

## BIRDS LOST FROM A GIANT SEQUOIA FOREST DURING FIFTY YEARS<sup>1</sup>

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**Abstract.** Not all forest bird species breeding on Redwood Mountain, Tulare County, California in the 1930s are still there in the 1980s. Over the 50 years virgin giant sequoia forest of the saddle and east slope (within Kings Canyon National Park) remains unchanged but has lost the Olive-sided Flycatcher (*Contopus borealis*). The mixture of old and second-growth sequoias of Whitaker's Forest, where pines and undergrowth were removed and snags eliminated, is missing the Mountain Quail (*Oreortyx pictus*), Flammulated Owl (*Otus flammeolus*), Northern Pygmy-Owl (*Glaucidium gnoma*), Spotted Owl (*Strix occidentalis*), Hairy Woodpecker (*Picoides villosus*), and Olive-sided Flycatcher. Though unchanged today, the riparian alders of Eshom Creek on the west slope have lost Swainson's Thrush (*Catharus ustulatus*). Drastic logging by Sequoia National Forest has driven all of the above from the west slope ponderosa pine forest that surrounds Whitaker's Forest.

New birds established at Whitaker's Forest by 1986 are the Common Raven (*Corvus corax*), House Wren (*Troglodytes aedon*), and Lincoln's Sparrow (*Melospiza lincolni*). Intrusion of Brown-headed Cowbirds (*Molothrus ater*) has begun without yet affecting two abundant species of vireos. The Pileated Woodpecker (*Dryocopus pileatus*) is reduced; the Winter Wren (*Troglodytes troglodytes*) has greatly increased.

I attempt to explain avifaunal changes by comparing habitats over the 50-year interval. Disappearance of the flycatcher and thrush from unchanged, prime habitat must be caused by destruction of corresponding forests in Central America, where these birds maintain their winter territories.

**Key words:** Nearctic forest migrants; winter territoriality; snags and wildlife; giant sequoia; *Contopus borealis*; *Catharus ustulatus*; *Molothrus ater*.

### INTRODUCTION

I revisited Whitaker's Forest, in the giant sequoia forest of the southern Sierra Nevada, from 8 to 17 June 1986 in order to see if the Brown-headed Cowbird (*Molothrus ater*) has spread there to the detriment of two species of vireos that had been abundant at this scene of my boyhood bird studies in the early 1930s. My interest in cowbirds resulted from seeing their disastrous effect upon the Black-capped Vireo (*Vireo atricapillus*) during a 2-year survey of that species in Texas (Marshall et al. 1985). Long before I located any cowbirds at Whitaker's Forest, I was shocked to realize that the Olive-sided Flycatcher (*Contopus borealis*) and Swainson's Thrush (*Catharus ustulatus*) were missing.

### OBJECTIVE

In the 1930s the summer breeding avifauna listed in Table 1 lived throughout the forest, which graded from sequoia and fir to ponderosa pine

at lower elevation (Fig. 1). Exceptions are the Flammulated Owl (*Otus flammeolus*) and Swainson's Thrush, found mostly within the pine areas (national forest); and Hammond's Flycatcher (*Empidonax hammondi*), Red-breasted Nuthatch (*Sitta canadensis*), Townsend's Solitaire (*Myadestes townsendi*), and Golden-crowned Kinglet (*Regulus satrapa*), which preferred firs and sequoias (national park and Whitaker's Forest). But by 1986, the avifauna of Whitaker's Forest differed from that of the park because of loss and gain of species; and that of the national forest had fewer species. Man's use of the trees differed in the three areas, producing differences in habitat. Therefore, the object of this report is to blame a particular habitat change for absence of a species, by comparing the three areas and their birds as they appear today. If a species is gone from all three, its winter habitat is incriminated.

### STUDY AREA

Giant sequoias of Redwood Mountain (Fig. 1), Tulare County, California, are part of the largest continuous stand of that species, called the Red-

<sup>1</sup> Received 15 June 1987. Final acceptance 29 January 1988.

TABLE 1. Estimates of forest bird numbers at various times at Whitaker's Forest, Tulare County, California.

| Species                             | 1938<br>28 May<br>census on foot | 1930s<br>Pairs per km <sup>2</sup><br>estimate | 1964-1967<br>Pairs per km <sup>2</sup><br>from Kilgore (1968) | 1986<br>8-17 June<br>Pairs per km <sup>2</sup> |
|-------------------------------------|----------------------------------|--|---|--|
| <i>Accipiter gentilis</i> *         |                                  | <1   | 0.6-1.9   | <1   |
| <i>Dendragapus obscurus</i>         |                                  | 1  |   | ?  |
| <i>Oreortyx pictus</i> *            | 3                                | 9  | 4.9   |  |
| <i>Columba fasciata</i>             | 1                                | 2  | 4.9   | 2  |
| <i>Otus flammeolus</i> *            |                                  | 3-4  | 2.5   |  |
| <i>Glaucidium gnoma</i> *           |                                  | 1  |   |  |
| <i>Strix occidentalis</i> *         |                                  | <1   | 1.2   |  |
| <i>Sphyrapicus ruber</i> *          | 2                                | 6  | 9.9   | 7  |
| <i>Picoides villosus</i> *          | —                                | 3  | 4.9   | <1   |
| <i>Picoides albolarvatus</i> *      | 4                                | 10   | 12.4  | 12   |
| <i>Colaptes auratus</i> *           | 1                                | 5  | 7.4   | 4  |
| <i>Dryocopus pileatus</i> *         | 1                                | 1  | 0.5   | <1   |
| <i>Contopus borealis</i> *          | 3                                | 4  | 4.9   |  |
| <i>Contopus sordidulus</i> *        | 6                                | 20+  | 61.8  | 20   |
| <i>Empidonax hammondi</i> *         |                                  | 8  | } 12.4  | 14   |
| <i>Empidonax difficilis</i> *       | 7                                | 5  |   | 4  |
| <i>Cyanocitta stelleri</i> *        | 7                                | 10   | 39.5  | 12   |
| <i>Corvus corax</i>                 |                                  |  |   | 1  |
| <i>Parus gambeli</i> *              | 4                                | 4  | 32.1  | 4  |
| <i>Sitta canadensis</i> *           | 2                                | 8  | 22.2  | 12   |
| <i>Certhia americana</i> *          | 4                                | 10   | 27.2  | 8  |
| <i>Troglodytes aedon</i>            |                                  |  |   | 1  |
| <i>Troglodytes troglodytes</i>      |                                  | <1   | 2.5   | 12   |
| <i>Regulus satrapa</i> *            | 2                                | 8  | 17.3  | 12   |
| <i>Myadestes townsendi</i> *        |                                  | 1  | 4.9   | 2  |
| <i>Catharus ustulatus</i> *         |                                  | 12   |   |  |
| <i>Catharus guttatus</i>            |                                  | <1   | 4.9   | <1   |
| <i>Turdus migratorius</i> *         | 3                                | 16   | 56.8  | 25   |
| <i>Vireo solitarius</i> *           | 4                                | 5  | 7.4   | 6  |
| <i>Vireo gilvus</i>                 | 7                                | 10   | 4.9   | 12   |
| <i>Vermivora ruficapilla</i> *      | 6                                | 7  | 17.3  | 10   |
| <i>Dendroica coronata</i> *         |                                  | 5  | 1.0   | 10   |
| <i>Dendroica occidentalis</i> *     | 7                                | 5  | 12.4  | 10   |
| <i>Oporornis tolmiei</i> *          | 4                                | 2  |   | 4  |
| <i>Piranga ludoviciana</i> *        | 3                                | 12   | 59.3  | 20   |
| <i>Pheucticus melanocephalus</i> *  | 8                                | 9  | 56.8  | 10   |
| <i>Pipilo erythrophthalmus</i> *    |                                  | 1  | 9.9   | 1  |
| <i>Melospiza lincolnii</i> *        |                                  |  |   | 3  |
| <i>Junco hyemalis</i>               | 9                                | 18   | 84.0  | 30   |
| <i>Molothrus ater</i>               |                                  |  |   | 2  |
| <i>Carpodacus purpureus</i> *       | 3                                | 20   | 19.8  | 25   |
| <i>Coccothraustes vespertinus</i> * |                                  | 1  | 14.8  | 1  |

\* Specimen from Redwood Mountain.

wood Mountain Grove. Their crowns reach a lofty 100 m. Associated forest trees are sugar pine, ponderosa pine, white fir, and incense cedar. Virgin forest of the summit, east side, and Redwood Saddle belongs to the Kings Canyon National Park. In June 1986 these portions of the mountain looked the same as they had in the 1930s.

Whitaker's Forest, 130 ha on the west slope (Figs. 1 and 2), was given to the University of California in 1910 for teaching and study of for-

estry. Over 200 mature sequoias are left from partial logging during 1870 to 1876. After 1876, sequoia seedlings sprouted profusely (Metcalf 1948) on soil bared by disturbance and fire. They had grown into impenetrable groves, approaching 60 years and 30 m, when I first saw them in 1932. Fire danger was extreme; accordingly, the Civilian Conservation Corps quartered there began to remove fallen timber in 1934 and Wortman's Mill started to harvest 3.3 million board feet of mature pine timber, taken mostly from

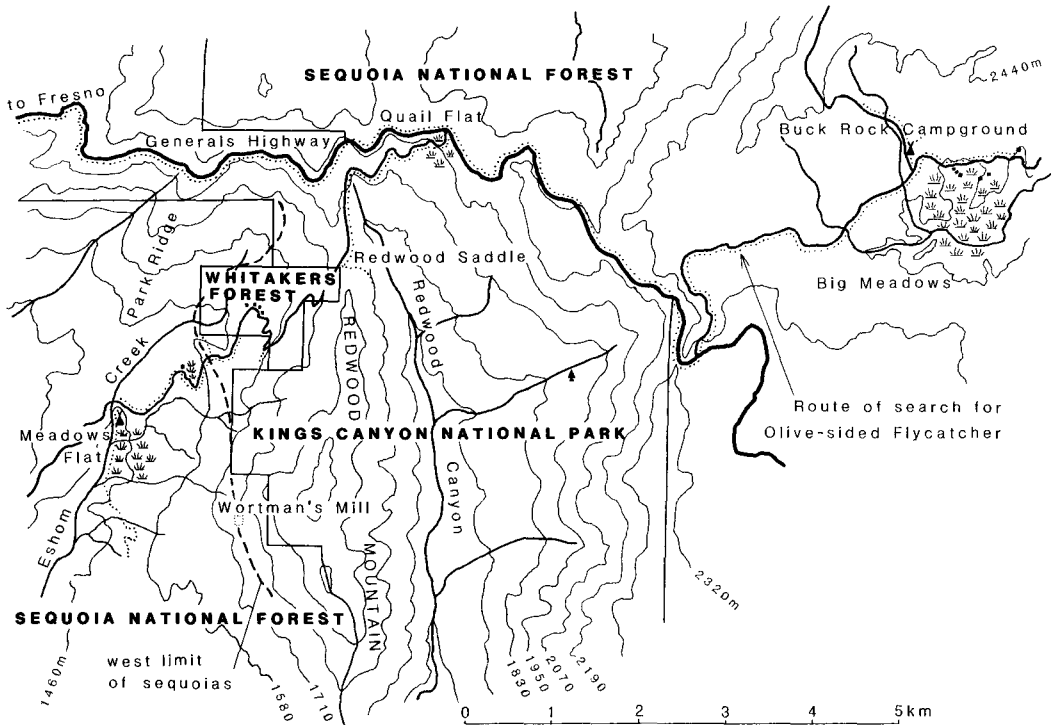


FIGURE 1. Map of Redwood Mountain and its surroundings, showing Whitaker's Forest, adjoining parts of Sequoia National Forest and Kings Canyon National Park, route of search for the Olive-sided Flycatcher from 8 to 17 June 1986, and Eshom Creek—the sole habitat of Swainson's Thrush in this area.

1941 to 1947 (Donald P. Gasser, in litt.). Snags were an incidental casualty. Thinning of saplings, removal of fir and cedar thickets, and cleanup of litter continues to the present but has never kept pace with the enormous productivity of the forest. When I revisited the site in 1986, the major difference from the 1930s was that the 110-year-old sequoias have eclipsed the pines, firs, and cedars while reaching 50 m in height. They have spire-shaped crowns, purplish bark, and dizzying flexibility, as seen when they sway in a light breeze. Persistent cleanup of the central area now affords a vista through the tree trunks and admits enough sunlight to convert myriad soggy low spots of the 1930s into a network of green, wet meadows (Fig. 2). No climatic change is evident from tree-rings or streams. The same trickles are in the same places. I doubt that climate can effect avifaunal change over a few decades (Raphael et al. 1987) in so tall and extensive a forest, which buffers change and nurtures its own climate.

(Quantitative documentation of habitat change at Whitaker's Forest exists in the form of measurements of basal area per acre and average di-

ameter at breast height of trees in Metcalf's [1948] plot number 1 from 1915 to the present [Donald P. Gasser in litt.], records of pine harvest, and reports of controlled burns and removal of thickets [for instance Kilgore 1971, Harvey et al. 1981]. I made no habitat measurements, which would have daunted a teenager inside a 90-m canopy. I hope subjective impressions will suffice [Fig. 3].)

Mature ponderosa pine forest entered the northwest corner of Whitaker's Forest (Fig. 2) and occupied the west slope of Redwood Mountain below the sequoia zone (Fig. 1), in the Hume Lake District of Sequoia National Forest. In 1984 to 1985 the U.S. Forest Service clear-felled and burned a ravine at the border of Whitaker's Forest (Fig. 2), which was thick with sequoia seedlings in 1987 (Woodbridge Marshall, pers. comm.). They logged the west slope, pushed up piles of flammable rubble 30 to 40 m in diameter along a revised north boundary of Whitaker's Forest, and left a facade of mature trees around public campgrounds.

The riparian alders (*Alnus rhombifolia*) along

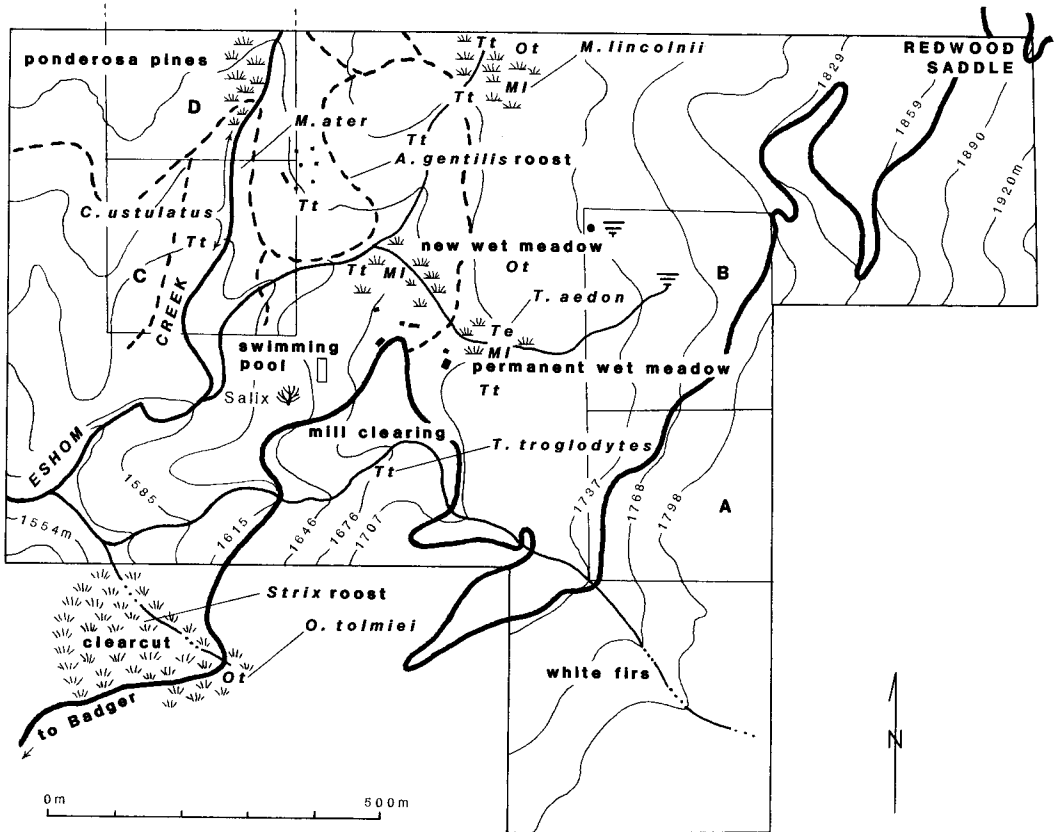


FIGURE 2. Whitaker's Forest, showing places mentioned in text. Boundaries were redefined in 1981 such that a northern strip, including part of study plot D, became National Forest and was logged.

Eshom Creek, which passes through Whitaker's Forest on the way to Meadows Flat (Fig. 1), look now the same to me as they did in the 1930s.

In El Salvador, 1941 to 1942, Nearctic migrants that could have come from the Sierra were prominent during winter in oak-pine forest of Mount Cacaguatique, deciduous and swamp forest at Lake Olomega, and cloud forest of Los Esesmiles; and during migration in cloud forest at Santa Ana and deciduous forest at Chilata (see gazetteer in Dickey and Van Rossem 1938). Perhaps a tenth of the natural vegetation of that populous country remained in 1942; remnants of original forest could not have survived the next two decades. For instance, wheat planted where cloud forest had been girdled and burned on 2,900 m Los Esesmiles at the Honduran border was harvested by pulling up roots and all. This activity had risen to 2,200 m in 1942, leaving nothing but blackberry vines and bare rock below.

## MATERIALS AND METHODS

My records of birds seen at Whitaker's Forest from 1932 to 1935 consist of a list of species made at that time, now filed at the Western Foundation of Vertebrate Zoology, and notations in the margins of Hoffmann's (1927) superb field manual that I used. Beginning in 1935 I deposited specimens (and a catalogue of them), and in 1938 my field journals and species accounts, at the Museum of Vertebrate Zoology, Berkeley, including notes and specimens from El Salvador, December 1941 to May 1942 (Marshall 1943). A 2-hr census began at Redwood Saddle, dawn 28 May 1938, and continued 3.2 km down to the west (Table 1); one each of the Wilson's Warbler (*Wilsonia pusilla*), Chipping Sparrow (*Spizella passerina*), Fox Sparrow (*Passerella iliaca*\*), and a Red Crossbill (*Loxia curvirostra*), were also seen. My specimens at the Museum of Vertebrate Zoology (asterisk on Ta-

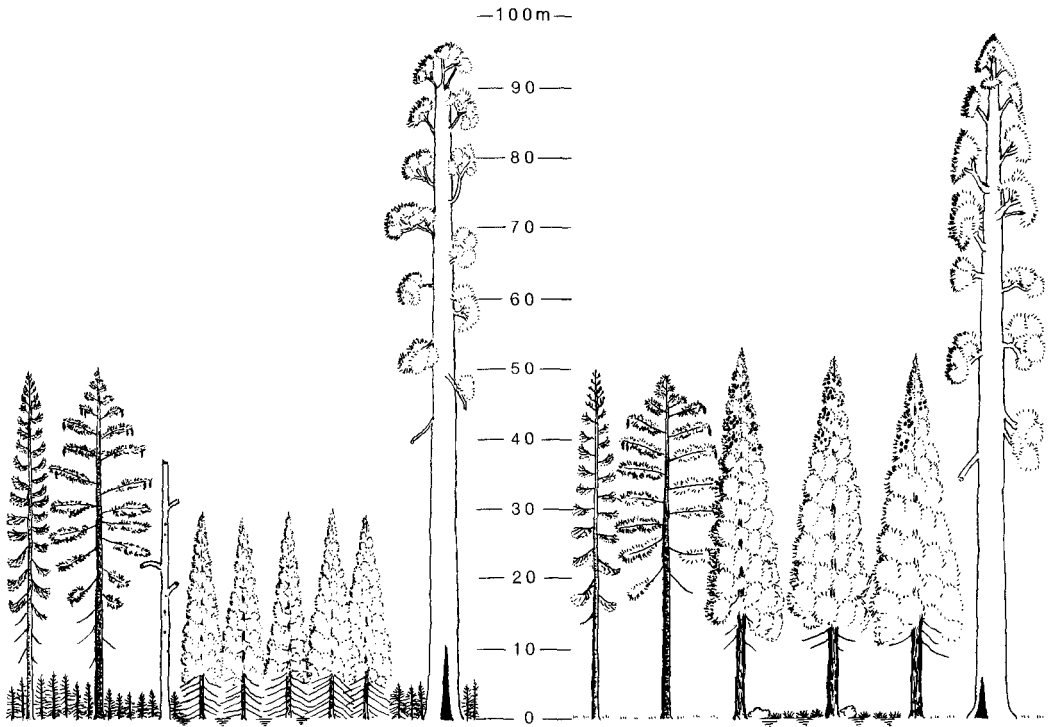


FIGURE 3. Habitat profiles of Whitaker's Forest, 1930s (left) and 1980s (right).

ble 1) plus reports on Flammulated Owls and Spotted Owl (*Strix occidentalis*) pellets (Marshall 1939, 1942) support the occurrence of summer species that I found at Whitaker's Forest in the 1930s. Times of observations were two or more weeks in June to August each summer from 1932 to 1935, late May to late August 1938, 17 to 19 November 1939, 5 to 7 June 1940, 26 to 30 August 1942, and 20 to 28 June 1947. Because I concentrated on owls and roamed the entire west slope by night, I did not map territories of diurnal birds.

Available for comparison with the early notes are censuses in four plots (Fig. 2) totalling 32 ha within Whitaker's Forest made by Kilgore (1971) from 1964 to 1967; my field notes and mapped territories (on Kilgore's dittoed maps) of 8 to 17 June 1986 and filed at the Smithsonian Division of Birds; and tape recordings of 36 species during that visit, deposited at the Bioacoustic Archive, Florida State Museum, University of Florida. Although I still searched for owls over the west slope, I mapped pairs and singing males of diurnal birds within a roughly 500-ha circle around the mill clearing; whereas Kilgore's counts of ter-

ritories, over three whole summers, involved quantitative ecological techniques concentrated within precise boundaries. I have found no publications on the avifauna in the giant sequoia forests of Tulare County besides Fisher (1893), Kilgore (1971), and papers dealing with single species, such as the condor (Koford 1953, Snyder et al. 1986).

## RESULTS

Table 1 lists the forest-dwelling species of birds known or presumed to be nesting on Redwood Mountain at the various times indicated, including the 1960s (Kilgore 1971). (Neither Kilgore nor I have evidence for nesting by Evening Grosbeaks, common there in summer.) Three non-forest species nested at least once: Mourning Dove (*Zenaida macroura*), Western Screech-Owl (*Otus kennicottii*), and Black Phoebe (*Sayornis nigricans*); the Chipping Sparrow also nested (Kilgore 1968). Visiting and aerial-foraging birds, of 27 fascinating species, enlivened my studies. Formerly conspicuous mammals that I did not see or hear in 1986 are the California gray squirrel (*Sciurus griseus*) and the northern flying squirrel



FIGURE 4. West slope of Redwood Mountain from the clearing at Whitaker's Forest, 1926. Photograph by Prof. Woodbridge Metcalf, copied from Metcalf (1948: 6). The forest was open enough for Scouler willows (left) and some woodland birds. Because this view was obscured by a new growth of cedars along the road, I could not take a replicate photograph to show the present stupendous masses of sequoia foliage.

rel (*Glaucomys sabrinus*\*). Now I comment on species whose status changed after 1938:

#### *OREORTYX PICTUS*

The Mountain Quail was abundant in the 1930s. In addition to the three calling males on the 28 May 1938 census (Table 1), later the same day six called from clumps of firs, one ran among rocks, and a pair flew up from grass. Notes for that day mention males calling at all hours, spaced apart throughout both hunting and game refuge areas. In the 1960s Kilgore (1971) found two pairs in 32 ha before experimental removal of fir and cedar thickets. In 1986 I found no quail on the west slope of Redwood Mountain but had no difficulty hearing one on the east slope, within the park. Perhaps the turmoil and cutting of the pine zone has made it too open for the species, whereas the brushier parts of Whitaker's Forest may be too small to maintain a population.

#### *OTUS FLAMMEOLUS*

Flammulated Owls were associated with Kellogg oaks and ponderosa pines and were therefore mostly outside the giant sequoia area, being restricted to openings and granite outcrops within Whitaker's Forest proper, where I first heard one on 14 July 1935. I called up two (by blowing into my cupped hands) in ponderosa pines on the Park Ridge trail at 1,980 m, north of Sequoia Guard Station on 10 and 13 August 1935, but could not see them. In 1938 a more intensive search revealed 18 to 20 territorial males in about 5 km<sup>2</sup> on the west slope of Redwood Mountain

(Marshall 1939). From 4 to 7 June 1940 I mapped about 15 males, five of them in the same territories as before. On 21 June 1947 five males were on territories north of the mill clearing. Density over those years was three to four territories per 100 ha. Kilgore (1971) thought that the species nested near his study site in 1965 and 1966.

I found no Flammulated Owls at Whitaker's Forest in 1986 but I did locate two males in the National Forest to the southwest, among suitable mixtures of huge Kellogg oaks, ponderosa pines, bushes, and conifer thickets where the loggers had skipped some rocky terrain. None was at the more severely cut Buck Rock Campground (Fig. 1), formerly ideal habitat (Marshall 1939). The bulk of the pine zone of Sequoia National Forest and the northwest portion of Whitaker's Forest has become unsuitable for the Flammulated Owl, which likes snags and fairly dense stands of mature pines.

#### *OTUS KENNICOTTII*

Western Screech-Owls (not in Table 1) participated in a drama of habitat change at Whitaker's Forest that ended in the 1930s; I was there just in time to see the finish. A fledged brood was being fed in a clump of large Scouler willows (*Salix scouleriana*) below the swimming pool (Fig. 2) in about 1932, and bones of this owl were in a Spotted Owl pellet of 1940 (Marshall 1942). Because the fate of Scouler willows may cause misunderstanding about changes in populations of Swainson's Thrush and Lincoln's Sparrow, I explain as follows:

When I first saw Whitaker's Forest, the vegetation looked like the photo (Metcalf 1948: 6) reproduced in Figure 4. A few large Scouler willows (spherical tree at left) graced the edges of clearings. More grew along dry ravines and wet meadows under the forest, but by 1938 they were dying there as the young sequoias joined ranks to blot out the sun. Scouler willows did not grow along Eshom Creek, which was taken up by alders; they formed no low thickets such as attract the thrush and sparrow. I assume that after logging in the 1870s, the openness of Whitaker's Forest allowed these willows to flourish and to attract lowland species like the Western Screech-Owl.

#### *GLAUCIDIUM GNOMA*

I found two wide-ranging Northern Pygmy-Owls among ponderosa pines at the northwest corner

of Whitaker's Forest (territory A, Marshall 1939) in July 1934, again two on 13 and 15 June 1938, and one on 21 June 1947. By 1986 I could find none, owing to devastation of the National Forest and removal of snags. But in the park right next door, in virgin sequoia forest at Redwood Saddle, one tooted away on 10 June 1986. Small birds at Whitaker's Forest still scold enthusiastically at imitated pygmy-owl whistles.

#### *STRIX OCCIDENTALIS*

Three pairs of Spotted Owls occupied respectively Whitaker's Forest, Meadows Flat to Wortman's Mill, and Redwood Saddle during my visits in 1935, 1938, November 1939, 1940, 1942, and 1947. The Whitaker's Forest pair roosted southwest of the mill clearing (Fig. 2) in firs of a deep, shady ravine that I thought was within the property (Marshall 1942). That is where I picked up the pellets as the birds pecked between their legs. Kilgore (1971) believed that a pair nested in 1965 and 1966 at Whitaker's Forest. In 1986 I saw that the U.S. Forest Service had clear-felled and burned the ravine and adjacent slope, except for three or four mature sequoias. I found Spotted Owls nowhere on the west slope nor at Redwood Saddle.

I conclude that current logging of the National Forest has eliminated the Spotted Owl, confining that species to virgin forest of the park. Also, the loss of snags has reduced its prey, the flying squirrel (Marshall 1942), and the now nearly isolated habitat of Whitaker's is too small for a pair. But the Northern Goshawk (*Accipiter gentilis*) which also requires a large area, still persists. Indeed the pair of 1986 centered its activity on the identical clump of sugar pines that was used in the 1930s (Fig. 2). Perhaps these goshawks are better off than the owls because they roost in the middle of Whitaker's Forest instead of the edge, and because their rarity permits them to commute to distant foraging sites without trespassing on another pair.

#### *PICOIDES VILLOSUS*

I have few notes on Hairy Woodpeckers at Whitaker's Forest but regarded the bird as regularly present during the nesting season and more numerous in fall (17 to 19 November 1939). Kilgore had two pairs within 32 ha in 1965 to 1966 and saw one in 1967, compared with an average of four pairs of White-headed Woodpeckers (*Picoides albolarvatus*). The only Hairy Woodpeck-

ers I saw from 8 to 17 June 1986 were a silent male working at dusk on 8 June on a small, dead oak at the top of the clear-cut slope mentioned in the preceding paragraph, and one at Buck Rock Campground, 2,440 m altitude (Fig. 1).

An obvious cause of the Hairy Woodpecker's decline would be the absence of any standing dead coniferous trunks. If so, why are the Red-breasted Sapsucker (*Sphyrapicus ruber*) and White-headed Woodpecker not likewise reduced? Because the sapsucker lives in and feeds on live trees and because the White-headed Woodpecker feeds on pine cones (including closed cones of Coulter pine, as pointed out to me in the San Gabriel Mountains by Kimball Garrett) and nests in the plentiful sequoia logs and stumps, too low for Hairy Woodpeckers. In 1986 a fresh hole, which was full of trilling young White-headed Woodpeckers, had been drilled into a transverse cut of a fallen giant.

#### *DRYOCOPUS PILEATUS*

The loudest and most thrilling bird sounds at Whitaker's Forest in the 1930s belonged to the numerous Swainson's Thrushes, Olive-sided Flycatchers, and Pileated Woodpeckers. The woodpecker and flycatcher are among the few birds routinely using the dead tops of mature giant sequoias, respectively, for drumming and for flycatching; others are the Townsend's Solitaire for singing and the Western Bluebird (*Sialia mexicana*) for resting or reassembling during flights to the summit.

One pair of Pileated Woodpeckers centered its activities at Whitaker's Forest in the 1930s, another was at Redwood Saddle, a third at Wortman's Mill 2.5 km to the south—areas corresponding to those of Spotted Owls. During Kilgore's studies in the 1960s and my visit in 1986, one would appear at Whitaker's Forest only occasionally. Removal of fallen fir, pine, and cedar logs would have eliminated the food source, as the nearly everlasting giant sequoia logs and stumps do not harbor the required larvae.

#### *CONTOPUS BOREALIS*

The Olive-sided Flycatcher was the peregrine of flycatchers, sitting erect on top of the tallest giant sequoias, shooting horizontally for 30 m or more to snap a flying insect invisible to the observer 90 m below, then uttering the triumphant three-note whistle after a return to the same perch. Commensurate with the great height of its activ-

ity that broadcast the call far and wide, its territories were large. I estimated two pairs within hearing and four per 100 ha; Kilgore (1971) had on average two pairs per 32 ha in 1965 to 1967. In June 1986 I both hiked and drove slowly along the route shown in Figure 1, stopping to listen, and thence westward along the Generals' Highway to the lower limit of coniferous forest without ever hearing the Olive-sided Flycatcher. On 10 June 1987 none answered my whistles in red firs at Donner Pass.

As a control, I found summer resident Olive-sided Flycatchers in normal numbers in the San Gabriel Mountains in 1986 and in redwoods and eucalypti of Oakland and Berkeley hills in 1986 and 1987. Though not implicating the Sierran west slope, alarms about the species in the 1970s have just been sounded (Robbins et al. 1986): "The Olive-sided Flycatcher appears to be declining sharply in the Western region. Populations in British Columbia in particular showed a significant decline, and decreases occurred in the Spruce-Hardwood Forest of Quebec and in Central New England. However, populations were stable in the Los Angeles Ranges and the Sierra-Trinity Mountains, areas with the greatest abundance."

Beyond devastated Sequoia National Forest, Olive-sided Flycatchers should still find an ideal home in Kings Canyon National Park and Whitaker's Forest. Therefore something must have gone wrong with the winter habitat in mountain forests of Central and South America. If so, why is the abundant Western Wood-Pewee (*Contopus sordidulus*) not similarly reduced? Perhaps because it is not restricted to forest, summer or winter, and does not winter in Central America. Other Nearctic migrants on Table 1 spend the winter in less populated areas of northwestern Mexico, and are still abundant.

#### *CORVUS CORAX*

During the period 11 to 17 June 1986 at least two Common Ravens, not together, sneaked carefully through the forest, muting their wing whistle, and perching at middle height in the young sequoias. They kept silent except for a couple of croaks that I heard on one day only. Is this low profile connected with breeding? I cannot explain their presence unless it is part of the general expansion that also brings them to Southern California suburbs.

#### *TROGLODYTES AEDON*

The House Wren was not known from Redwood Mountain before I heard one or more sing in the wet meadow (Fig. 2) near the headquarters residence at dawn of 9 June 1986. They were difficult to discern because of louder songs of Lincoln's Sparrows at the same place. I heard and saw no more until one began to sing and was actually seen on fallen logs in the middle of the same little meadow at noon of 16 June. Why this inconstancy or secretiveness in a species that is usually so conspicuous? Except for the loss of a clump of Scouler willows this meadow is unchanged from its condition of 50 years ago; therefore the appearance of the wren has nothing to do with habitat; it may not represent a lasting trend.

#### *TROGLODYTES TROGLODYTES*

The only Winter Wrens that I discovered at Whitaker's Forest in the 1930s were a male singing (and possibly the mate also) beneath the Spotted Owl roost (Fig. 2) in summer of 1938 and one found 17 to 19 November 1939 at the Whitaker's public campground (new meadow, Fig. 2). Kilgore (1971) had an average of 1.2 pairs per 32 ha over the 3 years 1965 to 1967. In June 1986 I mapped eight pairs of singing males (Fig. 2) at about 150-m intervals in rows along the streams through the wettest part of Whitaker's Forest. They foraged among exposed alder roots and other stream-bank crevices. I cannot account for this gradual (Table 1) increase. From the wren's standpoint the habitat has not changed.

#### *CATHARUS USTULATUS*

On the west slope of the Sierra Nevada, Swainson's Thrush is an extremely local, discontinuously distributed, late-arriving summer inhabitant of streamside willows and alders (Grinnell and Storer 1924—beware the erroneous contradiction in Grinnell and Miller 1944). The Whitaker's Forest thrushes were perhaps a dozen pairs of the several hundred in a continuous population along 4.5 km of Eshom Creek (Fig. 1). This is the only colony in the area; none of these thrushes occupied the few scattered riverine bushes along Redwood Canyon. I was an astonished auditor of their boisterous choruses in 1932, finally identifying them the following summer. They had not arrived in time for my census of 28 May 1938 (Table 1) but were present from 31 May onward, and were still singing on 10



August. That year the species was particularly abundant; the colony extended up a dry gully to some dying Scouler willows near the swimming pool and 150 m from Eshom Creek. This is the same willow clump (Fig. 2) which was haven to the pair of Western Screech-Owls and their fledglings earlier in the decade.

Kilgore (1971) did not find Swainson's Thrush from 1964 to 1967. The part of Eshom Creek that supported several singers of the 1930s passes through the middle of his study plots C and D and still has alders; the thrushes had been numerous around the wet meadow in D (Fig. 2). I conclude that Swainson's Thrushes were gone before the 1960s and perhaps before disturbance to the forest along Eshom Creek (but my notes of 1947 are inadequate). The alders are just as suitable today. Certain well-known populations farther north likewise had trouble before the 1970s (Beedy and Granholm 1985): "The disappearance of the Swainson's Thrush from Yosemite Valley is one of the unsolved mysteries of Sierran ornithology." The species nested in riparian timber there and in the vicinity of Bower Cave during the study of Grinnell and Storer (1924). Gaines (1977) gave only one west slope Yosemite site for the 1970s: "at 5000' near Tuolumne Grove . . . The reason for their apparent decline is mysterious." I suggest that the lack of winter habitat in Central America is at fault.

#### *MELOSPIZA LINCOLNII*

Lincoln's Sparrows were breeding at Meadows Flat (Fig. 1) on 27 June 1938. This large, wet meadow surrounded by ponderosa pines is 2.5 km southwest of Whitaker's Forest, at 1,524 m. By June 1986 three meadows at Whitaker's Forest had become large enough, due to thinning of the canopy and removal of conifer thickets, for each to support a pair of Lincoln's Sparrows (Fig. 2).

#### *MOLOTHRUS ATER*

Cattle have roamed this forest at least since the 1930s but at that time the Brown-headed Cowbird was confined to the San Joaquin Valley. In June 1986 I heard or saw cowbirds every other day, when a group of four or five males would chase one or more females in rapid flight up the main course of Eshom Creek. Several times they stopped for a moment to posture and utter their calls (which I tape-recorded). Because I heard no high-flying commuters, I believe that cowbirds

are just beginning their intrusion on Redwood Mountain, that they penetrate the forest along the riparian corridor, and that they will eventually have a sinister effect upon the abundant (Table 1) local vireos, which had no exposure to such plains-inhabiting birds and no previous need to evolve defenses against brood parasitism.

#### DISCUSSION

What is known of the behavior, habitat, distribution, and taxonomy of wintering Olive-sided Flycatchers and Swainson's Thrushes? Can we pinpoint the winter quarters of their Sierran populations? Scarcity of information on the two species makes this discussion uncomfortably speculative; may tropical ecologists who handle live birds be inspired to record measurements, molts, and subspecific identity! For behavior we rely on closely-related species, for habitat we embrace new findings at odds with conventional ecology, and for distribution we must sort out conflicts in the literature and reidentify specimens. First, for a general understanding of Nearctic forest migrants in winter, we should realize that for the best-known species, winter losses, winter territoriality, a foraging niche the same as summer, tropical evolutionary origin, and (as proven by Waide 1980) lack of competition with resident species are all documented.

Briggs and Criswell (1979) and Ambuel and Temple (1982) discovered a decrease of North American forest migrants correlated with destruction of their winter habitat in Latin America, not their breeding habitat. Ramos and Warner (1980) and Rappole et al. (1983) explain that the decrease results from yearlong behavioral continuity, including fidelity to winter territory structurally similar to that of summer. Nearctic migrants therefore are as vulnerable in winter as in summer to loss of forest. The frivolous notion that "winter residents opportunistically fit into wintering communities wherever resources are available," was meticulously refuted by Waide (1981:151). Rappole and Morton (1985) showed by banding that the seeming abundance at the forest edge following cutting is illusory; these birds are on the move. Unlike their sedentary conspecifics in primary habitats they are condemned, through loss of their forest habitat, to become nomads and floaters. We who observe birds wintering in the Neotropics must not misconstrue the presence of temporary flocks at fruit trees, or during tropical storms, or during migration to

TABLE 2. *Contopus borealis* wintering on mountains of Central America.

|                           |                               |                                     |
|---------------------------|-------------------------------|-------------------------------------|
| Mexico:                   |                               |                                     |
| Michoacan, La Nieve       | 19 February 1983              | Robert Phillips (2, one a specimen) |
| Veracruz                  | December                      | Phillips et al. (1964)              |
|                           | January                       | Miller et al. (1957)                |
|                           | February 1985                 | Mario A. Ramos (specimen)           |
| Oaxaca                    | December                      | Phillips et al. (1964)              |
| Belize:                   |                               |                                     |
|                           | 20 February to 5 March 1957   | Russell (1964)                      |
|                           | 22 January to 6 February 1958 | Russell (1964)                      |
| El Salvador:              |                               |                                     |
| Mount Cacaguatique        | 3 January 1942                | MVZ 86001                           |
| Costa Rica:               |                               |                                     |
| Alajuela, 2,100 m         | 24 November 1934              | MVZ 108312                          |
| Guarabe [?]               | 13 January 190?               | FM 35774                            |
| Panama:                   |                               |                                     |
| Chiriqui, El Volcan       | 17 February 1960              | SI 471437                           |
| Cocle, head of Rio Guabal | 28 February 1962              | SI 476910                           |

MVZ = Museum of Vertebrate Zoology. SI = Smithsonian Institution. FM = Field Museum.

mean that Nearctic forest migrants wander around in search of berries or edges like a flock of robins or waxwings. The best-known species that exhibit site fidelity prove upon further study to have winter territories; the paragon is the Northern Waterthrush (*Seiurus novaboracensis*) color-banded in Caracas by Schwartz (1964).

Survival of a Wood Thrush (*Hylocichla ustelina*) in the Sierra de Tuxtla, Veracruz, depends on maintenance of its winter territory in primary forest (Rappole and Morton 1985). Dr. Mario A. Ramos told me about ongoing studies by Kevin Winker, John H. Rappole, and himself: Successfully overwintering Wood Thrushes are territorial individuals that stay within 50 m in prime habitat and return to the same spot each year, whereas floaters wander 1.5 km per day after their habitat is cut down. These latter seek prime habitat only to be kicked out by the Wood Thrush that already owns the territory. The floaters wind up being predated—all that is left is a radio beeper in a little pile of feathers.

#### BEHAVIOR

Olive-sided Flycatchers sing in winter in Mexico (Phillips et al. 1964). They are faithful to sites in Belize (Russell 1964); one bird stayed at least from 20 February to 5 March 1957, another remained on its area from at least 22 January to 6 February 1958, and "Nickell banded an individual at Middlesex on March 27, 1961, which he recaptured at exactly the same locality on March 9, 1962." A close relative, the Eastern Wood-

Pewee (*Contopus virens*) does defend small, contiguous territories against its own kind in winter (Fitzpatrick 1980) and we should expect the same from *Contopus borealis*.

A belated migrant Swainson's Thrush spent 12 to 18 November 1934 at my backyard in Altadena, California, where it foraged daily over the same circuit—even migrants can have territories (Schwartz 1964; Ramos, in press). It frequented a feeding station I maintained for Hermit Thrushes (*Catharus guttatus*), whose territorial aggression toward each other would collapse as soon as they recognized the Swainson's Thrush at close quarters, particularly if it turned to face them. Near Tuxtla, Veracruz, Ramos and Warner (1980) encountered flocks of wintering Swainson's Thrushes in lowland forest during storms, the birds having temporarily abandoned their territories at higher altitudes. My notes of 30 March 1942 at Los Esesmites, El Salvador mention that "At dusk one called on ridge of cloud forest from brush—heard here two previous evenings in same spot. Too dark to see it. Obviously a winter visitor on a regular winter territory." And thus John W. Fitzpatrick (in litt.) from Peru: "In November and December we recapture the same individuals repeatedly in the same stretch of nets, which has always led me to suspect that these home ranges may be defended as territories."

Though we lack an observation of Swainson's Thrushes defending winter territories against each other, we may assume they do it because their

TABLE 3. Wintering subspecies of Swainson's Thrush, from mountains in Central and South America during December, January, and February.

I. Western, russet races with small, brown spots on buff chest and with tail ruddier than back:

A. *Catharus ustulatus ustulatus*. Breeds along north-west humid coast. Russet brown back and flanks.

|             |   |
|-------------|---|
| Tres Marias | SI 37318  |
| Veracruz    | KU 23938 (Queen Charlotte population), SI 187475 and 360036 |
| Campeche    | FM 121277-121278  |
| Colima      | WF 7607   |
| Guerrero    | MVZ 112311  |
| Oaxaca      | WF 13657-13658, 13660-13668, 30969                          |
| Chiapas     | WF 7600, 7886-7887, 14526                                   |
| Guatemala   | FM 23309  |
| El Salvador | FM 109823-109824, MVZ 86250-86251                           |
| Panama      | SI 471560   |

B. *Catharus ustulatus oedicus*. Breeds in California and inland Oregon and Washington. Grayish brown back and flanks (= paler and duller than *C. u. ustulatus*).

|             |  |
|-------------|--|
| Tres Marias | SI 52785   |
| Colima      | WF 7598, 7606  |
| Oaxaca      | FM 119764  |
| Chiapas     | SI 142459  |
| Guatemala   | FM 212866  |
| Honduras    | FM 118678  |
| El Salvador | The specimen from Los Esesmiles, 25 February 1927 (Dickey and Van Rossem 1938) is not <i>C. u. swainsoni</i> , but is <i>C. u. oedicus</i> (Allan R. Phillips, pers. comm.); MVZ 86252-86253 |

The specimen from Panama identified as *C. u. oedicus* by Wetmore et al. (1984), SI 457921, 2 March 1953, is actually a *C. u. swainsoni* migrant.

II. Eastern, olive races with large, black spots on cream chest and with tail concolor with the back:

A. *Catharus ustulatus almae*. Breeds in the Rocky Mountains. Olive gray back, tail and flanks.

|          |                       |
|----------|-----------------------|
| Colombia | FM 226810, MVZ 138753 |
| Bolivia  | FM 294493, 294497     |
| Peru     | FM 190129, MVZ 159263 |

An off-base specimen *C. u. almae* from Isla Cebaco, Panama, SI 486000, 20 January 1965 is mentioned in Alexander Wetmore's field notes as "probably an early migrant" from a lowland farm area.

B. *Catharus ustulatus swainsoni*. Breeds transborrealy and south in eastern mountains to West Virginia. Olive back, tail, and flanks.

|          |  |
|----------|--|
| Colombia | FM 226809, 249110, 250933-250934, 292662-292663, 292665-292667; MVZ 93944, 138752; SI 444728 |
| Ecuador  | FM 124876, 127269, 175604  |

TABLE 3. Continued.

|         |  |
|---------|--|
| Bolivia | FM 62608, 181673, 294486, 294494-294496, 294498-294500 |
| Peru    | FM 190001, 249516, 284961-284962; MVZ 163949           |

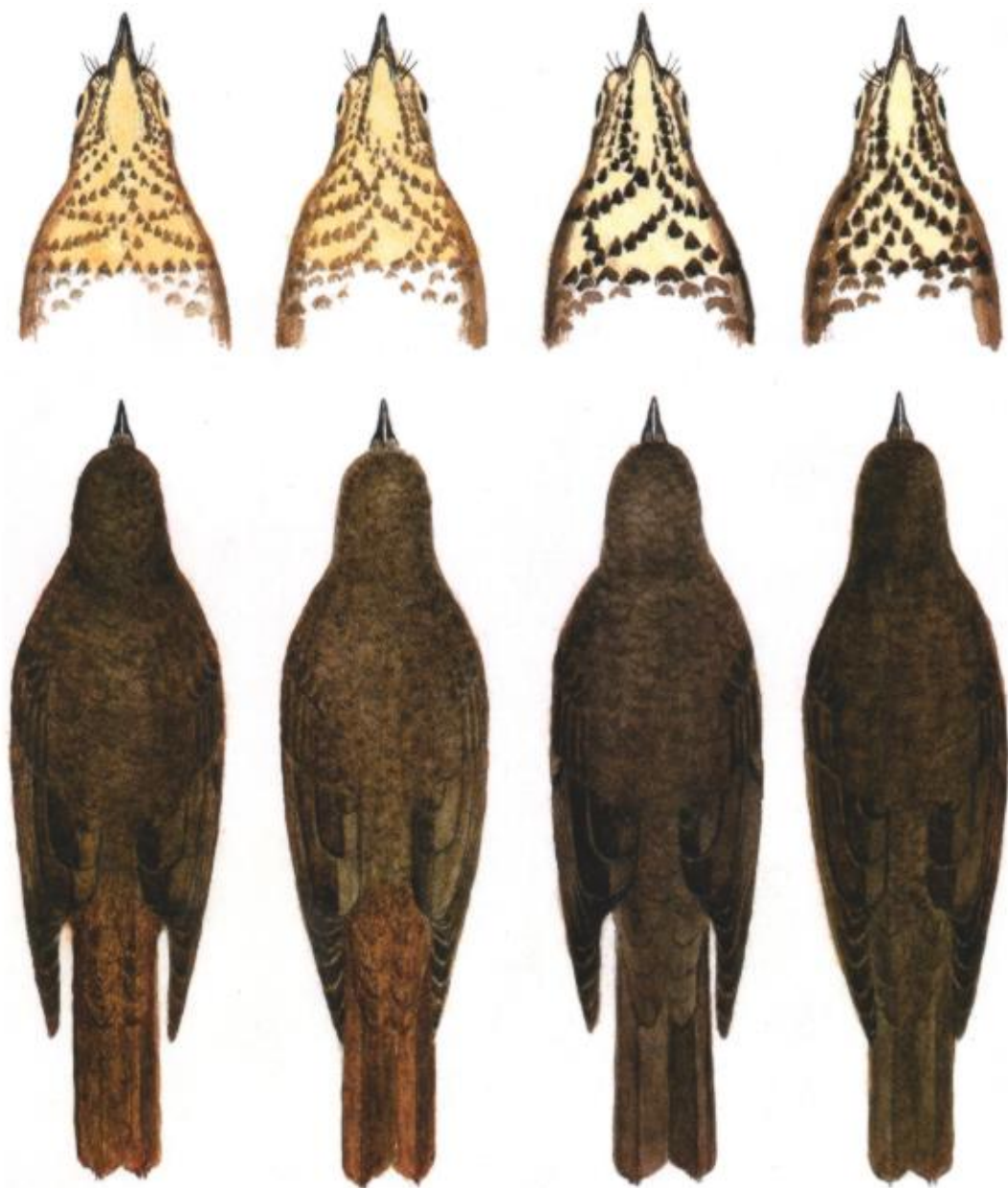
SI = Smithsonian Institution, KU = University of Kansas, FM = Field Museum of Natural History, WF = Western Foundation of Vertebrate Zoology, MVZ = Museum of Vertebrate Zoology.

close relatives do. The Wood Thrush defends winter territories (Rappole and Warner 1980). In 1934 I attracted wintering Hermit Thrushes to cuttings of toyon berries kept fresh in water bottles underneath bushes, where birds were oblivious to an observer sitting still. They also came to bathe in my artificial, ground-level pool. The territorial owner, alerted by the peculiar sound of long hops in the dry leaves, would threaten the intruding Hermit Thrush by a faint lisp sound and modified stance. Two individuals divided my backyard. Each sat still at midday inside its favorite bush and occasionally spat up pits from digested berries. These same perches, including one beside the bird bath, were used in successive winters. My observations of these tame Hermit Thrushes fit the description of wintering, color-banded Northern Waterthrushes by Schwartz (1964) insofar as unmarked birds are comparable.

HABITAT

The Olive-sided Flycatchers I collected in El Salvador in 1941 to 1942 were in tops of tall trees in oak-pine forest of Mt. Cacaguatique and pine forest at Los Esesmiles; whereas Swainson's Thrushes swarmed in all natural forests and edges in migration as well as winter. Because wintering Swainson's Thrushes are usually found in high mountains, I mention their great numbers at Lake Olomega, sea-level swamp forest, in January to February 1942.

In Colombia, Miller (1963) could tell from the call notes that eastern Swainson's Thrushes, numbering three or four within 180 m, occupied the cloud forest from 15 October to 11 April. John W. Fitzpatrick wrote me that "The principal wintering habitat of *Catharus ustulatus* in southern Peru is primary, humid, evergreen, upper tropical forest. We definitely find Swainson's Thrush to be a forest interior bird, although it can be seen in migration virtually everywhere, from well east of the Andes up to 2,000 m. Its



*ustulatus*

563956

*oedicus*

564873

*almae*

577133

*swainsoni*

536514

FIGURE 5. Identification chart of Swainson's Thrush subspecies, slightly exaggerated. From specimens (numbered) in Division of Birds, Smithsonian Institution. Symmetrical arrangement of spots on *Catharus ustulatus ustulatus* is from field sketches of a bird that visited my thrush feeding station at Altadena, California, in November 1934.

peak abundance falls between 500 and 1,500 m. It is very common at fruit trees.”

#### DISTRIBUTION AND TAXONOMY

Table 2 shows that the Olive-sided Flycatcher includes more than the mountains of South America to southeastern Peru in its winter range. Whether or not different breeding populations are correspondingly distributed apart from each other in winter might be determined if one person, building upon Todd's (1963) excellent start, could examine all existing museum specimens so as to locate the wintering area of the distinctively oversized subspecies, *C. b. majorinus*. That taxon, with the most southern breeding area, in high mountains of southern California and northern Baja California, should have the shortest migration. If Sierran birds were intermediate (say a wing chord of 112 mm for males, about 105 mm for females) in size and color between *C. b. majorinus* and eastern birds, their winter quarters might be identifiable somewhat to the south of winter *C. b. majorinus*. The plight of the Sierran birds should inspire such a study. It will be complicated by the winter molt of adults and the dark color of immatures (Rand and Traylor 1954) with their rich brown trimming, almost chestnut. Could these immatures be one of Todd's (1963) “color phases”?

Separate winter distribution of eastern and western groups of Swainson's Thrush subspecies (Bond 1963, Ramos and Warner 1980) implies the possibility of correspondence between summer and winter grounds of particular populations. The dividing line is the low part of Panama at the canal, where none winters (Allan R. Phillips, pers. comm.). I identified museum specimens of *C. ustulatus* using color traits discovered by Rand and Traylor (1954), Bond (1963), Phillips et al. (1964), Phillips (pers. comm.), Ramos and Warner (1980), and Ramos (1983 and pers. comm.). Differences (correlated with breeding area) in the size and color of spots, the chest color between the spots, the color of the flanks, the color of the back, and the contrast between tail and back colors (Fig. 5 and Table 3) make identification of subspecies possible. I hope that banders will identify the races so as to delineate more accurately the winter ranges that I attempt to define in Table 3, from which it appears that the two western races overlap north of Panama.

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