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THE BREEDING AVIFAUNAS OF THE SHEEP AND SPRING RANGES IN SOUTHERN NEVADA

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The Charleston or Spring Range, rising to nearly 12,000 feet in Clark County, Nevada, has long been of interest to students of biogeography because of the insular and partly endemic flora and fauna occupying its upper elevations. Van Rossem (1936), Burt (1934), and Clokey (1951) discuss the birds, mammals, and plants, respectively, of these mountains. The adjacent Sheep Range, whose two main peaks rise to approximately 9700 and 9900 feet, is approximately 20 miles northeast of the Spring Range and is separated from that range by a warm desert gap 2800 feet in elevation at its lowest point. The Sheep Range has received little attention from naturalists, and other than the scattered records offered in van Rossem (1936) and in Gullion, Pulich, and Evenden (1959), the breeding avifauna has not been surveyed previously.

These two ranges are the highest in southern Nevada and support on their upper slopes extensive coniferous forest and woodland well isolated by expanses of desert from similar vegetation on other mountaintops in the southwestern United States. Van Rossem (1936) appropriately examined the affinities of the summer resident birds of the Spring Range and concluded that the mountains supported an impoverished Rocky Mountain avifauna that showed some evidence of Sierran-Inyo relationships. After van Rossem's fifteen weeks of field work, many species were inexplicably unrecorded, partly because he neglected to collect during the early summer in his quest for specimens in fresh plumage. Therefore, further exploration was carried out from June 3 to 26, 1963, by a field party from the Museum of Vertebrate Zoology which included Gene M. Christman and Richard A. Fletcher in addition to the author. Alden H. Miller worked with us in the Sheep Range from June 7 to 12. From June 26 to 28, 1963, additional collections and observations were made in the Clover Mountains which lie southeast of Caliente in Lincoln County, Nevada, where an isolated conifer-dependent avifauna also breeds. The Clover Mountains provide an intermediate station between the Sheep Range and the Snake Range of White Pine County in east-central Nevada, from which a coniferous forest avifauna is known (Linsdale, 1936; N. K. Johnson, MS), and the records obtained in the Clover Mountains are of interest for comparative purposes.

The results of our recent field efforts in the Sheep and Spring ranges have proved so interesting in the light of the earlier published work that a re-analysis of the geographic relationships of the breeding avifaunas of the coniferous forests and woodlands in southern Nevada is appropriate. The following pages document the conclusions that: (1) the breeding avifaunas of these ranges are much more extensive than indicated by van Rossem (1936); (2) endemism in birds is more limited than van Rossem believed; (3) pronounced differences exist between the montane avifaunas of the Spring Range and Sheep Range, chiefly as a result of the presence in the latter range of a group of species with distributions centered in the mountains of Arizona and México.

ACKNOWLEDGMENTS

I wish to thank Gene M. Christman, Richard A. Fletcher, and Alden H. Miller, who gathered a large share of the specimens and observations upon which this report is based and who provided scintillating companionship in the field. Charles G. Hansen and Newell Morgan of the United States Fish and Wildlife Service, Las Vegas, Nevada, were extremely helpful in arranging for our stay in the Sheep Range and in furnishing information about the habitats and physiography of the area. Gordon W. Gullion provided information on roads, camps, and habitats in the Clover Mountains region. For the identification of plant specimens I am indebted to Donald G. Cooney of the Department of Biology, University of Nevada, and to the staff of the Herbarium of the University of California, Berkeley. Help in the assembling of data and in the shaping of the manuscript was offered by George T. Ferrell and Mercedes S. Foster at the Museum of Vertebrate Zoology. The manuscript was read by Richard C. Banks and Lester L. Short, Jr., who offered helpful suggestions. Gene M. Christman drafted the map and painted the watercolors.

ITINERARY AND COLLECTING STATIONS

From June 3 to 14, we camped in the Sheep Range at Hidden Forest Cabin, a field station of the United States Fish and Wildlife Service, at 7900 feet in Hidden Forest Canyon. From this station we collected on the surrounding slopes and ridges, westward down the canyon to 6000 feet, and northward and northeastward to the vicinity of Hayford Peak, 9900 feet. On June 16 we started field work in the Spring Range, establishing our first camp at 8900 feet in a small canyon running eastward into Lee Canyon, approximately three miles north of Charleston Peak and one mile west of the Lee Guard Station. Until June 20 we worked the forested slopes and ravines between 8400 and 9600 feet in the vicinity of this camp; side trips by truck were made to Lee Canyon, between 7700 and 8500 feet, and to Macks Canyon, between 7700 and 8100 feet. From the evening of June 20 to the morning of June 26, we camped at a spring at 8100 feet in Macks Canyon and worked the canyon bottom and adjacent ridges and slopes between 7700 and 8500 feet. Side trips on foot were made to the southwest over the divide between Macks Canyon and McFarland Canyon, and northward, down the latter canyon to 7500 feet. From the evening of June 26 until the morning of June 28, camp was established in the Clover Mountains, Lincoln County, at a point one-half mile east of Ella Mountain, 7200 feet. Field work at this locality was almost entirely in the ponderosa pine–Gambel oak zone at the ecotone with piñon woodland.

VEGETATION ZONES

This report primarily concerns the breeding avifaunas of montane woodlands and forests in the Sheep and Spring ranges. Because the vegetation is considerably intermixed in each of these ranges, as was pointed out by both van Rossem (1936: 6–9) and Burt (1934:380–384), I have found it appropriate to recognize only three arboreal formations: MONTANE WOODLAND—spaced or clumped piñon (*Pinus monophylla*), juniper (*Juniperus osteosperma*), mountain mahogany (*Cercocarpus ledifolius*), or aspen (*Populus tremuloides*), as pure stands or intermixed; LOWER MONTANE FOREST—open stands of ponderosa pine (*Pinus ponderosa*) which at higher elevations are intermingled with clumps of white fir (*Abies concolor*), particularly in cool, shady situations; GREAT BASIN SUBALPINE FOREST—stands of bristlecone

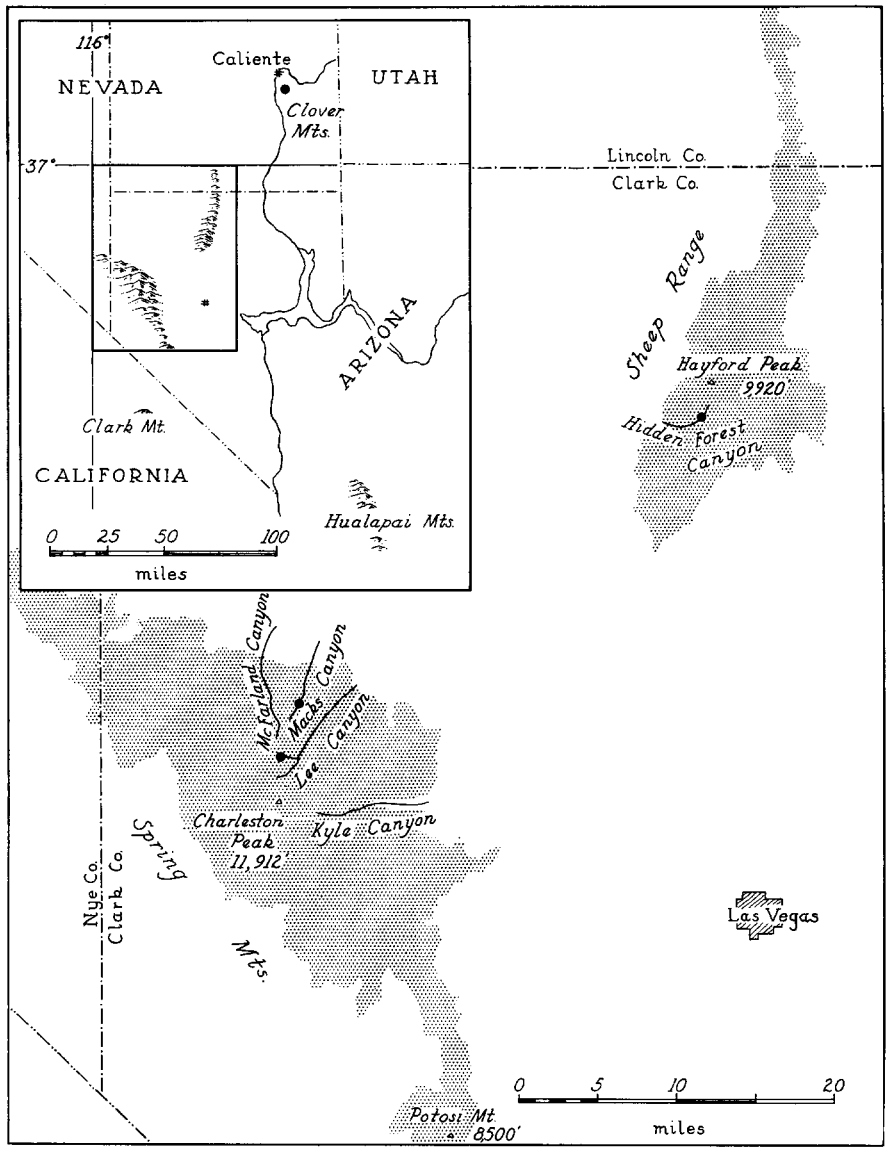

Fig. 1. Map of southern Nevada showing localities mentioned in text. Extent of woodland and forest zones in the Sheep and Spring ranges is indicated by stippling. Dots show the locations of camps.

pine (*Pinus aristata*) and limber pine (*Pinus flexilis*) which in the mountains under consideration are often intermixed with white firs, especially at lower elevations. Following the system of Billings (1951:116–118), in the Spring and Sheep ranges, above the piñon-juniper zone is found the yellow pine-white fir zone of the Wasatch Series, above which is the limber pine-bristlecone pine zone of the Basin Range Series. The occurrence of three major zonal groupings of conifers in the high ranges

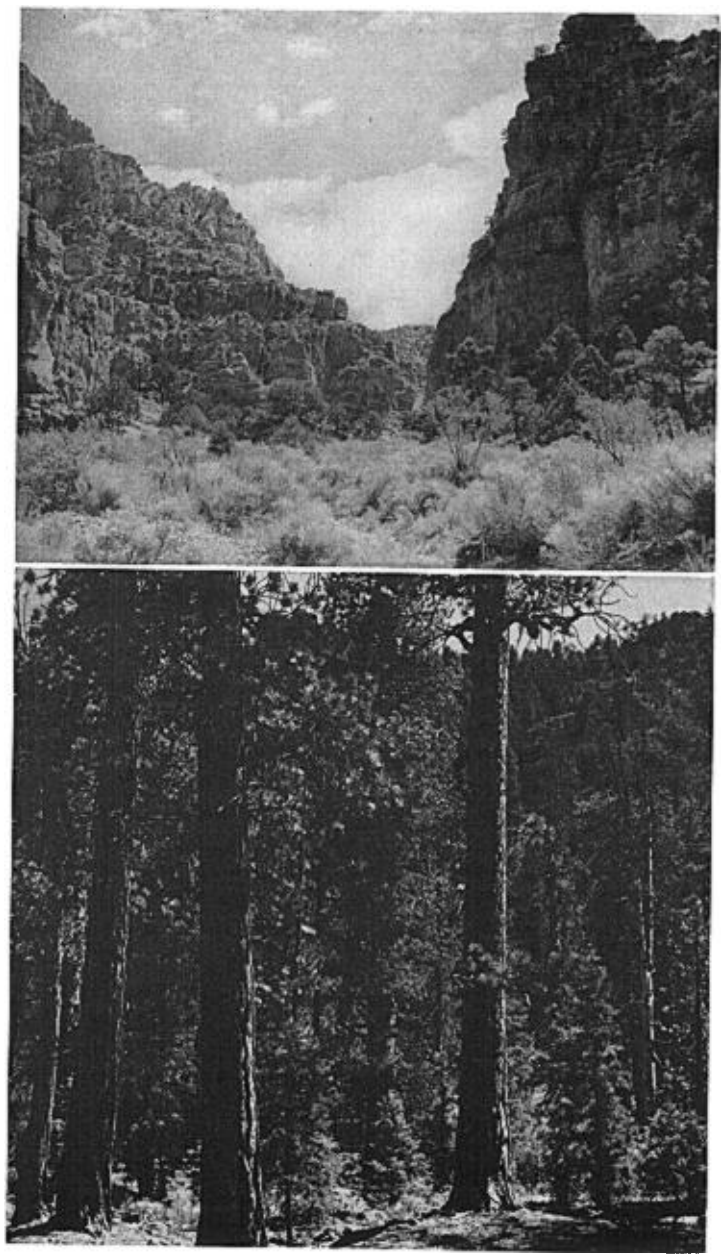

Fig. 2. Upper: Hidden Forest Canyon, 6400 feet, Sheep Range. Looking northeast at lower edge of piñon-juniper woodland. Black-chinned Sparrows lived in mixed brush in the canyon bottom, June 14, 1963. Lower: old-growth lower montane forest of ponderosa pine and white fir in Hidden Forest Canyon, 7900 feet, Sheep Range, June 10, 1963.

of southern Nevada undoubtedly accounts for the presence there of relatively diverse avifaunas as compared to other adjacent mountain systems on the southwestern deserts. However, numbers of summer resident species are still far below those of the breeding avifaunas of the Rocky Mountains and the Sierra Nevada.

SPECIES ACCOUNTS

In the following accounts, information is provided on relative abundance, altitudinal distribution, and ecological distribution for each species of bird. Subjective estimates of abundance are indicated by the adjectives abundant, common, fairly common, uncommon, and rare, according to the general definitions of these terms as given in Grinnell and Miller (1944:10). Elevational limits cited pertain to our records, although, where noted, they are supplemented by those of van Rossem (1936); actual limits were not obtained for all species. Detailed data on gonad sizes and dates for specimens collected are offered as documentation of breeding or migrant status and timing of reproduction. The general locality of collection for a particular specimen may be determined by checking the date provided with that of the itinerary. Particular attention should be given to the differences in composition and relative abundance of species in the two ranges and to the differences, apparent or real, between our recent findings in the Spring Range and the findings of van Rossem in the early 1930's. Both scientific and vernacular nomenclature follow the American Ornithologists' Union Check-list (1957), unless otherwise noted.

Cathartes aura. Turkey Vulture. The breeding of this species in southern Nevada is uncertain; most records seem to be of migrants (Gullion *et al.*, 1959:282). We did not record it in the Sheep Range. Single birds were seen on June 15 near the Kyle Canyon highway at 3400 feet, and on June 26 near the Lee Canyon highway at 5500 feet in the eastern foothills of the Spring Range. Jaeger (1927:3) saw five birds of uncertain breeding status soaring over Charleston Peak on June 21, 1926.

Accipiter gentilis atricapillus. Goshawk. Van Rossem (1936:19) reported that Burt and Dawson found a nest with nearly grown young attended by both parents in July, 1929, at Hidden Forest, Sheep Range. We found no evidence of this species in the Sheep Range and from the appearance of the high country conclude that this area is marginal for the Goshawk. In the Spring Range van Rossem recorded this hawk only in the fall, although he believed the species to be resident. Our summer records document the presence of a small breeding population. In Lee Canyon, 8500 feet, on June 20, one flew over the ponderosa pine-white fir timber. In Macks Canyon, 8100 feet, on June 22, an adult male was taken in pine-fir on a steep hillside near a spring. The left testis of this individual measured 10×3 mm., suggesting postbreeding condition. The body weight was 687.9 gm.

Accipiter cooperii. Cooper Hawk. In the Spring Range an adult male (testis 8×3 mm., 305.4 gm., small bird in crop) was shot in ponderosa pine, piñon, and mahogany in Lee Canyon at 7600 feet on June 18; it was presumably a local resident. Previous records of this hawk for both the Spring and Sheep ranges were for the fall months. In the Clover Mountains an adult female (459.2 gm., fat, bird remains in crop) was shot at a nest in a ponderosa pine on June 27. The ovary contained four collapsed follicles and the bird possessed an incubation patch, suggesting that the nest held eggs. These records document the southern extent of the breeding range in Nevada.

Buteo jamaicensis. Red-tailed Hawk. One record for the Sheep Range, that of an individual seen flying over Hidden Forest Canyon, 7000 feet, June 13. In the Spring Range, van Rossem (1936:20) and Jaeger (1927:3) found the species in the nesting season. We observed it near camp three miles north of Charleston Peak at 8900 feet, on June 17 and over a nearby ridge at 9200 feet, on June 20. A pair of Red-tails excited by our presence at Macks Canyon, 8100 feet, was seen several times between June 19 and 25. In the Clover Mountains a pair of adults screamed near a nest in a ponderosa pine stand on June 26 and 27.

Fig. 3. Looking northeast at 8500 feet, above Hidden Forest Cabin, Sheep Range. Ecotone of mature bristlecone pine subalpine forest (right) and ponderosa pine lower montane forest (left). June 13, 1963.

Aquila chrysaëtos. Golden Eagle. We did not record this species. Van Rossem (1936:20) mentions records for Lee Canyon that indicate summer residence in the Spring Range.

Falco sparverius. Sparrow Hawk. Reported as a fall migrant by van Rossem (1936:21), who found no evidence that this species breeds either in the Spring Range or on the adjacent desert. Gullion *et al.* (1959:283) likewise list the Sparrow Hawk as a migrant, although their records nearly span the breeding period. The following summer records are therefore of interest: In the Sheep Range one was seen in the top of a pine snag at Hidden Forest Cabin, 7900 feet, June 6, and another was noted in the top of bristlecone pine in subalpine forest east of Hayford Peak, 8800 feet, on June 13. In the Spring Range one was seen in piñon-juniper in Lee Canyon, 7000 feet, June 16, and a pair called loudly around a large ponderosa pine snag at the lower edge of the pine forest near Macks Canyon, 7800 feet, on June 24.

Meleagris gallopavo. Turkey. We recorded one Turkey in pine-fir three miles north of Charleston Peak, 8900 feet, on June 17, and four in juniper-pine-fir at Macks Canyon, 8100 feet, on June 21, in the Spring Range. No native Turkeys are known to occur in this region; thus we assume that these individuals were part of two plantings, totalling 44 birds, made on February 8, 1960, and on March 6, 1962, by the Nevada Fish and Game Commission in the vicinity of the Cold Creek Field Station, Spring Range, from stocks wild-trapped in Arizona (Glen C. Christensen, *in litt.*, November 20, 1963).

Columba fasciata monilis. Band-tailed Pigeon. One was noted flying high over Hidden Forest Canyon, 7500 feet, on June 5, and a juvenal female was taken (ovary inactive, small skull windows, 209.5 gm., no fat) at Hidden Forest Cabin, 7900 feet, on June 11, in the Sheep Range. In the Spring Range the following records were obtained: an adult was seen in circling flight over a canyon and later heard calling in pine-fir timber three miles north of Charleston Peak, 9500 feet, on June 17; an individual was heard calling in scattered ponderosa pine, white fir, and juniper in Macks Canyon, 7800 feet, on June 21; and a female accompanied by a male was taken from the top of a pine snag in virgin pine-fir in Macks Canyon, 8500 feet, on June 24. Although fat (356.2 gm.), this female was ready to lay; the ovary held several yellow ova enlarged to over 5 mm. in diameter. The crop held 38 piñon pine nuts which may indicate that this species can subsist in desert ranges lacking acorns when piñon nuts are available as substitute food. The recent record of this species in the Panamint Range, California (Paige, 1964), provides further evidence for this view. In the Clover Mountains, Lincoln County, two were seen in ponderosa pine and Gambel oak (*Quercus gambelii*) at 7200 feet on the east side of Ella Mountain, on June 27.

There is but one previous verifiable report of this species in Nevada, that of a fall vagrant taken four miles west of Fallon, Churchill County (Alcorn, 1941:119), although Neff (1947:20) reported that Couch observed an adult near Success Divide, Duck Creek Range, on November 4, 1943. From the foregoing records it seems probable that this species is a widespread resident in ponderosa pine forests of southeastern Nevada. Assignment of the specimens to the race *monilis* of the Pacific coastal drainage rather than to the Rocky Mountain and Sierra Madrean *fasciata* is tentative in view of the small sample. The adult female is closer to average *monilis* in wing length (208 mm.), although within the limits of variation of *fasciata*. In dorsal coloration this specimen is dark like *monilis*. Further sampling, particularly of the Clover Mountains and Sheep Range populations, may well show that the Band-tailed Pigeons of southern Nevada are actually intermediate, or even closer to *fasciata*, which is the racial assignment expected on geographic grounds.

Zenaida macroura. Mourning Dove. Van Rossem (1936:23) found this species in the Spring Range to be "of sparse though general distribution in the mountains up to 8700 feet altitude, principally in the yellow pine parks." However, he noted that there was no evidence of breeding in the Spring Mountains. We repeatedly saw pairs, presumably mated, in Hidden Forest Canyon, Sheep Range, between 7000 and 8200 feet, during our stay there in early June.

Otus asio cineraceus. Screech Owl. On June 3, in the Sheep Range, a male (testis 5 × 3 mm., 105.5 gm., no fat, moths in stomach) was taken in Hidden Forest Canyon at 8100 feet, from a mixed forest-woodland composed of ponderosa pine, bristlecone pine, white fir, piñon, and mountain mahogany. Two males of *Otus flammeolus* were stationed nearby. Another individual gave rapid, whining trills repeatedly in response to imitated calls in scattered pines and piñon-juniper in the same canyon at 6700 feet on June 7. Miller and Miller (1951:169) list two specimens from the north side of Potosi Mountain, 5800 feet, in the Spring Range. Van Rossem did not find the species in the mountains of southern Nevada.

Otus flammeolus flammeolus. Flammulated Owl. This owl was common in the Sheep Range in ponderosa pine and white fir in Hidden Forest Canyon from 7200 to 8200 feet, above which no nighttime hunting was attempted. Hansen found a dead male floating in Wiregrass Spring when we arrived at Hidden Forest Cabin on June 3; it was prepared as a skeleton. As many as five males were called in by the author during a two-hour evening hunt. In the Spring Range the Flammulated Owl was common in a canyon three miles north of Charleston Peak, between 8700 and 8900 feet, from June 16 to 19, where it occurred chiefly in ponderosa pines, bristlecone pines, and white firs. Aspen and mahogany were used to a lesser extent. As many as four males were heard in one evening. In Macks Canyon we obtained only one certain record, that of a very responsive male calling in heavy white fir and ponderosa pine at 8100 feet on June 25. The timber below that elevation has been destroyed extensively by lumbering which may account for the apparent absence of this owl in lower Macks Canyon. In the Clover Mountains, Lincoln County, a male was taken in ponderosa pine and Gambel oak at 7200 feet on the east side of Ella Mountain on June 26. He appeared before dark in a group of young pines, apparently in

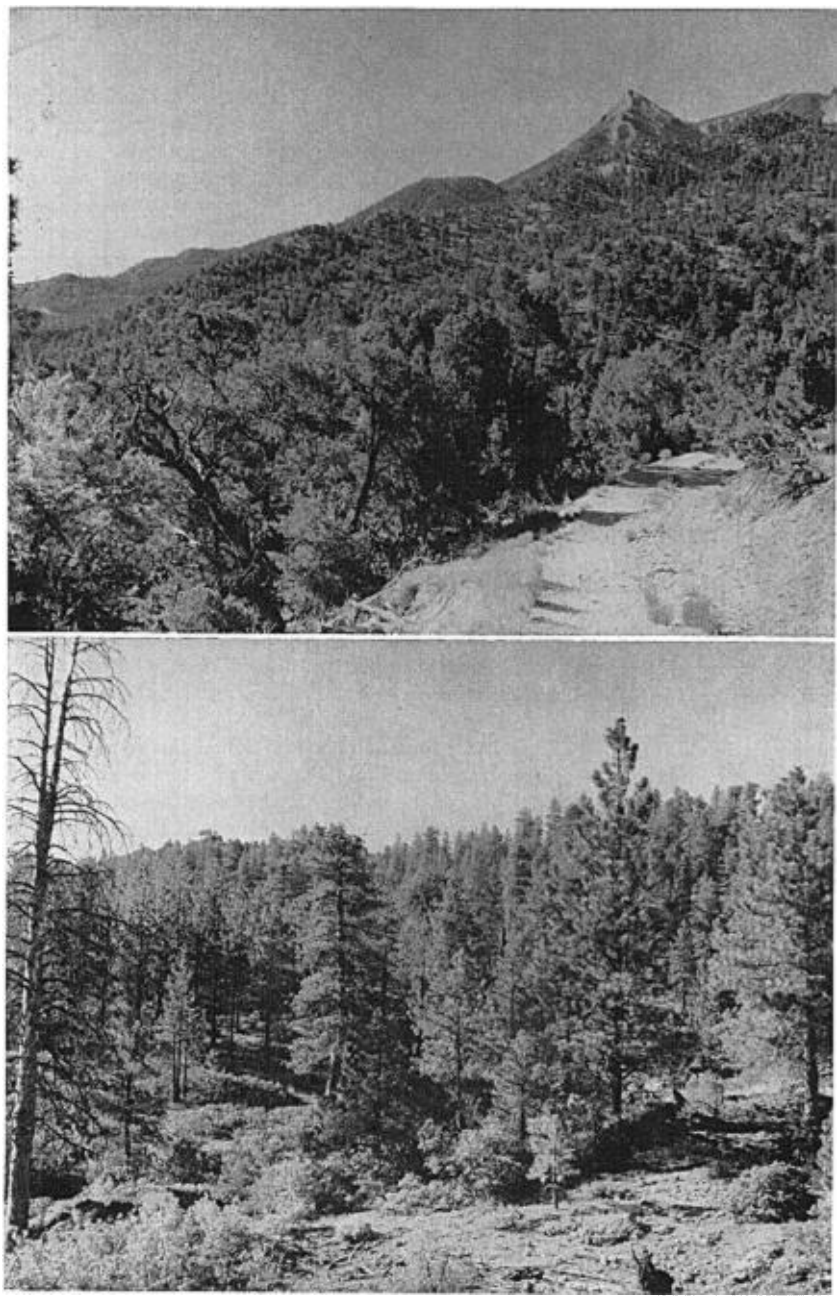

Fig. 4. Upper: looking south at 7700 feet across mixed piñon-juniper-mahogany woodland along Macks Canyon-Lee Canyon road, Spring Range. Lower edge of ponderosa pine-white fir belt can be seen on the slopes in the distance, June 26, 1963. Lower: residual ponderosa pine stand on north-facing slope at 7100 feet, Ella Mountain, Clover Mountains, Lincoln County, Nevada, June 28, 1963.

response to imitated Pigmy Owl (*Glaucidium gnoma*) whistles, and gave low-pitched aggressive hoots. Three other Flammulated Owls were found that evening, two of which repeatedly returned to a probable nest cavity in the dead top of a pine at the edge of a manzanita (*Arctostaphylos pungens*) field.

Data on gonads, weights, fat, and dates, respectively, are: ♂ ♂, testis 8 × 5 mm., 51.2 gm., slight fat (June 3); 5 × 4, 55.0, no fat (3); 8 × 5, 40.1 (starved), no fat (8); 6 × 4, 51.3, no fat (16); 4 × 3, 48.3, no fat (26). ♀, laying and with brood patch, 42.4 (starved), no fat (8). All of these birds had eaten various insects, among which were moths and beetles. The male and female taken on June 8 were evidently a mated pair, for they were captured within an hour at the same net emplacement. This pair died in an emaciated condition after several days in captivity despite nightly consumption of bird carcasses placed in their cage.

There have been no previous reports of this species in southern Nevada although Miller (1940:162) predicted the occurrence on geographic grounds. This owl probably breeds throughout the southeastern part of the state in mountainous regions where ponderosa pine and/or white fir occur.

Bubo virginianus. Horned Owl. Surprisingly, we obtained only one record of this species. On June 7 one called in the late morning from cliffs in the piñon zone in Hidden Forest Canyon, 7000 feet, in the Sheep Range.

Asio otus. Long-eared Owl. Calls attributable to this owl were heard in Hidden Forest Canyon, 7000 feet, Sheep Range, on June 6, and at three miles north of Charleston Peak, 8700 feet, Spring Range, on June 18. Although this species breeds in Las Vegas Valley (Gullion *et al.*, 1959:285), there is still no conclusive evidence of nesting in either the Spring or Sheep ranges.

Glaucidium gnoma californicum. Pigmy Owl. A male (testis 6 × 2 mm., 64.1 gm., rodent in stomach) was taken by Miller in Hidden Forest Canyon, 7500 feet, on June 11, in mixed ponderosa pine and piñon. This is the only verifiable record of this species in Nevada away from the Carson Range in the Lake Tahoe area (Johnson, 1956:449–450), and it represents a locality well isolated from breeding populations in adjacent states. Jaeger (1927:3) previously offered a sight record of this species in the Spring Range which van Rossem regarded as a misidentification of *Aegolius acadicus.* From the description given by Jaeger of the behavior of his bird, however, it seems probable that the Pigmy Owl was indeed involved.

Aegolius acadicus. Saw-whet Owl. Van Rossem reported June records from Kyle Canyon in the Spring Range. We did not record this species, although in both the Sheep and Spring ranges we observed that small birds were generally more responsive to imitated calls of the Saw-whet Owl than to imitated Pigmy Owl notes. This may indicate the greater abundance or more widespread occurrence of the former species, although the populations of both owls are undoubtedly small.

Caprimulgus vociferus arizonae. Whip-poor-will. At 4:15 a.m. on June 5, when the air temperature was 34° F., a Whip-poor-will called approximately 20 times from the hillside near Wiregrass Spring at Hidden Forest Cabin, 7900 feet, in the Sheep Range. The calls were apparently delivered in response to imitated whistles of the Saw-whet Owl given by Johnson. Because the last calls were heard shortly before daybreak, this individual probably roosted in the vicinity of Wiregrass Spring. That evening Christman fired at a calling Whip-poor-will perched in a pine snag at 7200 feet in the canyon bottom below camp. The following day at noon, near the same place, Johnson collected a male (testis 13 × 8 mm., 48.6 gm., no fat, insects in stomach) that flushed from the ground in a thicket of young white firs, currant (*Ribes*), and rabbitbrush (*Chrysothamnus*) in a notch shaded by large conifers at the base of north-facing cliffs. This individual had dried blood on the feathers when retrieved, and probably had been wounded the previous evening. On the night of June 9, sharp notes, *whick-whick-whick-whick*, heard coming from the fir-covered north-facing slope at 8000 feet above camp, were presumed to have been delivered by a Whip-poor-will, possibly the bird that had called near Wiregrass Spring several mornings previously. Therefore, at least two individuals were present in Hidden Forest Canyon during our visit, indicating the presence there of a small breeding population. This surprising occurrence extends the known breeding range of this species approximately 130 miles north-north-

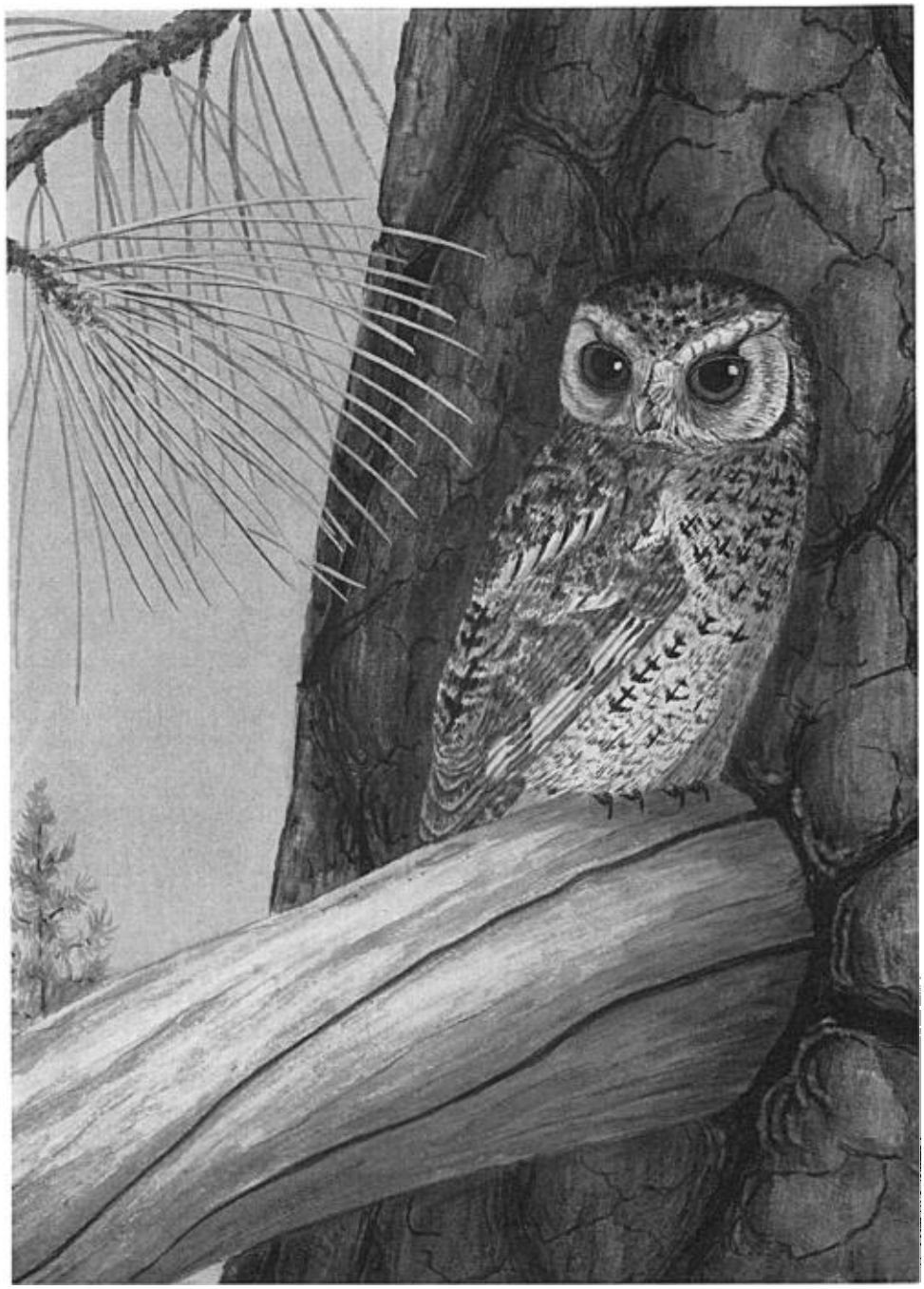

Fig. 5. Flammulated Owl. From a painting by Gene M. Christman.

west from the nearest previously reported population in the Hualapai Mountains, Mohave County, Arizona (Phillips *et al.*, 1964).

Phalaenoptilus nuttallii nuttallii. Poor-will. The Poor-will was common in Hidden Forest Canyon, Sheep Range, between 7500 and 8200 feet. In the Spring Range the species occurred commonly in Macks Canyon from 7800 to 8200 feet, and at least three males were near camp at 8900 feet, three miles north of Charleston Peak. Gullion *et al.* (1959:286) reported a nest at 5000 feet on the northeast side of Potosi Mountain on April 24, 1952.

Data on gonads, weights, fat, and dates, respectively, are: ♂♂, testis 9 × 6 mm., 46.0 gm., no fat (June 3); 7 × 5, 48.0, moderate fat (7); 7 × 5, 50.4, fat (7). ♀♀, 2 mm. ova, 38.9, moderate fat (5); 3 mm. ova, 53.2, fat (7).

Chordeiles minor. Booming Nighthawk. We did not find this species in the Sheep Range. In the Spring Range, one was seen flying over piñon-mahogany woodland at 7800 feet in Macks Canyon. Van Rossem recorded the species in mid-July between 6000 and 7000 feet on the sage-juniper mesa at Cold Creek but did not detect it in the higher mountains during the breeding season. The vernacular name is that proposed by Grinnell and Miller (1944:209).

Aeronautes saxatalis. White-throated Swift. In the Sheep Range, two or three individuals were seen almost daily flying in Hidden Forest Canyon between 7500 and 8200 feet. A single bird was recorded flying over the piñon-juniper belt, one-half mile east of Macks Canyon, 7700 feet. Van Rossem presented mid-summer records for the Spring Range and fall records for both the Spring and Sheep ranges.

Selasphorus platycercus platycercus. Broad-tailed Hummingbird. Noted commonly in the bottom of Hidden Forest Canyon, Sheep Range, in the vicinity of currant patches and fir clumps, between 7500 and 8500 feet. Found to be numerous also in the Spring Range, as reported by van Rossem (1936:26).

Data on gonads, weights, and dates, respectively, are: ♂♂, testis 3 × 2 mm., 3.4 gm. (June 6); 2 × 2, 3.3 (21); 2 × 1, 3.3 (21). ♀♀, ovum 5 mm., 3.7 (11); ova enlarged, 3.8 (11).

Colaptes cafer collaris. Red-shafted Flicker. Van Rossem found no evidence of summer occurrence of this species in the Spring Range and was at a loss to explain its absence (1936:27). However, Grater (1939:125) found two nests in Kyle Canyon in July, 1938. We commonly recorded this woodpecker during our visit in both the Spring and Sheep ranges in timbered areas, generally between 7600 and 9000 feet. Reproductive condition of the specimens collected indicated that many individuals were laying or incubating. Active nest holes were seen at 8400 feet in the Sheep Range and at 8100 feet in Macks Canyon, Spring Range.

Data on reproductive condition, weights, fat, and dates, respectively, for seven specimens are: ♂♂, testis 13 × 8 mm., 136.9 gm. (June 4); 12 × 6, brood patch, 132.6, fat (17); 6 × 3, brood patch, 141.3, slight fat (20); 8 × 4, brood patch, 127.6, slight fat (21); testis minute (juv.), 105.1 (27). ♀♀, ova 4 mm., brood patch, 133.4, little fat (6); ova 3 mm., brood patch, 132.8, fat (17).

Sphyrapicus varius. Yellow-bellied Sapsucker. The Great Basin-Rocky Mountain race *nuchalis* was detected by van Rossem in the Spring Range only as an October visitant in small numbers.

In contrast, we found *nuchalis* breeding in fair numbers in ponderosa pines and white firs between 7900 and 8500 feet in the Sheep Range and between 7500 and 9000 feet in the Spring Range. The occurrence in the Sheep Range was particularly unexpected in view of the almost total lack of aspen trees in these mountains. In Hidden Forest Canyon, at 8400 feet, a mated pair (fig. 6) was taken at a nest hole 25 feet from the ground in a dead white fir. The female, a typical *nuchalis*, had laid three eggs, and the appearance of the ovary indicated that at least one more would have been laid. Her mate (MVZ 150286) was a Type 5 hybrid (see Howell, 1952:250) between the strongly characterized "races" *daggetti* and *nuchalis*. In McFarland Canyon, 8000 feet, in the Spring Range, a specimen (MVZ 150295) was taken that is a Type 6 hybrid and thus is very close to the Sierran race *daggetti*.

These records point out another area of hybridization between these races which were formerly known to interbreed only in restricted areas of northeastern and east-central California. Furthermore, the presence in the breeding season of *daggetti* (together with *nuchalis*) in the Hualapai Mountains, Mohave County, Arizona (Coppa, 1960:297), is now understandable because the

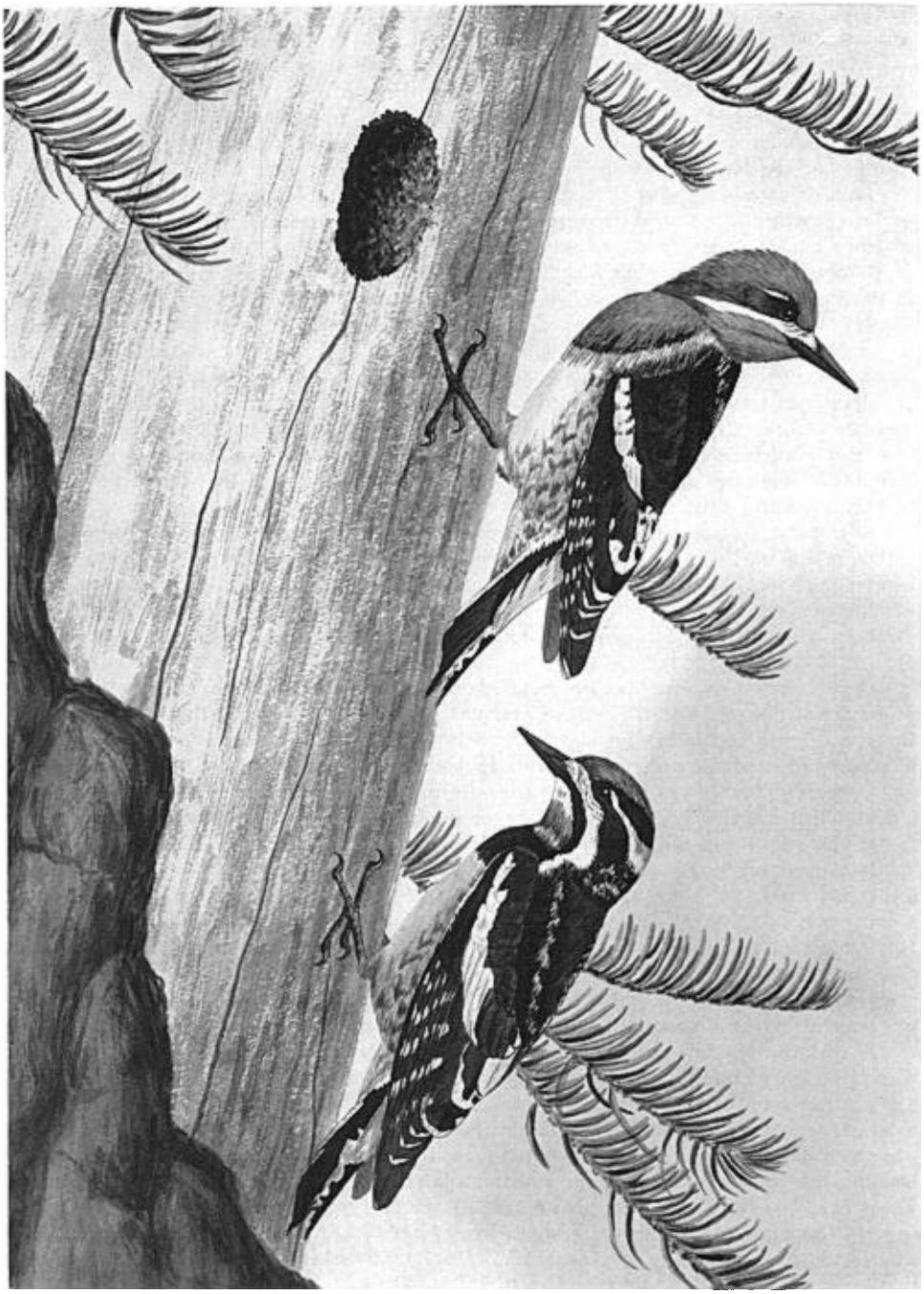

Fig. 6. Mated pair of Yellow-bellied Sapsuckers. From a painting by Gene M. Christman.

area of hybridization in southern Nevada is geographically intermediate between the populations in the Hualapai Mountains and those of *daggetti* in the Sierra Nevada.

Data on reproductive condition, weights, fat, and dates, respectively, are: ♂ ♂, testis 6 × 5 mm., 43.3 gm., medium fat (June 5); 6 × 5, 44.7 (10); 5 × 3, brood patch, 47.1, heavy fat (17); 5 × 3, brood patch, 46.5, very fat (20); 5 × 3, 46.8, medium fat (21); 7 × 4, 45.7, no fat (24). ♀ ♀, laying, brood patch, 46.9, moderate fat (6); laying, 48.7 (10); ova 2 mm., brood patch, 46.2, heavy fat (17); ova 1 mm., brood patch, 41.0, no fat (20); ova 1 mm., brood patch, 46.3, very fat (20); ova 1 mm., brood patch, 42.8, no fat (25).

Sphyrapicus thyroideus nataliae. Williamson Sapsucker. This bird was termed "rare" by van Rossem inasmuch as he recorded only four individuals in the Spring Range and two in the Sheep Range; all but one of these were found in the fall, leaving open the question of the summer residence status of the species. In the Sheep Range we found the Williamson Sapsucker to be fairly common between 8400 and 9200 feet in subalpine forest of bristlecone pine mixed with white fir and scattered ponderosa pine. The species seemingly occurred in greater numbers in the Spring Range, where as many as five individuals were recorded in one day between 8000 and 9600 feet, particularly above the 9000-foot level in mixed subalpine forest where limber pine was a principal constituent. A nest with young was noted on June 25 in a dead ponderosa pine at 8800 feet in Macks Canyon.

Data on reproductive condition, weights, and dates, respectively, are: ♂ ♂, testis 7 × 5 mm., brood patch, 55.3 gm. (June 5); 6 × 4, brood patch, 53.8 (10); 7 × 4, brood patch, 50.0 (10); 4 × 3, 47.3 (13); 6 × 5, 45.7 (16); 5 × 4, 44.4 (16); 5 × 3, 47.8 (17); 3 × 2, refeathering brood patch, 46.9 (17); 5 × 3, brood patch, 46.1 (17); 6 × 4, brood patch, 48.5 (18); 5 × 4, brood patch, 45.4 (20); 4 × 2, refeathering brood patch, 46.6 (24); 4 × 2, refeathering brood patch, 46.6 (24). ♀ ♀, brood patch, 47.0 (10); laying, brood patch, 46.4 (17); ova 1 mm., brood patch, 49.1 (24); ova 1 mm., brood patch, 44.8 (25); ova 1 mm., refeathering brood patch, 46.9 (25); ova 1 mm., brood patch, 46.4 (25).

Dendrocopos villosus leucothorectis. Hairy Woodpecker. Fairly common in the Sheep Range in lower montane forest between 7400 and 8400 feet; most individuals were recorded in ponderosa pine. Common from 7700 to 9600 feet in the Spring Range in ponderosa pine and white fir; scarce at higher elevations in limber pine. One nest was found at 9200 feet.

Data on reproductive condition, weights, and dates, respectively, are: ♂ ♂, testis 3 × 2 mm., brood patch, 63.3 gm. (June 9); 6, brood patch, 54.0 (9); 4 × 2, 61.1 (11); 5 × 2, 56.7 (13); 2 × 1, refeathering brood patch, 61.4 (19); 2 × 1, 67.0 (20); 3 × 2, brood patch, 66.1 (24); 4 × 2, 63.4 (27). ♀ ♀, ova 1–2 mm., brood patch, weight unrecorded (4); ovary inactive, 53.4 (18); ova 15 mm., brood patch, 56.9 (26); juvenile, ovary inactive, 51.5 (27).

Wing lengths for the seven males from Clark County range from 125.5 to 131.9 mm., with a mean of 127.4 mm.; two females measured 121.9 and 123.6 mm. The pair from the Clover Mountains, Lincoln County, have wing lengths as follows: ♂, 129.3; ♀, 127.3 mm.

In average size this series is intermediate between typical *leucothorectis* and *orius*; however, the clean specimens are whitish ventrally like the former race, hence the assignment is to that subspecies.

Empidonax traillii brewsteri. Traill Flycatcher. A migrant male (testis 4 × 2 mm., 12.9 gm., slight fat) was taken on June 14 in the piñon zone at 6700 feet in Hidden Forest Canyon, Sheep Range.

Empidonax hammondii. Hammond Flycatcher. Van Rossem (1936:30) mentioned a specimen taken in a mahogany thicket in Lee Canyon on July 13, 1932, which was "undeterminable, either as to seasonal or systematic status." He stated further that it might represent "an extraordinarily early migrant *hammondii* of decidedly abnormal characters." I examined this specimen (Dickey Collection no. 50607) and found it to be a typical *hammondii* in late stage 3 of the postnuptial molt (Johnson, 1963:128), abnormal only because it was undergoing heavy molt far from any known breeding locality; *hammondii* usually accomplishes the fall molt on or near the summering grounds. Inasmuch as the progress of molt is approximately one month advanced for a mid-July specimen of this species, and because the testes were reduced "almost to winter size," it is possible that this individual was a sexually inadequate laggard that had not returned

to its normal breeding area but instead had spent the early part of the summer in the Spring Range. It is unlikely that the Hammond Flycatcher breeds in the mountains of southern Nevada.

Empidonax oberholseri. Dusky Flycatcher. Although van Rossem termed this species an "uncommon summer visitant" in the Spring Range (under his account of the "Wright Flycatcher"), we found it to be very common and perhaps the most numerous species of bird in both the Spring and Sheep ranges. Individuals occurred from the upper limits of the piñon-juniper belt to at least 9200 feet in the Sheep Range and to 10,000 feet in the Spring Range. A variety of mixed woodland and open forest types with an understory of currant, squaw bush (*Rhus trilobata*), mahogany, and aspen were occupied. Nests with eggs were discovered on June 5, 11 (two), and 22. Males of *E. oberholseri* and of the following species were spaced on mutually exclusive territories, particularly in the Sheep Range where broad intermixing of preferred habitat occurs between 7500 and 9000 feet.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (27 specimens), testis 4 × 2 to 9 × 4 mm., 10.9 to 13.5 gm., June 4 to 27. ♀♀ (23 specimens), ova 1 mm. or larger, 10.2 to 15.1 gm., June 4 to 25. Several of the heaviest birds were laying. Incubation patches were found from June 10 to 24.

Empidonax wrightii. Gray Flycatcher. Common in the Sheep Range between 7200 and 8900 feet in piñon-juniper where scattered ponderosa pine and clumps of mountain mahogany were subdominant. Considerable open ground characteristically occurred on occupied territories of this species in contrast to the brushy understory found on at least portions of the adjacent areas defended by *E. oberholseri.* A favored site for a territory of the Gray Flycatcher often included a group of dead junipers on a highly insolated, sparsely-covered slope or ridge. Common between 7600 and 8000 feet in the Spring Range in the piñon-juniper belt and in arid areas of scattered ponderosa pine intermingled with considerable piñon, juniper, and occasionally white fir. Dusky and Gray flycatchers were frequently in local sympatry, although apparently on nonoverlapping territories, in the latter ecologic situation. Van Rossem (1936:31) cited a single specimen taken "on the sage-juniper mesa near Cold Creek on June 2, 1932." He also believed that several small flycatchers seen in July, 1932, at the same place were of this species. Therefore, he obtained surprisingly few records for a species we found to be rather numerous. In the Clover Mountains a female was flushed from a nest 12 feet from the ground on a horizontal branch of a ponderosa pine. Her incubation patch indicated she was incubating rather than brooding.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂, testis, 8 × 4 mm., 13.6 gm. (June 4); 6 × 3, 12.6 (4); 6 × 3, 12.1 (6); 7, 12.8 (7); 7 × 3, 11.3 (9); 9 × 3, 11.6 (12); 7 × 4, 11.3 (18); 7 × 5, 12.5 (19); 7 × 3, 12.4 (19); 6 × 4, 12.7 (21); 5 × 4, 12.7 (24); 7 × 5, 13.2 (25); 5 × 4, 12.1 (25). ♀♀, empty follicles, brood patch, weight unrecorded (7); ova 1 mm., 11.6 (8); egg in oviduct, 14.5 (19); ova 2 mm., brood patch, 12.4 (27).

Empidonax difficilis. Western Flycatcher. The race *E. d. hellmayri* unexpectedly occurred as a fairly common summer resident between 7600 and 9300 feet, particularly where dense subalpine forest of bristlecone pine and white fir occupied shady north-facing canyon walls above Hidden Forest Cabin in the Sheep Range. The local breeding population apparently arrived after we had set up headquarters on June 3, for males definitely stationed on territories were not recorded until June 9. A male with enlarged gonads taken on June 12 in a shady grove of large ponderosa pine and white fir in the canyon below the cabin at 7600 feet repeatedly gave the "position note" of *hellmayri* and seemed to have recently established a territory at that elevation. Migrants of this species were passing through the mountains until at least June 14, when an individual was met in scattered piñon at 6500 feet in Hidden Forest Canyon. Females, probably of *hellmayri*, were taken on June 6 and 12 (see beyond); neither was in breeding condition, and hence they may have been either recently arrived residents or migrants. A migrant male definitely of the coastal race, *E. d. difficilis*, was taken on June 7. The presence of a nonintergradient population of *hellmayri* high in the Sheep Range is of unusual interest in that a colony of "pure" *difficilis* breeds at 2200 feet in Ash Meadows, southern Nye County, approximately 65 miles to the west-southwest (Johnson, 1956:450).

In the Spring Range there was no evidence of breeding. Two probable migrants (undeveloped gonads) were taken, a male on June 16, at 8900 feet, apparently an example of *hellmayri*, and

a female on June 18, at 7600 feet, a representative of *difficilis*. Van Rossem (1936:31) expressed surprise that he could not find this species breeding in the Spring Range.

Data on reproductive condition, skull ossification, weights, fat, wing lengths, and dates, respectively, are: *E. d. hellmayri*, ♂ ♂, testis 5 × 2 mm., adult skull, 12.2 gm. (moderate fat), 68.4 mm. (June 7); 6 × 4, first-year skull, 12.0 (no fat), 71.1 (10); 8 × 5, first-year skull, 12.2 (no fat), 70.6 (11); 6 × 4, adult skull, 12.0 (no fat), 72.2 (12); 6 × 3.5, first-year skull, 12.2 (no fat), 70.0 (12); 1 × 1, first-year skull, 11.8 (slight fat), 66.8 (16). ♀ ♀, ova less than 1 mm., no brood patch, first-year skull, 10.5 (slight fat), 62.4 (6); small follicles, adult skull, 12.0 (medium fat), 64.1 (12).

E. d. difficilis, ♂, testis 4 × 3 mm., adult skull, 8.8 gm. (no fat), 59.7 (7); ♀, ova minute, first-year skull, 11.4 (fat), 60.4 (18).

The expression "first-year skull" is used to describe the condition occasionally found in this species (Miller, 1955:167) and in *Empidonax hammondii* and rarely found in *Empidonax oberholseri* and *Empidonax wrightii* (Johnson, 1963:137–139), in which single-layered, apparently *ossified* "windows" remain in the crania of first-year birds and some adults.

Contopus richardsonii richardsonii. Western Wood Pewee. This species was not recorded as a summer resident in the Spring Range by van Rossem (1936:31) even after a "careful search." Miller (1945:130), however, in mid-June of 1940, noted a pair on Potosi Mountain that apparently was nesting.

We found them in fair numbers in open yellow pine timber between 7500 and 8000 feet in the Sheep Range and in mixed forest composed chiefly of yellow pine between 7200 and 9300 feet in the Spring Range. A probable migrant was seen on June 14 in mixed piñon and Joshua trees in Hidden Forest Canyon at 6000 feet. The arguments for the retention of the name *richardsonii*, as advocated by the editors of the Distributional Check-list of the Birds of Mexico (Pac. Coast Avif. No. 33, 1957:83) are here followed.

Data on reproductive condition, weights, fat, and dates, respectively, are: ♂ ♂, testis 5 × 3 mm., 12.0 gm., no fat (June 9); 4 × 2, 14.2, fat (10); 5 × 2, 15.0, fat (12); 8 × 3, 13.5, no fat (24); 7 × 3, 13.3, slight fat (25); 8 × 3, 12.8, slight fat (26). ♀ ♀, ova 1 mm., 11.7, little fat (4); ova 1 mm., 12.6, medium fat (14); ova 2 mm., brood patch, 13.6, no fat (27); ova 1 mm., brood patch, 13.0, no fat (27).

Nuttallornis borealis. Olive-sided Flycatcher. In the Sheep Range we shot a silent male (testis 8 × 3 mm., 27.7 gm., very thin) on June 12 in ponderosa pine-white fir that might have stayed to breed. Other individuals seen or taken in this range, on June 7 at 5500 feet, on June 11 at 7800 feet, on June 13 (♀, ova 1 mm., 30.7 gm., very fat) at 7000 feet in ponderosa pines, and on June 14 at 6000 feet in piñon and at 7000 feet in ponderosa pines, were presumed to be transients inasmuch as they gave no evidence of being established on territories.

Van Rossem (1936:32) stated that "the environment provided in the higher zones [of the Spring Range] appears to offer every inducement to summer occupancy by olive-sided flycatchers, but neither Jaeger nor ourselves found them there." On June 18 at 7700 feet in Lee Canyon in the Spring Range, a singing male was encountered in mixed ponderosa pine, piñon, and Gambel oak. This individual was gradually moving up the canyon, stopping to call approximately every 100 yards, and was last heard nearly one-half mile from where it had been first encountered. The first positive evidence of territorial establishment by this species came on June 20, when a singing male (testis 13 × 5 mm., 32.8 gm., no fat) was taken in mixed ponderosa pine and white fir at 8500 feet in Lee Canyon. In Macks Canyon a singing male was stationed in open pine-fir on the ridge near camp from June 21 through June 24, providing further evidence that this flycatcher breeds in small numbers in the Spring Range.

Tachycineta thalassina lepida. Violet-green Swallow. Occurs as a common summer resident in ponderosa pine timber between 7000 and 8200 feet in the Sheep Range. A small flock of migrants was flying at the foot of Hidden Forest Canyon in the Joshua tree (*Yucca*) belt at 5500 feet on June 7. Violet-green Swallows were common summer residents also in the Spring Range, as reported by van Rossem (1936:32). Individuals or groups of up to 10 birds were frequently seen between 7500 and 9000 feet.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂, testis 10 × 8 mm., 15.3 gm. (June 13); 8 × 6, 14.2 (21); 10 × 8, 14.5 (22); 10 × 6, 16.0 (24). ♀♀, ova 2 mm., 14.6 (9); ova 1 mm., brood patch, 14.0 (13); ova 1.5, 14.1 (14); laying, brood patch, 25.0 (22).

Cyanocitta stelleri macrolopha. Steller Jay. The type specimen of the race *percontatrix*, described by van Rossem (1931:328) as confined to the Spring and Sheep ranges, was taken in Hidden Forest Canyon at 8500 feet on September 18, 1930. Another individual was seen at that time (van Rossem, 1936:33). Because we did not detect this species in the Sheep Range in spite of persistent hunting in the most promising forest habitat, we conclude that it does not breed there regularly, if at all. The two fall birds found by van Rossem could have been the result of the movement of immatures from the breeding population in the Spring Range. The recent report of fall records of this species from the piñon-juniper and oak communities on the Nevada Test Site (Hayward, Killpack, and Richards, 1963:15) is also evidence for such post-breeding movements.

In the Spring Range we encountered the species once, in Lee Canyon at 8500 feet on June 20, when two individuals, presumably mated, were taken in an open stand of ponderosa pine, white fir, and bristlecone pine. The condition of these birds (♂, testis 4 × 2 mm., 115.7 gm., postnuptial molt; ♀, ova 1 mm., old brood patch, 97.2 gm., postnuptial molt) indicated that they had completed breeding.

An unexpected intermediate locality for this species in southern Nevada, between the Spring Range in Clark County and the nearest previously reported place of occurrence in the Snake Range in White Pine County (Linsdale, 1936:84), was found in the Clover Mountains of Lincoln County, one-half mile east of Ella Mountain at 7200 feet. A postbreeding pair was taken here (♂, testis 5 × 3 mm., 116.5 gm., postnuptial molt; ♀, ova 1 mm., refeathering brood patch, 118.0 gm., postnuptial molt) in ponderosa pines, Gambel oak, and manzanita on June 26. Two others were observed the following day.

I do not perceive color differences between the four specimens here reported and comparable recently collected examples of *macrolopha* from the southern Rocky Mountains and thus see no basis on which "*percontatrix*" can be recognized. Phillips (1950:252–254) likewise does not recognize an endemic race of the Steller Jay in the mountains of southern Nevada.

Aphelocoma coerulescens nevadae. Scrub Jay. Postbreeding groups of up to 10 individuals that included fully grown juveniles were seen in piñon-juniper woodland between 6400 and 7000 feet in Hidden Forest Canyon on June 7 and 14 in the Sheep Range. On the former date an adult female was taken (ova less than 1 mm.; 60.0 gm.). In the Spring Range several were seen in Gambel oak-piñon-mahogany between 7600 and 7700 feet in Lee Canyon on June 18; two juvenal females were collected (69.2 and 68.3 gm.). Van Rossem (1936:34) reported this jay to be a common resident of the Spring Range.

Corvus corax. Holarctic Raven. Van Rossem did not record the Raven. On June 13, we observed one flying over the subalpine conifers at 8800 feet elevation, three-fourths mile east-southeast of Hayford Peak in the Sheep Range. The vernacular name follows the usage of Grinnell and Miller (1944:294).

Gymnorhinus cyanocephalus. Piñon Jay. On June 14, a group of six was found in scattered piñon woodland at 6200 feet in Hidden Forest Canyon, Sheep Range. This species was recorded by van Rossem only as a common visitant during the fall and winter. In the Museum of Vertebrate Zoology there is a female from the north side of Potosi Mountain, 7000 feet, taken on June 14, 1940. This specimen suggests that this species is a summer resident in the Spring Range, although it could be a wanderer inasmuch as the species breeds early.

Nucifraga columbiana. Clark Nutcracker. Single individuals were recorded on four separate days, between June 5 and 14, in Hidden Forest Canyon, from 6500 feet to the 9500-foot level on Hayford Peak, Sheep Range. In the Spring Range it was commonly noted between 7700 and 9000 feet from June 18 through 26; one adult male (testis 4 × 3 mm., 132.3 gm., no fat), a juvenal male (testis 2 × 1 mm., 138.5 gm.), and a female (ovary undeveloped; 116.2 gm.) were collected. Van Rossem reported this species to be a fairly common resident in the Spring Range and provided records from July to November and for February.

Parus gambeli inyoensis. Mountain Chickadee. Common in the Sheep Range between 7000 and 8200 feet in montane forest; less numerous outside this formation, both below it in piñon-juniper down to 6500 feet and above it in subalpine forest to at least 9000 feet. Common in coniferous growth between 7700 and 9600 feet in the Spring Range; however, during our period of field work this species was probably not the most common permanent resident, as stated by van Rossem (1936:35). On June 21, a nest with young was found at 8100 feet in Macks Canyon.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂, testis 2 × 1.5 mm., 10.5 gm. (June 9); 2.5 × 2, 11.3 (10); 2, 12.7 (11); 4 × 2, 12.8 (13); 2.5 × 2; 10.7 (17); 2 × 1, 10.7 (21). ♀♀, ova 1 mm., 10.7 (8); ½ mm., 10.0 (11); 1 mm., brood patch, 12.2 (17).

Parus inornatus ridgwayi. Plain Titmouse. In the Sheep Range we met this species on June 14 in piñon-juniper woodland in Hidden Forest Canyon at 6500 feet and again at 6900 feet. An adult female (ova ½ mm., old brood patch, 14.3 gm.) and three fully grown juvenal males were collected, two of which weighed 14.3 and 15.2 gm. This species was found twice in the Spring Range in mixed piñon-juniper-mahogany one-half mile east of Macks Canyon, 7700 feet, on June 25; an adult (16.5 gm.) and a juvenile (15.5 gm.) of indeterminable sex were taken. Van Rossem (1936:36) recorded this titmouse only at Cold Creek on November 24 and 25, 1932, and expressed surprise at its rarity.

Psaltriparus minimus providentialis. Common Bushtit. Common in the Sheep Range between 7000 and 9000 feet in mahogany, piñon, currant, white fir, ponderosa pine, and occasionally in bristlecone pine. Noted in similar vegetation in the Spring Range between 7700 and 9000 feet. In late June both mated pairs and postbreeding flocks were encountered. Van Rossem reported the bushtit as probably fairly common in mountain mahogany between 6000 and 9000 feet.

Data on testis dimensions, weights, and dates, respectively, for four males collected are: 4 × 2 mm., weight unrecorded (June 7); 5 × 3, 5.4 gm. (19); 5 × 3, 6.7 (23); 4 × 3, 6.4 (24).

Sitta carolinensis. White-breasted Nuthatch. Fairly common in the Sheep Range in mixed conifers from 7500 feet in the piñon woodland-ponderosa pine forest ecotone to 9200 feet in mixed bristlecone pines and white fir. Similar habitat was occupied at apparently comparable densities between 7600 and 9600 feet in the Spring Range. At the latter elevation the species used limber pine extensively.

On the basis of bill and wing lengths, the birds from the Sheep and Spring ranges are allied most closely to *S. c. tenuissima*, although certain individuals approach *nelsoni*. This conforms, in essence, with the conclusions of Hawbecker (1948), arrived at through examination of a small sample, that the southern Nevadan birds are intergradient between the Sierran-Inyo and Rocky Mountain races. The single specimen from the Clover Mountains is best placed with *nelsoni* pending the accumulation of further comparative material from southeastern Nevada.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂, testis 3 × 2 mm., 17.2 gm. (June 4); 4 × 3, 18.8 (5); 3 × 3, 16.1 (6); 5 mm., 18.5 (7); 6, 17.8 (9); 2, 18.0 (10); 6 × 3, 17.9 (13); 4 × 2, 17.5 (17); 3 × 2, 16.6 (18); 3.5 × 1.5, 18.0 (19); 3 × 2, 16.8 (19); testis minute (juv.), 17.8 (19); 1 × 1.5 (juv.), 16.9 (24); 2 × 1, 16.4 (25); testis unmeasured, 18.7 (27). ♀♀, ova minute, 16.9 (19); ovary undeveloped (juv.), 15.7 (21). It is surprising to note the great preponderance of males in the sample collected.

Sitta canadensis. Red-breasted Nuthatch. In the Sheep Range males were taken in cool, dense pockets of bristlecone pines at 8800 feet (June 13, testis 5 × 3 mm., 11.5 gm.) and at 9100 feet (June 10, testis 4 × 3 mm., 11.5 gm.); both individuals responded to imitated owl calls. A third male (testis 7 × 5 mm., 11.1 gm.) was shot at 7000 feet in pine-fir in Hidden Forest Canyon on June 13. These unexpected records provide circumstantial evidence of breeding by the Red-breasted Nuthatch in the Sheep Range. In the Spring Range a fully grown juvenal male (10.2 gm.) with undeveloped testis was taken on June 24. We obtained no further indication of the breeding of this nuthatch and the possibility exists that this individual was hatched some distance from this range. Van Rossem (1936:37) did not record this species during the breeding season.

Sitta pygmaea. Pigmy Nuthatch. Very common in ponderosa pine timber in the Sheep Range between 7500 and 8500 feet; less numerous up to at least 8900 feet in bristlecone pine.

Numerous also in ponderosa pine, and, at higher elevations, in limber pine in the Spring Range from 7600 to 9600 feet. The ponderosa pine zone of the Clover Mountains, Lincoln County, also harbored this species in good numbers.

The large sample of *S. p. canescens* collected is too worn to permit verification of the relative paleness ascribed to this endemic race (van Rossem, 1931) as compared with *melanotis*; however, the similarity of *canescens* and *melanotis* in size and proportions has been confirmed. Norris (1958) and Pulich and Phillips (1951) recognized *canescens* as a rather weakly differentiated subspecies. The specimens from the Clover Mountains have been placed with *melanotis* wholly on geographic grounds, for they are similarly too worn for color comparisons. This population forms a steppingstone between *canescens* in southern Nevada and populations of *melanotis* in the Snake Range of Nevada and the Pine Valley Mountains of Utah, indicating the need for material in new plumage from this intermediate region.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (21 specimens), testes minute to 5 × 3 mm., 9.9 to 11.7 gm., June 6 to 27. ♀♀ (9 specimens), ova up to 1 mm., brood patches active to old; 9.9 to 11.1 gm., June 5 to 26. Three fully grown juveniles were collected on June 26 and 27.

Certhia familiaris leucosticta. Brown Creeper. This species was noted in the Sheep Range from 7500 to 9300 feet in coniferous forest, generally with greatest densities reached in mixed subalpine forest of white firs and bristlecone pines from 8400 to 9000 feet where as many as eight individuals were found in one day. Brown Creepers seemingly occurred less commonly in the Spring Range; our records are from coniferous forest between 7700 and 9600 feet. Van Rossem (1936) stated that this species showed a decided preference for yellow pines in the Spring Range. In contrast we found them most numerous in white fir and limber pine.

I find no evidence in the large sample of worn specimens collected to support the recognition of a distinctive race for the mountains of southern Nevada (*leucosticta*; van Rossem, 1931:329), although the series is here assigned to that race pending the accumulation of a meaningful sample of early fall material in fresh plumage. Apparently *leucosticta* is a weakly differentiated form at best.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (16 specimens), testes 5 × 4 to 9 × 5 mm. (one bird, testis 2 × 1 mm., June 24), 7.4 to 8.4 gm., June 8 to 24. ♀♀ (5 specimens), ova up to 3 mm., brood patches active to old, 7.4 to 9.5 gm., June 8 to 24.

Cinclus mexicanus. Dipper. Jaeger (1927:7) found a nesting pair on Trout Creek, above the Williams Ranch, Spring Range, on June 20, 1926. Breeding habitat for this species is scarce in the Spring Range and lacking in the Sheep Range. Neither van Rossem (1936) nor we recorded the Dipper.

Troglodytes aedon parkmanii. House Wren. Uncommon in the vicinity of fallen logs in pine-fir forest in Hidden Forest Canyon, Sheep Range, between 7500 and 8600 feet; at the latter elevation an individual was carrying nest material. Three males were taken: testis 5 × 4, 10.0 gm. (June 12); 5 × 4, 10.7 (13); and 5 × 4, 9.3 (14). Only one record was obtained in the Spring Range, that of a singing bird seen at 7800 feet in McFarland Canyon on June 24. Van Rossem also recorded this species uncommonly in the Spring Range.

Thryomanes bewickii eremophilus. Bewick Wren. In the Sheep Range at least three pairs occurred in the mixed brush on the floor of Hidden Forest Canyon, from 6000 to 6400 feet. A male taken here on June 14 had testes in breeding condition (7 × 4 mm.) and weighed 10.2 gm. In the Spring Range two Bewick Wrens were singing in the piñon-juniper at 7700 feet, one-half mile east of Macks Canyon on June 25. Van Rossem found this wren only at Indian Springs, 3300 feet, on the desert at the north base of the Spring Range.

Catherpes mexicanus conspersus. Cañon Wren. Small numbers were noted near potholes in cliffs or among boulders in Hidden Forest Canyon, Sheep Range; two males were shot, one at 7000 feet (testis 4 × 3 mm., 10.8 gm.) and the other at 8400 feet (testis 4 × 2 mm., 10.1 gm.). We did not record the Cañon Wren in the Spring Range, although van Rossem (1936:40) found them "sparingly."

Salpinctes obsoletus. Rock Wren. We found this wren on two occasions in the Sheep Range, in Hidden Forest Canyon, 6000 feet, where several were heard on June 14, and near

the top of Hayford Peak, 9900 feet, where one was seen on June 9. We did not record this species in the Spring Range, although van Rossem (1936:40) reported them in numbers.

Turdus migratorius propinquus. American Robin. Between 7500 and 8000 feet in Hidden Forest Canyon in the Sheep Range, three robins were encountered independently by different collectors on June 12. Two of these individuals were taken; both were males in breeding condition (left testis dimensions of 10 × 8 and 12 × 10 mm.) although moderately fat (weights of 67.5 and 72.2 gm.). The other bird, also a male, was found singing in a pine top. No other robins were found in the Sheep Range. In the Spring Range a single bird was seen at the Kyle Ranger Station, 7100 feet, on June 16, and two were seen in the pine forest in Lee Canyon, 8500 feet, on June 20. Van Rossem reported robins as rare in summer in the Spring Range.

Hylocichla guttata polionota. Hermit Thrush. This thrush was numerous in the Sheep Range between 7500 and 9600 feet where its activity centered chiefly in the shady growth and leaf litter of mountain mahogany, white fir, and ponderosa pine. On June 10 a nest with four eggs was found four feet from the ground in an eight-foot white fir at 7900 feet in Hidden Forest Canyon. As reported by van Rossem (1936:41) this species is common also in the Spring Range as a summer visitant between 7000 and 10,000 feet. In the Clover Mountains, 7200 feet, in Lincoln County, the individual mentioned beyond was taken and another was heard singing; therefore, at least a small population of the Hermit Thrush evidently breeds in this isolated mountain region.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (16 specimens), testes 9 × 5 to 12 × 8 mm. (one bird, 5 × 4 mm., June 17), 25.7 to 31.0 gm., June 4 to 24. ♀♀ (10 specimens), ova 1–3 mm., active to old brood patches, 28.8 to 31.8 gm., June 8 to 26. A laying bird taken June 8 weighed 35.0 gm.

Sialia mexicana bairdi. Western Bluebird. This species was recorded commonly in the Sheep Range as a summer resident between 7500 and 9200 feet. Coniferous forest of ponderosa pine and bristlecone pine where snags were located near open ground was preferred. In the Spring Range, the Western Bluebird was common from 7600 to 9500 feet. Nests were found in snags of bristlecone pine at 9500 feet and of ponderosa pine at 8500 feet on June 20, and in ponderosa pine-white fir at 8100 feet on June 22. Van Rossem (1936:42) found this species to be "decidedly uncommon" in Lee Canyon in July and August of 1932. A pair seen on June 26 and a male collected on June 27, in the Clover Mountains, Lincoln County, one-half mile east of Ella Mountain, 7200 feet, provide a significant extension of known breeding range for *bairdi* in southeastern Nevada.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (17 specimens), testes 8 × 4 to 13 × 8 mm. (one bird, 4 × 2 mm., June 22), 22.0 to 26.6 gm., June 5 to 27. ♀♀ (9 specimens), ova 1–2 mm., active brood patches, 22.6 to 30.8 gm.

Myadestes townsendi. Townsend Solitaire. Small numbers of this species were noted in mixed lower montane forest of ponderosa pine and white fir between 7000 and 8300 feet in the Sheep Range and between 8000 and 8900 feet in the Spring Range.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (5 specimens), testes 11 × 7 to 13 × 7 mm., 30.7 to 36.6 gm., June 4 to 21. ♀, ova 3 mm., brood patch, 39.5 gm., June 7.

Polioptila caerulea amoenissima. Blue-gray Gnatcatcher. An inhabitant of mixed woodland and brush communities, the Blue-gray Gnatcatcher occurred commonly in the Sheep Range from 5500 feet in the Joshua tree belt, through canyon bottom shrubland of Mormon tea (*Ephedra*), rabbitbrush, and Anderson desert thorn (*Lycium andersonii*), to 7500 feet in piñons, junipers, and currant. In the bottom of Hidden Forest Canyon I estimated that at least 10 pairs were present between 6000 and 6700 feet on June 14.

In the Spring Range we found them numerous in mahogany, piñon, juniper, and currant, between 7600 and 7800 feet. One was seen carrying food, presumably to young, in Lee Canyon, 7600 feet, on June 18. Although Jaeger (1927) found the species to be common in the Spring Mountains in June, 1926, van Rossem (1936:43) reported only one record that suggested summer residence, that of a juvenile taken in piñon-juniper at Cold Creek on July 10, 1932.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂, testis 5 × 3 mm.,

5.6 gm. (June 9); 5 × 3, 5.5 (19); 5 × 4, 5.7 (24); 7 × 4, 5.4 (24); 7 × 5, 6.1 (25); 2 × 2, 4.7 (26). ♀, 3 collapsed follicles, brood patch, 5.5 (18).

Regulus calendula cineraceus. Ruby-crowned Kinglet. In the Sheep Range the Ruby-crowned Kinglet occupied coniferous forest between 7500 and 9600 feet; greatest densities were reached in subalpine forest of bristlecone pine and white fir above 8200 feet. The species also occurred commonly in the Spring Range from 7700 to 9600 feet in white fir, limber pine and bristlecone pine. Van Rossem (1936) found this kinglet in "small numbers" in this range in the summer of 1932, between 8000 and 10,000 feet.

Data on gonads, weights, and dates, respectively, are as follows: ♂♂ (9 specimens), testes 4 × 4 to 6 × 5 mm., 5.3 to 8.1 gm., June 5 to 21. ♀, ovary inactive, 8.0 gm., June 18.

Vireo vicinior. Gray Vireo. We found this species in the Sheep Range among scattered piñon, juniper, and brush on slopes near the bottom of Hidden Forest Canyon from 6100 to 6500 feet. No specimens were collected. Although van Rossem did not find the Gray Vireo in the Spring Range, a field party from the Museum of Vertebrate Zoology that visited the north side of Potosi Mountain in June, 1940 (Miller, 1945), recorded it commonly and collected three males: gonads unmeasured, wt. 12.1 gm., 5800 feet, June 12; testis 6 mm., 12.1 gm., 6000 feet, June 12; and testis 5 mm., 13.0 gm., 6000 feet, June 14.

Vireo solitarius. Solitary Vireo. Van Rossem (1936:45) expressed surprise at the absence of this species in the breeding season in the Spring Range despite intensive search "in all types of woodland." However, on June 13, 1940, Miller (1945:130) collected an example of the race *cassinii* in ponderosa pines on Potosi Mountain at 8000 feet. This individual had been singing, apparently on a territory, and showed testes in breeding condition; these findings suggested summer residence despite the fact that the bird was moderately fat. Gullion *et al.* (1959) reported two birds seen on Potosi Mountain on June 28, 1952, providing further indication that the Solitary Vireo breeds there. We discovered this species commonly in mixed piñon, juniper, and scattered ponderosa pine between 7500 and 8000 feet in the Spring Range. Mahogany and Gambel oak were occasionally subordinant components of the woodlands occupied. The species was an uncommon summer resident also in the Sheep Range, between 7000 and 8400 feet, occurring chiefly in arid ponderosa pines, although large piñons, junipers, and mahogany were also used. Surprisingly, the specimens taken in the Spring and Sheep ranges are all typical of the race *plumbeus* and show no obvious influence of *cassinii*. The possibility is therefore enhanced that the specimen of *cassinii* from Potosi Mountain was indeed a migrant, although the occurrence of introgression between *plumbeus* and *cassinii* in the mountains of southern Nevada should not be dismissed (N. K. Johnson, MS).

In the Clover Mountains the Solitary Vireo was numerous in the limited tract of open ponderosa pine. The specimens collected there represent *plumbeus*, as predicted on geographic grounds.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (14 specimens), testes 5 × 3 to 7 × 4 mm. (one bird, testis 1 mm., June 27), 15.0 to 16.5 gm., June 4 to 27. ♀♀ (5 specimens), ova 1–2 mm., active brood patches, 15.5 to 17.9 gm., June 24 to 27.

Vireo gilvus leucopolius. Warbling Vireo. Despite the virtual absence of aspens and other broad-leafed trees, the Warbling Vireo was very common in the Sheep Range where it inhabited ponderosa pines and white firs generally between 6900 and 8400 feet. Above 8000 feet bristlecone pine was also used. In the Spring Range this species was recorded commonly between 7600 and 9100 feet in ponderosa pine, white fir, and clumps of quaking aspen. Van Rossem (1936:45) reported the Warbling Vireo as "present in limited numbers" and with a surprisingly restricted distribution in the Spring Range; "it was seemingly confined to aspen thickets at from 8500 to 9000 feet." I follow Sibley (1940) in including these Southern Nevadan populations with the Great Basin race *leucopolius* rather than with *swainsonii*, the designation ascribed to them by van Rossem.

Data on reproductive condition, weights, dates, respectively, are: ♂♂ (9 specimens), testes 6 × 4 to 7 × 5 mm., 10.0 to 12.0 gm., June 4 to 25. ♀♀ (6 specimens), ova 1–3 mm., 11.3 to 12.3 gm., June 4 to 18.

Helmitheros vermivorus. Worm-eating Warbler. Christman took a male (testis 5 × 4 mm., 12.2 gm., moderate fat) of this species in a shady thicket of squaw bush at the base of a north-

facing cliff in Hidden Forest Canyon, 7000 feet, Sheep Range, on June 13. I know of no previous records of this warbler for the United States in the area west of western Texas (A.O.U. Check-list, 1957) other than that of the specimen found dead on September 18, 1960, in San Diego, California, and reported by Huey (1961).

Vermivora celata orestera. Orange-crowned Warbler. A fully grown juvenal male (testis minute; 8.8 gm.) shot in Hidden Forest Canyon, 7200 feet, Sheep Range, on June 6, resulted from an unusually early nesting, presumably at some distance from this locality. The species is not known to breed in southern Nevada.

Vermivora virginiae. Virginia Warbler. Common along the lower slopes of Hidden Forest Canyon, Sheep Range, between 7500 and 8400 feet. Mixed woodland and thickets of small white firs, mahogany, aspen, currant, and squaw bush were occupied. This warbler was less numerous in the Spring Range, from 7600 to 8200 feet, in mahogany, piñon, juniper, and Gambel oak. Van Rossem (1936:46) recorded it as a common summer visitant in the Spring Range in 1932. On Ella Mountain, 7200 feet, Clover Mountains, Lincoln County, the Virginia Warbler lived in Gambel oak and manzanita scrub below the ponderosa pines. Three males taken had testis dimensions, weights, and collection dates as follows: testis 6 × 4 mm., 8.3 gm. (June 6); 7 × 5, 7.0 (10); 8 × 6, 8.7 (21).

Parula americana. Parula Warbler. Christman shot a female (ova 1 mm., 8.0 gm., slight fat) in a thicket of squaw bush at the base of a north-facing cliff in Hidden Forest Canyon, 7000 feet, Sheep Range, on June 13, 1963. This is the first report of this species for Nevada, although there are scattered records of this "eastern" species, some of which presumably represent stragglers, for other western states.

Dendroica aestiva morcomi. Yellow Warbler. A male was taken in a patch of currant at Hidden Forest Cabin, 7900 feet, Sheep Range, on June 3. This individual was not in full breeding condition (testis 4 × 4 mm., 9.8 gm., moderate fat) and was apparently a migrant. In the use of the name *aestiva* I follow Grinnell and Miller (1944:398).

Dendroica auduboni auduboni. Audubon Warbler. This species was numerous in the Sheep Range in lower montane and subalpine forest between 7000 and 9500 feet, with greatest densities apparently reached at middle elevations. Records were obtained in the Spring Range from 7800 to 9600 feet in all kinds of conifers above the piñon zone. The limber pine-bristlecone pine forest at higher elevations was occupied to a lesser extent than the lower montane forest. Van Rossem (1936) reported similar altitudinal and ecologic distribution for the Audubon Warbler in the Spring Range in 1932. The male taken on Ella Mountain, 7200 feet, Lincoln County, was the only individual noted at that locality.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (11 specimens), testes 6 × 4 to 9 × 6 mm., 10.9 to 14.2 gm., June 5 to 27. ♀♀ (8 specimens), ova up to 7.5 mm., active brood patches, 11.5 to 13.0 gm., June 4 to 17.

Dendroica nigrescens. Black-throated Gray Warbler. This warbler was unusually abundant in the Sheep Range where it occurred from 6500 feet in piñon woodland to 9200 feet in bristlecone pines. Mixed growth of piñon, mahogany, white fir, and ponderosa pine seemed especially favored. A nest that contained small young and that was built seven feet up in a piñon was found in Hidden Forest Canyon at 9000 feet on June 9. In the Spring Range between 7600 and 7900 feet this species was common, and although densities were not comparable to those reached in the Sheep Range, occasionally as many as six birds were seen in one day by a person working in mixed piñon, juniper, and mahogany. Surprisingly, van Rossem (1936:48) found no evidence that this species breeds in the Spring Range; his few records pertained to fall transients. He states that the Black-throated Gray Warbler "is a species we had anticipated as breeding in the Charlestons and for which we made careful search without success." Jaeger (1927) likewise did not record the species in the Spring Range in June of 1926.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂, testis 7 × 4 mm., 8.3 gm. (June 4); 6 × 4, 9.0 (7); 6 × 5, 8.2 (12); 7 × 5, 8.1 (18); 7 × 4, 8.9 (19); 5 × 4, 7.7 (19); 6 × 4, 8.8 (21); 7 × 5, 8.7 (24); 6 × 4, 8.6 (24). ♀, ova enlarged, brood patch, 8.7 (4).

Dendroica graciae graciae. Grace Warbler. The Grace Warbler (see frontispiece) occurred

as a fairly common summer resident in Hidden Forest Canyon, Sheep Range, in arid ponderosa pine between 7500 and 8000 feet. We did not record this species in the Spring Range and the queried record by Jaeger (1927) was perhaps a misidentification. In the Clover Mountains, Lincoln County, a small population inhabited the limited tract of ponderosa pines at one-half mile east of Ella Mountain, 7200 feet. The Grace Warbler has not been authentically reported previously in Nevada, and the occurrence was not wholly anticipated in view of the wide geographic gap between the Sheep Range and the nearest previously reported population in the Hualapai Mountains of northwestern Arizona (A.O.U. Check-list, 1957).

Data on reproductive condition, weights, and dates, respectively, are: ♂ ♂, testis 5 × 4 mm., 8.0 gm. (June 4); 6, 8.5 (8); 4 × 3, 7.7 (26); 6 × 4, 9.1 (27); 7 × 4, 7.9 (27). ♀ ♀, ova 1 mm., 7.9 (5); 1, 7.6 (5); 1, brood patch, 7.5 (26); ovary inactive, 8.5 (27).

Oporornis tolmiei monticola. Tolmie Warbler. A migrant female with an inactive ovary and which was moderately fat (wt. 10.8 gm.) was taken in Hidden Forest Canyon, 6900 feet, Sheep Range, on June 14.

Geothlypis trichas campicola. Yellowthroat. Christman shot a migrant male of this pale race in Hidden Forest Canyon, 7000 feet, Sheep Range, on June 13. Although not fat, this bird was reproductively inactive. Phillips, Marshall, and Monson (1964:158) reported a specimen of *G. t. campicola* from Boulder City, Nevada, taken on August 24, 1951. There are no other records for Nevada.

Wilsonia pusilla pileolata. Wilson Warbler. Late spring migrants of this species were taken in Hidden Forest Canyon on June 7 (♀, 8.9 gm., 6200 feet; ♀, 7.8 gm., 7000 feet; and ♀, 7.0 gm., 7000 feet) and on June 14 (♂, testis 5 × 4 mm., 7.0 gm., 7900 feet).

Setophaga picta picta. Painted Redstart. Miller took a male in reproductive condition (testis 7 mm.) in mixed white fir and ponderosa pine at the base of a steep north-facing slope in Hidden Forest Canyon, 7900 feet, Sheep Range, on June 8. This individual was not fat and weighed 10.2 gm. On June 27, an adult flew in to an imitated hoot of the Horned Owl given by the author in an area of large ponderosa pines and heavy undergrowth, chiefly of Gambel oak, in a shady canyon in the Clover Mountains, Lincoln County, one-half mile east of Ella Mountain, 7200 feet. Although this species has not previously been recorded from Nevada, these records point to the occurrence of at least a small population of either summer residents or of pioneers in the mountains of the southeastern part of the state. In view of the residence of the Painted Redstart in the Hualapai Mountains of northwestern Arizona and the reports of the species as a straggler (summer resident?) in southern Utah, the new records from southern Nevada are not totally unexpected.

Piranga ludoviciana. Western Tanager. Numerous in the Sheep Range between 6700 and 8500 feet in lower montane and subalpine forest. Groups of up to six birds seen in piñon-rabbitbrush areas in early June were probably migrants. Records in the Spring Range were from 7700 to 9000 feet in coniferous forest generally, often where pines and firs were associated with mountain mahogany. In the Clover Mountains, Lincoln County, the species was common at 7200 feet in the ponderosa pine-Gambel oak zone.

Data on reproductive condition, weights, and dates, respectively, are: ♂ ♂, testis 11 × 7 mm., 22.9 gm. (June 4); 7 × 4, 26.7 (7); 11 × 9, 31.0 (9); 11 × 7, 28.6 (22); 10 × 7, 27.2 (27). ♀ ♀, ova 2 mm., 28.5 (9); 1, 22.6 (13); 1, brood patch, 25.6 (27).

Piranga flava hepatica. Hepatic Tanager. Miller and the author saw a male feeding at close range, apparently on caterpillars, in rabbitbrush tops at 6500 feet in the bottom of Hidden Forest Canyon, Sheep Range, on June 7. This bird flew to piñon trees at the base of a hillside, then disappeared up the canyon; it gave no indication of territorial establishment. On June 8, what was possibly a female Hepatic Tanager called repeatedly in tops of mature ponderosa pine and white fir near the north-facing slope in Hidden Forest Canyon at 8100 feet. No further evidence of the presence of this species in the Sheep Range was obtained. In the Clover Mountains, Lincoln County, one-half mile east of Ella Mountain, 7200 feet, Fletcher collected a male in breeding condition (testis 8 × 5 mm., 33.8 gm., slight fat) in the ponderosa pine-Gambel oak zone on June 26. This individual was with a dull-colored bird of similar size when first encountered and was therefore probably mated. There are no previous records of this species for

Nevada, the nearest known breeding population heretofore reported is that of the Hualapai Mountains in northwestern Arizona.

Pheucticus melanocephalus melanocephalus. Black-headed Grosbeak. Fairly common between 7500 and 8800 feet in the Sheep Range where mountain mahogany, ponderosa pine, and piñon were occupied. Similar mixed woodland was also favored by this species between 7800 and 8900 feet in the Spring Range, although at lower levels Gambel oak was used. In the Clover Mountains, Lincoln County, the Black-headed Grosbeak occurred commonly in mixed piñon and Gambel oak.

Data on gonad size, weights, and dates, respectively, are: ♂♂, 7 × 4 mm., 46.3 gm. (June 11); 7 × 5, weight unrecorded (11); 8 × 5, 39.6 (13); 11 × 7, 45.6 (18). ♀, ova 0.5 mm., 36.1 (23).

Carpodacus cassinii. Cassin Finch. An abundant resident of both the Sheep and Spring ranges from 7500 to at least 9000 feet in all types of woodland and forest growth. Concentrations of adults and fully grown juveniles frequented Wiregrass Spring in Hidden Forest Canyon, 7900 feet, Sheep Range, and a spring in Macks Canyon, 8100 feet, Spring Range. Only one bird, the individual collected, was found in the Clover Mountains, Lincoln County.

Data on reproductive condition, weights, and dates, respectively, are: ♂♂ (9 specimens), testes 8 × 5 to 10 × 8 mm. (one bird, testis 1 mm., June 27), 26.5 to 30.0 gm., June 6 to 27. ♀, old brood patch, 28.6 gm., June 8. Fully grown juveniles were taken on June 11, 19, and 22.

Spinus pinus pinus. Pine Siskin. The Pine Siskin occurred in small groups and pairs in subalpine forest, chiefly of bristlecone pine, from 8400 to 9200 feet in the Sheep Range. Males were repeatedly observed in circling song flights; one taken on June 10 was in full reproductive condition (testis 6 mm., body weight, 11.6 gm.). A female (2 mm. ovum, brood patch, weight, 11.5 gm.), shot from the top of a white fir, where trees of this species were intermixed with bristlecone pine at 8300 feet in Macks Canyon, was the only individual of this species encountered during our field work in the Spring Range. In July of 1932, van Rossem (1936:53) found them "fairly common . . . throughout coniferous timber from 8000 to 10,500 feet."

Loxia curvirostra grinnelli. Red Crossbill. Family groups and other small flocks of Red Crossbills were recorded in subalpine forest of bristlecone pine and white fir, with scattered ponderosa pine, in the Sheep Range between 8400 and 9100 feet. Individuals were observed to feed in the tops of both kinds of pines, although unopened cones were scarce. In the Spring Range a small flock was heard flying over the mixed conifers near camp at 8900 feet on June 17, one was shot from a group of three feeding in open ponderosa pines at 7700 feet in Lee Canyon on June 18, and one was collected from a stand of medium-sized white fir at a spring in Macks Canyon, 8100 feet, on June 23.

The presence of streaked young in the flocks met in the Sheep Range and the reproductive condition of the adults suggest that these birds were postbreeding, yet were probably not far removed from their nesting grounds. All specimens collected are typical *grinnelli*, thus clarifying the subspecific status of the breeding birds of the Sheep and Spring ranges (see van Rossem, 1936:54).

Data on reproductive condition, weights, fat, and dates, respectively, are: ♂♂, testis 5 × 4 mm., 37.4 gm., fat (10); 3.5 × 2.5, 32.1, no fat (10); testis minute (juv.), 28.8, no fat (10); 4 × 3, 36.4, slight fat (18); 4 × 2, 38.3, heavy fat (23). ♀, ovum 2 mm., 33.1, fat (9). Sex indeterminate (juv.), 21.9, no fat (10).

Chlorura chlorura. Green-tailed Towhee. Common in currant, sagebrush, rabbitbrush, and piñons in Hidden Forest Canyon between 7200 and 8400 feet in the Sheep Range. A nest with eggs was found at 7500 feet on June 9. Recorded commonly in the Spring Range in mixed brushy woodland of mahogany, sagebrush, rabbitbrush, piñon, and Gambel oak between 7600 and 8100 feet, where van Rossem (1936) also found them breeding in fair numbers.

Data on reproductive condition, weights, and dates, respectively, for two males collected are: testis 10 × 8 mm., 29.4 gm. (June 12) and 11 × 6, 27.8 (24). For two females: ova enlarged, 28.1 (12) and ovum 2 mm., brood patch, 24.8 (21).

Pipilo erythrophthalmus montanus. Rufous-sided Towhee. At least one pair was stationed for breeding in Hidden Forest Canyon at 7500 feet, Sheep Range, in mixed rabbitbrush, piñon,

and juniper in the canyon bottom. In the Spring Range a Rufous-sided Towhee was seen in mahogany and sagebrush in Lee Canyon at 7700 feet on June 18, and the species was common in mixed woodland-chaparral of piñon, juniper, mahogany, sagebrush, and rabbitbrush between 7600 and 7800 feet in Macks Canyon from June 18 to 24. In the Clover Mountains, Lincoln County, several were seen on June 26 and 27 in the heavy manzanita-Gambel oak chaparral at one half mile east of Ella Mountain, 7200 feet.

Data on reproductive condition, weights, and dates, respectively, are: ♂ ♂, testis 12 × 8 mm., 39.4 gm. (June 18); 11 × 7, 37.3 (21); testis minute (juv.), 34.3 (24). ♀ ♀, ova 3 mm., brood patch, 36.4 (18); 1.5, brood patch, 40.1 (21); ovary inactive (juv.), 34.5 (24); ovary inactive (juv.), 33.7 (24); 1.5, 36.7 (27).

Junco sp. Hybrids between the Oregon Junco (*Junco oreganus thurberi*) and the Gray-headed Junco (*Junco caniceps caniceps*), originally described as a race of the Oregon Junco (*J. o. mutabilis*) by van Rossem (1931:329), have long been known from the mountains of southern Nevada (Miller, 1939 and 1941). In June, 1963, we found juncos breeding commonly in lower montane and subalpine forests in the Sheep Range, between 7500 and 9500 feet, and in the Spring Range, from 7800 to 9300 feet. Moist canyon bottoms grown to currant, small aspen, dwarf juniper, squaw bush, and conifer seedlings seemed to be favored.

A detailed analysis of the characters of the new series of hybrids collected is being pursued by Alden H. Miller who will publish his findings separately.

Spizella passerina arizonae. Chipping Sparrow. In both the Sheep and Spring ranges this species was frequently encountered between 7500 and 9500 feet in arid woodland or open forest which included piñon, juniper, mahogany, ponderosa pine, and bristlecone pine. Juveniles attended by adults were noted in Lee Canyon, 7600 feet, on June 18.

Data on reproductive condition, weights, and dates, respectively, are: ♂ ♂, testis 6 × 5 mm., 12.5 gm. (June 3); 7, 11.5 (8); 7 × 5, 12.7 (10); 9 × 6, 11.6 (17); 9 × 6, 11.2 (19); 8 × 5, 11.7 (19); 7 × 5, 12.2 (21); 7 × 5, 11.2 (24). ♀, laying, brood patch, 14.4 (17).

Spizella atrogularis evura. Black-chinned Sparrow. Two singing males of this sparrow, one of which was taken (testis 9 × 6 mm., weight 12.4 gm.), were found in the bottom of Hidden Forest Canyon at 6400 and 6900 feet on June 14. They occurred in mixed brushland, which included rabbitbrush, Anderson desert thorn, and littleleaf mock orange (*Philadelphus serpyllifolius*) at the edge of a steep rocky slope where scattered piñon and juniper grew. Hardy (1949) reported this species earlier from Cabin Springs in the northern Sheep Range, southern Lincoln County, where it may breed. Neither van Rossem (1936:59) nor we found Black-chinned Sparrows in the Spring Range, although he reports that one was taken by Sheldon on Trout Creek above the Williams Ranch, on the west slope of the range, on June 15, 1929. Two males in the Museum of Vertebrate Zoology (testis 7 mm., 12.2 gm.; testis 5 mm., 9.0 gm.) were taken on the north side of Potosi Mountain, at 6000 and 7000 feet, respectively, on June 14, 1940.

FEATURES OF INSULAR FAUNAS

Endemism.—The degree of endemism shown by the montane birds in southern Nevada evidently is not as great as was believed formerly. Endemic races named for the Steller Jay, Pigmy Nuthatch, and Brown Creeper are either unrecognizable or weakly characterized. The supposed endemic race of the Oregon Junco is actually an introgressive swarm between that form and the Gray-headed Junco.

Perhaps the comparison so often made between oceanic or coastal islands and boreal "islands" of coniferous forest regarding their degree of isolation and predisposition as sites for differentiation is overdrawn. Certainly the forest belt of the southern Nevadan mountains has been isolated for at least several thousands of years (Wells and Jorgensen, 1964; Clokey, 1951) although such a period of isolation may not necessarily have been sufficient for the evolution of distinctive forms. Despite the isolation of forest habitat by desert, it should not be assumed that the desert has seriously interfered with accessibility. Migrating birds returning to boreal

TABLE 1

OCCURRENCE OF BREEDING BIRDS IN THE SHEEP AND SPRING RANGES AND IN RELATED FAUNAS

	Sheep Range	Spring Range	Sierra Nevadan	Great Basin Montane	Southern Rocky Mountain	Sierra Madrean
Cathartes aura teter?[1]		X?[2]	X	X	X	X
Accipiter gentilis atricapillus	X	X	X	(L)[3]	X	X
Accipiter cooperii		X	X	X	X	X
Buteo jamaicensis calurus?	X	X	X	X	X	(*fuertesi*)[4]
Aquila chrysaëtos canadensis?		X	X	X	X	X
Falco sparverius sparverius?	X	X	X	X	X	X
*Lophortyx gambelii gambelii**[5]	X	X		(L)	(*sanus*)[(L)]	
Columba fasciata monilis	X	X	X	(L)	(*fasciata*)	(*fasciata*)
Zenaidura macroura marginella?	X	X	X	X	X	X
Otus asio cineraceus	X	X		(L)+[6]	X	(*suttoni*)
Otus flammeolus flammeolus	X	X	X	(L)	X	X
Bubo virginianus pallescens?	X	X	(*pacificus*)	(*occidentalis*)	(*occidentalis*)	X
Asio otus wilsonianus?	?	?	X	X	X	
Glaucidium gnoma californicum	X	?	X	(L)	X	(*gnoma*)
Aegolius acadicus acadicus		X	X	X	X	X
Caprimulgus vociferus arizonae	X			(L)	(L)	X
Phalaenoptilus nuttallii nuttallii	X	X	(*californicus*)	X	X	X+
Chordeiles minor hesperis		X	X	X	(*henryi*)	(*henryi*)
Aeronautes saxatalis saxatalis?	X	X	X	X	X	X
*Calypte costae**	X	X		(L)		
Selasphorus platycercus platycercus	X	X		X	X	X
Colaptes cafer collaris	X	X	X	X	X	X
Sphyrapicus varius nuchalis (H)[7]	X	X	(*daggetti*)	X	X	
Sphyrapicus thyroideus nataliae	X	X	(*thyroideus*)	(L)	X	

[1] A queried racial name is used for species for which specimens were not obtained, in which case the name is based upon available skins from nearby areas. In many instances the races involved are very widespread forms which have little bearing in the present faunal analysis.

[2] Species present in breeding season, but breeding status uncertain. These and other queried records are not included in totals entered at the bottom of the table.

[3] (L) = Occurs very locally in this fauna. Use of this symbol implies that this species is of marginal occurrence in this fauna and that its center of distribution is in another fauna or faunas.

[4] Names in parentheses refer to other races of the species, or to closely related species, that are present.

[5] * = Species found by van Rossem (1936) in the Spring Range, marginally in piñon woodland or in mixed piñon-brushland, that are not mentioned in the species accounts in this paper. Certain of these species show strongest affinities to the Mohave Desert lowland fauna or to the Great Basin lowland fauna than to any of the montane faunas indicated in the table.

[6] + = Another race of this species is also present in this fauna.

[7] (H) = Hybridizes in southern Nevada with a representative of the Sierra Nevadan Fauna.

TABLE 1 (*Continued*)

	Sheep Range	Spring Range	Sierra Nevadan	Great Basin Montane	Southern Rocky Mountain	Sierra Madrean
Dendrocopos villosus leucothorectis	X	X	(*hyloscopus*)+	X+	X	(*icastus*)
Empidonax oberholseri	X	X	X	X	X	
Empidonax wrightii	X	X		X	X	
Empidonax difficilis hellmayri	X		(*difficilis*)	(L)	X	(*immodulatus*)
Contopus richardsonii richardsonii	X	X	X	X	X	X
Nuttallornis borealis	X?	X	X	X	X	
Tachycineta thalassina lepida	X	X	X	X	X	X+
Cyanocitta stelleri macrolopha	X?	X	(*frontalis*)	(L)	X	(*diademata*)+
Aphelocoma coerulescens nevadae	X	X	(*superciliosa*)[L]	X	(*woodhousei*)	(*grisea*)
Corvus corax	X?		X	X	X	X
Gymnorhinus cyanocephalus	X	X		X	X	
Nucifraga columbiana	X	X	X	X	X	
Parus gambeli inyoensis	X	X	(*abbreviatus*)	X	(*gambeli*)	
Parus inornatus ridgwayi	X	X		X+	X	
Psaltriparus minimus providentialis	X	X		X+	(*plumbeus*)	(*P. melanotis*)
Sitta carolinensis tenuissima	X	X	X	X	(*nelsoni*)	(*umbrosa*)
Sitta canadensis	X	X?	X	X	X	
Sitta pygmaea canescens	X	X	(*melanotis*)	X(E)[8]	(*melanotis*)	(*chihuahuae*)
Certhia familiaris leucosticta	X	X	(*zelotes*)	X(E)	(*montana*)	(*albescens*)
Cinclus mexicanus mexicanus?		X	X	X	X	X
Troglodytes aëdon parkmanii	X	X	X	X	X	(*T. brunneicollis*)
Thryomanes bewickii eremophilus	X	X		X+	X	X+
Catherpes mexicanus conspersus	X	X	X	X	X	(*mexicanus*)
Salpinctes obsoletus obsoletus	X	X	X	X	X	
*Oreoscoptes montanus**		X		X	X	
Turdus migratorius propinquus	X	X	X	X	X	X
Hylocichla guttata polionota	X	X	(*sequoiensis*)	X	(*auduboni*)	
Sialia mexicana bairdi	X	X	(*occidentalis*)	(L)	X	(*amabile*)
Myadestes townsendi townsendi	X	X	X	X	X	(*calophonus*)
Polioptila caerulea amoenissima	X	X		X	X	X
Regulus calendula cineraceus	X	X	X	X	X	

[8] (E) = Endemic to the Sheep and Spring ranges.

TABLE 1 (*Continued*)

	Sheep Range	Spring Range	Sierra Nevadan	Great Basin Montane	Southern Rocky Mountain	Sierra Madrean
Vireo vicinior	X	X		(L)	(L)	
Vireo solitarius plumbeus	X	X	(*cassinii*)	X	X	(*pinicolus*)
Vireo gilvus leucopolius	X	X	(*swainsonii*)	X	(*swainsonii*)	(*brewsteri*)
Vermivora virginiae	X	X		X	X	
Dendroica auduboni auduboni	X	X	X	X	X	(*nigrifrons*)
Dendroica nigrescens	X	X		X	X	
Dendroica graciae graciae	X			(L)	X	X
Setophaga picta picta	X?			(L)	(L)	X
*Icterus parisorum**	X	X		(L)	(L)	X
*Molothrus ater artemisiae**		X	X	X	X	(*obscurus*)
Piranga ludoviciana	X	X	X	X	X	
Piranga flava hepatica	X?			(L)	(L)	X
Pheucticus melanocephalus melanocephalus	X	X	(*maculatus*)	X	X	X
*Passerina amoena**		X	X	X	X	
Carpodacus cassinii	X	X	X	X	X	
Spinus pinus pinus	X	X	X	X	X	(*macropterus*)
Loxia curvirostra grinnelli	X	X	X	X	(*benti*)+	(*stricklandi*)
Chlorura chlorura	X	X	X	X	X	
Pipilo erythrophthalmus montanus	X	X	(*falcinellus*)	X+	X	(*griseipygius*)
Amphispiza belli nevadensis?*		X		X+	X	
Junco caniceps caniceps (H)	X	X	(*J. oreganus*)	X	(*dorsalis*)+	(*J. phaeonotus*)
Spizella passerina arizonae	X	X	X	X	X	(*atremaeus*)
*Spizella breweri breweri**		X	X	X	X	
Spizella atrogularis evura	X	X		(L)	(L)	(*atrogularis*)
Number of forms not shared between ranges	5 (8?)	12 (13?)	} Faunal difference score[9]: 17			
Number of forms shared between ranges	57 (60?)	57 (60?)				
Total number of forms present	62 (68?)	69 (73?)				

[9] Calculated according to the method of Miller (1951:582).

breeding areas often cross lowland deserts during the spring when these deserts may be relatively cool and otherwise hospitable. In other words the deserts may not serve as effectively as barriers, during the seasons of active dispersal, as would water masses surrounding islands. Even relatively sedentary montane species may cross deserts during the cooler seasons. Gullion *et al.* (1959) cite records of the Pigmy Nuthatch in the McCullough Range, southern Clark County, Nevada, for March. This locality is approximately 45 miles south of the nearest breeding populations in the Spring Range.

Impoverishment.—Although the isolation of forest habitats of these mountain ranges has not led to striking examples of endemism among birds, it may be an important factor in limiting the total size and diversity of the avifauna, particularly with regard to extremely sedentary species. The White-headed Woodpecker (*Dendrocopos albolarvatus*) and the Spotted Owl (*Strix occidentalis*), two species for which there seems to be suitable habitat, may not occur because of the great isolation of the Sheep and Spring ranges from source populations of significant size.

Lack, or deficiency, of habitats is probably the most important factor promoting impoverishment of the montane avifaunas in southern Nevada. For example, spruce-fir forests are not developed to a degree adequate to support breeding Golden-crowned Kinglets or Evening Grosbeaks (*Hesperiphona vespertina*), two species that occur widely in such forests in the southern Rocky Mountains. In addition, well-developed aquatic habitats and associated riparian areas are scarce in both ranges as are many of the species associated with such areas.

Ecologic extensions.—We found little or no evidence of the expansion of the ecologic range of any species in the absence of presumed competitors. Some species were extremely abundant and rather wide ranging, but apparently not at the expense of other species. This was particularly true in the Sheep Range where, although aspen was almost absent, Warbling Vireos were numerous in conifers such as white fir, piñon, and ponderosa pine. In this same range the Black-throated Gray Warbler was abundant, even though Audubon Warblers, Virginia Warblers, and Grace Warblers, all of which are possible competitors, also occurred in expected densities. There was some evidence of ecologic extension of Pigmy Nuthatches from the typically occupied ponderosa pine into bristlecone pine, without an obvious reduction in numbers or without the absence of another possibly competing form.

Population fluctuation and instability.—Some evidence for changes in population size and species composition exists for these ranges. Van Rossem surely missed some species which were actually present, when he did his work in the 1930's, largely as a matter of chance or because he did not work extensively in certain habitats at the proper season. However, the difference in abundance of so many species in the thirty-year period is great enough so that there is reason to believe that the actual numbers of some forms have changed markedly. I conclude that probably some species either were absent or their populations were much reduced when he did his work. One possible reason for these fluctuations is the reduced stability of marginal habitats compared to that of major blocks of more consistently occupied habitat. The small areas of forest may be providing only minimal requisites for the existence of a species during even "normal" years, so that the environment can easily become inadequate when relatively minor and quite typical climatic changes occur. A simple example serves to illustrate this point. The Dipper, a species that has nested at least once along the stream in Trout Canyon, Spring Range, could do so only during a wet year. In a dry year there could be no nesting in the entire range.

By way of contrast, in the Sierra Nevada, after a succession of very dry years that caused many of the smaller streams to disappear, there would still be sufficient places for the Dipper to nest along the larger, and hence more stable, streams.

I believe, therefore, that for certain species of birds the forest and woodland zones in isolated desert ranges may be marginal habitats which become inadequate at irregular intervals, so that some species do not necessarily breed there every year. The term irregular resident would then be appropriate, particularly for species that maintain only small populations even in the most favorable years. The Goshawk, Whip-poor-will, and Painted Redstart, in addition to the Dipper, would be examples of species with such a probable status.

ANALYSIS OF THE AVIFAUNAS

The geographic position of the Sheep and Spring ranges, at the southern border of the Great Basin and essentially equidistant from the Sierra Nevada and southern Rocky Mountains, provokes an attempt at analysis of the relationships of the breeding avifaunas. Table 1 provides the basic information for the analysis presented in table 2.

Comparison of the avifaunas of the two ranges.—As expected, the avifauna of the Spring Range is richer (by seven species) than that of the Sheep Range, in part as a consequence of greater size and more abundant moisture, which support the development of better riparian habitats, ground cover, coniferous forest, and woodland. Several species breed in the Spring Range, but not in the Sheep Range, presumably as a direct response to the aforementioned conditions: Cooper Hawk, Booming Nighthawk, Steller Jay, Dipper, and Lazuli Bunting. To this list could be added the Goshawk, a species which has nested in the Sheep Range but which is probably not a regular resident there. Certain other forms, recorded only from the Spring Range, occur widely in the Great Basin sagebrush zone, a zone much reduced in the Sheep Range: Sage Thrasher, Cowbird, Bell Sparrow, and Brewer Sparrow. It is important that several species which reach the Sheep Range do not occur in the Spring Range; hence, it is improper to view the avifauna of the former range as merely an impoverished version of that of the latter range. This group of species, which includes the Whip-poor-will, the interior race of the Western Flycatcher (*E. d. hellmayri*), the Grace Warbler, and probably the Painted Redstart and Hepatic Tanager (the latter two species are uncertain as breeding residents), indicates a stronger affinity between the Sheep Range avifauna and the montane avifaunas to the southeast than is shown by the Spring Range.

The faunal difference score of 17 (table 1) presumably reflects pronounced ecologic differences between the two ranges that have not been recognized previously. This level of difference is comparable to that known between the avifaunas of the Cascade and Sierra Nevadan areas in northern California, and between the avifaunas of the San Jacinto and San Diegan mountains in southern California (Miller, 1951: 587).

Avifaunal relationships.—As indicated in table 2, both ranges show strongest avifaunal affinites to the Great Basin Montane and the Southern Rocky Mountain faunas; this is demonstrated by the number of species that relate exclusively to these faunas (12). Only one form, the Band-tailed Pigeon, has affinities exclusively with the Sierra Nevadan Fauna, and this conclusion is based on a tentative racial assignment. The number of forms that relate to the Sierra Madrean Fauna is unexpectedly high considering the geographic position of the mountains in southern

Nevada; the percentage for the Sheep Range would actually be higher if two other probable breeding species, the Painted Redstart and the Hepatic Tanager, were included in the calculations.

The stronger affinity shown for the Great Basin Montane Fauna in comparison with that shown for the Southern Rocky Mountain Fauna is expected inasmuch as the two ranges are situated at the southern border of the Great Basin. Differences between the Great Basin and Southern Rocky Mountain faunas are perhaps not as great as the figures seem to indicate; many of the forms endemic to the Great Basin are weakly differentiated races obviously closely related to, if not actually identical to, forms in the southern Rocky Mountains. Examples are: *Aphelocoma coerulescens nevadae, Sitta pygmaea canescens, Certhia familiaris leucosticta, Hylocichla guttata polionota,* and *Vireo gilvus leucopolius.*

TABLE 2

ANALYSIS OF RELATIONSHIPS OF MONTANE AVIFAUNAS[1]

Source fauna	Sheep Range (62 species)				Spring Range (69 species)			
	Shared[2]		Exclusive[3]		Shared		Exclusive	
	No.	Per cent	No.	Per cent	No.	Per cent	No.	Per cent
Sierra Nevadan	27	43.5	1	1.6	34	49.3	1	1.4
Great Basin Montane[4]	38	61.3	8	12.9	48	69.6	8	11.6
Southern Rocky Mountain	40	64.5	4	6.5	47	68.1	4	5.8
Sierra Madrean	15	24.2	3	4.8	18	26.1	2	2.9

[1] Based on data from table 1. Queried and local occurrences in table 1 are not included.
[2] Number of forms that occur also in other faunas.
[3] Number of forms that occur only in the fauna specified.
[4] Includes the two races endemic to the Sheep and Spring ranges: *Sitta pygmaea canescens* and *Certhia familiaris leucosticta.*

In spite of the apparently weak relationship of the montane avifaunas of the Sheep and Spring ranges to the Sierra Nevadan Fauna, the influence of the latter mountain system is felt in another way—through introgression after secondary contact of strong differentiates. For at least three basically Great Basin or Rocky Mountain forms that breed in the mountains of southern Nevada, *Sphyrapicus varius nuchalis, Vireo solitarius plumbeus,* and *Junco caniceps caniceps,* there is evidence of actual or potential (in the case of the vireo) contamination by interbreeding with forms from the Sierra Nevada or from montane areas near the Pacific coast. Similar gene flow between less contrasting Sierran and interior differentiates that may be occurring in the Sheep and Spring ranges could be easily overlooked.

SUMMARY

A comparative study in 1963 of the composition and ecologic distribution of the avifaunas breeding in isolated forest and woodland zones of the Sheep and Spring ranges, two major mountain systems in southern Nevada, revealed that endemism among the resident birds is weak or lacking. The Spring Range supports a more diverse avifauna (69 species) than the Sheep Range (62 species), presumably because of the better development of coniferous forest, understory vegetation, and riparian habitats.

The avifaunas of both ranges are allied most closely to those of the Great Basin Montane and Southern Rocky Mountain faunas; that of the Sheep Range also shows an unexpected affinity with the Sierra Madrean Fauna to the southeast. Although affinity with the Sierra Nevadan Fauna is weak, the influence of this area is felt through introgression in the Spring and Sheep ranges between well-marked

differentiates of Sierran and Great Basin-Rocky Mountain forms of *Sphyrapicus varius*, possibly of *Vireo solitarius*, and of *Junco*. When compared with major source faunas, the diversity of species in the mountains of southern Nevada is not great. This impoverishment is presumably a result of the isolation and deficiency of the forest and woodland habitats. No evidence was found for increased ecologic range of species in the absence of possible competitors. Changes in the composition of the avifauna and in the abundance of certain species have evidently occurred in the Spring Range since van Rossem studied the area in 1932. Instability of marginal habitats may be a basic cause of population fluctuation in desert ranges so that some species breed there irregularly.

The following species are here reported for the first time from Nevada: Whip-poor-will, Worm-eating Warbler, Parula Warbler, Grace Warbler, Painted Redstart, and Hepatic Tanager. An additional nine species have not been recorded previously as summer residents in the southern part of the state.

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