

THE VERTEBRATE FAUNA OF THE BOREAL AREAS
OF THE SOUTHERN YOLLA BOLLY MOUNTAINS, CALIFORNIA

by

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THE VERTEBRATE FAUNA OF THE BOREAL AREAS
OF THE SOUTHERN YOLLA BOLLY MOUNTAINS, CALIFORNIA

INTRODUCTION

The study of the vertebrate animals found in California's varied topographic and climatic regions by scientifically-minded men presents a fascinating history. From the first visits of the maritime explorers to the present day, specimens have been collected in ever-increasing numbers, regions have been explored, numerous species and subspecies have been described, and volumes of natural history notes have been recorded. Even today California presents many challenges to those interested in studying faunal relationships.

The early maritime explorers worked chiefly in the coastal regions near the points where they landed. Often their days ashore were very limited and seldom did they reach points very distant. Most of the specimens collected by these early workers have been deposited in the museums of Europe.

Next came the overland explorers, who followed stream courses and sought mountain passes that would afford easy access to new regions. Many descriptions of the country were made (23, pp. 421-430) (66, pp. 1-500) and (112, pp. 17-338), but relatively few specimens were taken because of the difficulty of transporting them. When outposts

were established and bases for extending their explorations were available, more and more progress was made toward a knowledge of the fauna.

With a rapid increase in population augmented by the discovery of gold in 1849 and the development of San Francisco as a port, the need for better communication with the eastern states was realized. A series of railroad surveys was begun which was destined to cross new areas of California. Attached to the survey parties and the military forces which accompanied them was a number of medical doctors, who possessed an interest in natural history that was exploited whenever time permitted. These men added many valuable contributions to our knowledge of the vertebrate faunas of the regions they visited (1, pp. 21-134) (4, pp. 333-336) (5, pp. 1-764) (15, pp. 73-88) (63, pp. 282-335) (88, pp. 292-306) and (105, pp. 35-110).

One of the first major expeditions to cover a particular area in detail was the 1891 Death Valley Expedition of the Division of Biological Survey of the United States Department of Agriculture. A number of trained specialists composed the staff and the results of their work were very complete and valuable (25, pp. 1-394). In 1899 a biological survey of Mount Shasta was made (97, pp. 1-179).

In 1908 the Museum of Vertebrate Zoology was organized

at the University of California with Doctor Joseph Grinnell as its director. A major object in its program has been to obtain as rapidly as feasible, and to place on record, information in regard to the vertebrate animal life of the Pacific Coast region of North America, more particularly of California. Opportunity was always grasped to add to their records from any source whatsoever and concerning any locality within their chosen domain. In addition, from time to time organized field work was conducted in selected areas where extra-rapid changes of conditions due to human occupancy were impending or which offered help in solution of problems in faunistics. Some of the areas reported on include: San Bernardino Mountains, 1908 (37, pp. 1-170); San Jacinto Mountains, 1913 (58, pp. 197-406); Colorado River, 1914 (39, pp. 51-294); Trinity Mountains, 1916 (43, pp. 399-410) and (85, pp. 335-398); Death Valley, 1923, 1934, 1937 (45, pp. 43-109) (47, pp. 67-72) and (49, pp. 115-169); Yosemite, 1924 (57, pp. 1-752); Lassen, 1930 (54, pp. 1-594); Providence Mountains, 1948 (82, pp. 221-376).

Additional regional studies have been conducted by the California Academy of Sciences (94, pp. 273-296) and (95, pp. 261-359), other institutions, and private collectors. Most of the collections made by private collectors have eventually been deposited in scientific

institutions, and some of them have been reported on by these institutions (22, pp. 191-222) and (126, pp. 576-585).

Because the Southern Yolla Bolly Mountains have been inadequately explored scientifically, I have undertaken to study them in order to place on record additions to the known vertebrate fauna. Only thus can we attempt to understand the faunal relationships of these mountains to adjacent areas. Selection of boreal areas for study was made because of their present-day isolation and the fact that they represent the southern limits of distribution of the boreal fauna in the Inner North Coast Ranges of California. Studies were made in these areas in 1949 from May 28 to September 8, in 1950 from June 14 to September 8, and in 1951 from May 25 to July 26.

SCIENTIFIC WORK DONE IN THE AREA
PRIOR TO THE PRESENT STUDY

The earliest record known to me of scientific work done in the boreal areas of these mountains was that of Volney Rattan, who visited the Black Butte area in 1884 and collected botanical specimens there. In 1886 Rattan published An Analytical Key to West Coast Botany, which included over 1600 species, based largely upon his collections. Jepson (79, pp. 168-170) wrote a sketch on Rattan's botanical explorations.

Townshend Stith Brandeggee visited Snow Mountain in June, 1891, to collect flowering plants. His wife, Katherine, also visited Snow Mountain late in August, 1892, for the same purpose. A report of their collections was published in 1893 (9, pp. 168-176).

In 1895 W. W. Price and his assistants collected mammals in the "Snow Mountains of Colusa and Lake counties". Most of their specimens were lowland species, but the listing of one chickaree indicated that they reached the higher forests. The report of this work by Elliot in 1898 (22, pp. 191-222) did not describe the area in which collecting was done.

In May and June, 1896, W. W. Price, Malcolm P. Anderson, and Perry O. Simons collected bird and mammal specimens on and near Snow Mountain, but no field notes were

available to me for reference. Price was a student at Stanford University and led out in frequent collecting trips with fellow students and friends. Apparently he earned some money by collecting vertebrates, although a large number of his specimens was donated to various institutions, particularly Stanford University. Walter K. Fisher wrote an interesting biography (26, pp. 50-57) of Price's life and described his experiences as a collector.

Two trips to Mount Sanhedrin in 1897 and 1899 in the months of May, June, and July were made by A. S. Bunnell of Berkeley, California, for the purpose of collecting bird and mammal specimens. He stayed at Lierly's Ranch (Davis, 1940 United States Forest Service Map) on Thomas Creek, but made trips to the summit area and secured specimens there. His descriptions of the vegetation and topography were very detailed and accurate. The collection was deposited in the Academy of Natural Sciences of Philadelphia and in 1904 Stone published an account of it (126, pp. 576-585).

On July 9, 1913, W. H. Edwards secured a white-headed woodpecker at Monkey Rock, near Hull Mountain. This specimen is now in the California Academy of Sciences collection, but I have been unable to learn any more details on it or on the collector.

In 1913 the California North Coast Counties Expedition of the Museum of Vertebrate Zoology of the University of

California visited South Yolla Bolly Peak (8083 feet elevation), about eighteen miles north of the areas included in this report. There numerous specimens of vertebrate animals were taken in typical boreal areas. From August 14-25 the party, consisting of W. P. Taylor, Charles L. Camp, George E. Stone, G. F. Ferris, and A. C. Shelton, worked in the Mount Sanhedrin area. The first camp was established about seven miles south of Eden Valley and seven miles north of Hearst on a private road belonging to W. G. Henshaw, a little south of the main ridge running through Mount Sanhedrin in a north-west to south-east direction, at an estimated elevation of 4500 feet. The descriptions of the areas and lists of specimens observed and collected were particularly good as reported in the field notebooks of Taylor and Camp. These notebooks are now on file in the Museum of Vertebrate Zoology. On August 20 Camp and Shelton packed in to Lierly's Ranch and there secured specimens and considerable information on the local animal life from J. R. Lierly. Numerous specimens were taken in the summit area by members of the party. Although, to my knowledge, there has never been a published report on the expedition, the specimens collected have been cited in numerous papers dealing chiefly with systematics and distribution.

In 1919 Joseph Mailliard of the California Academy of Sciences made several trips into the Inner North Coast

Ranges of California. One base camp was Lierly's Ranch near Mount Sanhedrin. On May 25 Luther Little, Mailliard's assistant, reached the summit and took specimens of nesting fox sparrows and green-tailed towhees. On a second trip (September 22) Little and J. W. Mailliard (brother of Joseph Mailliard) reached Signal Station (probably the site of the old fire lookout). They took specimens of the Townsend solitaire and Yolla Bolly fox sparrows. The list of birds (from Joseph Mailliard's field notes) seen at or near the summit was not included in my report due to the late date seasonally, the large number of migrant species, and the numerous lowland species. A second area visited was Fouts Springs at the eastern base of Snow Mountain. Attempts to reach the habitat of the nesting fox sparrows on Snow Mountain and Goat Mountain were unsuccessful. A published account of the field trip was made in 1919 (94, pp. 273-296).

The summit of Snow Mountain was visited on June 2, 1931, by Harold W. Clark and his daughter, Melva. Notes were taken on the vegetation and bird life as well as some photographs. Black Butte was also visited for about a week, beginning on June 11. Two published reports of this field work appeared in 1932 (12, pp. 113-117) and 1937 (13, pp. 214-230), in addition to a detailed, unpublished thesis (Master of Arts in Zoology, University of California, Berkeley, 1933).

My first visit to Snow Mountain was on May 22-23, 1940. I camped overnight at the headwaters of Cedar Creek and secured bird and mammal specimens in that area. In 1943 Johnson (80, p. 118) cited a specimen of Eutamias townsendii senex (Allen) taken on this trip, which represented an extension of known range.

On July 9, 1941, Miss Alice Eastwood and John Thomas Howell of the California Academy of Sciences and Dr. Isabel McCracken, retired Professor of Entomology of Stanford University, stopped on the road summit near Black Butte to examine and collect flowers en route home from a botanical expedition to Log Spring Ridge, a few miles north of Mendocino Pass. Miss Eastwood mentioned several flowering plants seen and collected in the Black Butte area (21, p. 123).

Milo S. Baker collected botanical specimens near Plaskett Meadows in 1942. Included in the collections were several species of Carex (71, p. 124). Other plants were also collected in this area (7, pp. 1-43).

Field work on a soil survey of Colusa County was done in 1942, 1944, and 1945 by the Division of Soils, University of California, in cooperation with the Soil Conservation Service and the Bureau of Plant Industry, Soils and Agricultural Engineering, United States Department of Agriculture (61, pp. 1-140).

In August, 1943, John Thomas Howell and Milo S. Baker collected vascular plants at Plaskett Meadows, on Black Butte, and in the region adjacent. A general collection of plants was made, but of particular interest were 23 species of Carex (71, pp. 121-128). Two of these species collected became known for the first time in the Coast Ranges, while the known range of others was extended.

SOURCES OF MATERIAL USED

The published literature was utilized and it furnished much information on the earlier scientific work done in the study areas, particularly with regard to the flora and fauna. Subjects mentioned in the literature, but not given very thorough treatment were: geology, physiography, climate, and soils.

Several unpublished sources of information of value were: field notes of members of the California North Coast Counties Expedition (1913) of the Museum of Vertebrate Zoology, field notes of Joseph Mailliard for 1919, and a Master's thesis by Harold W. Clark (1933, Zoology Department, University of California, Berkeley).

Specimens of vertebrate animals in the collections of the Museum of Vertebrate Zoology, University of California, Berkeley, and the California Academy of Sciences, San Francisco, were examined. Additional specimens of rocks, plants, and vertebrate animals were collected by students of Pacific Union College and myself.

Numerous experiences with vertebrate animals in the area, related to me by oral communication and letters, were considered reliable and are included in this report. Sources of these data were chiefly United States Forest Service employees and persons with many years of acquaintance by residence, stock raising, hunting, and fishing

in the area.

Photographs were taken by myself and students who worked with me in the field.

METHODS

Observations on the biota were made by myself and student assistants and recorded in personal field notebooks. The Daily Journal included a description of each area visited, lists of vertebrate animals observed, and a log of daily activities. Species Accounts contained natural history data recorded for each species separately. The Specimen Register listed locality, date, measurements, species, sex, and field number of the collector for each specimen preserved.

The photographs were taken with an Exakta f 3.5 camera mounted on a tripod using Eastman 35 mm. Plus X and Panatomic X films and an Eastman haze filter. Exposures were based upon light readings on a Weston Master Exposure Meter.

The method of specimen collecting varied with the types and circumstances involved. Rock samples were taken at the summits of the peaks by breaking typical rocks so that weathered and fresh surfaces were present. Botanical specimens were pressed according to standard techniques; cones were simply labeled, if dry, or preserved in 4% formaldehyde solution, if green.

Fishes were taken by means of hook and line. The amphibians and reptiles were all caught by hand, except for a few rattlesnakes which were shot. Birds were

secured mostly by shooting with .22 shotgun and .410 shotgun, and a few were caught by hand or in traps. Most of the small mammals were trapped in Museum Special and rat traps. Bats, squirrels, and larger mammals were often shot with .22 or .410 shotguns or .22 rifles. Some skulls were picked up or received from trappers. No road-killed specimens were utilized.

Transportation to the study areas varied considerably. Black Butte, Brushy Mountain, Etsel Ridge (from the north-west), Spruce Grove on the southern end of the Bald Mountain area, Hull Mountain, Sheetiron Mountain, and Goat Mountain were reached by passenger car. By using a pickup with four forward speeds it was possible to reach Mount Sanhedrin and Bald Mountain via Long Meadow (on the south). A jeep with four-wheel drive was required to reach Bald Mountain from the east (via Logan Basin) and from the north (via Etsel Ridge), and to reach Etsel Ridge from the south (via Bald Mountain). Direct access to Mount Saint John and Snow Mountain was not possible with motor vehicles.

Mount Saint John was climbed three times on foot with back packs via the ridge from Low Gap, the head of Bear Wallow Creek, and the western ridge. Water was carried nearly 2000 feet vertically up the slopes, since none was found near the summit. The distance by trail from the road is nearly four miles.

Snow Mountain was climbed four times on foot with back packs via an unblazed trail from Potato Hill Fire Lookout up the south slope to the ridge between the Cedar Creek drainage and the drainage of the Middle Fork of Stony Creek, and thence up the southwest slope of Snow Mountain West, around the western head of Dark Hollow Creek to Snow Mountain East. Twice a pack mule was used to supplement the amount we could carry on our backs in order to be able to remain for a week or ten days near the summit. The distance by trail to the summit is about six miles, and the elevation ascended about 2700 feet. Passenger cars, if not too heavily loaded, can reach the Potato Hill Fire Lookout.

Tabulations of the time spent in the field, by seasons and by areas, will be given in the summary.

Identification of specimens was made by the use of the literature, by comparison with catalogued specimens in research collections, and by specialists. A list of those assisting in the identification of specimens is cited among the acknowledgments.

DESCRIPTIONS OF THE AREAS

LOCATION

The area studied lies wholly within the central and southern parts of the Mendocino National Forest in eastern Mendocino, western Glenn, northern Lake, and western Colusa counties, California. It lies east of the Redwood Highway (U.S. 101) and the cities of Ukiah and Willits and the town of Covelo, north of Clear Lake (Lake County), and west of Sacramento Valley and the cities of Maxwell, Willows, and Corning on U. S. Highway 99W. (Please refer to the Mendocino National Forest map on p. 341 for details.)

The main mountain ranges in this area were often referred to as the Inner North Coast Ranges (46, p. 80) (56, p. 536) and (94, p. 273) in a general manner, but Clark (13, p. 215) used the name Yolla Bolly Mountains for the main range at least as far south as Snow Mountain. North Yolla Bolly Peak (7870 feet elevation) is located 30 miles north of Mendocino Pass, the northern limit of my study area, and South Yolla Bolly Peak (8083 feet elevation) is 17 miles north of Mendocino Pass. Although some consider the Yolla Bolly Mountains as including only the main crest of the ridge from North Yolla Bolly Peak to South Yolla Bolly Peak, I am taking a broader view and including South Yolla Bolly Peak and the main ridge through Anthony Peak, Black Butte, Brushy Mountain, Sheetiron

Mountain, Mount Saint John, Snow Mountain, and Goat Mountain, as well as the spurs of Etsel Ridge, Bald Mountain, Hull Mountain, and Mount Sanhedrin as the Southern Yolla Bolly Mountains.

The term "boreal areas" will be used to include the forest belt of red fir, white fir, Jeffrey pine and associated species, which in these areas occurs as isolated islands on the higher peaks from 5500 feet elevation (but more typically 6000 feet) and above, rising above the more or less continuous yellow pine forest. It is recognized that these forest trees are not boreal species in the sense that they occur in the far northern latitudes. The white fir, Abies concolor Lindl. and Gord., occurs north to the Blue Mountains in Oregon, and the red fir, Abies magnifica Murr. var. shastensis Lem., occurs north to the southern Cascade Mountains in Oregon. The Jeffrey pine, Pinus jeffreyi Murr., occurs north to the Siskiyou Mountains in southern Oregon. This forest belt is representative of the Canadian Life-zone, of which the red fir is an indicator species (60, p. 61), and occurs at higher elevations than the montane forest, where the yellow pine, Pinus ponderosa Dougl., is a dominant species and an indicator species of the Transition Life-zone (60, p. 57).

GEOLOGY

The only published reference on the geology of the area appears to be that of Diller, 1902 (20, pp. 1-69). He dealt with the topographic development of the Klamath Mountains, of which the Southern Yolla Bolly Mountains were then considered a part. At present the Klamath Mountains, as a name, are a very restricted portion of the mountain complex which Diller was discussing.

Summarizing Diller's sequence of events, in brief, we find the Eocene Epoch closed in the Klamath Mountain region with an uplift initiating a long cycle of erosion, which reduced the Miocene land surface to a gentle relief, practically a peneplain, called the Klamath Peneplain. This was called the Klamath Stage. The seashore line was then near the southwest side of the present Trinity River and its tributaries, and received the Miocene sedimentary deposits.

In late Miocene times there was tilting and displacement by a series of faults (Post-Klamath Faulting) and the low, soft Miocene beds along the coast were reduced nearly to sea level (Bellspring Stage). Following the formation of the Bellspring Peneplain, there was an uplift of about 500 feet along the coast and increasingly greater amounts toward the crest of the mountains (Post-Bellspring Uplift). The period of erosion (Sherwood Stage) following the uplift resulted in the formation of

broad valleys, e.g. Round Valley, and another coastal peneplain (Sherwood Peneplain). A second major uplift (Post-Sherwood Uplift) raised the coastal regions another 500 feet and increasingly more toward the crests of the Coast Ranges and Klamath Mountains. At this time (Garberville Stage) the Bellspring Peneplain was about 1000 feet high nearest the coast, while the Sherwood Peneplain was about 500 feet high nearest the coast. The greatly invigorated streams initiated a new cycle of erosion which formed new broad valleys (Post-Garberville Subsidence).

Events of more recent times mentioned by Diller related to regions farther north. Erosion of the Yolla Bolly Mountains has continued since the last uplift mentioned, and was probably very heavy during the Pleistocene Epoch.

Diller (20, p. 18) remarked that "the Yallo Bolly Mountains mark the region of the southern Klamath Peneplain at around 7000 feet." He mentioned specific mountain peaks in the Southern Yolla Bolly Mountains (as defined by me earlier) as representing the Klamath Peneplain. Some examples of these were: the summit region of Grindstone Creek above Alder Springs, Snow Mountain, Mount Saint John, and Ocean View (on Brushy Mountain).

Anderson in 1938 (2, pp. 29-37) referred to the Yolla Bolly Mountains in his discussion of the Lower Cretaceous deposits but dealt with the higher areas north of those

studied by me.

The most recently published geological map of California, 1938, by the State of California, Department of Natural Resources, Division of Mines, indicated (122, p.1) that no mapping of geological formations had been made in the boreal areas of the Southern Yolla Bolly Mountains. The closest area mapped was near Anthony Peak, and it contained schist. Harold A. Boyd, Jr., of Oregon State College Department of Geology, said (January 24, 1952) that he knew of no recent literature on the study areas. Rock samples submitted to Boyd were named as follows: Franciscan graywacke sandstone from the summits of Bald Mountain, Hull Mountain, and Black Butte; pre-Franciscan schist (possibly of the Abrahms Series) from the summit of Sheetiron Mountain; and red chert of the Franciscan Formation (Upper Jurassic) from the summit of Snow Mountain East. Brandege (9, p. 171) referred to "many-colored shales of Snow Mountain".

GEOGRAPHY AND PHYSIOGRAPHY

Before describing the mountain areas studied, reference should be made to Fennemann's well-known book on the physiography of western United States (24, pp. 1-534). His descriptions of the Yolla Bolly Mountains were brief and somewhat indecisive. He mentioned traces of a summit peneplain (24, pp. 467-469) at 7,000 feet

elevation and also monadnock ridges, and stated that the local relief was complicated by deformation and perhaps faulting of the peneplain, so that it remained undetermined whether a high mass was a monadnock or the result of deformation of the peneplain.

Reference to the Mendocino National Forest Map (p. 341) will prove helpful while reading the descriptions of the mountain areas.

The Black Butte area, consisting of approximately 14 square miles, is divided into two sections; the Black Butte section with eight square miles, and the Brushy Mountain section with six square miles. Between these areas lies the deep canyon of Cold Creek. Black Butte, 7460 feet elevation, is the highest peak in the area studied and also the most northern one. It towers about 1000 feet above the main crest of the mountain mass. Drainage to the north and east is into Grindstone Creek by a number of small streams, thence into Stony Creek and the Sacramento River, which empties into the Pacific Ocean through San Francisco Bay. Drainage to the west and south is into Black Butte River, a tributary to the Middle Fork of the Eel River, which, with other branches of the Eel River, empties into the Pacific Ocean a short distance south of Humboldt Bay. The only permanent streams at the higher elevations during the summer months are Snow Basin Creek and Plaskett Creek; both are small and have their

sources in springs in meadows. Keller Lake is at the base of a talus slope on the southwest side of Black Butte at about 5500 feet elevation. The water surface is probably less than an acre in extent, because of an island of sphagnum moss. Formerly the lake was cleared of aquatic vegetation and planted with trout, but now over half of the lake surface is covered by aquatic vegetation. The bottom of the lake is rocky in the deeper areas below open water surface, but the remainder is covered with plant roots and plant detritus. The south and south-west slopes of Black Butte have several large rock outcrops and talus slopes. Meadows are found in the areas where snow pack is heavy and drainage is poor. Winds from the west blow over the long ridge from Mendocino Pass to Telephone Camp and the Butte Creek drainage. The prominence of Black Butte, towering above the Black Butte River, can be seen best on the west-facing slope, where in a distance of $3\frac{1}{4}$ miles the difference in elevation is 5000 feet.

The Brushy Mountain section occurs mainly on a nearly circular dome-shaped mountain mass surpassing the 6600 foot contour above Ocean View. A second portion consists of a narrow strip of the ridge top and north-facing slopes for a distance of about one mile north of Ford Hill and just west of Cottonwood Creek. A few streamlets trickle down the east-facing slope of Brushy Mountain, but there are no permanent streams (with surface drainage)

during the summer months. Several springs with seepages or miniature meadows occur near Board Tree Camp. The drainage from Brushy Mountain reaches the Black Butte River through Cold Creek, Hunter Creek, and Spanish Creek.

The boreal area of Etsel Ridge (Plate 18) consists of a narrow strip on the crest from Post Camp to the gate on the road to O'Neil Cabin, a distance of about two miles in length and averaging in width about one-fourth mile, thus being about one-half square mile in area. The elevation ranges from 5600 feet to slightly over 5800 feet. Since the boreal areas are found only on the crest and north-east facing slopes the drainage in this direction via a number of small streams into the Black Butte River is all that needs to be mentioned. A large spring at Post Camp runs through the summer and a few seepages persist, but otherwise conditions are quite dry.

The Bald Mountain area is dominated by the wind-swept peak of that name rising to an elevation slightly above 6600 feet. From the peak ridges extend to the north, east, and southeast. About five square miles of forest and associated upland vegetation occurs on these ridges and north-facing slopes and on Bald Mountain proper. Drainage from this area reaches the Eel River via three tributaries. From the northern portions it flows into Black Butte River, from the southwest portion into Elk Creek, and from the extreme southeast into Sand Creek, a

tributary to the South Branch of the Middle Fork of the Eel River. A number of meadows occur in this area, of which the ones at Spruce Grove, Long Meadow, Hell's Half Acre, and on the north slope of Bald Mountain are the largest. Sand Creek (below Long Meadow) and a small stream draining the Spruce Grove Meadow flow during the summer months. A large circular basin occurs between Bald Mountain and Dicks Buttes. One gravelly ridge top near Hell's Half Acre has been used as an airstrip several times.

The Hull Mountain boreal area consists of two long, high ridges meeting on Hull Mountain, 6954 feet elevation. The northwestern ridge extends for a little over two miles to Monkey Rock (Plate 15), whereas the northeastern ridge extends for about one mile. An estimated two square miles of boreal area occurs here. Drainage is entirely into the Eel River System; toward the west into Elk Creek, toward the north into Hull Creek, toward the east into Trout Creek, and toward the south into Rattlesnake Creek and Boardman Creek. No permanent streams occur at the higher elevations. Small patches of meadow or seepages occur at the head of Hull Creek and at Monkey Rock. Most of the terrain is very rocky and rather steep. On the north-facing slope of Hull Mountain at an elevation of from 6200-6600 feet there are rocky shelves and gravelly slopes. Winds from the west strike the northwestern ridge and prevent

forest growth there except in the more protected canyons.

Mount Sanhedrin consists of the highest portion of a ridge extending in a northwest-southeast direction between two branches of the Middle Fork of the Eel River, or between Round Valley on the northwest and Lake Pillsbury on the southeast. Pickwell (114, p. 187) called this the Sanhedrin Mountain Range. The closest connection of Mount Sanhedrin to other mountain masses is probably to Hull Mountain. The saddle between these mountains forms a separation of watersheds (and likewise the entire ridge of Mount Sanhedrin) and reaches its lowest point between 3600 and 3800 feet. On the Lake Pillsbury edge of this saddle there is a conspicuous ridge called "The Island". It was covered by a heavy stand of yellow pine forest prior to recent logging operations and was ecologically important in connecting these two mountains.

The Mount Sanhedrin boreal area consists of a narrow strip along the crest and leeward (north and east-facing) slopes of the ridge from just west of Impassable Rock (Plate 17) to Old Sanhedrin and a small area near Summit Lake, two miles to the south. It is an estimated three square miles in extent. The best development is on the north slopes of Mount Sanhedrin (Big Signal), 6183 feet elevation, and in the headwaters of Sulphur Spring Creek near the John Day Administrative Site. Drainage toward the north is into Sanhedrin, Crocker (Deadhorse), and

Sulphur Spring creeks which join Elk Creek; toward the east into Mill Creek and Lake Pillsbury; and toward the south and west into Garcia and Thomas creeks. All of these streams are a part of the Eel River system. At the higher elevations none of these streams is large, and most of them usually cease flowing on the surface during the summer period. Springs and small seepages occur frequently on north-facing slopes. Lily Pad Lake (Plate 9) is a permanent, shallow pond with a muddy bottom, and its surface is nearly covered by pond lilies. It is less than an acre in extent. Some portions of the Mount Sanhedrin area are very rocky and steep, e.g. Impassable Rock, while others are gravelly and have nearly level terraces intersected by narrow ravines.

The Sheetiron Mountain boreal area contains about one square mile of area, mainly on the north-facing slopes of the peak, 6425 feet elevation. The northern limit is just below Sheetiron Spring, while the southern limit is approximately at the level of the road that crosses the southern exposure of the mountain. Drainage to the east and southeast is into Briscoe Creek and the North Fork of Stony Creek, tributaries of the Sacramento River, while to the north and southwest drainage is into Anderson Creek and Cold Creek, tributaries of the Eel River. No streams persist at the higher elevations during the summer, although there are several seepage areas. The north and

south ridges of Sheetiron Mountain and the summit are rocky, windswept, and relatively bare of vegetation.

The Mount Saint John boreal area is restricted to the north-facing slope of the peak, 6750 feet elevation, where it occurs mainly above the 6000 foot contour in two canyons. It covers an estimated one-half square mile area, but is very well developed in that small area. Mount Saint John is located several miles to the southeast of Low Gap and receives much wind and precipitation from that direction. It is a massive ridge extending above the canyons of the North Fork and Middle Fork of Stony Creek which joins the Sacramento River. The north-facing and south-facing slopes are very steep and the runoff must be rapid. There is reputed to be a small spring near the summit, but I have never found it. No snow was found on the north-facing slope near the summit on June 6, 1951, whereas drifts ten feet deep were found on Snow Mountain (about five miles distant) on May 27, 1951, at the same elevation. The slopes of Mount Saint John consist of large rock outcrops, cliffs, talus slopes, and narrow rocky ridges.

The second largest boreal area in the Southern Yolla Bolly Mountains is the Snow Mountain area containing eight square miles or slightly more. Much of the area is between 6000 feet and 6400 feet elevation with ridges at about 6600 feet elevation extending from the summits of

Snow Mountain West, elevation 7040 feet, and Snow Mountain East, elevation 7056 feet. The higher ridges are rocky, but well-covered with timber except on the south-facing and west-facing slopes. Most of the mountain is drained by streams tributary to the Middle Fork and South Fork of Stony Creek, but the southwest slopes drain into the Rice Fork of the Eel River and Lake Pillsbury. The largest spring I have seen in the boreal area is the source of Cedar Creek, which is tributary to Bear Creek and Rice Fork of the Eel River. It runs a heavy flow all summer. Other springs that run well through the summer occur at Long Glade, at the head of Three Cedar Canyon, and at the head of Dark Hollow Creek. Much wind must sweep over the mountain, judging from the types and distribution of vegetation present. The northeast slope of Snow Mountain East drops off 5200 feet into the gorge of the Middle Fork of Stony Creek in a distance of three miles.

The Goat Mountain boreal area is the last vestige in the southern part of the Southern Yolla Bolly Mountains. About one square mile of area occurs in narrow strips on north-facing slopes near Summit Valley, Board Camp Ridge, the summit of the Bear Creek-Fouts Springs Road, and along the main ridge to a point about one-fourth mile south of Goat Mountain Fire Lookout, 6117 feet elevation. Drainage of this area is into the Sacramento River through the

South Fork of Stony Creek on the north, Little Stony Creek on the east, Cache Creek on the south, and into the Eel River through the Rice Fork on the southwest. No permanent streams occur at high elevation and seepages and springs are few. Early in the summer Summit Valley and Horse Glade are wet. A wind gap occurs near Linger Longer, between Goat Mountain and Summit Valley. Much wind blows over the crest of the main ridge also. The north-facing slope of Goat Mountain is very steep and numerous rock outcrops and cliffs occur along the crest of the ridge and at the head of Little Stony Creek.

CLIMATE

A discussion of climate must be very generalized in the absence of accurate data. The best available source was a study by Baker, 1944 (6, pp. 223-254), on mountain climates of the western United States. He discussed the Klamath Mountains and Inner Coast Ranges of Northern California and stated that there were almost no true high altitude stations for climatic observations. He showed no actual records for stations above 3000 feet elevation.

Baker stated that temperature lapse rates have been based largely upon analogies between this region and the northern Sierra Nevada. For July, however, the graph has been somewhat modified in accordance with Clark's (13, p. 218) observation that these mountains appear relatively

warm and that plant associations extend about 1000 feet higher than in the Sierra Nevada.

Baker published graphs from which I have read the following data:

I. July temperatures ($^{\circ}\text{F.}$) for elevations of 6000 to 7500 feet.

Lowest temperatures	26 -- 29*
Mean minimum temperatures	44 -- 47*
Mean temperatures	58 -- 62*
Mean maximum temperatures	72 -- 77*
Highest recorded temperatures	86 -- 92*

* Higher temperatures are for lower elevations.

II. January temperatures ($^{\circ}\text{F.}$) for elevations of 6000 to 7500 feet.

Lowest temperatures of record	-12 -- -7*
Mean minimum temperatures	15 -- 19*
Mean temperatures	24 -- 28*
Mean maximum temperatures	33 -- 38*
Highest recorded temperatures	63 -- 66*

* Higher temperatures are for lower elevations.

III. Length of the growing season for elevations of 6000 to 7500 feet, based upon mean temperatures above 42°F. as supra-minimal.

Length in days, 140 -- 180¹
 Start of the growing season, April 16 -- May 16²
 End of the growing season, October 4 -- October 18³
 Length of the frostless season in days, 45 -- 90¹
 Dates of the last spring frosts, June 17 -- July 7²
 Dates of the first autumn frosts, August 22 --
 September 16³

- 1 Longest at lower elevations
- 2 Earliest at lower elevations
- 3 Latest at lower elevations

IV. Monthly precipitation in percentages.*

January	21.1	July	.4
February	17.0	August	.3
March	11.5	September	2.1
April	7.0	October	4.9
May	3.8	November	12.5
June	1.9	December	17.8

*Percentages may vary insignificantly with elevations.

An accurate estimate of precipitation could not be made from Baker's graph, since there was such a variation from north to south, and the graph showed only areas below 6000 feet elevation. Baker suggested three curves according to location of area and the degree of shielding on the west by ridges of considerable height. At 6000 feet elevation Area A received an estimated 23 inches, Area B about 75 inches, and Area C about 150 inches.

J. N. Ewing, Forest Engineer for Mendocino National Forest, placed a rain gauge in Snow Basin, 6500 feet elevation, about one mile northeast of Black Butte summit, but claimed no great accuracy for his readings. Presumably the readings were for the period of July 1 to June 30 of the following year, but no mention was made of when the readings were taken. He stated that for the year 1947-1948 there were 22.25 inches, plus 4 inches of snow on the ground when the gauge was installed. This suggests to me that the gauge was installed in the fall of 1947, possibly in late October or early November, and did not include the rains during the fall which normally precede

the snow. For 1948-1949 Ewing recorded 32 inches, for 1949-1950 about 31 inches, and for 1950-1951 about 41 inches. He stated that due to overflow into a second tank the last two readings were too low. Whether the overflow into the second tank leaked out or was not measured, I do not know.

Snow surveys have been taken in Plaskett Meadows during the past five years in order to compute water resources for lowland irrigation districts. This area receives much drift snow, as is evidenced by cores taken on March 29, 1950, which ranged from 28 inches in depth to 73 inches, with an average of 55.3 inches. From a study of many readings of snow cores of known water content, it might be possible to estimate accurately the annual precipitation. Snow occurs some years as late as the second and third weeks of May, as in 1949, when the Covelo-Willows road was blocked by drifts of fresh snow reputed to be about three feet deep in the Black Butte section. The snow markers at Plaskett Meadows are at heights of 30 feet or more. Unofficial reports by forest rangers have been made of snow depths in excess of 20 feet. On the steep, north-facing slope of Bald Mountain there is the trail of an avalanche, that cleared out a section of red fir forest. In the trail there were in 1951 numerous young red firs about six to eight feet high, but no large trees.

Winds are prevailing from the west and northwest. Prominent windgaps occur between the mountain masses; as at Mendocino Pass, between Etsel Ridge and Bald Mountain, between Spruce Grove (Bald Mountain area) and Monkey Rock (Hull Mountain area), at Low Gap between Sheetiron Mountain and Mount Saint John, on the ridge between Foutch Camp (Snow Mountain) and Summit Spring, and near Linger Longer on Goat Mountain. In these areas the vegetation is deformed, dwarfed, and composed of types like the Brewer oak and Garry oak that can withstand such conditions. Under the most extreme conditions little or no vegetation occurs (Plate 8). On the exposed higher ridges and summits there are likewise areas of wind-deformed trees and shrubs and certain characteristic herbaceous plants. It appears that wind follows up the canyons tributary to the Eel River to reach these wind gaps. Clark (13, p. 217) stated that the elevation of the Trinity and Yolla Bolly ranges deflected these currents southward, and was one of the main factors in maintaining the semi-desert conditions of the upper end of the Sacramento Valley as well as tempering the valleys in the north coast region.

Russell (117, p. 82) and (13, p. 217) described the climate above 2500 feet in the Inner North Coast Ranges as a cool mountain climate. Seldom do summer fogs extend far enough inland to reach Round Valley and Lake Pillsbury, but there were several in June, 1951. When this

occurs a tempering of midday temperatures and an increase of humidity is manifested at the higher elevations. The more typical situation is a rapid rise in temperature and a decrease in humidity during midday due to convection currents rising up the steep slopes of the Yolla Bolly Mountains from Round Valley and other low, hot valleys to the west and from Sacramento Valley and the low foothills to the east. When heated currents of air meet at the summit, electrical storms may result, especially late in the summer. In the summer of 1951, however, no thunder showers fell, although thunder heads of cumulus clouds frequently built up in the mid-afternoons.

Clark (13, p. 218) stated that the steep slopes of the Yolla Bolly Range do not cool the air as much as do the long west slopes of the Sierras. As a result, certain zonal indicators are found at approximately 1000 feet higher than in the Lassen region (80 miles away), across the Sacramento Valley.

SOILS

The only study on the soils of the Mendocino National Forest was that of Harradine (60, pp. 1-140) published in 1948. It dealt with only the portions of Snow Mountain and Goat Mountain that are in Colusa County, as far as boreal areas were concerned.

Geologically the soils were divided into three groups.

The Hugo Series was formed from undivided, pre-Franciscan metasediments, e.g., sandstone and shale. The Contra Costa Series was formed from Lower Cretaceous marine sediments, e.g., sandstone, shale, and conglomerate. Recently valley alluvium was formed from sedimentary and igneous rock sources.

Physiographically the Hugo Series and the Contra Costa Series belong to the Upland Soils Group. A Miscellaneous Soils Group includes meadowland and rocky ridge tops.

Classification of soils by profile characteristics included two groups for the boreal areas. First, the upland soils formed in place from the underlying hard sedimentary bedrock, which included the Hugo Series and the Contra Costa Series. Second, a miscellaneous group of soils, e.g., meadowland and rocky ridge tops.

A more detailed description of each type is necessary to characterize the boreal areas.

The Hugo Series comprises primary soils derived in place from the underlying sandstone or shale parent rock. The sedimentary rocks are largely unaltered, and, although deeply cracked, are not shattered into small blocks. The soils are moderately deep for this region, and they usually have distinct horizons with some subsoil compaction. The profile of Hugo Loam includes 0-5" of light grayish-brown loam that is loose and friable and contains many very small platy sandstone fragments. A forest litter about one inch

in thickness usually covers the surface soil. A moderately high organic content is maintained and the pH is 5.5. Below this is a layer 5"-20" of brown loam with a pH of 5.0. A third layer of 20"-30" of light-brown, partially decomposed sedimentary parent material of the same pH covers 30" or more of partly fractured but unaltered parent material which may be penetrated by tap roots. The topography is hilly to mountainous, drainage is good to excessive, and erosion is slight to moderate, depending upon slope and relief. The natural vegetation is yellow pine forest and fir and Jeffrey pine forest, from 4000 feet elevation to the highest forested areas at nearly 7000 feet. Specific areas in which the Hugo Series of soils occur are Milk Ranch, Three Cedar Canyon, and the north side of Dark Hollow Creek on Snow Mountain, and Board Camp Ridge on Goat Mountain.

The Contra Costa Series of soils are shallow primary soils formed in place from the underlying slightly metamorphosed sedimentary sandstones, shales, or conglomerates. They have reached only a youthful stage in profile development, probably due largely to a progressive removal of the surface soil by geologic erosion. The profile of Contra Costa Clay Loam consists of 0-9" of light-brown friable clay loam with a soft cloddy structure, and easily penetrated by roots and moisture. The soil will bake and crack into irregular firm clods, but readily melts down

with wetting to a sticky mass. Organic content is moderate and the pH is 7.0. The upper subsoil consists of 9"-21" of reddish-brown clay with moderate to low organic matter and a pH of 6.5. Beneath this is 21"-31" of light reddish-brown stony clay with low organic content and a pH of 6.5. The lowest layer is 32" or more of shattered parent material that is partially disintegrated and dark-stained. The topography is hilly to mountainous and drainage is good to excessive. Erosion is slight to severe, depending upon slope and relief. Natural vegetation is usually grasses, annuals, and scattered oaks. This soil type occurs on the south side of Dark Hollow Creek and near Foutch Camp, on Snow Mountain. The vegetation in this area is red fir, white fir, and Jeffrey pine.

Rocky ridge tops occur on the crests of the range near Goat Mountain, near Summit Valley, and on Snow Mountain. There is practically no soil in these areas and the vegetation is mainly scattered small shrubs and herbs. Snow usually covers the ground from late October to early June.

Meadowland occupies depressions or enclosed flat mountain valley areas that are ponded or water-logged most of the year. In Summit Valley the soil is a fine gravelly loam, barren of vegetation around the edges of the depression area. In the lower portion where the soil is saturated most of the time, it is a dark gray, gritty

clay with a pronounced bluish subsoil mottling. Vegetative cover consists of a rank growth of hydrophilic plants and grasses. The meadow areas at Milk Ranch, Long Glade, Three Cedar Canyon, Cedar Creek, Dark Hollow Creek, and west of Foutch Camp on Snow Mountain should be included with Summit Valley in this soil group.

The soils of the remainder of the boreal areas of the Mendocino National Forest have not been studied, but seemingly correspond to the basic types discussed above.

DESCRIPTIONS OF THE PLANT COMMUNITIES

FOREST

The forest is neither a characteristic subalpine forest nor a true montane forest, rather it bridges the gap between them. It could be called a low, subalpine forest. The Shasta red fir (Abies magnifica Murr. var. shastensis Lem.) is the dominant tree in areas best representing this forest belt. Associated with red fir are white fir (Abies concolor Lindl. and Gord.), Jeffrey pine (Pinus jeffreyi Murr.), sugar pine (Pinus lambertiana Dougl.), incense cedar (Libocedrus decurrens Torr.), and Nuttall willow (Salix scouleriana Barr.). The place of each of these species in the forest will be discussed separately.

Table 1 in the Appendix (p. 235) lists the ranges of the following coniferous forest species which occur on Mount Shasta and the higher North Coast Ranges, but are not represented in the study areas under discussion:

Pinus albicaulis Engelm.
Pinus contorta Dougl. var. murrayana Engelm.
Pinus monticola Don.
Pinus balfouriana Jeff.
Tsuga mertensiana (Bong.) Sarg.
Picea engelmannii Engelm.
Picea breweriana Wats.
Juniperus communis L. var. montana Ait.
Juniperus occidentalis Hook.

Red fir occupies the colder slopes which are well-drained and less exposed to winds. It is usually found

from about 6400 feet elevation and above on south-facing slopes, but may occur at lower elevations on north-facing slopes. It seems to grow better in areas of high snow pack on leeward slopes where cold conditions prevail longer in the summer due to retarded snow melt, than on windy slopes with more exposure to insolation and with early seasonal snow melt. In its best development it forms a dense stand of large trees with virtually no shrub or herb layer beneath. Only wintergreen (Pyrola picta Sm.), coral-root orchid (Corallorhiza maculata Raf.), and an occasional gooseberry (Ribes) are found in the thick layer of broken limbs, litter, and duff beneath a heavy stand. Examples of large individual trees were 46.3 inches DBH (diameter breast high) at Hull Spring, 52.5 inches DBH at Bald Mountain, and 58.5, 59.9, and 71.7 inches DBH at Etsel Ridge. In more open stands of red fir there may be a ground cover of pine-mat manzanita (Arctostaphylos nevadensis Gray)(Plate 10). In openings in the red fir forest gooseberries (Ribes roezlii Regel. var. cruentum (Jeps.) Jeps.) and (Ribes lobbii Gray), and currants (Ribes viscosissimum Pursh. var. hallii Jancz.) and (Ribes sanguineum Pursh.) were found. On Black Butte a few western mountain ash (Sorbus sitchensis Roem.) were found on the eastern side.

All cones I have seen were those of the Shasta red fir with long exserted bracts (Plate 22). District Ranger

Ralph A. James (Stonyford) told me he had seen some of the typical cones of the species near Black Butte.

The range of the Shasta red fir is shown in the red areas on the Mendocino National Forest Map and is tabulated by mountain areas in Table 2. The stand on Etsel Ridge near the gate on the road to O'Neil Cabin contained only a few trees, the largest measured by me. Since there were few small trees in the area, I regarded it as a relict stand. It was on the highest part of Etsel Ridge (above the 5800 foot contour), which was about the lowest elevation at which I found red fir except on north-facing slopes.

On Pinto Ridge about one and one-half miles northwest of Black Butte, and on the northwest ridge of Hull Mountain about one to two miles south of Monkey Rock young red firs occurred in such dense stands that it was almost impossible to walk through them. The United States Forest Service tagged selected trees (Hull Mountain) or accepted bids on marked sections (Pinto Ridge) for sale to Christmas tree dealers. In this way crowding was reduced and commercial use of the species was made. To my knowledge no logging of red fir has been done in these mountains.

White fir occurs at lower elevations than red fir and also extends up to the summits of the peaks on the more wind-swept, warmer, and drier slopes than red fir. Often it is found in the open margins of red fir forest, indicating

that in competition with red fir it occurs in areas less favorable to red fir. At elevations too warm or in habitats too exposed for red fir, e.g., Etsel Ridge, the south spur of the Bald Mountain area, Mount Sanhedrin, Sheet-iron Mountain, and on Goat Mountain, white fir extends into the cooler, more protected slopes and very closely approximates the dense closed stands typical of red fir at higher elevations. Here the litter is deep, the shrub layer is absent, and only very shade-tolerant herbs, e.g., wintergreen and coral-root orchid, occur. Probably edaphic conditions as well as low light intensities limit the herbaceous vegetation. In more open stands currants (Ribes sanguineum Pursh.) and gooseberries (Ribes lobbii Gray.) are found.

Some authors (60, p. 57) and (78, p. 7) have regarded white fir as an indicator of the Transition Life-zone because it was widely distributed through the higher parts of the yellow pine forest. It may form small aggregations on cooler, more moist slopes than yellow pine grows on, but in no other section of California have I seen white fir form dense, pure stands as it does in the higher Southern Yolla Bolly Mountains. In this latter development I see indications of its role in the Canadian Life-zone, but as such, certainly in the lower portion.

White fir extends down into the Garry oak woodland very conspicuously on the ridge northwest of Telephone

Camp (Black Butte area), on Etsel Ridge, and on the east-facing slope of Mount Sanhedrin. In such cases I have used the composition of the stand to determine the boundaries of the Canadian Life-zone. Where Garry oaks predominated and white firs were scattered and few, I considered the area as an ecotone with favoritism toward the Garry oak and the Transition Life-zone. On the other hand, where white firs were dominant and Garry oaks few (Plate 18), I regarded it as the Canadian Life-zone.

Open stands of white fir often have forest chaparral in the spaces between trees. The presence of snowbrush (Ceanothus cordulatus Kell.) and bitter cherry (Prunus emarginata (Dougl.) are important as sites for growth of white fir seedlings. Eventually the firs grow up through the thicket, shade it, and then the shrubs die out. Many examples of this can be seen on Mount Sanhedrin, Sheetiron Mountain, and Goat Mountain. On Sheetiron Mountain and at Hell's Half Acre (near Bald Mountain) the same situation occurs with green manzanita (Arctostaphylos patula Greene).

White fir occurs in all the boreal areas studied. On the map (p. 341) the green areas represent the presence of white fir and the absence of red fir. White fir also occurs in the areas mapped in red (see also Table 2). Some of the largest white firs found were near Spruce Grove and these measured 58.5 inches and 60.5 inches DBH.

The name, Spruce Grove, is based upon the white firs there.

Jeffrey pine occurs commonly on the high exposed ridges near Hell's Half Acre (Bald Mountain), Monkey Rock (Hull Mountain) and Foutch Camp (Snow Mountain). The latter locality (Plate 14) is the most southern known station in the Inner North Coast Ranges of California (128, p. 47). Scattered trees occur elsewhere on Snow Mountain. Several trees occur on the highest part of Etsel Ridge near the relict stand of red fir. Mature trees tend to be flat-topped with a banner of branches (Plates 14 and 15) indicating the direction of prevailing winds. The largest tree measured was 60.1 inches DBH and was growing at Monkey Rock Camp, 6000 feet elevation.

Incense cedar occurs as a stunted and deformed tree scattered along the dry flats and windswept ridges in addition to its more common occurrence (60, p. 57) in the montane forest. It occurs in its distorted condition on the south-facing slope of Snow Mountain East and in its tall, symmetrical form along Cedar Creek on Snow Mountain, and at Post Camp, 5600 feet elevation, on Etsel Ridge. Although incense cedar occurs in all the boreal areas studied, it is not regarded as a dominant species in the Canadian Life-zone.

Sugar pine, like incense cedar, occurs as a symmetrical forest tree and as an occasional distorted tree (9, p. 176) near the summits of peaks and on leeward sides

of rocky exposed ridges. It can usually be recognized from a distance by the flattened crown with slender horizontal branches. It was found in all areas studied except Etsel Ridge, but it is regarded as a subdominant in this forest belt.

Occasional clumps of Nuttall willow (Salix scouleriana Barr.) occur in the forest, particularly in moist situations and open areas. The foliage is visited by a number of birds and the basal mass of trunks and dead branches affords shelter for some birds and small mammals. This species represents only a minor part of the forest in composition, but is important to a number of vertebrate animals within the forest.

The species of trees and shrubs in the forest and some of the herbs associated with them are listed in Table 3. The trees and shrubs will be listed in the order of their dominance and the herbs will be listed according to their taxonomic relationships.

FOREST CHAPARRAL

In scattered areas throughout the forest and on exposed ridges and dry hillslopes at high elevations above the yellow pine forest belt, forest chaparral occurs. It is not to be confused with the climax type of chaparral (16, pp. 26-27) found in the foothill regions at lower elevations, below the yellow pine forest belt. Forest

chaparral is a subclimax type of chaparral that may be invaded, at least marginally, by forest trees, and, in some cases is replaced by forest. It may represent a seral stage in either primary or secondary succession.

The two most abundant species are snowbrush (Ceanothus cordulatus Kell.) and bitter cherry (Prunus emarginata (Dougl.) Walp.). They may occur in separate stands or together. In the latter case, the snowbrush forms a fringing margin to the taller bitter cherry. Additional species of shrubs are: pine-mat manzanita (Arctostaphylos nevadensis Gray.), green manzanita (Arctostaphylos patula Greene.), and huckleberry oak (Quercus vaccinifolia Engelm.). One tree, blue elderberry (Sambucus glauca Nutt.), is found in moist ravines in closer association with the chaparral species of shrubs than with the forest trees.

Huckleberry oak forms a conspicuous belt on the south-facing slopes of Snow Mountain above the dwarfed canyon live oaks (Quercus chrysolepis Liebm.). Both species occupy loose gravelly slopes and talus areas. White firs are scattered about through the area and appear to be replacing the huckleberry oaks in the more favorable sites.

Clark (13, p. 222) listed the Brewer oak (Quercus garryana Dougl. var. breweri Jeps.) among the forest chaparral species. It occurs locally chiefly in the wind gaps in association with scrubby Garry oaks and probably represents a subclimax community that remains in control

of the area due to lack of competition by other woody species. Elsewhere Brewer oaks may extend up to 7000 feet. I have considered the extensive areas of Brewer oak and Garry oak as belonging to the Transition Life-zone rather than to the Canadian Life-zone. Garry oak will be discussed later in connection with its ecotone with the forest.

Succession of areas of forest chaparral by forest has been mentioned earlier. In approaching Spruce Grove by road from the south, one passes through a large area of white fir that has replaced bitter cherry. Marginally the large bitter cherry bushes are in varying stages of decadence due to shading by the firs, while within the stand death has come to the bitter cherry bushes and they lie prostrate in great numbers.

A list of the woody species of forest chaparral plants and some of the herbaceous species associated with them is found in Table 3.

MEADOW

The meadow is easily recognized by the presence of a sod, usually saturated with water, and the presence of sedges, rushes, grasses, and false hellebore (Veratrum californicum Durand). Often there is a small stream meandering through the meadow, bordered by Sierra rein-orchis, Sierra shooting stars, camass, and wild onions,

which hide the narrow channel from view. Bordering the dampest parts of the meadow are numerous herbs which yield an array of colors well through the summer months.

Perhaps the most conspicuous species found in the meadow is the false hellebore. It emerges with the melting of the snow banks (Plate 13) and occasionally the shoots push up through the snow. In June, 1950, on Snow Mountain I measured a growth of one inch for a shoot on the edge of a snowbank and two and one-half inches for a shoot six feet from the edge of the snow in a twenty-four hour period. False hellebore also occurs on gravelly slopes and flats which become dry early in the summer.

Shrubs which border meadows and stream courses will be discussed later under streamside woodland. For a list of species representative of the meadow see Table 3.

Meadows occur in the boreal areas of all the peaks studied except Mount Saint John. The best example, however, is Plaskett Meadows near Black Butte. It probably contains the greatest number of typical meadow species of plants and is one of the largest meadow areas. Another good meadow occurs at Spruce Grove (Bald Mountain area) and constitutes the only station where camass was found.

All of the meadow areas have been pastured by livestock, some very heavily. William Smith of Upper Lake related that the Milk Ranch on Snow Mountain was established in the 1870's. During the summer months dairy

cattle were pastured there and dairy products were packed out to Bartlett Springs weekly via mule train over Goat Mountain. In August, 1892, when Mrs. Brandegge visited Snow Mountain she mentioned that the sheep had nearly finished all that was to their taste. Today grazing is prohibited in this area by the United States Forest Service, but the damage has already been done. Erosion troughs scar the meadows (Plate 23) and blocks of sod crumble down as they are undermined by the streamlets. Zeno Jones of Upper Lake stated that these meadows are about the same today as they were in 1900. The damage was probably done very early by the first bands of sheep.

GARRY OAK WOODLAND

Garry oak (Quercus garryana Dougl.) on the slopes of the higher Inner North Coast Ranges of California is a small tree from about five to twenty feet high. Its appearance is very different from the tall tree form found at lower elevations. The mountain form reaches its best development at from 4000 to 5500 feet elevation in the Southern Yolla Bolly Mountains, with small groups of trees occurring in open areas of the forest up to about 6500 feet (Plate 12). It reaches the lower levels of white fir distribution and there forms an ecotone. The largest trees seen in these mountains were on Etsel Ridge in small groves amidst heavy stands of white fir, about one

mile southeast of Post Camp at 5700 feet elevation. Trees sufficiently large to attract my attention were measured and ranged from 12.4 to 20.6 inches DBH. These were associated with scattered California black oaks (Quercus kelloggii Newb.). In typical dense stands Garry oaks are usually less than 10 inches DBH. Other areas where Garry oaks are well developed are: the east-facing slope of Mount Sanhedrin and in the wind gap near Linger Longer (Goat Mountain). (Plate 4).

The Garry oak woodland community described in the boreal areas consists of a subdominant type that occurs in forest clearings or interdigitated with heavy stands of firs. Areas of pure Garry oak woodland were not studied in connection with vertebrate distribution. Small areas of this community within the forest or adjacent to forest chaparral, however, were utilized by many of the vertebrates of those adjacent communities and so inclusion in this discussion seemed necessary.

No special list of herbs occurring with the subdominant stands of Garry oak woodland was made. Herbs listed for the forest chaparral, rocky ridge and cliff, and dry flat and bare hillslope communities would likely occur there.

STREAMSIDE WOODLAND

The streamside woodland community is limited to the

shrubbery occurring on the margins of streams, seepages, meadows and lakes, and the herbaceous growth beneath such thickets. Others have called this community riparian woodland (101, pp. 553-555). The woody species listed in the order of their dominance are:

Mountain Alder, Alnus tenuifolia Nutt.
 Sitka Willow, Salix sitchensis Sanson var. parviflora
 (Jeps.) Jeps.
 Creek Dogwood, Cornus californica C. A. Mey.
 Western Service Berry, Amelanchier alnifolia Nutt.
 Cascara Sagrada, Rhamnus purshiana DC.
 Blackcap Raspberry, Rubus leucodermis Dougl.
 Sierra Nevada Currant, Ribes nevadense Kell.
 Siskiyou Gooseberry, Ribes binominatum Hel.
 Wood Rose, Rosa gymnocarpa Nutt.

The mountain alder is known to me locally from Black Butte and Brushy Mountain, and from Spruce Grove and vicinity in the Bald Mountain area.

The black cottonwood (Populus trichocarpa T. & G.) occurs along streams well up through the yellow pine belt and nearly reaches the lower limits of the boreal areas near Long Meadow on Sand Creek (Bald Mountain) and Cottonwood Glade on Cold Creek (Brushy Mountain).

A list of herbs from the streamside woodland community would include many from the stream, lake, and pond community.

STREAM, LAKE, AND POND

This community includes plants that are true aquatics and hydrophytes occurring in shallow water and on the

margins of bodies of water. No woody plants are included in this community.

Keller Lake, near Black Butte at an elevation of about 5500 feet (Plate 6), is a typical example of a small mountain lake. Shallow portions of the lake have masses of green algae, clumps of common cat-tail (Typha latifolia L.), and beds of broad pondweed (Potamogeton natans L.). An "island" of sphagnum moss (Sphagnum subsecundum Nees) sufficiently dense to support one's weight in walking about on its surface, contained a variety of flowering plants, among which mountain meadow knotweed (Polygonum histortoides Pursh.), western tofieldia (Tofieldia occidentalis Wats.), and an unidentified Mentzelia were collected. Clumps of mountain alder were growing on the outer margins.

Lily Pad Lake, near Mount Sanhedrin at an elevation of 5500 feet (Plate 9), is a typical example of a permanent shallow pond. Nearly the whole surface of the water is covered by yellow pond lilies (Nymphaea polysepala (Engelm.) Greene.). One small area has a dense mass of sedges and rushes with a narrow margin of open water along the edges. Below the open surface submerged water buttercups (Ranunculus aquatilis L. var. capillaceus (Thull.) DC.) grow. The muddy shores, subject to progressive drying toward late summer, have clumps of rushes and simple-stemmed bur-reed (Sparganium simplex Huds.).

A list of additional herbs in the stream, lake, and pond community is given in Table 3. Many species of the moist terrestrial shores in this community also occur in the streamside woodland and meadow communities.

ROCKY RIDGE AND CLIFF

The presence of rocky crevices, lee sides of rocks, and interstices affords shelter for plants occurring on the higher slopes, summits, and exposed ridges of mountains. Almost constantly air is rising over these areas and exerting a drying effect upon the vegetation. The rocky ridge and cliff community covers areas where climatic and edaphic conditions are rigorous. Earlier it was mentioned that lowland species occurred at higher elevations in these mountains than in the Sierra Nevada because of the steepness of the slopes and the convection currents bringing warm air up from the lowlands during the summer months. The summits also seem to exhibit another phenomenon.

A very pronounced "crest effect" occurs on the summits and high ridges of the higher peaks. It produces even more extreme environmental conditions than occur in the wind gaps at lower elevations between mountain masses. As air moves up the slopes of mountains it is cooled and compressed, but upon reaching the crest it expands and removes moisture from the crest areas. A similar drying

effect is exhibited by cool air (not rising up the slopes) and warm air passing over the summits. In addition to this drying effect, there is mechanical injury to plants inflicted during cold seasons when wind blows ice particles. Wind deformation of trees is very apparent, and when extreme, a krummholz form results. Shrubs and herbs in this area tend to be low, have enlarged bases, rosettes of basal leaves, reduced stems, and deformed shapes. Areas where this type of vegetation is well-represented are: the head of Butte Creek (Black Butte), the summit of Bald Mountain, the northeast ridge of Hull Mountain, and the summit ridges of Mount Saint John and Snow Mountain.

On Snow Mountain alpine potentilla (Potentilla gordonii (Hook.) Greene) and oval-leaved eriogonum (Eriogonum ovalifolium Nutt.) are found at 7000 feet elevation, but are known only from elevations of 8000 and 9000 feet and higher in the Sierra Nevada. Their occurrence at lower elevations on Snow Mountain can be attributed to the heavy winter snowpack, late seasonal snowmelt, and the "crest effect".

Another group of plants regarded as reaching their lower limits of range at 7000 feet elevation in the Sierra Nevada occur in the Southern Yolla Bolly Mountains about 1000 feet lower. This group includes: incised-leaved mustard (Sisymbrium incisum Engelm.), summer saxifrage (Saxifraga aestivalis Fisch.), deer's tongue frasera

(Swertia radiata (Kell.) Ktze.), and blue-purple pentstemon (Pentstemon confertus Dougl. var. caeruleo-purpureus Gray).

The shrubs found in the rocky ridge and cliff community include:

Dwarf Barberry, Berberis pumila Greene.
 Cream Bush, Holodiscus discolor (Pursh.) Maxim. var. dumosus Dippel.
 Desert Mahogany, Cercocarpus ledifolius Nutt.
 Antelope Brush, Purshia tridentata DC.
 Western Choke-cherry, Prunus demissa (Nutt.) Dietr.
 Western Service Berry, Amelanchier alnifolia Nutt.
 Cascara Sagrada, Rhamnus purshiana DC.
 Greene's Macronea, Macronea greenii (Gray) Greene.
 Rabbit-brush, Chrysothamnus nauseosus (Pall.) Britt. var. occidentalis Hall.
 Rabbit-brush, Chrysothamnus nauseosus (Pall.) Britt. var. albicaulis Rydb.
 Great Basin Sagebrush, Artemisia tridentata Nutt.*

*The Herbarium of the California Academy of Sciences has in the past regarded this as A. trifida Nutt. (21, p. 123) and now (February 14, 1952) in a letter from John Thomas Howell, considers it as A. arbuscula Nutt. My use of A. tridentata Nutt. is based upon specimens collected by me and identified by the Herbarium of the University of California.

Some of these shrubs (Great Basin sagebrush, desert mahogany, and antelope brush) are indicators of the very arid conditions. Their presence in these mountains represents the extreme southern limits of known distribution in the North Coast Ranges of California. Most of the remaining shrubs are of fairly wide range in mountain habitats. The presence of cascara sagrada at 7000 feet (Snow Mountain West) and 7450 feet (Black Butte) is unusual. It was found as a straggly shrub in rocky fissures in both localities.

For a list of plants representative of the rocky ridge and cliff community, see Table 3.

DRY FLAT AND BARE HILLSLOPE

This most barren and sparsely-covered plant community of all is found in clearings in the forest and on south-facing slopes. The soil is mainly of a sandy or fine gravelly texture and is well-drained. There may be heavy snow packs on the flats but runoff is great and little moisture is retained. The absence of rocks, trees, and shrubs, which afford shelter from the wind and reduce light intensities, further adds to the unfavorable environmental conditions already mentioned.

Species of plants found in this community include:

Pussy Paws, Calyptridium umbellatum (Torr.) Greene.
Chilacote, Argemone platyceras Link & Otto.
Tower Mustard, Arabis glabra (L.) Bernh.
Hair-stem Gayophytum, Gayophytum ramosissimum T. & G.
Common Mullein, Verbascum thapsus L.

Areas best representing this community occur near Hell's Half Acre (Bald Mountain), lower Milk Ranch (Snow Mountain), and Linger Longer (Goat Mountain).

Gravelly flats or meadows are present near Milk Ranch and Long Glade on Snow Mountain. The parts subject to early summer flooding develop a brilliant yellow aspect of plantain-leaved buttercups (Ranunculus alismaefolius Geyer var. alismellus Gray.). These areas have been included in the meadow community, although when they are

dry they resemble the adjacent dry flat and bare hill-slope community.

Brandegge (9, pp. 169-172) suggested that sheep may have brought seeds of some lowland species up to higher elevations.

SPECIES ACCOUNTS OF THE VERTEBRATES

METHOD OF PRESENTATION

The paucity of data on some species necessitates very brief accounts; yet other species that are well-known could provide voluminous accounts. An endeavor has been made to record the pertinent facts relative to geographic distribution, habitats occupied, and utilization of boreal areas by the forms present during the summer months. In addition, other data have been recorded in our field notebooks that deserve mention here in order to give a representative picture of the natural history of these forms in the Southern Yolla Bolly Mountains.

An attempt will be made to present data in the following order:

1. Scientific name.
2. Common name.
3. Occurrence.

The geographic distribution will be summarized in Table 5 for the native and introduced forms. Extensions of the known ranges will be mentioned. Some comments may be made concerning the habitats utilized and a summary of habitats occupied will be given in Table 6. Whenever possible comments will be made on species that are not resident for the entire summer period. General impressions on relative abundance may be expressed, although no special attempt was made to record numbers of

individuals.

4. Reproductive data.

Particular attention was paid to reproductive data on birds and mammals, but a little will also be given for other groups. For mammals, data on numbers, sizes of embryos, dates on nursing females, and dates on the appearance of young were kept. For birds the location of nests, numbers of eggs, and dates for eggs and young were noted.

5. Miscellaneous natural history data.

These included interspecific and intraspecific relationships, e.g., predation, competition, ecological associates, and food relationships.

6. Geographic variation and intergradation.

Certain trends in variation were noted in some cases. Some measurements and descriptions will be given for these cases.

7. Specimens examined.

These will be listed by areas, beginning first with the most northern one, and then working southward. Unless otherwise stated, specimens are in the Pacific Union College Museum of Natural History. Specimens in the Museum of Vertebrate Zoology will be designated by (M.V.Z.), and those from the California Academy of Sciences by (C.A.S.).

Literature will be cited in connection with the particular forms it concerns.

FISHES

Salmo gairdnerii gairdnerii Richardson

Coast Rainbow Trout

In nearly all permanent streams in the boreal areas rainbow trout were found. One exception was Snow Basin Creek (Black Butte area), which has falls too high for the fish to ascend and apparently the stream has not been planted by man. It is thought that native fish existed in the other streams prior to plantings by man. Plaskett Creek at 6000 feet is the highest elevation at which I know of rainbow trout in these mountains, although they may occur higher in Dark Hollow Creek on Snow Mountain.

A melanistic specimen was taken from Plaskett Creek on June 29, 1951. Two other specimens taken at the same time from the same pool were normal.

No other fishes are known to occur in these streams at the higher elevations. The nearest region I know of where other fishes occur is in Bear Wallow Creek, tributary of the Middle Fork of Stony Creek, near Mount Saint John. There some introduced brown trout (Salmo trutta) were found. If movement from this stream is possible, it is not likely that the brown trout would ascend to the headwaters of adjacent streams, since they prefer the quieter waters of the lower stretches.

Specimens examined.--A total of 9, as follows: Black Butte, 7; Bald Mountain, 2.

Salvelinus fontinalis (Mitchill)

Eastern Brook Trout

This non-native fish has been introduced into Keller Lake, 5500 feet elevation, near Black Butte. The lake was a sphagnum bog before the moss was removed and the fish planted. In June, 1951, there were some fish about 16 inches long as well as fingerlings. I do not know whether the smaller fish were planted or resulted from natural reproduction. There are no tributary streams to the lake that would permit spawning, but seepage from the talus slope at its head or springs might make part of the lake suitable for spawning.

Specimen examined.--One from Black Butte.

AMPHIBIANS

Triturus granulosus similans Twitty

California Rough-skinned Newt

Large numbers of newts utilize Lily Pad Lake, 5500 feet elevation, for reproductive purposes. It is shallow, warm, and has an abundance of aquatic vegetation. Sixteen of twenty specimens taken on July 13, 1950, were females. Many males were present, as evidenced by mating pairs, but apparently the gravid females were easier to capture. The largest male measured 210 mm. total length, and the largest female measured 196 mm. total length.

The only other amphibian noted in the lake was the Pacific

tree toad.

Newts also occur in Keller Lake, 5500 feet elevation, and in Cold Creek at 5600 feet elevation. They are smaller than the Lily Pad Lake individuals, possibly due to a colder environment. No other amphibians were noted in Keller Lake, but in Cold Creek one newt was found in a pool with two larval giant salamanders. It is likely that tree toads also occurred in both of these places.

Specimens examined.--A total of 25, as follows:
Black Butte, 2; Mount Sanhedrin, 23.

Dicamptodon ensatus Eschscholtz

Pacific Giant Salamander

Six larval salamanders four inches or more in length were taken from pools in cold streams. In all cases there was a retreat to which the animal could seek shelter, e.g., an overhanging bank or tangle of roots and sticks. The bottom was either silty or rocky. The one adult (Post Camp, Etsel Ridge) was seen crawling beneath an overhanging wet log along the margin of a stream shortly after dark.

In some cases rainbow trout were present in the same pools as the giant salamander larvae. On Cold Creek (Brushy Mountain) there were two giant salamander larvae, one newt, and about ten trout in the same pool. Elevations at which giant salamanders were taken ranged from

5600 feet (Cold Creek) to 6000 feet (Plaskett Creek).

At John Day Camp (Mount Sanhedrin) one larva was taken above the highest point which the trout reached on Sulphur Spring Creek.

Some of the larvae showed the pale ventral coloration blending into the dark lateral color, which is typical of a large series of specimens from western Oregon. Others showed a sharp break in coloration between these two areas or faint to heavy mottling ventrally from the head region to the hind limbs.

Specimens examined.--A total of 7, as follows:
Black Butte, 5; Etsel Ridge, 1; Mount Sanhedrin, 1.

Ensatina eschscholtzii oregonensis Girard

Oregon Red Salamander

One adult was found in rotten wood within a fallen yellow pine at Plaskett Meadows, 6000 feet elevation. It was identified by Dr. Robert C. Stebbins as belonging to this race, although it extends beyond the area mapped by him for this race (124, p. 378). Two young salamanders, each 34 mm. in length, were found beneath a wet log near the Milk Ranch, elevation 6400 feet, on Snow Mountain. In coloration they closely resemble Stebbins' colored plate (124, p. 515, Plate 11, Figure 15) of intergrades between the races oregonensis and platensis. Repeated searching failed to find any more specimens.

Specimens examined.--A total of 3, as follows: Black Butte, 1; Snow Mountain, 2.

Bufo boreas halophilus (Baird & Girard)

California Western Toad

Toads were frequently encountered in the southernmost group of peaks between elevations of 5500 feet and 6400 feet near springs and seepages. They likely reached these areas by following up streams from the lowlands. Activity begins at dusk when the toads emerge from their daytime retreats and begin their feeding activities. No tadpoles were found, but on August 1, 1950, many small toads were seen in Summit Valley near Goat Mountain. Evidence of a large population of both young and adults existed there. At nearly every step taken in the evenings, one could detect movements of toads nearby.

Specimens examined.--A total of 11, as follows: Hull Mountain, 4; Sheetiron Mountain, 3; Snow Mountain, 1; Goat Mountain, 3.

Hyla regilla Baird & Girard

Pacific Tree Toad

Tree toads probably occurred in all the areas studied, but our records have failed to note their presence in some cases. Utilization of high mountain habitats was as varied for tree toads as for any other amphibian, if not

more so. Tadpoles were found in Lily Pad Lake, and adults were found in streams, meadows, seepages, and streamside woodland. Specimens were taken between 5400 feet and 6400 feet elevation. Singing was noted in the meadow at Long Glade (Snow Mountain) in mid-June of 1950 when snow was still present in the forest bordering the meadow. Tree toads were found in all habitats occupied by other amphibians, except the forest habitats of the metamorphosed giant salamanders and the red salamanders.

Specimens examined.--A total of 16, as follows:
Black Butte, 3; Bald Mountain, 3; Mount Sanhedrin, 2;
Snow Mountain, 2; Goat Mountain, 6.

Rana boylli boylli (Baird)

California Yellow-legged Frog

Yellow-legged frogs were usually found in streams with rocky bottoms or on the margins of such streams where one or two hops would get them into the water. They followed up streams from the lower elevations and reached the highest levels where permanent surface water was present, as at Long Meadow (Bald Mountain), 5850 feet elevation, and Long Glade (Snow Mountain), 6400 feet elevation. No tadpoles or very small frogs were found.

Specimens examined.--A total of 13, as follows:
Etsel Ridge, 4; Bald Mountain, 8; Snow Mountain, 1.

REPTILES

Sceloporus graciosus gracilis Baird & Girard

Northern Mountain Swift

Mountain swifts were the most common of the three species of lizards found in the boreal areas. Their greatest abundance was in the rocky ridge and cliff plant community, but a considerable variety of habitats was utilized. Data were kept on 44 specimens taken and these included 27 from rocky areas, 13 from logs, three from manzanita, and one from a grassy area. In all cases rocks with interstices affording shelter were near at hand. Specimens were taken between 5500 feet and 7000 feet elevation, but they occurred even to the summit of Black Butte, 7460 feet elevation.

Reproductive data were taken from 25 sexually-mature females (22 in 1950, 3 in 1951) collected between May 27 and September 7. Fourteen were carrying eggs between May 27 and July 13, and 11 were without eggs between June 28 and September 7. The number of eggs ranged from two to eight. In 1950 the average was 4.72 for 11 gravid females, while in 1951 it was 5.00 for three gravid females, or an average of 4.78 for 14 gravid females during the two-year period. Stebbins (123, p. 27) mentioned that two to four eggs were laid by mountain swifts of the race gracilis and two to seven eggs were laid by mountain swifts of the race graciosus. I found only one female

with two eggs and that was a small female. My finding of eight eggs (June 8, 1951, Sheetiron Mountain) exceeded the number recorded in the literature for gracilis or graciosus (121, p. 250). Eggs were laid in June and July. On June 27, 1950, a female containing seven very large eggs was taken at Plaskett Meadows, and the following day a female taken about a quarter of a mile away (near Snow Basin Creek) was found without eggs. Stebbins reported that the first young of the season were seen on August 24 at Lassen Volcanic National Park, California.

Three size classes of swifts were found before the time that the young of the year first appeared. Sexual dimorphism and sexual maturity were present in the two larger classes, but not in the smallest size class. These size classes may represent age groups of one year, two year, and three year and older individuals.

Adult males typically showed a white area between the blue patches on the belly and a separation of the blue throat patch from the belly patches. The largest (and presumably the oldest) males taken on Snow Mountain had a narrow white line or almost none separating the blue belly patches and a confluence of the blue throat patch with the belly patches.

Adult females typically showed a pale throat area, sometimes speckled with bluish, and a band of salmon-orange color on each side of the lower sides of the body.

Counts of dorsal scales and femoral pores were taken on two typical, adult males and two typical, adult females. The males had 54 and 56 dorsal scales, 13-14 (left-right) and 16-16 femoral pores, whereas the females had 57 and 64 dorsal scales, and 16-16 (left-right) and 12-14 femoral pores.

Specimens examined.--A total of 48, as follows:
Black Butte, 3; Bald Mountain, 4; Mount Sanhedrin, 7;
Sheetiron Mountain, 6; Mount Saint John, 3; Snow Mountain,
22; Goat Mountain, 3.

Elgaria coerulea shastensis (Fitch)

Shasta Cerulean Alligator Lizard

Notes on 13 alligator lizards collected revealed that nine were taken in thickets of snowbrush, two in a litter of logs and branches on the forest floor, and two on the edges of a meadow. Many more were seen in snowbrush and in piles of broken logs where they could not be captured. Elevations of capture ranged from 5000 feet to 7350 feet.

Examination of 19 specimens showed that all had 16 dorsal scale rows, 17 had eight postnasal scales, one had seven postnasal scales, and one had six postnasal scales. The temporal scales of the specimens from Hull Mountain and northward were all smooth, whereas from Mount Sanhedrin and southward at least one or more of

the temporal scales was keeled. One specimen from Mount Sanhedrin had all the temporal scales strongly keeled, but the remainder of those with keeled scales had only weakly-keeled scales. In preserved specimens the number of pigment granules observed between the ventral scale rows varied from few to many.

Fitch (28, p. 409) has characterized the race shastensis as having 16 dorsal scale rows, eight postnasal scales, and smooth temporal scales.

Pickwell (114, p. 187) mentioned the range of this form in the Sanhedrin Mountain Range.

Specimens examined.--A total of 19, as follows:
Black Butte, 11; Hull Mountain, 3; Mount Sanhedrin, 2;
Sheetiron Mountain, 1; Snow Mountain, 1; Goat Mountain, 1.

Eumeces skiltonianus (Baird & Girard)

Common Western Skink

Skinks were seen only twice. One seen on Sheetiron Mountain at 6400 feet elevation escaped into a thicket of snowbrush, and two seen at Board Camp, 5400 feet elevation, on Goat Mountain, moved about on the ground among leaves at the base of logs, but they disappeared when approached too closely. Specimens taken in 1913 by the California North Coast Counties Expedition near Mount Sanhedrin were cited by Rodgers and Fitch (116, p. 197).

Charina bottae bottae Blainville

Pacific Rubber Snake

The first rubber snake found was under a litter of moist sticks and needles beneath a white fir at Plaskett Meadows, 6000 feet elevation, on July 20, 1949. A second one was taken in the same area from within a warm, moist, rotten log on June 27, 1950. Similar habitat elsewhere has been searched considerably but without success.

Klauber (91, pp. 83-90) discussed the subspecies of rubber snakes.

Specimens examined.--Two from Black Butte.

Coluber constrictor mormon (Baird & Girard)

Western Yellow-bellied Racer

The only observation on yellow-bellied racers was on July 21, 1950, when two were seen in a thicket of Brewer oak at 6300 feet elevation on the southeast-facing slope of Bald Mountain. The habitat was Garry oak woodland with forest chaparral nearby. This area lies just below the bare wind-swept portion of the peak. Both racers were caught. One measured 821 mm. total length and 192 mm. tail length; the other measured 700 mm. total length and 163 mm. tail length. Van Denburgh (134, p. 663) cited a specimen from three miles west of the summit of Mount Sanhedrin.

Specimens examined.--Two from Bald Mountain.

Fasticophis lateralis (Hallowell)

California Striped Racer

One striped racer was seen in the forest chaparral community on July 22, 1950, near Monkey Rock, 6000 feet elevation, on Hull Mountain, but it crawled into a large patch of snowbrush and eluded capture. The single yellow lateral stripe on each side of the dark body made identification certain.

Pituophis catenifer catenifer (Blainville)

Pacific Gopher Snake

A small gopher snake was captured on the edge of a meadow at Spruce Grove (Bald Mountain), 5900 feet elevation, on June 16, 1951. Another was seen crossing the road at 6000 feet elevation in an area of forest chaparral a few hundred yards from the Goat Mountain Fire Lookout. Still another habitat was represented by a gopher snake seen in Garry oak woodland at 5800 feet near its ecotone with the forest between Seven Troughs and Telephone Camp (Black Butte area). This area, however, was just outside the study area.

Specimen examined.--One from Bald Mountain.

Thamnophis elegans (Baird & Girard)

Western Garter Snake

The habits utilized by the western garter snake in

boreal areas included bodies of water, margins of bodies of water, and meadows. At Lily Pad Lake (Mount Sanhedrin) garter snakes were seen moving about among the yellow pond lilies at some distance from shore. Others at Keller Lake (Black Butte) readily took to the water when disturbed from their shoreline positions. The driest habitat occupied was at Summit Valley (Goat Mountain) in late summer. Specimens were collected between 5500 feet and 6200 feet elevation. Greatest abundance was near the larger permanent bodies of water.

Associated with the western garter snake at Plaskett Meadows was the common red-sided garter snake.

No notes were taken on food habits, but a variety of invertebrates and small vertebrates was available. Fox (32, pp. 498, 505-506) discussed the food habits of this species in this section of California.

Early discussions of the taxonomic status of the western garter snakes of California (88, pp. 292-306) (17, pp. 651-656) (10, pp. 286-297) and (134, pp. 812-848) were superceded by more recent papers (29, pp. 1-150) (31, pp. 113-120) and (32, pp. 485-530). Recently Fox (32, pp. 485-530) named two new subspecies, aquaticus and terrestris. He regarded specimens from my study areas as intergrades between the races terrestris and elegans. I concur with this opinion. He stated (32, p. 503) that most intergrades had at least a few red spots, but I

found none. Elegans has no red pigment, but has blackish ground color with indistinct black blotches, brighter dorsal and lateral stripes, top of head blacker, contrasting sharply with light-colored labials and throat, higher gastrostege and urostege counts, and almost invariably 21 dorsal scale rows. Terrestris has reddish-brown or olive-brown dorsolateral ground color with distinct black blotches, duller dorsal and lateral stripes, top of head paler, contrasting less sharply with the labials and throat, gastrostege and urostege counts averaging far lower, and either 19 or 21 dorsal scale rows.

In the absence of typical examples of these races for comparison, I must describe my specimens as being browner, with more distinct black blotches, and having 19 dorsal scale rows in the western part of the study areas, tending toward the race terrestris; and as blacker, with less distinct or no black blotches, and having either 19 or 21 dorsal scale rows in the eastern part of the study areas, tending toward the race elegans. All specimens examined had 8 supralabial scales. The Lily Pad Lake population is most typical of my western individuals and specimens from the whole main ridge from Black Butte to Goat Mountain were typical eastern individuals. The specimens from the Black Butte and Snow Mountain areas have no conspicuous black blotches and 19 dorsal scale rows, whereas those from the Goat Mountain area have 19

indistinct black blotches and 21 dorsal scale rows.

Fox (32, p. 506) cited one intergrade from Mount Sanhedrin in the California Academy of Sciences collection.

Specimens examined.--A total of 14, as follows:

Black Butte, 2; Bald Mountain, 1; Mount Sanhedrin, 8; Snow Mountain, 1; Goat Mountain, 2.

Thamnophis ordinatus fitchi Fox

Common Red-sided Garter Snake

Two specimens of red-sided garter snakes were taken from the damp parts of Plaskett Meadows, 6000 feet elevation. Also in the area were western garter snakes. Apparently there was some overlap in habitats occupied by these two species, but it was thought that the red-sided garter snake did not utilize the drier, more exposed habitats where the western garter snake was sometimes found.

Fitch in 1941 (30, pp. 570-592) discussed the geographic variation in this species in the Pacific Coast region. Formerly the local form was named Thamnophis sirtalis tetrataenia (Yarrow). The present species name is based upon Klauber, 1948 (92, pp. 8-10). Fox in 1951 proposed the race fitchi for the local form when it was found that the race tetrataenia was of very limited distribution elsewhere.

My specimens showed conspicuous red areas on the

sides, 7 supralabial scales on each side, no wedge-marks on the supralabial scales, and 19 dorsal scale rows.

Specimens examined.--Two from Black Butte.

Crotalus viridis oreganus Holbrook

Pacific Prairie Rattlesnake

Rattlesnakes occurred less frequently in the boreal areas than in the adjacent lowlands. Charles Springeld caught 129 rattlesnakes in 1911 and 125 in 1912 near Eden Valley, in the lowlands northwest of Mount Sanhedrin. I have seen rattlesnakes in the boreal areas between 5500 feet and 7300 feet elevation.

Specimens were taken in the forest, forest chaparral, meadow, and rocky ridge and cliff plant communities. Probably rattlesnakes also occur in Garry oak woodland. Rocky crevices and logs for shelter were usually close to places where rattlesnakes were found.

A 46-inch rattlesnake was found on May 27, 1951, stretched out on a trail through a dense stand of red firs at 6600 feet elevation, near Dark Hollow (Snow Mountain). Snowbanks three feet deep were present in nearby shady parts of the forest. The snake's stomach contained a recently-swallowed, adult Townsend chipmunk. A 38-inch rattlesnake was found on July 19, 1951, coiled beneath a clump of false hellebore in the meadow at 6000 feet elevation near Board Tree Camp (Brushy Mountain). Its

stomach contained a recently-swallowed, adult golden-mantled ground squirrel.

Specimens from forest habitats tended to be a greenish color with a conspicuous dorsal pattern, while those from chaparral habitats were usually browner and had less conspicuous dorsal patterns. Klauber (89, pp. 1-24) (90, pp. 185-276) discussed the characteristics of rattlesnakes in detail.

Van Denburgh (134, p. 935) cited a specimen from near Mount Sanhedrin.

Specimens examined.--A total of 8 as follows: Black Butte, 3; Hull Mountain, 1; Mount Sanhedrin, 1; Sheetiron Mountain, 1; Snow Mountain, 1; Goat Mountain, 1.

BIRDS PRESENT DURING THE SUMMER MONTHS

Pelecanus erythrorhynchos Gmelin

White Pelican

A flock of white pelicans flew over Goat Mountain during the summer of 1949, according to Harold Gallaher. These birds apparently were in transit between bodies of water in the Sacramento Valley and Clear Lake, about nine miles southwest of Goat Mountain.

Cathartes aura teter Friedmann

Western Turkey Vulture

Turkey vultures were seen frequently flying over the

areas studied, and apparently some utilized rocky sites for nesting. They stopped for food wherever it could be found.

Stone (126, p. 580) noted the presence of turkey vultures near Mount Sanhedrin.

Accipiter gentilis atricapillus (Wilson)

American Goshawk

Recent observations on goshawks have included birds flying over a variety of habitats and perching on the roof of the Goat Mountain Fire Lookout. The birds seemed to show their closest affinities to meadows and forests. An excellent view was had of an adult goshawk flying low over the white fir forest on Etsel Ridge on July 18, 1951. One bird flying over the meadow at Long Glade, 6400 feet elevation, on Snow Mountain on June 17, 1950, invoked shrieks from the golden-mantled ground squirrels.

Stone (126, p. 580) cited a record of a male taken on Mount Sanhedrin on August 1, 1899. Other authors (41, p. 64) and (56, p. 97) have later cited this same specimen.

Near Mendocino Pass are White Hawk Ridge and White Hawk Creek. These names may have been derived from the presence of goshawks in the area.

Accipiter cooperii (Bonaparte)

Cooper Hawk

The observations on Cooper hawks have been few and were limited to flying birds, particularly over meadows. Miller (101, p. 534) listed the Cooper hawk as occurring from the Lower Sonoran Life-zone to the Transition Life-zone. Our observations must have been on birds that drifted upward in summer into the small boreal areas. The highest elevation of observation was 6400 feet.

Accipiter striatus velox (Wilson)

Northern Sharp-shinned Hawk

Joseph Mailliard recorded in his field notes that a sharp-shinned hawk was seen at or near the summit of Signal Station on Mount Sanhedrin by J. W. Mailliard and Luther Little. The vegetation in that area was probably Garry oak woodland or forest chaparral.

Stone (126, p. 580) reported the nesting of this species in small spruces (Douglas firs) on the same mountain. Mention of this nesting record was also made by Grinnell and Miller (56, pp. 99-100).

Buteo jamaicensis calurus Cassin

Western Red-tailed Hawk

Relatively few red-tailed hawks have been observed in the boreal areas as compared with the lowlands. Most

of the observations were of single birds soaring overhead at considerable heights. On July 3, 1950, an adult bird circled low over the red fir forest near the summit of Mount Saint John, 6750 feet elevation. An immature bird accompanying the adult alighted in a red fir and perched there for a short time. Food is probably taken mostly in open areas, but also any other place where it can be secured.

Stone in 1904 (126, p. 580) said that red-tailed hawks were abundant in the vicinity of Mount Sanhedrin, although none was collected.

Aquila chrysaetos canadensis (Linnaeus)

American Golden Eagle

It was not an uncommon sight to see one or two golden eagles soaring over the crests of the mountains or descending rapidly down a canyon. Great distances are covered in a short time. Often an eagle was found on a rocky crag near Cedar Creek Gap on Snow Mountain, watching the surrounding terrain.

On Mount Sanhedrin we watched a golden eagle make several passes at a jack rabbit, but without success. Two eagles were seen eating a jack rabbit in the red fir forest at 6600 feet elevation on Snow Mountain, and another two with the same food on the road through Garry oak woodland near Telephone Camp (Black Butte).

Stone in 1904 reported (126, p. 581) golden eagles as rare in the vicinity of Mount Sanhedrin. Today I would say they are rather common, recognizing, of course, that each bird moves about over a large area.

Stone also reported (126, p. 581) bald eagles as rare in the vicinity of Mount Sanhedrin. I know of no recent observations and would consider their habitat to be along the Eel River rather than high in the mountains.

Falco sparverius sparverius Linnaeus

North American Sparrow Hawk

Open ridges, mountain crests, and Garry oak woodland were the habitats where sparrow hawks were found most frequently. They perched on conspicuous rocks and tree tops or rode the air currents rising over the crests of the mountains. Feeding upon grasshoppers in the open areas has been observed.

Stone in 1904 said (126, p. 581) that sparrow hawks were not common in the vicinity of Mount Sanhedrin. I have seen them commonly near Impassable Rock and on all other peaks.

Dendragapus fuliginosus sierrae Chapman

Sierra Sooty Grouse

All of our observations of the sooty grouse in the boreal areas were in the forest. They also occur in the

yellow pine forest locally about springs. Feathers were found in some areas where birds were not seen. Grouse were seen on Black Butte, Ford Hill (near Brushy Mountain), Hull Mountain, Mount Sanhedrin, and at Linger Longer (Goat Mountain).

The grouse population today seems to be smaller than formerly. Hunters are responsible for killing some of the birds they encounter, but probably they seldom go hunting for grouse in particular. Stone (126, p. 580) said grouse were formerly numerous on the higher ridges of Mount Sanhedrin. Shelton took a specimen in 1913 on Mount Sanhedrin and it has been cited in the literature (41, p. 60), (56, pp. 113-115).

Grouse Spring is about seven miles southeast of Black Butte.

Specimen examined.--One from Mount Sanhedrin (M.V.Z.).

Oreortyx picta picta (Douglas)

Sierran Mountain Quail

Large clumps of bitter cherry and snowbrush were the preferred habitat of mountain quail in the boreal areas. They also occurred in Garry oak woodland, open forest, and on the margins of meadows.

Early in the summer the mountain quail fed heavily upon clover (Trifolium longipes) and other green herbage in the meadows. In drier habitats a variety of seeds was

utilized, among which snowbrush and Garry oak were recognized.

A nest with two eggs was found in Snow Basin (Black Butte) at 6600 feet elevation. One of the parents was on the nest. Probably mountain quail nest earlier at lower elevations. On July 2, 1950, on Sheetiron Mountain, one bird with small chicks was seen, as well as one with young over half-grown. Twice two birds were seen with 17 or 18 young. These likely represented two broods that had joined company.

Mountain quail were more numerous on Mount Sanhedrin than in any other boreal area studied, because of the greater areas of bitter cherry and snowbrush. Specimens, other than ours, have been taken on Mount Sanhedrin by Mailliard (94, p. 294) and by members of the California North Coast Counties Expedition (41, p. 58) and (56, pp. 118-120). Stone (126, p. 580) listed the mountain quail as abundant on Mount Sanhedrin and stated that its range overlapped that of the California quail. We found mountain quail and California quail together at Vulture Spring, 5900 feet elevation, on Mount Sanhedrin on July 13, 1950.

Specimens examined.--A total of 19, as follows:
Black Butte, 3; Etsel Ridge, 1; Bald Mountain, 1; Hull Mountain, 1; Mount Sanhedrin, 9 (6 M.V.Z.); Sheetiron Mountain, 2; Snow Mountain, 1; Goat Mountain, 1.

Lophortyx californica brunnescens Ridgway

Coast California Quail

In addition to the case mentioned in the preceding account, we found the California quail present with the mountain quail in the meadow at Millsap's Cabin, 6000 feet elevation, in the Bald Mountain area on June 15, 1951. These two observations represented up-mountain straying from their usual habitats by these birds.

Subspecific determination of quail from Mount Sanhedrin by Grinnell and Miller was the basis for recording the same here. They stated (56, pp. 122-123) that it was not likely that these birds were transplants from some other area. Mention of California quail as abundant near Mount Sanhedrin by Stone (126, p. 580) must have referred to lowland areas.

Charadrius vociferus vociferus (Linnaeus)

Northern Killdeer

Two killdeers were found at a temporary pool near Long Glade, 6400 feet elevation, on Snow Mountain, on May 27, 1951. The female apparently was preparing to nest, for several times she was found sitting in a depression made in fine gravel. Internal examination of this bird, after being shot for a specimen, revealed that the ova were 15 mm. in diameter.

On the north slope of Bald Mountain, 6400 feet

elevation, two killdeers were found in a meadow on June 21, 1951. The birds exhibited typical nesting behavior by spreading the wings and tail and rolling onto their sides, getting up and running a short distance, and then repeating the procedure again with much loud calling. The male bird was shot and found to have testes measuring 7 by 3 mm.

Clark (MS) mentioned that killdeers were seen once in the Black Butte area.

Specimens examined.--A total of 2, as follows: Bald Mountain, 1; Snow Mountain, 1.

Columba fasciata monilis Vigors

Pacific Band-tailed Pigeon

Several band-tailed pigeons were seen in tall white firs on the north slope of Mount Sanhedrin at 5900 feet elevation on July 13, 1950. Feathers were also found at Board Camp, 5400 feet elevation, on Goat Mountain. The metropolis of band-tailed pigeon distribution lies in the yellow pine forest belt at lower elevations.

Zenaidura macroura marginella (Woodhouse)

Western Mourning Dove

Only two observations of mourning doves were made in the boreal areas. Both represented up-mountain straying. Two birds were seen in Garry oak woodland at

Telephone Camp, 6500 feet elevation, on Black Butte, and two birds were seen feeding on a dry flat near Linger Longer, 5400 feet elevation, on Goat Mountain. Walter P. Taylor recorded in his field notes seeing one mourning dove at the spring near the summit of Mount Sanhedrin.

Specimen examined.--One from Goat Mountain.

Otus asio bendirei (Brewster)

California Coast Screech Owl

On the evening of July 13, 1950, a screech owl was heard calling from a grove of white firs adjacent to Garry oak woodland at Lily Pad Lake, 5500 feet elevation, on Mount Sanhedrin. Screech owls usually forage in oak woodland, but may roost in dense coniferous trees nearby. They do not typically occur at the higher elevations.

Bubo virginianus pacificus Cassin

Pacific Horned Owl

All observations of horned owls were made in the forests at high elevations. There they were found less frequently than in the yellow pine forests at lower elevations. A skeleton with some feathers found in the white fir forest at 6000 feet elevation on Mount Sanhedrin was used to establish the subspecific status.

Specimen examined.--One from Mount Sanhedrin.

Phalaenoptilus nuttallii californicus Ridgway

Dusky Poor-will

In areas of forest chaparral poor-wills were frequently heard on summer evenings. Singing began about one hour after sunset and was noted as early as June 19. Birds also occurred in open forest and Garry oak woodland where much open ground was found between trees and shrubs. A bird was frightened from its daytime perch in a rocky outcrop surrounded by a heavy red fir forest on July 24, 1951, on Mary Brown Ridge, 6300 feet elevation, near Black Butte.

Poor-wills are said to nest in areas below the Canadian Life-zone (101, p. 536). Stone reported (126, p. 581) that two eggs were found on bare rock on July 23 in the scrub oak brush on a high ridge of Mount Sanhedrin. Actually this may represent the Upper Sonoran Life-zone, even though it is at a high elevation. Probably the presence of birds in the boreal areas represents an up-mountain movement following nesting. Specimens in immature plumage as well as adult plumage have been taken at the higher elevations. A male bird taken on July 17, 1950, at 6700 feet elevation on Hull Mountain, had testes measuring 6 by 4 mm.

Specimens examined.--A total of 4, as follows: Hull Mountain, 1; Snow Mountain, 1; Goat Mountain, 2.

Nephoecetes niger borealis (Kennerly)

Northern Black Swift

On the evening of July 26, 1950, several black swifts were seen flying over Plaskett Meadows shortly before dark. One bird came low overhead and afforded an excellent view, but I was unable to secure it as a specimen.

Vaux swifts have been seen near the Eel River Ranger Station and on Long Ridge near Goat Mountain. Both of these areas, however, are at low elevations.

These observations probably were of birds on long range foraging (56, p. 215) or migration flights rather than being indicative of breeding in nearby areas.

Calypste anna (Lesson)

Anna Hummingbird

Following nesting in the lowlands, some Anna hummingbirds moved up into the boreal areas. Miller said (101, p. 536) they nested in the Upper Sonoran Life-zone. References in the literature to Anna hummingbirds in the vicinity of Mount Sanhedrin must have referred to the lower elevations.

The earliest date I have seen these birds in the boreal areas was June 13. This was an immature bird. On June 22, 1950, two adult males were seen in a thicket of bitter cherry and snowbrush near Milk Ranch, 6400 feet elevation, on Snow Mountain. Other birds were seen in

the streamside woodland community.

Specimens examined.--A total of 2, as follows: Hull Mountain, 1; Snow Mountain, 1.

Selasphorus rufus (Gmelin)

Rufous Hummingbird

The rufous hummingbird is not known to nest in California, although there is increasingly strong, but not conclusive, evidence that it breeds in the Trinity Mountain region (56, p. 221). Specimens were taken on July 12 and 16, 1950, in the forest chaparral community on Mount Sanhedrin at elevations of 6000 and 5800 feet. All were adults. Two of the males had testes measuring 1 by 0.75 mm. and one had testes measuring 1.5 by 1 mm.

Field observations on this species are not certain unless specimens are taken, because of similarity to Allen hummingbirds. A male, thought to be a rufous hummingbird, was seen on June 22, 1950, near Milk Ranch, 6400 feet elevation, on Snow Mountain. At later dates other observations were made at Plaskett Meadows and at Bald Mountain.

Specimens examined.--Four from Mount Sanhedrin.

Selasphorus sasin sasin (Lesson)

Migratory Allen Hummingbird

Allen hummingbirds were observed in the forest

chaparral, streamside woodland, and rocky ridge and cliff communities. The summer flowers at the high elevations served as food sources. Allen hummingbirds are not known to nest more than 20 miles inland from the sea or coastal bays in California (56, p. 222). Observations on these birds on June 13 and later in the boreal areas were of birds that had moved away from the breeding range. The 12 specimens taken included four adults and eight immature birds, equally representing the two sexes. An adult male taken on June 20, 1950, at the Milk Ranch, 6400 feet elevation, on Snow Mountain, had testes measuring 2.5 by 1.5 mm.

Near the Milk Ranch there was a patch of bitter cherry and snowbrush which attracted many hummingbirds. We referred to it as "Hummingbird Half-acre". Four species of hummingbirds were seen there.

Stone (126, p. 582) and Grinnell (41, p. 88) mentioned that Allen hummingbirds were seen in the vicinity of Mount Sanhedrin.

Specimens examined.--A total of 12, as follows:
 Bald Mountain, 1; Hull Mountain, 2; Mount Sanhedrin, 3;
 Snow Mountain, 5; Goat Mountain, 1.

Stellula calliope (Gould)

Calliope Hummingbird

Near the Milk Ranch calliope hummingbirds were found

visiting a patch of bitter cherry and snowbrush. On Mount Saint John, 6400 feet elevation, one bird was seen feeding in pentstemons growing in rock crevices. Specimens were taken in both localities. It is not known definitely whether these birds nest in the boreal areas of these mountains, but it is likely that they do.

Specimens examined.--A total of 2, as follows: Snow Mountain, 1; Mount Saint John, 1.

Colaptes cafer collaris Vigors

Monterey Red-shafted Flicker

Observations of flickers were made chiefly in the forest but a few were made in Garry oak woodland. It is not known whether flickers nest in the boreal areas or move upward from the yellow pine forest. Grinnell and Miller said (56, p. 228) that flickers nested only exceptionally in the Canadian Life-zone. The earliest date I have seen flickers at the high elevations was June 15. After that date, they were seen and heard frequently.

Published references on flickers in the Mount Sanhedrin area probably referred to low elevations.

Specimens examined.--A total of 5, as follows: Hull Mountain, 1; Mount Sanhedrin, 3 (M.V.Z.); Mount Saint John, 1.

Dryocopus pileatus picinus (Bangs)

Western Pileated Woodpecker

Dense forests with mature trees, many snags, and fallen logs were the habitat of the pileated woodpecker. In addition to birds seen and heard, their presence was indicated by the finding of deep workings in rotten wood. At high elevations chiefly red firs and white firs were utilized. Pileated woodpeckers are resident at high elevations as well as in the yellow pine forest.

Stone (126, p. 581) and Grinnell (41, p. 81) cited specimens taken on Mount Sanhedrin.

Specimens examined.--A total of 4, as follows:
Mount Sanhedrin, 3 (2 M.V.Z., 1 C.A.S.); Snow Mountain, 1.

Sphyrapicus varius daggetti Grinnell

Sierra Yellow-bellied Sapsucker

Forests of red fir, white fir, and sugar pine were the preferred habitat of yellow-bellied sapsuckers in the boreal areas. At times thickets of mountain alder and willow were also visited. Foraging was done from near the ground to the uppermost branches. Some birds also occurred in the yellow pine forests at lower elevations.

The feeding of young was observed on Snow Mountain on June 24, 1950, at 6400 feet elevation. Nest holes were made from 30 to 60 feet above the ground in dead red firs. In several places more than one hole was

found. This may mean that several birds nested close together or that several holes were made, but only one was used for nesting. Once two pairs of adult birds were seen on a single snag.

Stone (126, p. 581) and Mailliard (94, p. 294) each mentioned a single specimen taken on Mount Sanhedrin. Additional specimens were taken by the California North Coast Counties Expedition (41, p. 80). Yellow-bellied sapsuckers may occur on Goat Mountain, although our notes do not record their presence there. With the specimens now at hand, it is possible to extend the known breeding range beyond that given by Grinnell and Miller (56, p. 235) in 1944.

Specimens examined.--A total of 11, as follows:
Black Butte, 1; Etsel Ridge, 1; Bald Mountain, 1; Hull Mountain, 1; Mount Sanhedrin, 4 (2 C.A.S.); Sheetiron Mountain, 1; Snow Mountain, 2.

Dendrocopos villosus hyloscopus Cabanis & Heine
Cabanis Hairy Woodpecker

Practically all species of trees in the fir forest and yellow pine forest were utilized by hairy woodpeckers. Restriction to forest habitat, however, was quite strict.

A pair of hairy woodpeckers was seen bringing food to their young in a nest in a white fir tree, one mile west of Telephone Camp (Black Butte), at 6300 feet

elevation, on June 27, 1951.

Hairy woodpeckers occurred in all the boreal areas studied, but I do not know whether the specimens taken on Mount Sanhedrin (126, p. 581) and Snow Mountain (41, p. 76) and (56, pp. 238-240) were from the boreal areas or from the yellow pine forest.

Specimens examined.--A total of 7, as follows:
Black Butte, 1; Mount Sanhedrin, 4 (3 M.V.Z.); Snow Mountain, 2.

Dendrocopos pubescens turati (Malherbe)

Willow Downy Woodpecker

Occasionally a downy woodpecker drifts upward into the high mountain forests. One was seen in a white fir on Mount Sanhedrin, at 6150 feet elevation, in July, 1951. Taylor's specimens from Mount Sanhedrin may have been from the boreal area.

Stone (126, p. 581) mentioned that two specimens were taken on Mount Sanhedrin, and Grinnell and Miller (56, p. 243) cited a published record from near Snow Mountain.

Specimens examined.--Two from Mount Sanhedrin (M. V.Z.)

Dendrocopos albolarvatus albolarvatus (Cassin)

Northern White-headed Woodpecker

The forest habitat of the white-headed woodpeckers included red firs, white firs, sugar pines, and Jeffrey pines. The pines of the higher elevations resemble the yellow pine forest where these birds were also commonly found. Foraging occurred from near the ground to the tops of the taller trees.

Two nest-holes with young were found. One was found on June 29, 1950, in a log without bark, on the shady side about two feet above the ground level at Plaskett Meadows, 6000 feet elevation. The young were about half-grown. The second was about eight feet above the ground on the lower side of an inclined log with bark. Entrance was gained by flying up from below the nest hole. On June 19, 1951, this nest at Hell's Half Acre (Bald Mountain), 6200 feet elevation, had large young in it.

In the paper containing the original description of the southern white-headed woodpecker (36, pp. 89-90) two specimens of the northern race from Snow Mountain were cited. These were probably taken by W. W. Price and his collectors. More recent papers (41, p. 79) and (56, pp. 246-247) have repeated these records. White-headed woodpeckers may occur on Goat Mountain, although our field notes do not mention them.

Specimens examined.--A total of 9, as follows:

Bald Mountain, 1; Hull Mountain, 3 (1 C.A.S.); Mount Sanhedrin, 1; Mount Saint John, 2; Snow Mountain, 2.

Tyrannus verticalis Say

Western Kingbird

On July 19, 1951, two western kingbirds were seen in Garry oak woodland at 6300 feet elevation near Telephone Camp (Black Butte). This place is within a boreal area, but it is marginal. It is obvious that these birds strayed far up the mountain slopes from their typical habitats.

Two specimens in the California Academy of Sciences collection labeled Mount Sanhedrin and Snow Mountain must have come from the lower elevations of these mountains.

Empidonax hammondi (Xantus)

Hammond Flycatcher

Observations of Hammond flycatchers (verified by specimens) indicated a preference for dense forest. They were usually found on branch tips and moving about within the crowns of trees above heights of 20 feet. Red firs and white firs were known to be used. Specimens were taken between 6000 feet and 6400 feet elevation.

Measurements of testes of 6 by 2 mm. on June 19, 7 by 3 mm. on June 28, and 6 by 3 mm. on June 29, indicated breeding in these areas. Specimens at hand now extend the known breeding range southward in the Inner North

Coast Ranges from South Fork Mountain in Humboldt and Trinity Counties (101, p. 257).

Specimens examined.--A total of 5, as follows:

Black Butte, 2; Sheetiron Mountain, 1; Snow Mountain, 2.

Empidonax wrightii Baird

Wright Flycatcher

Wright flycatchers occurred in the forest with Hammond flycatchers and were sometimes confused with them. Generally the Wright flycatchers utilized the lower forest stratum and, at times, even perched on rocks and branches within three feet of the ground. In addition to the forest habitat they also occurred in thickets of bitter-cherry, willow, and desert mahogany. Specimens were taken between 6200 feet and 6700 feet elevation.

Specimens taken on Snow Mountain and observations on Goat Mountain indicated that they occurred a few miles farther south in the Inner North Coast Ranges during the breeding season than the literature (41, p. 93) and (56, p. 258) indicated.

Specimens examined.--A total of 6, as follows:

Mount Sanhedrin, 1 (M.V.Z.); Mount Saint John, 3; Snow Mountain, 2.

Empidonax difficilis difficilis Baird

Northern Western Flycatcher

Occasionally a western flycatcher drifted into the boreal areas adjacent to its yellow pine forest habitat. On June 28, 1951, one bird was seen and heard in a dense stand of red firs near Plaskett Meadows, 6000 feet elevation. In the same area were Hammond and Wright flycatchers. Another western flycatcher was seen in a white fir on August 1, 1950, at Board Camp (Goat Mountain), 5400 feet elevation.

Stone's specimens (126, p. 582) were probably taken at low elevations on Mount Sanhedrin.

Contopus richardsonii richardsonii (Swainson)

Western Wood Pewee

Nearly anywhere in the forest where there were dead snags and bare branches affording perches and singing posts, we found wood pewees. They seemed to avoid dense stands of trees, save where suitable perches existed. Their foraging was done well above the ground. Often we located wood pewees by their frequent notes.

Stone (126, p. 582) reported that specimens were taken on Mount Sanhedrin.

Specimens examined.--A total of 2, as follows:
Mount Sanhedrin, 1; Snow Mountain, 1.

Nuttallornis borealis (Swainson)

Olive-sided Flycatcher

Nearly all species of trees in the forest were used by olive-sided flycatchers when they provided prominent perches for feeding and singing. Either living or dead treetops were used. Foraging was done at the levels of the highest trees in the area. The characteristic call notes made it easy to locate the birds.

An immature bird that was foraging independently was taken on July 21, 1949, for a specimen at Plaskett Meadows, 6000 feet elevation. Stone's specimens (126, p. 582) from Mount Sanhedrin may have been taken at high elevations.

Specimen examined.--One from Black Butte.

Tachycineta thalassina lepida Mearns

Northern Violet-green Swallow

Convection currents rising up over the higher ridges in midsummer often brought violet-green swallows with them. All birds seen were in flight, often at great heights above the ground. Groups of a dozen or two birds came and went in a short period of time. No evidence was available to indicate their residence at high elevations in these mountains.

Stone in 1904 (126, p. 584) remarked that violet-green swallows were common in the vicinity of Mount

Sanhedrin.

Petrochelidon pyrrhonota pyrrhonota (Rafinesque)

Common Cliff Swallow

Two cliff swallows were seen on July 28, 1950, flying over the summit of Sheetiron Mountain, 6425 feet elevation. Probably these birds drifted up from the lowlands.

Progne subis subis (Linnaeus)

Northern Purple Martin

A purple martin was seen on June 16, 1951, flying over the white firs at Spruce Grove (Bald Mountain), 5900 feet elevation. It was singing loudly as it flew. Several times purple martins were seen flying over the summit of Goat Mountain, according to Harold Gallaher. These observations were on birds foraging a distance from their typical habitat in the yellow pine forest.

Cyanocitta stelleri frontalis (Ridgway)

Blue-fronted Steller Jay

Steller jays were everywhere present in areas of heavy tree growth. At times they were also found in thickets of the streamside woodland community.

Mailliard recorded (94, p. 294) their nesting on Mount Sanhedrin on May 21, 1919, when four young were

taken from a nest. An adult male taken on June 29, 1949, at 6300 feet elevation near Plaskett Meadows had testes only 4 mm. in length.

Stone mentioned (126, p. 582) that specimens were taken in the vicinity of Mount Sanhedrin.

Specimens examined.--A total of 21, as follows:
Black Butte, 2; Bald Mountain, 2; Mount Sanhedrin, 14
(8 M.V.Z., 5 C.A.S.); Snow Mountain, 2; Goat Mountain, 1.

Aphelocoma coerulescens caurina Pitelka

Northwestern Scrub Jay

Scrub jays drifted upward at times on the chaparral-covered slopes of Mount Sanhedrin and moved into the Garry oak woodland, forest chaparral, and forest communities near the summit on the north-facing slopes. The Transition Life-zone is absent on the south-facing slopes, so the Upper Sonoran Life-zone meets the Canadian Life-zone at the summit of the main ridge. Grinnell and Miller said (56, p. 288) that scrub jays occurred up to 4500 feet elevation on Mount Sanhedrin. Presumably they referred to breeding birds. I regard the presence of these birds at 6000 feet elevation as indicative of post-reproduction drifting.

Pitelka named this race (115, pp. 225-230) in 1951. Formerly specimens taken near Mount Sanhedrin were named Aphelocoma californica oocleptica Swarth (126, p. 582)

(56, p. 288).

Specimens examined.--Four from Mount Sanhedrin (2 M.V.Z., 1 C.A.S.).

Aphelocoma coerulescens superciliosus (Strickland)

Interior Scrub Jay

Scrub jays in the Goat Mountain area at times strayed into the forest chaparral community on the north-facing slopes from the adjacent foothill chaparral community of the south-facing slopes.

No specimens were at hand for determining racial status. Specimens taken near Clear Lake were placed in the race caurina, and a specimen from Fouts Springs was placed in the race superciliosus. Goat Mountain lies between these two localities, but is closer to Fouts Springs.

Corvus corax sinuatus Wagler

American Holarctic Raven

Ravens were seen flying over the summit of Sheetiron Mountain on June 7, 1951, and over the summit of Mount Sanhedrin on July 13, 1951. It is not known whether they remained at the high elevations during the summer months.

Nucifraga columbiana (Wilson)

Clark Nutcracker

A group of five nutcrackers was seen feeding in the

white firs and rocky ridge and cliff community near the summit of Snow Mountain West at 6900 feet elevation on August 19, 1950. The birds moved frequently from place to place. Two days later nutcrackers (likely the same ones) were seen at the head of Dark Hollow Creek and on Snow Mountain East. Harold Gallaher also reported that nutcrackers were seen on Goat Mountain during the same month.

Grinnell and Miller said (56, p. 298) that nutcrackers occurred in mountains of 8000 feet elevation or more. They mentioned South Yolla Bolly Mountain about 45 miles to the north as the southern limit of the breeding range in the Inner North Coast Ranges. Nutcrackers are well-known to wander from their breeding grounds.

Parus gambeli abbreviatus (Grinnell)

Short-tailed Mountain Chickadee

Mountain chickadees seemed everywhere abundant in the forests of the boreal areas. At times they also occurred in thickets of the streamside woodland community. Some occurred in the upper yellow pine forest, but the metropolis of distribution is in the forests at higher elevations.

A nest with young was found in a cavity in decayed wood at a height of five feet above the ground in a living red fir on Snow Mountain, 6600 feet elevation, on June 15,

1950.

On Mount Sanhedrin some chestnut-backed chickadees may drift up from the base of the mountain during the summer months and be found in the typical habitat of mountain chickadees.

The literature contains the following records of birds observed and specimens taken on Mount Sanhedrin and Snow Mountain: (126, p. 585) (41, p. 163) (44, pp. 510-511) (94, p. 295) and (56, pp. 300-301).

Specimens examined.--A total of 12, as follows: Bald Mountain, 1; Mount Sanhedrin, 6 (4 M.V.Z., 1 C.A.S.); Mount Saint John, 2; Snow Mountain, 1; Goat Mountain, 2.

Parus rufescens rufescens (J. K. Townsend)

Northern Chestnut-backed Chickadee

The few chestnut-backed chickadees found in the forests at high elevations suggested to me that they occurred there chiefly by straying from nearby breeding areas. Grinnell and Miller remarked (56, p. 303) that they occurred up to at least 4500 feet on Mount Sanhedrin. We found these birds only on Mount Sanhedrin.

Specimens examined.--Three from Mount Sanhedrin (M.V.Z.).

Psaltriparus minimus californicus Ridgway

California Bush-tit

One specimen of the California bush-tit was taken on September 8, 1950, from a white fir tree at 5800 feet elevation on Goat Mountain. A flock of bush-tits had drifted onto the north-facing slope from the forest chaparral habitat on the crest and adjacent south-facing slopes. Bush-tits were not typically found in the boreal areas.

Specimen examined.--One from Goat Mountain.

Psaltriparus minimus minimus (J. K. Townsend)

Coast Bush-tit

Specimens of bush-tit from Mount Sanhedrin have been identified as belonging to the coastal race, minimus (56, p. 313). Typically bush-tits live in the foothill oak belt and foothill chaparral, but there is some movement into the forest chaparral following the breeding season.

Specimens examined.--Two from Mount Sanhedrin (M.V.Z.).

Sitta carolinensis aculeata Cassin

Slender-billed White-breasted Nuthatch

Very few white-breasted nuthatches were observed in the forests of the boreal areas. One area where several

were seen was a dense stand of white firs at 6000 feet elevation on the north slope of Mount Sanhedrin. It is possible that a few may breed in the higher forests, but it is more likely that these birds drifted into the higher forests from adjacent habitats.

Hawbecker cited (62, pp. 28, 34) a specimen from Mount Sanhedrin.

Specimen examined.--One from Mount Sanhedrin (M.V.Z.).

Sitta canadensis Linnaeus

Red-breasted Nuthatch

Red-breasted nuthatches were very common in the forest community. They were observed in red firs, white firs, sugar pines, and in desert mahogany, but a preference for firs was exhibited.

On June 16 and 17, 1950, one bird began making two different nest holes in dead red firs at heights of 30 feet and 40 feet at Long Glade, Snow Mountain, 6400 feet elevation. One of these holes was completed and used for nesting.

Grinnell and Miller reported (56, p. 317) that red-breasted nuthatches bred in the vicinity of Mount Sanhedrin.

Specimens examined.--A total of 6, as follows: Bald Mountain, 1; Mount Sanhedrin, 1 (C.A.S.); Sheetiron Mountain, 1; Mount Saint John, 1; Goat Mountain, 2.

Sitta pygmaea melanotis van Rossem

Black-eared Pigmy Nuthatch

One specimen of pigmy nuthatch was taken in the red fir forest of Mount Saint John, at 6600 feet elevation, on July 30, 1950. It was an immature bird that had probably drifted upward from the yellow pine forest.

Mailliard reported (94, p. 290) that pigmy nuthatches were seen on Mount Sanhedrin and said they were not known from along the Eel River.

Specimen examined.--One from Mount Saint John.

Certhia familiaris zelotes Osgood

Sierra Nevada Brown Creeper

Dense stands of trees in the forest constituted suitable habitat for brown creepers. They occurred in all areas studied and in fair numbers. Often they were located by their frequent notes.

Stone mentioned (126, p. 584) that specimens were taken in the vicinity of Mount Sanhedrin.

Specimens examined.--A total of 8, as follows:
Bald Mountain, 1; Mount Sanhedrin, 6 (5 M.V.Z.); Snow Mountain, 1.

Chamaea fasciata henshawi Ridgway

Pallid Wren-tit

On July 18, 1950, a wren-tit was heard singing in a

thicket of snowbrush at 6400 feet elevation on Hull Mountain. This bird apparently had drifted up the adjacent chaparral-covered slopes and found suitable habitat in the forest chaparral on the crest of the ridge.

Cinclus mexicanus unicolor Bonaparte

North American Dipper

Dippers were found along all the small mountain streams with pools and cascades. Nesting was usually along the steeper and rockier portions of the streams below the boreal areas.

Stone mentioned (126, p. 584) that specimens were taken from Thomas Creek on Mount Sanhedrin.

Troglodytes aedon ["]parkmanii Audubon

Western House Wren

The presence of many immature house wrens in the boreal areas early in the summer suggested an up-mountain movement from the lowlands. They invaded all sorts of thickets and small forest trees. Proof that some house wrens nest in the boreal areas was found in a singing male taken on June 27, 1951, one mile west of Telephone Camp (Black Butte) at 6300 feet elevation. This bird was seen entering a hole in a white fir about 30 feet above the ground. Examination of the bird when taken for a specimen revealed testes measuring 8 by 4 mm.; this

certainly indicated breeding.

Stone reported (126, p. 584) that house wrens were fairly common in the vicinity of Mount Sanhedrin and said specimens were taken.

Specimens examined.--A total of 9, as follows:

Black Butte, 1; Bald Mountain, 2; Mount Sanhedrin, 2 (1 M.V.Z.); Sheetiron Mountain, 2; Mount Saint John, 1; Snow Mountain, 1.

Thryomanes bewickii drymoeus Oberholser

San Joaquin Bewick Wren

Following the nesting season, some of the Bewick wrens disperse from the breeding grounds and enter the forest chaparral community in the boreal areas. They were very abundant in the desert mahogany shrubs on the summit of Mount Saint John, 6750 feet elevation, in July, 1950.

Grinnell and Miller suggested (56, p. 334) that the breeding range extended up to 4500 feet on Mount Sanhedrin. Taylor took one specimen that was later cited by Swarth (129, p. 69).

Specimens examined.--A total of 3, as follows: Mount Sanhedrin, 1 (M.V.Z.); Mount Saint John, 1; Goat Mountain, 1.

Salpinctes obsoletus obsoletus (Say)

Northern Rock Wren

Rock wrens were found in all the boreal areas having

large cliffs and talus slopes. The birds seemed very closely associated with that type of habitat and were observed while singing and feeding.

Toxostoma redivivum sonomae Grinnell

Northern California Thrasher

Occasionally thrashers left their preferred habitat in tall, dense manzanita-type chaparral and strayed into thickets in the forest chaparral. This was observed near the summits of Mount Sanhedrin and Goat Mountain.

Grinnell and Miller said (56, p. 349) thrashers occurred up to 5500 feet elevation on Mount Sanhedrin. I took a specimen on Goat Mountain at 6000 feet elevation. Oberholser (106, pp. 59-60) examined specimens from Mount Sanhedrin and Snow Mountain, and Mailliard observed thrashers on Mount Sanhedrin (94, p. 295).

Specimens examined.--A total of 3, as follows: Mount Sanhedrin, 2 (1 M.V.Z., 1 C.A.S.); Goat Mountain, 1.

Turdus migratorius propinquus (Ridgway)

Western Robin

Robins were abundant in the heavy forests, meadows, and streamside woodland during the summer months.

On May 27, 1951, a nest with four eggs was found at a height of eight feet in a white fir at 6600 feet elevation on Snow Mountain. Another nest with four eggs was

found at a height of ten feet in a white fir at 6000 feet elevation on Snow Mountain on June 17, 1950. On June 27, 1950, full-sized young robins were seen with adults at Plaskett Meadows. An adult male taken on June 27, 1951, at 6300 feet elevation near Telephone Camp (Black Butte), had testes measuring 15 by 10 mm.

Stone reported (126, p. 585) that robins were common on Mount Sanhedrin.

Specimen examined.--One from Black Butte.

Hylocichla guttata slevini Grinnell

Monterey Hermit Thrush

The preferred habitat of the hermit thrushes was dense forests and damp streamside thickets. The sweet musical notes of singing hermit thrushes often broke the silence of those places.

Immature birds were found as early as July 13. On June 22, 1951, a singing male was taken at Hell's Half Acre, 6200 feet elevation. The testes measured 9 by 6 mm.

Stone said (126, p. 585) that hermit thrushes were found "in high timber" on Mount Sanhedrin. Grinnell and Miller cited (56, p. 359) specimens taken on Mount Sanhedrin by Taylor and Camp.

Specimens examined.--A total of 8, as follows: Bald Mountain, 1; Mount Sanhedrin, 5 (2 M.V.Z.); Mount Saint John, 1; Snow Mountain, 1.

Sialia mexicana occidentalis J. K. Townsend

Western Mexican Bluebird

The breeding range of Mexican bluebirds in the boreal areas probably overlaps that of the mountain bluebirds. On June 24, 1950, two adult Mexican bluebirds and four full-grown young were seen perches near the top of a dead red fir in Dark Hollow (Snow Mountain), at 6600 feet elevation. Some holes seen near where these birds were perching appeared to be nesting holes. An adult male taken on June 27, 1951, near Telephone Camp (Black Butte), 6300 feet elevation, had testes measuring 10 by 8 mm.

Often small groups of Mexican bluebirds were seen and heard as they flew over the crests of the mountains and descended into the valleys. Feeding was done on dry flats and bare hillsides.

Specimens examined.--A total of 3, as follows: Black Butte, 1; Bald Mountain, 1; Hull Mountain, 1.

Sialia currucoides (Bechstein)

Mountain Bluebird

Stone's report (126, p. 585) of the nesting of mountain bluebirds on Mount Sanhedrin has been the only published account of nesting in this part of the state. It has been cited more recently by Grinnell (41, p. 173) and Grinnell and Miller (56, p. 365). I would look on the summits of Snow Mountain for the most southern breeding

station in the North Coast Ranges of California. An immature bird was taken on July 22, 1951, at the head of Butte Creek (Black Butte), at 6600 feet elevation.

Feeding was done on dry flats and bare hillslopes by hovering or flying down from a nearby perch.

Specimen examined.--One from Black Butte.

Myadestes townsendi townsendi (Audubon)

Northern Townsend Solitaire

The song of the Townsend solitaire in flight over the crests of the highest peaks was one of the rewards of mountain climbing. Foraging flights were made from the tops of isolated trees on the highest ridges and in the lower stratum of fairly dense forests.

No nests or young were found.

Specimens examined.--A total of 6, as follows: Black Butte, 1; Bald Mountain, 1; Mount Sanhedrin, 1 (C.A.S.); Mount Saint John, 1; Snow Mountain, 1; Goat Mountain, 1.

Regulus satrapa olivaceus Baird

Western Golden-crowned Kinglet

Dense forests harbored many golden-crowned kinglets during the summer months, particularly the red fir forests. Often the birds were heard far up in the tall trees when they could not be seen. Foraging was done near the tips of the branches. Altitudinally the kinglets extended up

to the highest limits of tree growth.

A male bird taken on July 20, 1949, at Plaskett Meadows, 6000 feet elevation, had testes measuring 4.5 by 2.5 mm. An immature bird was taken at 6500 feet elevation on Mount Saint John on July 30, 1950.

Stone mentioned (126, p. 585) young birds that were observed in the firs on Mount Sanhedrin and said a specimen was taken.

Specimens examined.--A total of 6, as follows: Black Butte, 2; Hull Mountain, 1; Sheetiron Mountain, 1; Mount Saint John, 1; Snow Mountain, 1.

Vireo solitarius cassinii Xantus

Cassin Solitary Vireo

A few solitary vireos were found in the white firs and Garry oaks in the boreal areas. These probably represented birds that bred at lower elevations earlier in the season or young birds. On July 11, 1950, singing solitary vireos were found in the same grove of white firs on Mount Sanhedrin, at 6000 feet elevation, as singing warbling vireos.

Elevations at which specimens were taken ranged from 5400 feet to 7350 feet. An adult male taken on July 16, 1951, at John Day Camp (Mount Sanhedrin), 5800 feet elevation, had testes measuring only 1 by 1 mm. This indicated that the breeding season was long past.

Published accounts dealing with solitary vireos near Mount Sanhedrin all referred to the lower elevations.

Specimens examined.--A total of 6, as follows: Black Butte, 1; Mount Sanhedrin, 3 (2 M.V.Z.); Snow Mountain, 1; Goat Mountain, 1.

Vireo gilvus swainsonii Baird

Western Warbling Vireo

Singing posts in red firs and white firs were frequently used by warbling vireos. Feeding was principally done in thickets of willow and mountain alder, but some was done in coniferous vegetation.

Nesting in the boreal areas was quite probable. The birds were present all through the summer and sang much of the time. Testes of a male taken on June 20, 1951, at Hell's Half Acre (Bald Mountain), 6200 feet elevation, measured 7 by 4 mm. Those of a male taken on June 29, 1951, at Plaskett Meadows, 6000 feet elevation, measured 6 by 4 mm.

Specimens examined.--A total of 3, as follows: Black Butte, 1; Bald Mountain, 1; Snow Mountain, 1.

Vermivora celata lutescens (Ridgway)

Lutescent Orange-crowned Warbler

Up-mountain movement from the lowland breeding grounds seemed to be a summer activity for many orange-crowned

warblers. They invaded forest chaparral, streamside woodland, Garry oak woodland, and even the forest. Adult birds were few in comparison with immature birds. An immature bird was taken for a specimen as early as June 13. All five specimens taken were immature birds.

Stone reported (126, p. 584) that a specimen was taken on June 5 near Mount Sanhedrin.

Specimens examined.--A total of 5, as follows: Black Butte, 2; Bald Mountain, 1; Hull Mountain, 1; Snow Mountain, 1.

Vermivora ruficapilla ridgwayi van Rossem

Calaveras Nashville Warbler

Foraging and singing by adult Nashville warblers was done in the highest branches of tall white firs, red firs, and Jeffrey pines. Often they were difficult to see and identify unless one knew their song. The best opportunity for observations was usually of singing birds near the tips of Jeffrey pine branches. Nesting and activity of the young seemed to center in thickets of snowbrush and bitter cherry.

Testes of two males taken on June 20 measured 7 by 4 mm., and 5 by 4 mm., whereas those from one taken on June 24 measured 7 by 4 mm., and one taken on June 27 measured 8 by 4 mm.

Stone reported (126, p. 584) that a nest was found

under the bank of a stream in the vicinity of Mount Sanhedrin. He stated that the birds were rather numerous and that specimens were taken. Stone's records have been cited twice (41, p. 145) and (56, p. 395).

Specimens examined.--A total of 10, as follows: Black Butte, 3; Bald Mountain, 3; Mount Sanhedrin, 3; Goat Mountain, 1.

Dendroica auduboni auduboni (J. K. Townsend)

Pacific Audubon Warbler

Audubon warblers were the most common warblers in the forest during the summer months. Foraging was done in red fir and white fir trees in particular and in meadows where flying insects were pursued.

During late August and early September when many warblers were moving southward over the mountains, additional species were found associated with Audubon warblers. On August 19, 1950, in a small incense cedar on North Ridge, Snow Mountain, 6700 feet elevation, pileolated, black-throated gray, and orange-crowned warblers were present with an Audubon warbler.

A male taken on June 24, 1951, at Hell's Half Acre (Bald Mountain), 6200 feet elevation, had testes measuring 8 by 5 mm.

Stone reported (126, p. 584) that Audubon warblers were present locally only on Mount Sanhedrin, but no

specimens were taken. Grinnell in 1915 cited (41, p. 148) Stone's record.

Specimens examined.--A total of 6, as follows: Bald Mountain, 1; Mount Sanhedrin, 2 (1 M.V.Z.); Snow Mountain, 3 (1 M.V.Z.).

Dendroica nigrescens (J. K. Townsend)

Black-throated Gray Warbler

Following nesting in the yellow pine forest belt some of the black-throated gray warblers moved up-mountain into the higher forests. They were observed in red firs and an incense cedar. Both adult and immature birds were involved in this movement to new habitats.

Stone said (126, p. 584) that black-throated gray warblers were common in the vicinity of Mount Sanhedrin and that specimens were taken. He may have been referring to birds at high elevations.

Specimens examined.--A total of 6, as follows: Mount Sanhedrin, 2 (M.V.Z.); Snow Mountain, 2; Goat Mountain, 2.

Dendroica townsendi (J. K. Townsend)

Townsend Warbler

A few Townsend warblers were seen on Snow Mountain while in southward migration. One was seen in a red fir at Long Glade on August 17, 1950, and a specimen was taken from a white fir on September 7, 1949, near Cedar

Creek.

Specimen examined.--One from Snow Mountain

Dendroica occidentalis (J. K. Townsend)

Hermit Warbler

The hermit warbler is very deserving of its name. Only the songs and occasional views of adult birds betrayed their presence in the dense foliage of red firs and white firs early in the breeding season.

An adult male taken on June 24, 1951, at Hell's Half Acre (Bald Mountain), 6200 feet elevation, had testes measuring 6 by 5 mm. Immature birds moving about independently were seen as early as July 20. Probably some were still near the home territory they knew as nestlings.

Specimens now at hand extend the known breeding range southward in the Inner North Coast Ranges to Goat Mountain.

Specimens examined.--A total of 5, as follows: Black Butte, 1; Bald Mountain, 1; Mount Saint John, 1; Snow Mountain, 1; Goat Mountain, 1.

Oporornis tolmiei tolmiei (J. K. Townsend)

Northern Tolmie Warbler

Tolmie warblers stayed well concealed in thickets of the streamside woodland community during the nesting season. An immature bird was taken on August 21, 1950, in a thicket of forest chaparral at 6800 feet elevation on the south-

facing slope of Snow Mountain East.

Stone mentioned (126, p. 584) that Tolmie warblers were abundant in the vicinity of Mount Sanhedrin and that specimens were taken. Grinnell and Miller cited (56, p. 410) Stone's records.

Specimens examined.--A total of 2, as follows: Mount Sanhedrin, 1 (M.V.Z.); Snow Mountain, 1.

Wilsonia pusilla chryseola Ridgway

Golden Pileolated Warbler

Some pileolated warblers probably nest in the stream-side woodland near Plaskett Meadows. In the early summer many singing birds were found in the mountain alder thickets bordering the meadows. Singing birds were also noted in willow thickets on Hull Mountain. No nests were found.

In late August and early September great numbers of migrating warblers were noted on Snow Mountain. That was the only time that pileolated warblers were noted in coniferous vegetation. Along Cedar Creek numerous pileolated warblers were seen in the thickets of bitter cherry.

Specimens examined.--A total of 5, as follows: Bald Mountain, 1; Hull Mountain, 1; Snow Mountain, 3.

Euphagus cyanocephalus (Wagler)

Brewer Blackbird

On the morning of June 13, 1951, two Brewer blackbirds were observed flying over Hull Mountain Spring,

6400 feet elevation. This constituted the only observation of the species. Seemingly some wet areas, e.g., Plaskett Meadows, would provide suitable habitat for Brewer blackbirds, but they do not seem to be utilized.

Piranga ludoviciana (Wilson)

Western Tanager

Tanagers foraged chiefly in open forests and were observed in red firs, white firs, incense cedars, and sugar pines. A singing male frequently visited our camp at Plaskett Meadows during the summer of 1951.

On July 2, 1950, two young birds and adults were seen in the white fir forest on Sheetiron Mountain. Mailliard mentioned (94, p. 290) finding a nest with four fresh eggs on May 22 near Mount Sanhedrin. A male taken at Spruce Grove (Bald Mountain), 5800 feet elevation, on June 17, 1951, had testes measuring 9 by 6 mm.

Stone reported (126, p. 583) that tanagers were very common in the spruces (white firs) and oaks in the vicinity of Mount Sanhedrin and said that specimens were taken. Later Grinnell cited (41, p. 138) Stone's records.

Specimens examined.--A total of 2, as follows: Bald Mountain, 1; Mount Sanhedrin, 1 (C.A.S.).

Pheucticus melanocephalus maculatus (Audubon)

Pacific Black-headed Grosbeak

Singing black-headed grosbeaks were often found in the higher forests. Birds were observed feeding in red fir trees. Near Millsap's Cabin (Bald Mountain) grosbeaks were found in Garry oak woodland, and at Plaskett Meadows they were found in streamside woodland.

Evidence of breeding in the boreal areas is at present not conclusive. On June 21, 1951, a male taken at Millsap's Cabin, 6000 feet elevation, had testes measuring 10 by 6 mm. On June 29, 1951, a male taken at Plaskett Meadows, 6000 feet elevation, had testes measuring 11 by 8 mm. These enlarged gonads suggested breeding, but both birds were from marginal areas and may have drifted into the boreal areas from lower elevations.

Stone's comments (126, p. 583) on black-headed grosbeaks being very common in the Mount Sanhedrin area and specimens taken probably referred to low elevations.

Specimens examined.--A total of 2, as follows: Black Butte, 1; Bald Mountain, 1.

Passerina amoena (Say)

Lazuli Bunting

Habitats where lazuli buntings were observed included thickets of willow, mountain alder, choke-cherry, bitter cherry, and Garry oak. In addition, singing posts in red

firs and white firs near the feeding areas were utilized.

Breeding in the boreal areas is probable. Singing birds were observed as early as June 14. On June 15, 1951, a male was taken at 6400 feet elevation on Hull Mountain. The testes measured 7 by 5 mm. During June the birds remained in pairs, but no young were seen. They were exceedingly difficult to approach.

Stone reported (126, p. 583) that lazuli buntings were common in the vicinity of Mount Sanhedrin and said specimens were taken. Taylor recorded in his field notes for August 15, 1913, an observation of a lazuli bunting near the summit of Mount Sanhedrin.

Specimen examined.--One from Hull Mountain.

Hesperiphona vespertina brooksi Grinnell

Western Evening Grosbeak

On July 14, 1950, two pairs of evening grosbeaks flew into our camp in the white fir forest on the north slope of Mount Sanhedrin at 6000 feet elevation. I was unsuccessful in securing a specimen. Other observations were on birds in the red firs on Snow Mountain, Bald Mountain, and Black Butte (Clark MS).

Breeding in these mountains seems unlikely, because of the vagrant movements of these birds. In the summer of 1951 no observations of evening grosbeaks were made.

Carpodacus purpureus californicus Baird

California Purple Finch

A few California purple finches penetrate into the lower margins of the boreal areas. At Millsap's Cabin, Bald Mountain, at 6000 feet elevation, a singing male was taken in Garry oak woodland on June 15, 1951. The lower margins of the white fir forest at 6100 feet on Mount Sanhedrin were utilized by purple finches.

No serious competition with Cassin finches was noted, since there was only a narrow area of overlap in habitat between the two species.

Stone mentioned (126, p. 582) a few purple finches in the vicinity of Mount Sanhedrin and stated that specimens were taken.

Specimens examined.--A total of 4, as follows: Bald Mountain, 1; Mount Sanhedrin, 3 (2 M.V.Z.).

Carpodacus cassinii Baird

Cassin Finch

Cassin finches exhibited a close restriction to heavy forests of red fir and white fir. Some feeding was also done on the edges of meadows. The crop of one bird examined contained only seeds of Abies. Locally the birds may extend down into the upper yellow pine forest belt. Singing posts were usually the tips of the tallest trees in the area.

On May 26, 1951, a nest of young Cassin finches was found near the top of a red fir at the head of Three Cedar Canyon, 6800 feet elevation, on Snow Mountain. On June 16, 1950, a young bird with some natal down, but unable to fly, was found near Long Glade, 6400 feet elevation, on Snow Mountain. On June 23, 1950, I saw two birds copulating. This suggests either late nesting or the possibility of two broods in one season.

In June, 1951, three singing males were collected. All showed the plumage typical of adult females. Testes measurements were taken on each and revealed: June 8, Sheetiron Mountain, 8 by 5 mm.; June 14, Hull Mountain, 7 by 4 mm.; and June 20, Bald Mountain, 7 by 6 mm. These data indicated that the birds were in breeding condition. Possibly they were males of one year of age that had not yet acquired the adult male nuptial plumage.

With specimens now at hand from Snow Mountain and observations made on Goat Mountain, it is now possible to extend the known breeding range in the North Coast Ranges southward about 50 miles from South Yolla Bolly Peak (56, p. 451).

Specimens examined.--A total of 8, as follows: Black Butte, 1; Bald Mountain, 1; Hull Mountain, 1; Sheetiron Mountain, 1; Mount Saint John, 1; Snow Mountain, 3.

Spinus pinus pinus (Wilson)

Northern Pine Siskin

Pine siskins were everywhere present in the higher forests. They occurred anywhere from ground level to the tops of the tallest trees when feeding and singing. Meadows were used for feeding, and at times also the thickets of mountain alder bordering the meadows.

On June 28, 1950, a nest with a brooding parent was found in the top of a red fir, at a level nearly equaling the summit of Black Butte, 7460 feet elevation. A male taken on June 29, 1951, at Plaskett Meadows, 6000 feet elevation, had testes measuring 7 by 5 mm.

Stone said (126, p. 583) that pine siskins were common in the vicinity of Mount Sanhedrin and that specimens were collected.

Specimen examined.--One from Black Butte.

Loxia curvirostra Linnaeus

Red Crossbill

Three crossbills were seen flying toward the white fir forest on Snow Mountain on June 15, 1950. On June 19, crossbills were heard in the red fir forest about two miles from the first area of observation.

The subspecific status of these crossbills could not be determined without specimens. It is likely that they were Sierra red crossbills of the race grinnelli. The

nearest known breeding station appears to be on the Mendocino Coast near Albion, where a breeding pair of the race grinnelli was taken (Hemphill MS). The female had an egg in the oviduct with the shell membranes formed when taken on July 2, 1948.

Chlorura chlorura (Audubon)

Green-tailed Towhee

Restriction of green-tailed towhees to thickets of snowbrush and bitter cherry was very close. Singing was usually done from the tops of bitter cherry bushes, but occasionally small firs were used. The habitat corresponded closely to that of the Yolla Bolly fox sparrow. Usually these two species get along amicably but sometimes there are difficulties (12, p. 117). Often green-tailed towhees were located by their sweet songs and "meowing" call notes.

On the east slope of Mount Sanhedrin at 5900 feet elevation in an area containing Garry oak, bitter cherry, and snowbrush, green-tailed towhees were seen with spotted towhees and fox sparrows. Spotted towhees were seldom found with the other two species.

Stone said (126, p. 583) that green-tailed towhees were found locally only on top of Mount Sanhedrin and an adjoining ridge in the brush, but no specimens were taken. Grinnell cited (41, p. 135) Stone's report. Mailliard

reported that one specimen (94, p. 295) was taken on Mount Sanhedrin.

Specimens were collected by us between 5700 feet and 7200 feet elevation. Specimens now at hand, and observed nesting behavior on Goat Mountain, makes it possible to extend the known breeding range in the North Coast Ranges southward about 18 miles from Mount Sanhedrin (56, p. 468).

Specimens examined.--A total of 10, as follows: Black Butte, 1; Etsel Ridge, 1; Bald Mountain, 1; Hull Mountain, 1; Mount Sanhedrin, 3 (1 C.A.S.); Sheetiron Mountain, 2; Goat Mountain, 1.

Pipilo maculatus falcinellus Swarth

Sacramento Spotted Towhee

Spotted towhees, typical of areas of foothill chaparral, sometimes drifted up-mountain and entered areas of forest chaparral late in the summer. This was observed on Mount Sanhedrin and on Goat Mountain, where foothill chaparral closely adjoined forest chaparral. Garry oak woodland was also utilized to some extent, and there an association with green-tailed towhees and fox sparrows resulted.

An immature bird was taken on July 13, 1950, on the north slope of Mount Sanhedrin at 5800 feet elevation. Stone said (126, p. 583) that spotted towhees were common in the brush near Mount Sanhedrin and specimens were taken.

The California North Coast Counties Expedition also took two specimens on Mount Sanhedrin.

Specimens examined.--Three from Mount Sanhedrin (2 M.V.Z.).

Chondestes grammacus strigatus Swainson

Western Lark Sparrow

On June 15, 1951, a lark sparrow was taken in the dry flat below Millsap's Cabin (Bald Mountain), 6000 feet elevation. The bird was feeding upon grasshoppers among scattered herbs and pussypaws. The testes of this bird measured 11 by 6 mm. This suggested that the bird was in breeding condition.

Another lark sparrow was seen feeding in a dry area near the summit of the Covelo-Willows road near Black Butte at 6700 feet elevation.

Taylor mentioned in his field notebook for August 19, 1913, that a western lark sparrow was seen in the oak brush on the ridge top of Mount Sanhedrin.

Specimen examined.--One from Bald Mountain.

Junco oreganus thurberi Anthony

Sierra Nevada Oregon Junco

Oregon juncos were abundant everywhere in open forests and around meadows. Some foraging was done in dry flats where vegetation was sparse.

A nest with four eggs was found on the ground under a clump of rushes and rein-orchis at Plaskett Meadows, 6000 feet elevation, on June 27, 1950. One parent was incubating. Another nest containing three eggs was found nearby on June 28, 1951, but a fourth egg was present on June 29. A third nest was found on a rocky ridge of Mount Saint John at 6400 feet elevation on July 3, 1950. It was beneath a desert mahogany bush and a white fir. In late July, following the nesting period, young juncos were present in large numbers.

Stone reported (126, p. 583) that Oregon juncos were common on Mount Sanhedrin and said that specimens were collected. Additional specimens were taken by the California North Coast Counties Expedition (41, p. 120) and (56, p. 508). Mailliard mentioned that specimens were taken on Mount Sanhedrin (93, p. 295).

Specimens examined.--A total of 17, as follows: Black Butte, 2; Hull Mountain, 1; Mount Sanhedrin, 12 (9 M.V.Z., 3 C.A.S.); Sheetiron Mountain, 1; Snow Mountain, 1.

Spizella passerina arizonae Coues

Western Chipping Sparrow

Chipping sparrows were very prominent in and about the margins of open forests. A limited amount of feeding was done in the trees, but the trees were important as singing posts and nesting sites. Much feeding was done on the ground in relatively bare areas, Garry

oak woodland, and about the edges of meadows.

No nests were found, but all indications were that nesting was taking place. Measurements of testes from two birds taken on June 25 and June 28, 1951, at Plaskett Meadows, were 8 by 5 mm., and 7 by 4 mm., respectively.

Stone said (126, p. 583) that chipping sparrows were "everywhere" in the vicinity of Mount Sanhedrin and that specimens were collected.

Specimens examined.--A total of 6, as follows: Black Butte, 3; Mount Sanhedrin, 2 (1 M.V.Z., 1 C.A.S.); Goat Mountain, 1.

Passerella iliaca brevicauda Mailliard

Yolla Bolly Fox Sparrow

Perhaps no other bird was as distinctively characteristic of the boreal areas of the Yolla Bolly Mountains as was the Yolla Bolly fox sparrow. It is endemic to the Trinity Boreal District as defined by Miller (101, p. 588). All through the summer months the sweet singing of fox sparrows greeted us as we visited areas of bitter cherry and snowbrush. A few birds entered the streamside woodland thickets while foraging and others perched in young firs while they sang.

Territories were established in late May or early June and were actively defended. The localized pair was easily brought to view by squeaking the lips. If young

were present the parents scolded loudly, displayed the wings and tail and fluttered about on the ground in circles about the intruder, at times even being so absorbed that they ran over one's feet and came within a few feet of persons standing near their thickets.

A nestling that had just left the nest was found on July 13, 1950, at 6000 feet elevation on Mount Sanhedrin. Nesting continued through June into mid-July. A group of four young birds just learning to fly was found on July 19, 1951, at 5600 feet elevation on Etsel Ridge.

Regression of the testes was relatively rapid. A male measured on June 27 had testes 11 by 6 mm., whereas one measured on July 19 had testes 4 by 3 mm. The latter bird was the father of the four young birds mentioned above.

Stone mentioned (126, p. 583) that fox sparrows were found locally only on top of Mount Sanhedrin and an adjoining ridge, but said no specimens were taken. An immature bird was taken in 1913 by Taylor. Grinnell cited (41, p. 131) Stone's records. Mailliard took specimens on Mount Sanhedrin. Little failed to find fox sparrows on Goat Mountain at 4500 feet elevation on June 2, 1919, because he did not reach their habitat (94, p. 292).

In 1932 Clark published a paper (12, pp. 113-117) on the southern limits of the breeding range of this fox sparrow. It was obviously incomplete in view of present knowledge, since he did not visit all the high peaks in

the area. From specimens taken and observations made, we can now say that the southern-most known breeding station is an area of snowbrush and bitter cherry about a half mile southeast of Goat Mountain Fire Lookout. To Clark's list of peaks we can add Etsel Ridge, Bald Mountain, Hull Mountain, Mount Sanhedrin, Mount Saint John, and Goat Mountain.

Specimens examined.--A total of 34, as follows: Black Butte, 2; Etsel Ridge, 3; Bald Mountain, 1; Hull Mountain, 3; Mount Sanhedrin, 10 (1 M.V.Z., 6 C.A.S.); Mount Saint John, 3; Snow Mountain, 6; Goat Mountain, 6.

Melospiza lincolni alticola (Miller & McCabe)

Montane Lincoln Sparrow

Wet meadows where false hellebore, rushes, sedges, grasses, and herbs grew was the summer habitat for Lincoln sparrows. Singing posts used were frequently conifers near the edges of meadows. Foraging was done almost entirely in the meadows.

Nesting occurred in June and early July. On June 19, 1950, a nest containing three eggs was found in a clump of rushes near a stream flowing through the meadow at Long Glade, 6400 feet elevation, on Snow Mountain. The nest was dry but not well hidden. On June 21 this nest contained five eggs. On June 21, a second nest containing four eggs was found in a meadow one mile east of Milk

Ranch at 6600 feet elevation. Two immature birds recently out of the nest were caught on June 28 in mouse traps at Plaskett Meadows. One adult was seen carrying food on July 19.

The progress of the breeding season was traced by a series of measurements of male gonads. The following were noted: June 17, 9 by 5 mm.; June 18, 10 by 6 mm.; June 21, 10 by 6 mm.; June 27, 10 by 5 mm.; July 19, 3 by 2 mm.; July 22, 4 by 3 mm. These data served to supplement nesting data in establishing breeding stations.

With specimens now at hand and nesting records, we can extend the known breeding range in the North Coast Ranges from South Yolla Bolly Peak (56, p. 541) southward some 45 miles to Snow Mountain.

Specimens examined.--A total of 14, as follows: Black Butte, 6; Etsel Ridge, 1; Bald Mountain, 4; Snow Mountain, 3.

MAMMALS

Scapanus latimanus caurinus Palmer

Northwestern Broad-footed Mole

Moles were usually found working in the loose, moist soils of the forest and near meadows, but at times were found in gravelly soils on chaparral-covered slopes.

One specimen was trapped near a thicket of snowbrush at 6400 feet elevation on Sheetiron Mountain. This was

nearly a thousand feet higher than the highest elevation recorded by Palmer (111, pp. 280-314). Another specimen was taken in a moist streambank near Spruce Grove (Bald Mountain), 5900 feet elevation.

Jackson cited (73, p. 67) specimens examined from Mount Sanhedrin and Snow Mountain.

Specimens examined.--A total of 3, as follows: Bald Mountain, 1; Mount Sanhedrin, 1 (M.V.Z.); Sheetiron Mountain, 1.

["]Neurotrichus gibbsii gibbsii (Baird)

Northern Gibbs Shrew-mole

Shrew-moles were trapped in moist meadows, in undercut stream banks, and around wet logs and mountain alders on the margins of meadows.

The only female in eight specimens taken had no embryos on June 23.

Four stations in the Black Butte area have yielded shrew-mole specimens--Telephone Camp, 6500 feet elevation; Plaskett Meadows, 6000 feet elevation; Masterson Camp, 6000 feet elevation; and Board Tree Camp, 6000 feet elevation. The only other station of collection was Spruce Grove (Bald Mountain), 5900 feet elevation. The known range of the Northern Gibbs shrew-mole can now be extended southward some 30 miles in the Inner North Coast Ranges from South Yolla Bolly Peak (46, p. 92) to Bald Mountain.

Specimens examined.--A total of 8, as follows: Black Butte, 6; Bald Mountain, 2.

Sorex trowbridgii mariposae Grinnell

Yosemite Trowbridge Shrew

Trowbridge shrews were trapped along margins of streams where rocks, thickets of shrubs, and logs afforded shelter. None was found in meadows and in stretches of stream margins which were lacking in shelter.

Adult females taken on June 17, July 31, and August 21 had no embryos. One taken on July 15 contained three embryos 13 mm. in length. A female taken on July 24 was nursing. Immature individuals were trapped on July 14, 15, and 18.

Jackson commented (74, pp. 99-100) that specimens from Lierly's Ranch, four miles south of Mount Sanhedrin, approached the color of the races montereyensis and humboldtensis, but the skulls showed no such tendency. On the contrary, a single specimen from South Yolla Bolly Peak was like mariposae in color, but cranially showed a distinct similarity to humboldtensis. Our specimens were taken mostly between these two stations.

Specimens examined.--A total of 21, as follows: Black Butte, 10; Etsel Ridge, 1; Bald Mountain, 1; Mount Sanhedrin, 4; Sheetiron Mountain, 2; Snow Mountain, 3.

Sorex palustris navigator (Baird)

Mountain Water Shrew

Water shrews were trapped in cold mountain streams, along the banks of these streams, and in wet meadows. Logs and rocky shelters were present in some place, but not in all. One water shrew was trapped on the edge of a stream where a deer mouse caught in a trap the night before had been eaten, save for the tail and feet. Cold, rushing streams seem to be an essential part of the habitat of the water shrew and were present in all stations where specimens were trapped.

Adult females taken on June 18, June 23, July 26, and August 18 contained no embryos. Nursing females were trapped on June 17 and June 28. No immature shrews were recognized among the 19 specimens taken.

Specimens from Cedar Creek on Snow Mountain probably represent the southern limit of range of this form in the North Coast Ranges, since this is the most southern permanently cold stream. This station represents an extension of known range southward of some 45 miles from South Yolla Bolly Peak (46, p. 84).

Specimens examined.--A total of 19, as follows:
Black Butte, 9; Etsel Ridge, 1; Bald Mountain, 5; Snow Mountain, 4.

Myotis lucifugus carissima Thomas

Yellowstone Little Brown Bat

Two adult male specimens of little brown bats were shot at Plaskett Meadows (Black Butte), 6000 feet elevation, on June 25 and July 22, 1951. The bats were flying over the meadow, streamside woodland, and a pond in a lane between areas of forest.

Also present in the area were little California, silvery-haired, large brown, and hoary bats.

One specimen is dark-colored and the other is brassy-colored. They may show a tendency toward the race alascanus as suggested by Miller and Allen (102, pp. 49-52) for specimens from the Trinity Mountains.

Specimens examined.--Two from Black Butte.

Myotis evotis evotis (H. Allen)

Northwestern Long-eared Bat

Specimens of adult male long-eared bats were shot at Summit Valley (Goat Mountain), 5500 feet elevation, on July 31 and September 4, 1950. They were flying over a dry meadow surrounded by Garry oak woodland, forest chaparral, and forest.

Also present in the area were little California and large brown bats.

Stone reported (126, p. 579) that one specimen was taken in the vicinity of Mount Sanhedrin. More recently

Stone's specimen has been cited.(35, p. 296) (102, p. 116) and (46, p. 87).

Specimens examined.--Two from Goat Mountain.

Myotis volans longicrus (True)

Northwestern Long-legged Bat

Four adult male bats were shot as they flew over a stream, meadow, streamside woodland, and in a lane through the forest. Nearby were areas of Garry oak woodland and forest chaparral.

Also present in these areas were little California, silvery-haired, and large brown bats.

Stone reported (126, p. 579) that one specimen was taken in the vicinity of Mount Sanhedrin. More recently Stone's specimen has been cited (35, p. 270) (102, p. 142) and (46, p. 88).

Specimens examined.--A total of 4, as follows:
Mount Sanhedrin, 2; Snow Mountain, 1; Goat Mountain, 1.

Myotis californicus caurinus Miller

Northwestern Little California Bat

Twelve little California bats were shot as they flew over the forest, forest chaparral, Garry oak woodland, streamside woodland, meadow, and ponds. This appears to be about the widest amplitude of habitats used by any bat studied and certainly this is one of the most abundant

species.

In the areas where little California bats were taken, there were also little brown, long-eared, long-legged, silvery-haired, large brown, and hoary bats.

Two adult females taken on June 19 had one embryo each, 18 mm. and 19 mm. in length, respectively. Nursing females were taken on June 25 and July 13. Females taken on July 31, August 1 and 2 had no embryos and were not nursing.

Stone reported (126, p. 579) that five specimens were taken in the vicinity of Mount Sanhedrin. Miller and Allen cited (102, p. 156) Stone's specimens. Another specimen was taken on Mount Sanhedrin by the California North Coast Counties Expedition (35, p. 284). There is one specimen in the Stanford University collection from Snow Mountain (35, p. 284). Grinnell suggested that this form occurred chiefly in the humid coast belt (46, p. 89).

Specimens examined.--A total of 13, as follows:
Black Butte, 2; Bald Mountain, 2; Mount Sanhedrin, 3 (1 M.V.Z.); Sheetiron Mountain, 1; Goat Mountain, 5.

Lasionycteris noctivagans (LeConte)

Silvery-haired Bat

Twelve silvery-haired bats were shot as they flew over the forest, streamside woodland, meadows and a pond. Nearby were areas of forest chaparral. Restriction

to forested areas and higher elevations seemed more apparent in this species than in other bats. In the early evenings they flew very high above the tree tops, but later they came down closer to tree-top levels and were within range of small shotguns.

Other bats found in the same areas as silvery-haired bats were little brown, long-legged, little California, large brown, and hoary bats.

A female taken on June 21 had two embryos 20 mm. in length. Nursing females were taken on June 27 and 28. Females taken on July 27 and September 7 were not nursing and had no embryos. An immature male was shot on July 27.

Stone reported (126, p. 579) that three specimens were taken in the vicinity of Mount Sanhedrin. Grinnell mapped the range of the species in California (35, p. 303) and cited Stone's specimens.

Specimens examined.--A total of 12, as follows:
Black Butte, 9; Snow Mountain, 3.

Eptesicus fuscus (Peale & Beauvois)

Large Brown Bat

Eleven large brown bats were shot as they flew over the forest, forest chaparral, Garry oak woodland, stream-side woodland, meadows, and ponds. One was found under a loose slab of bark on a tree that was being felled. Large

brown bats were among the most common species of bats and one of the earliest to emerge in the evening. Their slow regular flight and large size made them about the easiest bat targets to hit as darkness approached.

All other bats mentioned in this paper were found in the same areas as the large brown bats.

Adult females taken on July 13, and August 17 and 19 were not nursing and had no embryos.

Much variation in color occurred in large brown bats, even from the same station. I have not been able to correlate this variation with sex or age.

Stone reported (126, p. 579) that three specimens were taken in the vicinity of Mount Sanhedrin. Grinnell cited Stone's specimens and mentioned that there was one specimen in the Stanford University collection (35, pp. 318-319).

Specimens examined.--A total of 12, as follows:
Black Butte, 2; Mount Sanhedrin, 3; Snow Mountain, 5;
Goat Mountain, 2.

Lasiurus cinereus (Beauvois)

Hoary Bat

A large bat seen on July 27, 1950, flying in a lane through the forest at Plaskett Meadows (Black Butte area), 6000 feet elevation, was thought to be a hoary bat. Also in the area were large brown bats and silvery-haired bats

that appeared smaller by comparison. A specimen is needed to verify this report. Grinnell (46, p. 92) gave the summer range as Transition and Canadian life-zones of the Sierra Nevada and northern humid coast belt.

Ursus americanus altifrontalis Elliot

Northwestern Black Bear

Black bears were common in the boreal areas. They were seen fairly often in the forest, but they also ranged widely elsewhere in search of food. Bear scats, scratched trees, and chewed United States Forest Service signs were frequently encountered. Merrill Vann of Upper Lake saw an adult with two cubs on Hull Mountain On June 19, 1951.

Judging from the scats examined much of the food consisted of vegetable material, but one scat contained snake scales.

During the fall and winter many black bears go down into the glades and valleys. On the south side of Snow Mountain is Bear Creek; near Mount Saint John is Bear Wallow Creek, and about eight miles south of Black Butte are Bear Wallow and Bear Wallow Ridge.

Estimates of the number of bears in the Mendocino National Forest during the past five years have ranged from 540 to 900. The legal kill in 1949 was 56 bears, while in 1950 it was 110. Bears were reported to have

increased 20% during 1950.

Stone reported (126, p. 579) that a few bears were present on Mount Sanhedrin. Grinnell, Dixon, and Linsdale reported in the Fur-bearing Mammals of California (55, p. 96) that specimens were examined from near Mendocino Pass, Hull Mountain, and Mount Sanhedrin Summit. Julius Ruttluff of Potter Valley said that one trapper killed 21 bears in the Mount Sanhedrin area in one season.

Specimen examined.--One from Black Butte.

Ursus sp.

Grizzly Bear

Grizzly bears are now extinct, but they occurred formerly in the boreal areas. The species is unknown, and perhaps there may have been two; the Sacramento grizzly bear (Ursus colusus Merriam) and the Mendocino grizzly bear (Ursus mendocinensis Merriam).

Hull Mountain was named for James Hull, who was killed there near his cabin in 1854 by a grizzly bear (59, p. 156). He met the grizzly bear when he went to retrieve a deer killed at dusk the evening before. He shot the animal, but was mortally wounded before the bear died. Hull's hunting friends found his body, the dead grizzly bear, and the deer, and recorded the story. Several years ago District Ranger William Anderson of Upper Lake found Hull's grave marked by a circle of

rocks in a glade about one mile west of Hull Mountain Fire Lookout.

Grinnell, Dixon, and Linsdale said (55, p. 70) that the last grizzly bears killed in Mendocino County were a large male, a mother, and a yearling, killed on the Eel River south of Covelo in the fall of 1875 by Ben Hayden of Round Valley. This area is not far from Bald Mountain and Mount Sanhedrin.

J. R. Lierly, who was considered a man that could be trusted for reliability by Charles L. Camp of the California North Coast Counties Expedition, related that the last "pure blood grizzly" in the country was killed by the Foalwilders in 1880 near the Lierly Ranch (in Mendocino County near the Mendocino-Lake county line).

Grizzly bears lived chiefly in the valleys and foothill country, but, at times, were found above 6000 feet elevation (as mentioned above on Hull Mountain). Unfortunately no specimens were available for study from this area. Maps showing the supposed ranges of the Sacramento grizzly bear and the Mendocino grizzly bear included the areas studied (55, p. 67).

There is a Grizzly Canyon near Elk Mountain in the southern part of the Mendocino National Forest.

Procyon lotor psora Gray

California Raccoon

A few raccoons were found in the boreal areas, but their metropolis of distribution lies at lower elevations. Taylor described fresh coon tracks seen near a pond on Mount Sanhedrin. This was likely Lily Pad Lake. One specimen was taken three miles west of the summit of Mount Sanhedrin.

Stone reported (126, p. 579) that raccoons were common in the vicinity of Mount Sanhedrin and said one specimen was taken. Grinnell, Dixon, and Linsdale cited (55, p. 142) two specimens from the Mount Sanhedrin area.

Specimen examined.--One from Mount Sanhedrin (M.V.Z.).

Martes caurina humboldtensis Grinnell & Dixon

Humboldt Pine Marten

Pine martens were not well-known to many mountaineers in the boreal areas of the Southern Yolla Bolly Mountains. Records of observations seemed to concentrate near Mount Sanhedrin and the peaks surrounding Lake Pillsbury.

In 1904 Stone reported (126, p. 579) that pine martens occurred sparingly in the vicinity of Mount Sanhedrin, but said none was collected. Bill McCreary of Potter Valley trapped a number of them on Mount Sanhedrin between 1900 and 1915. On August 23, 1913, Taylor encountered a pine

marten near the Barney Place, northwest of Impassable Rock. About 1914 Henry Day of Upper Lake saw a female and three young killed by a deer hunter at Bear Camp on Mount Sanhedrin. About 1922 J. W. Kinlock of Upper Lake saw a marten that had been trapped at Sportsman Cabin.

About 1914 Louis R. Grigsby of Willows saw a pine marten along the Eel River between Hull Mountain and Snow Mountain. Jim Gentry of Upper Lake said he had seen pine martens along Dark Hollow Creek on Snow Mountain. In the spring of 1950 Russell Farrel, trapper for the California Division of Fish and Game, saw a pine marten on Bartlett Mountain.

When Grinnell and Dixon named the Humboldt pine marten in 1926 (53, pp. 411-417) they did not include the Southern Yolla Bolly Mountains in its range. The most recent paper (1947) on pine marten distribution in California by Twining and Hensley (131, pp. 133-137) included my study areas in the range of this race and reported a specimen from Hull Mountain. From 1946 to 1948 the estimated number of pine martens in the Mendocino National Forest ranged from 115 to 130 annually.

Martes pennanti (Erxleben)

Fisher

On July 22, 1950, a fisher was attracted to some mice thrown out along the roadside on Hull Mountain at 6400

feet elevation. The area is near a gap in the mountain and is covered by forest.

Numerous records of fishers seen and trapped indicated that they were present in small numbers from Black Butte to Goat Mountain. Taylor mentioned in his field notes a family of seven that was seen near Bald Mountain. Albert Millsap of Orland has seen fishers near Bald Mountain. In 1936 Jim Powell of Copper City trapped one near Black Butte and two near Ocean View. In 1940 Sam Phinney of Paskenta trapped one in Logan Basin.

Julius Ruttluff of Potter Valley caught one fisher on Mount Sanhedrin in 1926. Another trapper caught ten there in one winter. Several trappers mentioned poisoning of fur-bearing mammals in these mountains by baits set out for coyotes. Ruttluff mentioned a fisher trail between Mount Sanhedrin and the Outer Coast Ranges that crossed on a high ridge south of Willits. This trail was said to be used only in the winter and passed through a forest of yellow pines and Douglas firs. At its lowest point the trail went down almost to 2200 feet elevation.

Jim Gentry and Zeno Jones of Upper Lake have seen fishers on Snow Mountain. Harry Vann of Upper Lake trapped one on Bartlett Mountain.

Grinnell, Dixon, and Linsdale mentioned (55, p. 225) a report of ten fishers trapped in the California (now Mendocino) National Forest in the season of 1916-1917.

On their distribution map (55, p. 216) they cited specimens from near Covelo, Eden Valley, Lakeport, Black Butte, Sheetiron Mountain, Snow Mountain, and Goat Mountain.

Mustela frenata munda (Bangs)

Redwoods Long-tailed Weasel

Weasels were apparently scarce in the boreal areas, although they were common in the lowlands. Few of the mountain people had observed weasels in the mountains. One weasel was seen running along logs at Plaskett Meadows (Black Butte), 6000 feet elevation.

The only specimen obtained was caught during daylight on July 24, 1951, in a rat trap baited with fresh bird meat and set along a log extending out into a wet part of Plaskett Meadows. There were many small rodents in the meadow at that season.

Stone reported (126, p. 579) that weasels were common in the vicinity of Mount Sanhedrin, but said no specimens were taken. He must have been referring to the low elevations.

Specimen examined.--One from Black Butte.

Mephitis mephitis occidentalis Baird

Northern California Striped Skunk

A few striped skunks were found above the yellow pine forest in the fir forests, forest chaparral, and

Garry oak woodland. I saw a few diggings in the forest floor at Plaskett Meadows, 6000 feet elevation.

In 1950 Russell Farrel, California Division of Fish and Game trapper, took two striped skunks on Goat Mountain.

Stone reported (126, p. 579) that striped skunks were common in the vicinity of Mount Sanhedrin, but said no specimens were taken. He probably referred to the abundance of striped skunks in the lowlands. The California North Coast Counties Expedition took six specimens near Mount Sanhedrin. Locality records shown on the map and table (55, pp. 314-315) by Grinnell, Dixon, and Linsdale for Hull Mountain and Mount Sanhedrin may have been in boreal areas. Grinnell and Storer (57, p. 15) listed the striped skunk in the lower Canadian Life-zone of Yosemite.

Specimens examined.--Five from Mount Sanhedrin (M.V.Z.).

Taxidea taxus neglecta Mearns

California Badger

A few badgers occurred in the meadows and grassy slopes near Bald Mountain, according to Albert Millsap and Kendrick Masterson, who have spent many summers in that area. Jim Powell of Copper City said that there were a few in the Black Butte area, but nowhere near the number present in the foothills.

No specimens were available for study from the boreal areas, but there is one record from Eden Valley (55, p. 363) not far from Mount Sanhedrin and Bald Mountain.

Urocyon cinereoargenteus townsendi Merriam

Townsend Gray Fox

Gray foxes were abundant in Garry oak woodland and forest chaparral. Their tracks and scats were familiar sights and frequently at night foxes were heard barking. At Goat Mountain they raided our camp at night when we were gone for a few minutes, and later awakened us from sound sleeping by their loud noises.

We trapped one young male on July 23, 1950, at 6400 feet elevation on Hull Mountain. He had been attracted to some dead mice thrown out on a dry flat near our camp.

Russell Farrel, California Division of Fish and Game trapper, said on August 17, 1950, that he had trapped 119 gray foxes already that season. Gray foxes were caught in boreal areas as well as in the yellow pine forest and foothill chaparral belt.

Stone reported (126, pl 579) that gray foxes were common in the Mount Sanhedrin area, but said none was collected. Specimens were taken on Mount Sanhedrin by the California North Coast Counties Expedition (55, pp. 425, 429, 430).

Specimens examined.--A total of 6, as follows:

Hull Mountain, 1; Mount Sanhedrin, 2 (M.V.Z.); Goat Mountain, 3.

Canis latrans lestes Merriam

Mountain Coyote

Large coyotes were found in nearly every plant community of the boreal areas except streamside woodland. Typically they utilized open forest, forest chaparral, Garry oak woodland, and dry flats and bare hillsides.

Jack rabbits were among the more important food items utilized. One scat found on Mount Sanhedrin contained snake scales.

Clarence M. Griswold, United States Fish and Wildlife trapper, showed me several pairs of coyote ears recently taken for bounty purposes. They included both the slender type characteristic of the valley coyote (55, p. 501) and the short broad type characteristic of the mountain coyote (55, p. 477). Probably both forms occurred in the boreal areas, but the mountain coyote was more nearly resident. In winter, however, there was a pronounced down-mountain movement of coyotes into the foothills and valleys.

A very large coyote skull was taken from a carcass found hanging in a Garry oak at Mendocino Pass. Racial determination of this skull was not possible, because of the overlap of measurements in mountain and valley coyote

skulls and the unsatisfactory means of distinguishing them.

A small pup was trapped on Mary Brown Ridge (Black Butte area), 6400 feet elevation, on June 24, 1951, by E. J. Yockey of Willows.

Specimens examined.--Two from Black Butte.

Canis latrans ochropus Eschscholtz

California Valley Coyote

Valley coyotes were found in habitats similar to those of the mountain coyote (see preceding account). Generally the valley coyotes averaged smaller and were found at lower elevations. Where mountain and valley coyotes occurred in geographically adjacent areas a certain amount of intergradation was to be expected.

Stone reported (126, p. 579) that there were a few valley coyotes in the Mount Sanhedrin area, but said no specimens were taken.

Felis concolor californica May

California Mountain Lion

Mountain lion tracks were frequently seen in dusty roads and trails in the boreal areas. Mountain lions tended to range mostly through the forests, forest chaparral, and Garry oak woodland. Since deer were utilized as a chief item of food, mountain lions moved about over a

large area of country.

Hunting pressure on mountain lions has been heavy, both from the standpoint of predator control and as a sport. Quite a few cattle were pastured in the mountains and foothills and the occasional killing of a domestic animal by a mountain lion brought immediate action by the ranchers. Dogs were used in tracking mountain lions.

Julius Ruttluff of Potter Valley said that one trapper killed 19 mountain lions in the Mount Sanhedrin area in one season. Merrill Vann of Upper Lake is reputed to have averaged three to four mountain lions killed per year in the past ten years. In June, 1949, E. J. Yockey of Willows shot a pair of mountain lions in a canyon near Black Butte and captured three kittens alive.

Stone reported (126, p. 579) that mountain lions were fairly common in the Mount Sanhedrin area, but said none was collected. Grinnell, Dixon, and Linsdale compiled (55, p. 540) a map showing many localities in the Southern Yolla Bolly Mountains where mountain lions were taken for bounties paid by the California Division of Fish and Game.

There is a Panther Canyon near Horse Mountain, and one Panther Creek near Mount Sanhedrin and another near Black Butte.

Specimen examined.--One from Black Butte.

Lynx rufus californicus Mearns

California Wildcat

Some wildcats were found in the boreal areas according to our notes, but not as many as in the foothill regions and yellow pine forest. They ranged through open forest, forest chaparral, Garry oak woodland, and, at times, in meadows and streamside woodland.

Russell Farrel, California Division of Fish and Game trapper, said he had trapped wildcats at high elevations in these mountains. No specimens were available from the boreal areas, but a skull from about 5000 feet elevation on the ridge southeast of Black Butte was received from Clarence M. Griswold, United States Fish and Wildlife Service trapper.

Stone reported (126, p. 579) that wildcats were common in the Mount Sanhedrin area, but said none was collected.

Citellus beecheyi douglasii (Richardson)

Douglas Beechey Ground Squirrel

Beechey ground squirrels were found at high elevations in dry flats and bare hillsides, Garry oak woodland, and on the margins of meadows. They were found chiefly in areas having loose soil that would permit burrowing and near rock outcrops or logs where refuge could be taken. Near Mount Sanhedrin two squirrels were seen

climbing about 20 feet up the outside of old white firs with hollow centers. In one case a whole carton of walnuts was carried, a few at a time, to one of those trees for caching. We arrived in camp just in time to see the last nuts en route up the tree.

A female taken on July 14 had seven embryos 40 mm. in length. Immature squirrels were trapped on July 2 near their burrow. These data suggested that young were born in either early or late summer.

Specimens were taken between 5400 feet and 6400 feet elevation. Stone reported (126, p. 577) that two specimens were taken in the vicinity of Mount Sanhedrin. Grinnell and Dixon (52, p. 645) examined one specimen from Mount Sanhedrin. Howell examined three specimens from Mount Saint John, Glenn County (70, p. 152), which I think was a valley station.

Specimens examined.--A total of 13, as follows:
Black Butte, 2; Hull Mountain, 1; Mount Sanhedrin, 5 (2 M.V.Z.); Sheetiron Mountain, 3; Goat Mountain, 2.

Citellus lateralis mitratus (Howell)

Yolla Bolly Golden-mantled Ground Squirrel

Golden-mantled ground squirrels were common in many boreal areas in the forest and meadow communities. Burrows were frequently made near logs or rocks in the forest, but foraging was most commonly done in clearings

and margins of meadows where herbage was plentiful. In the camp areas the squirrels were often concentrated about garbage pits and made frequent raids on food stores left on the ground. Locally they extended down into the yellow pine forest in small numbers.

Three pregnant females were taken on June 16. One had four embryos 10 mm. in length and one 6 mm. in length, a second had three embryos 4 mm. in length, and a third had seven embryos 40 mm. in length. These data suggested that young were born in late June and early July. Adult females without embryos were taken on June 21 and 29, July 2, 4, 21, and 29, and August 1 and 20. Young squirrels were observed running around as early as the third week in July. Others apparently emerged from their burrows for the first time in the several weeks following this date.

Howell named the race mitratus in 1931 (69, p. 161) from a type specimen taken on South Yolla Bolly Peak. In 1938 in his monograph on the North American ground squirrels he characterized the race (70, pp. 191-192, 210-211) as having upper parts paler, more grayish, mantle darker, tail longer, darker beneath, and hind feet longer than the race chrysodeirus of the Sierra Nevada, and upper parts much paler, mantle deeper colored and less extensive, and external measurements smaller than the race trinitatus of the northern Trinity Mountains.

The published range for the Yolla Bolly golden-mantled ground squirrel was from Glenn County north to southern Siskiyou County. This form is endemic to the Trinity Mountain Boreal District. Specimens taken by us and observations made establish the southern limits of range as including Mount Sanhedrin, Snow Mountain, and Goat Mountain. The relatively few individuals seen in the Mount Sanhedrin area can be attributed to scanty or occasional drift across the gap between Hull Mountain and Mount Sanhedrin. In two visits to Mount Sanhedrin, golden-mantled ground squirrels were seen only in two localities. There were few on Mount Saint John because of limited habitat and few on Goat Mountain for the same reason. It is not likely that golden-mantled ground squirrels occur farther south than Goat Mountain in the Inner North Coast Ranges of California.

Specimens examined.--A total of 33, as follows:
Black Butte, 12; Bald Mountain, 2; Hull Mountain, 2;
Sheetiron Mountain, 3; Mount Saint John, 2; Snow Mountain, 10; Goat Mountain, 2.

Eutamias amoenus ochraceus A. H. Howell

Ochraceous Yellow Pine Chipmunk

Yellow pine chipmunks were found only in the open forest, forest chaparral, and rocky ridge and cliff communities of the Black Butte, Bald Mountain, Hull Mountain,

Mount Saint John, and Snow Mountain areas. Most of the individuals observed were on rock outcrops or in thickets of snowbrush. A few were seen in open forest, and one even climbed ten feet up in a small white fir tree. In distinguishing the habitat of the yellow pine chipmunk from others in the area, I would say that it consisted chiefly of scattered patches of snowbrush in rocky areas where clumps of herbage were present. Specimens were taken between 6000 feet and 6800 feet elevation.

The earliest date that females were taken was June 24, and they were nursing at that time. Another nursing female was taken on July 20, but others taken on July 21 and 27, and August 21 were not nursing and had no embryos.

Johnson in 1947 published (81, p. 65-66) the only record of this species I have seen from south of South Yolla Bolly Peak. It concerned an adult female taken in 1896 on Snow Mountain by P. O. Simons. The specimen is now in the Stanford University collection. Probably Snow Mountain is the southern limit of range in the Inner North Coast Ranges of California.

Specimens examined.--A total of 28, as follows:
Black Butte, 9; Bald Mountain, 9; Hull Mountain, 5; Snow Mountain, 5.

Eutamias townsendii senex (Allen)

Allen Townsend Chipmunk

Townsend chipmunks were found only in areas of heavy forest where there were numerous logs and much forest litter. In contrast to the other species of chipmunks found in the boreal areas, the Townsend chipmunk was closely restricted to forest habitats.

Two pregnant females were taken on June 7. One contained five embryos 4 mm. in length and the other contained five embryos 14 mm. in length. On June 20 a female with three embryos 20 mm. in length was taken. Nursing females were taken on June 29, and July 12, 16, and 18. Adult females taken on July 14 and September 7 were not nursing and contained no embryos. Young chipmunks were seen running around as early as July 12.

Specimens were taken between 5700 feet and 7400 feet elevation. Townsend chipmunks were found in all boreal areas except Goat Mountain. Johnson's published record (80, pp. 111, 118) for the southern limit of distribution in the Inner North Coast Ranges was based upon a specimen that I collected on Snow Mountain. It is possible that Townsend chipmunks may occur on Goat Mountain, but I have no specimens to substantiate it.

Specimens examined.--A total of 39, as follows:
Black Butte, 8; Etsel Ridge, 1; Bald Mountain, 2; Hull Mountain, 1; Mount Sanhedrin, 10; Sheetiron Mountain, 5;

Mount Saint John, 1; Snow Mountain, 11.

Eutamias sonomae sonomae Grinnell

Northern Sonoma Chipmunk

Sonoma chipmunks were found in forest chaparral, Garry oak woodland, and the forest. The preferred habitat was essentially one of dense thickets, and in this respect, differed from those of the yellow pine and Townsend chipmunks. When Sonoma chipmunks occurred in the forest they sought places where there were masses of fallen logs and shrubbery. They were attracted in late summer to the ripe fruits of gooseberry in open forested areas.

Some of the young must be born early in the summer. The earliest taken specimen, May 29, was a nursing female. Other nursing females were taken on July 2 and 17. Non-pregnant and non-nursing adult females were taken on July 14, 21, 24, and 30, August 1, and September 5.

Elliot mentioned (22, p. 195) that a specimen was taken on Snow Mountain. Howell in his revision of the North American chipmunks cited (68, pp. 117-119) specimens from Mount Sanhedrin (M.V.Z.), Sheetiron Mountain, (United States National Museum), and Snow Mountain (Field Museum of Natural History and Museum of Comparative Zoology). In addition to Howell's list of specimens

examined, Johnson added (80, p. 126) two from Mount Sanhedrin (M.V.Z.) and (C.A.S.) and four from Snow Mountain (C.A.S.).

Our specimens were taken between 5400 feet and 6750 feet elevation.

Specimens examined.--A total of 61, as follows:

Bald Mountain, 4; Hull Mountain, 1; Mount Sanhedrin, 28 (24 M.V.Z., 2 C.A.S.); Sheetiron Mountain, 2; Mount Saint John, 6; Snow Mountain, 6 (5 C.A.S.); Goat Mountain, 14.

Tamiasciurus douglasii albolimbatus (Allen)

Sierra Nevada Chickaree

Chickarees were found in heavy forests in all boreal areas studied. They spent nearly all of the time up in the trees, but did come to the ground and ran to other trees when it was not possible to cross from one tree to another by way of the branches.

The earliest-taken adult female, June 16, was nursing. Non-nursing adult females without embryos were taken on July 4 and 12, and September 6 and 7. A young chickaree, not yet weaned, was caught alive on June 19 at 6400 feet elevation on Snow Mountain.

A chickaree nest in an old white fir snag near Spruce Grove (Bald Mountain area), elevation 5800 feet, was examined. It was about ten feet above the ground level and consisted of shredded inner bark. Other spaces

in the hollow snag were filled with scales of fir cones.

Elliot in 1898 referred to a specimen taken in the "Snow Mountains" (22, p. 195). Stone reported (126, p. 577) that one specimen was taken on Mount Sanhedrin. Grinnell gave the range of the Sierra Nevada chickaree in the North Coast Ranges as south through the higher, Inner North Coast Ranges to Mount Sanhedrin and Snow Mountain (46, p. 134). We now have specimens from farther south in the boreal areas, as Goat Mountain, and from the yellow pine forest of Elk Mountain. Jim Gentry and Clinton Hensley of Upper Lake said that chickarees occurred in the yellow pine forest of Bartlett Mountain.

Specimens examined.--A total of 34, as follows:

Black Butte, 2; Bald Mountain, 2; Hull Mountain, 3; Mount Sanhedrin, 9 (6 M.V.Z.); Sheetiron Mountain, 3; Mount Saint John, 2; Snow Mountain, 7; Goat Mountain, 6.

Glaucomys sabrinus stephensi (Merriam)

Mendocino Northern Flying Squirrel

Two specimens of the Mendocino northern flying squirrel were taken in the dense white fir forest on Mount Sanhedrin, at 6100 feet elevation, on the north slope near Big Signal Fire Lookout.

Both specimens were nursing females and they were taken on July 15 and 17.

According to Howell, who monographed the North

American flying squirrels, the race stephensi can be most easily distinguished from the race flaviventris by the buffy white soles of the feet and the whitish underparts irregularly washed with light pinkish cinnamon (67, pp. 57-58). I noted also that the face was much darker in stephensi. The skull measurements for the two races were remarkably similar, but only a small series of each was given. Howell called the race stephensi the California coast flying squirrel.

Intergradation between stephensi and flaviventris was apparent in specimens from Goat Mountain and one specimen from Snow Mountain. This will be discussed under the race flaviventris.

Specimens examined.--Two from Mount Sanhedrin.

Glaucomys sabrinus flaviventris Howell

Trinity Northern Flying Squirrel

Twenty-six specimens of the Trinity northern flying squirrel were taken in forest habitats. In most cases they were found in dense forests of red fir or white fir, but exceptions were at the base of a sugar pine, and in scattered young white firs interspersed with forest chaparral.

The earliest date at which an adult female was taken was June 8. This was a nursing female. Other nursing females were taken on June 13, 20, and 29, and July 19

and 22. Adult females that were not nursing and that contained no embryos were taken on July 26 and September 7. A nursing female trapped on June 29 on a ten-foot snag near Plaskett Meadows at 6300 feet elevation led us to investigate the snag in search of a nest. We found a nest made of lichens in a cavity near the top of the snag. It could be reached by passing through a narrow crack for a distance of about 18 inches. In the nest were two young flying squirrels, well-furred and with open eyes, but not yet weaned. One lived for five days and the other for seven days on a diet of evaporated cow's milk. They were prepared as skins and skulls after death.

A young female of the year was trapped on August 18 away from the nest.

There was an old red fir snag in the camp at Long Glade (Snow Mountain) at 6400 feet elevation. Near the top, at a height of about 50 feet above the ground, there were two holes from which flying squirrels emerged after dark. At least six squirrels were seen to glide from the snag on one evening. There appeared to be a colony there consisting of several families. Two adult males were shot from a branch on the snag.

Most of the specimens were caught in rat traps baited with fresh bird meat and set about eight feet above the ground. Several were caught with walnut and bacon baits.

One specimen, caught in a trap about five feet above the ground, was removed, presumably by a fox. This unfortunate experience taught us to nail the traps or tie them securely to the trees at greater heights.

Howell distinguished (67, p. 54) the race flaviventris from the race stephensi by the oil yellow color of the soles of the feet, the whitish underparts usually heavily-washed with pale greenish yellow or Naples yellow, and a white patch on the throat. I noted also that the face was much paler in flaviventris. Howell called the race flaviventris the yellow-bellied flying squirrel.

There was much individual variation in the amount of yellow in the underparts. It was present even on juvenile and immature individuals. An adult male taken on August 21 near Dark Hollow Creek, at 6800 feet elevation on Snow Mountain, had fresh pelage on the tail and feet. The tail was pinkish on the underside and the feet were buffy. The older pelage on the underparts was yellowish. Since the winter pelage of flaviventris has never been described, it is problematic whether the fur changes to a yellowish color with age, due to oxidation or staining, or whether this specimen was an intergrade between flaviventris and stephensi.

Specimens from Goat Mountain showed the paler face and the dorsal coloration typical of flaviventris and the buffy feet and cinnamon buffy underparts typical of

stephensi. These specimens were placed with the flavi-ventris group, even though they did not show all the characters of flaviventris.

Specimens examined.--A total of 26, as follows:
Black Butte, 8; Etsel Ridge, 1; Bald Mountain, 5; Hull Mountain, 1; Sheetiron Mountain, 2; Mount Saint John, 1; Snow Mountain, 5; Goat Mountain, 3.

Thomomys bottae acrirostratus Grinnell

Pointed-nosed Botta Pocket Gopher

Botta pocket gophers were found in the margins of meadows and in dry flats and bare hillsides. Near the meadows there was a plentiful supply of herbage, but in the dry areas the gophers appeared to survive on a diet of wild onions. The soil varied from loose material to crumbly shale. An abundance of winter soil cores (made in the snow) were present and showed how movement from one place to another was possible with relative safety.

Only specimens from the Mount Sanhedrin area are known to belong to the race acrirostratus. Grinnell gave (48, p. 108) the range of this race as the interior valleys of northwestern California, west of Sacramento Valley and south of the Salmon-Scott-Trinity mountain divide. This is a small gopher with small teeth, small auditory bullae, and a short rostrum. Females were said to be more constant in diagnostic characters than males.

The Museum of Vertebrate Zoology which contains the most complete collection of California mammals does not have its pocket gopher collection in suitable order at present to encourage one to attempt a taxonomic study. Practically no work has been done with the pocket gopher collection since Dr. Grinnell's death in 1939.

The large size (222-224 mm. total length) of some female pocket gophers on Snow Mountain is suggestive that a new race may occur in that area.

Discussion from this point on will concern the botta pocket gopher as a species. In most boreal areas studied either the botta pocket gopher or the mountain pocket gopher was present. There were two exceptions. On the southeast spur of Bald Mountain botta pocket gophers were found in the flat south of Spruce Grove and in the meadow near Millsap's Cabin. The meadow at Spruce Grove (only a few hundred yards from the flat) had only mountain pocket gophers in it. The northern section of the Bald Mountain area likewise had only mountain pocket gophers. In a dry flat near Post Camp, at 5600 feet elevation, a botta pocket gopher and a mountain pocket gopher were trapped within thirty feet of each other. This is the only place I know of where these two species have been found together in the same habitat and the same geographic station. Our specimens of botta pocket gophers were trapped between 5500 feet and 6800 feet elevation.

Reproductive data included pregnant females taken on June 16 with three embryos 12 mm. in length, June 21 with four embryos 10 mm. in length, June 23 with three embryos 10 mm. in length, July 20, one with two embryos 15 mm. in length, and another with four embryos 8 mm. in length. Only one female was recorded in our notes as nursing and the date was June 14. Some of the following adult females may have been nursing, but none had any embryos on May 23, June 15, 16, 18, 20, and 23, July 2, 16, 18, 19, 20, August 21, and September 7. Immature young of the year were trapped on July 16.

The older literature recorded specimens from these areas under the name white-toothed pocket gopher (Thomomys bottae leucodon Merriam). Authors who wrote about this species in these areas were: Stone (126, p. 578), who mentioned three specimens taken on Mount Sanhedrin; Bailey (3, pp. 47-49), who examined eight specimens from Mount Sanhedrin, and three from Snow Mountain; and Grinnell (46, p. 138), who summarized the range of this race.

Specimens examined.--A total of 40, as follows: Etsel Ridge, 1; Bald Mountain, 3; Hull Mountain, 9; Mount Sanhedrin, 9 (4 M.V.Z.); Sheetiron Mountain, 1; Snow Mountain, 16; Goat Mountain, 1.

Thomomys monticola premaxillaris Grinnell

Yolla Bolly Mountain Pocket Gopher

Mountain pocket gophers were trapped in the margins of meadows and in dry flats and bare hillslopes of the northern group of boreal areas. Habitats were essentially the same as for the botta pocket gopher. The occurrence of a mountain pocket gopher in the same habitat and the same geographic station as a botta pocket gopher was mentioned in the preceding account.

A pregnant female taken on June 21 had five embryos 33 mm. in length, and one taken on June 28 had three embryos 12 mm. in length. A nursing female was taken on June 17. Adult females that contained no embryos were taken on June 28 and 29, July 26, 27, and 28. Four half-grown females were trapped on June 17. It seems likely that they were young of the year. If such were the case, then they were born early in the season. I do not know whether two litters are born in one season or whether different females bear a single litter during a period of many weeks.

The only published localities I know of for this race are the type locality, two miles south of South Yolla Bolly Peak at 7500 feet elevation (40, p. 312), and 12 miles north of North Yolla Bolly Peak at 4400 feet elevation (46, p. 146). Our specimens were taken between 5600 feet and 6800 feet elevation at Black Butte,

Plaskett Meadows, and Board Tree Camp in the Black Butte area; at Post Camp on Etsel Ridge; and at Bald Mountain, Hell's Half Acre, and Spruce Grove in the Bald Mountain area.

Specimens examined.--A total of 40, as follows:
Black Butte, 24; Etsel Ridge, 1; Bald Mountain, 15.

Dipodomys heermanni californicus Merriam

Northern California Heermann Kangaroo Rat

Kangaroo rats occur commonly in areas of foothill chaparral where loose soil permits burrowing. At times they may extend beyond the foothill chaparral into areas of forest chaparral. G. C. Hunter of Potter Valley described some "kangaroo mice" seen at Burgess Camp on Mount Sanhedrin. He said they came out from wet logs along the edge of a meadow and raided a sack of oats brought there for his horses. From what I have seen of that area I would think these animals were kangaroo rats rather than jumping mice. A series of kangaroo rats was taken by the California North Coast Counties Expedition on the northwest slopes of Mount Sanhedrin.

Specimens examined.--Twelve from Mount Sanhedrin (M.V.Z.).

Peromyscus maniculatus gambelii (Baird)

Gambel Deer Mouse

This was undoubtedly the most abundant mammal in the boreal areas and the one which occupied the most habitats. It was taken in all habitats except the stream, lake, and pond, and the aerial habitats. Several mice were trapped on gravel-bars in streams, which they could reach only by swimming. Two were caught on top of a ten-foot snag in a trap which could be reached only by climbing up the rough bark of the snag. Another was trapped at the mouth of an open gopher hole in an area of sparse vegetation where there were no large rocks. It seemed more likely that this mouse was traveling through the gopher tunnels than across an extensive area of bare ground surrounding the gopher hole. The highest density of population in the boreal areas appeared to be in scattered thickets of snowbrush and in the forest where old logs and spaces under tree roots afforded shelter. Our specimens were trapped between 5400 and 6600 feet elevation.

Pregnant females included those taken on July 2 with four embryos 10 mm. in length, July 21 with three embryos 15 mm. in length, and August 1 with five embryos 5 mm. in length. The wide range of dates and the large population of these mice suggested that more than one litter may have been born in a single summer by some females. One nursing female was taken on July 16. Other

non-pregnant adult females were taken on July 19 and 21, and September 7. Reproductive data were not taken on all female specimens.

Gambel deer mice, together with meadow mice, were probably the most important food sources for the smaller carnivorous mammals and the birds of prey.

Stone reported (126, p. 577) that a full series of specimens was taken in the vicinity of Mount Sanhedrin. Osgood monographed the genus Peromyscus in 1909 and cited specimens examined from Mount Sanhedrin and Snow Mountain. (110, p. 71).

Specimens examined.--A total of 51, as follows:
Black Butte, 11; Etsel Ridge, 1; Bald Mountain, 7; Hull Mountain, 4; Mount Sanhedrin, 7 (2 M.V.Z.); Sheetiron Mountain, 2; Mount Saint John, 3; Snow Mountain, 12 (7 C.A.S.); Goat Mountain, 4.

Peromyscus truei gilberti (Allen)

Gilbert Piñon Mouse

Gilbert piñon mice were found in areas of heavy forest chaparral and shrubbery on rocky ridges. They are common, however, in the foothill chaparral at lower elevations. On Mount Saint John these mice were taken only in areas of desert mahogany, whereas a short distance away in small clumps of snowbrush only Gambel deer mice were taken. On Mount Sanhedrin one specimen of Gilbert

piñon mouse was taken in a dense stand of snowbrush and bitter cherry. Our specimens were taken between 5800 feet and 6600 feet elevation.

A female taken on June 7 had three embryos 17 mm. in length. The only other female taken had no embryos on September 7.

Stone reported (126, pp. 577-578) that 11 specimens were taken in the vicinity of Mount Sanhedrin. Osgood cited (110, p. 171) 13 specimens examined from Mount Sanhedrin.

Reports of specimens of the Boyle brush mouse taken on Snow Mountain (22, pp. 206-208) and (110, p. 145) and a series of 12 from Snow Mountain seen at the California Academy of Sciences were probably concerned with foothill regions below the boreal areas. No data on the elevations of capture were available.

Specimens examined.--A total of 6, as follows: Mount Sanhedrin, 1; Mount Saint John, 4; Goat Mountain, 1.

Neotoma fuscipes monochroua Rhoads

Rhoads Dusky-footed Wood Rat

Three specimens were taken at 6150 feet elevation on Mount Sanhedrin in dense thickets of snowbrush and bitter cherry where rock outcrops were present.

Nursing females were taken on July 15 and 17. The other specimen was an immature female about half-grown.

Stone reported (126, p. 578) that four specimens were taken in the vicinity of Mount Sanhedrin. Grinnell recorded (46, p. 180) specimens from 4500 feet elevation on Mount Sanhedrin. Hooper referred (64, p. 220) to the same specimens as Grinnell.

Specimens examined.--Twelve from Mount Sanhedrin (9 M.V.Z.).

Neotoma fuscipes fuscipes Baird

Sacramento Valley Dusky-footed Wood Rat

Several wood rat houses were found in rocky areas in the forest chaparral on Snow Mountain, and Goat Mountain. One adult male was trapped at 6100 feet elevation on Goat Mountain, but houses were found as high as 6400 feet elevation on Snow Mountain.

Examination of one wood rat house on Snow Mountain suggested current occupation. The house was seven feet long, three feet wide, and three feet high, and was located in a thicket of bitter cherry and snowbrush. Inside the house were freshly cut twigs of red fir, white fir, bitter cherry, snowbrush, and a deer vertebra. The nest was made of shredded bark. The occupant in this house was not seen.

In 1938 Hooper published a paper on the geographical variation in wood rats of this species (64, pp. 213-246).

He gave the range of the race fuscipes as the Inner Coast Ranges of California north of San Francisco Bay, and stated that members of this race were paler than those of the race monochrourea. Specimens intermediate in color between these two races were taken on South Fork Mountain and at the headwaters of the Mad River just north of the Mendocino National Forest. The exact area of intergradation between fuscipes and monochrourea in the Southern Yolla Bolly Mountains is not known. Elliot mentioned (22, p. 203) 20 specimens that were taken in the "Snow Mountains". These probably would now be included in the race fuscipes.

Specimen examined.--One from Goat Mountain.

Neotoma cinerea pulla Hooper

Western Bushy-tailed Wood Rat

Bushy-tailed wood rats were taken chiefly in the forest near logs, at the base of a hollow tree, and around a rocky outcrop where thickets of bitter cherry and choke-cherry were present. One immature animal was taken beside a large log in a wet seepage area where mountain alders and much herbage were growing. A series of mousetraps set along the creek below Spruce Grove (Bald Mountain area) was sprung, possibly by bushy-tailed wood rats, but nothing was caught.

No reproductive data were available for the two adult

females taken. Half-grown young were taken as early as June 17.

Hooper (65, p. 411) and Grinnell (46, p. 183) gave the southern limits of range of this race as Elk Creek, Glenn County. Our specimen from Spruce Grove is certainly as far south as Elk Grove. We also collected specimens at Black Butte and near Plaskett Meadows. Elevations of capture were between 5800 feet and 6400 feet.

The meaning of the subspecific epithet, pulla, is dusky or dark-colored.

Specimens examined.--A total of 8, as follows:
Black Butte, 7; Bald Mountain, 1.

Clethrionomys mazama obscurus (Merriam)

Dusky Mazama Red-backed Mouse

Red-backed mice were found only in the streamside woodland and forest communities of the Black Butte area. Specimens were taken in the forest near prostrate logs, around tangles of mountain alder roots, and along the edges of wet logs projecting into the margins of meadows and streamside woodland.

A female with three embryos 24 mm. in length was taken on July 21. A nursing female was taken on June 29, and an adult female that was not nursing and had no embryos was taken on July 23.

One adult female had a greenish-yellow color on the

underparts. It appeared like either a stain or an oxidation of natural pigments.

Specimens were taken between 6000 feet and 6500 feet elevation at Telephone Camp, Snow Basin, and Plaskett Meadows. These stations represent a southward extension of nearly 20 miles from near South Yolla Bolly Peak (46, p. 185) for the known range of this form. There is a specimen of red-backed mouse in the Museum of Vertebrate Zoology from Lierly's Ranch, 2340 feet elevation, four miles south of Mount Sanhedrin. It is an immature animal and has a crushed skull, so that identification to species is not certain. Possibly it represents the California red-backed mouse that occurs to the west of this area in the redwood belt. Ingles (72, p. 172) considered the three geographic forms of red-backed mice in California under one species, C. californicus.

Specimens examined.--Twelve from Black Butte.

Microtus californicus eximius R. Kellogg

Sanhedrin California Meadow Mouse

California meadow mice were found in meadows, in streamside herbage, and seepage areas of all the boreal areas studied except Mount Saint John. They were found in the rankest growths of the succulent herbage as well as in areas that became quite dry by the end of the summer. California meadow mice were found in the driest

habitats of any of the three species of meadow mice collected in the boreal areas.

Data on reproduction included the following embryos: June 23, six embryos 5 mm. in length, and four embryos 25 mm. in length; July 2, six embryos 12 mm. in length, and five embryos 20 mm. in length; July 12, five embryos 9 mm. in length, and six embryos 7 mm. in length; July 14, seven embryos 4 mm. in length, and four embryos 6 mm. in length; July 18, four embryos 3 mm. in length; and August 18, five embryos 25 mm. in length. One nursing female was taken on July 19. Other adult females that were neither pregnant nor nursing were taken on June 27, July 19, 21, and 31, August 1, 18, and 21, and September 7. A small, immature mouse of the year was trapped outside the burrow on June 23. These data indicate that the California meadow mice may breed all through the summer months and suggest that more than one litter may be born by mature females during this period of time.

The population of California meadow mice was high in some areas. On June 18 four were caught during daylight while we were setting 50 traps in a seepage area on Etsel Ridge. During the following night 24 more mice, one Trowbridge shrew, and three deer mice were caught in this area, which does not exceed one-half acre. We nicknamed the area "Microtus Flat".

California meadow mice were found in the same meadows

with long-tailed meadow mice on Snow Mountain, and in the same meadows as Oregon meadow mice in the Black Butte, Bald Mountain, and Mount Sanhedrin areas. At Spruce Grove (Bald Mountain area), at 5900 feet elevation, a California meadow mouse was trapped within ten feet of an Oregon meadow mouse on June 18, 1951. Specimens of California meadow mouse were taken between 5400 feet and 6800 feet elevation.

The type locality of the Sanhedrin California meadow mouse is Lierly's Ranch, 2340 feet elevation, four miles south of Mount Sanhedrin (86, pp. 12-14). The common name of the race is derived from Mount Sanhedrin.

Stone reported (126, p. 578) that one specimen was taken in the vicinity of Mount Sanhedrin, and Elliot reported (22, p. 204) that one specimen was taken in the "Snow Mountains". More recently (1933) Grinnell summarized the known range of this race (46, p. 187).

Specimens examined.--A total of 62, as follows: Black Butte, 8; Etsel Ridge, 5; Bald Mountain, 9; Hull Mountain, 4; Mount Sanhedrin, 15 (4 M.V.Z.); Sheetiron Mountain, 2; Snow Mountain, 14; Goat Mountain, 5.

Microtus longicaudus (Merriam)

Long-tailed Meadow Mouse

Two specimens were taken in a meadow and along a stream on Snow Mountain. Also in the same areas were California meadow mice.

Identification of the specimens of long-tailed meadow mice was based upon the shape of the incisive foramina, the presence of conspicuous temporal ridges, the pattern of tooth structure, and the external body measurements. The external body measurements were 158-42-21-14 and 176-53-22-16. These figures represent measurements in millimeters as follows: total length, length of tail vertebrae, length of hind foot, and ear from the notch. The first measurements were for an adult female (with six embryos 5 mm. in length) taken on June 23, 1950, at 6400 feet elevation along Cedar Creek. The second measurements were for an adult female (with no embryos) taken on August 21, 1950, at 6800 feet elevation near Dark Hollow Creek. The skull of the former is in perfect condition, but that of the latter has a crushed cranium.

To my knowledge no other specimens of this species have been taken in the Inner North Coast Ranges of California south of South Fork of Salmon River in Siskiyou County (46, p. 190). Our specimens may represent the race sierrae or possibly a new form. Additional material is needed before an adequate comparison with known forms can be made.

Specimens examined.--Two from Snow Mountain.

Microtus oregoni adocetus Merriam

Yolla Bolly Oregon Meadow Mouse

Oregon meadow mice were found in very moist meadows and streamside woodland in the Black Butte, Bald Mountain, and Mount Sanhedrin areas. Probably the habitat of the Oregon meadow mouse is more permanently wet than that of the other two species of meadow mice in the boreal areas. Elevations of capture of specimens ranged from 5800 feet to 6400 feet elevation. In most areas the California meadow mouse was also present.

Females taken with embryos included the following: June 18, four embryos 18 mm. in length; July 26, five embryos 15 mm. in length; and July 27, three embryos 10 mm. in length, and four embryos 14 mm. in length. Nursing females were taken on June 20 and July 24. No specimens were taken in August or September, so it is possible that they were still breeding during those months. Very likely more than one litter is born to some females during a season.

The Oregon meadow mouse can be distinguished from other meadow mice in the boreal areas by its smaller size, shorter pelage, and by the presence of only five plantar tubercles.

The type specimen was taken about two miles south of South Yolla Bolly Peak at 7500 feet elevation (46, p. 191). It measured 172 mm. in total length, 49 mm. for length of

tail vertebrae, and 21 mm. for length of hind foot. These measurements are larger than those given by Ingles (72, p. 176) for the species, and larger than any of our specimens. Our largest specimen was a male that measured 156 mm. in total length, 39 mm. for length of tail vertebrae, and 20 mm. for length of hind foot.

Other published localities from which specimens were taken were near South Yolla Bolly Peak in Tehama County and South Fork Mountain in eastern Humboldt County. Our specimen from Mount Sanhedrin extended the known range in the Inner North Coast Ranges southward 34 or 35 miles from South Yolla Bolly Peak. Our stations of record included Snow Basin, Masterson Camp, Plaskett Meadows, and Board Tree Camp in the Black Butte area; Hell's Half Acre and Spruce Grove in the Bald Mountain area; and the north slope of Mount Sanhedrin at 6000 feet elevation. Apparently the race adocetus is endemic to the Yolla Bolly Mountains and the southern Trinity Mountains.

Specimens examined.--A total of 23, as follows:
Black Butte, 17; Bald Mountain, 5; Mount Sanhedrin, 1.

Zapus pacificus alleni Elliot

Allen Pacific Jumping Mouse

Specimens of jumping mice were taken in the meadow and streamside woodland communities in the Black Butte area between 6000 feet and 6500 feet elevation. An

abundance of succulent herbage was present in all areas where jumping mice were trapped. A thicket of mountain alders with streamside herbage near Spruce Grove (Bald Mountain area) appeared to be suitable habitat for jumping mice, but none was caught there in several nights of intensive trapping.

Females with embryos included two taken on June 27, each with five embryos 2 mm. in length; one taken on June 28 with six embryos 10 mm. in length, one taken on June 29 with four embryos 3 mm. in length, and another with six embryos 4 mm. in length; and one taken on July 19 with six embryos 5 mm. in length. Unfortunately no records of nursing females were taken. Non-pregnant females were taken on June 28 and 29, and July 19, 23, and 26. Since no specimens were taken in August and September, it is not known whether jumping mice breed during those months or whether they bear more than one litter in a season.

Our specimens from Telephone Camp, Masterson Camp, and Plaskett Meadows in the Black Butte area extended the known range (46, p. 196) of this species in the Inner North Coast Ranges southward about 20 miles from South Yolla Bolly Peak. If jumping mice ever occurred farther south in this area, it is safe to say that today much of the former habitat has been destroyed by heavy sheep grazing.

Specimens examined.--Thirty-three from Black Butte.

Erethizon dorsatum epixanthum Brandt

Yellow-haired Porcupine

Porcupines were found in the forest and meadow communities in all the areas studied except Mount Saint John. Evidence for these records included six live animals seen, specimens collected, skulls picked up, chewings on trees and camp tables, a den, footprints in a dusty road, and reports by United States Forest Service employees, trappers, cattlemen, loggers, and hunters.

The only adult female taken was one from Long Glade, 6400 feet elevation, on Snow Mountain. On August 16 she had no embryos and was not nursing. A young animal of the year visited our camp for several nights before we first saw it on June 24. It ate part of a bar of lava soap in preference to three bars of toilet soap.

Twice porcupines were found in meadows in the daytime. They appeared to be basking in the sunshine, but may have come there for green food. One was followed as it ran from the meadow (Milk Ranch on Snow Mountain) along a very definite pathway through the adjacent red fir forest to a hollow tree (Plate 21), which it entered and climbed out of sight. The entrance to this den had spines scattered about it and about a bushel of droppings. A half-grown porcupine was encountered in a patch of false hellebore at 6800 feet elevation along Dark Hollow Creek (Snow Mountain) on August 20.

Porcupines have become unpopular with human beings, especially around campsites. An adult animal was found chewing on the table top where food had been spilled at the Long Glade Camp on Snow Mountain. Two skulls found near camps on Snow Mountain were probably from porcupines killed by man.

Grinnell in 1933 (46, pp. 196-197) gave the range of the porcupine in the Inner North Coast Ranges as south to South Fork Mountain in Humboldt County and to the vicinity of North Yolla Bolly Peak. Specimens from Snow Mountain and tracks seen on Goat Mountain have extended this range more than 50 miles to the south in the boreal areas. Numerous reports of porcupines from lower elevations indicated that they strayed into the surrounding valleys and lower mountain areas. I have heard of several porcupines seen on Cobb Mountain, Lake County, and there was a published report of one killed near Calistoga, Napa County (93, p. 267). These scattered individuals probably were straying, but there is some evidence to indicate that a small population may be established on Cobb Mountain.

Specimens examined.--A total of 7, as follows:
Black Butte, 1; Snow Mountain, 6.

Lepus californicus californicus Gray

California Black-tailed Jack Rabbit

Black-tailed jack rabbits were found in the forest, forest chaparral, Garry oak woodland, and dry flat and bare hillslope communities. Greatest abundance was noted in the forest chaparral. Specimens were collected between 5500 feet and 6400 feet elevation, but others were seen as high as 7000 feet elevation. The northwestern portion of California is the only part of the state in which black-tailed jack rabbits are known to extend upward into the Canadian Life-zone (46, p. 200).

The only adult female examined had no embryos on July 19 and was not nursing.

An intensive search was made on Snow Mountain to locate snowshoe rabbits in the thickets of snowbrush and bitter cherry. All rabbits seen were jack rabbits. Snowshoe rabbits do occur, however, in the higher Trinity Mountains to the north of this area.

Elliot mentioned (22, p. 213) two specimens that were taken in the "Snow Mountains", and Stone reported (126, p. 578) that jack rabbits were abundant in the vicinity of Mount Sanhedrin, but said none was collected. In 1940 Orr monographed the rabbits of California and cited (109, p. 68) a specimen examined from Mount Sanhedrin.

Specimens examined.--A total of 9, as follows: Hull Mountain, 1; Mount Sanhedrin, 5 (1 M.V.Z.); Goat Mountain, 3.

Sylvilagus bachmani tehamae Orr

Tehama Brush Rabbit

Forest chaparral was the only habitat in which brush rabbits were found. They were observed in patches of snow-brush and bitter cherry between 5600 feet and 6600 feet elevation. The highest elevation of observation recorded was on Brushy Mountain in the Black Butte area.

Our two specimens were both adult females and were taken at 5900 feet and 6150 feet on Mount Sanhedrin. One rabbit had three embryos 20 mm. in length on July 13, and the other had four embryos $3\frac{1}{4}$ mm. in length on July 15.

Orr described this race (108, pp. 27-28) in 1935, and in 1940, in his monograph on the rabbits of California, he commented (109, pp. 143, 153-156) that specimens from Mount Sanhedrin were intermediate between the races ubericolor of the humid coastal belt and tehamae of interior regions. He noted that they were closer to the race tehamae, but said their skulls were larger and their auditory bullae smaller than typical tehamae.

The oldest published records of brush rabbits in the Southern Yolla Bolly Mountains were those of Elliot (22, p. 213) for one specimen taken in the "Snow Mountains" and Stone (126, p. 578) for two specimens taken in the vicinity of Mount Sanhedrin. In 1909 Nelson cited (104, p. 252) Stone's specimens. Both Orr and Grinnell (46, p. 204) referred to specimens from Lierly's Ranch, 2340 feet

elevation, four miles south of Mount Sanhedrin. I do not know whether Stone's specimens were taken at Lierly's Ranch or whether specimens were taken there by someone else at a later date.

Specimens examined.--Two from Mount Sanhedrin.

Cervus roosevelti Merriam

Roosevelt Elk

The Roosevelt elk has been extinct in the boreal areas of the Southern Yolla Bolly Mountains for many years. Presumably they occupied the meadow and forest communities. Charles L. Camp of the California North Coast Counties Expedition recorded in his field notes for August 20-21, 1913, information on elk obtained from J. R. Lierly of Lierly's Ranch near Mount Sanhedrin. The last elk seen in that area was said to have been wounded by an experienced hunter named Baker on Signal Point (Mount Sanhedrin) in 1872. Stone reported (126, p. 579) in 1904 that "old elk horns have sometimes been found in the region (Mount Sanhedrin)".

Merrill Vann of Upper Lake related that Elk Mountain got its name from the fact that it was the last place where elk were seen as they left the Clear Lake area for the mountains when white men began settling in the Clear Lake area. Vann also said he had seen an elk wallow in the vicinity of Elk Mountain and that in 1950 the base of

an old elk antler was found on Bucknell Creek between Garrett Mountain and Pine Mountain. There is an Elk Valley about five miles southeast of Elk Mountain. Elk Spring is located seven miles east of Anthony Peak and Elk Ridge is seven miles northeast of Anthony Peak.

Odocoileus hemionus columbianus (Richardson)

Columbian Black-tailed Deer

Black-tailed deer were abundant in the boreal areas as well as in the yellow pine forest and foothill regions. At the higher elevations they occurred chiefly in forest chaparral and Garry oak woodland, but also in the forest, meadow, and streamside woodland communities.

A new-born fawn was seen as late as June 28 at Plaskett Meadows, 6000 feet elevation. Fawns were common a month earlier on Sheetiron Mountain at 6400 feet elevation. Sheetiron Mountain seemed to be a nursery area for many does and fawns. It is part of California State Game Refuge 2A that extends across the Eel River between Sheetiron Mountain and Hull Mountain. Browsing on snowbrush and young white firs was very heavy on Sheetiron Mountain. Single fawns and occasionally twins were seen with does. Refuge was sought in clumps of chaparral when the deer were disturbed. During the early summer months while their antlers were in the velvet, the bucks formed bands of two to five and stayed in the open country at high

elevations. They were very wary and difficult to approach. On June 20, 1950, we saw 20 deer on Snow Mountain, of which 17 were forked-horn or larger bucks, two were does, and there was one fawn. A fresh antler still in the velvet was seen at Long Glade on Snow Mountain on August 19. It was a large forked-horn, presumably from an old buck killed during the first week of rifle season (after August 8).

Hunting pressure on deer has been heavy in the Mendocino National Forest. On the opening day of the deer season one year, Forest Supervisor James G. Kaiser and District Ranger Ralph James counted more than 2000 cars on the roads between Alder Springs and Black Butte. They estimated that about 10,000 people were in that area seeking deer. Figures on the deer situation in the Mendocino National Forest during the past five years were:

<u>Year</u>	<u>Estimated No. Deer</u>	<u>Legal Kill (Bucks)</u>
1946	27,000	2260
1947	27,000	2090
1948	29,500	2136
1949		2100
1950	<u>30,000</u>	2300

These figures suggest that one buck was legally killed for approximately every 12.8 deer estimated to be present. Many unsuccessful hunters would not agree that that many bucks were present. During the first week of rifle season in 1950 at least 18 bucks were legally killed on Snow Mountain, according to Game Warden Russell Farrel. Old timers said that the percentage of hunter success

dropped rapidly after the country was opened up by fire roads and jeep roads. Undoubtedly many deer are killed illegally by poachers and eager hunters that shoot at sights and sounds near them. In 1947 one hunter, mistaken for a buck, was killed, and another, mistaken for a jack rabbit, was wounded by other hunters. Some unscrupulous hunters take "camp meat" to be eaten in the mountains, but not to be included on their deer tags. An increasing number of persons are taking advantage of the archery season that opens earlier than the rifle season, but relatively few deer are killed by the archers.

In spite of heavy hunting pressure and forest fires deer are on the increase. Some factors aiding their increase include: legal protection, selective hunting, reduction of natural enemies, and the opening up of new habitat by logging operations.

J. R. Lierly said that deer were very abundant on his ranch near Mount Sanhedrin in 1872. From 1873 to 1875 there was a terrific slaughter of deer for their hides, some hunters killing as many as 100 in a season. The carcasses were left where they fell.

Stone reported in 1904 (126, p. 579) that deer were abundant in the vicinity of Mount Sanhedrin.

Numerous place names in the Mendocino National Forest refer to deer. Some of these are Deer Valley, Deer Creek, Doe Ridge, Little Doe Ridge, Long Doe Ridge, Little Doe

Camp, Doe Canyon, Buck Ridge, Buckhorn Ridge, Buck Creek, Buck Rock, Buck Rock Camp, and Little Buck Rock.

Specimens examined.--A total of 11, as follows: Bald Mountain, 1; Mount Sanhedrin, 5 (4 M.V.Z.); Snow Mountain, 5.

FAUNAL RELATIONSHIPS

BOREAL

The term boreal means "northern". Its use as an adjective has been with geographical units, environments, and biotas bearing the characteristics representative of the northern parts of the Northern Hemisphere. My use of the term boreal will refer to regions and areas in northern California where the faunas bear a marked resemblance to those of the north.

Miller (56, pp. 582-592) in discussing the boreal avifauna of California pointed out that the boreal group of life-zones (Canadian, Hudsonian, and Alpine-Arctic) did not fit the pattern of the avian distribution in California unless the Transition Life-zone was added. He included the latter and remarked that the lower and southern boundaries of the coniferous forests were likewise the main boundaries of distribution for the boreal avifauna.

My study was concerned with only a portion of the boreal fauna of northern California. The earlier definitions of the Canadian Life-zone for the interior mountains of northern California serve to identify these areas quite well. The areas ascribed to the Canadian Life-zone on the coast of northern California have not been so well defined. Apparently these coastal areas (50, pp. 329-330), small in extent, are composed of dense forests of Sitka spruce,

coast hemlock, lowland fir, beach pine, and associated shrubs and herbs. In addition there may be small streams, ponds, and sphagnum bogs. Essentially the same type of vegetation occurs in a narrow coastal strip from Mendocino County, California, northward to Alaska.

No attempt will be made here to trace the historical factors concerned with the development of the vertebrate fauna of the Southern Yolla Bolly Mountains. Daubenmire (18, pp. 17-22) has discussed the origin and distribution of North American plant formations and Gordon (34, pp. 25-31) has discussed the origin and distribution of living North American mammals. Miller stated (101, p. 610) that during Pleistocene times the boreal avifauna extended 200 miles farther south along the California coast, at least, and 1000 feet lower on the interior mountains, and possibly even more extreme extensions may have occurred.

The derivation of the boreal fauna of the Southern Yolla Bolly Mountains as a whole is a problem that would require much more data than are now available and would require investigation of many areas now poorly known faunally. Miller's study of the avifauna of California revealed many significant facts that might be applied to the distribution of other vertebrates than birds, even though it is admitted that they are less motile than birds and have their own specific requirements for life. Miller suggested (101, p. 583) that the boreal avifauna consists

of (1) species of northern derivation, or at least those currently showing northern distribution centers, which range into the Californian extension of the boreal faunal realm; (2) geographic races of boreal or nonboreal species, which as races have differentiated in the boreal faunal provinces north or east of the state, but which extend into it; (3) races of boreal or fundamentally nonboreal species which have differentiated within Californian subdivisions or isolated tracts of the boreal faunal realm. Some of these relationships will become apparent from the discussion to follow on the analyses of the faunas of the boreal districts and areas of northern California.

AUSTRAL

The term austral means "southern". Its use in defining geographical units, environments, and biotas is comparable to that suggested for boreal, but, of course, refers to southern rather than to northern. My use of the term will refer to regions and areas in northern California where the faunas bear a marked resemblance to those of the south.

Miller subdivided the austral avifauna of California into three groups according to origin. The Great Basin and Sonoran austral groups were regarded as being intrusive into California from the east and south. In addition there was the Californian endemic austral group. The

austral life-zones (as used by Miller) included the Lower Sonoran and Upper Sonoran life-zones. It is recognized that some of the nonboreal species have differentiated races that have spread and are now found breeding in boreal areas. Sometimes there are also found in the boreal areas species that are not known to breed there. Presumably they drift into the boreal areas sporadically or regularly (following the breeding season or during migration).

In Table 10 are listed a number of vertebrates found in the boreal areas of the Southern Yolla Bolly Mountains that are not thought to breed there. There are some typical boreal breeders, e.g., evening grosbeaks and Clark nutcrackers, that have been found in these areas, but still may not breed there. The evening grosbeak was not listed in the non-breeding group since the possibility of breeding existed (paired birds in mid-July). On the other hand, the Clark nutcracker was listed as non-breeding, since none was found early in the summer, and, when seen in August, the birds were in a flock. To help clarify the situation on birds, where it is more problematic than in the other vertebrate groups, I have included in Table 11 the austral birds that were listed by Miller for the Californian and Interior (Great Basin) austral provinces, that we have observed in the boreal areas. The adjacent austral districts were listed in Table 11 and the presence of these birds was noted. The Clear Lake and Sacramento

austral districts were the most likely sources of austral birds that moved into these boreal areas.

Further mention of the austral faunas will follow when the analysis of the fauna of the boreal areas of the Southern Yolla Bolly Mountains is discussed.

GENERAL CONTINENTAL OR HOLARCTIC

This is a group of birds unclassified with regard to faunas previously discussed. The name of the group denotes their widespread occurrence in North America and, in some cases, the Northern Hemisphere. Forms found in the boreal areas of the Southern Yolla Bolly Mountains included:

- Cooper Hawk
- American Golden Eagle
- North American Sparrow Hawk
- Northern Killdeer
- Common Cliff Swallow
- Northern Purple Martin
- Lutescent Orange-crowned Warbler
- Pacific Black-headed Grosbeak

GENERAL WESTERN

A further list of birds of widespread western North American distribution, not clearly related with respect to fauna, was given by Miller. Forms found in the boreal areas of the Southern Yolla Bolly Mountains included:

- Western Turkey Vulture
- Western Red-tailed Hawk
- Western Mourning Dove
- Northern Black Swift
- Monterey Red-shafted Flicker
- Western Kingbird

American Holarctic Raven
Western House Wren
Western Warbling Vireo
Black-throated Gray Warbler
Lazuli Bunting

THE VERTEBRATE FAUNAS OF THE CANADIAN LIFE-ZONE OF NORTHERN CALIFORNIA

The recent literature was consulted to determine the vertebrate fauna found in the Canadian Life-zone of northern California, including the Yosemite section of the Sierra Nevada. The classification of geographic areas used was the one proposed by Miller (101, p. 589) for the boreal avifauna of California. It is as follows:

- I. Coastal Boreal Province
 - 1. Northern Coastal Boreal District
 - a. Humboldt Boreal Area
 - 2. Central Coastal Boreal District
 - a. Sonoma Boreal Area
- II. Sierran Boreal Province
 - 1. Trinity Boreal District
 - 2. Sierran-Cascade Boreal District
 - a. Cascade Boreal Area
 - b. Sierra Nevada Boreal Area
 - 3. Warner Mountains Boreal District

A further subdivision was made in the Trinity Boreal District to form the Northern Trinity Boreal Area, which includes South Yolla Bolly Peak and the area north of it, and the Southern Yolla Bolly Boreal Area, which includes the area south of South Yolla Bolly Peak. Only the portion of the Sierra Nevada Boreal Area including the Yosemite section and northward was covered in the compilation.

Care was taken to make necessary nomenclatural changes in old lists of animals so that they would be up-to-date, and only native forms were included. This material is found in Table 7. An explanation of the symbols used in Table 7 follows:

The common name of each species represented is given in taxonomic order. The presence of an X indicates the occurrence of the species, when only one form is present. An X with a question mark indicates the presence of a form of unknown or difficult taxonomic status, e.g., an absence of specimens for taxonomic determination or a series of intergrades between two geographic races. A question mark alone indicates that there is inconclusive evidence for indicating presence, but a possibility of occurrence too worthy to be overlooked. Where two or more geographic races are present each is numbered, but no X is shown.

Table 8 gives the areas in which species were apparently (insofar as the literature records) localized, and thus Table 8 summarizes Table 7 on the species level. To learn the areas of localization of subspecies (geographic races) see Table 9. Endemism is not claimed for all of the forms included in Table 8 and Table 9, but it is often the case. The term "localization" of forms was used with reference to known ranges in northern California, since it was recognized that some of these

localized forms were not endemic and did even occur far beyond the boundaries of northern California.

An analysis of the data in Table 7 was made to see how the boreal districts and areas compared in richness of fauna, localization of forms, and percentage of the total fauna localized. These figures were based upon the most recent and most detailed literature available. It must be admitted that some districts and areas were far better known faunally than others. The species and subspecies recorded here as boreal forms were those that were known to breed or were thought to breed in the boreal areas. Forms known to be migrants, vagrants, and "drifters" were not included. The results of this analysis follow.

	Northern Coastal Boreal District	Central Coastal Boreal District	Trinity Boreal District	Northern Trinity Boreal Area	Southern Yolla Bolly Boreal Area	Sierran-Cascade Boreal District	Cascade Boreal Area	Sierra Nevada Boreal Area	Warner Mountains Boreal District
Boreal species	61	47	121	109	102	156	130	149	97
Boreal species and subspecies	63	49	130	115	104	176	137	158	97
Localized species	7	0	8	0	6	35	3	22	3
Localized subspecies	9	3	26	6	13	48	3	28	13
Total localized forms	14	3	27	6	14	57	4	33	13
Percentage of the fauna localized	22.22	6.12	20.76	5.21	13.46	32.38	2.91	20.88	13.41

Some of the localized species were included among the localized subspecies; hence the total number of localized forms was not the sum of the localized species and subspecies as listed separately.

From this analysis it can be seen that the Sierran-Cascade Boreal District is richest in boreal species while the Central Coast Boreal District (Sonoma Boreal Area) is the poorest. The same relationship can also be seen in regard to localization of forms. The Sierra Nevada Boreal Area of the Sierran-Cascade Boreal District is the richest area in total fauna, localization of forms, and percentage of the total fauna localized. As a center of differentiation of boreal forms in northern California, it far exceeds the sum of differentiates and endemics of all the other boreal districts of northern California (101, p. 587).

Let us next see how the boreal provinces of northern California compare faunally. The same districts as used in the previous analysis will be used again for summation.

	<u>Coastal Boreal Province</u>	<u>Sierran Boreal Province</u>
Boreal species	61	170
Boreal species and subspecies	68	224
Localized species	13	122
Localized subspecies	27	161
Total localized forms	33	189
Percentage of the fauna localized	48.52	84.37
Percentage of the fauna non-localized	51.47	15.62

There are 35 forms common to both provinces. These

comprise over 50% of the total fauna of the Coastal Boreal Province, but only slightly over 15% of the rich fauna of the Sierran Boreal Province. On the species level there were 48 (26.22%) of the 183 boreal species found in northern California common to both provinces. In a number of these species different subspecies were represented in each province.

The fauna of the Coastal Boreal Province is composed of many forms derived from the Oregon Coast which is regarded as an important center of differentiation of boreal forms. The number of forms represented in the districts and areas of the Coastal Boreal Province becomes progressively fewer in a southward direction. Miller (191, p. 618) in discussing the barriers or deterrents to the movements of birds said that this was "partial retardation of flow in a continuum as a result of selective action on individuals not adapted to the environmental extremes". The same situation probably occurs also in fishes, amphibians, reptiles, and mammals. Today there are in addition actual barriers, especially floristic barriers, that effect discontinuity of populations within the species. Some other reasons why the Coastal Boreal Province is poorer faunally than the Sierran Boreal Province are the occurrence of smaller isolated areas, and the fewer ecological (habitat) niches present for vertebrates in the dense, dark, and damp forests of the Coastal Boreal Province. Many of the forms

occurring in the open, lighter, and more arid forests of the interior mountainous parts of the Canadian Life-zone in northern California do occur in the coastal region in the open margins of the redwood forest and in the mixed forests of the Humid Transition Life-zone.

ANALYSIS OF THE BOREAL VERTEBRATE FAUNA OF THE SOUTHERN YOLLA BOLLY MOUNTAINS

When the boreal vertebrate fauna of the Southern Yolla Bolly Mountains was compared with faunas of the two adjacent boreal areas, the Sonoma, (Central Coast), which lies to the west, and the Northern Trinity, which lies to the north, the following relationships were noted:

	<u>Sonoma Boreal Area</u>	<u>Southern Yolla Bolly Boreal Area</u>
Boreal species	47	102
Boreal species and subspecies	49	104
Localized species	0	6
Localized subspecies	3	13
Total localized forms	3	14
Boreal species in common	34	34
Conspicuous differences	Low elevations Very dense forests Humid summers Small temperature range Long growing season	High elevations Less dense forests Arid summers Large temperature range Short growing season
Reasons for faunal similarities	Geographic proximity "Bridges" across the climatic barriers	

Miller commented (101, p. 590) that the most striking

differences between boreal units occur between Humboldt and Trinity (Northern Trinity), and between Sonoma and Trinity (Southern Yolla Bolly). Interiorly reduced rainfall, increased evaporation rate, and partial blocking of coastal fogs by physiographic features has resulted in an altered floral environment in a short distance. The boundary lines between areas of Transition Life-zone, at least, are not as sharp as between discontinuous forest areas, yet over comparable distances in the forest continuum of 20 to 40 miles much more radical changes take place than across many actual forest gaps. The sharpest contrasts of environment and in avian races occur along the breaks in the hygrogradients that occur in the vicinity of the Trinity-Humboldt County Line and along the Sierran axis (101, p. 613).

The over-all picture of differentiation in the boreal faunal areas is one of principal contrasts in an east-west direction, with or without forest discontinuity, in broad correlation with strong moisture gradients. This is more striking than the gradual, but nonetheless real, north-south depletion phenomenon, which is partly related to temperature differences within the limits of the temperature attributes of the whole boreal environmental belt (101, p. 591).

Several explanations for the presence of boreal (vertebrate) forms common to the Sonoma and Southern Yolla

boreal areas seem plausible.

1. Some forms may have been present in the areas when the environment was continuous and no isolation existed, and they have persisted.

2. Some forms are of wide distribution in both coastal and interior regions (see Table 13).

3. Some forms are common to both Canadian and Transition life-zones and are able to "bridge" the unfavorable lowland environment between the Sonoma and Southern Yolla Bolly boreal areas by means of high cross ridges with yellow pine and Douglas fir forests (e.g., the ridges south of Willits) and extend into Canadian Life-zone areas on either end of the "bridge".

All three situations may have contributed to the present faunal composition of these two areas. The geographic affinities of the subspecies found in the Southern Yolla Bolly Boreal Area are given in Table 13. A few species present have subspecies of undetermined status in the area. These are listed in Table 14.

	Southern Yolla Bolly Boreal Area	Northern Trinity Boreal Area
Boreal species	102	109
Boreal species and subspecies	104	115
Localized species	6	0
Localized subspecies	13	6
Total localized forms	14	6
Boreal species in common	89	89

Conspicuous differences	Lower mountains	Higher mountains
	Southern	Northern
	Isolated boreal areas	Nearly continuous boreal areas
	Total boreal area small	Total boreal area large

Reasons for faunal similarities

Geographic proximity
Climatic similarity
Physiographic similarity
Similar vegetation types

The Southern Yolla Bolly Boreal Area and the Northern Trinity Boreal Area comprise the Trinity Boreal District. Subdivision into these two areas was made for convenience in showing the faunal relationships of the southern portion of this district with the northern portion. The faunal relationships between these two areas are remarkably similar. If the Northern Trinity Boreal Area were better known faunally the differences would probably be found to be less than this analysis shows.

The Trinity boreal fauna is smaller than those of the Cascade Mountains and Sierra Nevada, principally because of reduction or absence of alpine and subalpine habitats and lack of numbers of lakes and streams at high elevation suitable for boreal water birds (101, p. 589). The Northern Trinity Boreal Area does have a number of boreal species that were not found in the Southern Yolla Bolly Area, principally because of closer geographic relationships to the Sierran-Cascade fauna, the higher elevations and the greater extent of boreal area. The

Southern Yolla Bolly Boreal Area has a number of boreal species not found in the Northern Trinity Boreal Area, but these are largely austral species that have moved up into small isolated areas and have established themselves there. Miller summarized these relationships when he said (191, p. 590) that although the Trinity Boreal District was large in area and its total fauna fairly distinctive, it had little novelty except in the sense of a distinctive combination of elements derived from the extremes. The elements mentioned referred to a northern element (which diminished in a gradient southward) and a southern element (which diminished in a gradient northward).

ANALYSIS OF THE TOTAL VERTEBRATE FAUNA OF THE BOREAL AREAS OF THE SOUTHERN YOLLA BOLLY MOUNTAINS

A casual survey of the vertebrate fauna in the boreal areas in midsummer or late summer would reveal numerous immature birds that one might assume were produced in the area, by breeding boreal species. On the contrary, it is known from observations made during three consecutive summers that many of these birds were produced in the Transition and Upper Sonoran life-zones nearby and then they moved into the boreal areas. The same trend was noted with some reptiles and mammals. Most of the species listed in Table 10 were regarded as non-breeding forms in boreal areas. Exceptions in this list were the Clark

nutcracker, which is known to breed in the northern Trinity Mountains, and the rufous hummingbird and Townsend warbler, which are not known to breed in California. All three are known to breed regularly in boreal areas elsewhere. Three other species known to breed irregularly in the boreal areas (Canadian Life-zone) elsewhere are the cliff swallow, Holarctic raven, and Brewer blackbird. In this analysis these latter three species were not grouped as boreal breeders.

According to the data now available, it appears that the total vertebrate fauna of the boreal areas of the Southern Yolla Bolly Mountains consists of:

<u>Groups</u>	<u>Number of forms</u>	<u>Percentage of fauna</u>
Boreal breeders in the local areas	106	67.94
Boreal forms not breed- ing locally	3	1.92
Vagrants, "drifters", and nonboreal mi- grants from adjacent areas	44	28.20
Introduced forms	1	.64
Forms recently extinct in the area	2	1.28
	<u>156</u>	<u>100.00</u>

ENDEMISM IN THE TRINITY BOREAL DISTRICT

Earlier discussion of the Trinity Boreal District mentioned that it was not prominent as a center of differentiation, but rather its distinctiveness was based upon its unique combination of elements from other faunas.

True endemics do occur, however, and will be listed below.

The three principal mountain areas used to show the extent of endemism were the Yolla Bolly Mountains on the south, the Trinity Mountains in the center, and the Siskiyou Mountains on the north. In addition there were a number of lesser mountains (Klamath, Scott, Marble, and Salmon) in the north which will be considered collectively under the Siskiyou Mountain (or northern) category.

For flowering plants only full species will be listed, except for the Brewer oak (considered in this study as a variety of Garry oak, but which may actually represent a full species). A number of varietal differentiates of widespread flowering plant species do occur in the Trinity Boreal District, but since no attempt was made to include a complete list of flowering plants for the areas studied, it was thought best to omit them here.

Endemics	Yolla Bolly Mountains	Trinity Mountains	Siskiyou Mountains
Birds			
<u>Passerella iliaca brevicauda</u> Mailliard	x	x	
Mammals			
<u>Mustela frenata saturata</u> (Merriam)		x	
<u>Citellus lateralis mitratus</u> (Howell)	x	x	
* <u>Citellus lateralis trinitatus</u> (Merriam)		x	x
* <u>Eutamias amoenus ochraceus</u> A.H.Howell	x	x	x
* <u>Eutamias townsendii siskiyou</u> A.H.Howell			x
<u>Thomomys bottae acrirostratus</u> Grinnell	x	x?	
<u>Thomomys monticola premaxillaris</u> Grinnell	x		
<u>Microtus oregoni adocetus</u> Merriam	x		
Flowering Plants			
* <u>Picea breweriana</u> Wats.		x	x
* <u>Quercus garryana</u> Dougl. var. <u>breweri</u> Jeps.	x	x	x
<u>Montia saxosa</u> Bdg.	x		
<u>Dentaria corymbosa</u> Jeps.	x		
<u>Pentstemon purpusii</u> Bdg.	x		
<u>Raillardella scabrida</u> Eastw.	x		
*Crosses the Oregon Line, but is still endemic to the Siskiyou Mountains			
x? known to be present at lower elevations and probably occurring also at higher elevations			

SUMMARY

Field work was conducted in the boreal areas of the Southern Yolla Bolly Mountains in order to determine what vertebrate fauna was present during the summer months. Field observations were made, notes were recorded, specimens were collected, and photographs of the areas were taken. The plant communities were studied and lists of the woody plants and some herbs were made.

The dates, places, and amount of time spent in the field are given below. These represent only the time spent in the boreal areas. In addition much more time was required to prepare for the field work and in traveling to reach the study areas.

Year	Month & Day	Areas	Number of Days
1949	May 28	Sheetiron Mountain	1
	May 29	Snow Mountain	1
	June 27-30	Black Butte	4
	July 18-21	Black Butte	4
	September 6-8	Snow Mountain	3
			<u>13</u>
1950	June 14-25	Snow Mountain	12
	June 26	Sheetiron Mountain	1
	June 27-29	Black Butte	3
	June 30	Sheetiron Mountain	1
	July 1-2	Sheetiron Mountain	2
	July 3	Mount Saint John	1
	July 4	Sheetiron Mountain	1
	July 10-16	Mount Sanhedrin	6
	July 17-19	Hull Mountain	3
	July 20-21	Bald Mountain	2
	July 22-24	Hull Mountain	3
	July 25-28	Black Butte	4
	July 29	Sheetiron Mountain	1
	July 30	Mount Saint John	1

Year	Month & Day	Areas	Number of Days
1950	July 31	Goat Mountain	1
	August 1-2	Goat Mountain	2
	August 16-21	Snow Mountain	6
	September 4-8	Goat Mountain	5
			<u>55</u>
1951	May 25-27	Snow Mountain	3
	June 5	Sheetiron Mountain	1
	June 6-7	Mount Saint John	2
	June 8	Sheetiron Mountain	1
	June 12-16	Hull Mountain (Approximate)	4
	June 15-24	Bald Mountain (Approximate)	9
	June 23	Etsel Ridge (Approximate)	1
	June 24-31	Black Butte (Approximate)	7
	July 1	Black Butte	1
	July 1-2	Sheetiron Mountain	1
	July 8-9	Goat Mountain	2
	July 12-17	Mount Sanhedrin	6
	July 17-19	Etsel Ridge	2
	July 19-22	Brushy Mountain (Black Butte)	3
	July 22-25	Black Butte	3
	July 25-26	Goat Mountain	1
			<u>47</u>

Total Days Spent in Each Area:

Black Butte (Black Butte Section)	26
Black Butte (Brushy Mountain Section)	3
Etsel Ridge	3
Bald Mountain	11
Hull Mountain	10
Mount Sanhedrin	12
Sheetiron Mountain	10
Mount Saint John	4
Snow Mountain	25
Goat Mountain	11
	<u>115</u>

Days Spent Personally:

1949	13
1950	55
1951	47
	<u>115</u>

Days of Student Help:

1949	11
1950	143
1951	60
	<u>214</u>

Specimens were examined from the areas listed as follows:

	Fishes	Amphibians	Reptiles	Birds	Mammals	Totals
Black Butte	8	11	23	42	199	283
Etsel Ridge	0	5	0	7	12	24
Bald Mountain	2	11	8	34	76	131
Hull Mountain	0	4	4	21	33	62
Mount Sanhedrin	0	26	18	130	144	318
Sheetiron Mountain	0	3	8	12	27	50
Mount Saint John	0	0	3	21	19	43
Snow Mountain	0	6	25	57	115	203
Goat Mountain	0	9	7	27	55	98
Totals	<u>10</u>	<u>75</u>	<u>96</u>	<u>351</u>	<u>680</u>	<u>1212</u>

Specimens were examined from the following collections:

Pacific Union College Museum of Natural History	1025
Museum of Vertebrate Zoology	147
California Academy of Sciences	40
	<u>1212</u>

A total of 156 vertebrate forms was observed in the areas studied and specimens were taken of the majority of these forms.

The literature was searched for information relating to the areas under study. The pertinent literature found is listed in the bibliography. An attempt was made to cite the original references in the species accounts of the vertebrate animals, but in some cases later references that merely dealt with the original material and added nothing were omitted. Additional information was received orally or in writing from numerous persons acquainted with

items relating to this study. These persons were credited for their help whenever the material was used.

Each of the boreal areas was described, as well as the geographical, geological, physiographical, and climatic characteristics of the region in general. The plant communities were defined, described, and used as habitat units for discussing the vertebrate animals.

The pertinent data relating to each of the vertebrate animals found in the boreal areas were recorded in the species accounts. These data were of much value in analyzing the fauna.

Analysis of the total vertebrate fauna (156 forms belonging to 151 species) revealed the following use of plant communities (and other units) as habitats by the number of living vertebrate forms listed beside each:

Forest	89
Forest Chaparral	54
Meadow	45
Garry Oak Woodland	39
Streamside Woodland	36
Stream, Lake, and Pond	16
Rocky Ridge and Cliff	17
Dry Flat and Bare Hillslope	17
Aerial	21

The geographic areas where each vertebrate form was observed or collected were tabulated (Table 5).

The boreal fauna of the Southern Yolla Bolly Mountains, based upon known or assumed breeding forms in the boreal areas, was compared with other boreal faunas in

northern California. For each faunal area the number of boreal forms present, the localization of species and subspecies in each area, and the percentage of forms in each fauna that were localized were given. The Coastal Boreal Province was found to be poor in boreal forms and to have a comparatively low percentage of localized forms, whereas the Sierran Boreal Province was found to be rich in boreal forms and to have a high percentage of localized forms. The Trinity Boreal District, of which the Southern Yolla Bolly Boreal Area is a part, lies between the Coastal Boreal Province and the main part (Sierran-Cascade Boreal District) of the Sierran Boreal Province. It is intermediate in number of boreal forms between the Coastal and Sierran-Cascade faunas. The composition of the Trinity boreal fauna shows elements of both the Coastal and Sierran-Cascade faunas. True endemism and racial differentiation within the Trinity Boreal District does occur, but it is not as well developed as in other boreal districts of comparable size.

The vertebrate fauna of the boreal areas of the Southern Yolla Bolly Mountains appears to consist mainly of boreal forms (67.94%) that breed in the areas and a fairly large number of nonboreal forms (mostly birds) that breed elsewhere but move into the boreal areas principally in mid-summer and late summer.

CONCLUSIONS

The use of the biotic province concept is a far more satisfactory means of interpreting relationships existing between regional faunas than is the life-zone concept. The best system of biotic provinces proposed for California is that of Munz and Keck (103, pp. 87-105). It clarifies the confusion existing in Dice's Californian Biotic Province (19, pp. 47-49) by the recognition of the Sierran Biotic Province as a separate region of mountains with a climate, flora, and fauna distinct from the lowland areas. The continued use of the terminology of the life-zone concept by the Museum of Vertebrate Zoology to the present time seems justified because of the help it affords in correlating recent publications with earlier publications on faunal areas.

The distribution of plant communities and physical formations is closely correlated with the distribution of many vertebrate animals. Two recent classifications for California vegetation have been proposed. Munz and Keck in 1949 (103, pp. 87-105) outlined a very useful system which includes biotic provinces, vegetation types, and plant communities. The system proposed by Miller in 1951 (101, pp. 531-644) is even better for use in studies of vertebrate distribution, since it includes not only a good classification of plant communities, but also

additional physical formations arranged as geologic, marsh, and aquatic groups. Since vertebrate distribution and survival is dependent upon adequate food sources, shelter, and safe breeding places (not restricted to plant communities), the value of Miller's additional formations can be appreciated. Emphasis upon the life-forms of the plant cover and on the physical aspects of the rock and aquatic habitats was made.

Formerly the extent of the boreal areas in the Southern Yolla Bolly Mountains was much greater than at present. If we accept Miller's suggestion (191, p. 610) that the boreal areas extended 1000 feet or more lower down on the interior mountains during Pleistocene times than at present, then we can say that it extended nearly continuously for the length of the Inner North Coast Ranges of California. The present small geographic units of boreal areas in the Southern Yolla Bolly Mountains existing altitudinally above the yellow pine forest are regarded as relicts. The less wide-ranging and smaller vertebrates (except birds and bats) are today isolated in these relict areas, except in cases where the intervening areas of vegetation at lower elevations are occupied or can be traversed.

The boreal areas nearest geographically to the Southern Yolla Bolly Boreal Area (and the Trinity Boreal District) have contributed the most forms to the vertebrate

fauna. These are the Humboldt Boreal Area and the Sonoma Boreal Area of the Coastal Boreal Province, and the Cascade Boreal Area and the Sierra Nevada Boreal Area of the Sierran Boreal Province. The contributions from the Sierran Boreal Province are so much greater than all others that it is clearly evident that the Southern Yolla Bolly Boreal Area is a part of the Sierran Boreal Province. The vertebrate forms that breed in the boreal areas are considered to be largely of boreal origin, although some austral species have apparently differentiated races that now breed in the boreal areas.

Differences in faunal composition between the Northern Trinity Boreal Area and the Southern Yolla Bolly Boreal Area are not very great. These differences appear to be less than between most adjacent faunal areas of a given faunal province. We can justify the acceptance of the Trinity Boreal District as a unit without subdividing it into areas. My subdivisions into areas was made for convenience in studying the southern area. The difference between these two boreal areas may be attributed to:

1. A depletion of Sierran forms increasing southward.
2. Local invasion by coastal forms from the Humboldt Boreal Area into the Northern Trinity Boreal Area.
3. Local invasion by coastal forms from the Sonoma Boreal Area into the Southern Yolla Bolly Boreal Area.
4. Local invasion by austral forms from adjacent

austral faunal areas.

5. Differentiation of endemic subspecies.
6. Extinction of forms.
7. Differences in geographic continuity.
8. Differences in elevation and latitude.
9. Differences in total sizes of the areas.
10. Differences in number of habitats present.

Miller's concept of the coniferous forests as the chief region of distribution for the boreal avifauna in California is true in its broad aspects. The birds in this avifauna undoubtedly show their principal geographic distribution in northern areas, rather than in southern areas. The same is true for many other vertebrates that inhabit coniferous forests. My use of this concept has been concerned with a limited part of the coniferous forests and hence with only a part of the boreal vertebrate fauna.

Not all forms that breed in the boreal faunal areas, and certainly not all forms that have been observed there, can be considered as true boreal forms. Some vertebrates belonging to species and genera showing their principal geographic distribution in southern areas have been known to breed in boreal faunal areas. Although known to be of austral origin, these forms have been included with the boreal vertebrate fauna because of present breeding range.

The presence of many vertebrates in the boreal faunal

areas that do not breed there can easily be explained by post-reproductive dispersion or "drifting", migration, and vagrancy. The season of highest infiltration by non-breeding forms into the boreal faunal areas is middle and late summer. This is the time of year that population pressure is greatest and dispersion is a natural process for increasing range and for insuring survival of the species, though not for all the individuals.

The small geographic units of vegetation in the boreal faunal areas in the higher Southern Yolla Bolly Mountains offer little restriction to some vertebrate animals of the adjacent yellow-pine forests and foothill chaparral at this season. Only food and shelter requirements must be satisfied and these can be satisfied outside the breeding range. With these considerations in mind, we can understand why the total vertebrate fauna of the higher Southern Yolla Bolly Mountains includes such a unique combination of forms.

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APPENDIX

Table 1. Subalpine and High Montane Coniferous Trees of Northwestern California

	Mount Shasta	Siskiyou Mountains	Klamath Mountains	Scott Mountains	Marble Mountains	Salmon Mountains	Trinity Mountains	North and South Yolla Bolly Peaks	South of South Yolla Bolly Peak
<u>Pinus albicaulis</u> Engelm.	x			x	x	x			
<u>Pinus contorta</u> Dougl. var. <u>murrayana</u> Engelm.	x	x	x	x	x	x	x		
<u>Pinus monticola</u> Don.	x	x	x	x	x	x	x		
<u>Pinus balfouriana</u> Jeff.				x	x	x	x	x	
<u>Pinus jeffreyi</u> Murr.	x	x	x	x	x	x	x	x	x
<u>Pinus lambertiana</u> Dougl.	x	x	x	x	x	x	x	x	x
<u>Tsuga mertensiana</u> (Bong.) Sarg.	x	x	x	x	x	x	x		
<u>Picea engelmannii</u> Englm.	x								
<u>Picea breweriana</u> Wats.		x	x		x		x		
<u>Abies concolor</u> Lindl. & Gord.	x	x	x	x	x	x	x	x	x
<u>Abies magnifica</u> Murr. (including var. <u>shastensis</u> Lem.)	x			x	x	x	x	x	x
<u>Libocedrus decurrens</u> Torr.	x	x	?	x	x	x	x	x	x
<u>Juniperus communis</u> L. var. <u>montana</u> Ait.	x	x					x		
<u>Juniperus occidentalis</u> Hook.	x	x					x	x	

Table 3. Plants Known from the Plant Communities

I. Forest

A. Trees

Shasta Red Fir, Abies magnifica Murr. var. shastensis Lem.
 White Fir, Abies concolor Lindl. & Gord.
 Jeffrey Pine, Pinus jeffreyi Murr.
 Sugar Pine, Pinus lambertiana Dougl.
 Incense Cedar, Libocedrus decurrens Torr.
 Nuttall Willow, Salix scouleriana Barr.

B. Shrubs

Pine-mat Manzanita, Arctostaphylos nevadensis Gray.
 Green Manzanita, Arctostaphylos patula Greene.
 Shiny-leaved Gooseberry, Ribes roezlii Regel var. cruentum (Greene) Jeps.
 Pioneer Gooseberry, Ribes lobbii Gray.
 Sticky Currant, Ribes viscosissimum Pursh. var. hallii Jancz.
 Red-flowering Currant, Ribes sanguineum Pursh.
 Western Mountain Ash, Sorbus sitchensis Roem.

C. Herbs

Many-stemmed Sedge, Carex multicaulis Bailey.
 Brainerd's Sedge, Carex brainerdii Mxz.
 Ample-leaved Sedge, Carex amplifolia Boott.
 Differently-nerved Sedge, Carex heteroneura W. Boott.
 Beavertail Grass, Calochortus caeruleus (Kell.) Wats.
 Fawn Lily, Erythronium californicum Purdy.
 Phantom Orchid, Cephalanthera austinae (Gray) Hel.
 Spotted Coral-root, Corallorhiza maculata Raf.
 Yellow Leafless Mistletoe, Arcuethobium campylo-podium Engelm.
 Miner's Lettuce, Montia perfoliata (Donn) Howell var. depressa (Gray) Jeps.
 Sticky Chickweed, Stellaria jamesiana Torr.
 Menzies' Campion, Silene menziesii, Hook.
 Yolla Bolly Toothwort, Dentaria corymbosa Jeps.
 Differently-leaved Fringe-cup, Lithophragma heterophyllum T. & G.
 Skelton's Violet, Viola skeltonii Torr.
 Fire-weed, Epilobium angustifolium L.
 Dwarf Gayophytum, Gayophytum humile Juss.
 White-veined Wintergreen, Pyrola picta Sm.
 Pine Drops, Pterospora andromeda Nutt.

Broad-leaved Shooting Star, Dodecatheon hendersonii Gray.
 Smooth-leaved Gilia, Gilia capillaris Kell.
 Squaw Lettuce, Hydrophyllum occidentale Gray.
 Western Hound's Tongue, Cynoglossum occidentale Gray.
 Many-flowered Stick-seed, Lappula floribunda (Lehm.) Greene.
 Small-flowered Collinsia, Collinsia parviflora Dougl.
 Torrey's Collinsia, Collinsia torreyi Gray.
 Pine-woods Pedicularis, Pedicularis semibarbata Gray.
 Mountain Hawksbeard, Crepis monticola Cov.
 Silvery Everlasting, Antennaria argentea Benth.

II. Forest Chaparral

A. Trees

Blue Elderberry, Sambucus glauca Nutt.

B. Shrubs

Snowbrush, Ceanothus cordulatus Kell.
 Bitter Cherry, Prunus emarginata (Dougl.) Walp.
 Pine-mat Manzanita, Arctostaphylos nevadensis Gray.
 Green Manzanita, Arctostaphylos patula Greene.
 Huckleberry Oak, Quercus vaccinifolia Engelm.

C. Herbs

Scarlet Fritillary, Fritillaria recurva Benth.
 Red Larkspur, Delphinium nudicaule T. & G.
 Bleeding Heart, Dicentra formosa (Andr.) DC.
 Western Wall Flower, Erysimum asperum (Nutt.) DC.
 Blue Flax, Linum lewisii Pursh.
 Shelton's Violet, Viola sheltonii Torr.
 Erect Rock Phacelia, Phacelia californica Cham.
 var. virgata (Jeps.) Jeps.
 Nettle-leaved Giant-hyssop, Agastache urticifolia (Benth.) Ktze.
 Narrow-leaved Paint-brush, Castilleja affinis H. & A. var. linariaefolia (Benth.) Zelle.
 Large-flowered Stephanomeria, Stephanomeria lactucina Gray.

III. Meadow

A. Conspicuous indicator herbs

False Hellebore, Veratrum californicum Durand.
 Sierra Shooting Star, Dodecatheon jeffreyi Moore.
 Sierra Rein-orchis, Habenaria leucostachys (Lindl.) Wats.

Western Blue Flag, Iris missouriensis Nutt.
 Mountain Meadow Knotweed, Polygonum bistortoides
 Pursh.
 Primrose Monkey-flower, Mimulus primuloides
 Benth.
 White Violet, Viola blanda Willd. var. macloskeyi
 Jeps.
 Great Camass, Camassia leichtlinii (Baker) Wats.

B. Other herbs

Hood's Sedge, Carex hoodii Boott.
 Jones' Sedge, Carex jonesii Bailey.
 Awl Sedge, Carex nervina Bailey.
 Alpine Nerved Sedge, Carex neurophora Mkze.
 Wood Sedge, Carex bolanderi Olney.
 Fragile-sheathed Sedge, Carex fracta Mkze.
 Thick-fruited Sedge, Carex multicostata Mkze.
 Slender-beaked Sedge, Carex athrostachya Olney.
 Abruptly-beaked Sedge, Carex abrupta Mkze.
 Smooth-beaked Sedge, Carex integra Mkze.
 Thick-headed Sedge, Carex pachystachya Cham.
 var. gracilis (Olney) Mkze.
 Brainerd's Sedge, Carex brainerdii Mkze.
 Ross' Sedge, Carex rossii Boott.
 Golden Sedge, Carex aurea Nutt.
 Luzula-like Sedge, Carex luzulina Olney.
 Ample-leaved Sedge, Carex amplifolia Boott.
 Sierra Alpine Sedge, Carex gymnoclada Holm.
 Water Sedge, Carex aquatilis Wahl.
 Kellogg's Sedge, Carex kelloggii W. Boott.
 Inflated Sedge, Carex inflata Hudson var.
utriculata (Boott.) Druce.
 Tiger Lily, Lilium pardalinum Kell.
 Hair-stemmed Eriogonum, Eriogonum spergulinum
 Gray.
 Chamisso's Montia, Montia chamissoi (Ledeb.)
 Dur. & Jac.
 Few-flowered Larkspur, Delphinium pauciflorum
 Nutt.
 Plantain-leaved Buttercup, Ranunculus alismae-
folius Geyer var. alismellus Gray.
 Western Buttercup, Ranunculus occidentalis Nutt.
 var. alceus Jeps.
 Swamp Buttercup, Ranunculus orthorhynchus Hook.
 Sticky Potentilla, Potentilla glandulosa Lindl.
 var. incisa Lindl.
 Slender Potentilla, Potentilla gracilis Dougl.
 Long-stalked Clover, Trifolium longipes Nutt.
 Western Dog Violet, Viola adunca Sm.
 Oregon Willow Herb, Epilobium oregonense Hausskn.

Harkness' Linanthus, Linthanthus harknessii (Curran) Greene.
 Free-flowering Monkey-flower, Mimulus floribundus Dougl.
 Thyme-leaved Speedwell, Veronica serpyllifolia L.
 Shasta Aster, Aster shastensis Gray.
 Long-leaved Aster, Aster adscendens Lindl.
 Sonne's Leafy Arnica, Arnica foliosa Nutt. var. sonnei Jeps.

IV. Garry Oak Woodland

A. Trees

Garry Oak, Quercus garryana Dougl.

B. Shrubs

Brewer Oak, Quercus garryana Dougl. var. breweri Jeps. or Quercus breweri Engelm.

C. Herbs -- similar to those of the forest chaparral, and rocky ridge and cliff communities

V. Streamside Woodland

A. Shrubs

Mountain Alder, Alnus tenuifolia Nutt.
 Sitka Willow, Salix sitchensis Sanson var. parvifolia (Jeps.) Jeps.
 Creek Dogwood, Cornus californica C.A.Mey.
 Western Service Berry, Amelanchier alnifolia Nutt.
 Cascara Sagrada, Rhamnus purshiana DC.
 Blackcap Raspberry, Rubus leucodermis Dougl.
 Wood Rose, Rosa gymnocarpa Nutt.
 Siskiyou Gooseberry, Ribes binominatum Hel.
 Sierra Nevada Currant, Ribes nevadense Kell.

B. Herbs -- similar to those of the stream, lake, and pond community

VI. Stream, Lake, and Pond

A. Aquatic and hydrophytic herbs

Water Buttercup, Ranunculus aquatilis L. var. capillaceus (Thuill.) DC.
 Broad Pondweed, Potamogeton natans L.
 Sphagnum Moss, Sphagnum subsecundum Nees.
 Yellow Pond Lily, Nymphaea polysepala (Engelm.) Greene.
 Common Cat-tail, Typha latifolia L.
 Western Tofieldia, Tofieldia occidentalis Wats.
 Simple-stemmed Bur-reed, Sparganium simplex Huds.

Mountain Meadow Knotweed, Polygonum bistortoides
Pursh.

- B. Herbs of damp ground near bodies of water
 Awl Sedge, Carex nervina Bailey.
 Short-scaled Sedge, Carex leptopoda Mkze.
 False Hellebore, Veratrum californicum Durand.
 Chamisso's Montia, Montia chamissoi (Ledeb.)
 Dur. & Jac.
 Nevada Lewisia, Lewisia nevadensis (Gray) Rob.
 Red Columbine, Aquilegia truncata F. & M.
 Downy Buttercup, Ranunculus hebecarpus H. & A.
 Woodland Star, Lithophragma affinis Gray.
 Mountain Clover, Trifolium cyathiferum Lindl.
 Smooth Woodland Violet, Viola glabella Nutt.
 Western Dog Violet, Viola adunca Sm.
 White Violet, Viola blanda Willd. var. macloskeyi
 Jeps.
 Free-flowering Monkey-flower, Mimulus floribundus
 Dougl.
 Reddish Monkey-flower, Mimulus rubellus Gray.
 Common Monkey-flower, Mimulus guttatus DC.
 Thyme-leaved Speedwell, Veronica serpyllifolia L.
 Sonne's Leafy Arnica, Arnica foliosa Nutt. var.
sonnei Jeps.

VII. Rocky Ridge and Cliff

A. Shrubs

- Cream Bush, Holodiscus discolor (Pursh.) Maxim.
 var. dumosus Dippel.
 Western Service Berry, Amelanchier alnifolia Nutt.
 Desert Mahogany, Cercocarpus ledifolius Nutt.
 Western Choke-cherry, Prunus demissa (Nutt.)
 Dietr.
 Great Basin Sagebrush, Artemisia tridentata Nutt.
 or Artemisia arbuscula Nutt.
 Cascara Sagrada, Rhamnus purshiana DC.
 White-stemmed Rabbit-brush, Chrysothamnus
nauseosus (Pall.) Britt. var. albicaulis
 Rydb.
 Dwarf Barberry, Berberis pumila Greene.
 Greene's Macronea, Macronea greenii (Gray)
 Greene.
 Antelope Brush, Purshia tridentata DC.
 Western Rabbit-brush, Chrysothamnus nauseosus
 (Pall.) Britt. var. occidentalis Hall.

B. Herbs

- Lace Fern, Cheilanthes gracillima Eat.
 Fragile-sheathed Sedge, Carex fracta Mkze.

- Abruptly-beaked Sedge, Carex abrupta Mkze.
 Thick-headed Sedge, Carex pachystachya Cham.
 var. gracilis (Olney) Mkze.
 Luzula-like Sedge, Carex luzulina Olney.
 Fringed Onion, Allium fimbriatum Wats. var.
 aboriginum Jeps.
 Sierra Onion, Allium campanulatum Wats. var.
 bidwelliae Jeps.
 Sickie-leaved Onion, Allium falcifolium H. & A.
 Siskiyou Fritillary, Fritillaria glauca Greene.
 Davis' Knotweed, Polygonum davisiae Brew.
 Oval-leaved Eriogonum, Eriogonum ovalifolium Nutt.
 Sulphur-flower Eriogonum, Eriogonum umbellatum
 Torr.
 Heart-leaved Eriogonum, Eriogonum compositum
 Dougl.
 Lobb's Eriogonum, Eriogonum lobbii T. & G.
 Shaggy Eriogonum, Eriogonum ursinum Wats.
 Pussy Paws, Calyptridium umbellatum (Torr.)
 Greene.
 Yolla Bolly Montia, Montia saxosa Bdg.
 Three-leaved Lewisia, Lewisia triphylla (Wats.)
 Rob.
 Nuttall's Sandwort, Arenaria nuttallii Pax. var.
 gregaria Jeps.
 Water-trickle Larkspur, Delphinium uliginosum
 Curran.
 Chicalote, Argemone platyceras Link. & Otto.
 Incised-leaved Mustard, Sisymbrium incisum Engelm.
 Flat-pod Rock Cress, Arabis platysperma Gray.
 Obtuse-leaved Stone-crop, Sedum obtusatum Gray.
 Summer Saxifrage, Saxifraga aestivalis Fisch.
 Alpine Potentilla, Potentilla gordonii (Hook.)
 Greene.
 Clustered Potentilla, Potentilla congesta Hook.
 var. tilingii Jeps.
 Pursh's Loco-weed, Astragalus purshii Dougl. var.
 lectulus Jones.
 Golden Violet, Viola douglasii Steud.
 Mountain Violet, Viola purpurea Kell.
 Hair-stem Gayophytum, Gayophytum ramosissimum
 T. & G.
 Shining Fräsera, Swertia nitida (Benth.) Jeps.
 Deer's Tongue Fräsera, Swertia radiata (Kell.)
 Ktze.
 Ground Cycladenia, Cycladenia humilis Benth.
 Purple Solonoea, Solonoea purpurascens (Gray)
 Greene.
 Douglas Phlox, Phlox douglasii Hook.
 Scarlet Gilia, Gilia aggregata (Pursh.) Spreng.
 Slender Gilia, Gilia leptalea (Gray) Greene.
 Granite Gilia, Leptodactylon pungens (Benth.) Jeps.

Common Mullein, Verbascum thapsus L.
 Davidson's Pentstemon, Pentstemon menziesii Hook.
 var. davidsonii Piper.
 Mountain Pride Pentstemon, Pentstemon newberryi
 Gray.
 Blue-purple Pentstemon, Pentstemon confertus
 Dougl. var. caeruleo-purpureus Gray.
 Yolla Bolly Pentstemon, Pentstemon purpusii Bdg.
 Dwarf Monkey-flower, Mimulus nanus H. & A.
 Hairy Many-flowered Bedstraw, Galium multiflorum
 Kell. var. hirsutum Gray.
 Large-flowered Stephanomeria, Stephanomeria
 lactucina Gray.
 Greene's Brickellia, Brickellia greenei Gray.
 Intermediate Long-leaved Hawksbeard, Crepis
 acuminata Nutt. var. intermedia Jeps.
 Woolly Mule-ears, Wyethia mollis Gray.
 Small Hemizonella, Hemizonella minima Gray.
 Hoary Chaenactis, Chaenactis douglasii H. & A.
 Rough Raillardella, Raillardella scabrida Eastw.

VIII. Dry Flat and Bare Hillslope

A. Herbs

Pussy Paws, Calyptridium umbellatum (Torr.)
 Greene.
 Chicalote, Argemone platyceras Link. & Otto.
 Tower Mustard, Arabis glabra (L.) Bernh.
 Hair-stem Gayophytum, Gayophytum ramosissimum
 T. & G.
 Common Mullein, Verbascum thapsus L.

Table 4. Vertebrate Animals Known from the Boreal Areas
of the Southern Yolla Bolly Mountains

I. Fishes

- Coast Rainbow Trout, Salmo gairdnerii gairdnerii
Richardson
Eastern Brook Trout, Salvelinus fontinalis (Mitchill)

II. Amphibians

- California Rough-skinned Newt, Triturus granulosus similans Twitty
Pacific Giant Salamander, Dicamptodon ensatus Eschscholtz
Oregon Red Salamander, Ensatina eschscholtzii oregonensis Girard
California Western Toad, Bufo boreas halophilus
(Baird & Girard)
Pacific Tree Toad, Hyla regilla Baird & Girard
California Yellow-legged Frog, Rana boylei boylei
(Baird)

III. Reptiles

- Northern Mountain Swift, Sceloporus graciosus gracilis
Baird & Girard
Shasta Cerulean Alligator Lizard, Elgaria coerulea shastensis (Fitch)
Common Western Skink, Eumeces skiltonianus (Baird & Girard)
Pacific Rubber Snake, Charina bottae bottae Blainville
Western Yellow-bellied Racer, Coluber constrictor mormon (Baird & Girard)
California Striped Racer, Masticophis lateralis
(Hallowell)
Pacific Gopher Snake, Pituophis catenifer catenifer
(Blainville)
Western Garter Snake, Thamnophis elegans (Baird & Girard)
Common Red-sided Garter Snake, Thamnophis ordinatus fitchi Fox
Pacific Prairie Rattlesnake, Crotalus viridis oreganus
Holbrook

IV. Birds

- White Pelican, Pelecanus erythrorhynchos Gmelin
Western Turkey Vulture, Cathartes aura teter Friedmann
American Goshawk, Accipiter gentilis atricapillus
(Wilson)
Cooper Hawk, Accipiter cooperii (Bonaparte)
Northern Sharp-shinned Hawk, Accipiter striatus velox
(Wilson)

- Western Red-tailed Hawk, Buteo jamaicensis calurus
Cassin
- American Golden Eagle, Aquila chrysaetos canadensis
(Linnaeus)
- North American Sparrow Hawk, Falco sparverius spar-
verius Linnaeus
- Sierra Sooty Grouse, Dendragapus fuliginosus sierrae
Chapman
- Sierran Mountain Quail, Oreortyx picta picta (Douglas)
- Coast California Quail, Lophortyx californica brun-
nescens Ridgway
- Northern Killdeer, Charadrius vociferus vociferus
(Linnaeus)
- Pacific Band-tailed Pigeon, Columba fasciata monilis
Vigors
- Western Mourning Dove, Zenaidura macroura marginella
(Woodhouse)
- California Coast Screech Owl, Otus asio bendirei
(Brewster)
- Pacific Horned Owl, Bubo virginianus pacificus Cassin
- Dusky Poor-will, Phalaenoptilus nuttallii californicus
Ridgway
- Northern Black Swift, Nephoecetes niger borealis
(Kennerly)
- Anna Hummingbird, Calypte anna (Lesson)
- Rufous Hummingbird, Selasphorus rufus (Gmelin)
- Migratory Allen Hummingbird, Selasphorus sasin sasin
(Lesson)
- Calliope Hummingbird, Stellula calliope (Gould)
- Monterey Red-shafted Flicker, Colaptes cafer collaris
Vigors
- Western Pileated Woodpecker, Dryocopus pileatus
pycinus (Bangs)
- Sierra Yellow-bellied Sapsucker, Sphyrapicus varius
daggetti Grinnell
- Cabanis Hairy Woodpecker, Dendrocopos villosus hylo-
scopus Cabanis & Heine
- Willow Downy Woodpecker, Dendrocopos pubescens turati
(Malherbe)
- Northern White-headed Woodpecker, Dendrocopos albo-
larvatus albolavatus (Cassin)
- Western Kingbird, Tyrannus verticalis Say
- Hammond Flycatcher, Empidonax hammondii (Xantus)
- Wright Flycatcher, Empidonax wrightii Baird
- Northern Western Flycatcher, Empidonax difficilis
difficilis Baird
- Western Wood Pewee, Contopus richardsonii richardsonii
(Swainson)
- Olive-sided Flycatcher, Nuttallornis borealis
(Swainson)

- Northern Violet-green Swallow, Tachycineta thalassina lepidus Mearns
- Common Cliff Swallow, Petrochelidon pyrrhonota pyrrhonota (Rafinesque)
- Northern Purple Martin, Progne subis subis (Linnaeus)
- Blue-fronted Steller Jay, Cyanocitta stelleri frontalis (Ridgway)
- Northwestern Scrub Jay, Aphelocoma coerulescens caurina Pitelka
- Interior Scrub Jay, Aphelocoma coerulescens superciliosus (Strickland)
- American Holarctic Raven, Corvus corax sinuatus Wagler
- Clark Nutcracker, Nucifraga columbiana (Wilson)
- Short-tailed Mountain Chickadee, Parus gambeli abbreviatus (Grinnell)
- Northern Chestnut-backed Chickadee, Parus rufescens rufescens (J. K. Townsend)
- California Bush-tit, Psaltiriparus minimus californicus Ridgway
- Coast Bush-tit, Psaltiriparus minimus minimus (J. K. Townsend)
- Slender-billed White-breasted Nuthatch, Sitta carolinensis aculeata Cassin
- Red-breasted Nuthatch, Sitta canadensis Linnaeus
- Black-eared Pigmy Nuthatch, Sitta pygmaea melanotis van Rossem
- Sierra Nevada Brown Creeper, Certhia familiaris zelotes Osgood
- Pallid Wren-tit, Chamaea fasciata henshawi Ridgway
- North American Dipper, Cinclus mexicanus unicolor Bonaparte
- Western House Wren, Troglodytes aedon parkmanii Audubon
- San Joaquin Bewick Wren, Thryomanes bewickii drymoeus Oberholser
- Northern Rock Wren, Salpinctes obsoletus obsoletus Say
- Northern California Thrasher, Toxostoma redivivum sonomae Grinnell
- Western Robin, Turdus migratorius propinquus (Ridgway)
- Monterey Hermit Thrush, Hylocichla guttata slevini Grinnell
- Western Mexican Bluebird, Sialia mexicana occidentalis J. K. Townsend
- Mountain Bluebird, Sialia currucoides (Bechstein)
- Northern Townsend Solitaire, Myadestes townsendi townsendi (Audubon)
- Western Golden-crowned Kinglet, Regulus satrapa olivaceus Baird
- Cassin Solitary Vireo, Vireo solitarius cassinii Xantus
- Western Warbling Vireo, Vireo gilvus swainsonii Baird

- Lutescent Orange-crowned Warbler, Vermivora celata lutescens (Ridgway)
 Calaveras Nashville Warbler, Vermivora ruficapilla ridgwayi van Rossem
 Pacific Audubon Warbler, Dendroica auduboni auduboni (J. K. Townsend)
 Black-throated Gray Warbler, Dendroica nigrescens (J. K. Townsend)
 Townsend Warbler, Dendroica townsendi (J. K. Townsend)
 Hermit Warbler, Dendroica occidentalis (J. K. Townsend)
 Northern Tolmie Warbler, Oporornis tolmiei tolmiei (J. K. Townsend)
 Golden Pileolated Warbler, Wilsonia pusilla chryseola Ridgway
 Brewer Blackbird, Euphagus cyanocephalus (Wagler)
 Western Tanager, Piranga ludoviciana (Wilson)
 Pacific Black-headed Grosbeak, Pheucticus melanocephalus maculatus (Audubon)
 Lazuli Bunting, Passerina amoena (Say)
 Western Evening Grosbeak, Hesperiphona vespertina brooksi Grinnell
 California Purple Finch, Carpodacus purpureus californicus Baird
 Cassin Finch, Carpodacus cassinii Baird
 Northern Pine Siskin, Spinus pinus pinus (Wilson)
 Red Crossbill, Loxia curvirostra Linnaeus
 Green-tailed Towhee, Chlorura chlorura (Audubon)
 Sacramento Spotted Towhee, Pipilo maculatus falcinellus Swarth
 Western Lark Sparrow, Chondestes grammacus strigatus Swainson
 Sierra Nevada Oregon Junco, Junco oreganus thurberi Anthony
 Western Chipping Sparrow, Spizella passerina arizonae Coues
 Yolla Bolly Fox Sparrow, Passerella iliaca brevicauda Mailliard
 Montane Lincoln Sparrow, Melospiza lincolni alticola (Miller & McCabe)

V. Mammals

- Northwestern Broad-footed Mole, Scapanus latimanus caurinus Palmer
 Northern Gibbs Shrew-mole, Neurotrichus gibbsii gibbsii (Baird)
 Yosemite Trowbridge Shrew, Sorex trowbridgii mariposae Grinnell
 Mountain Water Shrew, Sorex palustris navigator (Baird)
 Yellowstone Little Brown Bat, Myotis lucifugus carissima Thomas
 Northwestern Long-eared Bat, Myotis evotis evotis (H. Allen)

- Northwestern Long-legged Bat, Myotis volans longicus
(True)
- Northwestern Little California Bat, Myotis californicus caurinus Miller
- Silvery-haired Bat, Lasionycteris noctivagans (LeConte)
- Large Brown Bat, Eptesicus fuscus (Peale & Beauvois)
- Hoary Bat, Lasiurus cinereus (Beauvois)
- Northwestern Black Bear, Ursus americanus altifrontalis Elliot
- Grizzly Bear, Ursus sp.
- California Raccoon, Procyon lotor psora Gray
- Humboldt Pine Marten, Martes caurina humboldtensis
Grinnell & Dixon
- Fisher, Martes pennanti (Erxleben)
- Redwoods Long-tailed Weasel, Mustela frenata munda
(Bangs)
- Northern California Striped Skunk, Mephitis mephitis occidentalis Baird
- California Badger, Taxidea taxus neglecta Mearns
- Townsend Gray Fox, Urocyon cinereoargenteus townsendi
Merriam
- Mountain Coyote, Canis latrans lestes Merriam
- California Valley Coyote, Canis latrans ochropus
Eschscholtz
- California Mountain Lion, Felis concolor californica
May
- California Wildcat, Lynx rufus californicus Mearns
- Douglas Beechey Ground Squirrel, Citellus beecheyi douglasii (Richardson)
- Yolla Bolly Golden-mantled Ground Squirrel, Citellus lateralis mitratus (Howell)
- Ochraceous Yellow Pine Chipmunk, Eutamias amoenus ochraceus A. H. Howell
- Allen Townsend Chipmunk, Eutamias townsendii senex
(Allen)
- Northern Sonoma Chipmunk, Eutamias sonomae sonomae
Grinnell
- Sierra Nevada Chickaree, Tamiasciurus douglasii albolimbatus (Allen)
- Mendocino Northern Flying Squirrel, Glaucomys sabrinus stephensi (Merriam)
- Trinity Northern Flying Squirrel, Glaucomys sabrinus flaviventris Howell
- Pointed-nosed Botta Pocket Gopher, Thomomys bottae acirostratus Grinnell
- Yolla Bolly Mountain Pocket Gopher, Thomomys monticola premaxillaris Grinnell
- Northern California Heermann Kangaroo Rat, Dipodomys heermanni californicus Merriam
- Gambel Deer Mouse, Peromyscus maniculatus gambelii
(Baird)

- Gilbert Piñon Mouse, Peromyscus truei gilberti (Allen)
Rhoads Dusky-footed Wood Rat, Neotoma fuscipes monochroua Rhoads
Sacramento Valley Dusky-footed Wood Rat, Neotoma fuscipes fuscipes Baird
Western Bushy-tailed Wood Rat, Neotoma cinerea pulla Hooper
Dusky Mazama Red-backed Mouse, Clethrionomys mazama obscurus (Merriam)
Sanhedrin California Meadow Mouse, Microtus californicus eximius R. Kellogg
Long-tailed Meadow Mouse, Microtus longicaudus (Merriam)
Yolla Bolly Oregon Meadow Mouse, Microtus oregoni adocetus Merriam
Allen Pacific Jumping Mouse, Zapus pacificus alleni Elliot
Yellow-haired Porcupine, Erethizon dorsatum epixanthum Brandt
California Black-tailed Jack Rabbit, Lepus californicus californicus Gray
Tehama Brush Rabbit, Sylvilagus bachmani tehamae Orr
Roosevelt Elk, Cervus roosevelti Merriam
Columbian Black-tailed Deer, Odocoileus hemionus columbianus (Richardson)

Table 5. Geographic Areas Where Vertebrates Were Observed and Collected

- Key: 1. Observed by others and me--specimens examined by me--published record.
 2. Observed by others and me--specimens examined by me.
 3. Observed by others and me--no specimens examined by me--published record.
 4. Observed by others and me--no specimens examined by me.
 5. Observed by others--specimens examined by me--published record.
 6. Observed by others--specimens examined by me.
 7. Observed by others--no specimens examined by me--published record.
 8. Observed by others--no specimens examined by me.
 9. Observed by me--specimens examined by me.
 10. Observed by me--no specimens examined by me.

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
Fishes									
<u>Salmo gairdnerii</u> <u>gairdnerii</u>	2		2						
<u>Salvelinus fontinalis</u>	2								
Amphibians									
<u>Dicamptodon ensatus</u>	2	2			2			8	
<u>Ensatina eschscholtzii</u> <u>oregonensis</u>	2							2	
<u>Triturus granulosus</u> <u>similans</u>	2				2				
<u>Bufo boreas halophilus</u>				2		2		2	2

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Hyla regilla</u>	2		2		2			2	2
<u>Rana boylei boylei</u>		2	2					2	
Reptiles									
<u>Sceloporus graciosus</u> <u>gracilis</u>	2		2	4	2	2	2	2	2
<u>Elgaria coerulea</u> <u>shastensis</u>	2		8	2	2	2		2	2
<u>Eumeces skiltonianus</u>					7	8			4
<u>Charina bottae bottae</u>	2								
<u>Coluber constrictor</u> <u>mormon</u>			2		7				
<u>Masticophis lateralis</u>				8					
<u>Pituophis catenifer</u> <u>catenifer</u>			2						10
<u>Thamnophis elegans</u>	2		2	8	1			2	2
<u>Thamnophis ordinatus</u> <u>fitchi</u>	2								
<u>Crotalus viridis</u> <u>oreganus</u>	2		8	2	1	2		2	2
Birds									
<u>Pelecanus erythrorhynchos</u>									8
<u>Cathartes aura teter</u>	4	10	4	4	3	4	4	4	4
<u>Accipiter gentilis</u> <u>atricapillus</u>		4			7			10	8

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Accipiter cooperii</u>	8				8			10	
<u>Accipiter striatus velox</u>					7				
<u>Buteo jamaicensis calurus</u>	4		8	4	3	4	4		10
<u>Aquila chrysaetos canadensis</u>	4			4	3	10	4	4	8
<u>Falco sparverius sparverius</u>	4	4	4	4	3	4	4	4	4
<u>Dendragapus fuliginosus sierrae</u>	4		4	8	1			8	4
<u>Oreortyx picta picta</u>	2	2	2	2	1	2	10	2	2
<u>Lophortyx californicus brunnescens</u>			10		8				
<u>Charadrius vociferus vociferus</u>	8		2					2	
<u>Columba fasciata monilis</u>					10				10
<u>Zenaidura macroura marginella</u>	10	8			8				2
<u>Otus asio bendirei</u>					10				
<u>Bubo virginianus pacificus</u>	4		4		2				10
<u>Phalaenoptilus nuttallii californicus</u>	8	10	4	2	10	4		2	2
<u>Nephoecetes niger borealis</u>	4								

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Calypste anna</u>	8			2	8			2	
<u>Selasphorus rufus</u>	8		4		2			8	
<u>Selasphorus sasin sasin</u>	10	10	2	2	2	4	4	2	2
<u>Stellula calliope</u>							2	2	
<u>Colaptes cafer collaris</u>	4	10	4	2	4	10	2	4	4
<u>Dryocopus pileatus pictus</u>	4	4	4	10	2	4	10	2	4
<u>Sphyrapicus varius daggetti</u>	2	2	2	2	1	2	4	2	
<u>Dendrocopos villosus hyloscopus</u>	2		4	4	2	10	10	2	10
<u>Dendrocopos pubescens turati</u>					6				
<u>Dendrocopos albolarvatus albolarvatus</u>	4	10	2	2	2	8	2	1	
<u>Tyrannus verticalis</u>	4								
<u>Empidonax hammondi</u>	2				8	2		2	
<u>Empidonax wrightii</u>	4	10	10	4	1	10	2	2	8
<u>Empidonax difficilis difficilis</u>	10								10
<u>Contopus richardsonii richardsonii</u>	4	10	4	4	1		10	2	4
<u>Nuttallornis borealis</u>	2	10	4	4	3	10	4	4	
<u>Tachycinetta thalassina lepida</u>	4			4			4	4	
<u>Petrochelidon pyrrhonota pyrrhonota</u>						4			

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Progne subis subis</u>			4						8
<u>Cyanocitta stelleri</u> <u>frontalis</u>	2	10	2	4	1	4	4	2	2
<u>Aphelocoma coerulescens</u> <u>caurina</u>	10				1				
<u>Aphelocoma coerulescens</u> <u>superciliosus</u>									4
<u>Corvus corax sinuatus</u>					4	10			4
<u>Nucifraga columbiana</u>								10	8
<u>Parus gambeli abbreviatus</u>	4		2	4	1	4	2	1	2
<u>Parus rufescens rufescens</u>					7				
<u>Psaltiriparus minimus</u> <u>minimus</u>					1				
<u>Psaltiriparus minimus</u> <u>californicus</u>									2
<u>Sitta carolinensis aculeata</u>			10		1		8		
<u>Sitta canadensis</u>	4		2	4	1	2	2	4	2
<u>Sitta pygmaea melanotis</u>					7		2		10
<u>Certhia familiaris zelotes</u>	8	10	2	10	1	10	8	2	10
<u>Chamaea fasciata henshawi</u>				4	7				10
<u>Cinclus mexicanus unicolor</u>	4		10	8				10	
<u>Troglodytes ["]aedon</u> <u>parkmanii</u>	2		2	4	1	2	2	2	4

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Thryomanes bewicki</u> <u>drymoeus</u>					1		2		2
<u>Salpinctes obsoletus</u> <u>obsoletus</u>	4			8	10		4	4	4
<u>Toxostoma redivivum</u> <u>sonomae</u>					1				2
<u>Turdus migratorius</u> <u>propinquus</u>	2	4	4	10	3	4	10	2	10
<u>Hylocichla guttata</u> <u>slevini</u>	4		2	2	1	10	2	2	
<u>Sialia mexicana</u> <u>occidentalis</u>	2	10	2	2	10			4	8
<u>Sialia currucoides</u>	2	8			7				
<u>Myadestes townsendi</u> <u>townsendi</u>	2		2	4	2		2	2	2
<u>Regulus satrapa olivaceus</u>	2	10	4	2	3	2	2	2	4
<u>Vireo solitarius</u> <u>cassinii</u>	2	10	4	4	1			2	2
<u>Vireo gilvus swainsonii</u>	2	10	2		3	10		2	
<u>Vermivora celata</u> <u>lutescens</u>	2	10	2	2	3	4		2	4
<u>Vermivora ruficapilla</u> <u>ridgwayi</u>	2	10	2	8	1	10			2
<u>Dendroica auduboni</u> <u>auduboni</u>	4	10	2	4	1	4	4	2	4
<u>Dendroica nigrescens</u>					5			2	2

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Dendroica townsendi</u>									
<u>Dendroica occidentalis</u>	2		2	4			2	2	2
<u>Oporornis tolmiei tolmiei</u>	4				5			9	
<u>Wilsonia pusilla</u> <u>chryseola</u>	4		2	2				2	4
<u>Euphagus cyanocephalus</u>				10					
<u>Piranga ludoviciana</u>	4	10	2	4	5	4		4	10
<u>Pheucticus melanocephala</u> <u>maculatus</u>	2	10	2	4	3	8		4	
<u>Passerina amoena</u>	4	4	4	2	7				
<u>Hesperiphona vespertina</u> <u>brooksi</u>	8		4		4			10	
<u>Carpodacus purpureus</u> <u>californicus</u>			2		1				
<u>Carpodacus cassinii</u>	2		2	2	4	2	2	2	10
<u>Spinus pinus pinus</u>	2	10	4	4	3	4		4	8
<u>Loxia curvirostra</u>								10	
<u>Chlorura chlorura</u>	1	2	2	2	1	2	10	4	2
<u>Pipilo maculatus</u> <u>falcinellus</u>					1				10
<u>Chondestes grammacus</u> <u>strigatus</u>	10		2		8				
<u>Junco oreganus tharberi</u>	2	4	4	2	1	2	4	2	4
<u>Spizella passerina</u> <u>arizonae</u>	2	10	4	10	1	10	10	4	2

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Passerella iliaca</u> <u>brevicauda</u>	1	2	2	2	1	4	2	1	2
<u>Melospiza lincolni</u> <u>alticola</u>	2	2	2					2	
Mammals									
<u>Scapanus latimanus</u> <u>caurinus</u>	4		2	4	1	2	10	3	8
<u>Neurotrichus gibbsii</u> <u>gibbsii</u>	2		2						
<u>Sorex trowbridgii</u> <u>mariposae</u>	2	2	2		1	2		2	
<u>Sorex palustris</u> <u>navigator</u>	2	2	2					2	
<u>Myotis lucifugus</u> <u>carissima</u>	2								
<u>Myotis evotis evotis</u>					7				2
<u>Myotis volans longicrus</u>					1			2	2
<u>Myotis californicus</u> <u>caurinus</u>	2		2		1	2		7	2
<u>Lasionycteris noctivagans</u>	2				7			2	
<u>Eptesicus fuscus</u>	2	10			1			1	2
<u>Lasiurus cinereus</u>	8								
<u>Ursus americanus</u> <u>altifrontalis</u>	2	4	4	3	3	4	4	4	
<u>Ursus sp.</u>				7					

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Procyon lotor psora</u>									
<u>Martes caurina</u> <u>humboldtensis</u>				7	8			8	
<u>Martes pennanti</u>	8		8	8	8			8	
<u>Mustela frenata munda</u>	2				7				
<u>Mephitis mephitis</u> <u>occidentalis</u>	10				5			10	8
<u>Taxidea taxus neglecta</u>	8		8						
<u>Urocyon cinereoargenteus</u> <u>townsendi</u>		4	8	2	5	10		4	2
<u>Canis latrans lestes</u>	2	4	8	8		10		4	
<u>Canis latrans ochropus</u>				?		?		?	
<u>Felis concolor</u> <u>californica</u>	2				3			4	
<u>Lynx rufus californicus</u>	2				7			8	8
<u>Citellus beecheyi</u> <u>douglasii</u>	2		4	2	1	2		4	2
<u>Citellus lateralis</u> <u>mitratus</u>	2		2	2	4	2	2	2	2
<u>Eutamias amoenus</u> <u>ochraceus</u>	2		2	2			10	1	
<u>Eutamias townsendii</u> <u>senex</u>	2	2	2	2	2	2	2	1	
<u>Eutamias sonomae sonomae</u>			2	2	1	1	2	1	2

Table 5. (Continued)

	Black Butte	Etsel Ridge	Bald Mountain	Hull Mountain	Mount Sanhedrin	Sheetiron Mountain	Mount Saint John	Snow Mountain	Goat Mountain
<u>Microtus oregoni adocetus</u>	2		2		2				
<u>Zapus pacificus alleni</u>	2								
<u>Erethizon dorsatum</u> <u>epixanthum</u>	2		4	8	8	8		2	10
<u>Lepus californicus</u> <u>californicus</u>	4		4	2	1	4	10	3	2
<u>Sylvilagus bachmani</u> <u>tehamae</u>	4	4			1			7	8
<u>Cervus roosevelti</u>					7				
<u>Odocoileus hemionus</u> <u>columbianus</u>	4	4	2	4	1	4	4	2	4
Total number of forms	107	50	88	73	112	60	49	96	82
*One extinct form				*	*				

Table 6. Habitats Used by the Vertebrate Animals

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
Fishes									
<u>Salmo gairdnerii</u> <u>gairdnerii</u>						x			
<u>Salvelinus fontinalis</u>						x			
Amphibians									
<u>Dicamptodon ensatus</u>	x					x			
<u>Ensatina eschscholtzii</u> <u>oregonensis</u>	x								
<u>Triturus granulosus</u> <u>similans</u>						x			
<u>Bufo boreas halophilus</u>			x			x			
<u>Hyla regilla</u>			x		x	x			
<u>Rana boylei boylei</u>						x			
Reptiles									
<u>Sceloporus graciosus</u> <u>gracilis</u>	x	x		x			x		
<u>Elgaria coerulea</u> <u>shastensis</u>	x	x	x						
<u>Eumeces skiltonianus</u>	x	x							
<u>Charina bottae bottae</u>	x								
<u>Coluber constrictor</u> <u>mormon</u>		x		x					
<u>Masticophis lateralis</u>		x							

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
<u>Pituophis catenifer</u> <u>catenifer</u>		x	x	x					
<u>Thamnophis elegans</u>			x			x			
<u>Thamnophis ordinatus</u> <u>fitchi</u>			x						
<u>Crotalus viridis oreganus</u>	x	x	x				x		
Birds									
<u>Pelecanus erythrorhynchus</u>									x
<u>Cathartes aura teter</u>									x
<u>Accipiter gentilis</u> <u>atricapillus</u>	x		x						x
<u>Accipiter cooperii</u>			x						x
<u>Accipiter striatus velox</u>		x		x					x
<u>Buteo jamaicensis calurus</u>									x
<u>Aquila chrysaetos</u> <u>canadensis</u>	x			x			x		x
<u>Falco sparverius</u> <u>sparverius</u>				x			x	x	x
<u>Dendragapus fuliginosus</u> <u>sierrae</u>	x								
<u>Oreortyx picta picta</u>	x	x	x	x					
<u>Lophortyx californicus</u> <u>brunnescens</u>				x					
<u>Charadrius vociferus</u> <u>vociferus</u>			x						

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
<u>Columba fasciata monilis</u>	x								
<u>Zenaidura macroura marginella</u>				x				x	
<u>Otus asio bendirei</u>				x					
<u>Bubo virginianus pacificus</u>	x								
<u>Phalaenoptilus nuttallii californicus</u>	x	x		x					
<u>Nephoecetes niger borealis</u>									x
<u>Calypste anna</u>		x			x				
<u>Selasphorus rufus</u>		x							
<u>Selasphorus sasin sasin</u>		x			x		x		
<u>Stellula calliope</u>		x					x		
<u>Colaptes cafer collaris</u>	x			x					
<u>Dryocopus pileatus picinus</u>	x								
<u>Sphyrapicus varius daggetti</u>	x				x				
<u>Dendrocopos villosus hyloscopus</u>	x								
<u>Dendrocopos pubescens turati</u>	x								
<u>Dendrocopos albolarvatus albolarvatus</u>	x								

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	W Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
<u>Tyrannus verticalis</u>									
<u>Empidonax hammondi</u>	x								
<u>Empidonax wrightii</u>	x	x			x				
<u>Empidonax difficilis</u> <u>difficilis</u>	x								
<u>Contopus richardsonii</u> <u>richardsonii</u>	x								
<u>Nuttallornis borealis</u>	x								
<u>Tachycineta thalassina</u> <u>lepid</u>									x
<u>Petrochelidon pyrrhonota</u> <u>pyrrhonota</u>									x
<u>Progne subis subis</u>									x
<u>Cyanocitta stelleri</u> <u>frontalis</u>	x				x				
<u>Aphelocoma coerulescens</u> <u>caurina</u>	x	x		x					
<u>Aphelocoma coerulescens</u> <u>superciliosus</u>		x							
<u>Corvus corax sinuatus</u>									x
<u>Nucifraga columbiana</u>	x						x		
<u>Parus gambeli abbreviatus</u>	x				x				
<u>Parus rufescens rufescens</u>	x								
<u>Psaltriparus minimus</u> <u>minimus</u>		x							

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope Aerial
<u>Psaltiriparus minimus californicus</u>		x						
<u>Sitta carolinensis aculeata</u>	x							
<u>Sitta canadensis</u>	x							
<u>Sitta pygmaea melanotis</u>	x							
<u>Certhia familiaris zelotes</u>	x							
<u>Chamaea fasciata henshawi</u>		x						
<u>Cinclus mexicanus unicolor</u>						x		
<u>Troglodytes aedon parkmanii</u>	x	x		x	x			
<u>Thryomanes bewicki drymoeus</u>		x						
<u>Salpinctes obsoletus obsoletus</u>							x	
<u>Toxostoma redivivum sonomae</u>		x						
<u>Turdus migratorius propinquus</u>	x		x		x			
<u>Hylocichla guttata slevini</u>	x				x			
<u>Sialia mexicana occidentalis</u>	x							x
<u>Sialia currucoides</u>	x							x

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
<u>Myadestes townsendii</u> <u>townsendii</u>	x								
<u>Regulus satrapa olivaceus</u>	x								
<u>Vireo solitarius</u> <u>cassinii</u>	x			x					
<u>Vireo gilvus swainsonii</u>	x				x				
<u>Vermivora celata</u> <u>lutescens</u>	x	x		x	x				
<u>Vermivora ruficapilla</u> <u>ridgwayi</u>	x	x							
<u>Dendroica auduboni</u> <u>auduboni</u>	x		x						
<u>Dendroica nigrescens</u>	x								
<u>Dendroica townsendi</u>	x								
<u>Dendroica occidentalis</u>	x								
<u>Oporornis tolmiei</u> <u>tolmiei</u>		x			x				
<u>Wilsonia pusilla</u> <u>chryseola</u>	x	x			x				
<u>Euphagus cyanocephalus</u>									x
<u>Piranga ludoviciana</u>	x								
<u>Pheucticus melanocephalus</u> <u>maculatus</u>	x			x	x				
<u>Passerina amoena</u>	x			x	x				

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
<u>Hesperiphona vespertina</u> <u>brooksi</u>	x								
<u>Carpodacus purpureus</u> <u>californicus</u>		x		x					
<u>Carpodacus cassinii</u>	x		x						
<u>Spinus pinus pinus</u>	x		x		x				
<u>Loxia curvirostra</u>	x								
<u>Chlorura chlorura</u>		x							
<u>Pipilo maculatus</u> <u>falcinellus</u>		x		x					
<u>Chondestes grammacus</u> <u>strigatus</u>								x	
<u>Junco oreganus thurberi</u>	x		x					x	
<u>Spizella passerina</u> <u>arizonae</u>	x		x	x				x	
<u>Passerella iliaca</u> <u>brevicauda</u>		x			x				
<u>Melospiza lincolni</u> <u>alticola</u>			x		x				
Mammals									
<u>Scapanus latimanus</u> <u>caurinus</u>	x	x	x		x				
<u>Neurotrichus gibbsii</u> <u>gibbsii</u>			x		x				
<u>Sorex trowbridgii</u> <u>mariposae</u>					x				

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
<u>Sorex palustris navigator</u>			x			x			
<u>Myotis lucifugus carissima</u>	x		x		x	x			x
<u>Myotis evotis evotis</u>	x	x	x	x					x
<u>Myotis volans longicrus</u>	x	x	x	x	x	x			x
<u>Myotis californicus caurinus</u>	x	x	x	x	x	x			x
<u>Lasionycteris noctivagans</u>	x	x	x		x	x			x
<u>Eptesicus fuscus</u>	x	x	x	x	x	x			x
<u>Lasiurus cinereus</u>	x								x
<u>Ursus americanus altifrontalis</u>	x	x	x	x	x		x	x	
<u>Ursus sp.</u>	x	x	x	x	x				
<u>Procyon lotor psora</u>			x		x	x			
<u>Martes caurina humboldtensis</u>	x						x		
<u>Martes pennanti</u>	x								
<u>Mustela frenata munda</u>	x		x		x				
<u>Mephitis mephitis occidentalis</u>	x	x		x					
<u>Taxidea taxus neglecta</u>			x	x				x	
<u>Urocyon cinereoargenteus townsendi</u>		x		x				x	

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope Aerial
<u>Canis latrans lestes</u>	x	x	x	x			x	x
<u>Canis latrans ochropus</u>	x	x	x	x			x	x
<u>Felis concolor californicax</u>		x		x				
<u>Lynx rufus californicus</u>	x	x	x	x	x			
<u>Citellus beecheyi douglasii</u>			x	x				x
<u>Citellus lateralis mitratus</u>	x		x					
<u>Eutamias amoenus ochraceus</u>	x	x					x	
<u>Eutamias townsendii senex</u>	x							
<u>Eutamias sonomae sonomae</u>	x	x		x				
<u>Tamiasciurus douglasii albolimbatus</u>	x							
<u>Glaucomys sabrinus stephensi</u>	x							
<u>Glaucomys sabrinus flaviventris</u>	x							
<u>Thomomys bottae acirostratus</u>			x					x
<u>Thomomys monticola premaxillaris</u>			x					x
<u>Dipodomys heermanni californicus</u>		x						

Table 6. (Continued)

	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope Aerial
<u>Peromyscus maniculatus gambelii</u>	x	x	x	x	x		x	x
<u>Peromyscus truei gilberti</u>		x						
<u>Neotoma fuscipes monochrourea</u>		x					x	
<u>Neotoma fuscipes fuscipes</u>		x					x	
<u>Neotoma cinerea pulla</u>	x						x	
<u>Clethrionomys mazama obscura</u>	x				x			
<u>Microtus californicus eximius</u>			x					
<u>Microtus longicaudus</u>			x					
<u>Microtus oregoni adocetus</u>			x		x			
<u>Zapus pacificus alleni</u>			x		x			
<u>Erethizon dorsatum epixanthum</u>	x		x					
<u>Lepus californicus californicus</u>	x	x		x				x
<u>Sylvilagus bachmani tehamae</u>		x						
<u>Cervus roosevelti</u>	x		x					
<u>Odocoileus hemionus columbianus</u>	x	x	x	x	x			

Table 6. (Continued)

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	Forest	Forest Chaparral	Meadow	Garry Oak Woodland	Streamside Woodland	Stream, Lake, & Pond	Rocky Ridge & Cliff	Dry Flat & Bare Hillslope	Aerial
Total number of living forms	91	55	47	40	37	16	17	17	21
*Extinct forms	2	1	2	1	1				

Table 7. The Vertebrate Faunas of the Canadian Life-zone of Northern California

Key: x -- one form present
 x? -- of unknown or difficult taxonomic status
 ? -- inconclusive evidence
 1, 2, 3, 4 -- each number a separate subspecies

	North Coastal	Central Coastal	Trinity (Northern)	Trinity (Southern Yolla Bolly)	Cascade	Sierra Nevada (North & Central)	Warner Mountains
Fishes							
Rainbow Trout	x	x	x	x	x	x	x
Cutthroat Trout	x						
Dolly Varden					x		
Amphibians							
Rough-skinned Newt				x			
California Newt						x	
Northwestern Salamander	x						
Long-toed Salamander					x	x	x
Pacific Giant Salamander	x	x	x	x	x	x	
Del Norte Salamander	x						
Red Salamander				1		2	
Mount Lyell Salamander					?	x	
Bell Toad	x		x				
Western Toad				1	2	2	2
Yosemite Toad						x	
Pacific Tree Toad	x	x	x	x	x	x	x
Red-legged Frog	1	2					
Cascade Frog					x		
Yellow-legged Frog				1	2	2	
Reptiles							
Mountain Swift			1	1	1	1	2
Blue-bellied Lizard						x	
Cerulean Alligator Lizard			1	1	1	2	1
Rubber Snake			1	1	2	1	2
Western Garter Snake	1,2	1,2	x?	x?	3	3,4	4
Puget Sound Garter Snake	x	x					

Table 7. (Continued)

	North Coastal	Central Coastal	Trinity (Northern)	Trinity (Southern Yolla Bolly)	Cascade	Sierra Nevada (North & Central)	Warner Mountains
Red-sided Garter Snake	1	1	2	2	2	2	2
Prairie Rattlesnake			1	1	1	1	2
Birds							
Common Loon					x		
American Bittern						x	
Canada Goose					x	x	
Mallard			?		x	x	?
Barrow Golden-eye					x	x	
Harlequin Duck						x	
Common Merganser	x	x	x		x	x	
Turkey Vulture			x	x	x	x	x
Goshawk			x	x	x	x	x
Red-tailed Hawk			x	x	x	x	x
Golden Eagle			x	x	x	x	x
Marsh Hawk						x	
Sparrow Hawk			x	x	x	x	x
Sooty Grouse			x	x	x	x	x
Mountain Quail			x	x	x	x	x
Virginia Rail						x	
Killdeer			?	x	x	x	?
Spotted Sandpiper			x		x	x	x
Flammulated Owl			x	?	x	x	?
Horned Owl	1	1	2	2	2	2	3
Great Gray Owl						x	
Short-eared Owl					x	x	
Saw-whet Owl	x	x	x	?	x	x	x
Booming Nighthawk	x	x	x		x	x	x
Calliope Hummingbird			x	x	x	x	x
Red-shafted Flicker	1	2	2	2	2	2	2
Pileated Woodpecker	x	x	x	x	x	x	
Lewis Woodpecker			x	?	x	x	x
Yellow-bellied Sapsucker	1		1	1	1	1	2
Williamson Sapsucker			x		x	x	x
Hairy Woodpecker	1	1,2	2	2	3	3	3
White-headed Woodpecker			x	x	x	x	x
Arctic Three-toed Woodpecker			x		x	x	x
Traill Flycatcher					x	x	
Hammond Flycatcher			x	x	x	x	
Wright Flycatcher			x	x	x	x	x

Table 7. (Continued)

	North Coastal	Central Coastal	Trinity (Northern)	Trinity (Southern Yolla Bolly)	Cascade	Sierra Nevada (North & Central)	Warner Mountains
Western Wood Pewee	x	x	x	x	x	x	x
Olive-sided Flycatcher	x	x	x	x	x	x	x
Horned Lark					x	x	
Tree Swallow					x	x	?
Cliff Swallow						x	
Canada Jay	1		2		2		2
Steller Jay	x	x	x	x	x	x	x
Holarctic Raven						x	
Clark Nutcracker			x		x	x	x
Mountain Chickadee			x	x	x	x	x
Chestnut-backed Chickadee	x	x	x	x			
White-breasted Nuthatch			1	1	2	2	2
Red-breasted Nuthatch	x	x	x	x	x	x	x
Brown Creeper	1	1	2	2	2	2	2
American Dipper	x	x	x	x	x	x	x
House Wren			x	x	x	x	x
Winter Wren	x	x				x	
Rock Wren			x	x	x	x	x
Robin	x	x	x	x	x	x	x
Hermit Thrush	1	1	1	1	1,2	2	2
Swainson Thrush	1	1	1	?	1	1,2	2
Mexican Bluebird			?	x			?
Mountain Bluebird			x	x	x	x	x
Townsend Solitaire			x	x	x	x	x
Golden-crowned Kinglet	x	x	x	x	x	x	x
Ruby-crowned Kinglet			x		x	x	x
Solitary Vireo			x	x	x	x	x
Warbling Vireo			1	1	1	1	2
Orange-crowned Warbler			1	1	1	1	2
Nashville Warbler			x	x	x	x	x
Audubon Warbler	x	x	x	x	x	x	x
Hermit Warbler			x	x	x	x	
Tolmie Warbler	x	x	x	x	x	x	x
Pileolated Warbler	1	1	1	1	1	1	2
Brewer Blackbird			?		x	x	?
Western Tanager			x	x	x	x	x
Lazuli Bunting				x			
Evening Grosbeak	x		x		x	x	x
Cassin Finch			x	x	x	x	x
Pine Grosbeak						x	
Pine Siskin	x	x	x	x	x	x	x

Table 7. (Continued)

	North Coastal	Central Coastal	Trinity (Northern)	Trinity (Southern Yolla Bolly)	Cascade	Sierra Nevada (North & Central)	Warner Mountains
Red Crossbill	1	?	1	?	2	2	?
Green-tailed Towhee			x	x	x	x	x
Vesper Sparrow							x
Oregon Junco			x	x	x	x	x
Chipping Sparrow			x	x	x	x	x
Brewer Sparrow					x	x	x
White-crowned Sparrow					x	x	x
Fox Sparrow			1,2	2	1	1,3	4
Lincoln Sparrow			x	x	x	x	x
Mammals							
Townsend Mole	x						
Woods Mole	x						
Broad-footed Mole	1	1	1,2	1	2	2,3 4	2
Gibbs Shrew-mole	1	2	1	1	1		
Mount Lyell Shrew						x	
Trowbridge Shrew	1,2	2	3	3	3	3	3
Wandering Shrew	1	1	2		2	2	2
Dusky Shrew					x	x	
Pacific Shrew	x	x					
Water Shrew			x	x	x	x	x
Marsh Shrew	1	2					
Little Brown Bat	1		2	2	2	2	2
Long-legged Bat			?	1	2		?
Little California Bat			?	x			
Silvery-haired Bat	x	x	x	x	x	x	
Large Brown Bat			x	x	x	x	x
Hoary Bat	x		x	x	x	x	?
Black Bear	1	1	1	1	2	2	?
Pine Marten			2	1	2	2	?
Fisher	x	x	x	x	x	x	?
Least Weasel			x		x	x	?
Long-tailed Weasel			1	2	3	3	3
Mink	x	x	x		x	x	
Wolverine						x	
River Otter						x	
Badger			x	x	x	x	x
Red Fox					x	x	
Coyote (Mountain)			x	x	x	x	x

Table 7. (Continued)

	North Coastal	Central Coastal	Trinity (Northern)	Trinity (Southern Yolla Bolly)	Cascade	Sierra Nevada (North & Central)	Warner Mountains
Mountain Lion			x	x	x	x	x
Yellow-bellied Marmot					1	1,2	1
Beechey Ground Squirrel			1	1	1	2	
Oregon Ground Squirrel					x		x
Belding Ground Squirrel						x	
Golden-mantled Ground Squirrel			1,2	2	3	3	3
Alpine Chipmunk						x	
Small Chipmunk						x	
Yellow Pine Chipmunk			1	1	2	3	2
Lodgepole Pine Chipmunk					x	x	
Townsend Chipmunk	1	1	2,3	3	3	3	3
Long-eared Chipmunk						x	
Chickaree	1	1	2	2	2	2	2
Northern Flying Squirrel			1,2	2,3	2,4	4	2
Botta Pocket Gopher			?	1		2	
Northern Pocket Gopher						1	2
Mountain Pocket Gopher			1,2	1	3	3	
Small Pocket Mouse						x	
Beaver							x
Deer Mouse	1	1	2	2	2	2	2
Brush Mouse						x	
Dusky-footed Wood Rat			?	1,2			
Bushy-tailed Wood Rat			1	1	1,2	2,3	2
Pacific Coast Lemming Mouse	x						
Mazama Red-backed Mouse			1	1	2	2	
California Red-backed Mouse	x	x					
Montane Meadow Mouse			1		1,2	2	2
California Meadow Mouse			x	x			
Long-tailed Meadow Mouse			1	x?	1,2	1	2
Oregon Meadow Mouse	1	1	2	2			
Mountain Beaver	1		2		3	3	
Humboldt Bay Jumping Mouse	x	x					
Pacific Jumping Mouse			x	x	x	x	
Big Jumping Mouse							x
Yellow-haired Porcupine			x	x	x	x	x
Pika					1	1,2	3
White-tailed Jack Rabbit						x	
Snowshoe Rabbit			1		1,2	2	1
Black-tailed Jack Rabbit			x	x			
Brush Rabbit			?	x			

Table 7. (Continued)

	North Coastal	Central Coastal	Trinity (Northern)	Trinity (Southern Yolla Bolly)	Cascade	Sierra Nevada (North & Central)	Warner Mountains
Roosevelt Elk	x						
Black-tailed Deer (& Mule Deer)			1	1	1,2	1,2	2
Mountain Sheep					1	2	1

Table 8. Apparent Localization of Native Breeding Vertebrate Species in Areas of Canadian Life-zone in Northern California

I. Coastal Province

1. North Coast District

Cutthroat Trout
Northwestern Salamander
Del Norte Salamander
Townsend Mole
Woods Mole
Pacific Coast Lemming Mouse
Roosevelt Elk

2. Central Coast District

II. Sierran Province

1. Trinity District

California Meadow Mouse
Black-tailed Jack Rabbit

A. Northern Section (South Yolla Bolly Peak and northward)

B. Southern Section (South of South Yolla Bolly Peak)

Rough-skinned Newt
Mexican Bluebird
Lazuli Bunting
Little California Bat
Dusky-footed Wood Rat
Brush Rabbit

2. Sierran-Cascade District

Canada Goose
Mallard
Barrow Golden-eye
Short-eared Owl
Traill Flycatcher
Horned Lark
Brewer Blackbird
Dusky Shrew
Red Fox
Lodgepole Pine Chipmunk

A. Cascade Section

Dolly Varden
Cascade Frog
Common Loon

B. Sierra Nevada Section

California Newt
Mount Lyell Salamander
Yosemite Toad
Blue-bellied Lizard
American Bittern
Harlequin Duck
Marsh Hawk

- Virginia Rail
- Great Gray Owl
- Cliff Swallow
- Holarctic Raven
- Pine Grosbeak
- Mount Lyell Shrew
- Wolverine
- River Otter
- Belding Ground Squirrel
- Alpine Chipmunk
- Small Chipmunk
- Long-eared Chipmunk
- Small Pocket Mouse
- Brush Mouse
- White-tailed Jack Rabbit
- 3. Warner Mountains District
 - Vesper Sparrow
 - Beaver
 - Big Jumping Mouse

Table 9. Apparent Localization of Native Breeding Vertebrate Subspecies in Areas of Canadian Life-zone in Northern California

I. Coastal Province

1. North Coast District

Salmo clarkii clarkii
Rana aurora aurora
Colaptes cafer cafer
Perisoreus canadensis obscurus
Scapanus orarius orarius
Sorex trowbridgii trowbridgii
Sorex bendirii palmeri
Myotis lucifugus alascensis
Aplodontia rufa humboldtiana

2. Central Coast District

Rana aurora draytonii
Neurotrichus gibbsii hyacinthinus
Sorex bendirii bendirii

II. Sierran Province

1. Trinity District

Sitta carolinensis aculeata
Passerella iliaca brevicauda
Citellus lateralis mitratus
Eutamias amoenus ochraceus
Thomomys monticola premaxillaris
Clethrionomys mazama obscurus
Microtus oregoni adocetus

A. Northern Section (South Yolla Bolly Peak and northward)

Mustela frenata saturata
Citellus lateralis trinitatus
Eutamias townsendii siskiyou
Glaucomys sabrinus fuliginosus
Thomomys monticola mazama
Aplodontia rufa rufa

B. Southern Section (South of South Yolla Bolly Peak)

Triturus granulosus similans
Bufo boreas halophilus
Rana boylei boylei
Sialia mexicana occidentalis
Myotis volans longicrus
Myotis californicus caurinus
Martes caurina humboldtensis
Mustela frenata munda
Glaucomys sabrinus stephensi
Thomomys bottae acirostratus
Neotoma fuscipes monochroua

- Neotoma fuscipes fuscipes
Sylvilagus bachmani tehamae
 2. Sierran-Cascade District
Rana boylei sierrae
Branta canadensis moffitti
Anas platyrhynchos platyrhynchos
Asio flammeus flammeus
Empidonax traillii brewsteri
Eremophila alpestris sierrae
Loxia curvirostra grinnelli
Sorex obscurus obscurus
Ursus americanus californiensis
Vulpes fulva necator
Eutamias speciosus frater
Glaucomys sabrinus lascivus
Thomomys monticola monticola
Clethrionomys mazama mazama
Aplodontia rufa californica
Ochotona schisticeps schisticeps
Lepus washingtonii tahoensis
 A. Cascade Section
Salvelinus malma parkei
Myotis volans interior
Ovis canadensis californiana
 B. Sierra Nevada Section
Triturus torosus sierrae
Ensatina eschscholtzii platensis
Sceloporus occidentalis taylori
Elgaria coerulea palmeri
Botaurus lentiginosus peeti
Histrionicus histrionicus pacificus
Circus cyaneus hudsonius
Rallus limicola limicola
Strix nebulosa nebulosa
Petrochelidon pyrrhonota pyrrhonota
Corvus corax sinuatus
Pinus enucleator californica
Passerella iliaca monoensis
Scapanus latimanus sericatus
Scapanus latimanus monoensis
Gulo luscus luteus
Lutra canadensis brevipilosus
Marmota flaviventer sierrae
Citellus beecheyi beecheyi
Eutamias minimus scrutator
Eutamias amoenus monoensis
Thomomys talpoides fisheri
Perognathus parvus olivaceus
Peromyscus boylii boylii
Neotoma cinerea acraia
Ochotona schisticeps muiri
Lepus townsendii sierrae

3. Warner Mountains District
- Ovis canadensis sierrae
 - Sceloporus graciosus graciosus
 - Crotalus viridis lutosus
 - Bubo virginianus occidentalis
 - Sphrapicus varius nuchalis
 - Vireo gilvus leucopolius
 - Vermivora celata orestera
 - Wilsonia pusilla pileolata
 - Poecetes gramineus confinis
 - Passerella iliaca fulva
 - Thomomys talpoides quadratus
 - Castor canadensis shastensis
 - Zapus princeps major
 - Ochotona schisticeps taylori

Table 10. Species Found in the Boreal Areas of the Southern Yolla Bolly Mountains, but Not Thought to Breed There

Reptiles

Yellow-bellied Racer
Striped Racer
Gopher Snake

Birds

White Pelican
Cooper Hawk
Sharp-shinned Hawk
California Quail
Band-tailed Pigeon
Mourning Dove
Screech Owl
Dusky Poor-will
Black Swift
Anna Hummingbird
Rufous Hummingbird
Allen Hummingbird
Downy Woodpecker
Western Kingbird
Western Flycatcher
Violet-green Swallow
Cliff Swallow
Purple Martin
Scrub Jay (two subspecies)
Holarctic Raven
Clark Nutcracker
Bush-tit (two subspecies)
Pigmy Nuthatch
Wren-tit
Bewick Wren
California Thrasher
Black-throated Gray Warbler
Townsend Warbler
Brewer Blackbird
Black-headed Grosbeak
Purple Finch
Spotted Towhee
Lark Sparrow

Mammals

Long-eared Bat
Raccoon
Striped Skunk
Gray Fox

Wildcat
Sonoma Chipmunk
Heermann Kangaroo Rat
Piñon Mouse

Table 11. Austral Birds Observed in the Boreal Areas of the Southern Yolla Bolly Mountains

	California Province	Clear Lake District	Sacramento District	San Francisco District	Shasta Valley District	Interior Province	Modoc District
<u>Columba fasciata monilis</u>	x	x	x	x	x		
<u>Otus asio bendirei</u>	x	x		x			
<u>Bubo virginianus pacificus</u>	x	x	x	x	x		
<u>Phalaenoptilus nuttallii</u>							
<u>californicus</u>	x	x	x	x			
<u>Calypste anna</u>	x	x	x	x			
<u>Selasphorus sasin sasin</u>	x			x			
<u>Dendrocopos pubescens turati</u>	x	x	x	x	x		
<u>Aphelocoma coerulescens</u>							
<u>supercilliosa</u>	x		x		x		
<u>Psaltriparus minimus</u>							
<u>californicus</u>	x	x	x		x		
<u>Psaltriparus minimus minimus</u>	x			x			
<u>Sitta carolinensis aculeata</u>	x	x	x	x	x		
<u>Chamaea fasciata henshawi</u>	x	x	x		x		
<u>Thryomanes bewicki drymoecus</u>	x	x	x		x		
<u>Toxostoma redivivum sonomae</u>	x	x	x	x			
<u>Sialia mexicana occidentalis</u>	x	x	x	x	x		
<u>Pipilo maculatus falcinellus</u>	x	x	x		x		
<u>Salpinctes obsoletus obsoletus</u>						x	x
<u>Euphagus cyanocephalus</u>						x	x
<u>Chondestes grammacus strigatus</u>						x	x
<u>Spizella passerina arizonae</u>						x	x

Table 12. Mammals from Adjacent Areas That May Someday Be Found in the Boreal Areas of the Southern Yolla Bolly Mountains

- Sierra Nevada Wandering Shrew, Sorex vagrans amoenus Merriam
- Yuma Bat, Myotis yumanensis sociabilis H. W. Grinnell
(or saturatus Miller)
- California Fringed Bat, Myotis thysanodes thysanodes Miller
- Merriam Cañon Bat, Pipistrellus hesperis merriami (Dobson)
- Townsend Lump-nosed Bat, Corynorhinus rafinesquii townsendii
(Cooper)
- California Ring-tailed Cat, Bassariscus astutus raptor
(Baird)
- Pacific Mink, Mustela vison energumenos (Bangs)
- California Spotted Skunk, Spilogale gracilis phenax Merriam
- California Brush Mouse, Peromyscus boylii boylii (Baird)

Table 13. Geographical Affinities in Northern California of Vertebrate Subspecies Found in the Boreal Areas of the Southern Yolla Bolly Mountains

I. Subspecies showing coastal affinities

A. Amphibians

Ensatina eschscholtzii oregonensis Girard
Rana boylei boylei (Baird)

B. Birds

Lophortyx californicus brunescens Ridgway
Otus asio bendirei (Brewster)
Selasphorus sasin sasin (Lesson)
Aphelocoma coerulescens caurina Pitelka
Parus rufescens rufescens (J. K. Townsend)
Psaltiriparus minimus minimus (J. K. Townsend)

C. Mammals

Myotis evotis evotis (H. Allen)
Myotis volans longicrus (True)
Myotis californicus caurinus Miller
Ursus americanus altifrontalis Elliot
Martes caurina humboldtensis Grinnell & Dixon
Mustela frenata munda (Bangs)
Glaucomys sabrinus stephensi (Merriam)
Neotoma fuscipes monochroua Rhoads

II. Subspecies showing interior affinities

A. Amphibians

Triturus granulosus similans Twitty

B. Reptiles

Sceloporus graciosus gracilis Baird & Girard
Elgaria coerulea shastensis (Fitch)

C. Birds

Accipiter gentilis atricapillus (Wilson)
Aquila chrysaetos canadensis (Linnaeus)
Dendragapus fuliginosus sierrae Chapman
Oreortyx picta picta (Douglas)
Zenaidura macroura marginella (Woodhouse)
Bubo virginianus pacificus Cassin
Phalaenoptilus nuttallii californicus Ridgway
Dryocopus pileatus picinus (Bangs)
Dendrocopos villosus hyloscopus Cabanis & Heine*
Dendrocopos pubescens turati (Malherbe)*
Dendrocopos albolarvatus albolarvatus (Cassin)
Aphelocoma coerulescens superciliosus (Strickland)
Parus gambeli abbreviatus (Grinnell)
Psaltiriparus minimus californicus Ridgway
Sitta carolinensis aculeata Cassin
Sitta pygmaea melanotis van Rossem
Certhia familiaris zelotes Osgood

* Replaces a coastal race toward the south

Chamaea fasciata henshawi Ridgway
Troglodytes aedon parkmanii Audubon
Thryomanes bewicki drymoecus Oberholser
Salpinctes obsoletus obsoletus (Say)
Myadestes townsendi townsendi (Audubon)
Vireo solitarius cassinii Xantus
Vermivora ruficapilla ridgwayi van Rossem
Pipilo maculatus falcinellus Swarth
Chondestes grammacus strigatus Swainson
Passerella iliaca brevicauda Mailliard
Melospiza lincolni alticola (Miller & McCabe)

D. Mammals

Sorex trowbridgii mariposae Grinnell
Sorex palustris navigator (Baird)
Myotis lucifugus carissima Thomas
Canis latrans lestes Merriam
Lynx rufus californicus Mearns*
Citellus lateralis mitratus (Howell)
Eutamias amoenus ochraceus A. H. Howell
Eutamias townsendii senex (Allen)
Eutamias sonomae sonomae Grinnell
Tamiasciurus douglasii albolimbatus Allen
Glaucomys sabrinus flaviventris A. H. Howell
Thomomys bottae acirostratus Grinnell
Thomomys monticola premaxillaris Grinnell
Dipodomys heermanni californicus Merriam
Peromyscus maniculatus gambelii (Baird)
Peromyscus truei gilberti (Allen)
Neotoma fuscipes fuscipes Biard
Neotoma cinerea pulla Hooper
Clethrionomys mazama obscurus (Merriam)
Microtus oregoni adocetus Merriam
Zapus pacificus alleni Elliot
Erethizon dorsatum epixanthum Brandt
Sylvilagus bachmani tehamae Orr

III. Subspecies of wide range through coastal and interior regions of Northern California

A. Fishes

Salmo gairdnerii gairdnerii Richardson

B. Amphibians

Bufo boreas halophilus (Biard & Girard)

C. Reptiles

Charina bottae bottae (Blainville)
Coluber constrictor mormon (Baird & Girard)
Pituophis catenifer catenifer (Blainville)
Thamnophis ordinatus fitchi Fox
Crotalus viridis oreganus Holbrook

D. Birds

Cathartes aura teter Friedmann

* Reaches the south portion of the coast, but a coastal race occurs on the north

Accipiter striatus velox (Wilson)
Buteo jamaicensis calurus Cassin
Falco sparverius sparverius Linnaeus
Charadrius vociferus vociferus (Linnaeus)
Columba fasciata monilis Vigors
Nephoecetes niger borealis (Kennerly)
Colaptes cafer collaris Vigors*
Sphyrapicus varius daggetti Grinnell
Empidonax difficilis difficilis Baird
Contopus richardsonii richardsonii (Swainson)
Tachycineta thalassina lepida Mearns
Petrochelidon pyrrhonota pyrrhonota (Rafinesque)
Progne subis subis (Linnaeus)
Cyanocitta stelleri frontalis (Ridgway)**
Corvus corax sinuatus Wagler
Cinclus mexicanus unicolor Bonaparte
Toxostoma redivivum sonomae Grinnell
Turdus migratorius propinquus (Ridgway)
Hylocichla guttata slevini Grinnell
Sialia mexicana occidentalis J. K. Townsend
Regulus satrapa olivaceus Baird
Vireo gilvus swainsonii Baird
Vermivora celata lutescens (Ridgway)
Dendroica auduboni auduboni (J. K. Townsend)
Oporornis tolmiei tolmiei (J. K. Townsend)
Wilsonia pusilla chryseola Ridgway
Phaeucticus melanocephalus maculatus (Audubon)
Hesperiphona vespertina brooksi Grinnell
Carpodacus purpureus californicus Baird
Spinus pinus pinus (Wilson)
Junco oreganus thurberi Anthony
Spizella passerina arizonae Coues

E. Mammals

Scapanus latimanus caurinus Palmer
Neurotrichus gibbsii gibbsii (Baird)***
Procyon lotor psora Gray
Mephitis mephitis occidentalis Baird
Taxidea taxus neglecta Mearns
Urocyon cinereoargenteus townsendi Merriam
Canis latrans ochropus Eschscholtz
Felis concolor californica May
Citellus beecheyi douglasii Richardson
Microtus californicus eximius R. Kellogg
Lepus californicus californicus Gray
Odocoileus hemionus columbianus (Richardson)

* A coastal race occurs on the extreme north coast

** Another race occurs on the extreme south coast

*** Replaced coastally toward the south by another race

Table 14. Species Present Having Subspecies of Undetermined Status

I. Reptiles

Western Garter Snake, Thamnophis elegans (Baird & Girard). These include a series of intergrades between the races terrestris and elegans.

II. Birds

Red Crossbill, Loxia curvirostra Linnaeus. They probably represent the race grinnelli or the race sitkensis.

III. Mammals

Botta Pocket Gopher, Thomomys bottae (Eyndoux & Gervais). Possibly a new form may occur other than the race acrirostratus.

Long-tailed Meadow Mouse, Microtus longicaudus Merriam. This is possibly a new form, but may be the race sierrae.

Plate 1. Forest Community.

Snow Basin and Black Butte, 6500-7460 feet elevation,
Glenn County.

White firs in the foreground and Shasta red firs in
the background.

June 30, 1951.



Plate 2. Forest Chaparral Community.

West slope of Hull Mountain, 6400-6800 feet elevation,
Mendocino County.

Chaparral consisting of snowbrush, bitter cherry, and
green manzanita with scattered white firs;
heavy Shasta red fir forest on the north-
facing slope in the center background.

June 14, 1951.



Plate 3. Meadow Community.

Plaskett Meadows, 6000 feet elevation, Glenn County.

Wet meadow in the foreground with false hellebore,
Sierra shooting star, and mountain meadow
knotweed, bordered by thickets of mountain
alder and forest of Shasta red fir, white
fir, and sugar pine.

July 1, 1951.



Plate 4. Garry Oak Woodland Community.

Linger Longer, $1\frac{1}{2}$ miles north of Goat Mountain, 5900 feet elevation, Colusa County.

Small mountain form of Garry oak at the left and California black oak at the right.

July 26, 1951.



Plate 5. Streamside Woodland Community.

**One-half mile northwest of Hull Mountain, 6400 feet
elevation, Mendocino County.**

**Thickets of Sitka willow bordering the meadow in the
foreground; Shasta red fir forest in the
background.**

June 14, 1951.



Plate 6. Stream, Lake, and Pond Community.

Keller Lake at 5500 feet elevation on the southwest slope of Black Butte, Glenn County.

A small lake containing masses of green algae, a "floating island" of sphagnum moss, and beds of cat-tails and pondweeds, located at the foot of a talus slope and bordered by thickets of mountain alder, creek dogwood, and cascara sagrada.

June 27, 1951.



Plate 7. Rocky Ridge and Cliff Community.

South ridge of Black Butte, 7000-7300 feet elevation,
Glenn County.

Large rock outcrops and exposed ridge composed of
broken rock.

July 24, 1951.



Plate 8. Dry Flat and Bare Hillslope Community.

Wind gap at the junction of Goat Mountain road and Bear Creek-Stonyford road at the summit, 6000 feet elevation, Colusa County.

Bare hillslope and Garry oaks in the background, and a white fir in the left foreground.

July 26, 1951.



Plate 9. Shallow Permanent Pond.

Lily Pad Lake, one mile east of Mount Sanhedrin, 5500
feet elevation, Mendocino County.

Masses of yellow pond lilies covering the surface of the
pond and bur-reed, false hellebore, and rushes
on the margins.

July 16, 1951.



Plate 10. Pine-mat Manzanita.

North slope of Snow Mountain West, 6800 feet elevation,
Colusa County.

Pine-mat manzanita appearing in openings in the Shasta
red fir forest with the melting of snow.

May 27, 1951.



Plate 11. Shasta Red Fir Forest.

Long Glade, Snow Mountain, 6400 feet elevation, Colusa
County.

Pure stand of Shasta red fir in the background and
temporary pond in the foreground.

May 27, 1951.



Plate 12. Garry Oaks and Jeffrey Pines.

Near Foutch Camp, Snow Mountain, 6500 feet elevation,
Lake-Colusa county line.

Small mountain form of the Garry oak and Jeffrey pine
near the crest of an exposed ridge.

May 27, 1951.



Plate 13. Emergence of False Hellebore.

Dark Hollow, Snow Mountain, 6800 feet elevation, Colusa
County.

Rapid growth of false hellebore shoots near the edge of
a melting snowbank.

May 27, 1951.



Plate 14. Jeffrey Pines.

Near Foutch Camp, Snow Mountain, 6500 feet elevation,
Lake-Colusa county line.

Representatives of the most southern stand of Jeffrey
pines in the Inner North Coast Ranges.

May 27, 1951.



Plate 15. Forest Chaparral-Shasta Red Fir Forest Alterne.

Monkey Rock, Hull Mountain, 6000-6300 feet elevation,
Mendocino County.

South-facing slope with forest chaparral and north-facing
slope with Shasta red fir forest; Shasta red
fir at the left and Jeffrey pine at the right.

June 14, 1951.



Plate 16. Wind Gap.

Head of Butte Creek, Black Butte, 6000-6800 feet elevation, Glenn County.

Sagebrush and rabbit-brush in the foreground, forest chaparral on the south-facing slope and Shasta red fir forest on the crest of Pinto Ridge in the background.

June 30, 1951.



Plate 17. Climax Chaparral-White Fir Forest Alterne.

Impassable Rock, Mount Sanhedrin, 5000-6000 feet elevation, Mendocino County.

Climax chaparral consisting of manzanita, silk-tassel bush, and scrub canyon live-oak on the south-facing slope, and white fir forest and sugar pines on the north-facing slope.

July 14, 1951.

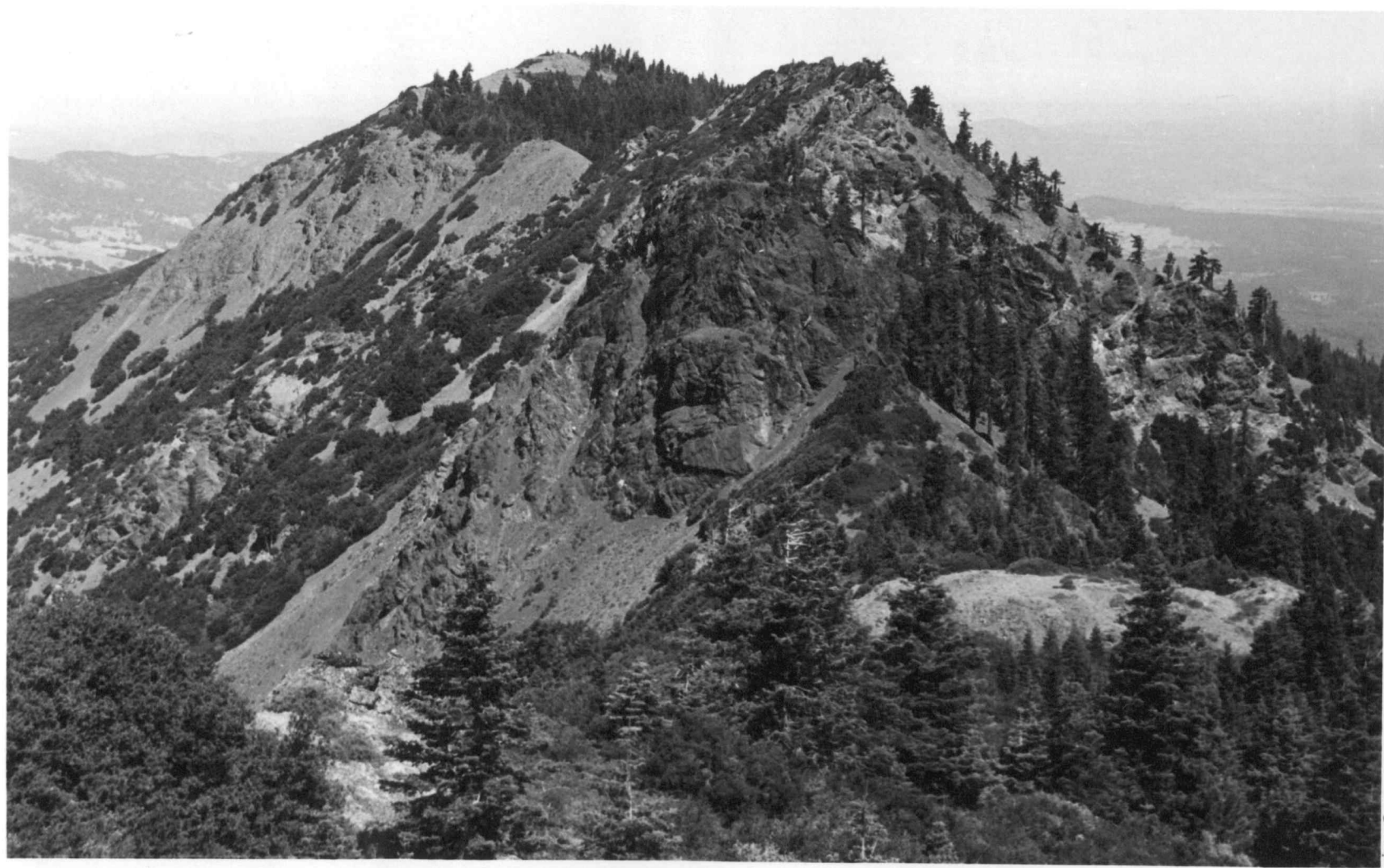


Plate 18. Garry Oak-White Fir Ecotone.

One mile southeast of Post Camp, Etsel Ridge, 5700 feet
elevation, Mendocino County.

Ecotone of Garry oaks and white firs on the crest of
Etsel Ridge.

July 19, 1951.



Plate 19. Wind-swept Summit.

Bald Mountain, 6200-6600 feet elevation, Mendocino County.

White fir forest and forest chaparral on the south-facing slope, barren wind-swept summit, and Shasta red fir forest on the north-facing slope.

June 21, 1951.



Plate 20. Desert Mahogany-Shasta Red Fir Forest Alterne.

Mount Saint John, 6750 feet elevation, Glenn County.

South-facing slope with desert mahogany and north-facing slope with Shasta red fir forest; Sheetiron Mountain in the background and Black Butte in the distance beyond (extreme right of) Sheetiron Mountain.

June 6, 1951.



Plate 21. Porcupine Den.

Near Milk Ranch, Snow Mountain, 6400 feet elevation,
Lake-Colusa county line.

Hollow Shasta red fir used by a porcupine; an accumulation of scats and spines near the entrance to the den.

May 27, 1951.



Plate 22. Shasta Red Fir Branch with Cones.

Plaskett Meadows, Black Butte, 6000 feet elevation,
Glenn County.

Large erect female cone (or megasporangiate strobilus)
with exserted bracts and small pendant male
cones (or microsporangiate strobili).

July 25, 1951.



Plate 23. Erosion Resulting from Sheep Grazing.

Long Glade, Snow Mountain, 6400 feet elevation, Colusa
County.

Blocks of undermined meadow sod crumbled into the erosion
gully at Long Glade, a former sheep camp; the
headwaters of the Middle Fork of Stony Creek.

May 27, 1951.



Plate 24. Leeward Snowpack.

Snow Mountain West, 7040 feet elevation, Colusa County side of the Lake-Colusa county line (running along the top of the ridge).

Remnant (30 feet deep) of the leeward snowpack on the north-facing slope of Snow Mountain West; Shasta red fir forest.

May 27, 1951.



Plate 25. Wind and Snowpack Pavement.

Bald Mountain, 6400 feet elevation, Mendocino County.

Relatively smooth pavement of broken rock resulting from the removal of fine particles by wind and the packing effect of heavy snow covering; basin at the headwaters of Buckhorn Creek with heavy Shasta red fir forest; deformed Jeffrey pine at the left.

June 21, 1951.



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