

CORVIDAEPerisoreus canadensis

Canada Jay

The Canada jay ranges from Alaska, Mackenzie, Manitoba, and Quebec south to New York, Michigan, Minnesota, South Dakota, New Mexico, Arizona, Idaho, and northern California. It is a permanent resident of Oregon. Two subspecies are found on the east and west margins of the Willamette Valley. The gray jay (P. c. griseus) is found in the Cascade Mountains, and the Oregon jay (P. c. obscurus) is found in the Coast Range and adjoining foothills on the east.

Gabrielson and Jewett classify this jay as a bird of the Canadian and Hudsonian zones (38:39-40). I have placed it on the boreal list because of its northern breeding range and coniferan habitat.

The gray jay has been recorded a couple of times from the east side of the valley adjacent to the Cascade foothills (38:417), but I have not yet observed this jay in the valley. The Oregon jay, on the other hand, occurs frequently in the foothills of the Coast Range, and in the small isolated ranges closely adjacent to them along the western edge of the Willamette Valley. I have recorded this latter jay 8 times in the coniferous forest on the

redges of McDonald Forest north of Corvallis, in Benton County (Fig. 10). The dates of these observations were May 8 and 18, June 16, 19, and 30, July 2, August 7, and November 7. Gullion saw five of these jays in the timber east of Creswell in southern Lane County (they may well have been the gray jay, instead).

Bent gives Oregon jay egg dates in Oregon: "4 records, March 31 to April 20" (13:30). I have found no nests of this species in the valley forests, but I have seen adults and young of the year on May 18 and on June 19. On this latter date I watched a family group of 6 birds working through the branches of the Douglas fir on a thickly forested north slope. On this date, and again on August 7 I observed these birds moving through the trees, in a "leap-frog" style, those behind moving ahead of the others, this process being continually repeated until the birds moved out of sight. Adults with at least three young were also seen on June 30.

In summary, this jay is found in cool, dense Douglas fir timber in small hill ranges along the west side of the valley, as well as in the coast range. It is not a rare bird, but field trips seldom take the observer into typical habitat where it could probably be observed every day throughout the year.

Cyanocitta stelleri

Steller's Jay

Bent gives the range of Steller's jay as from Alaska and eastern British Columbia south through the Rocky Mountains and Pacific Coast states into Mexico and Lower California (13:63). The local subspecies, the coast jay (C. s. carbonacea) ranges through the humid coastal strip from northwestern Oregon south into central California. In Oregon it is a permanent resident of the northern half of the Cascades, and northwestern Oregon south to, but not including the Siskiyou and Rogue River Valley, and thence along the coast belt to California (38:417). In the Willamette Valley it is a permanent resident.

The coast jay is classified as boreal by Gabrielson and Jewett (38:36). Bailey lists it as a bird of the Canadian zone (9:28). I have placed it in the boreal list of birds. In California its habitat is "Typically, heavy evergreen woods, as consisting of coast redwood, Douglas spruce, Monterey and Bishop pines, cypress, madrone, laurel, or any of these mixed. A large amount of shade in spring and summer seems to be required by this jay;.." (45:286).

The coast jay has occurred in my notes 106 times for the Willamette Valley area. I have recorded it during

every month of the year the following number of times in these habitats:

	Fir	Oak-Fir	Oak-Madrone	Oak	Total
January	2	2		2	6
February	1	5	2	1	9
March	6	8			14
April	5	4			9
May	10	5		1	16
June	6	1			7
July	1	1			2
August	3	8	1		12
September	3	7	1	1	12
October	3	5			8
November	3	2		1	6
December	3			2	5
Total	46	48	4	8	106

In the majority of observations made on this jay, it was found associated with a habitat containing fir, and even in those areas of oak-fir it was predominantly in the fir. Observations of this jay in the oak, and oak-madrone occurred during the non-breeding season.

I have found no nests myself. Bent gives the following egg dates for Oregon: "16 records, April 4 to June 5; 8 records, April 11 to May 4" (13:64). Nesting dates given

by Gabrielson and Jewett vary from April 14 to June 4. Charles Cutress has given me data on two nests southeast of Milwaukee. One nest, first found March 23, was 100 feet in from the edge of a Douglas fir forest, and was situated at the base of a horizontal limb on the west side of a Douglas fir at a height of 25 feet. The nest was completely shaded. Construction was completed on March 28, with the first egg April 2, and a set of 3 on April 8. On April 3 another nest was found in another Douglas fir at about the same height, except that the nest was about 5 feet out from the trunk of the tree. The eggs of this nesting were eaten by pine squirrels. These are the only records of nesting that I have available.

Not all of these jays nest this early as evidenced by the presence of flocks of half a dozen or more birds in madrone-serviceberry brushy fence rows along roads leading down from outlying ridges of oak-fir covered hills of the Coast Range on April 8. On May 29 I observed a pair courting in McDonald Forest, and then on June 6 I observed a flock of 7 birds - all adults, in the timber area of this forest. In late summer, fall, and through the winter these birds get into the oak and river bottom areas occasionally, but not often. Dave Marshall tells me that he has never seen them in the vicinity of the Columbia River bottomlands near Portland. On September 13 I observed 2 or 3

jays carrying matured wild hazelnuts away from a thicket growth in an area of mixed Douglas fir, bigleaf maple, and ash. Whether they were eating them outright, or storing them, I cannot say.

In summary, the coast or Steller's jay is closely associated with the coniferous forest, for all of its activities, nesting in particular.

Aphelocoma coerulescens

California Jay

The California jay breeds from southern Washington, Utah, Colorado, and Oklahoma south to Texas, Lower California and Mexico. The local subspecies, the long-tailed jay (A. c. superciliosa) breeds from southwestern Washington south to central California (except in Coast Ranges). It is a permanent resident in the Willamette Valley and valleys of the Umpqua and Rogue rivers in southern Oregon. It is also found in southern Klamath and Lake counties.

This jay is classified as a bird of the semi-arid portions of the upper sonoran zone by Bailey (9:12). Because of its southerly breeding range I have placed it on the austral list. In California, the habitat is "Essentially, mixed woodland and chaparral" (45:288). Buchanan (17:43) found this jay in the oak areas and valley fence rows.

I have seen this jay 105 times during every month of

the year in the following habitats:

	Oak-Fir	Oak	Brush	Total
January	1	5	5	11
February		11	5	16
March	1	6	6	13
April	3	6	2	11
May		7	3	10
June		2		2
July	1			1
August	3	5	1	9
September	3	10	2	15
October	1	3	3	7
November		5		5
December			5	5
Total	13	60	32	105

From the chart it is seen that this jay is a chaparral and brush bird, as it is in California. I saw it infrequently in the oak-fir areas, and then the birds were in the oaks and brush and not in the firs. These jays were not seen in the oak-fir areas during the breeding months of May and June. Otherwise, they were fairly well distributed in the three habitats throughout the year. Any absence from these habitats probably was because I failed to visit those habitats during the period involved. The

contrast in habitats occupied by this jay and the Steller's jay is outstanding. Their habitat distribution seems to be complimentary.

The height of the nesting season seems to be late May and early June. I found just one nest. It was in a holly hedge at Woodburn, and there were four young on May 22. The birds have been nesting in this city area for the past few years. Before this, the birds were seen very seldom in this part of the valley. Their numbers seem to have increased during the last decade.

The feeding habits of these jays often take them to the ground, where I have seen individuals, or small groups of five or six birds under brush or in open areas in the scattered oak groves around the valley. In the fall I have observed them feeding on fruits of the firethorn (Pyracantha sp.) and blue elderberry (Sambucus glauca). They are not a benefit to the bird community, for I have seen them take eggs from nests of such birds as the robin.

The abundance distribution of the California jay proposes quite a problem here in the Willamette Valley. In the north, around Portland, there are not too many of these birds, for they are seldom seen by bird observers. A little farther south, from Woodburn and Salem south to Albany and Corvallis there is a great increase in numbers of these jays, but the area south of here and south to Eugene has a

decreased abundance, again. In fact, around Eugene it is very unusual to see one according to Gullion. South of Eugene, and on into California, this jay increases in abundance. What factor, or factors, may be responsible for this peculiar variation in abundance throughout our valley is not known. A detailed study of this one bird, in its various habitats up and down the valley, together with all the factors involved in each habitat, should produce at least a suggestion of the proper answer.

The California jay is an austral bird that occurs in the oak woodlands and brush of the Willamette Valley.

Corvus corax

Holoarctic Raven

This raven is circumpolar in its distribution, extending south to northern Central America. The local subspecies, the American raven (C. c. sinuatus) breeds from southern British Columbia and North Dakota south into Central America. In Oregon it is a permanent resident. Compared to the raven's abundance in eastern Oregon, the Cascades and the Coast Range, the abundance in the Willamette Valley is relatively uncommon.

Although the raven is usually seen in open areas, its holoarctic distribution determines that it should be placed on the boreal list of birds. The raven is a northern bird

that is associated primarily with open and rocky areas, rather than areas of heavy timber, and because of the greater abundance of this type of habitat in the more austral areas, it is assumed that the raven has spread far to the south. In California its habitat requirements entail two important features: "(1) great areas of open or semi-open terrain for foraging; (2) faces of cliffs, bluffs or sea-walls which provide niches for nests safe from quadrapeds" (45:295).

My notes show that I have seen the raven only 52 times in the Willamette Valley. They have not been seen in August, but at least once in each of the other months. Habitats in which they have been seen are:

	Fir	Oak-Fir	Oak	Open	Total
January	1		2	3	6
February		1		5	6
March		2	2	3	7
April		2	1	5	8
May	5			5	10
June	2	1			3
July	1				1
September			1	2	3
October		1		1	2
November		1		3	4
December				2	2
Total	9	8	6	29	52

Those birds seen in the fir areas were just flying over. Those in the oak-fir and oak areas were usually perched in the oak trees, although a few of those seen in the oak-fir areas were feeding on the ground in open areas. Those in the oak areas were either roosting, or feeding on open ground nearby, and those seen in the open were either flying over, or feeding individually or in small groups on the ground. I remember one group of 10 feeding on a dead sheep in a pasture, and squabbling over it at that!

Many people have difficulty distinguishing a raven from a crow, but three things, the hoarse croak, the larger size, and the wedge-shaped tail all aid in certain identification of the raven.

I have never found a nest in the valley, although a few must certainly be present. Most of them probably nest in the foothill areas where suitable cliffs are available. The raven is known to have a considerable daily flight range, so birds seen foraging here on the valley floor, or circling high overhead may have nests many miles away in the foothills of the Cascades, or Coast Range. This soaring habit puts them in a class with the turkey vulture and the redtail hawk, and the ravens are sometimes seen circling in company with either or both of these birds. One time I watched two ravens pairing off against two red-tail hawks, with which they had dog-fights at irregular

intervals.

In the Willamette Valley the raven seems to be an open country bird, which it seems to be wherever itⁱs - in the sagebrush country of eastern, or along the summit of the Cascades, or along the beach of the Oregon coast.

PARIDAEParus rufescens

Chestnut-backed Chickadee

This chickadee ranges from southeastern Alaska and Montana south to southern California. In Oregon it is a common permanent resident from the Cascades west to the coast according to Gabrielson and Jewett. It is common in the Willamette Valley.

It is classified as a boreal bird (38:36). Other observers here in the valley have found it confined to the coniferous forest. Livezey (63:37) lists it as a winter resident in the oak areas, but I have never found it in anything more "oaky" than an oak-fir mixture. I have placed the chestnut-backed chickadee on the boreal list of birds.

I have only 41 records of it for the valley. This is another instance of a birds abundance being misrepresented because a low percentage of my field trips have been into the pure coniferous forest areas. The bird is, in my opinion, not as rare as my notes would indicate. For some unknown reason I saw none in January and July.

The only explanation I have for this is that during both of these months I made less field trips than during other months. The distribution of my observations in the following habitats, follows:

	Fir	Fir-Oak	Total
February	2	3	5
March	1	3	4
April	1	6	7
May	5	2	7
June	4		4
August	1		1
September	1		1
October	1	3	4
November	2	2	4
December	2	2	4
Total	20	21	41

These chickadees are associated closely with coniferous areas. Those seen in the mixed fir-oak areas did not stay just in the fir, but were seen in the oak as well. They also get into the brush at the edge of the forests, but not in open brush or oak areas away from the forests the way the Oregon chickadee occurs. I have no explanation for their scarcity during the late summer and early fall in the valley. Perhaps they move into the mountains during the hot period.

Charles Cutress has given me three nest records of this chickadee. One was found at Barlow on April 27, in a Douglas fir stump at a height of 8 feet. It contained 7 eggs. Near Milwaukee, two nests were found on May 10 and

11, one in a fir stump, and one in an alder stump in mixed fir and river bottom tree area. I have observed pairing and copulation of this species in mid- to late April, and I have found young in the middle and latter part of June. They have always occurred in fir woods, or mixed areas containing fir.

In winter these birds join other winter birds to form typical winter flock associations found throughout the northern hemisphere. Publicity has recently been given to those of eastern Washington and northern Idaho by Wing (95: 510-511), and those of northern India by Evenden (31).

In summary, the chestnut-backed chickadee is a boreal bird that stays, typically, in the coniferous forests and its associated brush habitats.

Psaltiriparus minimus

Bush-tit

The bush tit ranges over the western United States from southern British Columbia and Montana, south to Oklahoma, western Texas, Lower California, and Central America. Our local subspecies, the coast bush-tit (P. m. minimus) breeds along the coast from British Columbia to southern California. It is a permanent resident of the Willamette Valley and Oregon coast.

It is classified as a bird of the semi-arid portions of the Upper Sonoran zone (9:15). Because of its southern

breeding range and chaparral habitat I have placed it on the austral list. In California its habitat is "Typically, "hard" chaparral, especially where of tall growth and mixed with dense-foliaged evergreen trees. Of all the many tree and shrub species which provide forage, roosting and nesting places for Bush-tits, the live oak and scrub oak, and the various species of deer brush (Ceanothus), seem to be most preferred" (45:314).

I have only 64 records of the bush-tit in the valley area. This is not very indicative of the commonness of this bird, for it seems to me it should have been recorded many more times. I saw it every month in the following habitats:

	Brush	Oak	Oak-Fir	Total
January	1	2		3
February	5	2	1	8
March	9			9
April	7	3		10
May	2	3	2	7
June	3	1	2	6
July	1			1
August	2	1		3
September	3		1	4
October		2	1	3
November	3	1	1	5

chart continued:

	Brush	Oak	Oak-Fir	Total
December	3		2	5
Total	39	15	10	64

The bush-tit was seen predominantly in brush areas (Fig. 16), and when in the areas dominated by trees of either oak or fir it still occurred in the brush most of the time. In areas of heavier woods containing mixed oak and fir, the bush-tits do work the firs to a limited extent. Their occurrence was evenly distributed through the habitats listed during most of the months of the year. Gordon Gullion reports that his observations of this species have been in open oak forests and brushlands. Mr. Willet Griffie says that they occur in mixed areas, but are predominantly in the hardwood areas.

Most of the nesting takes place in April and May. Charles Cutress has given me records on four nests he has found at Milwaukee. These were found on March 30, April 13, May 1, and June 3, showing the extremes of the nesting season. These nests were in hazel, sweetbriar, and syringa. I have records of three nests. One was found in a scrub oak patch south of Corvallis on May 9. Another nest was found May 12 at the edge of an old-growth fir forest, in a dogwood tree that was exposed to afternoon sunlight. A third nest was found in a wild cherry tree in an abandon-

ed pasture area on June 10. This last one is the latest nesting record that I have. I have found very small young birds being tended and fed by the adults on May 19 and June 29.

In winter, flocks of 15 or 20 of these birds may be found working the brush areas alone, or in company with other species of winter birds to form typical winter bird associations. They maintain a continual line of chattering, which it is assumed is a means of communication, more or less binding the flock together.

In summary, the bush-tit is found in brush and oak, or oak-fir areas throughout the valley, but is not found in fully open or coniferous habitats.

SITTIDAESitta carolinensis

White-breasted Nuthatch

The white-breasted nuthatch breeds from southern Canada south to Florida, the Gulf of Mexico, Mexico, and Lower California. The local subspecies, the slender-billed nuthatch (S. c. aculeata) breeds from southern British Columbia to northern Lower California west of the Cascades and Sierras. It is a permanent resident of the Coast Ranges, Cascades, and Willamette Valley in Oregon.

I have placed it on the austral list because of its southern breeding range. In California, its habitat is the "Open-branched trees with trunks and larger branches that are rough-barked, upon which, by characteristic method, most of the foraging is done.... There must be present dead, or partly dead, trunks, providing cavities for nesting purposes" (45:316). Livezey lists this nuthatch as a permanent resident of the oak areas in the vicinity of Corvallis (63:37).

In my experience the slender-billed nuthatch has been quite common here in the valley for I have recorded it 157 times. It seems to be distributed more or less equally through all the months in the following habitats:
(on the next page)

	Brush	Oak	Oak-Fir	Total
January	4	4	2	10
February	10	7	3	20
March	13	8	2	23
April	9	7	4	20
May	7	6	3	16
June	6	2	3	11
July	3	1	1	5
August	5	7	4	16
September	4	4	7	15
October	5	1	1	7
November	2	3	1	6
December	5	2	1	8
Total	73	52	32	157

This chart shows quite conclusively that this nut-hatch is a bird of the brush, primarily, and secondarily of oak and brush mixtures. Its occurrence in oak-fir areas is to be expected, and within those areas it does not work just the oak, but is occasionally seen on the firs. No important variation in habitat use is noticeable from one season to another.

Nesting activity seems to occur during late April and May. I found a nest on April 25 at a height of 10 feet in a bigleaf maple along the Mary's River near Corvallis. The nest hole was situated on the east side where I could watch

it easily. The female was brooding the eggs, and this particular afternoon the male brought food to the nest no less than eighteen times during a period of 52 minutes, during which period I timed the individual visits accurately, and recorded the types of food the male brought. This is the only nest I have found, but Mr. Willet Griffie has given me data on a nest he found near Corvallis. The nest was found on May 10 at a height of 12 feet in a dead oak stub. Gordon Gullion tells me he found young in an oak grove near Eugene on May 30. He did not say what age they were.

In the fall, winter and early spring these birds join other birds in the typical roving winter flock associations found throughout the northern hemisphere (95:510-11; 31). These flocks are a conspicuous part of the winter landscape, roving through the brush, woods, forests, and river bottom areas in search of food.

In summary, the slender-billed nuthatch as found in the Willamette Valley is a resident of the brush and oak areas, principally, occasionally getting into the oak and fir mixtures, or into some of the fir.

Sitta canadensis

Red-breasted Nuthatch

The red-breasted nuthatch ranges from the northern limits of timber in Canada south in the Appalachians to North Carolina, northern Minnesota, New Mexico, Arizona,

and in the mountains to southern California. It is a permanent resident in the timbered portions of Oregon.

It is classed as a bird of the Hudsonian zone (38:40). Its northern and coniferan range indicate it is a boreal bird, and I have placed it in the boreal list. Grinnell and Miller give its habitat as the "Coniferous forest, mainly of Canadian life-zone. The single type of tree most frequented is the fir (Abies), both red and white, on the loftier branches of which most of the foraging is carried on.... For use in the breeding season, trunks of dead trees or dead parts of living trees are required, of degree of decay permitting the birds to do their own drilling of complete nest-holes. Such trunks are usually also of conifers, but at the lower altitudes cottonwood and black oak are also used" (45:318). Livezey (63:37) did not list this nuthatch in his studies of oak areas near Corvallis.

I have recorded this nuthatch every month of the year just 82 times in the following habitats:

	Fir	Fir-Oak	Oak	Total
January	1		3	4
February	3	3		6
March	3	6		9
April	3	12	1	16
May	10	8		18
June	3	2		5

chart continued:

	Fir	Fir-Oak	Oak	Total
July	1	1		2
August	5	1		6
September	3	2		5
October	3	1		4
November	3	1	2	6
December	1			1
Total	39	37	6	82

This chart needs very little explanation. The red-breasted nuthatch is found principally in a habitat in which conifers occur. Infrequently it is seen in pure oak areas. When in mixed fir-oak sections it usually is seen on the conifers, and not the oaks.

Nesting begins in April and lasts through May. I have found three different nests. On April 18 a nuthatch was drilling in a dead oak limb at a height of about 12 feet in a mixed fir-oak area. Another nest was found on April 25. It was completed, and in a dead oak snag, surrounded by tall firs. The nest was 30 feet above the ground. On May 16 I found a third nest located in a dead fir snag in a clearing. The nest was at a height of 35 feet. Mr. Willet Griffie tells me of a nest he found on May 12 at a height of 15 feet in a dead alder tree. Charles Cutress found a nest on May 7 that was 25 feet above the ground in

a small oak stub.

This is another of the several species of birds that form the winter flock associations seen throughout the winter months in the brush and forest areas. During this season this nuthatch tends more toward the mixed oak-fir sections.

This boreal bird occurs principally in habitats that possess conifers, either in pure or mixed stands with oaks here in the valley. During the winter months there is a tendency toward the mixed areas in comparison with the conifer areas. Nesting sites are not restricted to conifers, even within the coniferous sections.

CERTHIIDAECerthia familiaris

Brown Creeper

The brown creeper breeds from central Alaska, Alberta, and southern Quebec south in the mountains to North Carolina, northern Minnesota, Arizona and New Mexico, and on the west coast in the mountains to southern California. Our local subspecies, the California or tawny brown creeper (C. f. occidentalis) breeds on the Pacific Coast from Sitka, Alaska to central coastal California. In Oregon it is a permanent resident in the western part of the State. In the Willamette Valley it frequents the dense coniferous forest sections.

The brown creeper is classed as a boreal bird (38:36). Its northern range, and occurrence in the coniferan areas indicates that I should place it on the boreal list. In California, its habitat is the "Densest and oldest forests available" (45:324). Livezey (63:37) lists it as a permanent resident of the oak areas near Corvallis, but my own experience disagrees entirely with this statement.

I have observed the brown creeper only 49 times here in the valley. The low number of times I have seen it indicates the infrequency of my visits to the dense coniferan areas. The bird is more common, and one has only to get into a dense fir forest to hear or see this bird. I have

seen it in the following habitats:

	Fir	Fir-Oak	Oak	River bottom	Total
January	1				1
February		3		1	4
March	1	4		2	7
April	1	5		1	7
May	5	4	1		10
June	4				4
July	1				1
August	4	2			6
September	1	2			3
October	1				1
November	1	1	1		3
December		1	1		2
Total	20	22	3	4	49

Although these creepers were recorded every month, they were seen most in the months of March, April, and May. Usually they are a very quiet bird, but during the season they are most active and calling frequently (Spring), the observer can locate them more easily. Occurrences in oak, brush, and river bottom areas were very infrequent. Its occurrence in the river bottom and brush areas was during the winter months, only. Most of the time it was found in a habitat occupied by fir, or a mixture of fir and oak.

In this latter area it stayed primarily in the firs. An interesting point is that they occurred in only pure fir in June and July.

The nesting season is from April into June in the Willamette Valley. I have observed courting on April 26. I have never found an active nest, but old nests I have found were under loose pieces of bark on Douglas fir snags, in a crevice of a Douglas fir stump, and one located at a height of 8 feet behind a piece of split wood and bark on an 11 inch diameter Douglas fir snag in a logged area. Charles Cutress found two nests at Milwaukee. On April 28 he found one at 16 feet under the bark of an alder in a mixed fir and river bottom area. On June 25 he found another nest under alder bark at a height of 24 feet in the same locality. Gordon Gullion has seen young of undetermined age on May 18.

During the winter seasons I have seen very few creepers, for two reasons - They are very quiet during this time, and I visited the dense fir forests very seldom during the winter. From the evidence I have, it seems that these birds spread out into more open and deciduous tree and brush areas during the winter months. In summary, the brown creeper is a boreal bird that stays in the coniferous forest a majority of the time, but shows a tendency to scatter into other habitats during the winter season.

CHAMAEIDAEChamaea fasciata

Wren-tit

The wren-tit is found west of the Sierras in California from the Mexican boundary northward to the Rogue River Valley and along the coast strip as far north as Tillamook, in Oregon. The coast wren-tit (C. f. phaea) is our local subspecies. In Oregon it is a permanent resident of the immediate coastal strip. Up to the present time no record of its occurrence has ever been noted in the Willamette Valley.

Because of its southerly breeding range, and its limitations to a brush habitat, I have placed this bird on the austral list. In California the habitat is "brushland, often of continuous chaparral type, but also riparian and as margining forests" (45:326). Gabrielson and Jewett say that the coast wren-tit "is distinctly a bird of the seashore, never wandering far from the salt water, and is much more often heard than seen" (38:449).

This thesis was tentatively closed to further field data with the month of May, 1948, but this is the second occasion that I feel it is worthwhile to add more recent data.

On June 23, I spent over eight hours at the Cottage Grove Reservoir with Gordon Gullion of Eugene, and Mr. Ben

Pruitt of Thurston. The reservoir is about 7 miles south of the town of Cottage Grove, formed by damming the Coast Fork of the Willamette River. This area is at the extreme southern end of the Willamette Valley. We found a single wren-tit quite at home in an area along the west side of the reservoir. All three of us are certain of this bird's identification.

The point of interest in this observation is not only that the bird has been found a considerable distance from its previously known range, but the habitat in which it was observed was similar to that in which it occurs on the coast of Oregon. The habitat was an area of scattered young conifers and brushland on a northeast slope at the edge of a thick Douglas fir forest. The immediate area was a dense thicket of vegetation that was well-shaded, moist, and cool in its interior. Trees in the thicket were Douglas fir, western hemlock, chinquapin, and dogwood. A deep mat of moss covered the ground. The principal shrub was a dense tangle of salal that grew to a height of four feet.

We were attracted to the bird by its distinctive call notes. We entered the thicket and the bird would approach us within arms reach. When it would work away from us, we would coax it back by imitating the notes of the bird.

The occurrence of this wren-tit so far from the coast is unusual. It was in a similar, suitable habitat here.

TROGLODYTIDAETroglodytes aedon

House Wren

The house wren breeds from southern Canada south to Virginia, Missouri, Texas, Arizona, and Lower California. The western house wren (T. a. parkmani) is our local species and breeds over the same area, except it goes east only to Wisconsin and Missouri. It is a summer resident in Oregon.

Because of its southern breeding range I have placed this wren on the austral list. Its habitat in California is "For foraging, thickets, low trees, tracts of chaparral; most of food-seeking is done within four feet of ground. But for successful nesting, there must be within short cruising distance of such thickets, trunks of trees in which cavities are available" (45:330).

About this wren, Gabrielson and Jewett state: "It cannot be considered an abundant species, though it does reach that status in some localities. It is common in some parts of Lake and Harney Counties and becomes one of the really conspicuous songsters in Benton, Polk, and Yamhill Counties in the little valleys between the oak-covered foothills of the Coast Ranges" (38:452). Gordon Gullion has seen very few of these wrens in the Eugene area. In my own field experience in the Benton County area I must

say that the bird is definitely not common. I have only recorded it 11 times in the Willamette Valley. It occurred in a coniferous habitat, in the brush once each in May, August and September. The other eight times it was seen in deciduous habitats: once in May and June; twice in July; three times in August; and just once in September. I have found no nests, but Mr. Willet Griffie tells me of one he found on June 7 near Corvallis. It was in an old chickadee hole in an apple tree at a height of 8 feet.

This small number of observations would tend to show that this bird occurs most frequently in the deciduous and brush habitats, rather than the coniferous sections of the valley.

Troglodytes troglodytes

Winter Wren

The winter wren ranges from southeastern Alaska, southern Manitoba, and Gulf of St. Lawrence south in mountains to Georgia, Minnesota, Missouri, Texas, Arizona, and Lower California. Our local subspecies, the western winter wren (T. t. pacificus) ranges from southeastern Alaska and western Alberta south to Colorado and southern California. It is a permanent resident of the timbered sections of Oregon.

It is classified as a boreal bird (38:36). This bird is placed on the boreal list because of its northern breeding range. Grinnell and Miller state that its habitat

should be "Shade, general moistness of substratum, and terrestrial tangles through the interstices of which foraging can be carried on in this wren's own mouse-like way.." (45: 331).

I have 91 records of this wren made in every month but July, which I missed for some reason or another. The habitats in which the birds occurred are as follows:

	Fir	Fir-Oak	Oak	Brush	Total
January	1	3	2	1	7
February	3	8	3	1	15
March	5	7	1	1	14
April	3	7		1	11
May	9	5	1		15
June	1	1			2
August	2				2
September	3	1			4
October	3	2			5
November	4	3	1	1	9
December	2	3		2	7
Total	36	40	8	7	91

The winter wren is found in fir habitats or mixed fir and oak, secondarily. Its occurrence in oak and brush is infrequent, and it does not occur there during the breeding season. They were observed most often during the late winter and early spring months. The observer cannot overlook

this bird during these months, for it sings frequently.

This "thimble-sized" bird has one of the most beautiful and stimulating songs of all our native birds. Even persons not interested in birds have asked me about it, or described the song to me after they had heard it in the woods.

I have no nest records of my own, but Charles Cutress has given me data on two nests he found near Milwaukee.

The first nest was found on May 20 in an alder in deep woods. It was in an old woodpecker hole at a height of 8 feet. The second nest was located June 26 in another alder in deep fir woods at a height of 5 feet.

During the winter this wren is observed more often in the oak and brush areas. From available information, this wren stays in dark areas because they are relatively cool and moist. It is associated with the deep coniferous forests because they can consistently fulfill these requirements in such places. They seem to have little direct relation to the conifers, then, but almost entirely indirect relationships, instead.

Thryomanes bewickii

Bewick's Wren

Bewick's wren ranges from southern British Columbia, Nebraska, Illinois, and Pennsylvania south to Georgia, Arkansas, and southern California. The Seattle wren (T. b.

calophonus), our local subspecies ranges along the Pacific slope from southern British Columbia and Vancouver Island south to west-central Oregon. It is a permanent resident west of the Cascades south to the Rogue River Valley. Its status is the same in the Willamette Valley.

I have placed this wren on the austral list because of its southerly breeding range in North America. Throughout the range of the species, a brushland habitat seems to be preferred. Livezey (63:37) lists it as a permanent resident of the oak areas surrounding Corvallis.

I have recorded this wren 185 times in the Willamette Valley in every month of the year in the following habitats:

	Brush	Oak	Oak-Fir	Fir	Total
January	2	1	1		4
February	11	7	3		21
March	11	4	6		21
April	12	7	4	1	24
May	10	7	11	2	30
June	3	1	3	3	10
July	1		3		4
August	4	5	10	1	20
September	7	2	7	1	17
October	6	2	4		12
November	1	3	3	1	8
December	9	3	2		14
Total	77	42	57	9	185

The occurrence of this wren was predominantly in the brush habitats. Those seen in oak, and oak-fir areas were almost always in the brush associated with these dominant vegetation types. Those seen in fir areas were seldom seen in the pure fir forests, themselves, but associated, instead, with the brush growing at the forest edges, or in clearings in the forests.

Gabrielson and Jewett state that the nesting season is principally in May, but extends from April 4 to May 31. The earliest nest record I have is a nest containing 5 eggs found on April 11. This nest was constructed in a box of junk in a woodshed on the outskirts of Corvallis. Nesting sites are highly varied. Another nest I found on May 1 was built in a small shed on a rafter, close in under the roof. Two other nests found in May were constructed in snowberry and rose bushes at heights of 2 to 3 feet in open pasture areas, or along fence rows. Charles Cutress tells me of a nest he found May 6 near Milwaukee. It was at a height of four feet in a Douglas fir stump. Mr. Willett Griffiee tells me that they nest in available holes, at heights of three or four feet. The earliest I have seen young is May 9 and 12.

There seems to be little or no appreciable change in the winter habitat of the Bewick's wren.

In summary, the Bewick's wren is found principally in

a brushland habitat, typical of most of its subspecies. When it is found on the coast, it occurs in the drier habitats, indicating its tendency toward southern conditions.

Telmatodytes palustris

Long-billed Marsh Wren

The long-billed marsh wren breeds from southern Canada south to Florida and the Gulf Coast, Colorado, and Lower California. It sometimes moves southward during the winter months. The local subspecies, the Tule wren (T. p. paludicola) breeds from southern British Columbia south along the coast to southern California. It winters south to Mexico. In Oregon, it is a permanent resident.

I have placed this wren on the austral list, because of its southerly breeding range. Suitable marsh conditions evidently exist much farther north than the wren is found. The tule wren's habitat in California is "Marshland, at nesting time as grown to cattail, tule, and bulrush" (45:341). It is listed as a member of the cattail association in the east (2:24).

In my experience, this wren has never been seen away from a marshy or swampy habitat. Its association with water has been complete. I have recorded it 90 times in the valley during every month. Distribution of these observations follows:

January - 7	May -15	September - 7
February - 14	June - 2	October - 5
March - 12	July - 3	November - 3
April - 12	August - 6	December - 4

This variation in the number of times seen each month gives a fairly complete picture of the variation in total abundance of this wren throughout the year, except that the populations in any area vary considerably during the summer months, depending directly on the water supply. For instance, during the summer of 1946, the local swamp was almost completely dry, and very few wrens were recorded. This summer (1948) the water level is remaining consistently high, thanks to the activities of a beaver colony at the lower end, and the tule wren population is correspondingly higher.

Gabrielson and Jewett say "The Tule Wren is not an abundant bird in Oregon due to lack of suitable breeding sites" (38:458). They have only one nesting record for the State, a set of eggs collected at Devil's Lake on April 29, 1933. In my experience there seem to be quite a few suitable habitats in the Willamette Valley for the tule wren, especially in the area between Lebanon, Albany and Corvallis, south to Eugene. In these localities, their abundance seems to lessen during the early winter months, but perhaps this is because they are usually silent during

this period. By January and February, their numbers have increased again, and nest building begins in early April, my earliest nest date being April 8. Nests containing eggs have been found as early as April 24. The most eggs I have found in any nest is seven. This nest was first found May 13, and contained 3 eggs at that time. On May 20 the full set of 7 was present. Young wrens practically "take over" the local swamp area during mid-June.

Nesting sites vary. The largest percentage of 40 or 50 nests which I have found have been located in dense clumps of spirea bushes, that have a growth of sedges around the base of the spirea (Fig. 21). These nests vary in height from 2 feet to 5 feet in these shrubs. A smaller percentage of the nests are found in the low clumps of slough sedge (Carex obnupta) found commonly in local marsh areas. Naturally these nests cannot be placed more than a foot or two above the water.

This wren has a peculiar habit of constructing as many as 4 or 5 nests in a small radius of eight or ten feet, so that when one nest is located, and no eggs or young are found, other nests must be searched for in the immediate vicinity. These dummy nests may be used to confuse their enemies, I don't know, but it is known that they utilize them to a limited extent for shelter. All nests that I have found have been located over water. The nests are

a curious bulb-shaped affair, with the entrance hole on the side, near the top.

In summary, the tule wren is evidently an austral bird whose distribution is governed by the presence of suitable marshes rather than any other habitat requirement. However it seems that a mild climatic environment is the limiting factor in this wren's distribution. Contrary to published information on the local subspecies, I feel that the tule wren is not uncommon, and the observer needs but to search in the suitable habitats to find them.

Salpinctes obsoletus

Rock Wren

The rock wren breeds from southern British Columbia and Saskatchewan south to Mexico. It is a permanent resident in eastern Oregon, and of rare occurrence in western Oregon.

The southern breeding range of this wren, together with the habitat in which the species is found throughout its range, indicates that it should be placed on the austral list.

I have no personal records for the rock wren from the Willamette Valley, although I have seen it elsewhere in Oregon. I feel that it should be mentioned in this thesis because it has been recorded not too infrequently along the

west base of the Cascades in eastern Lane County by Mr. Ben Pruitt. On this border of the valley, steep, rocky hills rise abruptly from the quite level floor of the valley. Many out-crops and cliffs of broken rock can be seen exposed along this part of the Cascade foothills. These evidently form excellent habitats for the rock wren. Mr. Pruitt has recorded it during the months of August, November, and December in this vicinity.

TURDIDAEIxoreus naevius

Varied Thrush

The varied thrush breeds in western North America from Alaska and the Mackenzie deltas south to Montana and northern California. The Pacific varied thrush (I. n. naevius), our local subspecies, breeds from Yakutat Bay, Alaska south to northern California. In Oregon it is a breeding bird in the timbered areas from the eastern foot of the Cascades, west. In the Willamette Valley it is a winter resident, and rare breeding bird.

Its northern breeding range, and coniferan forest habitat indicates that it is a boreal bird, so I have placed it on the boreal list. Grinnell and Miller give as its habitat "In summer, heavy mature stands of conifers, principally redwood, but with associated tideland spruce and lowland fir. A dark forest, with wet, mossy, almost completely shaded floor is requisite" (45:356). Of course, this part of Oregon has no redwoods, so other conifers are associated with the varied thrush habitat. Livezey (63:37) lists it as a winter resident of the oak areas near Corvallis.

I have recorded the varied thrush during nine consecutive months of the year, the greater abundance centered in the winter months. They have occurred in the following

habitats:

	Fir	Fir-Oak	Oak	Urban & Brush	Total
September	2				2
October	3	2		5	10
November	2	1	1	2	6
December	3	2		6	11
January	1	4	3	3	11
February	1	8	1	9	19
March	4	10	1	12	27
April	1	3	1	4	9
May	3				3
Total	20	30	7	41	98

The varied thrush first returns from the mountains to the valley in September, and is in variable abundance until January and February when its numbers are increased considerably. Their greatest abundance seems to be in March, but towards the end of this month their numbers drop extremely rapidly, only stragglers remaining into April and May.

The varied thrush was observed in a fir habitat in every month that it has been recorded in the valley. It has occurred in the fir-oak, and urban and brush habitats with the same degree of consistency through the months, even though recorded more often in the latter. This is because observations can be made in town without the special

effort of a trip afield. It is difficult for me to say whether these birds are more abundant in the towns, or in an equal area of suitable habitat in the field. They were recorded infrequently in the pure oak areas, although they were in mixed oak and brush quite as often as in the fir-oak mixture. This does not show on the chart because the oak and brush habitat is listed as brush, for in this habitat the oaks are scattered.

These birds remain the year round in some localities in the valley. Nestings have occasionally been reported. I found one nest in the coast range along the west side of the valley on May 17. It was in a small cedar about 5 feet above the ground. There were 4 young in the nest. Mr. Willet Griffee tells me that the varied thrush usually nests in small conifers in timber areas. This is all the information I have on their nesting habitat in the Willamette Valley.

The varied thrush is found in a variety of habitats during the winter months. I have never seen it in open fields, however. Its choice of habitats seems to be those types furnishing shelter.

Hylocichla guttata

Hermit Thrush

The hermit thrush breeds from Alaska across the northern limits of timber in Canada to southern Quebec, south to

Virginia, Michigan, Minnesota, and in mountains to New Mexico, Arizona, and southern California. The Sierra Hermit thrush (*H. g. sequoiensis*), the local Oregon summer resident subspecies, ranges from southern British Columbia south to southern California. It is a summer resident of the high Cascades, Blue and Warner mountains in Oregon, and is a migrant and sometimes a winter resident in the Willamette Valley. Other subspecies of the hermit thrush also winter in the Willamette Valley, so for the purposes of this discussion, no distinction has been made between them.

The hermit thrush is a boreal bird whose breeding range is most often in the cool coniferous forests of North America. I have placed it on the boreal list because of its boreal breeding range and the habitat which it occupies during the breeding season. During the winter the hermit thrush is found in varied habitats. Livezey reports them as an occasional visitor to the oak areas near Corvallis.

I have recorded the hermit thrush just 15 times during the seven months of January, February, March, April, June, September, and December. My earliest date in the fall is September 3, and my latest in the spring is April 14. I have one record for McDonald Forest area north of Corvallis on June 19. This last mentioned record is the only bird seen in coniferous forest. The other records are during the hermit thrush's winter residence, and it was observed

most frequently in mixed oak-fir areas, and seral oak communities. It was seen in pure brush areas only once. I have no nesting records for the hermit thrush, although the bird seen in McDonald Forest may have been a breeding resident. Gullion reports them from the Eugene area between October 27 and April 6. He saw them principally in shrubs, vine maple, and scrub oak areas.

In summary, the hermit thrush is not restricted to its typical boreal habitat during the winter months when it occurs in the Willamette Valley.

Hylocichla ustulata

Swainson's Thrush

Swainson's thrush breeds from Alaska, Mackenzie, Manitoba, and Newfoundland south to southern California, Colorado, Michigan and Pennsylvania. The russet-backed thrush (H. u. ustulata), the local subspecies, breeds from southeastern Alaska to southern California. It is a summer resident of western Oregon, and the east slope of the Cascades.

I have placed this bird on the boreal list of birds because of its northern breeding range. In California its habitat is "riparian thickets of willows and alders and dense forest understory on moist slopes near streams or meadows. Tangles of blackberry, dogwood, and dense bracken form excellent cover" (45:363).

The russet-backed thrush has been seen 69 times in the valley area during five months of the year in the following habitats:

	Fir	Fir-Oak	Oak	Brush	Total
May	6	8	1	10	25
June	8	2	1	4	15
July	4	2		2	8
August	4	5		8	17
September	1	2		1	4
Total	23	19	2	25	69

The earliest date of arrival is May 1, and the latest date of departure is September 17. This thrush has been observed most often in brushy areas, but it will be noticed they occurred therein less frequently during the normal nesting period of June and early July. Then, when the young birds have appeared, they occur frequently in the brush areas again. These birds occurred just twice in the pure oak areas because they are a bird desirous of good cover, which is not available in a pure oak area. During the nesting period, they also seem to have been seen less in the fir-oak mixture than in the pure fir forests. As in the brush areas, their numbers again increased in the fir-oak areas following the nesting season. The nesting sites that I have located have all been in old-growth fir woods, well-shaded by the fir canopy, and located in lower

shrubbery in cool, moist situations. I seem to be "slow-on-the-draw" for I have never found an active nest. Those I have found have been in hazel, ninebark, and bigleaf maple at heights varying from 5½ feet to 8 feet above the ground. Charles Cutress has had better luck. He tells me of two nests he found near Milwaukee. One found on June 7 was in the lower limbs of a small ash, and the second nest found on June 17 was 8 feet above the ground in a bigleaf maple. I have seen a half-grown young being fed by the parents on August 7, indicating a late July nesting. Other immature birds have been seen as late as September 3.

During the migration periods in early May and September, these birds are apt to be found in a greater variety of habitats than during the most of the summer season. In the spring they are easily located because they give their peculiar call notes at frequent intervals. In the fall they are usually silent, and hence a goodly number of the birds present may be over-looked. The high frequency of this thrush in the brush areas in May is made up of migrating birds arriving in the area.

In summary, the Swainson's thrush is found in brush habitats associated with fir forests during the nesting season, but tends to be found in habitats less associated with the fir during the migratory periods at the beginning and end of the summer.

Sialia currucoides

Mountain Bluebird

The mountain bluebird breeds from Yukon south to Manitoba, Nebraska, British Columbia, southern California, and Mexico. It is a permanent resident east of the summit of the Cascades in Oregon. Gabrielson and Jewett do not mention its occurrence in the Willamette Valley, but it seems to be an uncommon winter visitor here.

The bulk of the range of this species is northern. Bailey lists it as occupying the arid and semihumid Transition, and the humid and semi-arid Canadian zones in Oregon (9:39). In summer, its life zone habitats are "chiefly Hudsonian, but also Canadian and high arid Transition; altitudes of known nesting range from 4000 feet, as in Yosemite Valley up to 12,000 feet as near Virginia Lakes, Mono County" (45:365) in California. With these facts in mind I have placed it on the boreal list.

Gordon Gullion considers the mountain bluebird a late winter visitor to the Willamette Valley. He has recorded it in the vicinity of Eugene, Fern Ridge Reservoir, and Walterville on February 2, 13, and 23, and March 2, and 15. They were observed in fir areas, as well as brushlands and open fields.

In California its habitat is "Widely open terrain, the ground covered with short grass, alpine turf, stunted or

widespread bushes, or even rock shingle..... High tolerance of wind and light exposure is shown" (45:366).

The mountain bluebird is a bird of the sagebrush as well as the high forests east of the Cascades, wherever it can find suitable nesting and foraging area. Its winter habitat is the open and brushy country, and it seems that a few individuals find similar conditions satisfactory in the southern part of this valley during the winter.

Myadestes townsendi

Townsend's Solitaire

The solitaire breeds in western North America from Alaska and Mackenzie south in the mountains to New Mexico, Arizona, and California. Its range in Oregon is given as

"Permanent resident that breeds in Cascades and Blue Mountains and probably in Warner Mountains and spreads in winter to lower valleys in eastern Oregon. Straggles more or less regularly to western Oregon after breeding season" (38:480).

This bird is classified as representative of the Hudsonian zone (38:40), and its northern and mountainous breeding range indicates it is a boreal bird. The solitaire's breeding season habitat is given as "mountain slopes and canyons, at least partly forested, with provision for nest sites on or near the ground, which are

well drained, free of snow early in the season, and often protected above from rain" (45:367).

I have only one record for the floor of the valley. On April 20 we (the Corvallis Bird Club) found 4 or 5 of them in the cottonwood-ash river bottom vegetation along the Willamette River at Peoria Ferry, Benton County. They were observed to fly from these trees to catch insects in mid-air, then returning to the trees. Gordon Gullion has found them in the Eugene area from late December until the middle of March. Dave Marshall's personal field notes show occurrences of the solitaire in the Portland-Gresham area during March and April.

According to the above quoted range in Oregon these birds do not nest in the Coast Range. However, I have several records for the Coast Range along the west side of the valley, some of them during the normal nesting season of this bird. I have seen them in partly-open fir areas on south slopes on the way up to Mary's Peak on January 4, April 20, May 16 and 18. I have no nesting records for the coast range, but Kenneth Walker has informed me that his father, Alex Walker, found a nest in June, 1948 near the Wilson River in the northern Coast Range. This is outside the boundaries of this thesis, but is important in showing that the solitaire does breed in the Coast Range. With sufficient observations in the outlying

foothills of this range, the solitaire may be found breeding within the limits of the Willamette Valley.

In summary, the Townsend's solitaire is a boreal bird that is found in semi-open portions of the fir forests here in Oregon. It is an uncommon late winter visitor to the Willamette Valley, apt to be found in varied habitat types while present here. It may be an occasional breeding bird in the fir forests on the foothill ranges of the Willamette Valley.

MOTACILLIDAEAnthus spinoletta

Water Pipit

The pipit breeds in the arctic, south in the mountains to Oregon, Colorado and New Mexico. It is a winter resident of western Oregon, and the lower valleys of eastern Oregon. It breeds on some of the higher peaks in the Wallawas, and perhaps in the Steens and Cascades as well.

The extreme northern breeding range of this bird indicates that it is definitely a boreal species. I have placed it on the boreal list. Throughout its winter range, it favors particularly "Shore lines, stream edges, flooded fields, and river flats..." (45:375).

I have recorded it 89 times during 8 consecutive months here in the valley. Habitat conditions were so similar in all instances that I will give only a listing of the number of times they were seen each month:

September - 7	November - 10	January - 16	March - 15
October - 5	December - 7	February- 23	April - 6

The earliest they have been recorded is September 15; the latest, April 22. Gordon Gullion has an earlier record for the Eugene area - August 17.

The pipits are found singly or in small to large flocks on the main floor of the valley. They are found in

open country, away from brush and trees. The habitat may be a mud flat, a field, or along a highway, but they all have one thing in common - water must be present. Damp and semi-flooded winter fields are probably their commonest habitat here in the valley. The pipit is not like some winter birds that are found in the open areas here, and then in brushlands and forests of their breeding ranges in the mountains or up north. They occupy the open areas above timberline in our mountains, and beyond the northern limits of trees over North America.

LANIIDAELanius excubitor

Boreal Shrike

The boreal shrike is found in the palearctic region of the Northern Hemisphere. In North America it breeds from the limit of trees south to northern British Columbia, Saskatchewan, Ontario and Quebec. The western boreal shrike (L. e. invictus) breeds from Alaska and Mackenzie south to northern British Columbia, and Saskatchewan. It winters south to northern California, Arizona, and Texas. In Oregon it is a regular winter resident east of the Cascades, and an irregular winter resident in western Oregon.

Because of its northern breeding range I have placed it on the boreal list of birds. Its winter habitat in California is "Open terrain provided with lookout posts; ..." (45:378).

I have recorded this shrike 23 times in the Willamette Valley during 6 consecutive winter months from October through March. The earliest I have seen them is October 21, and the latest is March 30. I have three records of shrikes in the valley during the summer months, but none of them were checked closely to ascertain the identity. They may possibly have been loggerhead shrikes (L. ludovicianus), instead. These three were seen as follows: May 17 at Marion, in Marion County; June 13 on the French

Prairie in north Marion County, and July 24 in the vicinity of Peoria, Linn County.

I am certain that the 23 winter records are the boreal shrike. They were seen the following number of times each month:

October - 2	December - 2	February - 8
November - 5	January - 2	March - 4

These shrikes are birds of the open country. Every one that I have seen has been perched on a wire line, a fence, or a tall shrub or tree along a fence row adjacent to open fields (Fig. 19). None have been seen in areas of brush or tree expanses. They have been observed to take food on the ground, and in the air, always returning to an elevated perch to eat. These perches are utilized for better vision in hunting for their prey in the open country.

The boreal shrike is a bird of northern distribution, but it has little relationship to the coniferous forests.

Instead, it occupies open habitats throughout its range. It is consistent in this choice of habitats, for it utilizes similar conditions during its winter residence in the Willamette Valley.

VIREONIDAEVireo huttoni

Hutton's Vireo

Hutton's vireo breeds on the Pacific Coast from southern British Columbia to Lower California. It is a permanent resident of western Oregon.

The range of this bird is not indicative of its being either a northern or southern bird. However, because of its restriction to non-deciduous forest vegetation throughout its range, and the fact that Douglas fir is the predominant conifer in its range, I have placed this vireo on the boreal list. In California its habitat is "Most importantly, live oaks, and in particular the foliage and smaller twigs of these trees.... Other plant associations frequented by smaller numbers of individuals are blue and golden oak woodlands, willow thickets, and Monterey pine, tan oak and Douglas fir forests.... Few species of birds are as conspicuously partial to non-deciduous oaks as is this vireo" (45:383). Livezey lists it as an occasional visitor to the oak areas near Corvallis (63:38).

I have just 24 records for the Hutton's vireo in the Willamette Valley. I have not seen them in December or January. Habitats in which they occurred follow:
(on next page)

	Fir	Fir-Oak	Oak	Total
February	1	2		3
March		1		1
April	1	3		4
May	2			2
June	3			3
July	1	1		2
August	2	1		3
September	1	2		3
October			1	1
November	1		1	2
Total	12	10	2	24

It seems to me that the habitat distribution of this vireo is complementary to that of the other two vireos found commonly during the summer in the Willamette Valley. From the chart it can be seen that this vireo is associated principally with habitats containing fir to a greater or lesser degree. This seems only reasonable, for the Hutton vireo is a permanent resident, that, throughout its range is evidently partial to non-deciduous forest. The oaks in this area are deciduous, so the fir habitat is the preferred one. Although this vireo is a permanent resident, and the others are not, it is seldom recorded, for it is a comparatively quiet bird, and occupies the fir, and fir-oak forests that I have not visited as consistently and

often as some of the other habitats here in the valley.

I have no nesting records for this vireo. Dave Marshall tells me of one found on May 10 in a vine maple on Mt. Tabor in Portland. Young birds have been seen on July 5 at Thurston, Lane County by Mr. Ben Pruitt. This is all the data I have on the breeding season on this bird.

I have recorded it less during the late fall months than at other times of the year. I have no explanation for not observing the bird in December and January. Perhaps most of them shift southward during these months. The two records of this bird in pure oak areas in October and November may be an indication that it spreads out into other habitats during the winter season.

In summary, the Hutton's vireo is a permanent resident, found predominantly in habitats containing some amount of fir cover, perhaps showing a tendency to spread into varied habitats during the late fall and winter.

Vireo solitarius

Solitary Vireo

This vireo breeds from southern Canada south in the mountains to Georgia, Michigan, Minnesota, North Dakota, Mexico, and Lower California. The Cassin's vireo (V. s. cassinii), our local subspecies, breeds from central British Columbia and Alberta south through Montana, Nevada,

Oregon, and California to Lower California. It is a summer resident in Oregon.

The southerly breeding range of this vireo, together with the habitat types it occupies shows that I should place it on the austral list. Grinnell and Miller give its habitat as "Oak and conifer forests that offer open branch-work at low and middle levels.... Comparatively dry, warm forests are favored, although growth in canyons and near streams is also sought, especially in the south" (45:387). It is listed as a spring and summer resident of the oak areas near Corvallis (63:38).

I have 106 records of this vireo for the spring and summer months here in the valley:

	Brush	Oak	Oak-Fir	Fir	River Bottom	Total
April	10	3	7	2	1	23
May	22	6	8	10	4	50
June	3	1	3	3		10
July	2		3			5
August	4	1	3		3	11
September	1	1	4	1		7
Total	42	12	28	16	8	106

My earliest date of arrival is April 3; the latest, September 21. The chart shows that this vireo is found mostly in habitats of a brushy nature. My few fieldtrips to river bottom areas probably show too low an occurrence

for that habitat. This vireo is also found often in oak-fir habitats throughout its period of residence here. I do not know why this vireo was not recorded from the pure fir areas during the months of July and August.

The nesting period seems to be in May and June. I found one nest on May 12, suspended from the crotch of a small branch of a dogwood, at a height of 25 feet. The tree was growing as an understory in an open, old fir forest. Mr. Willett Griffie of Portland states that the majority of nesting sites are in coniferous forests containing a hardwood understory, the nests occurring at heights of from 6 to 20 feet in the hardwoods. This statement coincides well with the one nest I found. Charles Cutress found one nest at a height of 5 feet in a hazel at the edge of a fir forest near Barlow on June 3. Gordon Gullion reports that the latest nesting record in the Eugene area is June 23. From the evidence at hand, it seems that nesting takes place in hardwood trees associated with coniferous forests. This would mean that the majority of observations of these birds in oak and brush habitats during the nesting season were of birds in quest of food, or, if late enough, of young birds that have left the nest. Many birds show a tendency to spread to varied habitats following the nesting season.

In this case, the evidence points towards a wide habitat distribution for this vireo during its entire stay

in the valley, but with more specific habitat selection for nesting sites.

Vireo gilvus

Warbling Vireo

The warbling vireo breeds from southern Canada south to North Carolina, Louisiana, Texas, Mexico, and Lower California. The western warbling vireo (V. g. swainsonii) breeds from southern British Columbia, southwestern Mackenzie and Alberta south to Texas and Lower California. It is a summer resident in Oregon.

This vireo has been placed on the austral list because of its generally southern breeding range. In California its habitat is "Deciduous trees, especially those growing in moist places, such as alders, willows and cottonwoods" (45:390). It is listed as a spring and summer resident in the oak areas around Corvallis (63:38). Gullion states that it is found in open woodlands about Eugene.

I have recorded the warbling vireo just 31 times during four months of the late spring and summer, my earliest record being May 8; and the latest, August 29. These birds were observed in the following habitats:

(on the next page)

	Brush	Willow	Oak	Oak-Fir	Total
May	5	5	2	5	17
June	2			2	4
July	1		2	1	4
August	1	2	1	2	6
Total	9	7	5	10	31

This vireo is supposed to be the most common one in the State, and it is probably much more common than my meager records would indicate. It can be seen this vireo is found in the deciduous vegetation most of the time. The occurrences in the oak-fir habitat were primarily in the oak, and not the fir. Much of the brush area where it was recorded was river bottom brush, rather than dry, brush-covered hillsides.

I have observed these birds courting on May 13, but I have never found a nest. Charles Cutress found a nest near Milwaukee on June 10 on the outer limb of an ash tree. It contained 4 eggs. The young birds seem to band together after leaving the nest, for I have seen over a dozen birds working the ash and willows along the river bottom areas, and around the isolated ponds and sloughs throughout the valley. Their greatest abundance seems to be in July. Late nestings do occur, for Gordon Gullion tells me of a nest containing young on August 13. In summary, this vireo occupies the deciduous vegetation, especially river bottom.

PARULIDAEVermivora celata

Orange-crowned Warbler

The orange-crowned warbler breeds west of Hudson Bay in Canada and Alaska, south to southern California, Arizona, and New Mexico. The lutescent warbler (V. c. lutescens), the local subspecies, breeds along the Pacific Coast from Alaska to southern California. It is a common summer resident of northwestern Oregon.

I have placed the orange-crowned warbler on the boreal list because of its northern distribution. When taken from the habitat viewpoint, however, there is some question as to whether it should be classed as a boreal bird. In California its habitat is the "Moderately compact foliage as provided by chaparral, streamside thickets, and undergrowth of open forests or woodlands; .."(45:394). Livezey lists it as a spring and summer resident in the oak areas near Corvallis (63:38).

There are 79 records of this warbler in my field notes for the valley. They have been seen from March through October, with the exception of no records for July. The earliest I have seen them is March 1; the latest, October 13. The number of times I have observed this warbler in varied habitats follows:

	Brush	Willow	Oak	Oak-Fir	Fir	Total
March	2	1		1		4
April	10	2	7	4	2	25
May	10	3	8	7	7	35
June	2			3	2	7
August			2	2		4
September				2		2
October			2			2
Total	24	6	19	19	11	79

The majority of these warblers were observed during April and May, when they are active, previous to and during the nesting season. After that, either the majority of them leave the valley, or else they become very quiet, and are then difficult to observe in their brush habitats. From the chart it can be seen that the brush habitat was occupied most by this warbler, the fir forest the least. Even in the oak-fir areas, many of the birds were in the brush, and not the trees. I have no nest data on this one.

On several instances these warblers have been observed as late winter residents in the Willamette Valley. Gordon Gullion has taken them at his trapping station in Eugene on January 11, 13, and 20, and on February 21 (46: 88). The January 20 specimen was collected and later identified by Mr. Stanley G. Jewett as the subspecies celata, the form that occurs rarely in the eastern part of the

State. Perhaps the other wintering warblers were of this same subspecies, rather than the subspecies normally found here during the breeding season.

In summary, the orange-crowned warbler is a summer resident boreal bird that has a decided preference for brush habitats, although it does occur in the oak, and the fir habitats as well. A few winter occurrences have been recorded for the Willamette Valley.

Dendroica nigrescens

Black-throated Gray Warbler

The black-throated gray warbler breeds in western North America from southern British Columbia, Utah, and Nevada south into New Mexico, Mexico, and Lower California. It is a summer resident of western Oregon and parts of eastern Oregon.

I have placed this bird on the austral list of birds because of its southerly breeding range, and seemingly drier habitat. In California its common habitat requirement is "fairly dense foliage, often stiff, harsh and semi-xerophytic, which either through local exposure or by reason of the prevailing summer climate in the region is warm and at least moderately dry..."(45:405). It is a spring and summer resident in the oak areas in the vicinity of Corvallis (63:38).

I feel that my records do not indicate the true abundance of this warbler for I have only 52 records for the valley. I have seen it from March to September, the earliest date being March 17, and the latest, September 15. Gordon Gullion has recorded them on October 11 in the Eugene area. The number of times I have seen these birds in various habitats follows:

	Brush	Oak	Oak-Fir	Fir	Total
March	1				1
April	1	3	2	1	7
May	10	3	8	8	29
June	2		1		3
July		1			1
August		2	4		6
September	1	1	2	1	5
Total	15	10	17	10	52

The occurrence in the fir areas was principally in the brush associated with the fir, but occasionally they were seen in the pure fir. During May, the nesting season, this warbler occurred less in pure oak stands than in the other habitats where sufficient brushy growth existed. The unusual thing about this warbler is that so few of them were seen during June and July; their numbers again increasing in August and September. I have seen young birds being fed by the adults on August 25, so perhaps the months

of June and July are occupied with nesting, and the birds are relatively quiet in their habits. I have no nesting records to verify this. Gabrielson and Jewett give the nesting season as May 14 to June 24 (38:505). With the mentioned increase in birds in August and September they are seen in varied habitats, but tending toward the more open brush and oak areas, staying out of the fir, particularly.

In summary, the black-throated gray warbler is a summer resident austral bird that is found primarily in brush, and brush associated with trees like the oaks and firs. It seldom occurs in pure stands of fir.

Dendroica townsendi

Townsend's Warbler

The Townsend's warbler breeds from southeastern Alaska and Yukon south to Washington and Montana. It is a spring and fall migrant in Oregon. It may be a casual winter resident, and also a rare breeding bird in Oregon.

I have placed this warbler on the boreal list because of its entirely northern breeding range, and coniferan breeding habitat. Grinnell and Miller give its habitat "In winter, prefers upper foliage of live oaks, laurels and conifers. Most often seen in shaded or dense trees, reflecting in some measure the adherence to dark cool

forests shown on the breeding grounds to the northward" (45:406).

The Townsend's warbler has been recorded a half dozen times here in the valley. I have seen it on February 24 and 25, March 14, April 26, May 1, and 31, and August 7, the last record in McDonald Forest just north of Corvallis. Gullion states that they migrate through the Eugene area during April. They have been recorded quite consistently on the University of Oregon campus in December and January. The February records mentioned above were made on the Oregon State College campus. Other places have been recorded on both the east and west sides of the valley.

No observations have been made of this warbler in the fir groves on the flood of the valley, indicating that they may stay close to the foothill ranges in their northward and southward migrations, as well as during any residence in either the summer or winter.

All of the records I have of the Townsend's warbler have been in conifers, and none in other vegetation types. Even those seen on the college campus were seen in conifers only. I do not mean to infer by these statements that this warbler does not ever occur in deciduous habitats, for it undoubtedly does, at least occasionally. In summary, the Townsend's warbler is a boreal bird that stays almost exclusively in coniferous habitats during valley residence.

Dendroica occidentalis

Hermit Warbler

The hermit warbler breeds west of the Cascade-Sierra crest in the Pacific States. It is an Oregon summer resident.

Bailey lists this bird as a resident of the Canadian zone (9:39). I have listed it as a boreal species because of its breeding range, and its coniferous forest habitat. The habitat in California is "Moderately dense and shaded coniferous forests, composed either of large firs or pines in which forage beats 20 feet or more above the ground are afforded... Species of trees most commonly constituting the habitat are white fir, red fir, Douglas fir, yellow pine and sugar pine" (45:408).

I have 13 records of this warbler in the Willamette Valley, the earliest date being April 26, and the latest, August 27. In all of these instances, the birds have been in fir woods, either in the foothills surrounding the valley (Fig. 10), or in forests on the floor of the valley. I have no nesting records, but Gordon Gullion has told me that he found nestlings at Cottage Grove Reservoir on June 16, and that he and Ben Pruitt of Thurston saw adults carrying food to young birds in the nest at West Point Hill, on the east side of the valley in Linn County on June 19. These are the only recent records that I have available.

In summary, I have classified the hermit warbler as a boreal bird because of its strict adherence to a coniferan habitat. I have never seen them outside this particular habitat.

Icteria virens

Chat

The chat breeds from extreme southern Canada south to Florida, Mexico, and Lower California. The long-tailed chat (I. v. auricollis), our local race, breeds from southern British Columbia and North Dakota south to Mexico and Lower California. It is a summer resident throughout Oregon, except for the coastal strip.

I have placed this bird on the austral list because of its southern breeding range. Bailey lists the chat as a sonoran form (9:15). Grinnell and Miller give its breeding habitat as "low dense riparian plant growth, consisting most commonly of willow thickets and tangles of tall weeds, blackberry vines and grapevines. The ground need not be damp or muddy but the plant cover must be dense to provide shade and concealment.." (45:416). Livezey lists the chat as an occasional visitor to the oak areas in the vicinity of Corvallis (63:39).

The chat does not seem to be a common bird, and my low number of 36 records indicates it. I have seen them

from April to August, the earliest date being April 20, and the latest, August 25. Gordon Gullion recorded one on September 30 in the Eugene area. The number of times I have recorded the chat in varied habitats follows:

	Brush	River Bottom	Oak	Total
April		1		1
May	10	10	4	24
June	1	3		4
July	1	2	2	5
August	1	1		2
Total	13	17	6	36

The bulk of the population arrives in May, and immediately announce their presence with their distinctive assortment of calls, heard often during the twilight hours, but also at any other hour of the day or night. The birds are found in very dense thicket areas, and they are not particularly associated with any deciduous or coniferous tree cover. Often some tree, such as an ash, or an oak, may be present in the midst of an area of thick brush, and perhaps it will be utilized by the bird as a singing perch. Trees are not essential to the habitat of the chat. Thick brush tangles most often occur in river bottom areas, as I mentioned in an early portion of this thesis, but may also occur on open hillsides far from water-courses (Fig.

17). Two chats even took residence one month of May in a thick tangle of blackberry vines and unpruned shrubbery within 50 feet of one of the large fraternity houses here in Corvallis.

The nesting period seems to be in May and June. I located a nest on a dry, brushy hillside of Miller Butte, near Marion, in Marion County on May 17. It was at a height of $2\frac{1}{2}$ feet in a dense clump of poison oak. Charles Cutress has given me data on several nests he has found: A nest found April 29 along Johnson Creek, near Portland, was in a wild rose at a height of 4 feet; another nest found May 3 at Milwaukee, Clackamas County, was at 4 feet in a wild rose bush; another nest located at Milwaukee on May 21 was at a height of 4 feet in a thicket of vegetation; a fourth nest was found June 4 at 4 feet in a sweetbriar at Milwaukee; a fifth nest located June 7 was in an exposed site in a hazel bush at 4 feet; his last nest was located July 4 on the Columbia River bottoms near Portland. It was at 4 feet in a wild rose. All these nests seem quiet consistent so far as height above the ground is concerned. Mr. Ben Pruitt has seen 2 young out of the nest on June 27. Nesting dates seem to range from April 29 to July 4.

The chats are more or less silent following the nesting season, and few birds are seen. Perhaps many of them start south as soon as their nesting duties are completed.

In summary, the chat is an austral bird that is found chiefly in the dense thickets or chaparral areas of the valley. Their distribution is not directly associated with any deciduous or coniferan forest vegetation.

Wilsonia pusilla

Pileolated Warbler

The pileolated warbler breeds in Canada and Alaska from the northern limit of trees south to Maine, Minnesota, and in the mountains to Texas, Arizona, and southern California. The golden pileolated warbler (W. p. chryseola), the local subspecies, breeds along the Pacific slope from British Columbia to southern California. It is a summer resident west of the Cascades in Oregon.

This warbler is a bird of the boreal areas, and I have placed it on the boreal list. In California its habitat is the "Low, shaded, plant cover close to streams, meadows or seepage of water on hillsides; locally the temperature is moderately low and the humidity normally high" (45:419). Throughout its range this warbler is found in the deciduous vegetation associated with lakes, ponds, and streams.

This warbler has been quite uncommon in my experience. I have only 38 records of its occurrence in the Willamette Valley, made from April through September. The earliest record I have is April 21; and the latest is September 24.

The number of times I have seen them in various habitats follows:

	Fir	Fir-Oak	Oak	Brush	Total
April	1			1	2
May	5	7	1	6	19
June	3			2	5
July	1	1		1	3
August		3	1	4	8
September		1			1
Total	10	12	2	14	38

This list shows the pileolated warbler is widely spread through several habitats, which is true. However, their greatest abundance is found in those areas associated with the more cool and damp areas, as provided by the fir forests. Those birds seen in the fir areas occurred primarily in the understory shrubs, and younger conifers, not in the higher trees of the forest. It was observed rarely in the pure oak areas because little concealing shrubby vegetation is present in such areas. In fact, in all the habitats it was observed in, this warbler occurred most frequently in the brush layer associated with that habitat.

I have no nesting records for this warbler. On August 25 I did see a young bird, accompanied by an adult, but there is no indication that the young bird was being cared for by the adult. Gordon Gullion has found these warblers

most often in the cottonwoods and maples along river bottom areas. He also mentions having seen young birds on July 24.

In summary, the pileolated warbler is a boreal bird that prefers a shrubby habitat, and it is evidently not governed by the presence or absence of coniferous timber.

ICTERIDAEXanthocephalus xanthocephalus

Yellow-headed Blackbird

The yellow-headed blackbird breeds from the east side of Hudson Bay, Mackenzie, and British Columbia south to Indiana, Iowa, Nebraska, south into Mexico. It is a summer resident in eastern Oregon, particularly in the south-central portion. It is only an "irregular visitor west of Cascades" according to Gabrielson and Jewett (38:521). My notes will change this status considerably.

Bailey (9:39) lists this blackbird as occupying the arid transition and sonoran zones in Oregon. I have placed it on the austral list of birds, because its breeding range in the western United States is primarily in the regions of austral plants and animals. However, it must be noted here that in its northeastern range this blackbird occurs in association with boreal plants and animals. Even so, it seems to be a bird of austral origin that has found suitable marsh habitats in the more boreal areas of our continent. In California its habitat in the nesting season is "fresh-water marshes with tules, cattails, or other plant growths that afford nesting sites over standing water of considerable depth. Thus, protection from ground-prowling predators is provided. Forage areas at this season and in winter consist of meadows, muddy ground, marsh edges

grown with sedges, and open cultivated fields" (45:423).

I have so few records of the yellow-headed blackbird in the valley that they are not worth charting. My first record was on May 10, 1941 (27:28), and since returning from the service I have seen them almost a dozen times. Most of my records are for the month of May. The earliest I have seen them is May 6; and the latest, August 8. Many more records could have been made if I had visited Fern Ridge Reservoir more often.

All of these observations have been made at two locations here in the valley. A few records are from our local swamp south of Corvallis, where they have been seen in May, only. In 1947 a pair attempted nesting there, but were not successful. The bulk of the records are for the Fern Ridge Reservoir in Lane County. There is a breeding colony established there, although I didn't know about it until 1947. At that time about 50 birds nested in a small area on the east side of the reservoir where there was a dense growth of cattails suitable for their needs. (Fig. 23) Gordon Gullion's records show that these blackbirds arrive in mid-April and are gone by the end of August. The nesting season seems to be from early May to the latter part of June, although I have found young in the nest as late as July 18. On June 11 I found nests containing eggs, others with young birds, and also young birds already out

of the nest, and on their own. This cattail area in which the birds nest is in $2\frac{1}{2}$ to 3 feet of water. Cattail areas in shallow water elsewhere around the reservoir are not utilized by these blackbirds. During the past year a great deal of change has taken place in the vegetation at Fern Ridge. In one area of about 200 acres, where there were no cattails last year, there is a heavy growth of them this year. Coincident with this change in the vegetation, the yellow-headed blackbirds have spread into this area. They do not seem to be nesting there, however, for the water is quite shallow. This water depth requirement seems to hold elsewhere, for I mentioned it previously in a description of their habitat requirements in California. With this increase in habitat area, there has been a corresponding increase in the number of blackbirds present. I estimate that there are at least 125 birds at Fern Ridge Reservoir this year (1948).

After the nesting season these blackbirds band together and may be seen in many habitats near the reservoir. By late July and August they are often seen in huge mixed flocks with the redwings and Brewer's blackbirds.

In summary, the yellow-headed blackbird is a summer resident and breeding species in at least one locality in the Willamette Valley, and seems to be of unusual occurrence elsewhere. Its breeding areas are the more dense

growths of cattails in fairly deep water, and the nesting season occurs in May and June. The marsh areas in which it occurs are in the low, flat, open and more arid parts of the valley, indicating that the yellow-headed black-bird may be an austral species.

THRAUPIDAEPiranga ludoviciana

Western Tanager

The western tanager breeds from British Columbia, Mackenzie, and South Dakota, south to the mountains of Texas, Arizona, and Lower California. It is a summer resident of the forested portions of Oregon.

Because of this tanager's northern and mountainous breeding range I have placed it on the boreal list of birds. Grinnell and Miller give its habitat as "Fairly open coniferous forests with their associated broad-leaved trees; less commonly dense live oak or pinon woodland. A similar spacing of trees is afforded in these two kinds of habitat. Dense, poorly lighted forests are avoided or sparsely occupied, and at the other extreme, woodlands are avoided in which the trees are so far apart as to necessitate prolonged exposure in flight and high insolation of ground cover and leafy canopy" (45:440). Livezey lists it as an occasional visitor to the oak areas at Corvallis.

I have just 61 records of the western tanager in the valley, made during 5 months in the following habitats:

	Fir	Fir-Oak	Oak	River bottom	Brush	Total
May	14	4		1	7	26
June	9	2		1		12
July	2	1				3

chart continued:

	Fir	Fir-Oak	Oak	River bottom	Brush	Total
August	4	6	1		1	12
September	3	4	1			8
Total	32	17	2	2	8	61

Their earliest date of arrival has been May; and their latest date of departure, September 26. The bulk of the birds are seen in May, as these birds arrive on their northward migration. At that time they may be seen in almost any habitat, as will be noticed from their occurrence in the brush areas. They were seen also in river bottom habitat. The rest of their residence in the valley is closely associated with habitats in which Douglas fir is found. Following the nesting season, and during the fall migration period, they occasionally get into other habitats such as are shown on the chart - oak and brush areas. The reason more tanagers are seen in the spring migration than there are in the fall migration is because in the spring the birds seem to arrive about the same time, whereas in the fall, the migration period is spread over at least a month and a half. Also the birds are singing and calling in the spring, but are quite silent during the late summer and fall.

I have just one nesting record for the western tanager

- a nest located on the south side of a Douglas fir on a horizontal limb at a height of 18 feet in McDonald Forest on July 12. I was attracted to the nest because the adults were driving a Steller's jay from the nest area. It was inaccessible, but the nest must have contained young birds at such a late date. Mr. Willet Griffie tells me he has found 3 nests in Douglas fir and one in an orchard.

Charles Cutress located a nest containing 4 eggs on June 12 at Milwaukee. The nest was 35 feet up in a small Douglas fir, and was 5 feet out from the trunk of the tree.

During the summer these birds seem to feed principally on insects but towards fall they eat considerable quantities of fruit. I have observed them taking the fruit of the mountain ash in late September. During the late summer small noisy groups of young birds may be found in the woods. They feed and chase each other through the trees and bushes.

In summary, the western tanager is a boreal bird associated principally with the Douglas fir in the Willamette Valley. During spring migration and late summer they may be seen in habitats not containing fir, but during the nesting season they stay in the habitats containing Douglas fir.

FRINGILLIDAEPheucticus melanocephalus

Black-headed Grosbeak

The black-headed grosbeaks breed in western North America from southern British Columbia and Alberta south to Texas, Mexico, and Lower California. In Oregon, it is a summer resident throughout the valleys of the State. It is a summer resident in the Willamette Valley.

I have placed this grosbeak on the austral bird list because of its southern breeding range. Its habitat in California is "Riparian woodland, oak woodland with associated shrubs, and open coniferous forests of Transition and Upper Sonoran zones, especially where intermixed with deciduous oak" (45:444).

My own records indicate that this grosbeak is not too common in the Willamette Valley. I have 29 records for just four months of the year in the following habitats:

	Urban	River bottom	Oak	Oak-Fir	Fir	Total
May	3	3	1	5		12
June		4	1	2	1	8
July				1		1
August		3		5		8
Total	3	10	2	13	1	29

My earliest date of their arrival is May 7; the latest date of departure, August 27. The conspicuous things about

this grosbeak's habitat distribution is that it is found in several different deciduous types, but I saw it only once in a fir habitat. When seen in the oak-fir areas, it was usually in the oaks or brush associated with this habitat. Mr. Willet Griffiee has found them most often in the river bottom brush along the Columbia and Willamette Rivers near Portland. Gordon Gullion has seen them most often in areas of deciduous trees, with some Douglas fir occasionally present.

On June 30 I found a nest at a height of 25 feet in an oak tree on the north side of a clump of Douglas fir in a mixed fir-oak-brush area in McDonald Forest, north of Corvallis. This is the only nesting record that I have. Charles Cutress has found two nests near Milwaukie, Clackamas County. One was found on May 17 at a height of 10 feet in a vine maple; the other at a height of 5 feet in an ocean spray bush on May 31. For full details of the breeding behavior of this grosbeak in California, see Weston's article (93).

After the nesting season, adults and young tend to stay together, and these small flocks may be seen in August in mixed deciduous trees and brush, particularly along the rivers. At this time of the year they feed on bigleaf maple samaras, indian peach, wild blackberry and other wild fruits.

In summary, the black-headed grosbeak is an austral bird that is found chiefly in deciduous forest and brushland habitats here in the valley. It is present for only four months of the year, but I feel it is much more abundant than my meager number of observations would indicate.

Passerina amoena

Lazuli Bunting

The lazuli bunting breeds in western North America from southern British Columbia and Manitoba, south into Texas and Lower California. It is a summer resident in the valleys of the State of Oregon, and is particularly common in the Willamette Valley.

I have placed this bird on the austral list because of its southern breeding range, and the open habitat which it tends to occupy. In California, its habitat is "clumps of bushes, broken chaparral, weed thickets and other low vegetation on hillsides or in and about water courses, but not usually over water or damp ground" (45:447). Livezey lists it as a spring and summer resident of the oak.(63:38)

This is another summer resident that I feel is much more abundant than my few records indicate. I have seen the lazuli bunting just 37 times in the valley, during just four months in the following habitats:

(on next page)

	Urban	Open	Brush	Oak	Oak-Fir	Total
May	2	1	10	4	1	18
June		4	3	3	1	11
July		2	2			4
August		3	1			4
Total	2	10	16	7	2	37

The earliest date of arrival is May 8; the latest date of departure, August 23. Gabrielson and Jewett list the dates of arrival and departure as April 24 to September 9 (38:535). From this chart it can be seen that this bunting is a bird of the open and brush habitats. Its occurrence in the other habitats was principally during the period of migration, when the birds were first arriving in the valley. The lazuli bunting, along with the Brewer's black-birds, western meadowlarks, and sparrow hawks, is one of the conspicuous birds on the wire lines beside the highways during the summer months. These perches are usually selected in more or less open areas, but with a brushy fence row of varied height into which they can drop when seeking protection or shelter.

I have no nesting data of my own. Gabrielson and Jewett give the nesting season as mid-June (38:535). Mr. Ben Pruitt found a nest on June 20 at Thurston, Lane County. It was in a snowberry bush at a height of $2\frac{1}{2}$ feet and contained 3 eggs. Charles Cutress found a nest on May 28

near Milwaukee in an ocean spray bush at a height of 5 feet; and another nest on June 19 at a height of 3 feet in a hazel bush. Mr. Griffie says that they nest in brush at low heights.

The lazuli bunting seems to arrive in small groups in the spring, for I saw 4 of them early on the morning of May 14 feeding on dandelion seeds in an unkempt lawn here in Corvallis. They remain conspicuous during the early part of the summer, but by August, they are singing infrequently, and most of their feeding activities are hidden by the foliage of the brush patches which most of them inhabit. Consequently, they are not often seen in late August.

In summary, the lazuli bunting is an austral bird that tends to occur in the open and brushy habitats occupied by austral plants and animals here in the valley. It is not a bird of the fir forests.

Hesperiphona vespertina

Evening Grosbeak

The evening grosbeak breeds from the western part of central Canada south to Michigan, Virginia, Kentucky, Arizona, New Mexico, and California, principally in the mountains in the last three states mentioned. Our local subspecies, the western evening grosbeak (H. v. brooksi) breeds from central British Columbia and Montana south in the mountains to California, Arizona, and New Mexico. It

is a permanent resident of the State of Oregon, breeding in the mountain forest areas, and tending to winter over the lower areas of the State. It is a sporadically common winter and spring visitor to the valley, and occurs during the breeding season in the forested foothills around the valley.

It is listed as a bird of the Canadian zone (38:39). I have placed this grosbeak on the boreal list because of its northern habitat and mountainous breeding range. In California, as elsewhere, its breeding habitat is "primarily fir (Abies) forests of fairly dense mature type" (45:449). Livezey lists it as an accidental visitor to the oak areas in the vicinity of Corvallis (63:39).

I have 96 records of this bird in the valley, for every month except October, with the majority of the records being made during April and May:

	Fir	Fir-Oak	Oak	River bottom	Urban	Total
January	1	1			1	3
February	1	2	1		5	9
March		4	2	1	3	10
April	3	10	1	2	9	25
May	13	5	1	4	9	32
June	5				2	7
July	2					2
August	2					2

chart continued:

	Fir	Fir-Oak	Oak	River bottom	Urban	Total
September		1				1
November	2					2
December					3	3
Total	29	23	5	7	32	96

During the late winter and early spring months the evening grosbeaks band together in huge flocks and "invade" the urban areas of the valley, to feed on the fruits and flowers of such trees as the elm and bigleaf maple. At such times these birds are so abundant, and so fearless that they attract the attention of a great many people.

Their appearance each spring on the Oregon State College campus is an annual event. The size of the flocks varies from year to year. At this time of the year small flocks may be seen in the river bottom areas feeding on the maple and ash samaras found there. It is during these first few months of the year that the grosbeaks are seen in varied habitats. The nesting season seems to occur in June and July (38:537). These grosbeaks are seldom seen out of the coniferous forests during this season, for the large flocks have split up, and headed northward or to the mountains.

During the summer of 1947 I had occasion to spend a great deal of time in McDonald Forest during the spring and summer months. These birds were heard and seen during this

entire period, indicating that they must breed in these foothill ranges, as well as higher in the mountains. I found no nests. Gordon Gullion and Ben Pruitt report that adult birds were feeding young on June 19 on the north side of West Poing Hill at the edge of the foothills in eastern Linn County.

I cannot account for the paucity of records during the late summer, fall, and early winter months, except that these birds are still in very small scattered flocks, and may move higher into the mountains feeding on fruits at this time of the year.

The evening grosbeak is a boreal bird that is found in the fir forests on the foothill ranges of the valley during the nesting season, but it may be found in other habitats containing an abundant food supply during the rest of the year, especially during the first few months of the year.

Carpodacus purpureus

Purple Finch

The purple finch breeds from Newfoundland, Quebec, Ontario, on across southern Canada, south to Maryland, Illinois, North Dakota, and Lower California. The local subspecies, the California purple finch (C. p. californicus) breeds from southern British Columbia to Lower California west of the Cascade-Sierra Range. It is a permanent resi-

dent of western Oregon and the Willamette Valley.

I have placed this bird in the boreal list because of its somewhat northern breeding range, and because it utilizes the coniferous forests for breeding. Its habitat in California is "oak woodland and coniferous forest in which there are at least some densely foliated trees or compact tree-clumps. Along the northwest coast much of the forest meets this requirement, but interiorly and to the south, streamside and canyon bottom woodland is usually resorted to because of the denser character of the forest there and apparently also because of the higher humidity and presence of surface water. Of the three finches of the genus Carpodacus, this species shows most liking for moist and shaded places; the choice is reflected both in the local distribution and in the limits of the range as a whole"(45:451). Livezey lists it as an occasional visitor to the oak areas (63:39). Peterson lists it as a coniferous forest bird (74:247).

I have 134 records of this bird in the valley for every month, in a variety of habitats:

	Fir	Fir-Oak	Oak	Brush	Open	Total
January		1	1	2	1	5
February		2	1	4	5	12
March	1	6	1	1	3	12
April	3	12	2	3	3	23

chart continued:

	Fir	Fir-Oak	Oak	Brush	Open	Total
May	4	7	5	7	7	30
June	3	2			1	6
July	1	1		2	5	9
August		3		1	3	7
September	2	4	2		3	11
October	1	4	2	2	1	10
November	2	1		2	1	6
December		1	1	1		3
Total	17	44	15	25	33	134

From a study of this chart, it is natural to suppose that this finch is a widespread species. On the contrary, it is a nesting bird of the fir and fir-oak forests. It occurs in oak, brush and open areas because these areas are adjacent to the fir woods, and are utilized readily for feeding and other activities. Under such circumstances, the purple finch may be seen more often, and more readily, than in its nesting habitat of conifers. The purple finch was observed every month in the fir-oak habitat, only, possibly because this habitat offers more of the necessary variety than would a pure fir area. Most of the birds are seen during the months of April and May when they sing from available perches within, and outside their nesting habitat.

I have no nesting records of my own, but Charles

Cutress found a nest near Milwaukee on June 19. It was in a mixed fir-oak area, at a height of 30 feet in a scrub oak tree. Mr. Willet Griffiee has found most of the nests in firs, but occasionally in orchards.

In summary, the purple finch is a boreal bird that seeks the shade of the coniferous forest in the valley for the nesting season, but is seen in diversified habitats for such activities as feeding, even during the nesting season.

Carpodacus mexicanus

House Finch

The house finch breeds from the northern western United States south into New Mexico, Mexico, and Lower California. It is a permanent resident of eastern Oregon, but less abundant in western Oregon. It is a more or less irregular permanent resident of the Willamette Valley.

I have placed it on the austral bird list because of its southern breeding range, and open and brushland habitats. It is classed as a sonoran bird (38:34). Grinnell and Miller state that the house finch habitat must meet the following requirements: "(1) water, at least within a fairly wide daily cruising radius, fruits perhaps forming a satisfactory substitute; (2) open ground of limited or great extent thus affording growths of low seed-producing plants, especially composites; (3) sources of fruits and berries during part of year (possibly not essential);

(4) trees, cliffs and earth banks, or man-made structures for roosting and placement of nests above ground in sites often partly enclosed. These requisites are not met in forest associations or continuous chaparral, although they may be found in woodland formations, in forest and chaparral edges and on treeless plains and deserts;" (45:454).

It was not until 1939 that the first record was published on the occurrence of the house finch in the Willamette Valley (40:164), but since that day this finch has been observed with increasing frequency. I have only 26 observations of it here in the valley during 8 months of the year in the following habitats:

	Open	Brush	Oak	Total
January			1	1
March	1	1	1	3
April		2	1	3
May	1	6	2	9
June	2		2	4
July	1			1
August	1	2	1	4
October		1		1
Total	6	12	8	26

Discussion with other bird observers seems to indicate that the house finch is more common in the valley than my records show. It certainly has not reached the abundance,

however, that I witnessed in the small town of Mountain Home, Idaho, where approximately 660 individuals were observed in one afternoon in mid-April (34:209).

From the chart it seems that the house finch is a bird of the more open area, not associated at all with either deciduous or coniferous forests. Most of the observations on this finch were made in brush areas. Their occurrence in open areas is more often close to towns and farmsteads than away from them. Its occurrence in oak may have been for two good reasons: (1) available food in the brush growths associated with the oaks, and (2) available cavities in the older oaks that could be used for nest sites. Mr. Willet Griffie found a nest June 12 on the drooping limb of a Douglas fir in an open area just outside Portland.

These finches were seldom seen individually or in pairs, but more often in small groups of 4 or 5 individuals.

In summary, the house finch is an austral bird that, supposedly, has just recently spread into the Willamette Valley, and is now found in suitable open and brushland habitat throughout the valley.

Spinus pinus

Pine Siskin

The pine siskin breeds from the limits of timber in Alaska and Canada south to New England, North Carolina (in

the mountains), Minnesota, New Mexico, and southern California. It is a permanent resident of the forested portions of Oregon. It is present in the Willamette Valley proper, except during the summer months.

I have placed this bird on the boreal list because of its northern breeding range and coniferous habitat. Bailey lists it as a bird of the Canadian zone (9:28). Grinnell and Miller give its nesting habitat as "conifers of any type, except those native to the Upper Sonoran Zone, whether these trees be in forest formation or in scattered clumps" (45:459). Livezey lists them as an occasional visitor to the oak areas near Corvallis (63:39).

In my experience, the pine siskin has been a wandering, irregular bird here in the valley. If you happen to be where there are flocks you will see the, and if not, you will miss them, for they seem to occur just about anywhere except during the summer months. I have recorded them 55 times in the following habitats:

	Fir	Fir-Oak	Oak	River bottom	Brush	Open	Total
January	1		1		1		3
February		2					2
March						2	2
April		6		1	4	4	15
May	4	7		3	3	4	21
June	1					1	2

chart continued:

	Fir	Fir-Oak	Oak	River bottom	Brush	Open	Total
September		1			1		2
October		1			1	2	4
November	2	1				1	4
Total	8	18	1	4	10	14	55

I have no records for the pine siskin during the months of July or August, and December. Gordon Gullion has no record for them during July in the Eugene area. During the two summer months these birds may move up into the mountains, retreating valley-ward as the cold weather begins to set in in the fall, but I have no explanation for their absence during December. It is better to think that I just overlooked them during the 31 field trips I made during the Decembers covered by this thesis. From the chart, the wide variety of habitats in which they occur is notable. From this chart it would be difficult to pick out the particular habitat which is used for nesting purposes. This is because the siskins have wide-ranging habits, even during the nesting season.

I have no nesting records of my own, but I did find adults attending young birds that were barely able to fly on May 23 in Avery Park. Evidently nesting had taken place in the park, as the young birds were not good enough fliers to have come in from any other fir woods area.

During most of the year siskins may be seen individually, in small groups or large flocks of their own kind, or in mixed groups or large flocks with the local goldfinches. On October 25 I saw a flock of 50 to 75 birds feeding on the fruits of a weeping birch in Woodburn; on November 30 I saw a flock of over 250 individuals perched in the tops of some river bottom cedar along Pudding River; on January 27 I watched about 225 of them feeding on the alder cones of a small stream coming out of the Cascade foothills on the east side of the valley; on January 30 I watched a flock of 8 or 10 feeding on maple samaras; on February 29 I saw 50 individuals feeding on alder cones along the Marys River near Corvallis. At other times I have seen them in the open fields and weed patches feeding, along with the goldfinches, on weed seeds of various kinds. From this discussion a general picture of their period of flocking is evident - fall, winter, and early spring seems to see the greatest amount of flocking.

In summary, the pine siskin is a boreal bird that breeds in the fir forests of the Willamette Valley, but does not confine its feeding activity to these forests, even during the nesting season, as it is found in a wide variety of habitats during any month of its occurrence in the valley.

Spinus psaltria
Arkansas Goldfinch

The Arkansas goldfinch breeds from Colorado, Utah, Nebraska, and Oregon, west of the Cascades south into Mexico. It is a permanent resident of western Oregon, but very rare in mid-winter in the Willamette Valley.

I have placed this goldfinch on the austral list because of its southern breeding range. In California its habitat is "Open terrain with scattered trees or bushes; Brushland may be occupied if open land and edge situations are present in the vicinity" (45:462). Livezey lists it as an occasional visitor to the oak areas (63:39).

The Arkansas goldfinch has not been a common bird in my experience. Although it is supposed to be a common resident, my records indicate that it moves out of this valley, at least for three months of the winter. I have not recorded it in November, December, or January. I have seen it the other nine months in the following habitats:

	Open	Brush	Oak	Total
February	2	1		3
March	3		1	4
April	7	2		9
May	7	5	3	15
June	3	2		5
July	1			1

chart continued:

	Open	Brush	Oak	Total
August	4	3	1	8
September	2	1	1	4
October	4	2		6
Total	33	16	6	55

From the chart it can be seen that this goldfinch is a bird of the open areas and brushland, occurring infrequently in the oak areas, and even then it is usually in the brush or clearings in the oak. The largest number of observations were made in May, with a second modal peak in August, their abundance being much reduced in June and July for some reason.

I have little nest data on this species. On June 11 I found one nest in a Colorado blue spruce in a suburban yard. The nest was at a height of 14 feet, and had full exposure to the elements. On May 19 I found a young bird, just out of the nest in the shrubbery around the Corvallis post office. It is odd that the only two nestings of which I have evidence should both be associated with urban and suburban conditions. Gabrielson and Jewett give no nest data for the Willamette Valley (38:548).

In the fall and early spring, this goldfinch will oftentimes be observed in mixed flocks with the common goldfinch, feeding in the fields and weedpatches.

In summary, the Arkansas goldfinch is present in the open fields and brush here in the Willamette Valley during all but the mid-winter months. They may be here during those months, but their numbers are so small that perhaps I have completely overlooked them.

Loxia curvirostra

Red Crossbill

The red crossbill breeds from the limit of trees in Alaska and Canada south to the northern United States, and in the mountains to Georgia, New Mexico, California and Lower California. The Sitka red crossbill (L. c. sitkensis) is the local subspecies, and it breeds from Sitka, Alaska south along the coast to central California. In Oregon it is a permanent resident west of the summit of the Cascades. In the Willamette Valley it is a permanent resident of the timbered mountains and foothills, and may occur in other areas of the valley at anytime.

Gabrielson and Jewett classify this crossbill as a bird of the Canadian zone (38:39). I have placed it on the boreal list of birds because of its northern and mountainous breeding range, and coniferous habitat. Throughout their range they occupy the coniferous forests, particularly the Douglas fir, Sitka spruce, and white firs of the genus Abies. The peculiar structural arrangement of their bills make it almost compulsory that they feed on the cones

of the conifers.

I have seen red crossbills in the Willamette Valley proper just a few times. They are a nomadic group of birds and so an observer feels lucky if and whenever he runs across them. I have seen them on January 4 near Wells Creek in Benton County; on April 19 on the lower reaches of the South Santiam River where it comes out of the foothills; on May 18 in McDonald Forest north of Corvallis (Fig. 10); and on November 2 in McDonald Forest. At all times they were in the coniferan areas, usually up quite high in the trees, as the cones are ordinarily born on the upper branches. I have never seen just a pair of birds - they are always in flocks of half a dozen to two dozen individuals. At Thurston, in Lane County, Mr. Ben Pruitt has seen these crossbills on January 13; January 18; July 23; and on September 15. There were 9 in the flock seen on July 23.

In conclusion, the red crossbill is a boreal bird that is rarely found outside the habitat of coniferous timber. It may occur in the valley at any time of the year.

Pipilo maculatus

Spotted Towhee

The spotted towhee breeds from British Columbia and western Alberta south into New Mexico and Lower California.

The Oregon towhee (P. m. oregonus) is the local subspecies which breeds from southwestern British Columbia west of the Cascades to west-central Oregon. It is a permanent resident west of the Cascades in Oregon. Occasionally birds may be found in the southern part of the Willamette Valley that may be of the more southern form (P. m. falcinellus), the Sacramento towhee.

This towhee has a relatively southern breeding range so I have placed it on the austral list. Throughout its range it seems to be a bird of the thickets and brush, more than a bird of the forests.

I have recorded it 254 times as follows:

	Brush	Oak	Oak-Fir	Fir	Total
January	10	5	1		16
February	30	6	1		37
March	27	3	1	1	32
April	16	12	1		29
May	21	7	10	2	40
June	9			1	10
July	5		2	1	8
August	15	4	3	1	23
September	8	4	3		15
October	11	2	3		16
November	6	4	2		12
December	12	2	1	1	16
Total	170	49	28	7	254

From this chart it can be seen that the towhee is predominantly a brush inhabitant. It gets into pure forests infrequently, although it may be found in the brush in clearings or around the edges of the forest. Its abundance remained quite high through all the months, though there is a tendency for more birds to be present, or at least observed, during the late winter and spring months. Possibly this is because the birds are not so secretive in their habits during this period.

Gabrielson and Jewett give the following data on nesting: "The eggs are usually laid in May. Our nesting dates extend from May 3 to June 25, although young of the year are always on the wing before the latter date" (38:554). My personal notes do not agree entirely with the foregoing data. I have found two nests, both on the ground, one under thick herbaceous growth, and the other quite in the open. The former nest was found on June 29 and contained 4 freshly hatched young birds. The latter was found May 13, with young just about to leave the nest (it was vacated by May 18). Both of these examples are extremes beyond those given above. Mr. Willet Griffie of Portland states that most of the nests he has found have been on the ground, with a few in low shrubbery, between 3 and 4 feet above the ground. He found one nest near Corvallis on July 2. Charles Cutress has found even more nests, most of them on the ground at the base of shrubby plants. He

has found nests on May 12, June 20, 25, and 28. The June 25 nest was at a height of 4 feet in a sweetbriar. From all these dates it seems that the towhee's nesting season ranges from late April to mid-July.

It has been my experience that these towhees stay paired during the winter months, and even seem to maintain their territory somewhat loosely. Sometimes they may be seen with the roving flocks of birds that are so common working through the brush during the winter months, but I doubt that they rove far beyond their home range.

In summary, the spotted towhee is an austral bird that is found primarily in a brushy habitat, seldom seen in open areas, except to traverse them, and seldom seen in thick woods, except in the brush areas associated with those woods.

Calamospiza melanocorys

Lark Bunting

The lark bunting breeds in prairie country from southern Alberta and southwestern Manitoba south over most of the central United States west of the Mississippi. It has been recorded as a straggler to the Willamette Valley of Oregon by Dr. Kenneth L. Gordon.

It is a grassland bird so I have placed it on the austral list of birds.

There is just one record for it in the Willamette Valley. On May 14, 1939, Dr. Gordon observed a single male bird in a prairie area north of Saddle Butte in Linn County (41:119).

How, or why this bunting found its way into this valley does not matter. The point of interest is that it was observed in that portion of the valley that best corresponds to the habitat of the normal range of this species. The area around Saddle Butte is mostly wide, open expanses of farmland.

Within its normal range the lark bunting is a migrant species, so it seem possible that this individual followed the west coast northward from its wintering grounds in Mexico, instead of heading north through the central part of the continent. Its presence here in mid-May could be considered as in the spring migration period.

Chondestes grammacus

Lark Sparrow

The lark sparrow breeds from extreme southern Canada south to Ohio, Louisiana, Texas, and Mexico. The western lark sparrow (C. g. strigatus), the local subspecies breeds from southern British Columbia and Saskatchewan south to Mexico and east to the Great Plains. In Oregon it is a summer resident of eastern Oregon, extreme southwestern Oregon, and less abundantly in the Umpqua River Valley.

It has been recorded irregularly from the Willamette Valley, usually in the spring and summer.

This sparrow is classed as a sonoran bird (38:34). This, together with its southerly breeding range indicates that I should place it on the austral list. Its habitat in California is "A combination of open terrain with scattered bushes and trees such that there is opportunity to forage on the ground and yet to utilize elevated places for viewpoints and retreats" (45:494).

I have just three records of my own for this species. I saw my first male bird in May, 1940 in an abandoned pasture area along the east side of the valley, east of Woodburn, Marion County. The pasture had scattered clumps of brush. On February 6 (1947) I located a small flock of 5 or 6 of them on North Cemetery Hill, Corvallis (Fig. 17). This is an area of pastureland, scattered oaks, and scotch broom thickets. Then on June 26 (1947) I saw 3 or 4 of them perched on fence posts along a little-used road near Twin Buttes in Linn County. Only one of these was a full adult. This area is very flat and open, except for brushy fence rows. Dave Marshall saw one on Sauvie Island below Portland in September. Mr. Ben Pruitt has records of their occurrence for a period of three to four months every winter in the vicinity of Thurston, Lane County.

All of the habitats in which the lark sparrow has been observed here in the valley are either open, or a combin-

ation of open areas and brushland. These habitats are similar to those which this bird occupies over the greater part of its normal range. The lark sparrow seems to be present at any time of the year, but it is very low in numbers at all times.

Spizella passerina

Chipping Sparrow

The breeding range of the chipping sparrow is from southern Canada south to Georgia, Alabama, Texas, and Mexico. The western chipping sparrow (S. p. arizonae), the local subspecies, breeds from southern British Columbia and Alberta south to Mexico. It is a summer resident in Oregon and the Willamette Valley.

Because of its southerly breeding range I have placed this sparrow on the austral list. Grinnell and Miller say that its habitat is "Of great variety, but in summer seemingly always includes the following elements: trees, scattered or in open stands through which much light penetrates to the ground; ground forage area essentially bare or covered with sparse or dense grass, but usually not with continuous, tall grass; the ground usually is not heavily shaded or extensively bush covered" (45:513). Livezey lists it as a spring and summer resident of the oak areas near Corvallis (63:38).

I have 90 records for 8 months of the year, the earliest date of their arrival being February 23; the latest date of departure, September 21. I have seen them in several habitats the following numbers of times:

	Open	Brush	Oak	Oak-Fir	Total
February	1				1
March	4	3	3		10
April	8	11	2	1	22
May	12	12	7	5	36
June	4	1	1	3	9
July	1	2			3
August	4	3			7
September			1	1	2
Total	34	32	14	10	90

From the chart it can be seen that the chipping sparrow occurs most often in open and brush areas, preferably a combination of the two. Those recorded in open areas were most often seen perched on wire lines or the tops of bushes in the fence rows adjacent to large open fields. Their occurrence in the oak and oak-fir areas is to be expected as suitable habitat requirements are met in these areas, also. They often nest in these areas as well.

It seems to nest during May and June. I have found just three nests, all on May 17. They were on Miller Butte

near Marion, Marion County, in a wild rose clump at a height of 3 feet; in a sweetbriar; and in a snowberry bush, all on a north-northeast slope. Young birds were in these nests. Ben Pruitt found a nest on May 15 at Thurston, Lane County. Charles Cutress found a nest May 4 at a height of 6 feet on an overhanging oak branch. Mr. Willett Griffie gives me nest dates for the Corvallis area of May 4, 11, and 12, and June 5 and 29. These nests were from 8 to 12 feet above the ground in apple or pear trees.

During the spring and summer of 1946 and 1947 these birds were very common on the campus lawns of Oregon State College. Pairs could be seen feeding in the trees and on the grass. Following the nesting season, I have not seen many of them. They seem to disappear, so to speak; this past August (1947) I may have found a partial solution to their disappearance from the valley for on August 8 I found a flock of 50 to 75 adults and immatures working southward through sweetbriar and young incense cedar on a dry foothill slope of the Cascades in eastern Linn County. I have also observed considerable numbers of these birds in the high mountains during the month of September. Perhaps most of the chipping sparrows do leave their valley habitats, following the nesting season, and move into the mountains, flocking and slowly working their way southward.

The chipping sparrow is a summer resident austral bird that is found in habitats that are relatively open, ranging

from fields and fence rows to oak woodlands and mixed oak-fir areas.

Zonotrichia leucophrys

White-crowned Sparrow

The breeding range of the white-crowned sparrow is from the northern limit of trees in Alaska and Canada, south to the northern edge of the eastern United States, Montana, Colorado, New Mexico, and California. The local subspecies, the Puget Sound white-crowned sparrow (Z. l. pugetensis) breeds from Vancouver Island and southern British Columbia south to northern California, west of the Cascades and Sierras. The white-crowned sparrow is a common summer resident and less common winter resident of the Willamette Valley in Oregon.

It is a bird of the Canadian zone (38:39). Because of its northern and mountainous breeding range I have placed it on the boreal list of birds. In California, its habitat in summer is the "brushlands along unforested parts of slopes facing the sea" (45:522). Livezey says it is an occasional visitor to the oak areas near Corvallis (63:39).

I have recorded the white-crowned sparrow 91 times during every month of the year. I have seen it the following number of times in five different habitats:

	Fir	Fir-Oak	Oak	Brush	Open	Total
January	1			2	1	4
February	1	4	3	2		10
March		2		2	2	6
April	3	10	1	10	5	29
May	6	5	2		3	16
June	4	1				5
July	1					1
August	1	2				3
September				3	1	4
October		1	2	2		5
November	1	1		1		3
December				4	1	5
Total	18	26	8	26	13	91

These sparrows are seen most often during the months of April and May, maintaining much the same balance during the rest of the year. They are found most consistently in the fir, and fir-oak areas, and exclusively in these areas during the three summer months, June, July, and August. They occur quite regularly in the oak, brush, and open habitats during the other months of the year.

I have two nesting records of the white-crowned sparrow. On June 16 and July 12 I found nests containing young. These were at elevations of about 1400 feet in McDonald Forest north of Corvallis. Nests were not over a

foot above the ground in dense thickets in exposed clearings in the woods. Mr. Willet Griffie states that they do not nest in bottomland areas, and their nests are on, or close to the ground. Occasionally nests are situated differently. He found a nest on May 17 at a height of 18 feet in top of a small Douglas fir. Another nest he found April 30 was 8 feet high in a clump of raspberries. Gordon Gullion has found young in the Eugene area on June 1. Charles Cutress has found 7 nests in the vicinity of Milwaukee and Damascus in Clackamas County on dates ranging from May 7 to June 28. All of these nests were in bushes of hazel, ocean spray, and young Douglas fir at heights of 2 to 8 feet. It seems that the majority of their nesting sites are in areas that are partially open and have at least scattered Douglas fir in the vicinity.

In the fall these sparrows feed on wild fruits of the cascara, dogwood, blackberry and many others. In the winter they often occur in mixed flocks with the golden-crowned sparrows which I am going to discuss next.

In summary, the white-crowned sparrow is a boreal bird that is widely distributed through several habitats, only showing a preference for the fir and fir-oak habitats during the summer months.

Zonotrichia coronata

Golden-crowned Sparrow

The golden-crowned sparrow breeds from Alaska to central British Columbia. It is a migrant and winter resident in Oregon.

I have placed this bird on the boreal list because of its northern breeding range. Its winter habitat in California is "An interrupted type of brushland, such as constituted by streamside thickets, chaparral where broken up by patches of open ground, and garden shrubbery" (45:525). Livezey lists it as a spring and summer resident of the local oak areas (63:38). I question this classification. Gullion says that it is a winter occupant of the scrub oak and brushlands in the Eugene area.

My records do not show this bird to be very abundant in the winter, but I believe it is more common than the following chart of their occurrences shows:

	Oak-Fir	Oak	Brush	River bottom	Total
January	1	1	2		4
February	2	2	5		9
March			8	2	10
April	1	2	5	1	9
May	3			1	4
September			2		2

chart continued:

	Oak-Fir	Oak	Brush	River bottom	Total
October	2	1	5		8
November	1	1	1		3
December		2	3		5
Total	10	9	31	4	54

During its winter residence in the Willamette Valley, this sparrow is principally an occupant of the open brush areas found associated with oak woodlands and fence rows adjacent to the farm fields and pastures. It is not seen in fir forest areas. They seem to be most abundant during the spring, as migrants move through from the south. Also they are singing during the spring, and hence more easily located at that season. They feed on the ground close to brushy thickets or fence rows where they can seek shelter quickly when the need arises.

In summary, the golden-crowned sparrow is a boreal bird that is found in the brushy habitats of the Willamette Valley during the winter months.

DISCUSSION

From this rather detailed dissertation on the habitats of the preceding species some summarizing discussion seems necessary. As to my original tentative selection of the species, based on their austral or boreal relations, the majority have fitted remarkably well into one or the other division. Some others have been found to be more generally distributed than at first considered. Others, because of insufficient data, cannot be definitely relegated to any specific division by this study.

Most of the aquatic types, like waterfowl, shorebirds, and related forms are governed in their distribution and occurrence by the presence of water, not so much by the conditions of the surrounding countryside and its vegetation types. Instead, climatic conditions may be one of the more important limiting factors. The winter and summer aspects of many of our aquatic habitats may be radically different. Water levels may be high, providing little vegetation cover, but at the same time providing more area for resting and feeding for both the surface-feeding and diving ducks. On the other hand, water levels may recede, permitting rank aquatic vegetation growth that provides both food and shelter, and nesting sites for some species; and at the same time exposing mud flats which are attractive feeding grounds for shorebirds. These variable condi-

tions may meet the needs of both austral and boreal aquatic forms. On the other hand, a few aquatic birds need more than just water to meet their habitat requirements:

The green heron is found in areas of quiet or slow-moving ponds and streams that have a surrounding land vegetation of deciduous trees and shrubs. Coniferous forest, or open fields adjacent to the water will not do.

The cinnamon teal breeds in areas of marshland in the warmer or drier parts of the United States. In the valley it is found principally in the southern, drier portions.

The wood duck, like the green heron, is found on ponds and sloughs associated with deciduous trees and shrubs; not on waters adjacent to open fields, or coniferous forest.

In contrast, the harlequin duck is seldom found on quiet waters, but typically on rapid flowing streams ordinarily associated with high mountain meadows or coniferous forests, though some streamside deciduous growth is present.

The hooded merganser is another duck principally associated with ponds and slow-moving streams. Here again deciduous trees and shrubs seem to be an important requirement.

Only one of the shorebirds that I have discussed is a definite summer resident. All of them prefer the flat marshy and muddy borders of lakes and marshes, where there is comparatively short herbaceous vegetation, or no vegetation

at all.

The vulture had a high occurrence in the more open areas, and the one nesting record was in a dry situation, indicating a desire for more austral conditions. I have too few records of other hawks to make very definite statements of their habitats here in the valley.

The blue grouse proved a true boreal bird, occurring exclusively in habitats exhibiting boreal conditions. It was associated constantly with forests containing conifers.

Two quail, the bobwhite and the California quail, both introduced from austral areas, were found to occur principally in the austral habitats here. However, they differed from each other in the type of austral habitat in which

they occurred. The bobwhite was found most often in open areas such as farmlands. Contrarily, the California quail occurred a greater share of the time in brush areas.

A large number of observations on the mourning dove showed a high frequency in the austral habitats of oak woodland and open areas.

Two of the owls, the burrowing and short-eared were found principally in the open areas, showing the utilization of a common habitat. The northern United States is an ecotone, so to speak, for the burrowing owl reaches its northern limits, and the short-eared owl its southern limits in the area. Here in the valley open habitat conditions have a wide enough range that both of these owls are

tolerant of it. The great gray and spotted owls occurred only in coniferous forests, indicating the suitability of local boreal conditions.

The rufous hummingbird, though classified as austral, will nest in coniferous trees, as well as deciduous species just so there are flowering shrubs in the vicinity.

Another contrasting pair of birds are the pileated and Lewis's woodpeckers. The former is a northern bird and it occurs almost exclusively in habitats containing coniferous trees, particularly old growth fir areas. The latter, a southern form, occurs in oak areas and in the open country, not in the boreal habitats of the valley.

The western kingbird tended to occur in semi-open areas, whereas the Say's phoebe was in varied types of open habitat in the drier parts of the valley. In contrast, the olive-sided flycatcher, a northern bird, was found nearly always in habitats containing coniferous trees.

The Canada jay occurred exclusively in coniferous timber in the valley area. Similarly, the Steller's jay occurred chiefly in habitats containing fir, but with a tendency to roam during the fall and winter into other habitats. In definite contrast to this, the California jay was predominantly in the oak and brush areas. This contrast will appear more plain by referring to the habitat distribution charts of these two jays.

The chestnut-backed chickadee, though found in brush, was seen more often in areas of coniferous timber, whereas the bush-tit occurred in no pure stands of coniferous forest, being more frequent in the oak and brush areas.

The habitat charts for the white-breasted and red-breasted nuthatches should be referred to in order to see what the contrasts and the similarities are between these two birds. Both occur often in oak-fir areas, which are ecotones resulting in nuthatch distribution ecotones, as well. From this oak-fir habitat, the white-breasted shows a greater preference for oak and brush areas, while the red-breasted occurs more in the coniferous forest. The brown creeper is associated mostly with habitats containing coniferous timber.

Few records were made of the house wren, but it occurred most frequently in the deciduous and brush habitats. Two other wrens are noticeably contrasted in their habitat distribution. The winter wren and the Bewick's wren both occur frequently in the oak-fir areas. However, the winter wren occurs in the darker thickets, preferably composed of Douglas fir, and in the dense fir forests; while the Bewick's wren occupies the more open brush types in the oak-fir, staying out of the firs, and tends to spread widely into oak and brush areas as well. I have never seen the marsh wren away from a brushy or herbaceous aquatic habitat.

The varied and hermit thrushes are winter residents found in a variety of habitats exclusive of open areas. The summer resident Swainson's thrush is also found in a variety of habitats, but shows a slight preference for coniferous locations. The Townsend's solitaire is a northern bird found in boreal coniferous areas during the breeding season, but occasionally wandering elsewhere during the winter.

The pipit, a northern open-country bird, is found in varied open habitats during the winter here in the valley. The boreal shrike has similar habitat relations, but, unlike the pipit, is more frequently associated with brush such as in fence rows, than pure open fields.

There is a slight contrast between the Hutton's vireo, a permanent resident, and the summer resident solitary and warbling vireos; the latter showing a preference for the deciduous trees and shrubs whereas the Hutton's preference is for habitats containing Douglas fir.

The orange-crowned warbler, a northern bird, occurs most often in brush habitats. The black-throated gray warbler, a southern form, also occupies the brush habitats, although it is found with regularity in the other habitats. Townsend's and hermit warblers are both northern birds found in the boreal coniferous habitats here in the valley. The chat is an austral form found predominantly in brush habitats, either on dry hillsides or in river bottom areas.

The yellow-headed blackbird is an austral bird that inhabits cattail marshes particularly in the comparatively dry regions in the southern portion of the valley.

The western tanager, a northern bird, occurs most frequently in the coniferous forests, but gets into deciduous trees and brush during the migration periods.

The black-headed grosbeak, a southern bird is found mostly in deciduous forest and brushland. The evening grosbeak is a permanent resident of the coniferous forest during the breeding season, and apt to be found anywhere during the winter and spring.

Two more contrasting birds are the purple and house finches. The house finch occurs in open, brush, and oak areas, but not in coniferous habitats, whereas the purple finch is found in all habitats. This is a little misleading in regards to the purple finch, for it nests principally in habitats containing conifers; its occurrence in the other habitats is usually for other activities. The pine siskin is another bird, like the purple finch, typically found in conifer sections, but occurring in other habitats frequently. Red crossbills are northern birds apt to be found anywhere in coniferous forests in the valley.

The spotted towhee is an austral bird of the brush and oak areas. The lark sparrow and the chipping sparrow

are both austral birds of the brush and open habitats of the valley, although the habitat of the latter is more varied.

The white-crowned and golden-crowned sparrows are northern birds, both of which tend to occur in the brush habitats more than either the open or forest habitats.

From this paper it should be evident that there is a correlation between bird distribution and the life-forms of plants. Many wide-ranging species not discussed in this paper, also are governed by the occurrence of particular life forms. These wide-ranging habits exist because entirely different ultimate habitats can possess highly similar developmental stages, so far as life forms are concerned.

SUMMARY

According to Gordon's scheme (42) there are two principal divisions in the Willamette Valley - the Coast Forest Association, and the Woodland and Chaparral. A third division, grassland, is subordinate to both of the foregoing because it is typically not equivalent to the grasslands of the Palouse country, or of the Great Plains; but even so, it does have a typical avifauna here in the valley. Whether these grasslands are a stage in the development of the forest or of the woodland and chaparral divisions, we can not say for certain, because we lack historical data on the trend of the existing vegetation.

Birds that I have discussed that can be associated typically with the grassland division here in the valley are:

Prairie Falcon	Short-eared Owl	Arkansas Goldfinch
Bobwhite	Raven	Lark Bunting
Burrowing Owl	Pipit	Lark Sparrow

The following species, which I have discussed, are typical of the Woodland and Chaparral division of austral habitats in the Willamette Valley:

California Quail	California Jay
Rufous Hummingbird	Bush-tit
Acorn Woodpecker	White-breasted Nuthatch
Lewis's Woodpecker	Wren-tit

(woodland and chaparral list continued)

Bewick's Wren	Chat
Solitary Vireo	Black-headed Grosbeak
Black-throated Gray Warbler	Spotted Towhee

The boreal coast forest formation here in the valley also has several typical bird species:

Sooty Grouse	Brown Creeper
Spotted Owl	Winter Wren
Great Gray Owl	Townsend's Solitaire
Pileated Woodpecker	Townsend's Warbler
Olive-sided Flycatcher	Hermit Warbler
Canada Jay	Western Tanager
Steller's Jay	Evening Grosbeak
Chestnut-backed Chickadee	Red Crossbill
Red-breasted Nuthatch	

Of the 87 species discussed in this paper, 19 are found in aquatic habitats. Of the remaining 68 I have found 40 species very typical of one of each of the three divisions mentioned. 14 austral birds occupy the Woodland and Chaparral austral habitats here in the valley. 17 boreal birds are found typically in the coniferous forests. 9 birds occur in the subordinate grassland stages here in the valley. Of these, 6 are austral birds, and 3 are boreal birds, indicating that the grassland stages existing in the valley are acceptable to open-country birds of both the north and the south. The remaining 28 avian species

are not listed as typical of one of the above divisions either because they occur more or less equally in more than one of these divisions, or else the observational data I have is too incomplete to show the proper distribution of the species concerned.

From the evidence shown in this paper, there seems to be a sufficient number of species confined to each of the two major divisions of the Gordon scheme to say that these divisions are distinct from each other. Therefore, from the findings on the habitat occurrence and distribution of birds, it seems to me that the Coast Forest boreal division, and the Woodland and Chaparral austral divisions of Gordon's scheme are valid, and that they may be applied to the faunal and floral habitats of the Willamette Valley.



Fig. 10. Douglas fir (Pseudotsuga taxifolia) Dense growth in McDonald Forest, Benton County. Habitat for sooty grouse, pileated woodpecker, Canada jay, brown creeper, winter wren, hermit warbler, and red crossbill.



Fig. 11. Cut-over Douglas fir. Open habitat suitable for olive-sided flycatcher, Bewick's wren, robin, western bluebirds, spotted towhee, and song sparrow.



Fig. 12. Yellow pine (Pinus ponderosa)
Open stand typical of flat gravelly soil of the
valley floor. Note open shrub habitat.



Fig. 13. Incense cedar (Libocedrus decurrens)
Portion of forest found along base of Cascade
foothills in eastern Linn County. Note adjacent
pasture area grown to sweetbriar (Rosa rubiginosa).



Fig. 14. An example of groves of white oak (Quercus Garryana) found throughout the valley.

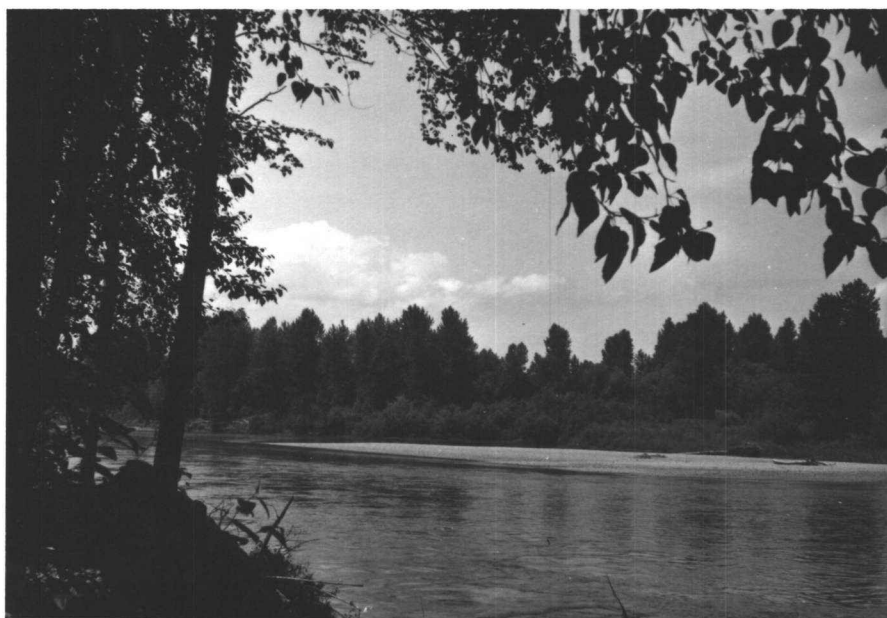


Fig. 15. The Willamette River, showing tall black cottonwood (Populus trichocarpa) and lower dense growth of willow (Salix sp.) across the river.



Fig. 16. Closeup of a tall chaparral growth on a south slope. This stand is composed entirely of madrone (Arbutus Menziesii)



Fig. 17. Low chaparral growth on a south slope - chiefly of scotch broom (Cytisus scoparius) with a scattering of white oak.



Fig. 18. Hawthorne (Crataegus Douglasii)
Thickets such as this occur in the prairie-
like grassland areas of the valley.



Fig. 19. Prairie-like grassland typical of
the southern portion of the Willamette Valley.
Habitat for bobwhite, burrowing owl, short-
eared owl, raven, pipit, and lark sparrow.



Fig. 20. A portion of a small lake on the floor of the valley. Note bordering mixture of Douglas fir, white oak, and Oregon ash. The first nest of the green heron located in Oregon was in an ash shown here in the right-center background.



Fig. 21. Swamp habitat composed of dwarfed ash, hardhack (Spirea Douglasii), and slough sedge (Carex obnupta). Excellent nesting habitat for long-billed marsh wrens, and redwing blackbirds.



Fig. 22. Marsh habitat of low vegetation and open water, and bordered by swamp habitat of ash and hardhack. The low vegetation is mostly Eleocharis, Carex, Sparganium, Polygonum, and Alisma.



Fig. 23. Cattail marsh bordering Fern Ridge Reservoir, Lane County. Yellow-headed blackbirds flying, and one perched near center. Redwing blackbird in right foreground. Note the oak woodland in background.



Fig. 24. Nestling green heron from nest in ash shown in Fig. 20.



Fig. 25. Pair of common egrets feeding in marsh area of the local swamp south of Corvallis.



Fig. 26. Nest and eggs of mallard found in grass and weed patch near Fern Ridge Reservoir. Heavy lining of down does not show well in this reproduction.



Fig. 27. Nest and eggs of the American Bittern at the local swamp. It is another species found only about aquatic habitats.

BIBLIOGRAPHY

1. Abel, Arthur R. An intensive ornithological survey of a typical square mile of cultivated prairie. *Proc. Iowa Acad. Sci.* 27:385-393. 1920.
2. Aldrich, John W. Birds of a deciduous forest aquatic succession. *Wilson Bul.* 57:no.4:243-5. 1945.
3. American Ornithologists' Union. Check-list of North American birds. 4th ed. Lancaster, Penna., 1931. 526p.
4. ———, Committee on classification and nomenclature. Nineteenth supplement to the A. O. U. check-list of North American birds. *Auk* 61:no.3:441-464. 1944.
5. ———, Twentieth supplement to the A. O. U. check-list of North American birds. *Auk* 62:no.3:436-449. 1945.
6. ———, Twenty-first supplement to the A. O. U. check-list of North American birds. *Auk* 63:no.3:428-432. 1946.
7. ———, Twenty-second supplement to the A. O. U. check-list of North American birds. *Auk* 64:no.3:445-452. 1947.
8. ———, Twenty-third supplement to the A. O. U. check-list of North American birds. *Auk* 65:no.3: - . 1948.
9. Bailey, Vernon. The mammals and life zones of Oregon. Wash. D. C., U. S. Dept. of Agriculture, Bur. of Biolog. Surv., North American Fauna no. 55. 1936. 416p.
10. Baker, William H., and Robert M. Yancey. Plant-form spectra of Oregon. ms., unpublished. 1947.
11. Bent, Arthur C. Life histories of North American woodpeckers. Wash. D. C., Smithsonian Institute, U. S. Nat. Mus. Bul. no.174. 1939. 334p.

12. Bent, Arthur C. Life histories of North American flycatchers, larks, swallows and their allies. Wash. D. C. Smithsonian Institute, U. S. Nat. Mus. Bul. no.179. 1942. 555p.
13. ——— Life histories of North American jays, crows, and titmice. Wash. D. C. Smithsonian Institute, U. S. Nat. Mus. Bul. no.191. 1946. 495p.
14. Bird, Ralph D. Biotic communities of the aspen parkland of central Canada. Ecology 11:no.2:356-442. 1930.
15. Blair, Thomas A. Climatology. New York, Prentice-Hall, Inc., 1942. 478p.
16. Braun-Blanquet, J. (transl. by George D. Fuller and Henry S. Conrad). Plant sociology, the study of plant communities. New York, McGraw-Hill. 1932. 439p.
17. Buchanan, Robert L. Population and occurrence of birds in varying cover types of the Willamette Valley. Thesis for the degree of M. S. Oregon State College, Corvallis. 1942. 59p.
18. (deleted)
19. Carpenter, J. Richard. The biome. Amer. Midl. Nat. 21:75-92. 1939.
20. Clements, Frederick E., and Victor E. Shelford. Bioecology. New York, John Wiley and Sons. 1939. 425p.
21. Currier, Ed S. Lewis woodpecker nesting in colonies. Condor 30:356. 1928.
22. Daubenmire, Rexford F. Merriam's life zones of North America. Quart. Rev. Biol. 13:327-332. 1938.
23. Decker, Henry J. Spotted owl seen at Dundee, Oregon. Condor 39:132. 1937.
24. Dice, Lee R. The biotic provinces of North America. Ann Arbor, Mich., Univ. of Mich. Press. 1943. 78p.
25. ——— Application of statistical methods to the analysis of ecologic association between species of birds. Amer. Midl. Nat. 39:no.1:174-8. 1948.

26. Dimick, Roland E., and Fred Merryfield. The fishes of the Willamette River system in relation to pollution. Oregon State College, Engin. Exper. Sta. Bul. Ser. no. 20. June, 1945.
27. Evenden, Fred G., Jr. Black brant, cinnamon teal, and yellow-headed blackbird in the Willamette Valley, Oregon. Murrelet 24:no.2:28. 1943.
28. ——— Anthony's green heron nesting in western Oregon. Auk 64:no.2:322-3. 1947.
29. ——— The bufflehead nesting in Oregon. Condor 49: no.4:169. 1947.
30. ——— Phytogeographical study of the arboreal species of the west side of the Willamette Valley. ms., unpublished. 1947.
31. ——— An avian association in the Himalaya Mountains. Auk 65: in press. 1948.
32. ———, and Alvin R. Aller. Phytogeographical study of the arboreal species in McDonald Forest, Benton County. ms., unpublished. 1947.
33. ———, Philip C. Dumas, and Kenneth L. Gordon. The black phoebe in western Oregon. Condor 49:no.5: 212. 1947.
34. ———, and Joan R. Evenden. A house finch census at Mountain Home, Idaho. Condor 46:no.4:209. 1944.
35. Fautin, Reed W. Biotic communities of the northern desert shrub biome in western Utah. Ecol. Monog. 16:no.4:251-310. 1946.
36. Fenneman, Nevin M. Physiography of western United States. 1st ed., New York, McGraw-Hill. 1931. 534p.
37. Finch, Vernon C., and Glenn T. Trewartha. Elements of geography, physical and cultural. 2nd ed., New York, McGraw-Hill. 1942. 823p.
38. Gabrielson, Ira N., and Stanley G. Jewett, Sr. Birds of Oregon. Oregon State College Monographs. (Studies in Zoology, no. 2), Portland, Oregon. James, Kerns, and Abbott. 1940. 650p.

39. Gordon, Kenneth L. The amphibia and reptilia of Oregon. Oregon State Monographs (Studies in Zoology, no. 1). Oregon State College, Corvallis. 1939. 82p.
40. ——— The house finch in the Willamette Valley, Oregon. Condor 41:164. 1939.
41. ——— Lark bunting in Oregon. Auk 57:no.1:119. 1940.
42. ——— Distribution of North American Mammals, ms., unpublished. 1948.
43. Graf, William F. Notes on the distribution and habits of the Anthony's green heron. Murrelet 27:no.3: 50-51. 1946.
44. Grinnell, Joseph. Joseph Grinnell's Philosophy of nature. Berkeley, Univ. of Calif. Press. 1943. 237p.
45. ———, and Alden H. Miller. The distribution of the birds of California. Berkeley, Calif. Cooper Ornithological Club, Pacific Coast Avifauna no. 27. 1944. 608p.
46. Gullion, Gordon W. Orange-crowned warbler wintering in Oregon. Condor 49:no.2:88. 1947.
47. ——— An early record of the western kingbird in Lane County, Oregon. Condor 50:no.1:46. 1948.
48. ——— A breeding record for the yellow-headed blackbird in western Oregon. Auk 65: in press. 1948.
49. ——— Notes on the birds of the southern part of the Willamette Valley of western Oregon. ms. unpublished. May, 1948.
50. Hansen, Henry P. Postglacial forest succession, climate, and chronology in the Pacific Northwest. Trans. Amer. Philos. Soc. n.s.37:part 1:1-130. 1947.
51. Huestis, R. R., and Kenneth L. Gordon. Geographical distribution of Oregon land vertebrates (in physical and economic geography of Oregon). Oregon State Board of Higher Education. part of chapt. 7:110-117. 1940. 319p.

52. Jewett, Stanley G., Sr. Some new bird records from Oregon. Condor 44:no.1:36-7. 1942.
53. ——— The burrowing owl in the Portland, Oregon region. Murrelet 25:no.1:9. 1944.
54. ——— Breeding of the green heron in northwestern Oregon. Condor 47:no.5:219. 1944.
55. ——— American rough-legged hawk taken in the Portland, Oregon region. Murrelet 27:no.1:13. 1946.
56. Kendeigh, S. Charles. A study of Merriam's temperature laws. Wilson Bul. 44:no.3:129-143. 1932.
57. ——— The role of environment in the life of birds. Ecol. Monog. 4:no.3:301-417. 1934.
58. ——— Breeding birds of the beech-maple-hemlock community. Ecology 27:no.3:226-245. 1946.
59. ——— Bird population studies in the coniferous forest biome during a spruce budworm outbreak. Ontario, Canada, Dept. of Lands and Forests, Div. of Research, Biol. Bul. no.1. 1947.
60. Larrison, Earl J. Biotic areas in the Pacific Northwest. Murrelet 27:no.2:19-24. 1946.
61. ——— Present status of the green heron in Washington. Condor 49:no.2:87. 1947.
62. ——— Sections of the puget lowland belt. Murrelet 28:no.3:35-6. 1947.
63. Livezey, Robert L. A comparative vertebrate ecology of typical and atypical oak areas. Thesis for the degree of M. S. Oregon State College, Corvallis. 1943. 73p.
64. Livingston, Burton E., and Forrest Shreve. The distribution of vegetation in the United States, as related to climatic conditions. Wash. D. C. Gibson Bros. Press. Carnegie Instit. of Wash. Publ. no. 284. 1921. 590p.
65. Mayr, Ernst. History of North American bird fauna. Wilson Bul. 58:no.1:1-41. 1946.

66. Merkle, John. An analysis of the plant communities of Mary's Peak, western Oregon. Thesis for the degree of Ph. D. Oregon State College, Corvallis. 1948. 95p.
67. Merriam, C. Hart. Life zones and crop zones of the United States. U. S. D. A. Biol. Surv. Bul. 10: 9-79. 1898.
68. Odum, Eugene P. The concept of the biome as applied to the distribution of North American birds. Wilson Bul. 57:no.3:191-201. 1945.
69. Peck, Morton E. A manual of the higher plants of Oregon. Portland, Oregon, Binford and Mort. 1941. 866p.
70. Pequegnat, Willis E. A report upon the biota of the Santa Ana Mountains. Journ. of Entom. and Zool. 39:no.2:21-36. 1947.
71. Peters, James L. Check-list of birds of the world, Volume I. Cambridge, Harvard Univ. Press. 1931. 345p.
72. ——— Check-list of birds of the world, Volume II. Cambridge, Harvard Univ. Press. 1934. 401p.
73. ——— Check-list of birds of the world, Volume IV. Cambridge, Harvard Univ. Press. 1940. 291p.
74. Peterson, Roger Tory. Coniferous forest birds. Wilson Bul. 57:no.4:247-8. 1945.
75. Pettingill, Olin S., Jr. A laboratory and field manual of ornithology. Revised. Minneapolis, Burgess Publ. Co. 1946. 248p.
76. Piper, Arthur M. Groundwater resources of the Willamette Valley, Oregon. Wash. D. C., U. S. Govt. Print. Off., U. S. Geol. Surv. Water Supply Paper no. 890. 1942. 194p.
77. Pitelka, Frank A. Distribution of birds in relation to major biotic communities. Amer. Midl. Nat. 25:113-137. 1941.
78. Potter, E. L., and M. N. Nelson. Types of farming in Oregon (in physical and economic geography of Oregon). Oregon State Board of Higher Education. part of chapt. 11:160-170. 1940. 319p.

79. Powers, W. L., J. S. Jones, and C. V. Ruzek. Composition, rating, and conservation of Willamette Valley soils. Oregon State College Exper. Sta. Bul. no.365. 1939. 38p.
80. ———, and C. V. Ruzek. Soils of Chehalis series and their utilization. Oregon State College Exper. Sta. Bul. no.299. 1932. 20p.
81. ———, C. V. Ruzek, and R. E. Stephenson. Soils of Willamette series and their utilization. Oregon State College Exper. Sta. Bul. no.240. 1928. 26p.
82. Ruzek, C.V., and W. L. Powers. The "red hill" soils of western Oregon and their utilization. Oregon State College Exper. Sta. Bul. no.303. 1932. 20p.
83. Shantz, H. L., and Raphael Zon. Natural Vegetation. U. S. D. A., Atlas of American Agriculture, part IV:1-29. 1924 (1936).
84. Shelford, Victor E. Life zones, modern ecology, and the failure of temperature summing. Wilson Bul. 44:no.3:144-157. 1932.
85. ———, and S. Olson. Sere, climax and influent animals with special reference to the transcontinental coniferous forest of North America. Ecology 16:375-402. 1935.
86. Sipe, Frank P., W. E. Lawrence, and L. F. Henderson. Flora of Oregon (in physical and economic geography of Oregon). Oregon State Board of Higher Education. chapt. 6:99-109. 1940. 319p.
87. Smith, Warren D. The Willamette Valley province (in physical and economic geography of Oregon). Oregon State Board of Higher Education. part of chapt. 3:32-40. 1940. 319p.
88. Sprague, F. LeRoy, and Henry P. Hansen. Forest Succession in the McDonald Forest, Willamette Valley, Oregon. Northwest Science 20:no.4:89-98. 1946.
89. Stovall, James C., and Ruth E. Hopson. Climate of Oregon (in physical and economic geography of Oregon). Oregon State Board of Higher Education. Chapt. 4:83-91. 1940. 319p.

90. United States Department of Agriculture. Climate and man. Wash. D. C., U. S. Govt. Print. Off. Year-book of Agriculture. 1941. 1248p.
91. ———, Weather Bureau. Climatological data, annual summary. 40:no.13, supplement. December, 1934.
92. Weaver, John E., and Frederick E. Clements. Plant ecology. New York, McGraw-Hill. 1938. 601p.
93. Weston, Henry G., Jr. Breeding behavior of the black-headed grosbeak. Condor 49:no.2:54-73. 1947.
94. Williams, Arthur B. The composition and dynamics of a beech-maple climax community. Ecol. Monog. 6:no.3:318-408. 1936.
95. Wing, Leonard. Species association in winter groups. Auk 63:no.4:508-511. 1946.
96. Wright, Albert H., and Arthur A. Allen. The increase of austral birds at Ithaca. Auk 27:no.1:63-6. 1910.