REPORT ON THE AVIFAUNA OF THE VERMILION PASS BURN AREA

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FINAL REPORT

A study by Murray J. Christman in 1970 entitled "The Occurrence of Birds on the Vermilion Pass Burn", gave a preliminary indication of the early composition of bird species in the Vermilion Pass Burn. Generally however, the role of birds in a burn area in the Rocky Mountains is not well understood. Further, the composition and ecology of the bird species inhabiting the climax spruce/fir forest of the Canadian Rocky Mountains remains largely unresearched.

This paper presents information on the composition of the avifauna of the Vermilion Pass Burn area at a point four years following the forest fire. The field technique employed was transects or census routes. Some controversy exists over whether this method is preferable to the establishing of plots and determining absolute density of nesting species (Kendeigh 1944). However due to the number of variables involved, the extent of area to cover, the length of time, and the amount of base-line data available the transect route technique was selected. In addition to sampling the burn, areas outside the burn (pristine forest) were also sampled in order to serve as a control. The variable factors of unburned pockets, burn edge, altitude, nearness to water, the direction in which the slope faces, altitude, the time of day and the time of month were also taken into account when establishing the transect routes.

METHODS

Five regular transect routes were established. (The exact location of these routes has been plotted on the grid map accompanying this

report.) In addition three cross-check routes were established. Each transect route was subdivided by flagged reference points, varying from approximately 200 to 400 meters apart. The reference points were numbered and accompanied a recording of a sighting, indicating its location.

The usual census technique was to walk slowly along transect lines stopping for about 15 minutes at each reference point, and making a 360° scan with 7 x 40 field glasses or a spotting scope. At the start of each route the time, the weather, and the temperature (approximate) were recorded. At each sighting the specie (as near as possible i.e. genus) the sex, the age, the number of individuals if in a flock, the time, the location (reference marker), the behaviour (calling, singing, foraging, hawking, feeding, flying, perched etc.) the habitat, and information on nesting were recorded in the field notebook. This information was later recorded on data cards, one card for each sighting.

In recording observations an attempt was made not to record the same individual more than once on the same day. No special attempt was made to locate nests, due to the length of time this would have involved.

RESULTS AND DISCUSSION

During the months of June, July and August, 607 recorded sightings of birds were made in the area of the Vermilion Pass Burn. These sightings included 1124 individuals. The reason for the difference between these two figures, is that a recorded sighting might be a group or flock of birds which for convenience were treated as a group. No attempt was made to establish absolute densities.

Initially routes were established to census the variables mentioned previously. However within the range of areas covered in the study such

factors as altitude and direction in which the slope faced, appeared to have little affect on numbers or specie composition. For the purposes of analyzing the data simple vegetative distinctions were drawn. The distinctions recognized were (1) middle burn (2) pristine forest (3) pristine forest edge (in unburned forest)[1] (4) burn edge (in burned area)[2] (5) unburned pockets (in pocket) (6) burn/pocket edge (in burn)[3] (7) aquatic habitat in burn (8) aquatic habitat in pristine forest. The data in the remaining section of this paper is dealt with under these headings.

The approximate length of census route represented by each of the first six of these categories was, middle burn-4600 m, pristine forest - 3600 m, pristine forest edge - 2000 m, burn edge - 2000 m, unburned pocket - 900 m and burned pocket edge - 1200 m.

No one transect route consisted solely of one of these categories. Thus each figure represents a combination of sections of various routes. Each of the distances was walked approximately the same number of times over the three month period. The distances were determined by simple pacing and by consultation with the survey team. However, since a grid map was not established prior to the initiation of the bird study, the distances might be subject to some inaccuracy and were therefore not used in a statistical manner.

Sightings were made at all times of the day from approximately 0630 to 2030.

A total of 49 species were sighted in the study area. The species are listed in Table 1 showing the routes on which they were recorded and Table 2 indicating the habitat types with which they were associated.

Figure 1 indicates the percentage of the total sighting that each of the twelve most numerously sighted species represent. Pine siskins were by far the most numerously sighted species in the study area (38.5%). The

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[1] Within 100 meters of burned area [2] Within 100 meters of unburned area
[3] Within 100 meters of unburned pocket

next two most commonly sighted species, Oregon juncos and Robins, were far less common at around 11%.

Pristine Forest Versus Middle Burn

Four hundred and eighty-nine individual sightings of 22 species were made in the middle burn area compared to 224 sightings of 18 species in the pristine forest. Although the distances covered in the middle burn area were greater than in the pristine forest, the number of individual sightings appears to be disproportionate with the distance difference, 4600 m (middle burn) to 3600 m (pristine forest). It is possible however that sampling difficulties in the pristine forest might account for some of this difference.

Of the species sighted in the burn, the kestrel, red shafted flicker, Clarke's nutcracker, robin, blue bird and Townsend's solitaire all are thought to have nested in the middle burn area and also fed in the middle burn. The northern-three-toed woodpecker, olive-sided flycatcher, white crowned sparrow also possibly nested in the middle burn area and are known to have fed in the middle burn. Birds nesting in the pristine forest are thought to include the gray jay, winter wren, robin, hermit-thrush, Swainsons thrush and pine siskin. Probably nesting in the pristine forest were black capped, mountain and boreal chickadees, the varied thrush, Audubon's warblers, Oregon junco and chipping sparrow, while it is felt the goshawk, northern three-toed woodpecker, Townsend's warbler and red breasted nuthatch possibly nested there.

Figures 2 and 3 indicate the relative percentage of total sightings of the most abundant species represented. Pine siskins made up over 50% of the total sightings in both the pristine forest and middle burn areas. Very few pine siskins were observed in the burn in June. However during July and August small flocks of pine siskins began entering the burn and

were seen feeding on arnica seeds (one of the most abundant plants in the burn). They did not however nest in the burn nor did they appear to nest in the unburned pockets sampled. As Table 3 indicates pine siskins were generally observed flying, and when they were observed feeding in the pristine forest they fed mostly in the tops of tall spruce trees. In the middle burn areas however, the exact reverse was true and they were observed feeding at ground level. It might be possible to predict that as arnica is replaced by later shrub stages, pine siskins will become less common in the burn.

Robins were the second most commonly recorded species in the burn, and unlike pine siskins they nest in the burn. (Four nests were located in burned trees). Thus the absence of any cover did not appear to affect the suitability of the area for nesting robins. Within the burned area robins were most common around avalanche areas (S.E. facing slopes) and near to water. Robins were also the third most common specie in the pristine forest.

In the pristine forest the Audubon's warbler was the second most common species after the pine siskin. As Table 3 indicates they were generally observed foraging and hawking in conifers.

If one compares the size of the five most common species in middle burn and pristine forest areas, middle burn species were on the average considerably larger (10.8 inches in average length to 6.35 inches). Therefore it appears that the burn area was seemingly able to support a greater biomass. A similar observation was made by Bock and Lynch (1970).

The reason for this difference is fairly clear if one looks at the manner in which foraging was generally carried out in the two areas. As Table 4 indicates, 61% of all foraging sightings in burned areas were on ground level, 31% associated with fallen logs and only 7% associated

with burned trees. In pristine forest areas 7% of species observed foraging were associated with the ground level, 22% associated with large conifers and 38% associated with small conifers. Smaller species of course are better adapted to foraging in dense vegetation. Without this restriction in the burn (and possibly in response to an increased food supply) larger and bioenergetically more efficient species can prosper.

Unburned Pockets

In analyzing data on unburned pockets two distinctions were drawn. Firstly species actually in the unburned pocket were noted and secondly species within approximately 100 meters of the unburned pocket, but in the burn were noted. This distinction was made in order to account for bird species which might feed in the burn but nest or roost in unburned pockets or visa versa. A high incidence of birds feeding in the burn around unburned pockets prompted this distinction.

Ninety-two sightings of 20 species were made in unburned pockets. This species number appears to be fairly high considering the relatively small area which unburned pockets represented and the relatively low number of individual sightings it represents. The area sampled with one hundred metres of unburned pockets represented a distance of approximately 1200 metres. Seventeen species were recorded in 121 sightings.

The rufous hummingbird, northern three-toed woodpecker, olive-sided flycatcher winter wren, robin, hermit thrush, Audubon's warbler, Wilson warbler, Oregon junco and chipping sparrow nested in unburned pockets. The hermit thrush, Wilson's warbler and winter wren were not seen outside of unburned pockets and may utilize them as they would pristine forest. The varied thrush probably nests and feeds exclusively in the unburned pockets while the mountain chickadee, Tennessee warbler, golden crowned sparrow and fox sparrow possibly nest in unburned pockets.

Robins, Clarke's nutcrackers and red shafted flickers nested within one hundred metres of unburned pockets in the burn and fed both in the burn and in unburned pockets. In this area however these species were no more common than in middle burn areas.

As Figure 4 indicates robins were the most commonly observed species in unburned pockets. However unlike other habitat types recognized in this study no one species dominated the percentage of sightings. Pine siskins, Wilsons warblers, Oregon juncos, and Audubon's warblers were all fairly close in terms of numbers of sightings.

Oregon juncos greatly dominated the burn/pocket edge (in burn) area constituting 38% of the sightings (Figure 6). Oregon juncos are a ground nesting species and presumably required the cover of unburned pocket vegetation for nesting. Most individuals observed were foraging for insects either on the ground or on fallen logs (Table 4). Evidently this combination of nesting cover and open ground strata is ideally suited for Oregon juncos. The next most commonly sighted species in this area were the pine siskin, robin, chipping sparrow and Audubon's warbler. In the pocket edge area, middle burn and burn edge, a mixed group of Oregon juncos, chipping sparrows, Audubon's warblers and white-crowned sparrows were frequently observed feeding in the same area. This was particularly apparent in areas of wood piles such as those which result from avalanche action.

Pristine Forest Edge and Burn Edge

As in the case of unburned pockets a distinction was drawn between sightings made at the edge of the burn in the burned area and in the pristine forest area.

Seventy-seven sightings of 18 species were made in the pristine forest edge area compared to 42 sightings of 15 species in the burn edge area. (The distances represented are the same.) The situation is the reverse of unburned pockets where more sightings were made in burned areas than unburned. The probable reason for this is the fact that pine siskins were the dominant specie (23.4%) in pristine forest edge while they were not as common (relatively) in unburned pockets. Robins however which dominated unburned pockets in numbers of sightings (18%) made up only 6.5% of the sightings in pristine forest edge. Gray jays were the second most abundant species next to pine siskins, followed by Oregon juncos, robins, and olive-sided flycatchers. In both the pristine forest edge and in unburned pockets Oregon juncos made up about 10% of the total sightings.

The winter wren, robin, hermit thrush, Audubon's warbler, Oregon junco and chipping sparrow all nested in the pristine forest edge area. All except the hermit thrush were also sighted feeding in the burn edge area. The olive-sided flycatcher, gray jay, mountain chickadee, varied thrush and Wilson's warbler probably nested in the pristine forest edge area. Of these only the olive-sided flycatcher was consistently seen feeding in the burn. The goshawk, kestrel, blue grouse, black capped chickadee, Tennessee warbler, orange-crowned warbler and pine siskin also might possibly have nested in the pristine forest edge area. Of these all but the black-capped chickadee and orange crowned warbler were also observed feeding in the burn edge area.

As in the case of areas around unburned pockets the burn edge was dominated in number of sightings by Oregon juncos, although its percentage representation was smaller (23% burn edge to 38% burn pocket edge). Four species, Oregon juncos, olive-sided flycatchers, pine siskins and kestrels accounted for over half the total sighting in the burn edge area (Figure 7).

Hydrospheres

Hydrospheres refer to both aquatic habitats within and outside the boundary of the burn. These areas were thought to be sufficiently different from the areas referred to thus far, to warrant separate treatment.

Species deemed to be associated with hydrospheres were those which depended for their livelihood on water bodies, or emergent and marshy vegetation zones around water bodies. Unlike other species the numbers of pairs of birds associated with water bodies was fairly well known. Because of this, species occupying these areas were excluded from comparative treatment with other non aquatic areas and dealt with slightly differently in this text.

Seven species qualified for the hydrosphere categories. These were the mallard, Barrow's goldeneye, common merganser, spotted sandpiper, cliff swallow, dipper and northern waterthrush.

One female mallard was observed on the first Altrude Lake and raised four young to near fledging. (Six or seven newly hatched ducklings were originally sighted). A pair of Barrow's goldeneye's raised three young out of a total of seven young hatched, on the second Altrude Lake. Both of these lakes have unburned edges. In comparison Vista Lake with a burned edge (other than a few small unburned sections) did not support any nesting waterfowl despite the fact that it is a larger lake. The probable reason for this difference relates to the protective behaviour of the species involved. Both the mallards and Barrow's goldeneyes depended on the overhanging willow and other shrub growth at the lake edge for hiding cover. At Vista Lake almost all of this vegetation was destroyed by the fire (although there does appear to be sufficient pockets of vegetation for the nest site themselves).

A Barrow's goldeneye duckling (separated from the adult female and other two young on the Altrude Lakes), an adult female mallard (probably same female as mentioned previously), an osprey, a belted kingfisher and cliff swallows were observed feeding at Vista Lake. This would appear to indicate that despite losing most of its surrounding cover vegetation the lake itself may be still fairly productive.

Spotted sandpipers were commonly observed at both burned and unburned lake edge, and burned and unburned stream edge. Similarly dippers were also fairly commonly sighted at the Altrude Lakes (unburned shore edge), and in a stream running through the middle of the burn (route 1).

CONCLUSIONS AND SUMMARY

Even at a point only four years following the Vermilion Pass burn, a surprisingly high number of species were sighted in the burn. The burned areas would also superficially appear to support comparable numbers of birds as pristine forest. Many of these birds however, are associated with unburned pockets. Also the body size of species sighted in the burn appears to be larger on the average and thus the burn may support a larger biomass than the pristine forest areas sampled.

Although the composition of burn and pristine forest avifaunas did not differ drastically in terms of the dominant species, certain species did appear to take advantage of the burn situation. Other than the pine siskins almost all species feeding in the burn fed on insects. Unburned pockets in particular greatly increased the diversity of species within the burn, allowing many species to take advantage of the area for feeding, while nesting and roosting in unburned vegetation.

The most common specie in the burn, the pine siskin, was also the most common specie in the pristine forest. Pine siskins nested in the pristine forest and visited the burn to feed. The next most common specie, the Oregon junco, nested in unburned pockets and fed in the burn. The third most common specie in the burn, the robin, both nested and fed there. Thus the three most common species in the burn had decidedly different types of involvement in the burn habitat.

The forest fire, by destroying lake shore vegetation apparently decreased the suitability of the lake area concerned for nesting waterfowl. However, generally the fire does not seem to have greatly affected the viability of hydrospheres for other birds associated with them.

ACKNOWLEDGEMENTS

I would like to acknowledge the assistance of Kootenay Head Park Naturalist Ian Jacks, and seasonal Park Naturalist Murray Christman, for supplying necessary background information.

TABLE 1. Comparative Trans Route/Bird Sightings

Specie	Number of Sightings					
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Total
mallard			18	1		19
Barrow's goldeneye			22	1		23
common merganser					1	1
accipter (Sp?)					1	1
goshawk			1			1
red-tailed hawk		1		3		4
Kestrel	3	13		2	2	20
osprey				1		1
blue grouse					3	3
spotted sandpiper	5	4	2		1	12
rufous hummingbird					2	2
caliope hummingbird	1					1
red-shafted flicker	1	2	2	2		7
piliated woodpecker	1		1			2
northern three-toed woodpecker	2	1	2	7	2	14
belted kingfisher				1		1
Epidonax flycatcher	1					1
olive-sided flycatcher	6	1	5		5	17
cliff swallow				3		3
gray jay					10	10
Clarke's nutcracker	5	21	1	16	6	49
common raven		1	1	5		7
black-capped chickadee			1		3	4
mountain chickadee	1		2	2	2	7

TABLE 1 Continued.

Specie	Number of Sightings					
	Transect 1	Transect 2	Transect 3	Transect 4	Transect 5	Total
boreal chickadee					1	1
dipper	3		5			8
winter wren			3	6	2	11
robin	15	37	18	33	7	110
varied thrush			2	1		3
hermit thrush	1	2	3	4	3	13
Swainson's thrush			1	1		2
bluebird	5	1		4		10
Townsend's solitaire	1	3		2	3	9
ruby-crowned kinglet	1					1
Tennessee warbler				3		3
orange-crowned warbler			2			2
Audubon's warbler	4	10	35	7	3	59
Townsend's warbler					1	1
northern waterthrush			3			3
MacGillivray's warbler		2				2
Wilson's warbler	1	4	5	4		14
brown-headed cowbird	1					1
pine siskin	53	107	58	24	137	379
Oregon junco	30	41	18	27	6	122
chipping sparrow	7	8	6	11	5	37
white-crowned sparrow	3	5				8
golden-crowned sparrow				2		2
fox sparrow		1				1
slate-coloured junco				1	1	2
Total sightings	150	265	220	172	206	1014
Total species	21	19	24	23	17	47

TABLE 2. Number of Bird Sightings per Habitat Type

	Middle Burn	Pristine Forest	Unburned Pocket	Burn/Pocket Edge	Pristine Forest Edge	Burn Edge	Aquatic Habitat In Burn	Aquatic Habitat Out of Burn	Total
mallard							1	19	20
Barrow's goldeneye							1	23	24
common merganser							1		1
Accipiter					1				1
goshawk						1			1
red-tailed hawk	3		1						4
kestrel	19				4	4			27
osprey									
blue grouse					2	1			3
spotted sandpiper							11	4	15
rufous hummingbird			2	1					3
calliope hummingbird	1								1
red-shafted flicker	9	1		1					11
piliated woodpecker	1					1			2
northern three-toed woodpecker	4	1	3	5		3			16
belted kingfisher							1		1
Empidonax flycatcher			1						1
olive-sided flycatcher	4	1	1	3	5	5			19
cliff swallow							3		3
gray jay		5			8				13
Clarke's nutcracker	49		1	5	2	2			59
common raven	6					1			7
black-capped chickadee		6			2				8
mountain chickadee		4	2						6
boreal chickadee					1				1
dipper							3	4	7
winter wren	1	3	4	1	7				16
robin	62	16	17	13	5	3			116
varied thrush		2	1						3

TABLE 2 ntinued

	Middle Burn	Pristine Forest	Unburned Pocket	Burn/Pocket Edge	Pristine Forest Edge	Burn Edge	Aquatic Habitat In Burn	Aquatic Habitat Out of Burn	Total
hermit thrush		5	7	2	4				18
Swainson's thrush		3							3
mountain bluebird	10								10
Townsend's solitaire	6				1	2			9
ruby-crowned kinglet			1						1
Tennessee warbler	1		2		1				4
orange-crowned warbler		2							2
Audubon's warbler	4	30	8	8	3	1			54
Townsend's warbler		1							1
northern waterthrush								3	3
MacGillivray's warbler	1			1					2
Wilson's warbler			12	1	2				15
brown-headed cowbird	1								1
pine siskin	252	127	13	17	18	4			431
Oregon junco	43	8	10	46	7	10			124
chipping sparrow	11	8	3	10	4	3			39
white-crowned sparrow				7					7
golden-crowned sparrow			2						2
fox sparrow			1						1
slate-coloured junco	1					1			2
red-breasted nuthatch		1							1
Total sightings	493	224	92	121	77	42	22	53	1124
Total species	22	18	20	17	18	15	7	5	49

TABLE 3. Simple Behaviour Categories

Species	Flying	Perched	Feeding	Foraging	Singing	Calling	Hawking
Accipiter	1						
goshawk		1					
red-tailed hawk	4						
Kestrel	18	2	3			2	
blue grouse	2			1			
spotted sandpiper	1			5		6	
rufous hummingbird	1	1					
calliope hummingbird			1				
red-shafted flicker	8		1	2			
piliated woodpecker			2				
northern three-toed woodpecker	2		11				
belted kingfisher	1						
olive-sided flycatcher	1			1	10	5	3
cliff swallow			3				
gray jay	7	1		3			
Clarke's nutcracker	41	2	1	15		4	
common raven	7						
black-capped chickadee				8			
mountain chickadee				1	4		
boreal chickadee							1
dipper	3		4				
winter wren				12		6	
robin	30	19	7	38	20	3	
varied thrush	1	1		2			

TABLE Continued.

Specie	Flying	Perched	Feeding	Foraging	Singing	Calling	Hawking
hermit thrush	1			3	13	1	
Swainson's thrush				4			
bluebird	2	2	3	1	1		1
Townsend's solitaire	2	3		1	2		1
ruby-crowned kinglet							1
Tennessee warbler				1			3
orange-crowned warbler	2						
Audubon's warbler	3	1		28	3		23
Townsend's warbler					1		
northern water thrush						3	
MacGillivray's warbler		1				1	
Wilson's warbler	1			9		2	3
brown-headed cowbirds		1					
pine siskin	317	9	66	10	10	1	
Oregon junco	14	6	11	61	10	16	7
chipping sparrow	3	3	4	11	8	8	3
white-crowned sparrow				7		1	
golden-crowned sparrow				2			
fox sparrow						1	
slate coloured junco				2			
red-breasted nuthatch			1				
grosbeak (Sp?)		2					
Total	470	55	114	228	82	69	46

TABLE 4. Foraging Categories

	Burned Habitat				Unburned Habitat				
	Ground Level	Fallen Logs	Large Conifer	Small Conifer	Ground Level	Fallen Logs	Large Conifer	Small Conifer	Shrubs
Oregon junco	23	28	3		5		1	5	
robin	29				9				
Audubon's warbler		3	1	2			13	12	
Clarke's nutcracker	17								
winter wren	1							1	14
chipping sparrow	5	2		1			3		
Wilson's warbler			1					5	5
black-capped chickadee								8	
white-crowned sparrow		5	1				1		
Totals	75	38	6	3	14		18	31	19
%	61.4	31	4.9	2.45	17	0	21.9	37.8	23.1

SCIENTIFIC NAMES OF SPECIES REFERRED TO

mallard	*Anas platyrhynchos*
Barrow's goldeneye	*Bucephala islandica*
common merganser	*Mergus merganser*
goshawk	*Accipiter gentilis*
red-tailed hawk	*Buteo jamaicensus*
Kestrel	*Falco spavarius*
osprey	*Pandion haliaetus*
blue grouse	*Dendragapus obsurus*
spotted sandpiper	*Actitis macularia*
rufous hummingbird	*Selasphorus rufus*
calliope hummingbird	*Stellula calliope*
red-shafted flicker	*Colaptes cafer*
piliated woodpecker	*Dryocopus pileatus*
northern three-toed woodpecker	*Picoides tridactylus*
belted kingfisher	*Megaceryle alcyon*
olive-sided flycatcher	*Nuttallornia borealis*
cliff swallow	*Petrochelidon pyrrhonota*
gray jay	*Perisorens canadensis*
Clarke's nutcracker	*Nucifraga columbiana*
raven	*Corvus corax*
black-capped chickadee	*Parus atricapillus*
mountain chickadee	*Parus gambeli*
boreal chickadee	*Parus hudsonicus*
dipper	*Cinclus mexicanus*
winter wren	*Troglodytes troylodytes*
robin	*Turdus migratorius*
varied thrush	*Ixoreus naevins*
hermit thrush	*Hylocichla guttata*
Swainson's thrush	*Hylocichla ustulafa*
mountain blue bird	*Sialia currocoides*
Townsend's solitaire	*Myadestes townsendi*
rube-crowned kinglet	*Regulus calendula*

Tennessee warbler	*Vermivora peregrina*
orange-crowned warbler	*Vermivora celata*
Audubon's warbler	*Dendroica audubonì*
Townsend's warbler	*Dendroica townsendi*
northern waterthrush	*Seiurus noveboracensis*
MacGillivray's warbler	*Oporornis tolmiei*
Wilson's warbler	*Wilsonia pusilla*
brown headed cowbird	*Molothrus ater*
pine siskin	*Spinus pinus*
Oregon junco	*Junco oreganus*
chipping sparrow	*Spizella passerina*
white crowned sparrow	*Zonotrichia leucophrys*
golden crowned sparrow	*Zonotrichia atricapilla*
fox sparrow	*Passerella iliaca*
slate-coloured junco	*Junco hyemalis*
red-breasted nuthatch	*Sitta canadensis*

Figure 1. Percentage distribution of total specie sightings.

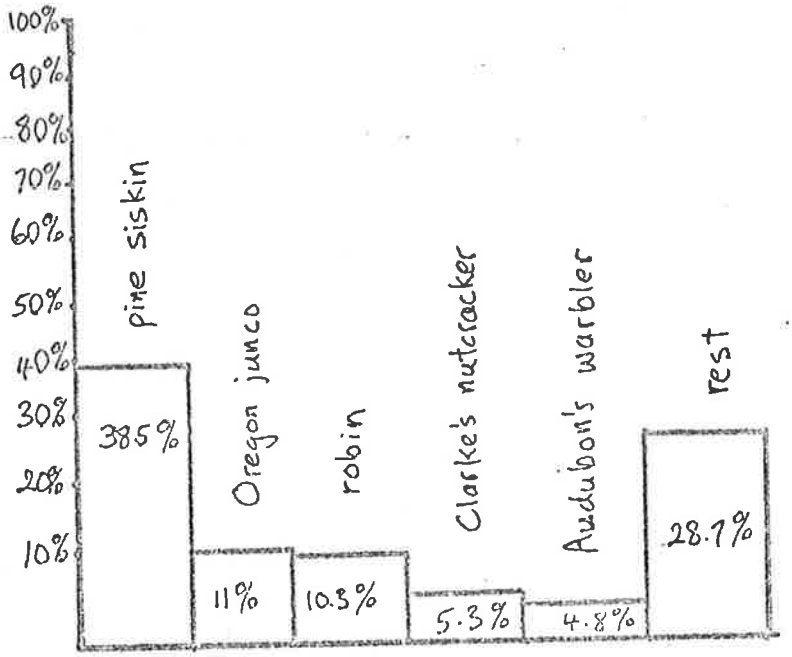


Figure 2. Pecentage distribution of middk burn specie sightings.

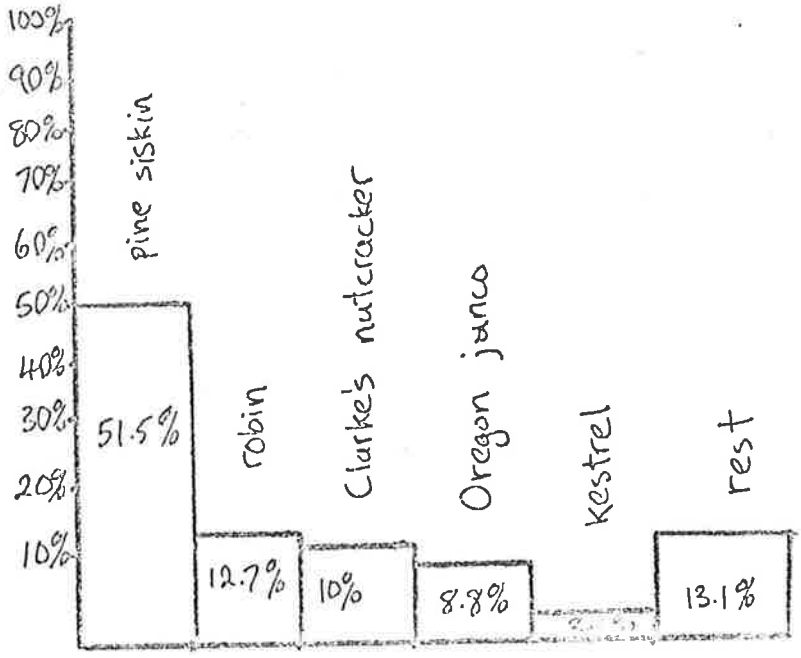


Figure 3. Percentage distribution of pristine forest specie sightings.

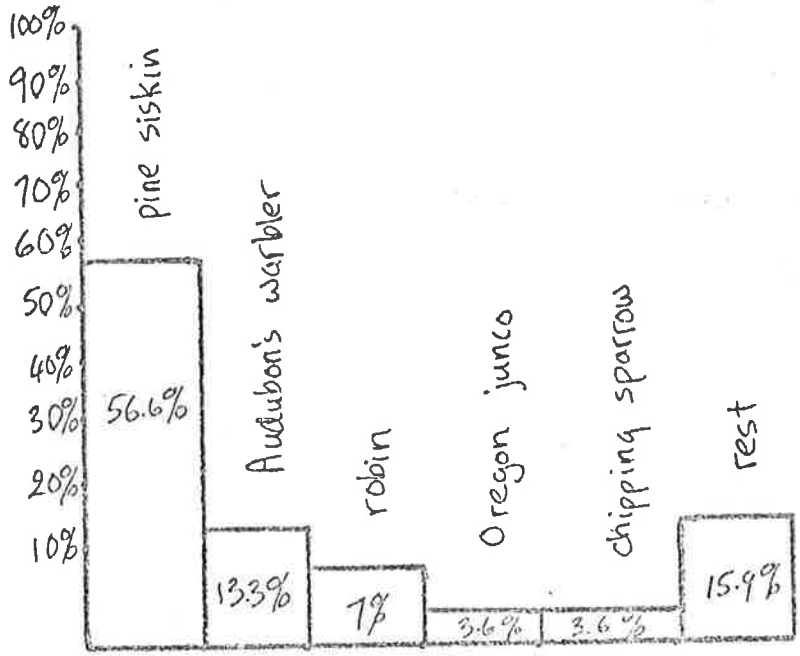
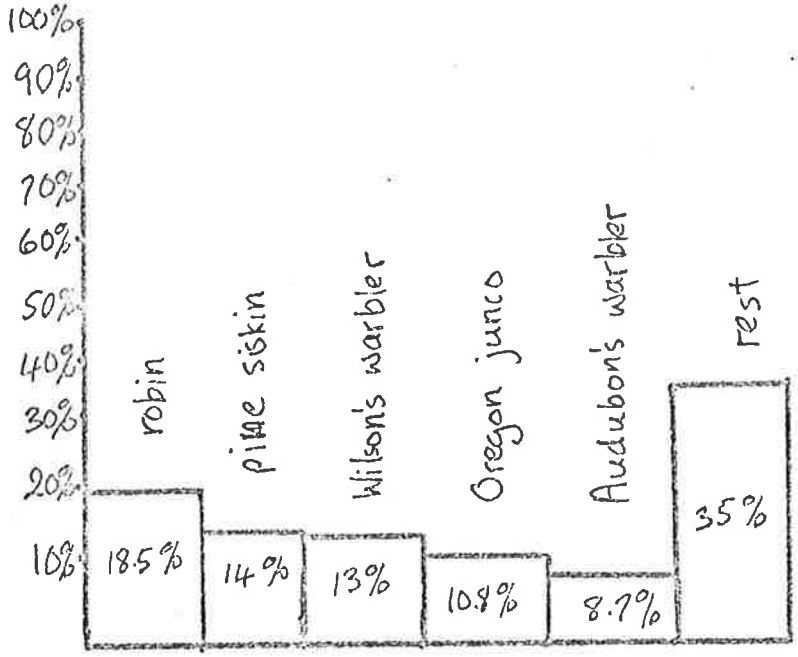


Figure 4. Percentage distribution of unburned pocket specie sightings.



'gure 5. Percentage distribution of pristine forest edge specie sightings.

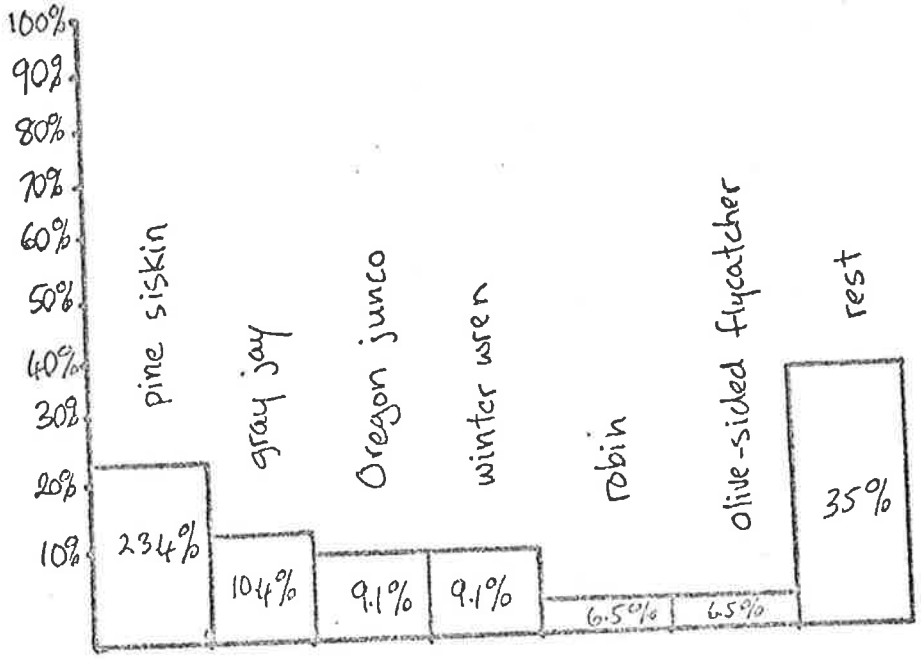


Figure 6. Percentage distribution of burn/pocket edge specie sightings

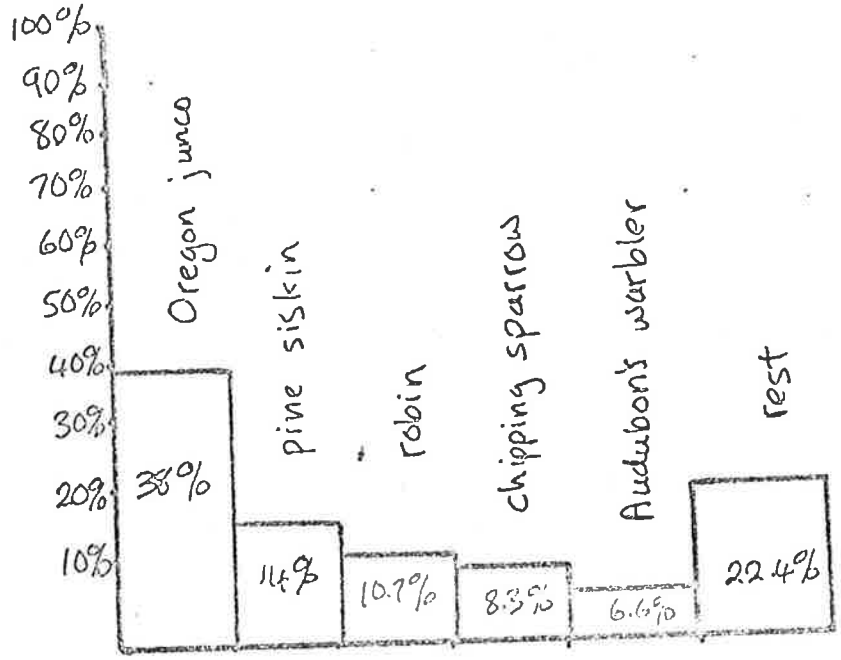
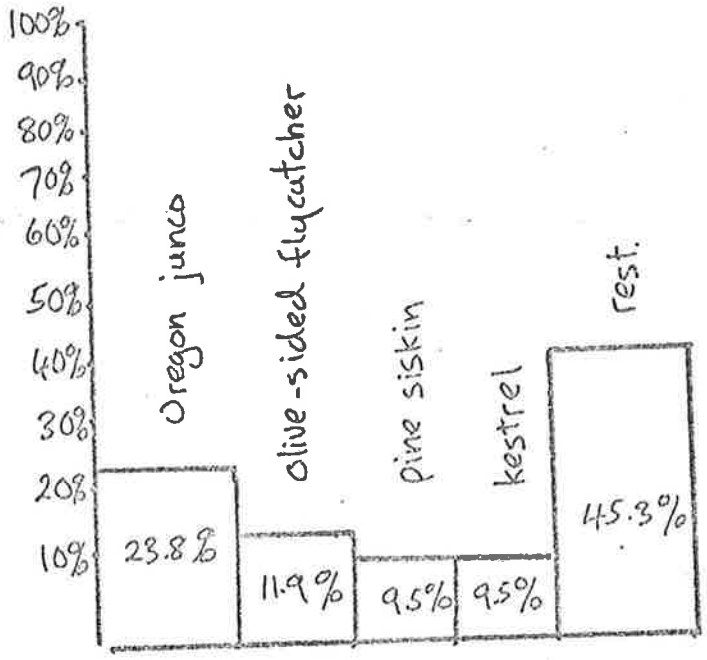


Figure 7. Percentage distribution of Burn edge species sightings.



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