

ECOLOGICAL DISTRIBUTION OF THE BIRDS OF THE PANAMINT MOUNTAINS, CALIFORNIA

By ROLAND H. WAUER

The Panamint Range which forms the western edge of Death Valley rises abruptly from the alkali flats of the valley floor to the boreal heights of Telescope Peak. This range of elevations includes all of the western American life-zones except the Arctic-alpine. The first published account of the birds of the Panamint Mountains was that of the Death Valley Expedition of 1891 (Fisher, 1893). Fisher reported 72 species of birds from the Panamints. Little further attention was given this mountain range until 1917 and 1918 when members of the University of California's Museum of Vertebrate Zoology collected specimens from the northern portion of the Panamints. Grinnell published the more important findings in 1918 and 1923. There has been no other avifaunal publication dealing specifically with this mountain system. The writer had the opportunity to study the eastern slope of this range at all seasons of the year from 1957 through 1962; the present paper is the result.

Because of the tremendous size of the study area, specific localities were chosen for careful study partly for the convenience of the writer and partly because they typified the various ecological communities to be found within the Panamint Range.

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PHYSICAL AND BIOLOGICAL CHARACTERISTICS OF THE STUDY AREA

The Panamint Range rises from the below-sea-level region of Death Valley to 11,049 feet at the summit of Telescope Peak. The high Panamint ridge is nowhere below 5400 feet and it rises above 9500 feet in four distinct peaks within the 70-mile length of the study area. Warm Springs Canyon and Butte Valley, which bound the study area on the south, lie wholly within the Lower Sonoran Life-zone. The northern boundary of the study area is situated at the base of the north slope of Hunter Mountain, also in the Lower Sonoran Life-zone.

The base of the Panamint Range lies in the salt pan of Death Valley. A line of heavy vegetation exists along the western edge of the salt pan where pickleweed (*Allenrolfea occidentalis*) grows nearest the salt. Salt grass (*Distichlis stricta*) and arrowweed (*Pluchea sericea*) form the next strip which intermingles with the dominant growth, namely honey mesquite (*Prosopis juliflora*). Desert holly (*Atriplex hymenelytra*) and iodine weed (*Suaeda suffrutescens*) occur next. Cattle spinach (*Atriplex polycarpa*) grows at the base of the alluvial fans where creosote bush (*Larrea tridentata*) intermixes and becomes common on the open slopes. It is this line of vegetation which constitutes the first avian habitats. The avifauna of the below-sea-level area was discussed previously by Wauer (1962). Plant nomenclature follows that of Munz (1959).

Long, open, and dissected alluvial fans slope upward and meet the canyon mouths one to six miles from the salt pan. Desert holly, fourwing saltbush (*Atriplex oblongifolia*), and brittlebush (*Encelia farinosa*) grow in the washes and on the exposed flats. This xerophytic region has very little avian appeal and is the most desolate zone within the study area.

The canyons begin at 800 to 2500 feet elevation. The low canyons are characterized by open steep slopes and washes that support a moderate growth of vegetation. Here

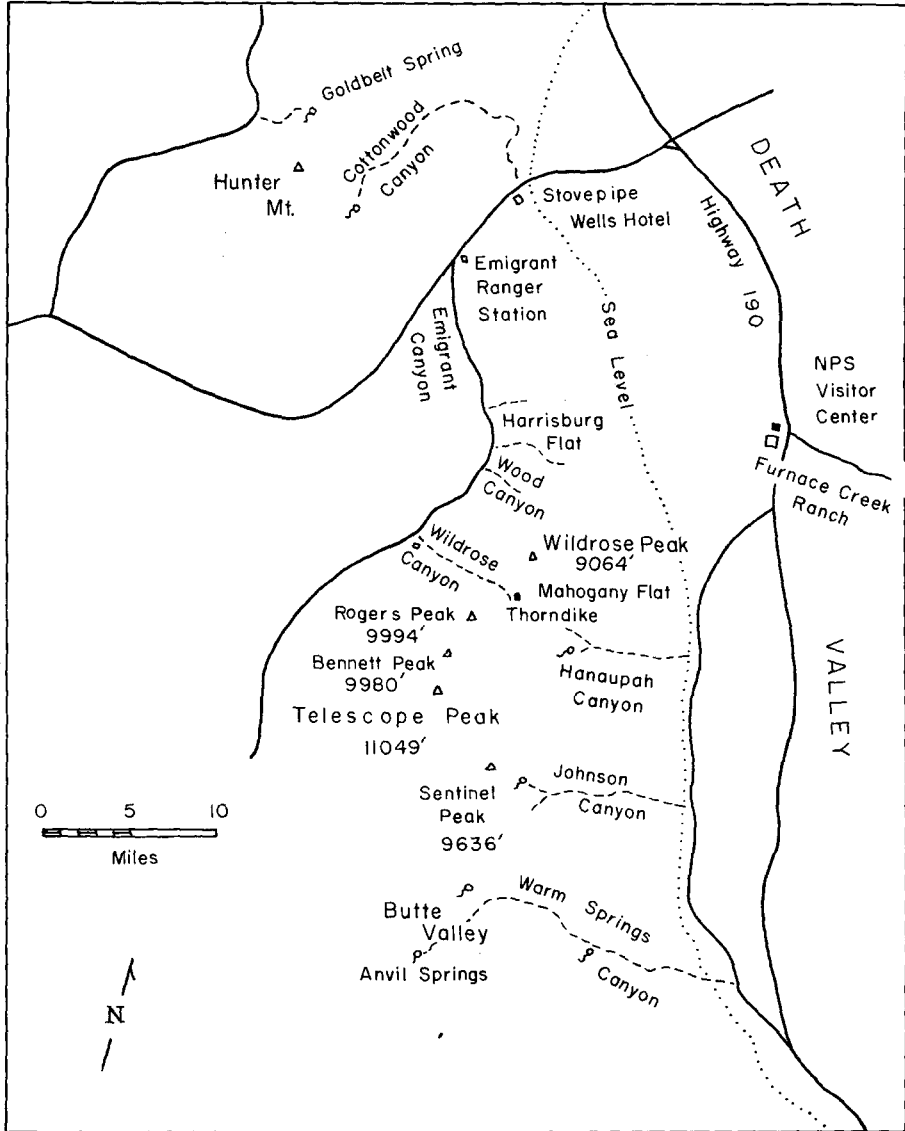


Fig. 1. Map of key locations in the eastern slope of the Panamint Range.

can be found fourwing saltbush, dalea (*Parosela*), creosote bush, stingbush (*Eucnide urens*), bladder sage (*Salazaria mexicana*), water molly (*Baccharis glutinosa*), brittlebush, bursage (*Franseria dumosa*), cheesebush (*Hymenoclea salsola*), and desert-fir (*Peucephyllum schottii*). This region supports a sparse avian population.

The upper canyons of the Lower Sonoran Life-zone support a heavier avian population. Where the canyons narrow and the elevation allows the temperature to become tolerable during mid-summer, the vegetation increases and a varied habitat exists. Common here are greenmolly (*Kochia americana*), rabbitbrush (*Chrysothamnus nauseo-*



Fig. 2. Emigrant Canyon is typical of the habitat present in the low canyons. This zone of desert shrub is utilized by many birds in the spring and fall months, but birds seldom remain here during the hot summer days.

sus), and creek senecio (*Senecio Douglasii*). A line of springs exist at about 4000 feet elevation throughout the study area which often support heavy growths of willow (*Salix*) and a few cottonwoods (*Populus Fremontii*).

The open flats and valleys of the high desert below the piñon-juniper woodlands support shadscale (*Atriplex confertifolia*), cliffrose (*Cowania stansburiana*), desert mallow (*Sphaeralcea eremicola*), bladdersage, desert sage (*Salvia carnosa*), sagebrush (*Artemisia tridentata*), and cottonthorn (*Tetradymia spinosa*). This community is heavily utilized by birds in the spring and fall but supports very sparse populations in the summer and winter. The aforementioned plant formations occur in the Lower Sonoran Life-zone, the major zone of the study area. Above 5500 feet elevation, however, the flora changes considerably. The piñon-juniper woodlands exist from approximately 5500 to 8000 feet elevation. Large tracts of piñon occur from the northern slope of Hunter Mountain and on Hart Mountain south to Butte Valley. It is mostly a climax growth which may form heavy, dense stands or sparse ones depending on the geographic position. The piñon-juniper association includes piñon pine (*Pinus monophylla*), juniper (*Juniperus*), fernbush (*Chamaebatiaria millefolium*), cliffrose, desert grape (*Vitis girardiana*), desert sage, sagebrush, Mohave brickellia (*Brickellia oblongifolia*), and cottonthorn. This community undoubtedly has the largest populations of birds in the study area.

On Hunter Mountain, between 5500 and 7365 feet elevation, is a piñon forest which covers more than eight square miles. Juniper grows at lower elevations and on warmer south slopes, but piñon alone dominates the higher slopes. Open tracts of sagebrush occasionally occur throughout; willow and rabbitbrush grow in numerous gullies and canyons where springs and seeps are found. Large piles of huge granite boulders and slabs spot the entire area. From Hart Mountain to Bald and Wildrose peaks, the piñon

forest is sparse, with many talus slopes forming an ecotone situation with sagebrush tracts. Wildrose Peak is barren of trees at its wind-blown summit of 9064 feet elevation. Here sagebrush and fernbush grow. A belt of piñon occurs along the steep eastern face of the Panamints south of Wildrose Peak to as far as the southern slope of Sentinel Peak, overlooking the southern boundary of the study area. In a few locations, as above Hanaupah and Johnson canyons, piñon forms large tracts of woodland along the ridges and gentle slopes.

Above the piñon woodlands is a Transition Zone which begins in the cooler, high canyons as low as 7500 feet elevation and rises to 9500 or 10,000 feet elevation on the ridges of Roger's, Bennett, and Telescope peaks. The dominant vegetation includes limber pine (*Pinus flexilis*), water birch (*Betula occidentalis*), mountain mahogany (*Cercocarpus ledifolius*), fernbush, maple (*Acer glabrum*), buckbrush (*Ceanothus cordulatus*), and tansy (*Tanacetum canum*). A distinctive avifauna is present here during the breeding season.

On Telescope Peak a distinctly boreal situation is evident from the lower edge of the bristlecone pines (*Pinus aristata*) to the summit of the peak. This zone includes both the Canadian and Hudsonian life-zones as defined by Gilman (Life-zones of Death Valley, unpublished), based upon his findings above 9500 feet elevation. Gilman termed the 9500- to 10,500-foot belt "Canadian" and regarded *Gilia aggregata*, *Physocarpus alternans*, *Ribes montigenum*, *Pinus aristata*, *Pinus flexilis*, and *Chamaebatiaria millefolium* as marking this zone. He regarded the region from 10,500 to 11,049 feet elevation as "Hudsonian" and listed three plants present there: *Tanacetum canum*, *Crepis nana*, and *Heuchera rubescens*. I feel there is not sufficient evidence, at least on the basis of the avifauna, to split the Boreal Zone. It is the dominance of the bristlecone pine and the presence of the limber pine which are the important factors for birds. The steep slopes, heavy winds, and rocky terrain do not allow a heavy forest above 9500 feet, and it is in the suppressed pine growth where a distinctive avifauna appears.

THE AVIFAUNA

One hundred and forty-five species of birds were found within the study area, seventy-five of which are considered to be breeding. For purposes of discussion, these breeding species are grouped according to the ecologic formation or association they occupy. Nomenclature is based on the American Ornithologists' Union Check-list (1957).

I. *Valley alluvial fans*.—Only three species have been found to nest in this formation: Burrowing Owl (*Speotyto cunicularia*), Say Phoebe (*Sayornis saya*), and Rock Wren (*Salpinctes obsoletus*).

Burrowing Owls prefer burrows along the washes at the bases of the alluvial fans and they seldom move into the canyons of the study area. Fisher (1893) found a nesting pair at Bennett Well at the base of the alluvial fans. I found a single bird at its burrow on the Johnson Canyon fan, at about 500 feet elevation, on October 21, 1961. A single bird was observed near Harrisburg Flat on July 12, 1959, but no burrow or other sign of breeding was found.

The Say Phoebe is a resident bird seen frequently in all but the mid-summer days. Nesting occurs in erosion holes in the banks of the washes throughout the alluvial fan area and up into the canyons to the piñon-juniper woodlands. I found young being fed by an adult above Stove Pipe Wells Resort, elevation 200 feet, on May 13, 1962. A nest and adults were found in Jayhawker Canyon at 2500 feet elevation on May 10, 1959; and young and a nest were found and photographed at Wildrose, elevation 4000 feet, on June 9, 1960.



Fig. 3. Hanaupah Spring presents a luxurious growth of willows and seepwillows. The spring areas are heavily utilized by birds throughout the summer months.

This species appears to nest far from available water. Grinnell (1923:71) suggests that they are probably "able to go entirely without water, even in the hottest summer, save for such as may be secured along with its insect food or elaborated during the process of metabolism." I have many mid-summer records from places many miles distant from the nearest known water. Say Phoebes nest at low elevations after early March and in the higher portions of their range in May and early June. Immediately after the nesting season ends, the species becomes quite rare and apparently vacates its nesting grounds for a few to several weeks, returning in mid-summer or early fall. Such changes in abundance have been noticed in the summers from 1959 through 1962, both in the study area and in the below-sea-level region of Death Valley (Wauer, 1962).

The Rock Wren is probably the most common species of bird within the study area. Nest sites have been reported among the jumbled rocky outcrops from below the canyons at sea level up to the boreal areas near the summit of Telescope Peak. I found young being fed by an adult at 300 feet elevation on Emigrant Pass, April 16, 1961.

There are many nesting records for the canyons; and the writer found young birds being fed by an adult at about 10,800 feet elevation, near the summit of Telescope Peak on June 4, 1962. This species may make seasonal movements up and down the mountains. During the winter it occurs below the snow-line and down to the below-sea-level region of Death Valley (Wauer, 1962). By mid-summer it moves upslope; I have not found it below approximately 2000 feet elevation after early June.

II. *Lower canyons*.—The cliffs at the canyon mouths and the side washes provide nesting sites for 16 species of birds: the Red-tailed Hawk (*Buteo jamaicensis*) utilizes the higher cliffs and ledges. A nest was found at 2500 feet elevation in Emigrant Canyon on May 13, 1962. This is the most common resident hawk and it may be expected throughout the study area in spring, summer, and fall. Rarely it is observed above the piñon woodlands during the colder winter days.

The Prairie Falcon (*Falco mexicanus*) seeks similar nesting sites. A nest was found at 2800 feet elevation in Emigrant Canyon on March 25, 1958. This species can be found throughout the study area on all but the colder winter days. It frequents the washes and low canyons in spring and early summer and moves into the higher regions, such as along the high ridges of the Panamints, during summer and fall. Some utilize the low valley oases throughout the year (Wauer, 1962).

The cliffs of the low canyons also supply nesting sites for the Great Horned Owl (*Bubo virginianus*), White-throated Swift (*Aëronautes saxatalis*), and Common Raven (*Corvus corax*). All three may be expected from the lower canyon mouths up into the piñon woodlands throughout the summer. I have observed Great Horned Owls in Warm Springs, Johnson, Trail, Jayhawker, and Cottonwood canyons. A pair of birds and a nest were found just below Hungry Bill's Ranch in Johnson Canyon on June 4, 1959. This species is undoubtedly the most common nocturnal predator in the study area.

The White-throated Swift reaches the study area by mid-March and nesting is evident by early April. I found nests in Cottonwood Canyon on April 19, 1960, and in Hanaupah Canyon on May 20, 1962, and at Green Spring on May 25, 1960. The raven is one of the most common species and may be expected throughout the study area. Nesting occurs primarily in the lower canyons. Gilman (1935:242) found a nest "in a crevice high on an inaccessible cliff." There is little activity of this species in the low canyons in mid-summer as postnesting birds move at this season into the higher canyons or to the low desert oases such as Furnace Creek Ranch and Eagle Borax Works (Wauer, 1962).

The Roadrunner (*Geococcyx californianus*) is occasionally found in the low canyons and on the open flats below the piñon-juniper woodlands. The Costa Hummingbird (*Calypte costae*) arrives in the study area after mid-February, and nesting may be expected by late February, during the warmer spring seasons. A single nest containing two eggs was discovered on February 18, 1957. It was situated about four feet above the ground on a desert-fir branch. Other nests were found at 2000 feet elevation in Hanaupah Canyon on March 27, 1960, and at Wildrose on June 6, 1959. Nesting pairs were fairly common about the canyon springs in May and June.

The House Finch (*Carpodacus mexicanus*) is probably the most common nesting bird of the low canyons. Nesting may be expected from mid-March through June. A nest was found in a rabbitbrush at 2500 feet elevation in Hanaupah Canyon on March 27, 1960. Dozens of individuals sang along the canyon up to an elevation of about 4000 feet. On May 24, 1962, 12 nests were found at Wildrose. Eight nests were located on the buildings and four were located on the shrubs that grow in the immediate area. Young birds were seen at Hunter Spring, 5500 feet elevation, on June 17, 1960. Nest-

ing has not been detected above the piñon woodlands but postnesting birds and migrants are abundant throughout.

The Ash-throated Flycatcher (*Myiarchus cinerascens*) is another of the species nesting in the low canyon. A nest was being constructed under a rocky overhang seven feet above the wash in Emigrant Canyon on May 13, 1962. Postnesting birds can be expected well into the lower limits of the limber pine association, and they move out of the study area by mid-September.

Where the canyons broaden somewhat there exists a habitat similar to the open sage flats. This area affords nesting sites for the Mockingbird (*Mimus polyglottos*) and Black-throated Sparrow (*Amphispiza bilineata*). The Mockingbird arrives in the study area in early April and nesting occurs during May and June from 1500 to 5500 feet elevation. I found a nest in Chuckwalla Canyon on June 20, 1959, and another in Butte Valley at Anvil Springs on May 12, 1960. The latter contained two young birds about ready to leave the nest. Postnesting Mockingbirds are abundant throughout the study area below the piñon woodlands but they rarely visit the forested areas. The Black-throated Sparrow may be expected to nest in May and June. A nest containing three young was found near Hanaupah Spring on June 20, 1959. Postnesting birds have been found in all parts of the study area.

The House Sparrow (*Passer domesticus*) occurs at two locations: Emigrant Ranger Station and Wildrose. Nests were found on buildings as well as in the tamarisks (*Tamarix* sp.) which grow around the buildings. The species is well established and remains at these localities throughout the year.

The springs and seeps which occur in Emigrant, Jayhawker, Six Springs, and Warm Springs canyons support heavy populations of birds in the spring and summer months. The availability of water is apparently directly responsible for the presence of at least two breeders, the Bullock Oriole (*Icterus bullockii*) and Blue Grosbeak (*Guiraca caerulea*). A pair of Bullock Orioles was observed building at Cottonwood Spring on April 19, 1960. Postnesting birds seldom remain in the study area but move into the low valley about the desert oases (Wauer, 1962). A young Blue Grosbeak was being fed by adults at Emigrant Spring on June 30, 1961, and a nest and young were found at Hanaupah Spring on June 20, 1959. The nest was located about four feet above the ground in a heavy willow growth.

III. *Upper canyons*.—This is the canyon area just below the piñon-juniper woodlands and is one of the best watered zones within the study area. Twenty-nine species of birds have been found to nest here, 14 of which utilize the spring areas. They are the California Quail (*Lophortyx californicus*), Gambel Quail (*Lophortyx gambelii*), Costa Hummingbird, Mourning Dove (*Zenaidura macroura*), Western Kingbird (*Tyrannus verticalis*), Verdin (*Auriparus flaviceps*), Blue-gray Gnatcatcher (*Polioptila caerulea*), Yellowthroat (*Geothlypis trichas*), Hooded Oriole (*Icterus cucullatus*), Bullock Oriole, Blue Grosbeak, Lazuli Bunting (*Passerina amoena*), House Finch, and Lesser Goldfinch (*Spinus psaltria*).

California Quail were found by Fisher (1893:28) to be common in the Panamint Range, as in Johnson Canyon, but here they reached their eastern limit. The species is now quite scarce within the study area. Several adults and a few young were seen in Johnson Canyon on June 5, 1959. A covey of 30 birds was reported for Butte Valley on November 17, 1954; and 35 birds were seen at Five-mile Spring on June 20, 1961. Gambel Quail were found at Warm Springs and in Butte Valley. Local miners at Warm Springs informed the writer that young "quail" were present early each summer.

A pair of Mourning Doves nested in a cottonwood at Greater View Spring. A nest-

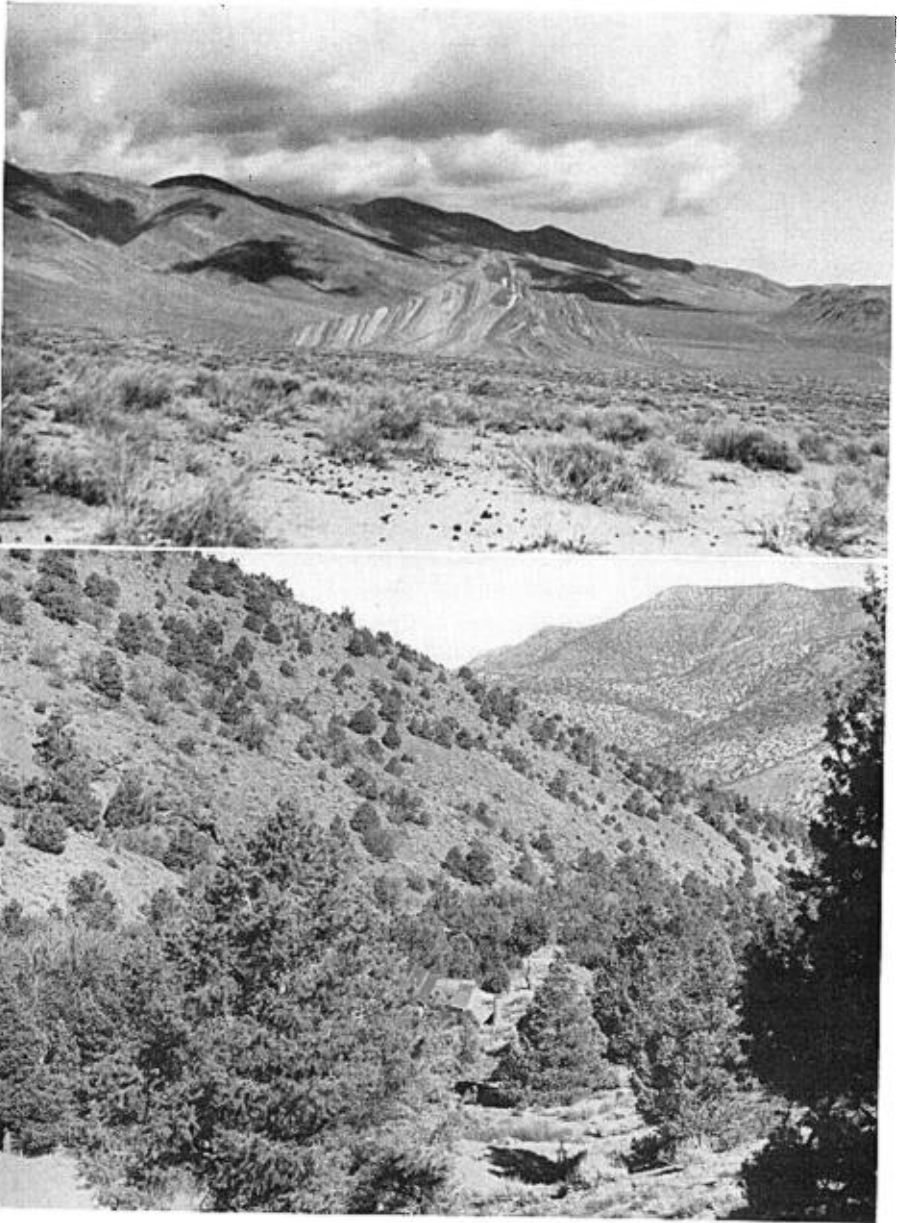


Fig. 4. Above: Butte Valley forms the southern edge of the study area. Here is a typical open sage flat which is utilized by several birds such as Horned Lark, Mockingbird, Sage Thrasher, and Black-throated Sparrow.

Fig. 5. Below: Thorndike, located in Wildrose Canyon, is typical of the piñon-juniper woodlands found in the Panamint Range. This zone of vegetation is the most popular zone for breeding birds within the study area.

ing pair of Western Kingbirds was found at Anvil Springs on May 12, 1961; and a Verdin nest was found at Five-mile Spring on June 20, 1961. Blue-gray Gnatcatcher nests were found from the upper canyons well into the piñon-juniper woodlands. A nest, located about 30 feet up in a cottonwood tree, was found at Cottonwood Spring on April 19, 1960. I found young being fed by adults in Hanaupah Canyon on June 20, 1959. Several nests were found among the piñon-juniper woodlands, 5900 to 9000 feet elevation, in Wildrose Canyon on June 9, 1960, and a nest was discovered on Hunter Mountain on June 16, 1960. All of the nests were located in a tree or shrub four or more feet above the ground.

A singing pair of Yellowthroats was found at Goldbelt Spring on June 16, 1960. Hooded and Bullock orioles were found nesting at Hanaupah Spring on June 20, 1959. Nesting Lazuli Buntings were discovered at Hanaupah and Thorndike springs in May and June of 1960 and 1962. Lesser Goldfinches were found nesting at Hanaupah and Johnson springs on June 6, 1959.

Chukar Partridges (*Alectoris graeca*) utilized the immediate areas of springs for nesting. This was one of the more common birds of the upper canyons. Young birds were observed in Hanaupah Canyon on May 21, 1959. Two families with 15 and 20 young each were seen in Wildrose Canyon at 5400 feet elevation on June 9, 1960. Post-nesting birds frequented the high springs and open slopes above the Lower Sonoran Life-zone. The writer counted over 150 individuals near Goldbelt Spring in late June. During the spring of 1959, 10 to 15 birds stayed around Stove Pipe Wells Hotel where they were fed daily. When warm weather arrived and the hotel closed for the season, the daily supply of food was terminated. The writer found a dozen birds under a step of one of the buildings where they had crowded into a small opening and died, probably from dehydration.

Other nesting birds of the high canyons included the Poor-will (*Phalaenoptilus nuttallii*), White-throated Swift, Ash-throated Flycatcher, Say Phoebe, Rock Wren, Mockingbird, and Black-tailed Gnatcatcher (*Polioptila melanura*). A nest of the latter was found near Wildrose on June 4, 1961. It contained three eggs and was located about 1½ feet above the ground in a fourwing saltbush. A pair of Phainopeplas (*Phainopepla nitens*) nested at Wildrose on May 18, 1962, using a Joshua tree which had been planted alongside one of the residences.

IV. *Open sage flats and valleys*.—This is the open land just below the piñon-juniper woodlands. Eleven species of birds have been found nesting in this community. They are Chukar Partridge, Roadrunner, Poor-will, Say Phoebe, Horned Lark (*Eremophila alpestris*), Rock Wren, Mockingbird, LeConte Thrasher (*Toxostoma lecontei*), Sage Thrasher (*Oreoscoptes montanus*), House Finch, and Black-throated Sparrow. The Horned Lark is present throughout the year although it is rare during mid-winter. Nesting of this latter species occurs on Harrisburg, Old Crump, and Butte Valley flats, and young birds are common in late June and July. Young LeConte Thrashers were found on Wildrose and Harrisburg flats during July. A nest was discovered in a cholla on Harrisburg Flat, and a pair was seen in the vicinity from late March through July, 1959. The Sage Thrasher was found to be resident in Butte Valley and on Rabbit and Harrisburg flats.

V. *Piñon-juniper woodlands*.—This is the most heavily populated association during the breeding season. It is comprised of three distinct ecologic formations: the woodlands, the associated riparian habitat, and the associated high cliffs and rocky gorges. Forty-one species of birds have been found to breed within the piñon-juniper woodlands.

The breeding birds of the woodlands include Turkey Vulture (*Cathartes aura*),

Mountain Quail (*Oreortyx pictus*), Chukar Partridge, Mourning Dove, Great Horned Owl, Poor-will, Broad-tailed Hummingbird (*Selasphorus platycercus*), Ash-throated Flycatcher, Gray Flycatcher (*Empidonax wrightii*), Scrub Jay (*Aphelocoma coerulescens*), Piñon Jay (*Gymnorhinus cyanocephalus*), Mountain Chickadee (*Parus gambeli*), Plain Titmouse (*Parus inornatus*), Common Bushtit (*Psaltriparus minimus*), White-breasted Nuthatch (*Sitta carolinensis*), Bewick Wren (*Thryomanes bewickii*), Rock Wren, Hermit Thrush (*Hylocichla guttata*), Blue-gray Gnatcatcher, Loggerhead Shrike (*Lanius ludovicianus*), Gray Vireo (*Vireo vicinior*), Black-throated Gray Warbler (*Dendroica nigrescens*), Scott Oriole (*Icterus parisorum*), Brown-headed Cowbird (*Molothrus ater*), Western Tanager (*Piranga ludoviciana*), Black-headed Grosbeak (*Pheucticus melanocephalus*), House Finch, Green-tailed Towhee (*Chlorura chlorura*), Rufous-sided Towhee (*Pipilo erythrophthalmus*), Black-throated Sparrow, Sage Sparrow (*Amphispiza belli*), Oregon Junco (*Junco oreganus*), Chipping Sparrow (*Spizella passerina*), Brewer Sparrow (*Spizella breweri*), and Black-chinned Sparrow (*Spizella atrogularis*).

Seven of the 41 species are permanently established on their nesting grounds and move out of the area only during brief periods of extreme cold in winter. They are Mountain Quail, Chukar Partridge, Scrub Jay, Mountain Chickadee, Plain Titmouse, Common Bushtit, and Rufous-sided Towhee. Mountain Quail frequent the mountain springs and occasionally stray far from available water. Young birds were found at Thorndike Spring on June 9, 1960; on June 29, 1961, a female and eight young were found on the upper slope of Bennett Peak at 9500 feet elevation. The writer found young Scrub Jays being fed by an adult at Thorndike in late May. Fisher (1893) reported young on Telescope Peak in June. Another pair was seen feeding young at Hungry Bill's Ranch on June 5, 1959. The Mountain Chickadee nests in late May and June. A nest was found at Piñon Mesa on June 9, 1960; a pair of adults was seen carrying food in the bristlecone pine forest on June 4, 1959. The Plain Titmouse is found in the lower portions of the piñon-juniper woodlands during its breeding season. Fisher (1893) collected a female containing eggs on April 17, 1891, in upper Johnson Canyon. The Common Bushtit was nesting at Piñon Mesa on April 6, 1960. The nest was located about 18 feet above the ground, hanging from a piñon branch. Rufous-sided Towhees frequent the springs and covered slopes; young were being fed by adults at Thorndike Spring on June 9, 1960.

The first sign of the coming nesting period in the piñon woodland is the movement of some of the nearby wintering flocks. Increasing populations are noticeable by mid-March. Bewick Wrens, Rock Wrens, and Loggerhead Shrikes begin to leave their low country winter homes and appear in the higher canyons and on their nesting grounds. Some species may begin nesting as early as late March, but it is not until late April and May before the mass of summering birds arrive to occupy their territories and nest.

Throughout the piñon woodlands are large open tracts of sagebrush which were occupied by several species of birds. From 5500 to 7000 feet elevation, Black-throated Sparrows and Green-tailed Towhees nest in this association, the latter species breeds throughout the altitudinal range of sagebrush. A nest was found on Hunter Mountain on June 16, 1960; another nest was found on the north slope of Bennett Peak on July 3, 1960. Sage Sparrows use this habitat as well but prefer tracts above the juniper line, even into the limber pine association, to about 9100 feet elevation. Young birds were seen being fed by adults at Thorndike and at Arcane Meadow on July 23, 1959. Fisher (1893) found Sage Sparrows and Brewer Sparrows nesting in the sage tracts among the piñons well into the higher tracts of sagebrush. A single singing Brewer Sparrow was seen by the writer at Arcane Meadow on May 26, 1959.

On June 9, 1960, I surveyed a track of piñon woodland along the eastern slope of Roger's Peak, south and below Mahogany Flat, at 7800 feet elevation. An area approximately one-quarter mile square was covered by zig-zagging back and forth, following contour lines of the Telescope Peak Quadrangle. Eight species of birds were observed and six were considered to be nesting: Gray Flycatcher (12 pairs; nests situated 15 to 25 feet above the ground in piñons), Mountain Chickadee (16 pairs; a few nests in cavities in piñon and one in a mountain mahogany), Blue-gray Gnatcatcher (8 pairs; 5 nests well hidden among the branches and lower portions of piñon trunks), Black-



Fig. 6. A bristlecone pine forest is present on the upper slope of Telescope Peak, at an elevation of 11,049 feet. Snow may remain for nine months of the year along the high ridges.

throated Gray Warbler (at least 10 pairs; one nest 20 feet up in a piñon), Oregon Junco (2 pairs; one nest under a boulder), Chipping Sparrow (at least 12 pairs; no nests found).

Several Hermit Thrushes and three male Western Tanagers were also found, but it was not determined if these species were nesting. Fisher (1893) reported Hermit Thrushes to be regular breeding birds of the piñon woodlands and I found a juvenal Western Tanager (too young to fly any distance) in the piñon area just north of the study area. Both species are here considered to be summer residents of the study area.

Other species found nesting in the piñon woodlands include the Broad-tailed Hummingbird which was found defending a territory on Hunter Mountain on June 17, 1960. A pair of White-breasted Nuthatches was observed near Hunter Spring carrying nesting materials on May 24, 1959. Bewick Wrens preferred the dry gullies for nesting; a nesting pair was found on Hunter Mountain on June 17, 1960. Fisher (1893) recorded a pair of Gray Vireos nesting in Wood Canyon in June.

Species	Elevation in thousands of feet																			
	I	II	III	IV	V	VI	VII	0	1	2	3	4	5	6	7	8	9	10	11	
Orange-crowned Warbler																				
Yellow Warbler																				
Audubon Warbler																				
Black-throated Gray Warbler																				
Yellowthroat																				
House Sparrow																				
Hooded Oriole																				
Scott Oriole																				
Bullock Oriole																				
Brown-headed Cowbird																				
Western Tanager																				
Black-headed Grosbeak																				
Blue Grosbeak																				
Lazuli Bunting																				
Cassin Finch																				
House Finch																				
Lesser Goldfinch																				
Green-tailed Towhee																				
Rufous-sided Towhee																				
Black-throated Sparrow																				
Sage Sparrow																				
Oregon Junco																				
Chipping Sparrow																				
Brewer Sparrow																				
Black-chinned Sparrow																				
Total.....																				
		3	16	29	11		41	19		8										

The springs were heavily used during the breeding season and a few species nested in the associated riparian habitat. Orange-crowned Warblers (*Vermivora celata*) were fairly common summer residents; a nest was found among the willows at Thorndike Spring. Young were being fed by adults on June 9, 1960. Fisher (1893) found Yellow Warblers (*Dendroica aestiva*) breeding among the willows. I noted several pairs of Brown-headed Cowbirds at Hunter Spring in June, 1960, and a young cowbird was seen being fed by a House Finch on June 17, 1960. Black-headed Grosbeaks were also summer residents, young being fed by adults were seen in upper Johnson Canyon on June 6, 1959. A singing pair of Black-chinned Sparrows was observed at Thorndike Spring on June 29, 1961. Mountain Quail, Lazuli Buntings, and Lesser Goldfinches have also been found in the riparian habitat.

Six species were found to utilize the high cliffs and rocky gorges associated with the piñon woodlands: Golden Eagles (*Aquila chrysaetos*), Chukar Partridges, Great Horned Owls, White-throated Swifts, Rock Wrens, and House Finches.

VI. *Limber pine association*.—Nineteen species of birds have been found to nest in this association. Although limber pine is the dominant growth, tracts of sagebrush, in the lower half of the zone are utilized by the Mountain Quail, Chukar Partridge, Green-tailed Towhee, Sage Sparrow, and Brewer Sparrow. The White-throated Swift and Rock Wren occur in the vicinity of outcrops, and Violet-green Swallows (*Tachycineta thalassina*) nest in rocky crevices in the cliffs. I have also found the species nesting in holes in limber pines along the north slope of Bennett Peak on June 9, 1960. Fisher (1893) reported a nesting pair of Townsend Solitaires (*Myadestes townsendi*) in Death Valley Canyon on June 22, 1891, and I have noted the species about the high

canyons and ridges throughout the spring and summer months, although no nesting has been observed.

In the limber pine forest, the Hairy Woodpecker (*Dendrocopos villosus*) nests. An adult was seen bringing food to young in a nest in a limber pine on Roger's Peak, June 21, 1962. Nesting Mountain Bluebirds (*Sialia currucoides*) were found in the limber pine on Roger's Peak on June 4, 1962. A House Wren (*Troglodytes aedon*) was seen feeding young among the mountain mahogany in upper Wildrose Canyon, just below the limber pines, on July 12, 1959. The Mountain Chickadee, White-breasted Nuthatch, Robin (*Turdus migratorius*), Hermit Thrush, Black-throated Gray Warbler, Oregon Junco, and Chipping Sparrow also nest in this association.

VII. *Bristlecone pine association*.—The region of bristlecone pine and associated high altitude flora supports eight species of birds as summer residents: Red-shafted Flicker (*Colaptes cafer*), Clark Nutcracker (*Nucifraga columbiana*), Mountain Chickadee, Rock Wren, Western Bluebird (*Sialia mexicana*), Audubon Warbler (*Dendroica auduboni*), Cassin Finch (*Carpodacus cassinii*), and Oregon Junco. An adult Red-shafted Flicker was observed carrying food at 10,500 feet elevation on Telescope Peak, July 3, 1960. Juvenal Western Bluebirds were seen being fed by adults at 10,700 feet elevation on June 4, 1962. This species was also reported to be nesting here by Grinnell and Miller (1944). A pair of Audubon Warblers was observed nest building at 10,500 feet elevation on May 25, 1959. The species remains throughout the summer months. Young Cassin Finches were seen being fed by adults above Eagle Spring on June 29, 1961. A pair of juncos which appeared to be a crossing of the Gray-headed Junco (*Junco caniceps*) and the Oregon Junco was found nesting at 10,500 feet elevation on May 26, 1959. A nest containing four eggs was found under a large boulder along the Telescope Peak trail.

ADDITIONAL RECORDS

The following list includes birds that have not been previously reported for the Panamint Range and others whose seasonal status is uncertain.

Zenaidura asiatica. White-winged Dove. I observed this species at Wildrose Spring on June 10, 1962. This is the only record for the study area, although the species is found about the desert oases as a postnesting visitor (Wauer, 1962).

Selasphorus rufus. Rufous Hummingbird. This species was found to be a fairly common south-bound migrant through the study area. Individuals have been observed in the piñon and limber pine areas from July 3 through August 15.

Sphyrapicus thyroideus. Williamson Sapsucker. I found a single bird in the limber pine association on Roger's Peak on September 15, 1961. It was observed the day after the first snow of the season had fallen on the Sierra Nevada, which was visible to the west.

Dendrocopos scalaris. Ladder-backed Woodpecker. A single individual was seen on a wooden post at Goldbelt Spring, 3800 feet elevation, on September 28, 1959.

Contopus sordidulus. Western Wood Pewee. This species appears to be a fairly common migrant through the study area, but a single record of an individual defending a territory along the riparian area in Johnson Canyon, June 6, 1959, may indicate establishment for breeding.

Toxostoma dorsale. Crissal Thrasher. I observed a singing individual of this species atop a cottonthorn at 5500 feet elevation on upper Wildrose Flat on June 9, 1960.

Regulus satrapa. Golden-crowned Kinglet. Several individuals seen at 10,000 feet elevation on Telescope Peak, on October 21, 1958, were chasing insects that were stirred up in *Salvia* and *Ephedra*.

Vermivora ruficapilla. Nashville Warbler. This species appears to be an uncommon fall migrant in the Panamint Range; I observed several at Thorndike on August 28, 1960.

Dendroica townsendi. Townsend Warbler. This species is an uncommon spring and fall migrant through the study area. Records are as follows: Mahogany Flat, May 10, 1959; Thorndike, August 15, 1959; Cottonwood Spring, April 19, 1960; and Warm Springs, May 12, 1960.

Dendroica occidentalis. Hermit Warbler. I collected an individual at Thorndike on August 28, 1959. This is the only record for the Panamints, but it is a rare fall migrant to the valley oases (Wauer, 1962).

Dendroica striata. Blackpoll Warbler. One of several birds was collected at Mahogany Flat on September 15, 1961. The species is not listed for California by Grinnell and Miller (1944) or for Nevada by Linsdale (1951). This is apparently the first record for California and the area immediately east of the Sierra Nevada.

Setophaga ruticilla. American Redstart. The writer observed three females or immatures in the piñon-juniper woodland at Thorndike on August 28, 1959.

Leucosticte tephrocotis. Gray-crowned Rosy Finch. The writer found six flocks of 20 to 30 birds each along the crest of the Panamints, between Roger's and Telescope peaks, on November 28, 1960. Snow had drifted on the ridges, but the birds were found throughout the day in the protected places along the slopes just below the heavier drifts.

Spinus lawrencei. Lawrence Goldfinch. Several birds were observed at Wildrose and at Thorndike on August 12, 1959. This is the first record for the Panamint Range.

SUMMARY

Of 144 species reported for the Panamint Mountains, 75 are considered to be breeding. Three species nest in the valley alluvial fans, 16 species nest in the lower canyons, 11 species nest in the open sage flats and valley, 41 species nest in the piñon-juniper woodlands, 19 species nest in the limber pine association, and 8 species nest in the bristlecone pine association. Only one species, the Rock Wren, was found to nest in all of the associations. Forty-three species were found to nest in only one association.

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