surface lighter," in reference to S. neglecta. Bent (1958): "These two species [eastern and western] can be easily recognized by their white lateral tail feathers, yellow breast, and black crescent," but it is very difficult to tell them apart.

Intraspecific - Bent (1958) describes confluenta as similar to neglecta but the bars on the tail and tertials are broader and much more confluent; upper parts are darker throughout and the black areas more extensive; yellow of underparts darker. Kincaid (1974), S. n. confluenta: "Resembling S. n. neglecta but upper parts more deeply colored with black markings broader; bars on tertials and tail wider; yellow of lower parts a little darker."

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I GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) Sturnella neglecta in general: "Central British Columbia, central Alberta, central Saskatchewan, southern Manitoba, western and southern Ontario, northern Michigan, and northwestern Ohio south to Baja California, Zacatecas, Nuevo Leon, central Texas and Louisiana."

Sturnella neglecta confluenta: "Breeds from southwestern and central British Columbia south through Washington, western Idaho, and Oregon to southern California, intergrading with *S. n. neglecta* in central Idaho, Death Valley, and San Diego County, California."

Sturnella neglecta neglecta: "Breeds from southern British Columbia, central Alberta, central Saskatchewan, southern Manitoba, western Ontario, northeastern Minnesota, northern Wisconsin, northern Michigan, southern Ontario, northwestern Ohio south through western Montana, eastern Idaho, Nevada, southeastern California to northwestern Baja California, northwestern Sonora, central and southeastern Arizona, eastern Sonora, Sinaloa, Jalisco, northwestern Durango, Guanajuato, southeastern Coahuila, central Texas, northwestern Louisiana, northwestern Arkansas, central and eastern Missouri, southwestern Tennessee, southern Illinois, southern Michigan, and central Ohio."

Gullion et al. (1959): "Noted as a common resident in the valleys and sagebrush areas...but also found to be common throughout the year on desert areas, particularly in desert grassland and creosote-bush." Lanyon (1956) describes the sympatric distribution of Meadowlarks in the north-central states.

B. California distribution of the species

Grinnell and Miller (1944): "Occurs throughout the state with exception of most arid and barren tracts of deserts, roughest mountains and densest forests. Included are all coastal islands, and many high points in the Sierra Nevada reached by vagrants. Life-zones occupied in breeding season; Lower and Upper Sonoran, and Transition."

Dawson (1923): "Resident and general distribution throughout state, save arid portions of the desert, broken mountain sections, and the dense forests. Breeds from Lower Sonoran to Lower Boreal." Small (1974) calls *S. neglecta* a common resident in the state.

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C. California desert distribution

Grinnell and Miller (1944) say that breeding populations are rare in the desert but that on southeastern deserts numbers have increased with the development of oases and irrigated lands. They give records for San Bernardino Mountains, San Jacinto Mountains, Owens Valley, Inyo Mountains, Panamint and Death Valleys, San Bernardino County, Riverside County and Imperial County. Dawson (1923) lists Colorado deserts at Indio and Inyo County as breeding sites. Willett (1951) calls S. neglecta a scattered resident in the southern desert. Phillips et al. (1964): "In occasional years heavy winter or spring rains on the desert will bring up a stand of grass which will become inhabited with Western Meadowlarks."

D. Seasonal variations in distribution

AOU (1957), S. n. confluenta: "Winters from Vancouver Island and the adjacent mainland southward. Migrant, in part, in the northeastern section of its range."

S. n. neglecta: "Winters north to southern Alberta, southern Saskatchewan, southern Manitoba, and southern Wisconsin; south to southern Baja California, Michoacan Mexico, Tamaulipas, southern Texas, Louisiana, and Mississippi. Casual in Alaskan northern British Columbia, Mackenzie, northern Alberta and Kentucky."

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944): "Life-zones occupied in breeding; Lower Sonoran, Upper Sonoran, Transition." Habitat in grassy plains, hillslopes and meadowlands, may be moderately intermixed with bushes. Peterson (1961): "Open fields, meadows, grassy plains, prairies." Kincaid (1974): "...in habits prairies, meadows, and fields. Habit details frequently differ however." Walcheck (1970) in a study in the Missouri River Breaks, Montana, found S. neglecta associated with greasewood-sagebrush shrubland, sagebrush grassland, and pine-juniper woodland. Lanyon (1957) notes that neglecta selects drier environments than S. magna.

B. Altitudinal range

Grinnell and Miller (1944) - 200 feet to 11,000 feet. Dawson (1923) - up to 11,000 feet. Bent (1958) - about 8,000 feet is the highest in California.

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C. Home range size

Bent (1958) - 10 to 32 acres. Lanyon (1957) - 3 to 15 acres. These areas were found to undergo changes in shape through the season. Kendeigh (1941) in 50 acres of prairie noted 6 S. neglecta nesting and feeding in the area.

D. Territory requirements

Perch sites - Bent (1958) says the males have singing perches on trees or posts in their territory.

Courtship and mating sites

Nest sites - Baird et al. (1905) state that they build their nest in a slight depression under a bunch of grass, and concealed by it. Dawson (1923): "On ground, chiefly in meadows or pastures, in thick grass or weeds. Peterson (1961): "A grassy saucer, partially domed, among grass." Bent (1958) describes a nest placed in a growth of low grass that was arched over with strips of dry bark. Roseberry and Klimstra (1970) in a study of S. magna note pastures to be the favored nest site and then hayfields.

E. Special habitat requirements

F. Seasonal changes in habitat requirements

Kincaid (1974): "During spring and summer the western nests on uplands where grass is comparatively short and dry; in winter habitat preferences are less marked...the western is more likely to forage on bare, desert-like ground.

V FOOD

A. Food preferences

Baird et al. (1905) say they feed chiefly on insects, seeds and grain. Bent (1958) says the diet consists of grasshoppers, beetles, crickets; 70% animal matter to 30% vegetable. Kincaid (1974): "The vegetable portions of its diet consists of grain (corn, oats, wheat, barley), a little fruit pulp, and weed seeds." Bryant (1914) found meadowlarks to eat 63.3% animal food and 36.7% vegetable food; grain was the largest by volume.

B. Foraging areas

Grinnell and Miller (1944) give foraging areas as matted grass tangles, living vegetation, in cultivated lands.

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C. Foraging strategies

Grinnell and Miller (1944) say that much food is obtained from the ground surface by turning over clods and by drilling the soil.

D. Feeding phenology

Bryant (1914) found vegetable food to make up the largest part of the diet in January through March and October through December. Animal food made up the largest percent in April through September.

E. Energy requirements

Dawson (1923) gives an estimate of 6 pounds of food needed annually by an adult.

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

Bent (1958) prints an excerpt from a study by Kendeigh (1941): "Territorial behavior is well established in this species, although only the male defends the territory." They have singing posts in the territory where they perch while singing. Lanyon (1957): "Territories were established and maintained solely by the males and defended for a period of up to 4 weeks before the arrival of the female. Maintenance of territories continued until fledging of the final brood." Species of a different genus were often tolerated in the territory.

C. Courtship and mating behavior

Bent (1958): "It probably consists of song and plumage display." Lanyon (1957) says that both male and female sing. Lanyon (1957) found males that did not obtain a mate could not maintain territories. Pair formation took place immediately upon arrival of the female on the male's territory. 53% of male S. neglecta had more than one mate.

D. Nesting phenology

Bent (1958) records egg dates from California from February 11 to June 10. Kincaid (1974) reports the nesting season in Texas as mid-March to mid-August. Lanyon (1957) gives 18 April as the average date of egg-laying initiation; last egg laid - 4 May.

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E. Length of incubation period

Bent (1958) - 13 days. Lanyon (1957) - 13 to 14 days, occasionally 15 days.

F. Length of nestling period

Bent (1958) - about 4 weeks.

G. Growth rates

Bent (1958) gives a detailed description of each days growth for the eastern species. By the eleventh or twelfth day the young leave the nest at which time they can fly a little if necessary.

H. Post-breeding behavior

Bent (1958) says the male chases his young out of his territory at about 1 month of age. "After the last brood of young are...on the wing, old and young gather into groups... and begin their late summer wanderings..." Lanyon (1957) says that they become gregarious following the late-summer molt.

VI POPULATION PARAMETERS

A. Clutch size

Dawson (1923) - 4 to 5, rarely 6 or 7. Peterson (1961) - 3 to 7. Bent (1958) - 3 to 7, 5 being the commonest.

B. Fledging success

Lanyon (1957) records 50% of nests fledging young.

C. Mortality rates per age class

D. Longevity

Kennard (1975) did not publish an age record from band returns for the Western Meadowlark, but the oldest eastern one he found was 8 years 8 months.

E. Seasonal abundance

Bent (1958): "...many birds winter on suitable portions of the Colorado and Mohave deserts where this species is unknown in the summer."

F. Habitat density figures

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II INTERSPECIFIC INTERACTIONS

A. Predation

Bent (1958): "Meadowlarks have many enemies, more especially Golden Eagles, Prairie Falcons, Marsh Hawks, Red-tailed Hawks," and also skunks, weasels, minks, raccoons, coyotes, snakes and crows. "Some nests are probably trodden by cattle or sheep. Roseberry and Klimstra (1970) attribute losses to predation at 51% of total losses.

B. Competition

Kendeigh (1941) on a 50-acre prairie noted 16 species of passerines using the area for feeding and/or nesting.

C. Parasitism

Friedmann et al. (1977) do not list the Western Meadowlark as being a cowbird victim. The eastern species is, however.

IX STATUS

A. Past population trends

Baird et al. (1905) report the species to be abundant in California. Lanyon (1957) notes a marked northeastward extension of the range of neglecta during the past 50 years.

B. Present population status

Lanyon (1957) notes the increasing range of both the eastern and western species as a result of increased suitable habitat due to greatly expanded agricultural activities. Bryant (1914) gives a long discussion on the economic status of the western meadowlark in California. This study was prompted by the number of complaints against the meadowlark by farmers who said they ate sprouting grain. The results of Bryant's study (1914) indicate that the meadowlark actually does more good than harm by eating cutworms and grasshoppers.

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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WESTERN WHITE-THROATED SWIFT

Aeronautes saxatalis

A. s. saxatalis

I TAXONOMY

A. Type description

AOU (1957), Acanthylis saxatalis Woodhouse, in Sitgreaves, Rep. Expd. Zuni and Colorado Rivers, 1853, p. 64. (Inscription Rock, New Mexico).

B. Current systematic treatments

Lack (1956) Apodinae divided into five genera, one of which is Aeronautes containing three New World species. "as compared with Aeronautes, Panyptila has a white nape like A. andecolus, white sides to the rump like A. andecolus and A. saxatalis, a white throat and upper chest like A. saxatalis, and white bases to the secondaries, like A. saxatalis, these resemblances are far too striking to be due to chance...indicate that Panyptila and Aeronautes... are closely related...with the transfer of andecolus from Apus to Aeronautes, these two genera can no longer be differentiated...by presence or absence of feathering on toes." Order Apodiformes, family Apodidae.

C. Synonomies of scientific nomenclature

AOU (1957), Acanthylis saxatalis Woodhouse. Peters (1940), Cypselus melanoleucus (Baird). Ridgway (1911), Aeronautes melanoleucus (Baird). Grinnell (1944) Panyptila melanoleuca, Micropus melanoleucus, Cypselus saxatilis

D. Synonomies of vernacular nomenclature

Dawson (1923), Rock Swift, Mountain Swift, Rocky Mountain Swift, White-throated Rock Swift. Grinnell and Miller (1944), White-bellied Swift.

II DESCRIPTION

A. External morphology of adults

Ridgway (1911), detailed description of adults, including plumage, soft parts, and measurements. Peterson (1961), "contrasting black and white pattern...underparts white with black side patches." Dawson (1923), "Adults: chin, throat, breast, middle line of belly, and a conspicuous patch on flanks, white--also outer edge of first primary and tips of secondaries; remaining plumage brownish black, paling on forehead, shading on sides of head; a whorl of stiffened feathers in front of eye black."

Aeronautes saxatalis (con't.)

B. External morphology of subadult age class

Ridgway (1911), "Similar to adults, but white of underparts duller (more or less grayish or sooty) and blackish of sides duller especially anteriorly, where more sooty grayish and less strongly contrasted with whitish of throat, etc."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "Known as a swift by its long, narrow, stiff wings and characteristic twinkling and gliding flight; from other North American swifts by its contrasting black and white pattern."

Intraspecific -

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "From southern British Columbia and Southern Alberta (possibly) to Montana and northwestern South Dakota, south in the mountains to Guatemala and El Salvador." A. s. saxatalis: "Breeds from southern British Columbia (Vaseaux Lake and Okanagon Valley), Idaho, western Colorado, New Mexico, and western Texas (Davis and Chisos Mountains) south to the Cape region of Baja California (including the Santa Barbara Islands and Guadalupe Island), Sinaloa, and Guanajuato."

B. California distribution of the species

Small (1974), "more arid regions of the state east and south of the northwest humid coastal belt." Dawson (1923), "Resident in cliffs of Upper and Lower Sonoran life zones in southern California, foraging to highest altitudes; also breeding locally in Sonoran and Transition zones throughout the state, except in the humid coastal districts from Santa Cruz northward. Resident on the Santa Barbara Island."

C. California desert distribution

Dawson (1923), "Resident in cliffs of Upper and Lower Sonoran life zones." Wauer (1964), found in lower canyons of Panamint Mountains from mid-March to mid-summer. Wilson (1945), Kettleman Hills area. Miller (1951), Inyo, Upper Kern Basin, San Diego, Mojave, Colorado regions. Bent (1940), nesting near San Pasqual, San Diego County, and on Slover Mountain in the San Bernardino Valley. Grinnell (1944) "Certain mountain ranges of Inyo County...Death Valley and Salton Sink...San Bernardino Mountains."

Aeronautes saxatalis (con't.)

D. Seasonal variations in distribution

AOU (1957), "Winters from San Francisco Bay region in central California, central Arizona (Big Sandy and Phoenix), and southwestern New Mexico (Hachita and Chloride) south to south-central Mexico. Small (1974) "resident and summer visitor (California), larger part of population leaves state for winter (October to March)." Dawson (1923), "Wintering birds from the north appear to rove about the country in considerable companies...at other seasons... appears to be much less sociable." Wauer (1964) "post-nesting birds move (mid-summer) into higher canyons (Panamint Mtns.) or to the low-desert oases such as Furnace Creek Ranch and Eagle Borax Works." Grinnell and Miller (1944) "part of population emigrates for winter, leaving a part...remaining through winter at low altitudes, southerly."

IV HABITAT

A. Biotopic affinities

Miller (1951), Upper and Lower Sonoran, and Transition zones. Grinnell and Miller (1944), "semi-arid and arid parts of the State..."

B. Altitudinal range

Dawson (1923), "foraging to highest altitudes." Grinnell and Miller (1944) "nests from within a few feet of sea level...up probably to at least 6000 feet."

C. Home range size

Grinnell and Miller (1944), "probably the daily cruising radius of this bird is greater than in any other species, even the California Condor."

D. Territory requirements

Perch sites - Small (1974), "roosts in deep crevices in cliffs, canyons, bluffs, and rocks."

Courtship and mating sites - Bent (1940) "performed largely, if not wholly, on the wing." Dawson (1923) "the nuptial embrace, appears to take place...in the air. In this the birds come together from opposite directions, engage with the axes of their bodies held at a decided angle laterally, and begin to tumble slowly downward, turning over and over the while for several seconds, or until earth impends, where upon they separate...coition may take place in the nesting crevices also."

Aeronautes saxatalis (con't)

Nest sites - Dawson (1923), "a shallow, often formless saucer of feathers glued together with saliva and placed at bottom of inaccessible cranny or crevice on cliff." Describes a number of efforts to reach such nests. Pitelka (1944), on Life Science Building on Berkeley campus in a colony of Cliff Swallows. Lack (1956), "builds (nests) in rock crevices on steep cliffs...it has also taken to using holes in buildings."

F. Seasonal changes in habitat requirements

V FOOD

A. Food preferences

Bent (1940), winged ants and other Hymenoptera, bugs, flies, dung beetles, engraver beetles, clover root weevils, leaf-hoppers...root maggots, long-legged flies (Dolichopodidae), flesh flies, March flies, true bugs.

B. Foraging areas

Small (1974), "forages over deserts, foothills, mountains, sea coast." Grinnell and Miller (1944), "air-ways...high and low, over valleys and desert mesas, foothills and highest mountains."

C. Foraging strategies

Bent (1940) "food...obtained wholly on the wing, it probably feeds on whatever small flying insects it can capture."

D. Feeding Phenology

E. Energy requirements

Bartholomew, Howell and Cade (1957), body temperatures, respiratory rate, and behavior for entry torpor, and arousal in captivity. Remained capable of effective, coordinated movement at body temperatures as low as 25.8°C. "Reduced body temperature and torpor provide a means of energy conservation and are associated with survival during long periods of fasting."

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

C. Courtship and mating behavior

Aeronautes saxatalis (con't.)

D. Nesting phenology

Dawson (1923), "April-June, varying with locality; one brood."

E. Length of incubation period

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

VII POPULATION PARAMETERS

A. Clutch size

Dawson (1923), "4 or 5 elongate ovate; pure white."

B. Fledging success

C. Mortality rates per age class

D. Longevity

E. Seasonal abundance

F. Habitat density figures

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Arnold (1942), observed captured in flight by the smaller of a pair of Falco peregrinus which had both pursued the swift. Webster (1944) "have, on occasion, seen the amazing feet of a small Prairie Falcon taking white-throated swifts."

B. Competition

C. Parasitism

IX STATUS

A. Past population trends

Grinnell and Miller (1944), "Resident partially, within State;...part of population emigrates for winters, leaving part (the smaller) remaining through winter at low altitudes. "Common in vicinity of colonial roosting and nesting retreats."

Aeronautes saxatalis (con't.)

- B. Present population status
- C. Population limiting factors
- D. Environmental quality: adverse impacts
- E. Potential for endangered status

Aeronautes saxatalis (con't.)

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Aeronautes saxatalis (con't.)

Wilson, I. D. 1945. Birds of the Kettleman Hills area, California. Condor 47:149-153.

WILSON'S WARBLER

Wilsonia pusilla

I TAXONOMY

A. Type description

AOU (1957), W. p. pusilla Wilson, Amer. Orn., Vol. 3, 1811, p. 103, pl. 26, fig. 4. (Southern states, ...lower parts... of New Jersey and Delaware = southern New Jersey.)

W. p. pileolata: Motacilla pileolata Pallas, 300 gr. Rosso-Asiatica, vol. 1, 1811, P. 497. (ex insula kodiak = Kodiak Island, Alaska.)

W. p. chryseola Ridgway, U.S. Nat. Mus. Bull. 50, pt. 2, Oct. 16, 1902, pp. 705, 714. (Pacific Coast district = Red Bluff, California.)

B. Current systematic treatments

AOU (1957), recognizes three species in the genus Wilsonia. Subspecies are W. pusilla: W. p. pusilla, w. p. pileolata, W. p. chryseola. In the Family Parulidae: Wood Warblers. Bent (1953), divides the W. pusilla western representatives into two subspecies, pileolata and chryseola. Mayr and Short (1970) state that the species of this genus are quite distinct and their relationships with other genera are unclear.

C. Synonomies of scientific nomenclature

AOU (1957), W. p. pileolata: Motacilla pileolata Pallas. Grinnell and Miller (1944), pileolata, "Myiodioctes pusillus, Wilsonia pusilla, Sylvania pusilla pileolata." chryseola, "Sylvania pusilla, Setophaga wilsonii, Myiodioctes pusillus." Ridgway (1915), Wilson's Warbler: Sylvania pusilla.

D. Synonomies of vernacular nomenclature

Grinnell and Miller (1944), pileolata: "Northern Pileolated Warbler" and lists synonomies as "Green Black-cap Warbler, Alaska Pileolated Warbler." chryseola, "Golden Pileolated Warbler" and lists synonomies as "Green Black-capped Flycatcher, Black-capped Warbler, Western Blackcap." Peterson (1961), gives Wilson's Warbler the synonym, Pileolated Warbler."

Wilsonia pusilla (con't.)

II DESCRIPTION

A. External morphology of adults

Bent (1953), describes chryseola as yellow of forehead and superciliary region, inclining more or less to orange; yellow of the underparts, olive-green upper parts and almost yellow in extreme cases. Grinnell and Storer (1924) say that chryseola is recognized by its black cap.

Dawson (1923) describes adult male pileolata as "A base bright olive-green; forehead, sides of head, and under parts bright yellow, shading on sides into color of back; crown or cap lustrous black; wings and tail fuscous, edged with olive-green and without peculiar marks. Bill dark above and light below; feet light brown." The adult female is similar "but the black cap sometimes wanting-dark olive veiled by warbler green tops instead." Dawson (1923) gives the same description of chryseola as in Bent (1953).

B. External morphology of subadult age classes

Grinnell and Storer (1924), chryseola; young are said to resemble female or young yellow throats, with no black cap. Dawson (1923) describes immature pileolata as being "like respective sex of parents, but black cap sometimes variously, or even completely, veiled by olive-green."

C. Distinguishing characteristics

Interspecific - Peterson (1961), "yellow Warbler has yellow spots in tail."

Intraspecific - Peterson (1961), "male: yellow warbler with a round black cap. Females sometimes do, and immatures do not, show traces of the cap. Olive above, bright yellow below, no streaks or wing bars; with a yellow stripe above the body black eye." Bent (1953), pileolata; "is much like the eastern Wilson's Warbler, but is somewhat larger... and its coloration is brighter...it is not, however, so brightly colored as [chryseola]." Dawson (1923) says that pileolata is brighter than pusilla but not so bright as chryseola, which is also smaller. Phillips, et al. (1964) places the duller birds in the east and the brightest along the Pacific coast; the largest from the Rocky Mountains and the smallest from the coast. W. p. pusilla is the eastern bird, W. p. pileolata is the middle range, brighter bird, and chryseola is the coastal brightest bird. Chapman (1907); chryseola is "similar to pileolata but smaller and of a still brighter, deeper yellow."

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II GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957) Wilsonia pusilla: "Northern Alaska, northern Yukon, northwest and central Mackenzie, northeast Manitoba, northern Ontario, southern Labrador, and Newfoundland south to southern California, central Nevada, northern Utah, northern New Mexico, central Saskatchewan, southern Manitoba, northern Minnesota, southern Ontario, northern Vermont, central Maine, and central Nova Scotia."

W. p. pileolata: "Breeds from northern Alaska, northern Yukon, and extreme northwestern Mackenzie south to southern Alaska, northern British Columbia, and the mountains of interior southern British Columbia, eastern Washington and eastern Oregon, central eastern California, central Nevada, northern Utah, southwestern Colorado, and north central New Mexico; ranging east to western Alberta, central Montana, and eastern Wyoming."

W. p. chryseola: "Breeds along coasts and coastal ranges from southwestern British Columbia south to southern California (San Bernardino Mountains, Escondido)."

Bent (1953), gives the breeding ranges of pileolata as, "From the northern tree limit in Alaska, southward along the coast...mainly in the mountain regions, at least as far as New Mexico and perhaps central western Texas." It is a common summer resident of the mountains of western Montana. Probably breeds in eastern Oregon. Breeds commonly along the timberline in Colorado, from 12,000 to 6,000 feet. The breeding range of chryseola is given as being confined "to the Pacific Coast district, from southern British Columbia to southern California, mainly west of the mountain ranges."

B. California distribution of the species

Grinnell (1928), W. p. pileolata, rare fall and late spring transient, in southern California. W. p. chryseola, common in migration through Baja and southern California. Grinnell and Miller (1944), W. p. pileolata, "Summer resident along eastern margin of California. Rare winter visitant." W. p. chryseola "Summer resident and migrant arriving by late March in the lowlands and leaving principally in September. As breeding, in general entire state from eastern edge of Sierran forests westward. However, irregularly and locally distributed within this range...sparse in arid lowlands. Most abundant in humid coastal belt and in high meadows of interior mountains." Dawson (1923), pileolata: "Fairly

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common migrant through southern California especially east of the desert divide. Also breeds in mountain ranges east of the Sierras and for an undetermined distance northward. Possibly the line of demarcation between pileolata and chryseola should be set at the Sierran divide." Chryseola, according to Dawson (1923) is a summer resident chiefly in semi-riparian associations in Lower Sonoran and Canadian Zones, from the crest of the Sierras to the Pacific, and from Oregon south to the San Bernardino Mountains. Small (1974), "for breeding, length of state, irregularly distributed but absent from floor of Modoc Plateau, eastern and southern deserts, floor of central valley."

C. California desert distribution

Grinnell and Miller (1944), W. p. pileolata, "In migration... most often detected in southern and eastern California. Specific reports of summer residence;...San Diego County; Argus Mountains, Inyo County; Providence Mountains, San Bernardino County; Colorado River Valley, Imperial County; San Bernardino Mountains, 8,500 feet; San Diego County." Small (1974) "reports W. pusilla as breeding throughout the length of the state but absent from the floor of the Modoc Plateau, eastern and southeastern deserts, and Central Valley, and in migration, almost everywhere.

D. Seasonal variations in distribution

AOU (1957) "In winter, from southern Baja California, southern Sonora, central Nuevo Leon and southern Texas south to Costa Rica and western Panama. W. p. pileolata: "Winters from Guerrero, Morelos, Nuevo Leon, and south Texas, south through Mexico (except the Yucatan Peninsula) and Central America to west Panama; casually north to California." W. p. chryseola: "Winters from southern Baja California and southern Sonora south through western Mexico and Central America to western Panama; casually north to central California. In migration east to Arizona and, casually, to Veracruz."

Bent (1953), pileolata winters in Mexico and Central America. Grinnell et al. (1930), state that chryseola in the Larsen Peak region of California is limited closely in summer to alder and willow thickets bordering ponds, streams and moist meadows. Chryseola is seen about the city in Seattle as fall migration starts, Bent (1953). Dawson (1923), chryseola; Winters in lower California, Sonora and Chihuahua; occurs during migrations on the east side of the Sierra-Cascade divide and in Arizona. Phillips et al. (1964), gives southern Arizona migration dates for pileolata as April 13 to June 3 and again from August 18 to November 6.

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"It migrates later than chryseola." Chryseola is given as a common spring transient in southwestern Arizona, northeast to the Tucson Valley. Southern Arizona migrations are from March 9 to April 25, fall migrations from August 1 to November 5.

IV HABITAT

A. Biotopic affinities

Grinnell and Miller (1944), pileolata, "Life zones in summer, Transition and Canadian." chryseolata, "Low, shaded plant cover close to streams, meadows, ... humidity high. Willows, alders, dogwood, blackberries, poison oak and ferns..." Bent (1953), pileolata, "in its winter home... is chiefly an inhabitant of low growth beneath the forest." Hines (1963), pileolata; exhibits a definite affinity for alders along the Noatak River in Alaska. Chapman (1907) cites Walter Fisher as saying that chryseola frequent copsas along the water courses in valleys or willow thickets and moist meadows, in California. Chapman (1907) himself found them in many anita chaparral.

B. Altitudinal range

Grinnell and Miller (1944), chryseola, "Altitudes of nesting range from near sea level up to at least 9,500 feet on east slope of Mount Whitney, Inyo County."

C. Home range size

D. Territory requirements

Perch sites -

Courtship and mating sites -

Nest sites - Grinnell and Miller (1944), chryseola, "...found on the ground or up two or three feet in tangles of vegetation. Bent (1953) gives the same placement of nests; low in shrubs, and an elevation of vegetation, or in a depression in the ground. Peterson (1961), "Nest a loose grass cup on or near ground." Bent (1953), pileolata; Nesting in Alaska is given as "found only in the vicinity of willow and alder thickets... lower mountain slopes... in cleared defiles and under matted dead grass it builds its home. The nest may be sunken flush with the mossy sod or... in the center of a large tuft of grass." In Colorado a nest is described as "sunken in the ground on the eastern slope... of the swamp... beneath the low, spreading branch of a willow." Chapman (1907) describes a nest in blackberry vines eight feet from the ground.

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- E. Special habitat requirements
- F. Seasonal changes in habitat requirements

Grinnell and Miller (1944), pileolata, "In migration...as in summer." chryseola, "In seasons of migration, low thick vegetation is preferred but not solely in the vicinity of water."

V FOOD

- A. Food preferences

Bent (1953), chryseola; In 52 stomach samples, animal matter made up 93% and vegetable 7%. Hemiptera were 35% of the former, and the rest was made up of wasps, ants, flies, crane-flies, beetles of 6 different families and caterpillars. Vegetable food was almost entirely fruit pulp.

- B. Foraging areas

Grinnell and Miller (1944), pileolata, "tangles of stream side vegetation over moist ground...stays close to the ground." chryseola, "All activities take place within six feet of the ground. Utilizes close-set branchwork of thickets as forage beats...but also engages in considerable flycatching." Grinnell and Storer (1924) state that chryseola adheres closely to damp situations. "either over boggy ground or within a few yards of a stream."

- C. Foraging strategies

Grinnell and Storer (1924), chryseola; "The birds are noted for their habit of darting out after flying insects."

- D. Feeding phenology

Bent (1953), chryseola; Its vegetable food (fruit pulp) consumed in the months of September and October.

- E. Energy requirements

VI REPRODUCTION

- A. Age at first breeding
- B. Territorial behavior
- C. Courtship and mating behavior

Wilsonia pusilla (con't.)

D. Nesting phenology

Bent (1953), chryseola generally arrives on their breeding grounds in March or early April in California and in western Washington, about the first of May.

E. Length of incubation period

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

VII POPULATION PARAMETERS

A. Clutch size

Peterson (1961), "Eggs (3-6) dotted." Bent (1953), reports 5 nests of pileolata in Alaska with 6 eggs each, but that farther south there were 3 to 5 in a clutch, 4 being the most common. For chryseola, 3 to 5 eggs, most often 4, and raises 2 broods a year. Dawson (1923), chryseola; clutch size is given as, 3 or 4. Chapman (1907) gives pileolata clutch size as 4 to 6, usually 4 or 5.

B. Fledging success

C. Mortality rates per age class

D. Longevity

Kennard (1975) in a summary of longevity records from band recoveries does not have a record for W. pusilla, but gives 7 years, 11 months as the record for W. canadensis.

E. Seasonal abundance

Grinnell and Miller (1944), "in spring on the southeastern deserts W. p. pileolata outnumber chryseola." chryseola, "Common as a breeding species...in the lowlands." Bent (1953), pileolata was reported as being "a rather common winter visitor between the elevations of 3,500 and 8,500 feet." Land (1963), pileolata; Reported it as abundant in winter in Guatemala.

F. Habitat density figures

VIII INTERSPECIFIC INTERACTIONS

A. Predation

Wilsonia pusilla (con't.)

B. Competition

Grinnell and Storer (1924), chryseola, is reported as feeding with the Tolmie Warbler, but the Tolmie often forages into drier chaparral which chryseola does not.

C. Parasitism

Friedmann (1934) says chryseola is not an uncommon victim of the Dwarf Cowbird in southern California. Friedmann et al., (1977) found recent evidence that W. pusilla must be a fairly regular host for cowbirds, especially in southern California. The subspecies affected most was W. p. chryseola.

IX STATUS

A. Past population trends

Chapman (1907) cites Cooke as saying that W. p. pileolata is the most numerous insect-eating bird just above the timberline in Colorado, and Nelson, as saying that pileolata is one of the most common bush-frequenting species in Alaska."

B. Present population status

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

Wilsonia pusilla (con't.)

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YELLOW-RUMPED WARBLER

Dendroica coronata

I TAXONOMY

A. Type description

AOU (1957), D. c. coronata (Linnaeus). Motacilla coronatus Linnaeus, Syst. Nat., ed. 12, vol. 1, 1766, p. 333. Based on Golden crowned Flycatcher of Edwards, Gleanings, 187. (in Pennsylvania = Philadelphia, Pa.)

D. c. hooveri McGregor, Bull. Cooper Orn. Club, 1, no. 2, Mar. 15, 1899, p. 32. (Palo Alto, California.)

D. c. auduboni: Sylvia auduboni J. K. Townsend, Journ. Acad. Nat. Sci. Philadelphia, 7, pt. 2 (Nov. 21), 1837, p. 191. (forests of the Columbia river [near Fort Vancouver, Washington].)

D. c. memorabilis: D. auduboni memorabilis Oberholser, Ohio Journ. Sci., 21, May (June 6), 1921, p. 243. (Ward, Boulder County, Colorado.)

B. Current systematic treatments

Grinnell and Miller (1944), say it is inadvisable to recognize a large race, D. c. memorabilis, from Rocky Mountain region, even though there is a graded increase in size interiorward.

AOU (1957), recognizes 20 species in the genus Dendroica, and four subspecies of D. coronata. In the family Parulidae: Wood Warblers.

Peterson (1961), compares Audubon's and Myrtle as two separate species, as does Hubbard (1970), who recommends that they be conspecies.

Bent (1953) gives Dendroica coronata two subspecies, coronata and hooveri, and D. auduboni two subspecies, auduboni and nigrifrons. Mayr and Short (1970), "The auduboni group comprises several races, but the eastern coronata group is monotypic." These two species hybridize in the northwest.

C. Synonomies of scientific nomenclature

AOU (1957), D. c. auduboni: D. auduboni and Sylvia auduboni J. K. Townsend.

D. c. memorabilis: D. auduboni memorabilis Oberholser. Bent (1953) D. auduboni auduboni. Ridgway (1915), D. auduboni.

Dendroica coronata (con't.)

D. Synonomies of vernacular nomenclature

AOU (1957), Myrtle Warbler, D. coronata; Audubon's Warbler
D. c. auduboni.

Grinnell (1928), Alaska Myrtle Warbler, D. c. hooveri;
Rocky Mountain Audubon Warbler, D. c. memorabilis. Phillips
et al. (1964) give three common names for D. coronata,
Yellow-rumped, Myrtle, and Audubon's.

II DESCRIPTION

A. External morphology of adults

Peterson (1961), "male in spring: Blue-gray above; heavy black breast patch, throat yellow or white, crown yellow; 2 narrow white wing patches or one broader. Female in spring, brown; 2 white wing bars. Bent (1953), auduboni; In winter the old and young, males and females are very similar. "Hybrids...occur occasionally between the different races... especially where their ranges approach or overlap." Adult male auduboni are described by Dawson (1923): "throat rich yellow, black cheeks...bluish gray over auriculars;...white on middle and greater wing coverts...tail with white sub-terminal blotches on inner webs of 4 or 5 outer feathers... Adult female similar to adult male but duller...white of wing patch nearly obsolete...yellow of throat paler and often displaced by white." Hubbard (1970) describes auduboni, "in breeding plumage, males from north of the Mexican border are gray above streaked with black, and white below with the breast streaked to solidly black. The loreal and anterior-most auricular areas are blackish, and the areas posterior to the auriculars and posterior to the yellow crown patch are gray or grayish white. Over much of the western United States, southwestern Canada, and Baja California this plumage varies only slightly, with males from the southern Rockies and Black Hills southward averaging somewhat more extensively black on the underparts than those to the north and west... in the southernmost Southwest a marked increase occurs in the extent of black. Females resemble first year males and in breeding plumage show a pattern of geographic variation that parallels that of the breeding plumage of males and winter plumages. Hubbard (1970) also describes geographic variation in the amount of white in the outer retrices of auduboni. He gives details of mensural characters. Yarbrough and Johnston (1965) compare mensural characters of hooveri and coronata.

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B. External morphology of subadult age classes

Peterson (1961), "Brownish above, whitish below, streaked; throat yellowish or white, rump yellow. Bent (1953), auduboni, "Juvenile is brown above streaked with black and white, and white below, streaked with black; sexes are alike." As a subadult the plumage is browner, the yellow areas paler and less pronounced, the black streaks less prominent. Dawson (1923) describes the young males (rarely) and females as losing the yellow throat in winter. Hubbard (1970) describes first-year males as browner, less gray above and have the ventral black markings as streaks. He also gives the same geographic variation as in females.

C. Distinguishing characteristics

Interspecific - Phillips et al. (1964) say that Yellow-rumped Warblers can be recognized by their yellow rump and similar yellow on the crown and sides, pale throats and white tails patches that do not reach the tip of the tail. Hubbard (1970) says that memorabilis (applied to the breeding birds in the southern Rockies) is not recognizable because of broad intergradation in wing length and plumage characters with northwestern populations.

Intraspecific - Bent (1953), wings of California males average .15 inch longer than those of eastern birds (D. c. coronata), tails .14 inch longer. "It appears to be a finely drawn subspecies." The western subspecies differs from the eastern in being "larger in size and more solidly black breast in the male. Audubon's and Myrtle Warbler juveniles ...are almost indistinguishable though there is always more white in the tail feathers of the western bird." Dawson (1923), auduboni; "Similar to hooveri but throat rich yellow, black cheeks reduced by encroachment of bluish gray over auriculars." Phillips et al. (1964), "Geographic variation in the species...consists of increase in the amount of black and larger size to the south. The Myrtle group is northern...the eastern race is small and dark (coronata) with a brownish suffusion over the back." Audubon's is to the south and the winter basic plumage shows no cheek pattern, the unstreaked breast is clouded with brown.

III GEOGRAPHICAL DISTRIBUTION

A. Overall distribution of the species

AOU (1957), "From northern Alaska, northern Yukon, western and central Mackenzie, northern Manitoba, northern Ontario, central Quebec, north-central Labrador, and Newfoundland south to north and central British Columbia, south Alberta, southwestern Saskatchewan, central and southeastern Montana, northern Minnesota, northern Michigan, central Ontario,

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northeastern New York, Massachusetts, and Maine, from western South Dakota south in the mountains to southern California, northern Baja California, southern Arizona, and southern New Mexico, and in the Sierra Madre Occidental to Durango."

D. c. auduboni: "Breeds from central British Columbia south along the Pacific coast through the Cascade Mountains and the Sierra Nevada to southern California and northern Baja California."

D. c. memorabilis: "Breeds from southeastern British Columbia, southwestern Alberta, and southwestern Saskatchewan south, east of the Cascade Mountains and the Sierra Nevada, to central eastern California (White and Inyo Mountains), southern Nevada, southern Arizona, southern New Mexico, and western Texas."

D. c. hooveri: "Breeds from north-central Alaska, northern Yukon, and northwestern and central Mackenzie south to southern Alaska, and northern British Columbia."

Bent (1953) "In the Atlin region of northern British Columbia it (hooveri), is a common species breeding mostly in lowlands." Bent also reports that the breeding ranges of hooveri and auduboni may overlap in British Columbia. Auduboni range is given as, "Western North America from British Columbia to Guatemala."

B. California distribution of the species

Rett (1953), shot a D. coronata on Santa Rosa Island, California 24 March 1951. Grinnell (1928), D. c. hooveri, mid-winter visitant. D. c. auduboni, abundant and widespread as a winter visitant over most of southern California, also reaching most of the islands. D. c. memorabilis, "winter visitant scatteringly," through southern California and Baja. Grinnell and Storer (1924), auduboni; most widely distributed and most abundant wood warbler found in the Yosemite region. Dawson (1923), auduboni; "A common breeder of the mountainous sections in both Boreal and Transition zones; found from the Santa Rosa to the San Jacinto Mountains north along the Sierran ridge to Shasta, east upon the White and Warner ranges; in the northwest in the Trinities, south to Lake and Mendocino Counties and locally in Sonoma County. Small (1974), lists the Myrtle Warbler as "fairly common in northwest coastal region; less common to south and uncommon to rare in southern California," and the Audubon's Warbler, breeding range as "virtually all mountainous regions of state except desert mountains of extreme eastern section of San Bernardino County; in coast range, south to Monterey Coast and in Peninsular Ranges, south to Santa Rosa Mountains; otherwise, length of state."

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C. California desert distribution

Grinnell and Miller (1944), give selected sightings and dates. D. c. hooveri, Kern County, November 4; Los Angeles County, November 13 to March 1, Death Valley in Inyo County, April 10, northeastern San Diego County, March 10; Imperial County, February 11.

D. c. auduboni, in the mountains of Riverside County in breeding season; also Inyo Mountains. Eastern San Bernardino County, possibly summer resident. Bent (1953), auduboni; one of the most abundant birds of the San Bernardino Mountains, widely distributed from the Transition Zone up through the Boreal.

D. Seasonal variations in distribution

AOU (1957), "Winters from Kansas, the southern Great Lakes region, and southern New England through Mexico and Central America to central Panama; also on Bermuda, Cuba, Jamaica, the Bahamas, Hispaniola, Puerto Rico, the Virgin Islands, and Antigua; and on the Pacific Coast from northwestern Oregon south to northern Baja California, in the west from southwestern British Columbia, central Washington, central Nevada, southwestern Utah, central New Mexico, southern Texas, through Mexico, Central America and Costa Rica." Grinnell and Miller (1944), D. c. auduboni, "in winter throughout low lands and lower mountains" in most of California, "occurs widely on coastal islands." Bent (1953) hooveri has been found in winter from California to southeastern Louisiana...and in northern Baja California, and in southern Veracruz in Mexico:" auduboni, "is widely distributed in the lowlands only during winter, retiring to the mountains for the breeding season." Dawson (1923) reports the same for auduboni. Small (1974) says that "Myrtle" Warbler is a winter visitor, October to late April. Phillips et al. (1964) reports that Yellow-rumped Warblers are found in or near southern Arizona away from the breeding grounds, from September to late May, but that they are rare on the desert before late September. They give the latest date in the mountains as November 6. "Auduboni is a common winter resident in Arizona. Hooveri is a rare winter visitor to Lower Sonoran Zone rivers and farms in western and southern Arizona. Memorabilis breeds in the highest mountains of Arizona, migrates in fall and spring and winters in parts of the state."

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IV HABITAT

A. Biotopic affinities

Williamson (1957), D. c. hooveri, found only in riparian woodland in Napaskiak area of Alaska. Peterson (1961), "coniferous and mixed forests." In winter varied; woods, tree tops, brush, thickets, gardens. Grinnell and Miller (1944), D. c. hooveri, "Distinctly varied. Deciduous or evergreen. Frequently seen in gardens, orchards." D. c. auduboni, Life-zones in summer, Transition, Canadian, Hudsonian." In coniferous forests of wide variety. Hubbard (1965), memorabilis, "common in fir and spruce-fir forests and uncommon in other habitats." Bent (1953), auduboni, "it's breeding range does not extend nearly as far north as that of the Myrtle Warbler, it extends further south and to considerably higher altitudes, breeding largely in the Canadian Zone among the pines, spruces, and firs."

B. Altitudinal range

Miller (1955), reported D. c. auduboni only at 7000 foot level in Sierra del Carmen area of northern Mexico in April. Grinnell and Miller (1944), "Altitudes of known or probable breeding range from 500 feet to 11,000 feet as at Cottonwood Lakes, Inyo County, for D. c. auduboni. Bent (1953), auduboni; found breeding in the mountains of New Mexico at 7,500 to over 11,000 feet. Breeds at similar elevations in Colorado. In the San Bernardino Mountains from 9,000 to 10,500 feet. Grinnell and Storer (1924), auduboni; summer range from Transition Zone yellow pines (3,300 feet) up through lodge pole pines and other conifers to the upper limit of un-stunted trees (10,000 feet).

C. Home range size

D. Territory requirements

Perch sites - Grinnell and Miller (1944), D. c. hooveri, open branchwork, tops of trees and bushes.

Courtship and mating sites -

Nest sites - Peterson (1961), "in conifer." Grinnell and Miller (1944), D. c. auduboni, "Nest emplacements range from 3 or 4 feet up to 100 feet..." "rarely nesting occurs in broad-leaved trees, in meadows or in orchards." Bent (1953), hooveri, nesting 40 feet up, near the top of a spruce... another nest was in a small jack pine in open woods on the shore of Lake Atlin, in northern British Columbia. Auduboni, in the Rocky Mountains in Utah, nests in almost any tree, pine, spruce, fir, aspen or oak. Bent (1953),

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auduboni; Reported nesting in two different habitats: near Seattle, Washington, in a fir tree, 30 feet up, and near Ft. Sherman, Idaho, in deciduous trees and bushes. Generally hidden inside the tree or bush. "Nests in tamarack, cedar, and birch have been reported..." Ridgway (1915) reports that D. coronata nests in pine or spruce trees."

E. Special habitat requirements

Bent (1953), reports hooveri being confined to heavier spruce woods during breeding in Alaska. Small (1974) gives the breeding habitat of Audubon's Warbler as "montane and subalpine forests of Transition, Canadian, and Hudsonian Life Zones."

F. Seasonal changes in habitat requirements

Grinnell and Miller (1944), D. c. auduboni, "in winter habitat is highly varied." Bent (1953), hooveri: during winter they frequent spruce, birch and cottonwoods. Grinnell and Storer (1924), auduboni; during the summer it frequents the main forested districts of the mountains in Yosemite, in winter the deciduous trees and brush of the foothills and valley country.

V FOOD

A. Food preferences

Bent (1953), auduboni; During a year-long survey in California, food was found to consist of 85% animal matter and 15% vegetable matter (fruits and seeds). Spofford (1977) observed Audubon's Warbler in southeastern Arizona eating galls on poplar leaves which were caused by aphids.

B. Foraging areas

Grinnell and Miller (1944), D. c. hooveri, over open ground, on ground surface and grass tops. D. c. auduboni, search needle tufts of conifers. "Part of insect food is caught on the wing." From ground to tops of trees. In winter, flycatching in the open, ground foraging, berry eating, sipping nectar, in addition to searching foliage surfaces. Whitmore (1977) in a study on habitat partitioning states that Audubon's Warbler (D. c. auduboni) is associated with high canopy cover and many trees.

C. Foraging strategies

Grinnell and Miller (1944), D. c. auduboni, fly out from edge of tree searching needle tufts and return to it. Bent

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(1953), auduboni, Flies through the air searching for insects, snapping them up as it goes. Makes "flycatcher sallies" from a post of observation. Bent calls them "versatile" feeders, describing their airborne feeding and ground feeding.

D. Feeding phenology

Bent (1953), auduboni; collect in great flocks in spring to feed on oak worms in live oaks, and they eat myrica berries in the fall. Yarbrough and Johnston (1965) give the feeding phenology of the eastern Myrtle Warbler.

E. Energy requirements

VI REPRODUCTION

A. Age at first breeding

B. Territorial behavior

C. Courtship and mating behavior

D. Nesting phenology

Bent (1953), hooveri; reports a nest taken with five fresh eggs on June 15. They arrived at breeding grounds in northern Alaska on 22 May in 1900...already in pairs. Auduboni; "general opinion seems to be that two broods are often raised in a season." Gives the nesting season in the Sierra cuchumatanes, nearly 11,000 feet high, as April to August. Dates of arrival at breeding grounds; in Kansas, April 14; in Colorado Springs, April 12; in Wyoming, April 21; in Grass Valley, California, April 10; Idaho, April 16. Late dates of departure from breeding grounds: Prospect, Oregon, 18 November; Bayview, Idaho, 26 October; Laramie, Wyoming, 9 November; Silver City, New Mexico, 10 November. Eggs were reported in California from 11 May to 30 July. The height of the season is given as 13 to 25 June.

E. Length of incubation period

Bent (1953), auduboni; "probably between 12 and 13 days, as with the Myrtle Warbler.

F. Length of nestling period

G. Growth rates

H. Post-breeding behavior

Bent (1953), auduboni; Young birds are the first to leave the nesting area and appear in the lowlands, probably driven out by their parents.

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II POPULATION PARAMETERS

A. Clutch size

Peterson (1961), "Eggs (3-5) spotted." Bent (1953), auduboni; 3-5 eggs, almost always 4. Slightly glossy, spotted. Dawson (1923), gives auduboni clutch size as 3 to 5, usually 4, as does Chapman (1907).

B. Fledging success

C. Mortality rates per age class

D. Longevity

Bent (1953), auduboni; A bird banded at Altadena, California, on December 1, 1935, was retrapped at the same station on February 13, 1940, being nearly 5 years old at the least. Kennard (1975) in a summary of longevity records from banded birds gives 6 years, 8 months as the oldest Myrtle Warbler (D. coronata).

E. Seasonal abundance

Bent (1953), hooveri, "It may be commoner than is supposed, as it is recognizable only with specimens in hand." A southward exodus was at its height during the last week in August and first week in September in northern British Columbia, accompanied by a constant stream of Myrtle Warblers. Hines (1963), hooveri, In the Noatak River area in Alaska this race is abundant during the breeding season in the willow understory of the spruce forest.

F. Habitat density figures

Phillips et al. (1964). refer to D. coronata as the most abundant, hardiest warbler in Arizona.

VIII INTERSPECIFIC INTERACTIONS

A. Predation

B. Competition

Grinnell and Storer (1924), auduboni; nests with the Hermit Warbler in the Transition and part of Canadian Zones of Yosemite. At higher altitudes it is the only Warbler in the evergreens. In Guatemala, auduboni has been reported feeding with bluebirds (Sialia sialis guatemalae). Whitmore (1977), found Audubon's Warblers and Yellow Warblers to use much of the same habitat in Utah and suggested they may be competitive. Ficken and Ficken (1966), "...individual Myrtle Warblers are quickly attracted to food sources, particularly berries, where other species are feeding."

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C. Parasitism

Friedmann et al. (1977) report five records of cowbirds (*m. ater artemisiae*) laying in nests of D. c. auduboni, and two records of cowbirds laying in nests of D. c. memorabilis.

IX STATUS

A. Past Population trends

Chapman (1907) refers to D. auduboni as one of the most common warblers of the Pacific slope.

B. Present population status

C. Population limiting factors

D. Environmental quality: adverse impacts

E. Potential for endangered status

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