VERTEBRATES OF THE MIDDLE OREGON COAST STRIP

by

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VERTEBRATES OF THE MIDDLE OREGON COAST STRIP

Introduction

The Oregon Coast Strip is being depleted more and more each year. Mild summer climate and the beauty of its natural vegetation, beaches and many lakes have caused man to choose it as an ideal summer vacation site. This is indeed unfortunate from an ecological point of view.

Little field work has been done in any section of the narrow geographical area along the west coast of Oregon. Though this region shows certain floral and faunal affinities with the Coast Forest, it's plants and animals are more closely allied to the biota of the Subalpine Forest of the Cascade Range. It is not the purpose of this paper to analyse the affinities of these two biotic regions, but these affinities are recognized by anyone familiar with the two regions.

Though the biotic specificity of this region is generally known, there is no widely used name for the region. Peck (37,38) calls it the Coast Area and that name has had acceptance as far as some plant ecologists are concerned. This area is a strip or narrow band along the coast, so some, primarily animal ecologists, have preferred to call it the Coast Strip. The author prefers the latter, more descriptive term and will use it throughout this manuscript.

Though the study was primarily of the Coast Strip, it was

found profitable to do some work in the Coast Forest. By studying the Coast Forest one can better realize whether the animals in the Coast Strip are more or less endemic or whether they are wanders from the Coast Forest.

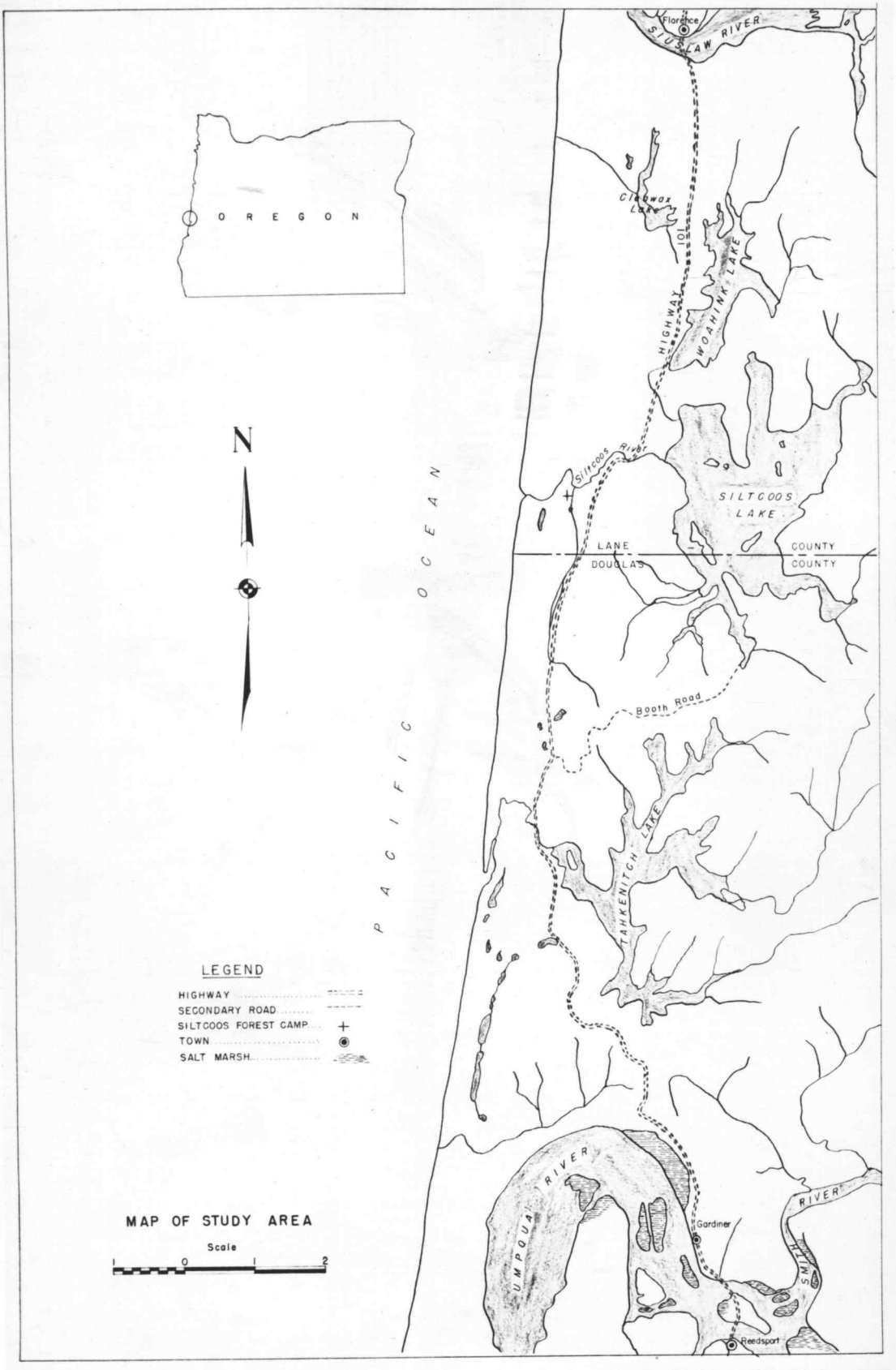
Geographic Location

The area of study was on the Oregon Coast, extending from sand dunes on the west into Coast Forest on the east. The northern boundary was the southern bank of the Siuslaw River, just south of Florence, Lane County Oregon, and the southern boundary was the northern bank of the Umpqua River, just north of Reedsport, Douglas County, Oregon, (see fig.1, p. 3).

Physiography

The Coast Range is a dissected plateau or upraised peneplain consisting primarily of Tertiary basalt and Oligocene shales and sandstones. Structurally the range, a low anticlinorium, generally shows from two to five minor folds. Dips do not ordinarily exceed ten degrees, but in exceptional cases do rise to twenty-five and even thirty-five degrees.

The Coast Strip varies a great deal in width in the area of study. It is non-existent just south of Gardinier, Douglas County, Oregon, but is about three miles wide in the center of the area of study. The width and position of this area has varied a great deal during different periods of rising of the land. The last uplift drowned both the Umpqua and Siuslaw Rivers, the Umpqua being drowned



MAP OF STUDY AREA

for twenty-five miles.

The primary area of study, the Coast Strip, is characterized by a gradual rise of land which blends into the Coast Mountains, but around Gardinier in particular there is an abrupt rise into the Coast Mountains. The general topography is primarily rolling due to the sandy composition of the substrate. Wandering sand dunes are constantly molding the terrain into different patterns, few of which are to be lasting.

Bays and estuaries made by partial drowning of streams (Umpqua and Siuslaw River mouths) are incompletely cut off from the sea by sand bars. In certain areas some bays were cut off and were converted into fresh-water lakes (Siltcoos Lake, Tahkenitch Lake, etc.)

Soils (47, p. 1045)

The dominant soil of the Coast Range is the gray-brown podsolic soil called Melbourne. The parent materials of this soil are shales and sandstones. These parent materials give rise to a yellowish friable surface soil, which is mottled with reddish-brown. This earth is usually found beneath a layer of forest litter which causes the soil to be moderately to strongly acid.

Melbourne soil is used primarily for forestry, grazing and recreation, although in lower areas walnuts, orchard fruits, berries and some general farming crops are grown.

The soil of the Coast Strip arises from sand. The A_o horizon is best developed in Sitka Spruce climax areas and becomes

insignificant or absent in sand dune vegetation. A like situation is typical of the A horizon. The B horizon is almost non-existent in sand dune vegetation, where it tends to blend with the C and D horizons; but this B horizon along with the C horizon progressively developes into "hardpans" as one progresses into the Sitka spruce climax. In all places the parent D horizon consists of sand.

From the previous discussion it is apparent that the Coast Strip soil is immature. It is considered to be a developmentary stage toward Melbourne soil, but the general nature of climate and topography would probably prevent the development of mature Melbourne soil.

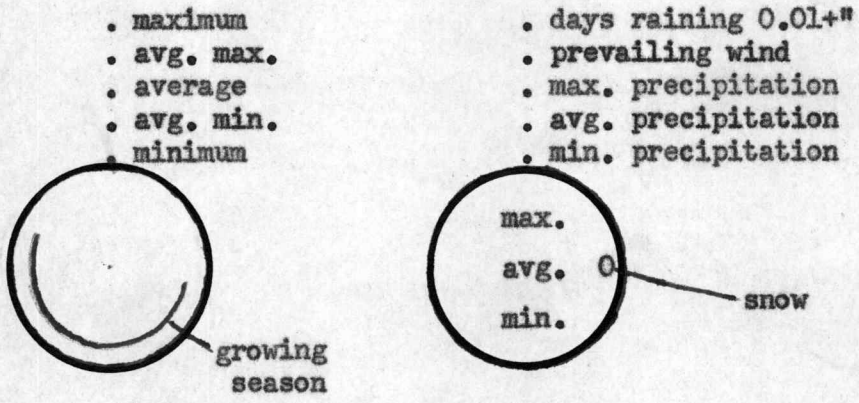
There is one area near Gardinier where hay is grown on this immature soil, but the primary uses for the area are recreation and homes for fishermen and lumbermen.

Climate (48, p. 1085-1086)

The Coast Strip has a humid microthermal type of climate with temperature and precipitation much the same throughout the year. The temperature is seldom below freezing in the winter or over 70° F. in the summer. Precipitation averages approximately eighty inches per year. There is rain in July and August, but they are the driest months. Sunshine is at a premium in this area, there being approximately seventy-five sunny days per year. Since this area is in the coastal fog belt, dense, high clouds and rain also contribute to the lack of bright sunshine.

In the winter there are high sea winds from the southwest, which bring in severe storms. During the rest of the year, the winds are from the northwest and are much milder.

More complete data can be found for the particular area of study in Table Ia and Ib, which are the climatic summaries for Gardinier. The following diagrams are keys to tables Ia and Ib respectively.

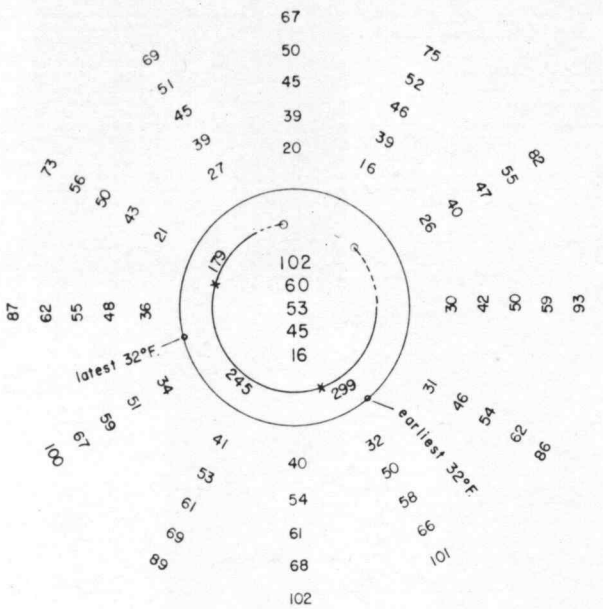


TEMPERATURE PRECIPITATION AND WIND

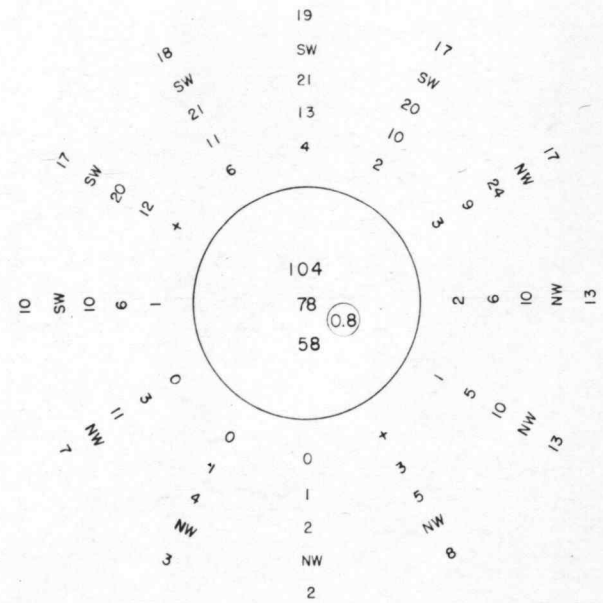
The data in the center of the precipitation and wind graph denote maximum, average and minimum annual precipitation. The figures in the temperature graph are annual data for the same climatic measurements shown monthly.

The semicircle in the temperature graph indicates the following growing season data: solid line, average growing season; extention by dotted lines, maximum growing season; and portion of solid line delimited by crosses, minimum growing season. The total number of days is given for each of the above.

The graph is arranged clockwise, January starting at "12 o'clock".



TEMPERATURE



PRECIPITATION AND WIND

Habitats

Introduction

Various references were considered before beginning the study. Although the discussion is based on the author's observations, he was influenced by these references. Peck (37;38) was used as a taxonomic and distributional reference for plants present. Plant taxonomy is after Peck (38). Hansen (19) was used as a local succession reference. More details on succession were found in Hansen's monograph (20).

It was fortunate that study of the above references was made. Clear cut habitats are difficult to find. There is a great deal of merging of vegetation, therefore ecotones tend to be broad. Although there was a difficulty in demarcating communities, the following habitats were present: sand dune, herbaceous, lodgepole pine, Sitka spruce climax, shrub, willow-alder, marsh and cedar-hemlock climax.

Succession

The best way to understand the complexity of habitats and to obtain an adequate picture of their arrangement is to discuss them as they occur successionally.

Along the edge of the ocean there is a bare area of sand. Shortly behind this area primary invasion of psamophytes occurs. Plate I shows an area of primary succession. In the foreground

there are various psammophytes (Poa, Agrostis, Carex, Juncus, Rumex, etc.) gaining a foothold. Note the parallel bands of vegetation, which is characteristic of these invading plants. In the background of this picture there are rolling dunes, which are being held by a denser cover of the same psammophytes. In plate II, illustrating a view toward the sea, one can see dunes in the background. At the right of the plate the same psammophytes gradually assume the characteristics of a herbaceous habitat. The sparseness of this cover is evident in the foreground of the picture.

Plate III shows a well developed herbaceous habitat, which is the next seral stage. The plants tend to remain much the same, but there is a greater abundance and dominance of such forms as Lupinus, Lathyrus, Potentilla, Plantago and Erigeron. Also in plate III one can see a "blowout" area where wind has removed the vegetative cover. Blowouts may be started by sand-shifting which reduces the ability of the vegetation to hold the sand.

The herbaceous seral stage is gradually invaded by shrubs. Plate IV shows invasion of an extensive herbaceous sere by three shrubs. The shrub habitat or sere is characterized by wax myrtle (Myrica californica), salmonberry (Rubus spectabilis), thimbleberry (Rubus parviflorus), rhododendron (Rhododendron californicum), huckleberry (Vaccinium ovatum), cranberry (Vaccinium oxycoccus), madrona (Arbutus menziesii), vine maple (Acer circinatum), manzanita (Arctostaphylos columbiana), devil's club (Oplopanax horridum), elderberry (Sambucus racemosa), the main dominant, salal (Gaultheria shallon), Labrador tea (Ledum columbianum), and scotch broom (Cytisus scoparius), which is an

introduced form that is spreading rapidly throughout the drier sections of the area.

Plate V shows the denseness of the shrub habitat. The shrub habitat varies little in its composition. Salal is widely distributed. Labrador tea tends to be confined to bogs and the drier areas, whereas vine maple and salmonberry tend to be found in the damper situations. The shrub layer of tree habitats tends to be of the species mentioned and varies according to the degree of moisture. The dominant, salal, tends to be found in all shrub situations.

Although plate V shows a logged-off area where shrubs are seral dominants, one can see the invasion of young Sitka spruce and lodgepole pine throughout the area.

Lodgepole pine is usually the next invader, though as plate V shows, this is not always the case. Sometimes lodgepole completely repla ces the shrub layer (plate VI) or the shrub layer may remain (plate VII).

At any stage of succession wind may erode the substrate and cause a contraction of the size of the area occupied by the sere. Plate VI shows an instance of this in lodgepole pine. Another cause for successional regression is wandering dunes. Plate VIII shows an isolated group of lodgepole pine that is being encroached upon by sand dunes.

If lodgepole pine retains a foothold, it will develop conditions suitable for Sitka spruce, the Coast Strip climax, to enter on the leeward side of the lodgepole sere and gradually encroach on the

lodgepole toward the ocean.

A "typical" arrangement of the shrub layers under Sitka spruce climax is shown in plate IX. Plate X shows the arrangement more typical of moister Sitka spruce habitats. Here one can identify sword fern and salmon berry.

Plate XI illustrates a rather aberrant situation in which Sitka spruce surrounds the estuary formed by the geological flooding of the mouth of the Umpqua River. Greater protection allows climax vegetation to prosper here. Sitka spruce, alder and wax myrtle are in the foreground.

As one moves inland out of the Coast Strip into the Coast Forest, the Sitka spruce climax is replaced by cedar-hemlock, the Coast forest climax. Plate XII shows the denseness of this habitat.

Western red cedar (Thuja plicata) and western hemlock (Tsuga heterophylla) are the dominant trees, although cedar tends to be rather sparse in the ecotonal region. Sitka spruce remains as a subdominant in the coastal region. Douglas fir is an important subdominant.

Salal remains as a prominent feature of the cedar-hemlock shrub layer, as do most of the Coast Strip shrubs; but there is an increase im more hydrophytic forms such as evergreen black-berry (Rubus laciniatus). There is a prominent change in the herbaceous layer. Most of the Coast Strip forms disappear and give way to Oxalis, Erythronium, and Mimulus,

Beside the above prominent psammophytic succession there are

localized hydrarch successions that will aid in diagnosing habitats. An important succession is typified by lake succession at Tahkenitch Lake. Initial succession begins with a submerged hydrosere, which is dominated by water milfoil (Myriophyllum spicatum). This gives way to pondweed (Potamogeton natans) and yellow pond lily (Nymphozanthus polysepala), dominants of the floating hydrosere (see plate XIII). The swamp sere dominants, cattail (Typha latifolia), bulrush (Scirpus validus), hardhack (Spiraea douglasii), sedge (Carex) and willow (Salix) (plates XIV-XVI), command the replacement of the floating stage. The swamp stage is replaced by lodgepole pine (Pinus contorta) and a variety of shrubs (plates XIII and XVI). The shrubs tend to remain the same as Sitka spruce (Picea sitkensis) enters and eventually replaces lodgepole pine (plate XIII). If this be out of the Coast Strip, the cedar-hemlock climax will eventually encroach upon the Sitka spruce.

Sphagnum bog succession was not significant in the area of study. There is a sphagnum bog near Woahink Lake, but the habitat is so covered with Labrador tea that it had all the characteristics of a shrub habitat. The fauna bore out the aforementioned statement.

Delimitation of Habitats

Salt marshes proved barren as far as animals were concerned, so a discussion of this successionally or as a habitat will be eliminated. Fruitful habitats can be logically analysed only if each seral stage considered a habitat. Wide floral ecotones were ignored, because

they would only result in confusion caused by the admixture of animals from the two different habitats. By this measure it was hoped that "more typical" data would be accumulated.

The habitats, as the author saw them and already stipulated in the introduction to the habitat discussion, were sand dune; herbaceous; lodgepole pine; Sitka spruce climax; shrub; willow alder, which is found along streams and in and on the border of swamp seres; marsh, the various hydrosere stages which were too limited in size to differentiate as separate habitats; and cedar-hemlock climax, which was out of the Coast Strip.

These above habitats showed some differentiation as far as mammalian and herpetological faunas were concerned, but the birds showed no apparent preference for Sitka spruce climax or cedar-hemlock climax. This lack of habitat preference made it simpler to lump the two habitats into a "climax habitat, which was used only for the birds. The habitats as indicated by seres were used for amphibians, reptiles and mammals.

Purpose

The purpose of this study was to determine the density of each form in each habitat in which it was encountered. This plan proved feasible only for the birds. An attempt at explanation of the difficulties encountered will be found in the following section.

Statistics of Field Work

Duration

Work was started on July 6, 1949, and ended on September 12, 1949.

Field Aid

Certain valuable mammalian trapping sites were located because of suggestions by local residents. The only verbal evidence accepted for the local distribution of a mammal was that given by young Mr. Reavis, who is the son of Roy Reavis, a one-time government trapper and now a commercial trapper.

The only successful help in fieldwork was that of my wife, who captured three *Gerrhonotus coeruleus principis*.

Field Methods

Originally the plan of study was to use random quadrats and to determine the frequency of each species found. As previously stated, this proved possible only for the birds. The size of a mammalian

quadrat was determined by how far seventy-two mouse traps and twenty-four rat traps, alternated three mouse and one rat trap, would extend, when placed five paces apart. The time per habitat method for birds was used (5,22-24). Time for various habitats was established by first determining the area covered in one half hour in a sand dune quadrat and then determining and using the time necessary to cover the same distance in each of the other quadrats. Notes were taken to denote number of birds seen in each layer, i.e. shrub, tree, etc., in each habitat being sampled. Attempts were made to use areas of the same size in different habitats to acquire frequency indices for the distribution of reptiles and amphibians.

Difficulties and Revised Methods

If more time had been devoted to the study, frequency indices might have been obtained for mammals. If one had at least a hundred mammalian traps per habitat, it is believed that one would be able to accomplish a problem of this type in the time allocated to the present study, if the study had been limited to mammals. It is also believed that the traps should be left stationary for at least four and possibly as many as six nights, because new records were obtained as late as the seventh night. Trapping would enable the immigration of other members of the species already caught, but after the second or third night individuals of species already caught could be ignored as far as density is concerned.

At the present time it can not be determined how successful was the herpetological quest. If there are more amphibians there than

were collected, results should prove more satisfactory if work were started earlier, preferably as soon after the breeding season as possible. Species breeding much earlier or much later than the majority would have to be collected separately. It would be necessary for many test samples to find out exactly the best time for sampling. With this precaution, valid frequency indices should be obtained. If more reptiles occur in the study area, no adequate explanation can be made for not finding them.

Kendeigh (28, p. 68-106) has criticized the time per habitat method for birds, maintaining that frequency is not as important as actual numbers. It is true that frequency indices are not as valuable as actual numbers, but density determined by number of times each species is seen in a given habitat, during a known time interval, is much simpler to obtain that population size, and to many ecologists is just as valuable as actual numbers.

Reference should be made to habitat delimitation for all forms (see p. 13).

Realizing that unprejudiced quadrats and the limitation of materials and time would result in utter failure, Dr. Gordon advised abandonment of attempts to obtain frequency indices. A perusal of habitats for suitable niches resulted in the capture of a good percentage of the mammals and two new mammalian records. The herpetological specimens were also increased.

Amphibians and Reptiles

Introduction

Little is known about the herpetological fauna of the Coast Strip. This is apparent when the distributional references are studied (4, 6, 9, 10, 11, 12, 13, 14, 17, 27, 39, 43, 44, 45, 47, and 53). Because of the scarcity of distributional records for reptiles and amphibians in this area and adjacent regions, it seems best not to include a hypothetical list of forms. The following list of forms includes only those taken in the study area although there is a good possibility of the occurence of Dicamptodon ensatus (Eschscholtz) (17, p. 54).

Triturus g. granulosus (Twitty)	Oregon Newt
Bufo b. boreas (Baird & Girard)	Northwestern Toad
Hyla regilla Baird & Girard	Pacific Tree Toad
Rana a. aurora (Baird & Girard)	Oregon Red-legged Frog
Rana catesbeiana Shaw	Bullfrog
Gerrhonotus coeruleus principis (Baird & Girard)	Northern Alligator Lizard
Thamnophis ordinoides (Baird & Girard)	Puget Garter Snake
Thamnophis sirtalis tetrataenia Cope	Pacific Garter Snake

Accounts of Species

The total number of specimens taken was not large, 178 in all. In an attempt to simplify mensuration and certain other data, the

statistics of this group will be tabulated. Abbreviations used for these two groups are as follows: No.-number, referring to catalogue number in the author's herpetological catalogue; TL-total length, the length of any one specimen from the tip of its nose to the tip of its tail; T-tail length, length from posterior margin of vent to the tip of the tail; SV-snout-vent, length from tip of nose to the anterior margin of the vent, this measurement being made along the dorsal surface of Anura; HL- hind leg length, length of medial surface of leg from vent in Anura or groin in Caudata to the longest toe; H-thigh length, measurement from vent to cleft between thigh and shank made only in Anurans; Tf-shank length from thigh-shank cleft to distal protuberance of tibio-fibula; IN-internasal distance; distance between medial margins of external nares; IO-interorbital distances, medial distance between points of eye protuberance; M-mouth width, greatest width of mouth; Ty-diameter of tympanic membrane; and Emb.-embryos. Plus and minus respectively refer to the presence or absence of a character (e.g. eggs), except in Thamnophis ordinoides and Gerrhonotus coeruleus principes where plus refers to a subscript. Numbers under eggs or embryo columns refer to total number of eggs or embryos, a normal situation in the egg-embryo ratio would be signified by the same number in each column. Asterisks in all cases refer to subscripts. All measurements were made in millimeters.

Triturus g. granulosus (Twitty)

Oregon Newt

Date	No.	Sex	TL	T
7/21/49	77	♂	122	61
7/21/49	78	♂	125	58
7/21/49	79	♂	150	63
7/25/49	92	Im.	97	37
8/ 5/49	142	Im.	61	28
8/ 5/49	144	Im.	88	47

It is interesting to note that all adult specimens were males. The only adults taken, specimens 77 to 79, were collected in the shallow edge of the western shore of Tahkenitch Lake. The habitat of this shoreline constituted a submerged hydrosere. These adult newts were first sighted floating on the top of the water. When startled, they did not attempt to reach cover in the vegetation covering the bottom, which was five feet below the surface. Whether by instinct or mere chance, these salamanders all attempted to escape to deep water. Two additional specimens did reach the common goal and were not netted. Capturing only males does not belie the hypothesis that males are the first to enter and the last to leave the aqueous breeding habitat.

Specimen 92 was taken from within a rotted log that was partly inundated by a pool. This pool was roughly triangular, being about 150 yards long and about seventy-five yards wide. The southern end of this pool terminated in a submerged hydrosere, which was so dense as to form a marshy area. This marshy area is not present throughout the year, because there was evidence of at least a one foot higher water

level. These emophytes extended around the perimeter of the sublake, but were well developed only on the southern end. This locality was about 200 yards west of the point where the Booth Road enters Highway 101. It is the more northern of the two lakes indicated on the map of the area (see p. 3). The more northern lake is actually much smaller than the southern lake, which is about 300 by 100 yards in size (see account of Rana catesbeiana).

Specimens 142 and 144 were taken from within submerged vegetation along the edge of the lagoon west of Lagoon Picnic Grounds of Siltcoos Forest Camp.

An additional specimen was observed under dense vegetation on a moist, moss-covered substrate in a Lodgepole consocies, but it was impossible to collect the animal.

The three adults taken and all other specimens observed seemed much smaller than the forms the author has encountered in the Willamette Valley. On the basis of the sample from the Coast Strip, there would be a significant difference, even with a one per cent level of significance, but this statistical interpretation could well be erroneous, because of the different conditions of capture. The three Willamette Valley forms were breeding males.

Bufo b. boreas (Baird & Girard)

Northwestern Toad

Date	No.	Sex	SV	HL	H	Tf	IN	IO	M	Ty.
7/21/49	85	♀	116	122	23	24	4	8	33	5.2

The above specimen was taken on the beach west of Siltcoos Forest Camp, about seven miles south of Florence, Lane County, Oregon. This site of capture is about two miles north of the Douglas-Lane County line. The above animal was tracked for well over a hundred yards before capture at 9:20 P.M.

Toads occupy a wide variety of habitats in the Coast Strip. Their tracks were most prevalent in sand dune areas, but were extensive in shrub and Sitka spruce climax habitats. Despite this prevalence of tracks, only one other specimen was observed. This animal was in the dense shrubbery in a moist habitat of the Sitka spruce climax. The denseness of cover prevented the collection of this toad.

Some Bufos are known to have traveled long distances, although the abundance of invertebrates belies any thought of food searching. Whether these excursions are caused by food specialization, which is doubtful in view of the known food habits of the form, wanderlust or some other unknown factor can not be hypothesized from the data obtained. There is much interlacing of the tracks of these toads, and it is a rare occasion when one animal's travels can be traced over any great distance. On one fortunate occasion the tracks of one

individual, known to be made during the previous night, were followed for more than a half mile over and around dunes before being lost in the puzzle of other toads' tracks.

Hyla regilla Baird & Girard

Pacific Tree Toad

Date	No.	Sex	SV	HL
8/5/49	133	Im.	27	44
8/5/49	134	Im.	27	48
8/5/49	135	Im.	26	42
8/5/49	136	Im.	25	40
8/5/49	137	Im.	28	45
8/5/49	138	Im.	27	43
8/5/49	139	Im.	27	46
8/5/49	140	Im.	27	44
8/5/49	141	Im.	27	44

Tree toads were found only in one locality. This area was the dense herbaceous hydrosere on the southern margin of the pool described in the account of Triturus. As therein stated, this locality was opposite and slightly north of the junction of Highway 101 and the Booth Road. This emophytic vegetation was virtually alive with barely transformed Hylas, nine of which were taken. No tadpoles or adults were seen. Though no tails were evident in any of the animals seen or taken, a triangular ridge of epidermis indicated recent tail absorption.

The only other animal observed in this marshy area was Thamnophis sirtalis tetrataenia.

The presence of tree toads was indicated in the lagoon west of Lagoon Picnic Grounds, which is part of Siltcoos Forest Camp. One

individual was heard calling on the night of July 23, 1949, at about 8:30 P.M. There were intermittent showers during most of this night.

Rana a. aurora (Baird & Girard)

Oregon Red-legged Frog

Date	No.	Sex	Eggs	SV	HL	H	Tf	IN	IO	M	Ty.
7/21/49	71	♀	+	63	119	28	38	5.0	4.0	23	5.3
7/22/49	86	Im.	-	50	86	21	24	3.8	2.9	16	3.4
7/22/49	87	♂	-	55	96	21	29	3.2	3.2	17	3.9
7/22/49	88	Im.	-	39	75	19	22	3.0	2.3	13	2.7
7/22/49	89	♀	+	63	115	26	26	3.8	3.9	23	4.9
7/24/49	90	Im.	-	49	85	19	26	3.2	2.8	17	2.9
8/ 5/49	132	♀	+	65	120	26	34	4.0	2.0	22	4.5

Specimens 71 to and including 90 were taken along the edge of a slow-flowing stream about six feet wide and six inches deep. In the places of capture the stream had a sparse to moderate coverage of vegetation, predominently Carex. Farther up stream, where no frogs were taken, the water could not be seen because of a complete coverage of the same vegetation. This upper portion of the stream had very little slope and the water barely moved. Below the site of capture, the stream had a steeper slope, ran faster and had little or no vegetation in it. The vegetation surrounding the stream consisted of a Sitka spruce association with a dense shrub and sword fern secondary layer. The substrate was covered with moist moss. Red-legged frogs were observed in this latter habitat throughout the summer, but the author was not fortunate enough to capture any. Seemingly similar localities proved fruitless.

Specimen 132 was taken next to the log where the Triturus was

excavated. This animal was sitting on the dry bank shaded by the log. This area would be considered an unexpected locality for this frog because of the lack of more hydric conditions (17, p. 62).

Rana catesbeiana Shaw

Bullfrog

Date	No.	Sex	Eggs	SV	HL	H	Tf	IN	IO	M	Ty.
7/21/49	73	♂	-	78	118	25	35	5	3.5	29	6.8
7/21/49	74	♂	-	95	126	27	44	5	4.0	31	7.3
7/21/49	75	♂	-	73	106	24	35	5	3.0	25	6.2
7/21/49	76	Im.	-	65	67	20	30	5	3.0	21	5.3
7/24/49	91	♀	+	136	181	41	49	7	5.3	46	11.2
8/ 2/49	120	Im.*	-	57	113	-	-	5	4.0	17	-
8/ 2/49	121	♂	-	92	150	32	43	7	4.0	35	8.2

* Four-legged tadpole

This introduced from was by far the most readily observed frog in the area. Tadpoles were seen in the more open situations, such as lagoons, edges of lakes, pools and marshes, that provide adequate cover in the form of submerged vegetation; but all of these localities had direct access to sunlight. The adults were found in like situations, but they extend their ranges into ponds and pools with a complete cover of herbaceous or shrubby vegetation and even into aqueous situations in densely forested areas. It seems that tadpoles are restricted to opener habitats that afford a warming of the water by sunlight, but the adults range anywhere that this highly aquatic form can find water.

Specimens 74, 75 and 76 were found in the moderately-flowing stream that acts as the southern outlet to Woahink lake. This stream

supplies water to an extensive shrub-covered bog. Specimen 91 was taken in a pool almost covered with sword ferns in the area called Lodgepole Pine Camp, a part of Siltcoos Forest Camp. This locality is actually climax Sitka spruce, there being no lodgepole pines. Specimens 120 and 121 were taken in sparse vegetation along the shallow western shore of Woahink Lake.

About fifty feet south of the lake described for Triturus, opposite the Booth Road, is a sublake, about 300 by 100 yards. Areas along the shore of this pond were literally black with bullfrog tadpoles, many of which were taken. These tadpoles were congregated around fresh water algae plants, which were bathed in sunlight. The pale green water of the pool had patches of floating, light blue scum; both water color and scum were believed to be the result of chemicals used by the State Department of Fish and Game to control noxious water plants. There was no evidence that the scum was harming the tadpoles. No dead tadpoles were seen around the edge of this small lake.

Gerrhonotus coeruleus principis (Baird & Girard)

Northern Alligator Lizard

Date	No.	Sex	Eggs	Emb.	TL	T
7/21/49	80	♀	4	4	133	86
7/21/49	81	♂	-	-	133	77
7/21/49	82	♀	4	2*	175	87
7/21/49	83	♀	4	4	180	84
7/21/49	84	♀	5	5	168	85
7/27/49	109	♀	-	-	178	82
8/ 2/49	110	♀	4	4	144	84
8/ 2/49	111	♂	-	-	151	85
8/ 2/49	112	♀	5	5	179	89
8/ 2/49	113	♀	6	6	209	93
8/ 2/49	114	♂	-	-	186	78
8/ 2/49	115	♀	6	6	215	90
8/ 5/49	127	♀	6	4+	138	52
8/ 7/49	162	♀	5	5	164	76
8/ 7/49	163	♀	5	5	121	30
8/ 7/49	164	♀	5	5	140	52
8/ 7/49	165	♀	5	5	155	65
8/ 7/49	166	♀	4	4	194	113
8/ 7/49	167	♀	4	4	168	86

* Two dead eggs

\+ Two others were mummies.

This alligator lizard seemed to choose its niche in herbaceous edges of any area that would afford cover. Although burrows in the sandy soil were used, no animal was found far from some sort of protective cover.

This species was closely associated with Thamnophis ordinoides and not quite so closely with Thamnophis sirtalis tetrataenia. Thamnophis sirtalis, as will be seen, is found in rather hydrophytic situations, but does sun itself along the drier herbaceous margins of these moist habitats. These dry herbaceous margins are the areas where these two forms are found together. Thamnophis ordinoides

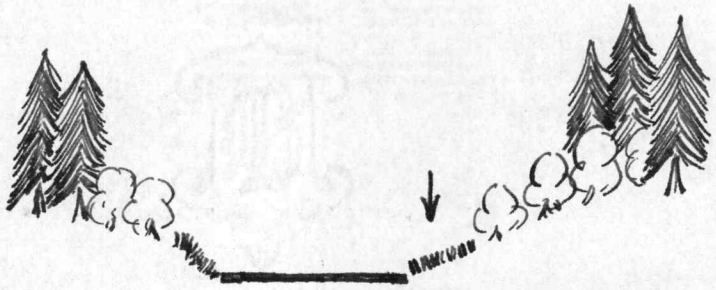


Figure 2. Diagram of roadside habitat found on Highway 101 at and near the Lane-Douglas County line. Arrow indicates the herpetological collecting site in herbaceous vegetation.

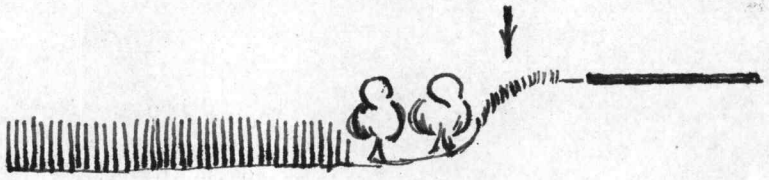
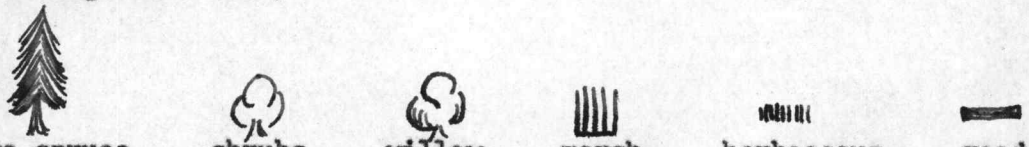


Figure 3. Diagram of roadside habitat where Highway 101 joins Tahkenitch Lake. Arrow indicates place where most forms were taken. Only Thamnophis sirtalis tetrataenia ranged throughout this area.

Key to figures 2 and 3:



prefers dry areas and was never found in a locality where Gerrhonotus was unknown. There was no evidence to indicate a predator-prey relationship. Both T. ordinoides and Gerrhonotus were observed sunning themselves side by side in apparent harmony.

Three male and sixteen female lizards were taken. All but one female had eggs with embryos, ranging from four to six in number with an average of four and eight-tenths per female. One female with four eggs had two infertile ones. A female with six embryos had two mummies. It might be hypothesized that females cannot adequately carry six embryos, but two females had six seemingly normal embryos. Six embryos, however, may be near the physiological limit of most females.

Specimens number 80 through 109 were taken near the Highway 101 autocourt across the road from the west side of Woahink Lake. Number 80 was taken in the flower beds in front of the autocourt cabins (holes under the foundation afforded a safe retreat), 81 was taken in sparse herbaceous vegetation in a salal habitat just north of the cabins, and 84 and 109 were found under boards in the same habitat. Specimens 82 and 83 were found in a junk pile (tin cans, bottles, etc.) just north of the salal habitat. All of the above localities extended about 150 yards from the cabins to the junk pile.

Specimens numbers 110 through 115 were found in an area along the side of Highway 101, extending about 100 feet north of the Douglas-Lane County line to about 200 feet south of the same county line. This roadside habitat is diagramed and described in figure 2, page 27.

Specimens 127 and 167 were taken near the logging boom on the west side of Tahkenitch Lake. These animals were in the sparse herbaceous vegetation along the edge of the road (see fig. 3, p. 27). Characteristic vegetation just in from the road is pictured in XIV to XVI.

Specimens 162 to 166 were taken in similar situations along Highway 101 from the entrance of Siltcoos Forest Camp to the roadside spring about 200 yards south. This vegetation was much the same as that characterized in figure 2.

<u>Thamnophis</u> <u>ordinoides</u> (Baird & Girard)

Puget Garter Snake

			Embryo		Specimen	
Date	No.	Sex	TL	T	TL	T
7/25/49	93	♀	156	36	620	132
7/26/49	101	♀	139	34	551	128
7/26/49	102	♀	146	34	501	118
7/26/49	103	♀	128	32	618	132
8/ 2/49	116	♂	-	-	496	115
8/ 2/49	118	♂	-	-	275	58
8/ 2/49	119	♀	115	23	601	138
8/ 4/49	123	♀	148	35	486	115
8/ 4/49	124	♀	155	38	643	149
8/ 5/49	130	♀	154*	36	481	109
8/ 6/49	146	♀	+	+	570	136
8/ 6/49	149	♀	-	-	576	116
8/ 6/49	150	♀	+	+	478	110
8/ 6/49	151	♀	+	+	606	132
8/ 6/49	153	♀	+	+	627	144
8/ 6/49	154	♂	-	-	457	104
8/ 6/49	155	♀	+	+	550	116
8/ 6/49	156	♀	+	+	529	119
8/ 6/49	157	♀	+	+	536	121
8/ 6/49	158	♀	+	+	587	134
8/ 6/49	167	♀	+	+	509	106

* One stunted embryo was 34 mm. in TL.

\+ Embryos were present, but measurements were not made.

This animal, like the alligator lizard, seemed to choose its niche in herbaceous edges of any area that would afford cover. The close association of these two forms is discussed under the previous section on Gerrhonotus.

Specimens 93 through 119 were taken at the same Lane-Douglas County line locality as Gerrhonotus (see fig. 2, p. 27). Specimens 123 to 130 were taken at the Tahkenitch Lake locality with Gerrhonotus and Thamnophis sirtalis (see fig. 3, p. 27). The remaining specimens were taken in the locality in front of Siltcoos Forest Camp (see section on Gerrhonotus).

All females taken, except one, had embryos. Apparently the height of the parturition period had not yet occurred.

Thamnophis sirtalis tetrataenia Cope

Pacific Garter Snake

Date	No.	Sex	Eggs	Embryo TL	Embryo T	Specimen TL	Specimen T
7/ 7/49	1	♀	-	49	-	704	141
7/25/49	94	♂	-	-	-	748	177
7/25/49	95	♀	+	-	-	892	194
7/25/49	96	♀	-	187	56	926	192
7/26/49	97	♂	-	-	-	788	161
7/26/49	98	♀	-	181	45	871	167
7/26/49	99	♀	-	142	35	890	194
7/26/49	100	♀	+	-	-	779	161
7/26/49	104	♀	-	179	47	666	167
7/26/49	105	♀	-	178	42	662	157
7/26/49	106	♂	-	-	-	662	183
7/26/49	107	♀	-	189	46	697	178
7/26/49	108	♀	-	92	24	507	95*
8/ 2/49	117	♂	-	-	-	497	113
8/ 2/49	122	♀	-	-	-	788	159
8/ 2/49	125	♂	-	-	-	488	121
8/ 2/49	126	♀	-	-	-	639	62*
8/ 5/49	128	♀	-	-	-	728	165
8/ 5/49	129	♀	-	194	47	654	105
8/ 5/49	131	♀	-	225	53	841	180
8/ 6/49	145	♀	-	-	-	753	187
8/ 6/49	147	♀	-	-	-	662	162
8/ 6/49	148	♂	-	-	-	646	171
8/ 6/49	152	♂	-	-	-	660	166
8/ 6/49	159	♀	-	220	50	673	160
8/ 6/49	160	♀	-	-	-	336	38*
8/ 6/49	161	Im.	-	-	-	222	53
8/ 7/49	168	♀	-	-	-	527	119
8/ 7/49	169	♀	-	-	-	645	167
8/ 7/49	171	♂	-	-	-	623	168
8/ 7/49	172	♀	-	-	-	634	168
8/ 7/49	173	♂	-	-	-	611	66*
8/ 7/49	174	♂	-	-	-	620	148
8/ 7/49	175	♀	-	178	44	700	152
8/ 7/49	176	♀	-	-	-	526	132
8/ 7/49	177	♀	-	-	-	754	183
8/ 7/49	178	♀	-	210	51	703	167

* Tails not entire

This form is the more aquatic of the two species of Thamnophis. It was found in and along the margin of marshes and along the margin of boggy areas. To a lesser degree it was also found with Thamnophis ordinoides and Gerrhonotus coeruleus.

The reproductive data seems quite significant. From the data for this form it can be seen that there is a good deal of variation in the reproductive period. One female, number 95, was taken on July 25, but her apparently fertile eggs showed insufficient embryological development to identify positively any embryos. On July 7, 1949, the first specimen taken was a female with 49 mm. embryos. Apparently a peak in births is reached in early August, since only five of the sixteen females taken after August 2, had embryos. No reproductive anomalies or abberant reproductive patterns were noted. The last collection made was on August 8, 1949. Later attempts to find Pacific garter snakes proved unfruitful. The next collection period after the eighth of August was on the tenth of the same month. It is believed that the primary reason for these negative results was due to passage of the peak of the parturition period. This hypothesis is supported by some of the collecting data. Of the nineteen Gerrhonotus collected, three were males. Three of twenty-one Thamnophis ordinoides were males. However, eight of the thirty-six adult Thamnophis sirtalis taken were males. Even if the ease of capture was associated with the females incubating their embryos, it seems that some males or even additional post-reproductive females should have been taken. The author has no

evidence to propose an explanation of the latter inconsistency, but he believes that this latter negative evidence does not belie his hypothesis.

Specimen number 1 was taken on the road about four miles south of Florence, Oregon. The roadside vegetation was predominently shrubby spruce on a dry herbaceous substrate. Examination of this specimen proved that it was a "typical" tetrataenia. This is of interest because the farthest north record for this subspecies had been Siltcoos Lake (12, p. 579). Specimens 94 through 131 were taken along the edge of Tahkenitch Lake (see description under Gerrhonotus and fig. 3, p. 27). Here the animals were found with Thamnophis ordinoides and and Gerrhonotus, but found their greatest abundance in marshy vegetation. Roadside habitats in which the three forms were found seemed to be used by the females of all three species to warm themselves. This basking, as stated previously, probably aided incubation of the eggs. Specimens 145 to 160 and 168 to 178 were taken in front of Siltcoos forest camp just north of the area where Thamnophis ordinoides and Gerrhonotus were found. These snakes were also in the same type of herbaceous vegetation, but the vegetation was just above a bog, whereas the former niche was in a xeric area. Specimen 161 was a young of the year. This animal, which was taken under a log in well-developed herbaceous vegetation next to Driftwood Picnic Grounds in Siltcoos Forest Camp, was smaller than the embryos of specimen number 131. This latter evidence is in accord with the hypothesis previously stated regarding the ease of capture of this and the other two forms of

reptiles encountered.

Birds

The study was limited to land birds. It was not thought necessary nor practical to check the literature for each form. The following list was made previous to the study and there was no need for any additions. Birds starred with an asterisk can be expected as summer visitants or transients; those with a plus in front of them may occasionally be found there (15, 21).

Cathartes aura (Linnaeus)	Turkey Vulture
Accipiter striatus Vieillot	Sharp-shinned Hawk
+ *Accipiter cooperi* (Bonaparte)	Cooper Hawk
* *Buteo jamaicensis* (Gmelin)	Red-tailed Hawk
* *Haliaeetus leucocephalus* (Linnaeus)	Bald Eagle
+ *Circus cyaneus* (Linnaeus)	Marsh Hawk
* *Falco sparverius* Linnaeus	Sparrow Hawk
* *Bonasa umbellus* (Linnaeus)	Ruffed Grouse
Oreorytyx picta (Douglas)	Mountain Quail
Columba fasciata Say	Band-tailed Pigeon
Zenaidura macroura (Linnaeus)	Mourning Dove
* *Tyto alba* (Scopoli)	Barn Owl
* *Otus asio* (Linnaeus)	Screech Owl
+ *Bubo virginianus* (Gmelin)	Horned Owl
* *Glaucidium gnoma* Wagler	Pigmy Owl
+ *Strix occidentalis* (Xantus)	Spotted Owl
Chordeiles minor (Forster)	Booming Nighthawk
Chaetura vauxi (Townsend)	Vaux Swift
Selasphorus rufus (Gmelin)	Rufous Hummingbird
Megacercyle alcyon (Linnaeus)	Belted Kingfisher
Colaptes cafer (Gmelin)	Red-shafted Flicker
Dryocopus pileatus (Linnaeus)	Pileated Woodpecker
+ *Asyndesmus lewis* (Gray)	Lewis Woodpecker
Sphyrapicus varius (Linnaeus)	Yellow-bellied Sapsucker
Dendrocopos villosus (Linnaeus)	Hairy Woodpecker
Dendrocopos pubescens (Linnaeus)	Downy Woodpecker
Empidonax trailli (Audubon)	Traill Flycatcher
Empidonax difficilis Baird	Western Flycatcher
Contopus richardsonii (Swainson)	Wood Pewee
Nuttallornis borealis (Swainson)	Olive-sided Flycatcher

Tachycineta thalassina (Swainson)	Violet-green Swallow
Iridoprocne bicolor (Vieillot)	Tree Swallow
Riparia riparia (Linnaeus)	Bank Swallow
* Stelgidopteryx ruficollis (Vieillot)	Rough-winged Swallow
Hirundo rustica Linnaeus	Barn Swallow
Petrochelidon albifrons (Rafinesque)	Cliff Swallow
Progne subis (Linnaeus)	Purple Martin
+ Perisoreus canadensis (Linnaeus)	Oregon Jay
Cyanocitta stelleri (Gmelin)	Steller Jay
Corvus corax Linnaeus	Holarctic Raven
Corvus brachyrhynchos Brehm	American Crow
Parus atricapillus Linnaeus	Black-capped Chickadee
Parus rufescens Townsend	Chestnut-backed Chickadee
Psaltriparus minimus (Townsend)	Bush-tit
Sitta canadensis Linnaeus	Red-breasted Nuthatch
Certhia familiaris Linnaeus	Brown Creeper
Chamaea fasciata (Gambel)	Wren-tit
* Cinclus mexicanus Swainson	American Dipper
Troglodytes aëdon Vieillot	House Wren
Troglodytes troglodytes (Linnaeus)	Winter Wren
Thryomanes bewicki (Audubon)	Bewick Wren
Telmatodytes palustris (Wilson)	Long-billed Marsh Wren
Turdus migratorius Linnaeus	Robin
* Ixoreus naevius (Gmelin)	Varied Thrush
Hylocichla ustulata (Nuttall)	Russet-backed Thrush
+ Sialia mexicana Swainson	Mexican Bluebird
Regulus satrapa Lichtenstein	Golden-crowned Kinglet
Bombycilla cedrorus Vieillot	Cedar Waxwing
Vireo solitarius (Wilson)	Solitary Vireo
Vermivora celata (Say)	Orange-crowned Warbler
Dendroica petichia (Gmelin)	Yellow Warbler
Dendroica auduboni (Townsend)	Audubon Warbler
Dendroica nigrescens (Townsend)	Black-throated Gray Warbler
Dendroica occidentalis (Townsend)	Hermit Warbler
Oporornis tolmiei (Townsend)	Tolmie Warbler
Geothlypis trichas (Linnaeus)	Yellow-throat
Wilsonia pusilla (Wilson)	Pileolated Warbler
Passer domesticus (Linnaeus)	English Sparrow
Sturnella neglecta Audubon	Western Meadowlark
Agelaius phoeniceus (Linnaeus)	Red-winged Blackbird
Euphagus cyanocephalus (Wagler)	Brewer Blackbird
Piranga ludoviciana (Wilson)	Western Tanager
Pheucticus melanocephalus (Swainson)	Black-headed Grosbeak

+ *Passerina amoena* (Say)	Lazuli Bunting
Carpodacus purpureus (Gmelin)	Purple Finch
+ *Carpodacus mexicanus* (Müller)	House Finch
Spinus pinus (Wilson)	Pine Siskin
Spinus tristis (Linnaeus)	American Goldfinch
Loxia curvirostra Linnaeus	Red Crossbill
Pipilo maculatus Swainson	Spotted Towhee
Passerculus sandwichensis (Gmelin)	Savannah Sparrow
+ *Pooecetes gramineus* (Gmelin)	Vesper Sparrow
Juncus oreganus (Townsend)	Oregon Junco
Spizella passerina (Bechstein)	Chipping Sparrow
Zonotrichia leucophrys (Forster)	White-crowned Sparrow
Melospiza melodia (Wilson)	Song Sparrow

In no instance have two subspecies of the same species been recorded in or near the area of study, but this fact does not eliminate the possibility of such happening. For this reason the forms considered will be listed only to taxonomic species.

The following table includes the number of birds seen per sample of each habitat, and also those not seen during a sample (indicated by a plus in the appropriate habitat. Abbreviations used are Herb. for herbaceous, Lodge. for lodgepole, and Wil-Al for willow-alder. The names of the birds have been shortened or abbreviated, because of the limitations of space; but it is doubted that this will cause any confusion.

Table I. Habitat Frequency Indices for Coast Strip Birds.

	Dunes	Herb.	Lodge.	Climax	Shrub	Wil-Al	Marsh
Turkey Vulture		0.2					
Sharp-shinned Hawk					+		
Mountain Quail		+					
Band-tailed Pigeon			0.4				
Mourning Dove			0.6				
Booming Nighthawk					0.2		
Vaux Swift					1.6		

	Dunes	Herb.	Lodge.	Climax	Shrub	Wil-Al	Marsh
Rufous Hummingbird		0.2	0.6	0.2	3.8		
Belted Kingfisher		0.6	0.2				1.2
Red-shafted Flicker			1.0		0.2		
Pileated Woodpecker			0.8	0.8			
Yellow-bellied Sapsucker				0.2			
Hairy Woodpecker			0.2				
Downy Woodpecker					0.2		
Traill Flycatcher						0.8	
Western Flycatcher			3.6	1.2	1.0		
Wood Pewee			0.2	0.4	1.6	2.8	
Olive-sided Flycatcher			1.0	2.6			
Violet-green Swallow	2.8	0.4	0.2	0.2			
Tree Swallow							3.2
Bank Swallow		0.8					
Barn Swallow	3.0	3.4	1.0	0.6		2.8	5.0
Cliff Swallow		0.4				1.2	
Purple Martin				+			
Steller Jay				8.0	0.4		
Holarctic Raven			0.6				
American Crow	1.8	2.4	1.4	1.2			1.2
Black-capped Chickadee				0.8			
Chestnut-backed Chick.			9.6	5.6		1.4	
Bushtit			1.4		5.0		
Red-breasted Nuthatch			0.2	0.4			
Brown Creeper				0.2			
Wrentit			3.8	3.6	3.6	1.0	
House Wren					0.6		
Winter Wren				0.6			
Bewick Wren					0.4		5.2
Marsh Wren							5.2
Robin			0.2	2.2		0.4	
Russet-backed Thrush			0.8	3.6	2.6		
Golden-crowned Kinglet					0.6	0.2	
Cedar Waxwing			0.4	3.6		4.0	
Orange-crowned Warbler			1.6	0.2	9.8	1.2	
Yellow Warbler			0.6		0.4		
Audubon Warbler			3.0				
Black-throated Gray W.			0.8				
Hermit Warbler			0.2	0.4			
Tolmie Warbler					0.2		
Yellow-throat						3.8	3.4
Pileolated Warbler			4.0	7.4	10.4	2.6	
English Sparrow	Observed only around human habitations.						
Meadowlark		0.2					
Red-winged Blackbird							16.2
Brewer Blackbird					0.2	0.6	1.6
Western Tanager			1.0	1.4			

	Dunes	Herb.	Lodge	Climax	Shrub	Wil-Al.	Marsh
Black-headed Grosbeak						0.2	
Purple Finch			0.4		5.4	2.8	
Pine Siskin			2.0				
American Goldfinch		0.4			1.0	1.0	
Green-backed Goldfinch					4.0	0.6	
Red Crossbill			0.2	0.8		0.2	
Spotted Towhee			0.2	1.2	0.6	0.4	
Savannah Sparrow	1.2	8.6					0.8
Oregon Junco			3.2		1.2		
Chipping Sparrow					0.2		
White-crowned Sparrow		1.2	4.0		3.2		
Song Sparrow		1.0	1.4	0.6	35.8	7.4	1.0

Although these indices show habitat preference, greater clarity can be obtained if the above habitats are broken down into sub-habitats as follows:

Abbreviations used are Fl., flying; Gr., ground; He., herbaceous; Lg., log; Tw., telephone poles and wires; Sh., shrub; Tr., tree; Wil, willow; Al., alder; and Ma., marsh.

Table II: Layer Frequency Indicies within Habitats.

Bird Species	Dunes					Herbaceous				Lodgepole-Spruce					Climax					Shrub						Willow-Alder					Marsh			
	Fl.	Gr.	He.	Lg.	Tw.	Fl.	He.	Lg.	Sh.	Fl.	Gr.	He.	Sh,	Tr.	Fl.	Gr.	He.	Sh.	Tr.	Lg.	Fl.	Gr.	He.	Sh.	Al.	Fl.	Ma.	Sh.	Wi.	Al.	Al.	Fl.	Ma.	Sh.
Turkey Vulture	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sharp-shinned Hawk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-
Mountain Quail	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Band-tailed Pigeon	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mourning Dove	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Booming Nighthawk	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-
Vaux Swift	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.6	-	-	-	-	-	-	-	-	-	-	-	-	-
Rufous Hummingbird	-	-	-	-	-	0.2	-	-	-	0.4	-	-	0.2	-	0.2	-	-	-	-	-	3.0	-	-	0.8	-	-	-	-	-	-	-	-	-	-
Belted Kingfisher	-	-	-	-	0.4	0.2	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	-	-
Red-Shafted Flicker	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pileated Woodpecker	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Yellow-bellied Sapsucker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hairy Woodpecker	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Downy Woodpecker	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-
Traill Flycatcher	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	0.4	-	-	-	-	-
Western Flycatcher	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	-	-	-	-	1.2	-	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-
Wood Pewee	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.4	-	-	-	-	1.6	-	-	-	-	2.8	-	-	-	-	-
Olive-sided Flycatcher	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Violet-green Swallow	2,8	-	-	-	-	0.4	-	-	-	0.2	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tree Swallow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.2	-	-	-	-	-	-	-	-
Bank Swallow	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barn Swallow	3.0	-	-	-	1.8	1.6	-	-	-	1.0	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	2.8	-	-	-	-	-	5.0	-	-
Cliff Swallow	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-
Purple Martin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Steller Jay	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	1.0	6.6	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-
Holarctic Raven	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
American Crow	1.0	0.4	-	0.4	-	1.8	-	0.6	-	0.8	-	-	-	0.6	0.2	-	-	-	1.0	-	-	-	-	-	-	-	-	-	-	-	-	1.2	-	-
Black-capped Chickadee	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chestnut-backed Chickadee	-	-	-	-	-	-	-	-	-	-	-	-	1.8	7.8	-	-	-	2.4	3.2	-	-	-	-	-	-	-	-	-	1.4	-	-	-	-	-
Bushtit	-	-	-	-	-	-	-	-	-	-	-	-	0.8	0.6	-	-	-	-	-	-	-	-	-	5.0	-	-	-	-	-	-	-	-	-	-
Red-breasted Nuthatch	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Brown Creeper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wrentit	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.6	-	-	-	-	-	3.6	-	-	-	-	1.0	-	-	-	-	-
House Wren	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	-
Winter Wren	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bewick Wren	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-
Marsh Wren	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.2	-
Robin	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	2.2	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-
Russet-backed Thrush	-	-	-	-	-	-	-	-	-	-	0.2	-	0.4	0.2	-	0.2	-	2.0	1.4	-	-	-	-	2.6	-	-	-	-	-	-	-	-	-	-
Golden-crowned Kinglet	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.2	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-
Cedar Waxwing	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	0.4	3.2	-	-	-	-	-	-	-	-	-	4.0	-	-	-	-	-
Orange-crowned Warbler	-	-	-	-	-	-	-	-	-	-	-	-	1.0	0.6	-	-	-	-	0.2	-	-	-	-	9.8	-	-	-	-	1.2	-	-	-	-	-
Yellow Warbler	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-
Audubon Warbler	-	-	-	-	-	-	-	-	-	-	-	-	-	3.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black-throated Gray Warbler	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hermit Warbler	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tolmie Warbler	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-
Yellow-throat	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3.8	-	-	-	3.4	-
Pileolated Warbler	-	-	-	-	-	-	-	-	-	-	-	-	1.6	2.4	-	-	-	2.6	4.8	-	-	-	-	10.4	-	-	-	-	2.6	-	-	-	-	-
English Sparrow	OBSERVED ONLY AROUND HUMAN HABITATION																																	
Western Meadowlark	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Red-winged Blackbird	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16.2	-
Brewer Blackbird	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	0.2	-	-	0.4	-	0.2	-	1.6	-
Western Tanager	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	1.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black-headed Grosbeak	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-
Purple Finch	-	-	-	-	-	-	-	-	-	-	-	-	-	0.4	-	-	-	-	-	-	0.8	-	-	4.6	-	-	-	-	2.8	-	-	-	-	-
Pine Siskin	-	-	-	-	-	-	-	-	-	-	-	-	-	2.0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
American Goldfinch	-	-	-	-	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	-	-	-	-	1.0	-	-	-	-	-
Green-backed Goldfinch	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	3.8	-	-	-	-	0.6	-	-	-	-	-
Red Crossbill	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-	0.8	-	-	-	-	0.2	-	-	-	-	-
Spotted Towhee	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	0.4	0.8	-	-	-	-	0.6	-	-	-	-	0.4	-	-	-	-	-
Savannah Sparrow	-	0.6	0.6	-	-	-	3.2	5.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.8	-
Oregon Junco	-	-	-	-	-	-	-	-	-	-	1.0	-	1.2	1.0	-	-	-	-	-	-	-	-	-	1.2	-	-	-	-	-	-	-	-	-	-
Chipping Sparrow	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.2	-	-	-	-	-	-	-	-	-	-
White-crowned Sparrow	-	-	-	-	-	-	0.4	-	0.8	-	1.8	-	1.6	0.6	-	-	-	-	-	-	-	-	-	3.2	-	-	-	-	-	-	-	-	-	-
Song Sparrow	-	-	-	-	-	-	-	-	1.0	-	-	-	1.0	0.4	-	-	-	0.6	-	-	-	0.6	-	35.2	-	-	-	-	7.0	4.0	-	-	0.2	0.8

Discussion

The habitat preference, denoted by indices, for the following forms do not agree with those stated by Gabrielson and Jewett (15).

Western Flycatcher
Wood Pewee
Black-capped Chickadee
Yellow Warbler
Black-throated Gray Warbler
California Purple Finch
Red Crossbill

No explanation can be given for this discrepancy, but the lateness of the season may have caused a shuffling of the various populations.

The Western Mourning Dove is seemingly out of its proper habitat, but all specimens observed during samples were on dead snags. They were also observed on dead snags in shrub habitats.

Habitat Preference

Before discussion of the preferred habitats, it might be well to point out that not too much reliance can be put on flying records. Difficulty of diagnosis and the chance of missing a form are unequal in different habitats. A form that flies across one habitat into the one sampled can only be listed for the area being studied, yet the bird belongs to the previous area, just as much as it does for the one being sampled.

For purposes of comparison the forms will be listed under the habitat showing the greatest density, and in parentheses after each form will be placed the layer of greatest density. Forms denoted

merely by a plus for presence will not be considered.

Forms that were predominently on the wing were:

Turkey Vulture
Vaux Swift
Violet-green Swallow
Bank Swallow
Barn Swallow
Cliff Swallow
Holarctic Raven
American Crow

The Rufous Hummingbird has been kept from the above list for obvious reasons. The Western Belted Kingfisher was always found near water, so it likewise has been eliminated from the list of flying birds, and must be put by itself in an aqueous habitat.

No birds reached their greatest density in the sand dune habitat.

The only bird reaching its greatest density in the herbaceous habitat was:

Savannah Sparrow (Lg.)*

Birds most prevalent in the lodgepole habitat were:

Red-shafted Flicker (Tr.)
Hairy Woodpecker (Tr.)
Western Flycatcher (Tr.)
Chestnut-backed Chickadee (Tr.)
Wrentit (Sh.)
Yellow Warbler (Tr.)
Audubon Warbler (Tr.)
Black-throated Gray Warbler (Tr.)
Pine Siskin (Tr.)
Oregon Junco (Sh.)
White-crowned Sparrow (Sh.)

One bird is equally distributed between lodgepole and climax habitats.

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* See page 39 for abbreviations for layers.

Pileated Woodpecker (Tr.)

Birds most common in the climax habitat were:

Band-tailed Pigeon (Tr.)
Mourning Dove (Snags)
Black-capped Chickadee (Tr.)
Yellow-bellied Sapsucker (Tr.)
Olive-sided Flycatcher (Tr.)
Steller Jay (Tr.)
Red-breasted Nuthatch (Tr.)
Winter Wren (Gr.)
Robin (Tr.)
Russet-backed Thrush (Sh.)
Golden-crowned Kinglet (Sh.)
Hermit Warbler (Tr.)
Western Tanager (Tr.)
Spotted Towhee (Sh.)

Birds with greatest indices for the shrub habitat were:

Rufous Hummingbird (Fl.)
Downy Woodpecker (Al.)
Bushtit (Sh.)
House Wren (Sh.)
Bewick Wren (Sh.)
Orange-crowned Warbler (Sh.)
Tolmie Warbler (Sh.)
Pileolated Warbler (Sh.)
Purple Finch (Sh.)
Green-backed Goldfinch (Sh.)
Red Crossbill (Sh.)
Chipping Sparrow (Sh.)
Song Sparrow (Sh.)

One bird was equally distributed between willow and shrub habitats.

American Goldfinch (Sh., Wi.)

Birds of the willow-alder habitat were:

Traill Flycatcher (Sh., Wi.)
Cedar Waxwing (Wi.)
Yellow-throat (Wi.)
Black-headed Grosbeak (Wi.)

Birds densest in the marsh habitat were:

Marsh Wren (Ma.)
Red-winged Blackbird (Ma.)

Brewer Blackbird (Ma.)

The bird always found adjacent to various water habitats was:

Belted Kingfisher (Fl.)

From these data it can be seen that habitat occurrence does not show the complete story. The author believes that layers are much better sources of habitat preference studies than are habitats in toto. On the other hand, it is believed that elimination of vegetation type from one's data would also obscure the ecological picture.

The greater uniformity of habitat preference can be seen in the following table.

Table III. Layer Frequency Indices for Coast Strip Birds

	Fl.	Gr.	He.	Lg.	Tw.	Sh.	Al.	Wi.	Tr.
Turkey Vulture	0.2								
Sharp-shinned Hawk						+			
Mountain Quail		+							
Band-tailed Pigeon									0.4
Mourning Dove									0.6
Booming Nighthawk	0.2								
Vaux Swift	1.6								
Rufous Hummingbird	3.8					1.0			
Belted Kingfisher	1.4				0.4				0.2
Red-shafted Flicker	0.2								1.0
Pileated Woodpecker									1.6
Yellow-bellied Sapsucker									0.2
Hairy Woodpecker									0.2
Downy Woodpecker							0.2		
Traill Flycatcher						0.4		0.4	
Western Flycatcher						1.0			4.8
Wood Pewee						1.6		2.8	0.6
Olive-sided Flycatcher									3.6
Violet-green Swallow	3.6								
Tree Swallow	3.2								
Bank Swallow	0.8								
Barn Swallow	14.0				1.8				

	Fl.	Gr.	He.	Lg.	Tw.	Sh.	Al.	Wi.	Tr.	Ma.
Steller Jay		0.4				1.4			6.6	
Holarctic Raven	0.6									
American Crow	4.4	0.4		0.4					2.0	
Black-capped Chickadee									0.8	
Chestnut-backed Chick.						4.2		1.4	11.0	
Bushtit						5.8			0.6	
Red-breasted Nuthatch									0.4	
Brown Creeper									0.2	
Wrentit						11.0		1.0		
House Wren						0.6				
Winter Wren		0.4				0.2				
Bewick Wren						0.4				
Marsh Wren										5.2
Robin								0.4	2.4	
Russet-backed Thrush		0.4				4.6			1.6	
Golden-crowned Kinglet						0.6		0.2	0.2	
Cedar Waxwing						0.4		4.0	3.6	
Orange-crowned Warbler						10.8		1.2	0.8	
Yellow Warbler						0.4			0.6	
Audubon Warbler									3.0	
Black-throated Gray W.									0.8	
Hermit Warbler									0.6	
Tolmie Warbler						0.2				
Yellow-throat								3.8	3.4	
Pileolated Warbler						14.6		2.6	5.4	
English Sparrow	Observed only around human habitation									
Western Meadowlark					0.2					
Red-winged Blackbird			16.2							
Brewer Blackbird	0.4	0.2						0.4		1.6
Western Tanager									2.4	
Black-headed Grosbeak								0.2		
Purple Finch	0.8					4.6		2.8	0.4	
Pine Siskin									2.0	
American Goldfinch	0.4					1.0		1.0		
Green-backed Goldfinch	0.2					3.8		0.6		
Red Crossbill						1.0		0.2		
Spotted Towhee						1.2		0.4	0.8	
Savannah Sparrow		0.6	3.8	5.4						0.8
Oregon Junco		1.0				2.4			1.0	
Chipping Sparrow						0.2				
White-crowned Sparrow		1.8	0.4			5.6			0.6	
Song Sparrow		0.6				38.6	0.4	7.0	0.4	0.2

Mammals

For the sake of clarity and ready reference it was thought better to list in this introduction both the animals studied in the area and also those forms that would constitute a hypothetical list. It will be noted that in the list of those forms encountered during the study reference is made to subspecies wherever the species is a polytypic one, although actual discussion in the accounts of species may be confined to the species. Literature pertinent to the form studied in the area was from taxonomic reports, which referred to subspecies in most instances, hence the reason for the name used in the following list. Certain of the author's observations were insufficient to designate the exact subspecies, so it was not designated in certain discussions in the Accounts of Species section.

Numbers enclosed in brackets after the name of each animal refer to the literature cited.

Scapanus townsendii (Bachman) (3; 26)
Sorex bendirii palmeri (Merriam) (3; 30)
Sorex t. trowbridgii Baird (3; 30)
Sorex pacificus yaquinae Jackson (3; 30)
Ursus americanus altifrontalis (Elliot) (30)
Canis latrans lestes Merriam (3)
Procyon lotor pacifica Merriam (3)
Mustela longicauda saturata (Merriam) (3; 31)
Mustela cicognanii streatori (Merriam) (3; 31)
Mustela vison energumenos (Bangs) (3; 31)
Martes c. caurina (Merriam) (3)
Spilogale gracilis latifrons (Merriam) (3; 23)
Lutra canadensis pacifica Rhoads (3)
Felis concolor oregonensis (Rafinesque) (3; 54)
Lynx rufus fasciatus Rafinesque (3)
Aplodontia rufa pacifica Merriam (3
Tamiasciurus d. douglasii (Bachman) (3)
Citellus beecheyi douglasii (Richardson) (3; 6)
Eutamias t. townsendii (Bachman) (3; 6,25)

Thomomys Maximillian (3)
Castor canadensis pacificus Rhoads (3)
Peromyscus maniculatus rubidus Osgood (3; 6,36)
Neotoma cinerea fusca True (3; 16)
Clethrionomys c. californicus (Merriam) (3; 29)
Ondatra zibethicus occipitalis (Lord) (3; 6)
Phenacomys albipes Merriam (3; 22, 45, 49)
Microtus townsendii (Bachman) (1; 3)
Microtus o. oregoni (Bachman) (1; 3)
Rattus r. rattus (Linnaeus) (3; 40)
Rattus rattus alexandrinus (Geoffroy) (3; 40)
Zapus t. trinotatus Rhoads (3; 41)
Lepus americanus washingtonii Baird (3; 6, 35)
Sylvilagus bachmani ubericolor (Miller) (3; 6, 35)
Odocoileus hemionus columbianus (Richardson) (3)
+Alces americanus gigas Miller (3)

Forms that were not found but would be considered hypothetical for the area are:

Scapanus o. orarius True (3; 26)
Sorex v. vagrans Baird (3; 30)
Myotis yumanensis saturatus Miller (3; 33, 34)
Myotis volans longicrus (True) (3; 33, 34)
Myotis californicus caurinus Miller (3; 33, 34)
Eptesicus f. fuscus (Peale & Beauvois) (3; 33)
+Canis lupus fuscus Richardson (3; 53)
Phenacomys longicaudus True (3; 22, 45, 50)
Erethizon e. epixanthum Brandt (3)
+Odocoileus virginianus leucurus (Douglas) (3)

Accounts of Species

Only those forms actually encountered by the author or those reported by Mr. Reavis will be discussed in this section.

Scapanus townsendii (Bachman)

Townsend Mole

One specimen was taken in a herbaceous habitat about 700 yards from the ocean. The workings of this animal were the only ones observed in the study area that could be positively identified for this species. Surface excavations extended about one hundred feet and were confined to the herbaceous habitat though they did approach within seventy-five feet of a dense salal growth. The capture of only one mole and the fact that the local residents complained of little or no "mole trouble" would indicate a scarcity of this form in the coast strip.

Sorex bendirii palmeri (Merriam)

Palmer's Shrew

One specimen was taken in a logged-off area (shrub habitat). The trap was placed adjacent to water seepage from a spring that originated about five feet from the base of a roadcut for Highway 101. The run off supported a mixed herbaceous-bryophytic layer otherwise foreign to the shrub associes. It is quite remarkable that shrews, which frequently die when caught in the hand or in a live trap, would be found within four feet of a moderately traveled highway.

The general lack of trapped shrews, both of this species and the others, can not be considered evidence for their scarcity. Previous trapping experience has convinced the author that for some unknown reason shrews may be trapped in fairly large numbers in a place where only shortly before none were taken.

Sorex t. trowbridgii Baird

Trowbridge's Shrew

One was taken in the same niche as that of the above Palmer's Shrew, so it would be hard to reconcile a "chance" occurrence of these two animals. Perhaps the habitat is an optimal source of food, and so these voracious little animals brave the "terror" of man's automobiles in order to obtain this food.

Another shrew was taken in a trap adjacent to a partly rotted log in a cedar-hemlock climax habitat (it must be remembered that the cedar-hemlock climax is a climax of the coast forest and not the Coast Strip). The shrub and bryophytic layers were well developed, but the herbaceous layer was absent. This habitat was quite moist, having a dankness that supported many puddles of water long after a rainy period. The above mentioned log was about ten feet from a sluggish stream that appeared out of an impenetrable shrub tangle about fifty feet from the point where the stream was closest to the site of capture.

In both instances the shrews had come out of previously unknown underground tunnel systems, their point of exit being noted after capture. It is believed that the shrews "broke through" in attempting

to get at the bait, because their points of burrow exit were so obvious that the author does not know how he could have missed seeing them when setting the traps.

Sorex p. pacificus Coues

Pacific Shrew

Sorex pacificus yaquinae Jackson

Yaquina Shrew

These two subspecies are supposed to intergrade in the area of study (3, p. 363). Two Yaquina shrews were taken, one in an area comparable to that in which the Palmer's and Trowbridge Shrews were taken, which increases the doubt in chance occurrence in this type of niche, and the other in a niche characterized by a calm shallow pool, surrounded by dense shrub vegetation, in almost pure Sitka spruce. This pool was caused by the overflow of a slow-flowing stream that was about five feet wide and six inches deep. The second Yaquina shrew was captured farther north, having been taken in Lodgepole Pine Camp (the name is a misnomer, because the dominant tree is Sitka spruce) of Siltcoos Forest Camp about seven miles south of Florence, Lane County, Oregon.

No apparent difference in habitat selection was noted among Palmer's, Yaquina or Trowbridge's Shrews. This is quite pertinent from an ecological point of view, because the distributions of the three forms overlap to a great degree. There is a difference in size

in the three forms, Palmer's being the largest and Trowbridge's being the smallest, which makes possible a difference in food preference among the three forms. If there are different food preferences, especially in areas where the forms are coterminous, competition may not be strong enough to prevent their existing together.

Ursus americanus (Pallas)

Black Bear

One set of bear tracks was seen on a dirt road in a shrub habitat. Upon following these tracks, the author observed several places where the bear had stopped along the side of the road and torn parts from fruiting huckleberry and blueberry shrubs. It seemed that the animal had casually walked through the area and intermittently stopped and sampled the fruit of the aforementioned shrubs. The tracks were lost when the animal finally left the road and went into the shrubby undergrowth.

Canis latrans Say

Coyote

Though positive identification could not be made, many canid tracks were observed along dusty roads in shrub habitats. Most of these were of sufficient size to be coyote sign, but the vagueness of the tracks and the similarity of coyote tracks to those of dogs defeated all identification attempts by the author.

Coyotes probably reach their greatest density in shrubby areas,

but they do range widely throughout the study area. Mr. Reavis maintains that he has seen them in logged off or burned over areas in the Coast Strip, (shrub habitat).

Procyon lotor L.

Raccoon

Raccoon tracks were found in sand dune, shrub and marsh habitats. Trapping in the vicinity of all tracks showed that there were well developed small rodent populations in known areas of raccoon travel. This abundance of small mammals could well have been the source of attraction to these animals.

Mustela longicauda Bonaparte

Long-tailed Weasel

Mustela cicognanii Bonaparte

Weasel

Mr. Reavis maintains that weasels are quite common throughout the area, and that the largest populations are usually found in the bottoms of large canyons near water, the vegetation being a willow or alder seral stage of the cedar-hemlock climax.

Obscure fresh tracks, thought to be those of a weasel, were found by the author along a slow-moving stream in Sitka spruce. These *might* truely have been those of a weasel, because of an abundance of food in the form of many small rodents trapped in the same area.

Mustela vison Schreber

Mink

Martes caurina Merriam

Marten

Neither of these forms were observed by the author, but both are a source of livelihood to Mr. Reavis.

In the winter he finds mink prevalent in creeks and marshes, but in summer they apparently follow the main rivers.

Marten on the other hand seem to wander little in their habitat. Although most numerous on ridges in thick cedar growth, they are found throughout forested areas.

Spilogale gracilis Merriam

Spotted Skunk

Spotted skunks or "civet cats" are well known in the area. Few of the local residents are willing to acknowledge the beneficial side of this animal, because of its predation on poultry houses and "general cussedness". There is no doubt in the author's mind that this animal is widely distributed throughout the Coast Strip. Any doubt could be dismissed after talking with the local populace.

One animal was found DOR next to a shrub habitat far from any human habitation. It is extremely doubtful that these skunks depend primarily on predation of man's domestic animals for a source of food.

Lutra canadensis (Schreber)

River Otter

Mr. Reavis traps the greatest numbers of this form in the lagoon marshes of the larger streams and rivers, but they are found throughout the waterways of the area. In no areas are they too common.

Felis concolor Linnaeus

Puma

Mountain lions seem to have reached a population peak this year. Oscar Olson, a state hunter, shot three of these animals in the study area during the summer. These large cats are widely distributed throughout the area, but apparently prefer the denser forested regions. They have been seen crossing Highway 101 in the vicinity of the West Lake portion of Siltcoos Lake.

Mr. Reavis has seen mountain lion tracks in a lodgepole pine habitat within five hundred yards of the ocean.

Lynx rufus (Schreber)

Wildcat

Mr. Reavis usually encounters this form in grassy areas at the edge of cedar-hemlock climax vegetation, but its range extends into the Coast Strip study area. It is not uncommon for these animals to attempt to raid a chicken house.

Aplodontia rufa (Rafinesque)

Mountain Beaver

Several workings were observed on a steep hillside in climax vegetation. These animals apparently soon tire of one homesite. Five fresh and fourteen old workings were observed along about a quarter mile trail. The area was visited two weeks later and one of the five previously used burrows was apparently abandoned. There were no additional burrows. Young Mr. Reavis claimed that it was not at all uncommon for new burrows to appear and old ones to be abandoned. The entrances to the burrows were between four and five inches in diameter.

Two of the used burrows from the first observation had fresh sword fern cuttings projecting out of the burrow entrances. No other vegetation accumulations were noted. Parts of the fronds had been removed in such a manner as to suggest that the animals had been eating these ferns.

Tamiasciurus d. douglasii (Bachman)

Douglas Pine Squirrel

One was taken and one was sighted in a spruce habitat. The call of one was heard in cedar-hemlock climax. Fifteen were observed in lodgepole pine habitat, where they apparently reach their greatest density. Five were observed in one lodgepole pine. Three were adjacent to the trunk; the other two were in the proximal third of limbs. The farthest apart were within fifteen feet of one another; the closest were within four feet of one another. Apparently these

usually solitary, pugnacious animals were declaring a truce, if not enjoying one another's company. No size difference was apparent among the various individuals. If they were a family, it appears that family dispersal had been long delayed. Population pressure could not be an answer to this observation, for there were numerous adjacent untenanted trees.

Citellus beecheyi Richardson

Beechey Ground Squirrel

Three were observed in scattered lodgepole pines. The sandy substrate was bare of vegetation. Four were seen in dense shrubby vegetation, where tree trunks, remaining from logging, were used as observation perches.

Those in lodgepole were around the campsite. They had their burrows on the margin of the lodgepole pines not far from a pseudo-sand dune habitat that was an island about seventy-five feet in diameter. This sandy area was sparsely covered with low vegetation predominated by yellow sand-verbena (Abronia latifolia) and sand-mat (Pentacaena ramossissima). Although constantly subjected to "friendly" tourists, these animals were quite wild and no coaxing could keep them from scurrying to their burrows whenever humans came into sight. Needless to say the animals would do their best to obtain camp stores when one was out of camp.

Eutamias t. townsendii (Bachman)

Townsend Chipmunk

Chipmunks were readily seen. Forty-three were seen in lodgepole habitats, 103 in shrub habitats, three in spruce habitats and three in coast forest climax. This form like the previous one used tree stumps for perching posts. Cut down trees seemed to be important highways of traffic.

When alarmed, chipmunks utter their characteristic sharp barks. This form did not take complete refuge from danger. If in a conspicuous spot, they would move into vegetation, but remain in view. This boldness was not foolhardy because their coloration made it extremely difficult to locate them.

Others were trapped (four in shrub, three in spruce and two in cedar-hemlock climax), but this information did not seem as reliable as the direct sight observations. One could not help notice the greater density of forms in the shrub habitat, where they were not only visibly more apparent, but their calling and alarm notes also denoted their greater abundance.

Thomomys Maximilian

Pocket Gopher

One specimen was taken in cedar-hemlock climax vegetation without shrub or herbaceous layers. This specimen fitted *Thomomys monticola helleri* Elliot, as far as external characters are concerned. Having come from an area where the status of the pocket gophers is well known and these forms can be distinguished externally, the author did not realize that external characters were quite unreliable for Oregon

forms, nor did he realize that any form in the area of study would be of uncertain status. The animal was not prepared as a study skin, so there is nothing that can be done to clarify the position of this one form.

Unfortunately there was no other gopher activity observed during the entire period of study. Mr. Kenneth Walker, who is studying the Oregon Thomomys, believes that they will travel through unfavorable areas to form new populations in ecologically suitable areas. If this be true, this form could have been a transient individual, if the study area is not a suitable habitat. If there are suitable areas for this form, they must be rather limited.

Local residents had not seen any gophers or their workings.

Castor canadensis Kuhl

Beaver

Beaver are widely distributed throughout the quieter streams, sloughs and lagoons. In most cases only recent activities of these animals were observed. Seven dams were seen in the area of study. These constructions ranged from about ten to thirty feet in length. One, not considered in the previous measurements, was in the process of construction. This uncompleted dam was first noted about two weeks before field work was ended. At that time the dam was above water only on the edges of a slow-moving stream, which was about thirty feet across. Before leaving the study area, the dam was again observed. The original structure was about three feet above water

on the margins of the stream and about four feet below the surface of the stream, which was about six feet deep at that point. When last observed, two weeks later, only the center ten feet was under water. The lowest point in the middle of the dam was about one foot under the water. During this time the water level had increased almost six inches.

The only observations on the animals were made in Lagoon Picnic Grounds of Siltcoos Forest Camp. On all occasions the animals were eating. The only plants identified were Elodea, Nymphaea (pond lily) and Salix (willow). Branches of Alnus (alder) were stripped of their bark, and though the animals were not observed eating alder, it is assumed that they did so.

The least number of animals seen was one, but on one occasion eleven were observed. The animals, contrary to the usual actions of the species, seemed quite unconcerned during the author's presence. It was possible to approach within fifteen yards of the beavers and not disturb them. Although the author was cautious and attempted to be as quiet as possible, their casual glances toward the writer's place of concealment would belie their ignorance of an intruder. This apparent lack of alarm was surprising. It is true that humans are not allowed to molest the animals in this area, but the Forest Service does not encourage the presence of beavers. The dams frequently cause a flooding of the forest camps, so they are often dynamited to keep these camps open to the public. The author does

not propose to speculate on the intelligence and behavior patterns of this form, but he believes that most people will agree that the dynamiting of beaver dams four or five times a year does not aid in their "taming".

In view of the above it is quite surprising that the following occurred:

At 7:30 P.M. when light conditions prevented photographs, as was the case during other observations, it was decided to find out how much disturbance the animals would accept before leaving. Walking in plain sight seemed to have little effect upon the beavers. Clapping of the hands caused them to swim casually away and finally to disappear beneath the water.

Peromyscus maniculatus rubidus Osgood

Ruddy Deer Mouse

Deer mice are widespread in this area. The following were trapped: sixteen in dunes, six in herbaceous vegetation, twelve in shrub, twenty-three in willor-alder, nine in marsh, two in lodgepole, eleven in cedar-hemlock climax and five in spruce climax.

Any discussion on the trapping data would be based on the author's impressions and little quantitative evidence, but certain observations are pertinent and must be included. In sand dunes ruddy deer mice were found with *Zapus*, but no other mammal was trapped or observed. It seems logical that the above deer mice may wander farther for food in dunes than they do in other areas, because

of the lesser amount of food. Other species may have been present as was indicated by an apparent difference in small mouse-sized tracks. Certain other tracks could have been those of a weasel, but they were too obscure to make positive identification. Evidence of the carniverous habit of some form or forms was evident. Eleven of the sixteen deer mice had been partly eaten. It is doubtful that this was accomplished by a member of the Carnivora, because the traps were not carried away. It is believed that the trap predators were small because the traps were secured with merely a spike driven into the sand. This has proved quite effective in holding a trapped animal, but not in preventing the trap and trapped animal being carried off by a larger animal. There is also a tendency for carnivores to carry away their prey, but small mice tend to eat their brethren on the spot. Peromyscus is known to be canabalistic towards its own species, so the predators may have been other Peromyscus.

Deer mice as a genus find their greatest abundance in wooded areas; but despite the probability of these animals ranging farther for food in willow-alder habitats, the available data, including trap nights per capture, would indicate that deer mice are most abundant in the willow-alder habitats of the study area.

Neotoma cinerea fusca True

Dusky Bushy-tailed Wood Rat

The only evidence of this form was one specimen found dead on the road about four miles north of Gardinier, Douglas County, Oregon.

This was definitely in the Coast Strip study area. The highway at this point passed through precipitous spruce-covered hills. Known ecology of the animal would indicate that it reaches its greatest density in the few precipitous, rocky regions of the Coast Strip.

Clethrionomys c. californicus (Merriam)

California Red-backed Mouse

One was taken in a set next to a partly decayed log in a lodgepole pine habitat. The shrub layer, primarily Oregon myrtle (Myrica californica), was especially luxuriant for a lodgepole pine habitat, and although there was no bryophytic layer, the area was extremely damp.

This would be considered a rare, but not a new record. The capture of one specimen could not be considered significant as far as preferred habitat is concerned.

Ondatra zibethicus (Linnaeus)

Oregon Coast Muskrat

Mr. Reavis traps the greatest number of muskrats in fresh water marshes, lakes and ponds, but he also finds them in sloughs.

Phenacomys albipes Merriam

Red Tree Mice

No evidence was found of tree mice, though Walker (49, p. 254-255) found P. albipes near Gardinier, "----near the mouth of the

Umpqua River, Oregon. This specimen was trapped on the brush-covered bank of a tiny creek high up on the hillside above the river." Trapping of similar localities proved fruitless.

Microtus townsendii (Bachman)

Townsend Meadow Mouse

Six were taken in dry herbaceous areas. The vegetation here was stunted in comparison to other herbaceous habitats. More runways, believed to be those of this form because of size, were found in a well-developed herbaceous habitat, but over 400 trap nights resulted in the capture of only one individual, whereas 206 resulted in the capture of the former six. The above causes a doubt in the writer's mind as to the exact preferred habitat of this form. Should one accept the results of the animals captured, or consider the possibility of a greater population in the second area with obviously better cover, more runways and more food. It is not at all improbable that readily available natural food reduced the frequency of the animals' visits to the traps in the second trapping site.

Microtus o. oregoni (Bachman)

Oregon Meadow Mouse

One was taken in cedar-hemlock climax in a trap set near a log. The ground was covered with decaying leaves and there was a poorly developed shrub layer. A second specimen was taken from the same marsh habitat at the edge of Tahkenitch Lake where Rattus r. rattus was taken. Apparently this meadow mouse frequents moister areas than

Townsend's Meadow Mouse and therefore does not compete with it.

Rattus r. rattus (Linnaeus)

Black Rat

Six black rats were taken about seven miles due south of Florence, four in dank undergrowth beneath lodgepole pines (the same area where the one specimen of Clethrionomys was taken), and two near standing water in a mixture of Sitka spruce and alder with a shrub layer predominately willow, alder and sword fern. Nine others were taken on the northwest shores of Tahkenitch Lake; seven in marsh vegetation and two in the willow border of the marsh.

This is a new record for the area. In fact there is apparently only one record for Oregon, "a half-grown young taken in a trap set under old logs in the Sitka spruce forest near the shore at Empire," (Coos County) (3, p. 169).

These animals are quite wary and difficult to capture. Many traps were sprung; it is believed that most of this was due to Black or Roof Rats, but comparatively few were taken.

It was noticed that all the males were in the reproductive condition (i.e. the testis were in the scrotum), and that all but one female was lactating or had quite recently weaned their young. The other female was gravid and seemed close to parturition.

Rattus rattus alexandrinus (Geoffroy)

Roof Rat

Five were taken. All were in the above spruce-alder situation

with the black rat. This too seems to be a new record for the area. Bailey (3, p. 169) states, "In Oregon there are two specimens in the Jewett collection from Netarts Bay and one in the Gabrielson collection taken at Portland."

All females and males indicated a reproductive period. A male and female were captured side by side in the same trap. It seems logical that they were traveling together, but whether or not they were about to breed can only be surmised. The female was lactating and there is no doubt in the writer's mind that she was nursing young.

It is interesting to note that 144 trap nights in this area had passed before any roof rats were taken.

Zapus t. trinotatus Rhoads

Northwestern Jumping Mouse

One was taken in vegetation in sand dunes, three in the same spruce-alder situation as *Rattus rattus*, and two in sets next to seepage of a small spring, which flowed from a small knoll in dense salal growth. The traps were placed in a small herbaceous area about twenty feet below the spring.

This meadow form was found in as near meadow-like situations as were seen in the above habitats. There were well-developed herbaceous layers in all the sites of capture.

Lepus americanus Erxleben

Snowshoe Hare

Seven snowshoe hares were seen in dense shrubby habitats and two

were seen in spruce habitats that had a dense undergrowth of shrubs. From the above it is obvious that there was no case in which these animals were found far from dense shrubby cover. Numerous tracks, believed to be those of this form and the brush rabbit, were found on the dusty roads and paths through various shrub areas.

This animal is believed to be widely distributed in the study area, because of the predominance of dense shrubby growth and the many signs of this animal.

Sylvilagus bachmani (Waterhouse)

Brush Rabbit

Three in lodgepole habitats, six in shrub habitats and five in spruce habitats took almost immediate haven in dense shrubs. The possibility of their tracks and those of L. americanus was previously mentioned in the discussion of the snowshoe hare.

One immature brush rabbit was taken in a rat trap that was set by a shallow pool of water in Sitka spruce. Here also there was a dense undergrowth of shrubs. Bracken fern and sword fern also contributed to the density of the shrub layer.

Odocoileus hemionus columbianus (Richardson)

Columbian Black-tailed Deer

Tracks of four black-tailed deer were found in a cedar-hemlock climax habitat. Two additional sets of tracks were observed together in a shrub habitat within the Coast Strip.

Mr. Reavis believes that the greatest concentration of this

subspecies is found in heavy forests and burns.

+ Alces americanus gigas Miller

Alaska Moose

Bailey (3, p. 76) has the following to say about the moose:

"..... In October 1923, five moose calves from the Kenai Penninsula, Alaska, were released near Lake Tahkenitch, Oreg., just north of the mouth of the Umpqua River in western Douglas County. On March 30, 1925, State Game Warden A. E. Burghduff, writing to the Biological Surey, reported these moose in excellent condition with indications that the 3 cows would calve that spring. He said the moose had not gone entirely wild but remained semidomesticated in the vicinity where released and could be readily approached at any time. They were seen daily by hunters and fishermen, and there seemed every indication that the planting was proving a complete success. The weight of the larger of the 2 bulls was then estimated at 1,000 pounds.

Under date of February 20, 1928, Jewett wrote that the most recent report on the moose near the mouth of the Umpqua river was to the effect that there were 2 cows and 1 bull of the original planting from Alaska, 1 yearling born in 1926, and 3 calves born in 1927, making a total of 7 animals. Of the original 5 head, 1 had been killed by a railroad train and another, which became considerable of a pest about the ranches and dooryards, had been wounded so badly by a local gunner that it had died. In the game-census reports of the Forest Service only 2 moose were reported on the Siuslaw National Forest in 1929, against 9 in 1928, and 6 in 1927. In a letter of February 2, 1931, Jewett says the Alaska moose of Oregon are no more. The last bull was shot by a State deputy warden at Tahkenitch Lake, in Douglas County, after it had been wounded and blinded by a charge of bird shot by some local resident."

It can be seen from the foregoing account that the moose can not be considered a native of the area.

Hypothetical List

The making of a list of hypothetical forms always constitutes a problem. Deciding what forms should be included and what forms should be excluded, especially in an area so little collected as the entire Coast Strip, constitutes a problem that is not readily solved. No one reason can be used to decide which forms are to be listed or which forms are not to be listed. The author has tried to be conservative in making this list, but he realized that despite his own views the list is open to criticism. This list is based on known ecology of the forms. It is assumed that the following forms could find a niche in the area studied between Florence, Oregon, and Reedsport, Oregon, and that there are no stringent barriers between the present known range and the aforementioned area of study.

Hypothetical Forms

Scapanus o. orarius True

Coast Mole

From the map in Bailey (3, p. 353) one can see the proximity of known occurence. Numerous workings of a size to be associated with this form and not *Scapanus townsendii* were noted in almost every sand dune habitat. It is believed by the author that this form actually does occur in the study area, but trapping did not locate one of these animals. It is possible, but not probable, that the workings noted belonged to other Townsend moles.

Sorex v. vagrans Baird

Vagrant Shrew

The proximity of known occurrence (3, p. 366) and known habitat occurrences (3, p. 364), would indicate the presence of this form.

Order Chiroptera

Bats

Bats were observed in the area, but none were taken. The most likely forms are:

Myotis yumanensis saturatus Miller (3, p. 372)
Myotis volans longicrus (True) (3, p. 375)
Myotis californicus caurinus Miller (3, p. 377)
Eptesicus f. fuscus (Peale & Beauvois) (3, p. 379)

+ Canis lupus fuscus Richardson

Northwestern Timber Wolf

Data of Young and Goldman (53, p. 455) make it likely that this form once occurred in this particular area.

Phenacomys longicaudus True

Red Tree Mouse

It can be seen (3, p. 194) that this form might occur where the study was made.

Erethizon e. epixanthum Brandt

Yellow-haired Porcupine

Information from Bailey (3, p. 229) would indicate the presence

of this form.

+ Odocoileus virginianus leucurus (Douglas)

Columbian White-tailed Deer

This deer may have wandered down into the study area (3, p. 90).

Origin of Mammals

Gordon (18) has endeavored to explain mammalian distribution by using paleontological data. No other explanation seems to lend as satisfactory a solution to the problem of mammalian distribution. It was thought that comparisons with other mammalian fauna of Oregon might be simplified if the Coast Strip mammals were listed under their respective elements. Only native animals discussed under the accounts of species are considered.

Old World element: 21.87%

Sorex (3 species)
Ursus (1 species)
Martes (1 species)
Lutra (1 species)
Lynx (1 species)

Boreal North American element: 18.75%

Scapanus (1 species)
Tamiasciurus (1 species)
Eutamias (1 species)
Phenacomys (1 species)
Ondatra (1 species)
Zapus (1 species)

Panboreal element: 31.25%

Canis (1 species)
Mustela (3 species)
Felis (1 species)
Castor (1 species)
Clethrionomys (1 species)
Microtus (2 species)
Lepus (1 species)

Austral North American Element: 28.13%

Procyon (1 species)
Spilogale (1 species)
Aplodontia (1 species)
Citellus (1 species)

Thomomys (1 species)
Peromyscus (1 species)
Neotoma (1 species)
Sylvilagus (1 species)
Odocoileus (1 species)

If the hypothetical forms were added to the above list, the following percentages would prevail:

Old World element: 21.05%

Boreal North American element: 21.05%

Panboreal element: 28.95%

Austral North American element: 26.32%

South American element: 2.63%

This would cause no drastic change in the faunal picture. Northern forms are predominant as is to be expected.

Summary

A survey was made of the land vertebrates of a strip of vegetation between Florence, Lane County, Oregon, and Reedsport, Douglas County, Oregon. This is just a segment of the seaside vegetation, which extends well beyond the northern and southern limits of the state of Oregon. For reasons already stated, this entire region has been referred to as the Coast Strip.

All amphibians and reptiles were measured. The place of capture and habitat were duly recorded. Efforts were made to collect other ecologically pertinent material. The latter information is in no way equally distributed among the various herpetological forms. One hundred and seventy-eight specimens were taken and deposited in the Oregon State College Natural History Museum.

There was only one objective as far as the avian fauna was concerned. Habitat distribution was studied and frequency indices were compiled. These indices denote number of birds seen per sample. Because visibility, travel, etc. were not on an equal level the time per samples were varied to equalize the sampling of each habitat. The significance of layer occurrence is also indicated.

The mammals were studied in much the same manner as were the amphibians and reptiles, but more data was obtained on habitat distribution. The mammals were listed according to their generic origin to facilitate comparative studies. Two new records were discovered, *Rattus r. rattus* and *Rattus rattus alexandrinus*. Specimens of both the black and roof rat have been deposited in the Oregon State College

Natural History Museum.

Conclusions

1. Quantitative data on habitat occurrence and layer occurrence showed the stringency of niche requirements for much mobile forms as the birds. It is believed that such data on other animal groups would also display the same tendency.

2. The Coast Strip, at least as far as the present area is concerned, is a profitable as well as an exceedingly interesting area for study. The following are but a few of the possible problems opened by the present study: the distribution of any of the forms throughout the area, the predator-prey relationships, the annual cycle of any of the forms in the area, the relation of aquatic plant poisoning to the local fauna, etc.

3. Commercialization of the Coast Strip has already impaired much of the area for study. Any subsequent studies should be made not too far in the near future.

Plate I. Primary succession on sand. Note the consolidation into sand dune vegetation in the distance.

Plate II. In the foreground the dune vegetation, typified in the distance, is developing into a herbaceous habitat.

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Plate III. A typical herbaceous habitat. Note the "blowout" in the center of the plate.

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Plate IV. Invasion of a herbaceous habitat by shrubs.

Plate V. Shrub habitat resulting from logging operations.

Plate VI. Lodgepole pine. Note dwarfed trees to the right and also the effect of wind on the substrate. There is no shrub layer.

Plate VII. Lodgepole pine being invaded by Sitka Spruce. Note the well developed shrub layer.

Plate VIII. Lodgepole pine being engulfed by wandering dunes.

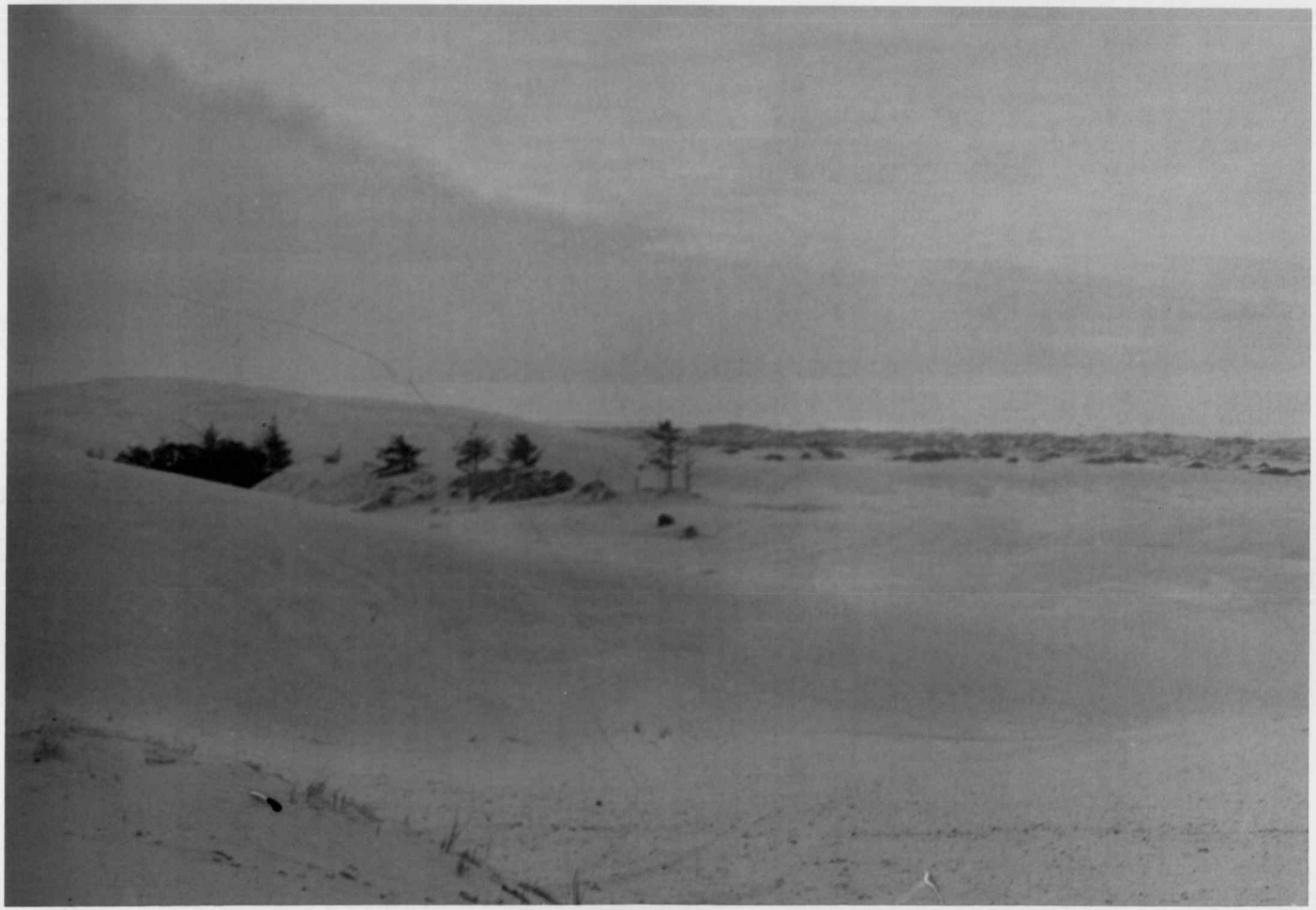

Plate IX. Understory in a drier Sitka spruce habitat.

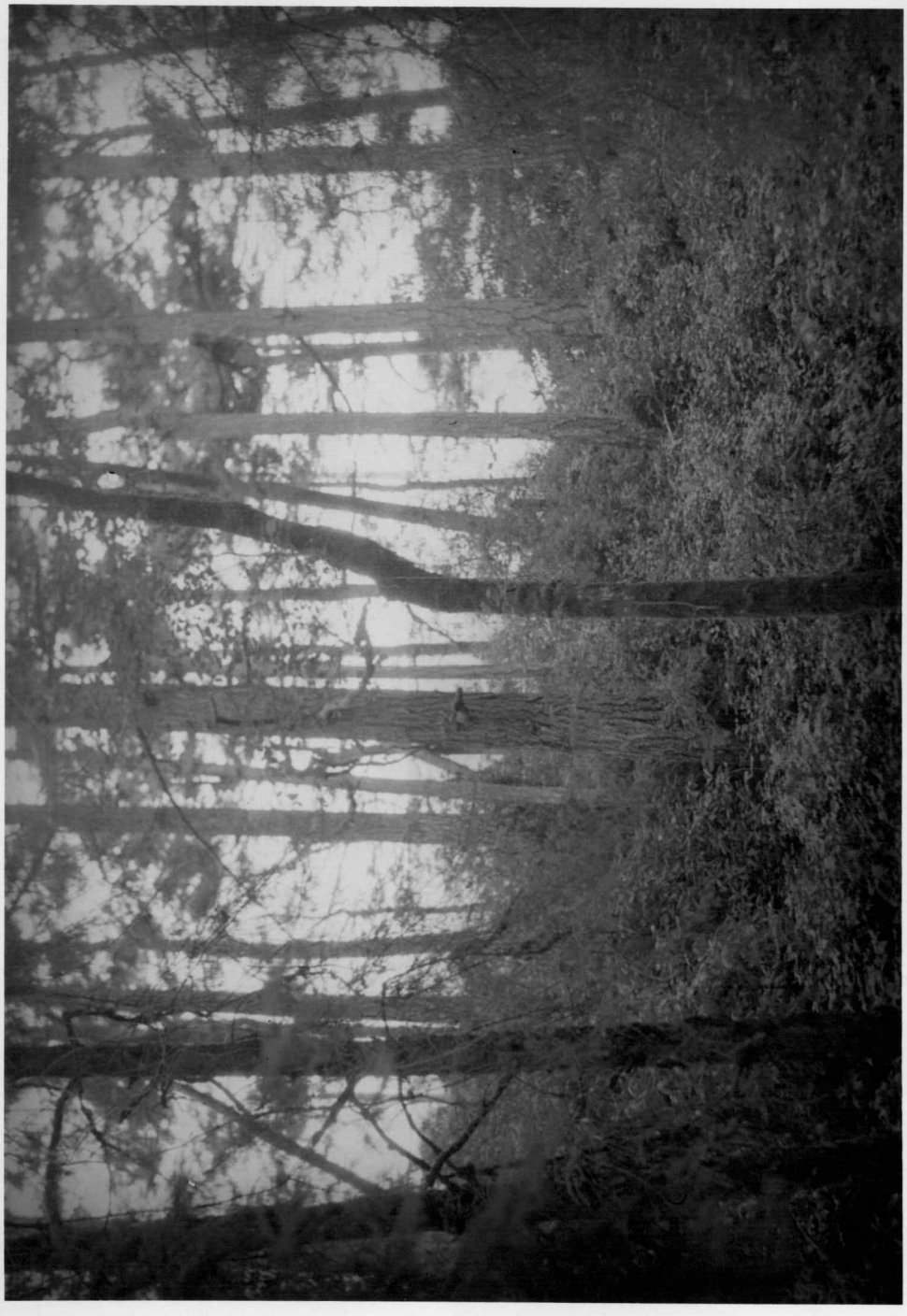

Plate X. Understory in a more mesic Sitka spruce habitat.

Plate XI. Sitka spruce along the edge of the estuary of the Umpqua River.

Plate XII. The cedar-hemlock climax of the Coast Forest.

Plate XIII. A floating hydrosere with lodgepole pine and Sitka spruce in the background.

Plate XIV. Marsh at Tahkenitch Lake. Note the more mesic shrubs in the foreground and Sitka spruce in the background.

Plate XV. Willows with marsh in the foreground and roadcut and Sitka spruce in the background.

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Plate XVI. Isolated marsh, showing encroachment by lodgepole pine and Sitka Spruce.

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