

A STUDY OF
THE BIRDS OF REESE'S BOG
by
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A report of an original field study
conducted as a requirement for Advanced
Zoological Studies (Zoology 231) at the
University of Michigan Biological
Station, Cheboygan, Michigan.

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Preface

The study of Reese's Bog was embarked upon at the suggestion of Dr. S. Charles Kendeigh as a requirement for Advanced Zoological Studies at the University of Michigan Biological Station, Cheboygan, Michigan, during the months of June, July, 1946. Many thanks are due to Dr. Kendeigh for aid in the study and in preparation of this report, and persuading me that mosquitos were worse elsewhere. Dr. Theodora Nelson has given me a number of valuable morsels of information, Dr. Josselyn Van Tyne has answered in detail several questions put to him, Dr. William Steere has identified the mosses on the Wood-Thrush nest, and to these people I am very grateful. My great botanical ignorance has been compensated for by the willing, indispensable aid of Oscar Root in making tree counts, and describing the vegetation. This has been supplemented by Dr. Frank C. Gates who has given me much information about the history and development of the bog.

Refers
to what?
T.N.

Introduction

Location - Reese's Bog is located in Row 3 west T36 North, sections 3 and 4, in the Northern part of Burt township, Cheboygan County, Michigan. Map I indicates the area studied, and Map II is an enlargement.

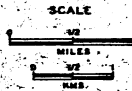
History - From a thin scattering of records in the past thirty years, it is clear that few people have ventured into Reese's Bog for more than a brief interval. Then, in 1939, the mosquitos were temporarily overcome. Wilcox and Brunson (1939) succeeded in withstanding them, and made a survey of the bog birds east of the road to Burt Lake. Laying emphasis on lake shore to forest succession, their data on the bog proper is meagre. Wilcox returned in 1946 and continued this study. But Root in the following year (1941) made the most extensive survey yet, of all the important bogs of Cheboygan County. His data was in the form of individuals seen and indicate only relative frequency, and the exact locations of the birds were not recorded.

For the sake of completeness, six species recorded in the bog previously, but not found this year, should be mentioned. Blanchard and Nelson (1946) list the Evening Grosbeak (2 July 18, 1924 seen by Blanchard), which could either be nesting or wandering; the Magnolia Warbler which is recorded as occurring regularly in the bog forests but infrequently observed; the Yellow-bellied Flycatcher, August 9, 1921,

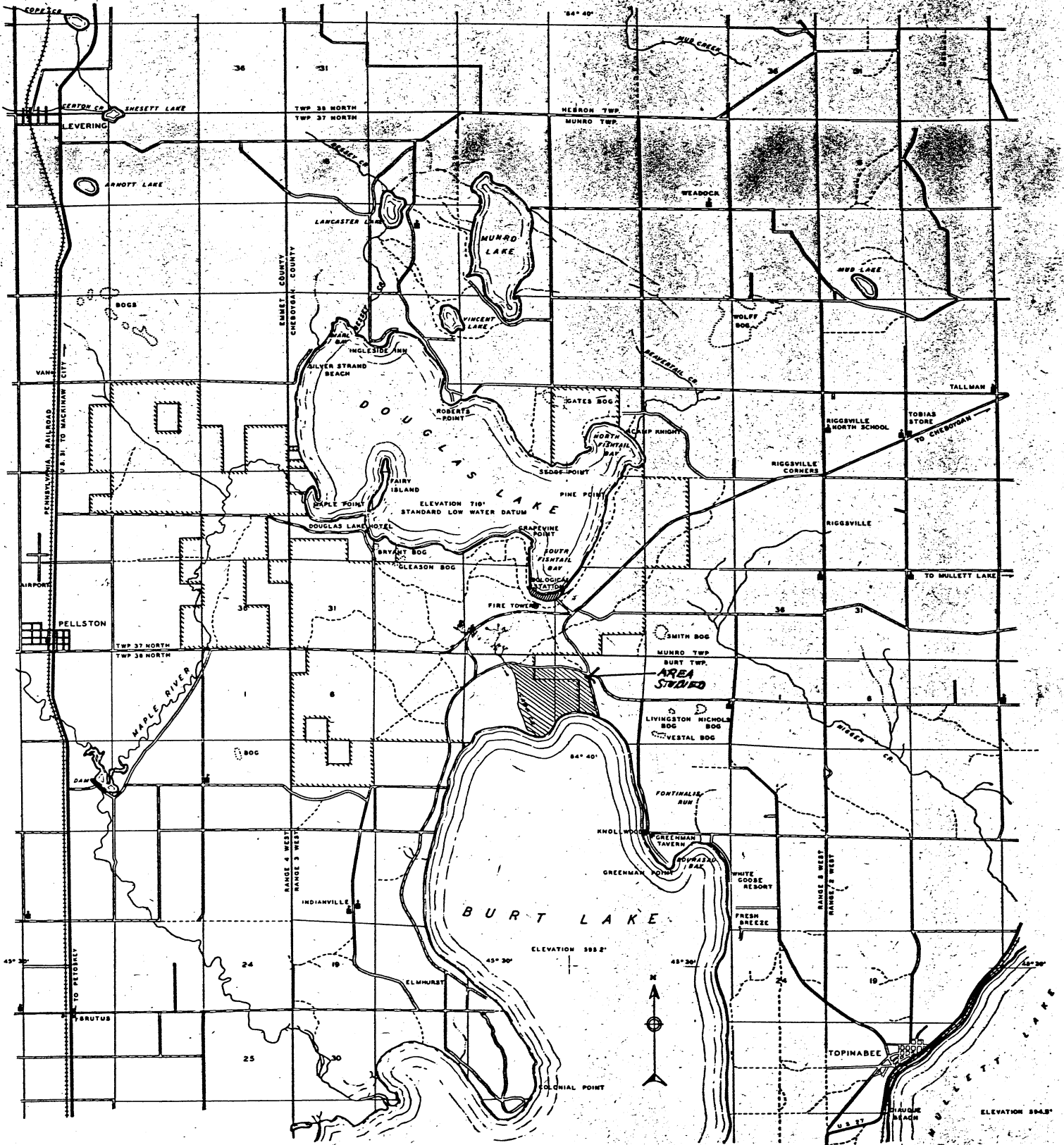
VICINITY OF
**UNIVERSITY OF MICHIGAN BIOLOGICAL STATION
 AND DEMONSTRATION FOREST**
 CHEBOYGAN AND EMMET COUNTIES, MICH.

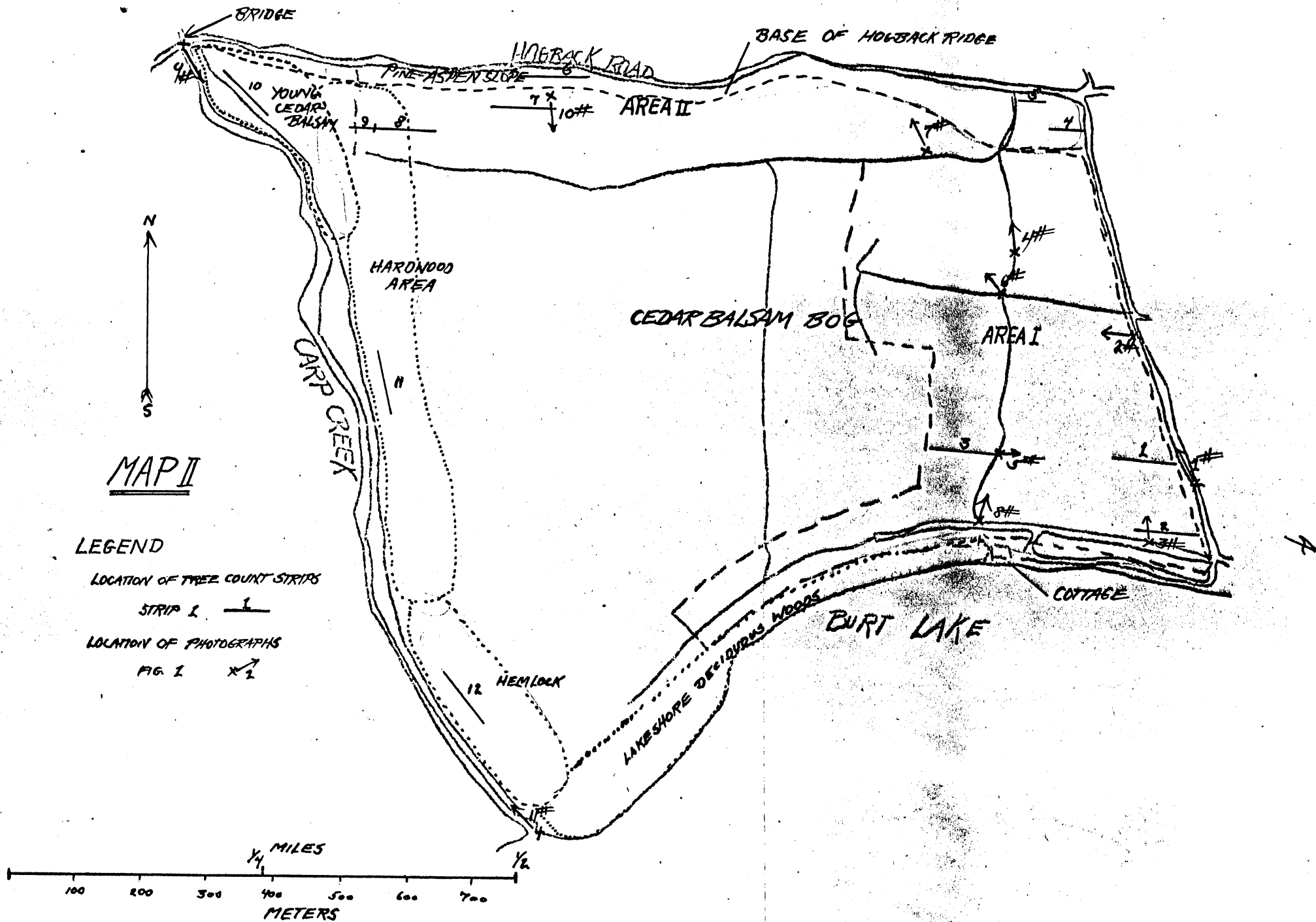
MAP I

LEGEND
 CHURCH
 SCHOOLHOUSE
 BOUNDARY OF UNIV. LANDS
 RAILROAD



LEGEND
 PAVED HIGHWAY
 GRAVELLED ROAD
 GRADED ROAD
 UNIMPROVED ROAD
 TRUCK TRAIL





collected by Fortner is most probably a migrant; the Osprey nested along Carp Creek 1921-31, 35; the Connecticut Warbler (2) was found July 12, 1921 by Fortner, and this could easily have been nesting; the date is too early for migrants; the Waterthrush was found by Wilcox and Brunson (1939) and possibly also by Root (1941). Aside from these six species all summer birds recorded in previous years in the bog proper were found in June and July, 1946.

*found in a tree
 (leafy) collected
 (I think) near
 bog in the
 same corner
 M. H. S. N.*

Methods - The entire bog covers about 450 acres; that part studied includes about 300 acres (See Map I). Two areas were studied intensively: I - A 69-acre plot of white cedar and balsam chiefly: the bog proper, II - A 33-acre plot of bog which has been partially lumbered, chiefly in the last 3 - 5 years, and contains many aspens. These two areas are indicated on Map II. The sizes of these plots were determined from an aerial photograph by means of a planimeter.

Of approximately 75 hours, June 23 to July 25 inclusive, 71% of the time was in active census work, the remainder of the time being devoted to botany, trail marking, photography, exploring and looking for nests which weren't found (e.g. Parula Warbler). The existing trails were marked with index cards every 50 meters by either of two methods: over the rough territory, where walking was difficult a Keuffal and Esser 50 meter tape was used; over easy walking trails, pacing was considered sufficiently accurate. On the 12 days

in which I made morning visits the times varied between 2:30 A.M. and 11:30 A.M., and averaged 5 hours per trip, the usual interval being 4:30 - 9:30 A.M. On 6 days afternoon trips were made between 1:30 - 5:30 P.M., averaging about 2 hours. Two evening trips were made, June 29 and July 12, between 9:15 and 12:00 P.M. for owls, but none were heard.

On a given day I would go first to one area then the other, the first area covered being alternated every day. I went chiefly along the trails marked on Map II, but frequently went off them to better estimate the number of birds present. The position of each bird seen or heard was recorded in a pocket notebook, the notes being entered in a journal on the return to camp, ^{and then plotted.} Often it was necessary to estimate the distance a bird was believed to be from the road or trail.

Almost all species have been plotted on the maps at the end of the report. The purpose of this plotting is twofold: (1) to aid in determining the estimate of the population, and (2) to give the localities and dates when the birds were observed. The encircling lines are intended merely to indicate what marks are believed to represent the same birds and are not intended to show boundaries of territories, although in some cases they do so approximately.

Discussion - The errors involved in this work are considerable for certain species and practically non-existent for others. Some of these are inherent in census taking itself while

others can be improved upon. In the first place, the work was begun very late in the season; it should have been started around June 1. The effect of this late beginning is twofold: first, singing is increasingly more erratic and less frequent, the later the season, and secondly, juvenal birds appear and wander out of the established territories and out of the area altogether. Another added source of inaccuracy was the fact that the area covered was too large considering the difficulty of getting through the bog, and the limited time at my disposal. Other sources of error are not inherent in this particular situation: in some species it is questionable whether just the male sings. In most such cases no diagnostic field character exists whereby the sexes may be separated. Examples are the Least and Crested Flycatchers (if these have songs!), the Winter Wren, Wood and Hermit Thrushes, Robin, Blue-headed and Red-eyed Vireos. Furthermore, unmated males may be singing. Another more important difficulty lies in the fact that while a bird's nest may be in a certain area its territory may extend for a considerable distance outside.

Because of these sources of error each estimate of the number of pairs per 100 acres has to be custom-tailored to fit the known habits and idiosyncrasies of the individual species. Herein lies what has been called the human factor: judgement must be exercised, and often the adjustment is quite crude. I do not feel, however, that I have overestimated

the population. Rather, in many cases the figure seems too small.

The conditions of observation were good. Practically every day was clear, sunny, and lighting conditions excellent. Only in a few instances early in the morning was it cold enough for fog to form on binoculars.

Future Work - That this work needs to be continued is obvious, but there are a number of improvements which should be made in the method of censusing, and the areas chosen. Firstly, the census taker should arrive ^{around} ~~in the vicinity~~ by June 1. Secondly, at least two 25 acre plots should be marked off in the center of the bog free from edge effect. A grid of string would be easy to set up and convenient to use; tree blazing would be difficult because of the denseness of the woods and difficulty of retracing routes. Thirdly, the individual should have plenty of time available.

Area I - The essential botanical facts are that the area is fairly homogenous, coniferous, wet with few deciduous trees, and little plant life on the ground, to which ^{direct sun -} light hardly penetrates. Vertically the trees average 50 - 55 feet. The edge effect consists chiefly of allowing birds a certain amount of openness if their habits warrant it: botanically there are few plants characteristic of edge, for the area is bounded by roads and trails on both sides of which is more bog, for the most part. Along the northern edge, a few birds seem to inhabit the bog chiefly because nearby there is Area II which has many

aspens which are also scattered thinly through Area I in this part. Examples are the Crested Flycatcher and Scarlet Tanager. Other unusual or unexpectedly numerous birds, the Least Flycatcher, Wood Thrush, Ruby-crowned Kinglet, Blue-headed and Red-eyed Vireos, Blackburnian Warbler, and white-throated Sparrow are discussed in the annotated list.

Area II - The essential botanical facts significant ornithologically are threefold: (1) the area is a narrow strip of cut-over bog, which (2) has a 3 - 5 year old bushy aspen growth in it, and (3) is bordered by a pine-aspen ridge on the north and the uncut bog on the south. Thus it is in essence, a strip of edge, and has a mixture of both the birds peculiar to the bog and many found almost wholly in the pine-aspens and the deciduous trees to the north. Examples of non-bog birds recorded here are the Scarlet Tanager, ~~White-throated Sparrow~~, ^{This is as} ^{very nesting in this} ^{region. T.N.} Crested Flycatcher, Wood Pewee, Red-eyed Vireo, Baltimore Oriole, Slate-colored Junco and Mourning Warbler. ^{Found in} ^{cut over} ^{areas} ^{T.N.} Some of these: the ~~White-throated Sparrow~~ and Mourning Warbler prefer these cut-over bushy areas to anything else. Some bog birds on the other hand were not found at all in Area II, or else very little: the Golden-crowned Kinglet, Red-breasted Nuthatch and Blackburnian Warbler. Others, such as the Winter Wren seemed to be able to tolerate the change with no loss in numbers.

Kendeigh (1945) describes 4 factors in community selection by birds which he considers as important in determining whether

a given species shall inhabit a deciduous or coniferous forest. These are (1) conifers are evergreen and cast dark shadows continually, (2) food requirements of the species, (3) ground: needle leaves rot slowly, form compact layers, and have fewer insects than broad leaved ground cover, (4) leaf form and arrangement: a Magnolia Warbler for example, has, he believes, a "stereotyped behavior pattern (which) appears to limit the Magnolia to building a nest that requires interlocking leaves or twigs of a conifer to hold it in place, and only rarely permits it to anchor the nest in a vertical fork as a Redstart regularly does." I would like to suggest a fifth possible factor. There is a difference in brittleness and flexibility of trees which may be significant. In a breeze the branches of a maple, for example, swing much more extensively and violently than do those of a conifer, and if a bird prefers to remain continually hidden from light in a deciduous woodland he often cannot do it ^{so} as easily as he can in a coniferous forest. And if we suppose that birds vary in their desire for stability when singing or perching this could easily be a deciding factor. A deciduous tree, then, seems to be more risky business, perhaps requiring special nesting techniques. These would of course, all be points which would prevent a bird from going to nest outside a coniferous forest. But the reverse might also be true: a bird used to the wavy motion of a deciduous tree might feel peculiar if he was in a more serene environment, much as a sailor long at sea will feel

peculiar when first on land. These are speculations, perhaps wild, but their subtlety is no reason for abandoning them. Anyone who has watched birds feeding in a deciduous tree on a windy day will realize how much more difficult feeding is there than in most conifers. Another point of evolutionary significance is that brittle trees are more likely to topple over and the nest destroyed. As long as we are in the realm of fancy, consider the matter of noise. Birds are keen eared and some may perhaps prefer the whistling of pines to the swishing sound of a broad leafed tree. I know I do.

Now these points are concerned only with conifers versus deciduous trees. But there are other factors dependant upon the local situation. Exposure, whether the woodland is on a hilltop or ^{in a} gorge is important. The overall climatic factors, and the geography of the neighborhood outside the area are significant. What other species are present may be important limiting factors. The suggestion that the Red-eyed Vireo may not tolerate a Blue-headed's presence has been advanced as the reason for the limiting of the Blue-headed to conifers.

*Are Blue-headed
Vireos limited to
Conifers?*

Specifically Reese's Bog is partly sheltered by a ridge to the north. Burt Lake gives it an open southern exposure. Lowther (1944) has studied vertical distribution of birds, and supposes that while horizontal distribution of birds is governed by physiological activities, the vertical distribution is governed by psychical activities. Just what he means by this distinction is obscure, but different species certainly have different preferred elevations.

It is worthwhile comparing the total populations of the two areas discussed.

Area I contains 103 pairs, which with individual species adjustment leads to 149 pairs per 100 acres. 103 pairs with no adjustment would lead to 164 pairs per 100 acres. From this it seems clear that I have on the whole "adjusted" down, and that the total estimate may well be below what it should be. The same is true for Area II which has 63 pairs, leading, with adjustment, to 164 pairs per 100 acres, but with no adjustment to 190 pairs per 100 acres. I would not be in the least surprised if the no adjustment figures were somewhat nearer the truth than the adjusted ones. One thing seems definite, however. There seem to be more birds in the cut-over area, than in the bog proper. This can easily be explained by the fact that Area II is largely a mixture of habitats, with much more ground cover than Area I. I have searched for similar cedar-bog breeding bird censuses, but have found nothing strictly comparable, and I do not feel that the comparison, once made, would be significant because of the inaccuracies involved. However, a few general statements can be made. A relatively large number of species are found ^{in the bog,} but the total population is not unusually high. There are more species than in any aspen community and more individuals; but probably there are fewer individuals than a mature Beech-maple-hemlock forest.

Oak-hickory probably
higher.

Table I - Area I Population

	No. of pairs	No. of pairs/100 acres
+Black-throated Green Warbler	12	18
Golden-crowned Kinglet	11 16	17 15
Blackburnian Warbler	8 9	12 13
+Black-capped Chickadee	7 6	10 9
Winter Wren	7	10
+Parula Warbler	7	10
+Myrtle Warbler	7	10
+Nashville Warbler	6	9
Black-and-white Warbler	5	7
+Robin	5	7
+Blue-headed Vireo	5 4	7 6
+Purple Finch	3	4
+Oven-bird	3	4
+Red-breasted Nuthatch	3	4
+Blue Jay	2	3
Wood Thrush	2	2
+Hairy Woodpecker	1	2
+Crested Flycatcher	1	2
+Least Flycatcher	1	2
+Red-eyed Vireo	1	2
Scarlet Tanager	1	2
+Brown Creeper	1	2
+White-throated Sparrow	1	1
+Ruby-crowned Kinglet	1	1
+Ruffed Grouse	1	1
+Great Horned Owl	<u>1</u>	<u>1</u>
25 species	103 pairs	149 pairs/100 acres 140

Table II - Area II Population

	No. of pairs	No. of pairs/100 acres
Black-and-white Warbler	54	15 13
Nashville Warbler	53	15 10
Oven-bird	43	12 10
Winter Wren	4	13
Scarlet Tanager	43+	10
Parula Warbler	32	9 7
White-throated Sparrow	3	9 10
Robin	2	7
Black-throated Blue Warbler	20	7 5
Black-capped Chickadee	21	8 5
Blue-headed Vireo	21	6 3
Wood Pewee	21	6 3
Red-eyed Vireo	21	6 3
Crested Flycatcher	1	4 3
Mourning Dove <i>Warbler</i>	21	4 3
Purple Finch	21	3
Blue Jay	21	3
Myrtle Warbler	1	3
Hairy Woodpecker	1	3
Red-breasted Nuthatch	3+	3 1
Black-throated Green Warbler	1	3
Slate-colored Junco	1	3
Flicker	2	2 8
Yellow-bellied Sapsucker	21	2 3
Canada Warbler	21	2 3
Baltimore Oriole	1	2
Mourning Dove	1	2 3
Golden-crowned Kinglet	1	2
Downy Woodpecker	1+	1
Brown Creeper	1	1
30 species	63	164

Hummingbird
Woodpecker

139

TABLE III
RESULTS OF
TREE COUNTS
JULY 14, 1946

SPECIES	Area I - 100 meters		Area I - 100 meters		Area I - 100 meters		Young Spruce Area 45 meters		Pine Grove, 60 meters		Pine - Spruce slope 100 meters		Area II - 100 meters		Hardwood Area 100 meters		Hardwood Area 100 meters		Cedar - Balsam Area 100 meters		Red Maple Area 60 meters		Hemlock Grove	
	1	% Total	2	% Total	3	% Total	4	% Total	5	% Total	6	% Total	7	% Total	8	% Total	9	% Total	10	% Total	11	% Total	12	% Total
THUJA OCCIDENTALIS	53	53	39	36	32	54						1		2		2		93				1		
ABIES BALSAMICA	43	42	46	42	14	24	1				3		1		4		6		67		2		1	
ACER RUBRUM	8	7	3	3			12		2			13		4							45	64	4	
PICEA CANADENSIS			7	6	10	17	1							16	22	4		4			7		2	
FRAXINUS NYRA			1	1			1											4						
BETULA PAPERIFERA			11	10	2	34					5		5		1			1			4			
PIEA MARIANA					1	17																		
POPULUS GRANDIDENTA							58	48			16		101	72										
ALNUS INCANA							8												12					
POPULUS TREMULOIDES							38	32							11		1					4		
ULMUS AMERICANA							1																	
PINUS STROBUS							1				1													
CORNUS STOLONIFERA							1										3					1		
PINUS RESINOSA									12		17													
PRUNUS PENNSYLVANICUM											1				1									
QUERCUS BOREALIS													1									3		
ACER SPICATUM													12		19	26	4							
FRAXINUS AMERICANA													6		13	18	5							
RHUS GLABRA v. BOREALIS													1											
ACER SACCHARUM													1		1		2							
" PENNSYLVANICUM															1									
TAXUS CANADENSIS															1				1			18		21
TSUGA CANADENSIS															1				178		70		30	70
	104		110		59		122		14		43		141		74		37		178		70		30	70

15

TABLE IV

Larix Association. Ecology Class
Cheboygan-Levering Rd n of Mud Lake
July 16, 1946

Thuja Association N. from cottage Rd head of
Burt Lake. July 19, 1946

TREES in 3 2M lanes = 600 sq. meters.

TREE totals in about 300 sq. meters	
*Amelanchier canadensis	1
*Betula glandulifera	34
*Cornus stolonifera	209
Larix laricina	117
*Lonicera oblongifolia	27
Picea mariana	5
Prunus pennsylvanica	1
*Rhamnus alnifolia	1
*Rubus strigosus	1
Salix bebbiana	2
*Salix candida	5
*Salix discolor x bebbiana	1
Thuja occidentalis	9
* = shrubs	

GROUND PLANTS in 15 quadrats

	FI
Aster novae-angliae	40
Betula glandulifera	47
Calamagrostis canadensis	34
Caltha palustris	40
Campanula aparinoides	13
Chamaedaphne calyculata	54
Clintonia borealis	
Cornus canadensis	10
Cornus stolonifera	51
Carex trisperma	34
Epilobium angustifolium	13
Fragaria virginiana	47
Galium triflorum	17
" triflorum	10
Kalmia polifolia	20
Larix laricina	27
Ledum groenlandicum	34
Lonicera oblongifolia	7
Maianthemum canadense	71
Melampyrum lineare	13
Mitella nuda	34
Moss cover	60
Osmunda regalis	54
Potentilla palustris	13
Pirola chlorantha	13
Rubus triflorus	94
Solidago uliginosa	13
Thalictrum dasycarpum	60
Trientalis americana	7
Vaccinium canadense	7
" macrocarpon	13
Viola pallens	27
Valeriana uliginosa	near
Salix bebbiana 8M high	5cm

	0-2.5	2.5-5	5-10	10-15	15-20	20-25	25-30	30-35	35-50cm	
Abies balsamea	1	5	2	6	3	1	1	↑		19
Acer rubrum	-	1	3	2	-	-	-	-		6
Betula papyrifera	1	-	6	8	3	2	-	-		20
Fraxinus nigra	-	1	-	-	-	-	-	-		1
Picea glauca (CANADENSIS)	-	1	-	-	-	-	-	-		4
Picea mariana	-	-	7	4	5	-	-	-		16
Pinus strobus	-	-	1	-	-	-	-	-		1
Populus tremuloides	1	-	1	-	-	1	3	1		7
Prunus virginiana	1	-	-	-	-	-	-	-		1
Taxus c.	2	-	-	-	-	-	-	-		2
Thuja occidentalis	3	13	29	56	10	15	5	2	1	199

GROUND PLANTS in 30 quadrats (3 lanes of 10)

	not the frequency index!	Occurrences (number)
Abies balsamea	11 (89)	Mossy logs 3 (5330 sq cm)
Acer rubrum	12 (112)	Moss & Lichen 5 (335 sq cm)
" spicatum	6 (20)	Phlegopteris dryopteris 1 (3)
Anemone canadensis	1 (1)	Picea mariana 6 (14)
Aster hirsuticaulis	1 (1)	Polygala paucifolia 3 (30)
" laevis	1 (3)	Populus tremuloides 1 (3)
" macrophyllum	1 (1)	Prunella vulgaris 1 (1)
" novae-angliae	1 (2)	Pteris aquilina 1 (1)
Betula papyrifera	5 (11)	Pirola secunda 2 (3)
Betula virginiana	3 (4)	Rhamnus alnifolia 1 (3)
Carex sp	4 (36)	Rubus triflorus 2 (7)
Chicogonea hispida	3 (36)	Smilacina stellata 2 (8)
Clintonia borealis	8 (22)	Sphagnum sp. 1 (103)
Coptis trifolia	15 (128)	Solidago sp 1 (3)
Cornus canadensis	2 (30)	Taxus canadensis 9 (49)
" ovalifera	1 (4)	Thuja occidentalis 11 (45)
Debris 2 (12 pieces)		Trientalis americana 3 (7)
Epipactis ophioides	1 (3)	Uvularia grandiflora 1 (2)
Eupatorium p. maculatum	1 (7)	Vaccinium pennsylvanicum 1 (4)
Fragaria virginiana	1 (1)	Viola pallens 8 (63)
Fraxinus nigra	4 (6)	Heavy needle cover 2
Galium triflorum	2 (5)	
Gaultheria procumbens	3 (23)	RING COUNTS STUMPS FRESH 1946
Habeneria obtusata	1 (2)	Picea mariana 19cm 65.
Lichen 3 (36cm ²)		Populus tremuloides 25cm 58.
Liverwort 1 (30 sq. cm)		30cm 60, 32cm 43, 34cm 65,
Linnaea borealis	4 (35)	33cm 63, 37cm 53, 34cm 60,
Lysichiton obscurus	1 (1)	24cm 64, 25cm 43, 35cm 61
Maianthemum canadense	4 (8)	Thuja occidentalis
Mitella nuda	14 (250)	17cm 38, 22cm 50, 21cm 58,
Mitchella repens	3 (18)	17cm 52,
Moneses uniflora	2 (15)	
Marchantia polymorpha	1 (9)	
Moss 18 (18343 sq cm)		

Clark, DeBrine, Hofslund,
Kugel, Loveland,
McAlpin, Pangburn.

Botany

Botanical information was obtained from two sources. Firstly, tree counts were made with the indispensable help of Oscar ^{M.}Root. The results of these counts are tabulated in Table III. Secondly, Dr. Frank C. Gates has kindly given me information about the history and development of the bog, and dates collected by the Plant Ecology class of 1946. The nomenclature of plants used is that of Gray (1908). The tree counts were all made July 14 in the following manner. Oscar Root walked 100 meters in the direction chosen counting all the trees which came within a meter on either side of him. I followed, recording and pacing the distance. An attempt was made to choose as typical strips as possible. Map II indicates the location of each of these strips. I shall describe the region in three parts: firstly, a general description of the whole area indicated on Map I, secondly, a description of Area I, and thirdly, Area II.

General - Very little is known of the original primeval condition of the bog. It was completely lumbered in the years 1870-72 and ^{no} ~~all~~ trees therefore cannot be older than 74 years. Aspens came up and were eventually replaced by the cedar-balsam bog of the present time. Dr. Gates states that in 1915 he could walk nowhere without getting his feet wet, but now there are many areas of dry ground. Gradually the bog is drying up and there are more hard woods than formerly. Eventually, barring human interference or acts of God, all or most of the cedars will be replaced. The

water causing the dampness comes from springs which drain Douglas Lake which is 100 feet ^{higher,} above one mile north. A certain amount of drying up in the southeast part has apparently been brought about by artificial ditches which help to drain the bog in the vicinity of the cottage on the shore of Burt Lake. The western quarter of the bog is quite different from the rest, having more hardwoods. There is a 70% Hemlock grove (Tsuga canadensis) of about 3 acres near the mouth of Carp Creek which grades gradually into ^a two-thirds Red Maple area (Acer rubrum), the other third being composed of white Spruce (Picea canadensis), birch (Betula papyrifera), Aspen (Populus tremuloides), and Oak (Quercus borealis). North of this is an area of very dense young Cedar-balsam forest, trees 20-25 feet high. To the east of this is a hardwood area, and just beyond this is the cut-over part which is Area II. The northeast corner belongs outside Area II, and consists chiefly of a mixture of both Aspens (Populus grandidenta and P. tremuloides), and a grove of Red Pines.

Area I consisted, according to the counts made, of 53% Cedar (Thuja occidentalis), 29% Balsam (Abies balsamia), 6% White Spruce (Picea canadensis), 2% Black Spruce (Picea mariana), 5% White Birch (Betula papyrifera), and 3% Red Maple (Acre rubrum). Most of these trees are about 50 - 55 feet high; a few are 60 - 65 feet (White Spruce). The southeast corner is the driest part of Area I except for the central western part which is on a slight rise of ground, The ground consists of varying quantities of rotting logs and stumps.

Lichens, liverworts, Sphagnum and other mosses are common. Pteris aquilina is scattered thinly thruout, but there is a great deal of bare ground, covered only by needle leaves. The few open spaces are filled with a variety of herbaceous plants. Just north of the cottage on Burt Lake is a large open area of about an acre, which is wet and contains a number of dead Cedar stumps, some balsam, and a small number of White Birch, and Willow (Salix sp.). There is a thin scattering of Typha, but it is not a marsh. There are a variety of sedges and grasses and other herbaceous plants.

Area II is in reality a gigantic edge, being an area of separation of the bog proper from the Pine-Aspen land to the north. Parts of this area have been lumbered in the past 3 - 5 years; some spots were lumbered much earlier, especially the westernmost part. During this time Aspens and small bushes have come up. Many of the ~~logs~~ were never removed and it is a difficult area to walk through. The northern part of this area includes the slope of Hogback ~~Ridge~~ which is covered with Red Pines (Pinus resinosa) and Aspen (Populus grandidentata^{TA}), and the ground cover is a uniform scattering of Pteris aquilina. In the cut-over area the situation is as follows: there are groups and clumps of untouched Cedars scattered along ^{THE} strip, 100 - 150 feet across. Interspersed with these are open spaces where there has been fairly extensive cutting, and a great deal of under-brush is present. Aspens are coming up in many places very thickly. In the westernmost part of this area, the situation is quite different. There is a uniform scattering of very tall Quaking Aspens (Populus

tremuloides), 60 - 75 feet high, 15 - 20 feet apart. There are also a few tall Birch (Betula Papyrifera), and scattered shorter Cedars. The count given for strip 7 is deceptive because it counts a great number of Aspens which are only 5 - 6 feet high and form a great deal of scrubby growth. The patch which includes this area is bordered on all sides except the north by Cedar and balsam. The ground is covered by many logs and a variety of herbaceous plants, Viola sp. being especially common. There is a scattering of tall stumps 15 - 40 feet high, well drilled and hacked by woodpeckers.

Annotated List

1. Loon. - Thrice recorded on Burt Lake (2 individuals); one flew over bog July 13.
2. Great Blue Heron. - Twice seen flying over bog, July 12. Colony of eight nests occupied in last three years in Aspens in the northwest corner of the bog unoccupied this year, possibly because of recent logging in vicinity.
3. Goshawk. - In the Hemlock grove in the southwestern part of the bog a nest 45 feet up in a Hemlock was found ^{JUNE 23} It was about 2½ feet across, and was composed of large branches lined with still green Hemlock bows. A number of feathers and egg shell fragments were found on the nest which were sent to Dr. Josselyn Van Tyne and he writes (July 8) that "I have compared the feathers and egg shells you sent me.... and I am quite confident they came from a Goshawk nest." On the ground was found a mandible and another bunch of feathers, apparently also belonging to a Goshawk. The following explanation seems plausible: the nest was either abandoned or one of the young fell out and was devoured on the ground by some animal, leaving only feathers and a mandible. Two other nesting records probably representing one pair (1940-41, see Porter, 1941, and Blanchard & Nelson, 1946), were in Aspens in Cedar Aspen woods near Douglas Lake.
4. Bald Eagle. - Two records: June 27, 1 immature was flushed from a large maple at the mouth of Carp Creek, and July 4, 2 adults were on Burt Lake.

5. Ruffed Grouse. - Two juvenals June 23 flushed just north of the house near the bog edge are the only ones recorded.
6. Killdeer. - One on shore of Burt Lake July 1; twice has flown over bog.
7. Spotted Sandpiper. - Several on shore of Burt Lake nesting; has frequently flown over parts of the bog.
8. Herring Gull. - One July 4 over bog.
9. Ring-billed Gull. - Between 64 and 96 on Burt Lake June 23-29, many of which flew^{EW} over the bog.
10. Common Tern. - June 27: 6 flew over the bog.
11. Mourning Dove. - The count of 4 pairs per 100 acres in the cut-over area, and none in the bog proper may be deceptive. It has been heard in the bog, but its voice carries a great distance, and it was difficult to estimate the location of the bird when heard. One nest, discovered 18 feet up in a Cedar, 5 feet from the trunk by R. T. Peterson, contained one white egg June 29; the bird flushed at 20 feet, but on July 13 a 4 foot approach was possible, and the nest then contained one downy young, and one egg.
12. Yellow-billed Cuckoo. - Heard on two occasions June 27, and July 6 to give the typical song with the retarded ending. On July 2~~4~~ and 13, Cuckoos were heard which were probably Black-bills, but the songs were atypical.
13. Great Horned Owl. - June 24 one seen by Kendeigh and others; feathers^{were} found June 29; none have been heard.
14. Whippoorwill. - One pair heard 150-200 feet southeast of Carp Creek Bridge on three occasions, June 24, 27, and July 1.

15. Night hawk. - Up to 4 at once have been seen flying over the bog, June 24 - July 13, and later. Needing more or less open ground for nesting purposes they would not be found nesting in the area.
16. Ruby-throated Hummingbird. - On July 1 one was found in the western tenth of the cut-over section of the bog within a short distance of the nest location of the Yellow-bellied Sapsucker, possibly indicating the commensalism known to occur elsewhere: the hummingbird consumes the sap which drips from holes made by the Sapsucker.
17. Belted Kingfisher. - On Burt Lake, but unrecorded within the bog.
18. Flicker. - Two nests were found in the 33-acre cut-over section, indicating about 2 pairs per 100 acres, taking into consideration the wide territory of the birds. One nest was 30 feet up in a dead stump; the other was 25 feet up in an aspen.
19. Pileated Woodpecker.* No birds ^ewere observed, but recent work was found conspicuously scattered over the bog.
20. Yellow-bellied Sapsucker.- One nest 30 ft. up in a tall aspen ⁵at the westernmost part of Area II, was discovered by Kendeigh and others, who also found another pair at the eastern end of the area. The estimated density of the bird in this area is 2 pairs per 100 acres.
21. Hairy Woodpecker.- Since it is difficult to estimate their abundance, one can only guess the number present. One was thrice found in the cedar-balsam area in the same place, and twice found in two localities in Area II, possibly indicating a density of 3 pairs per 100 acres here.
22. Downy Woodpecker.- Unrecorded from the bog proper, and but ~~one~~

twice seen in the cut-over region, this bird cannot be common.

1 pair/100 acres in the last part seems a reasonable estimate.

23. Kingbird- One pair apparently nested near the house on the shore of Burt Lake; unrecorded elsewhere. Apparently preferring open places in its method of catching insects, there wouldn't be room ~~perhaps~~ for it in the bog but the next species, also a large flycatcher is found in woods.
24. Crested Flycatcher.- 4 pairs /100 acres in the bog cut over section and only 2 pairs /100 acres in the bog proper ^{perhaps} probably indicate the relative abundance of nesting holes. One nest was discovered in a dead stump, 30 feet up in a hole. This species does not feed in the same way as a Kingbird and this may explain the difference of habitat. The Crested does not go to a conspicuous perch and wait for insects to fly by.
25. Phoebe.- Just two localities recorded neither of which are in the census areas : (1) near the shore of Burt Lake, and (2) beneath the bridge over Carp Creek. The necessity of a flat support beneath an overhanging structure would explain its absence from the bog.
26. Least Flycatcher.- One pair deep in the bog proper, June 29, and July 6 are the only ones recorded. The necessity for a nesting crotch would limit its occurrence in bogs.
27. Wood Pewee.- None in the bog proper, there are about 6 pairs/100 acres in the cut over area, but these were found in ^P spots where aspen and ^{other} deciduous trees were predominant.
28. Tree Swallow.- Seen at various times flying over bog. A hole nester requiring open space, this species ^hould not be found in the bog.

29. Purple Martin.- Has flown over bog on various occasions.
30. Blue Jay.- 3 pairs/100 acres in the bog and also in the cut over area seem reasonable estimates, but the birds wander greatly. I see no particular reason why Castle (1940) should think that Blue Jays "seem to prefer dense conifers."
31. Crow.- Up to 6 have been recorded flying over the bog; none ever regularly occurred in it however. The birds feeding habits requiring fields and edge would ^{prevent} its occurrence in the bog.
32. Black-capped Chickadee.- Seemingly the 4th commonest bird in the bog proper, much less common in the cut-over area, it is difficult to evaluate the significance of these figures because the birds moved around considerably. There is nothing exclusive about the occurrence of the Chickadee in the bog.
33. Red-breasted Nuthatch.- 3-4 pairs/100 acres in the bog and cut over areas seems reasonable. There is enough density in the clumps of cedar left in the cut-over area to harbor these birds and shelter them from excess light which may be an important factor. A nest was discovered in a dead birch stump hole 8 feet up in the bog, June 29. From the hole dripped resin of some sort brought there by the birds. Messrs. Nestle and Hyatt spent 5 hours at the nest July 9, 1946 and took a number of photographs. They report that both male and female were feeding 2 young, and that one of the young was able to fly off at 3:00 P. M.
34. Brown Creeper.- 2 pairs/100 acres in the Bog proper, and 1 pair /100 acres in the cut-over area are based on very few observations. It is quite possible that light may be an important limiting factor for this species as with the Red-breasted Nuthatch, and

also, perhaps, its feeding method seems peculiarly adapted to coniferous bark; it would be difficult for it to find insects and larvae on an aspen for instance.

35. Winter Wren.- 10-13 pairs/100 acres in the bog proper and cut over area respectively is believed to be fairly close to the truth. Brush heaps and low growth are essential, as well as low light intensity probably.
36. Brown Thrasher.- July 16: one flew into the bog from the aspen area beyond Hogback Road, hence cannot be considered part of the breeding population; the date furthermore is late.
37. Robin.- 7 pairs/100 acres in both areas I and II are probably not accurate figures, because Robins move about a great deal and their territories extended beyond the limits of the areas.
38. Wood Thrush.- The discovery of a nest with two eggs in area I June 27th and the finding of two other pairs which uttered alarm notes upon approach of intruders, are further evidences that the bird is not uncommon in bogs of this type. The nest is worth describing in some detail because it seems "out of bounds" for the schematic ecologist, the bird ordinarily preferring hardwood forests, making its nest of leaves. Root (1942) described its occurrence in bogs of this region and no information since that date has appeared according to Dr. Josselyn Van Tyne in letter to me dated August 2, 1946. The nest was situated 27 feet up in a 20 foot cedar (Thuja occidentalis), saddled 6 inches from trunk on a quarter inch branch. Only 3 leaves of higher plants are included in nesting material. The outer part is composed of mosses of three species according to Dr. William Steere. Apparently the bird used Calliergon stramineum as the basic constituent, and later added portions of C. schreberi, and Hylocomium triquetrum. Interwoven with
- Based on what?

these around the nest base are portions of birchbark. The nest interior is composed of what Dr. Steere believes, after microscopic examination, to be dried, pressed sphagnum, with a lining of small rootlets. The sphagnum apparently takes the place of mud. The measurements are- interior diameter 8.5 cm., interior depth 5 cm., and thickness about 1.5 cm. The eggs hatched between June 30 and July 6, and ^{the young} left the nest about July 16-20; there was no sign of the birds July 25 and the nest was collected. An estimate of 2 pairs /100 acres is quite reasonable.

39. Hermit Thrush.- Contrary to my expectations, only one was heard within Reege's Bog.
40. Veery.- Never recorded in either Area I or II, but four times seen and heard in the wet hardwood area 200 feet northeast on the mouth of Carp. Creek, June 23-July 6.
41. Golden-crowned Kinglet.- In Area I it is one the commonest birds with 17 pairs/100 acres; only 2 pairs/100 acres were found in Area II. Possibly light is here a limiting factor.
42. Ruby-crowned Kinglet.- A ^{male} ~~pair~~ was found in Area I June 23 rd which was present in song until at least July 6th; ^{it was} ~~they were~~ last seen on the 11th. Van Tyne (1938) list no nesting records for Lower Michigan, and there are no station records whatever for summer. Van Tyne (1946) in a letter ^{to me} ~~to the~~ author dated August 2nd states that "there seem to be no recent nesting records for the Ruby-crowned Kinglet and none at all for the Lower Peninsula. However, I am not surprised you have found them."
43. Cedar Waxwing.- Unrecorded from the bog except as flying over: June 23-July 13, up to 4 individuals were seen. Regularly seen

in the vicinity of the house on the shore of Burt Lake.

44. Blue-headed Vireo.- Seven ~~pairs~~ /100 acres in Area I and 6 pairs /100 acres in Area II, representing 7 recorded pairs, are remarkable figures. Apparently outnumbering the Red-eyed Vireo 3 to 1 in the bog proper, the two are equally common in the cut over area. A explanation for ~~the last fact~~ ^{THIS} lies in the fact that the cut over area is, in reality, a gigantic edge, with the coniferous bog to the south and aspen woods to the north. In the cut over area, then, are enough aspens to satisfy the Red-eye and enough conifers to please the "idiosyncrocies" of the Blue-headed. But that there should be a number of Blue-headed Vireos is, indeed, unusual. Root (1942) in his 1941 survey of the bog birds of Cheyboygan County failed to find a single individual. Furthermore, there are no station records whatever for ~~the~~ ^{this} bog, and only three local records prior to 1941, when 2 nests were discovered. I can scarcely believe that this dearth of records is due entirely to overlooking the bird or mistaken identity. Van Tyne in a letter (Aug. 2.) to me finds this situation very puzzling. He states that "our other summer records have all referred to single pairs, usually in dry pine locations." Brigham (1942) lists 3 nests from Michigan, 2 (1932, 42) were in pine locations, the other was in a cedar, at the edge of a marsh, discovered by Pettingill *in 1941*.
45. Red-eyed Vireo.- Only 2 pairs/100 acres in Area I and 6 pairs/100 acres in Area II contrast strongly, and are discussed above. The existence of even a few pairs in Area I is probably due to the presence of a small scattering of deciduous trees. Why there shouldn't be more is anybody's guess, but it is true that Red-eyes are largely deciduous forest birds, whereas Blueheads

prefer conifers. (There is a 1936 hemlock ^{nest} record by Williams, 1946). White (1944) suggests that the "shade and shelter given by large leaves" is responsible for the preference; I consider this doubtful in view of the greater motion of deciduous trees.

46. Black-and-White Warbler.- At the top of the list in Area II with 15 pairs /100 acres, it is about one half as common in Area I, with only 7 pairs/100 acres. Its abundance can be explained by assuming that it requires low growth for feeding and grass leaves or bark for nest building. There is much less suitable material in Area I than in II.
47. Nashville Warbler.- Exactly the same statements appear to apply to this species as to the Black-and-white; it is found in the ^{same} sort of places, and builds a similar nest on the ground. ?
48. Parula Warbler.- While no nests have yet been discovered in Michigan, it seems quite certain that it must ^{breed here} do so. 9-10 pairs/100 acres in both Areas I and II is an indication that it is really relatively common. The presence of Usnia moss, which is used in most nest building, may be the niche requirement.
49. Black-throated Blue Warbler,- 1 pair was found in the westernmost quarter of Area II. An individual was heard just once, July 4, in Area I. Apparently it usually requires dense underbrush as a nesting locality. If, however, birds in different geographical areas, are in any way comparable, it probably does not require a forest canopy, for I ^{found} them June 1946 in scrubby growth near the top of Pack Monadnock Mountain (2000 feet) in southern New Hampshire with no high trees in the neighborhood.

These are estimates!
actual population
cannot be
not bear
this out
T.N.

50. Myrtle Warble.- 10pairs/100 acres in Area I, and 3 pairs/100 acres in Area II contrast rather strongly with one another. The nest is usually in conifers, and constructed of fibers and grass. Coniferous trees might be a niche requirement. *No. 1 nest in white birches. See region bird records. T.N.*
51. Black-throated Green Warbler.- Standing at the top of the list in Area I with 18 pairs/100 acres, and much less common in Area II with 3 pairs/100-acres, it seems to be predominately a conifer loving bird. On July 5 and 6 Dr. Kendeigh and I found 6 pairs along a trail running north-south through the center of the bog (see Map II). These were in an area believed not to exceed 20-25 acres, which would indicate a higher population than that given, e.g., 25-30 pairs/100 acres. The forest along the trail does not seem materially different from that in Area I. Pitekka (1940) makes the remarkable statement that "during the breeding season the Black-throated Green Warbler is one of the more frequent Compothlypida in the conifer region of northern Lower Michigan, though it is by no means to be included among the common birds. Locally, it occurs in spruces of mature bog communities and in upland developmental forests of mixed pine and deciduous growth". In his description of the breeding habitat he never mentions cedar or balsam, and practically none of the vegetation he does describe occurs in Reese's Bog; furthermore, the "associated" avifauna he describes has almost no representation. The reason for these statements appears at first glance to be due to the fact that the 2 nests he discovered were in a pine-aspen community and that he never bothered to investigate other communities to see where it was most abundant. But if we examine his original manuscript (1938) we find that the birds are characteristic of

bogs and that they are most common there; apparently the editing caused the above misleading statements to occur.

52. Blackburnian Warbler.- Next to the Black-throated Green this appears to be the commonest warbler with 12 pairs/100 acres in Area I; none were recorded in Area II. Soon after my arrival in Cheyboygan, I found that I had to contend with a peculiar local variation in the song which was unlike any that I had previously heard. This song was very similar to that of the Golden-crowned Kinglet, but after the first few confusing days, I found it possible to distinguish the songs with reasonable certainty. That I was not alone in this confusion is indicated by the fact that both Roger T. Peterson and Dr. Kendeigh were misled by it. The following points may help to distinguish the two songs: generally the Blackburnian completes his song; 3-4 sees end in a chatter. The kinglet often gives out chatterless phrases. The Blackburnian's song is lower in pitch, louder, and in general gives the impression of being more staccato. In spite of the similarity of songs, I believe the results are not far from correct, for I have not used the first few days observation as the basis for the results. Apparently the Blackburnian is exclusively confined to conifers. Blanchard and Nelson (1946) state that "...it may be found at all times in the summer in the bog forests (in this region)". It is a bird of the tips of trees, singing exposed in a conspicuous place. If this be so, light would not appear to be a limiting factor.
53. Pine Warbler.- A single individual was heard July 21 in the edge between the aspen-covered slope and the cutover section in Area

55. Mourning Warbler. - Thrice recorded in the westernmost portion of area II, June 29, July 1st, and 6th, it could easily have been nesting. As here, it seems to prefer low underbrush and thickets in semi-open areas; it has often been associated with raspberry patches; Wendell Taber in a letter to me July 17, 1946, states that the Mourning Warbler is confined to raspberry patches in the Kathadin region of Maine.

broad leaves available, a relatively large number of Ovenbirds
55. may be found.

56. Yellowthroat.- 2 pairs recorded July 6 in the region just west of the house on ^{Burt} Douglas lake; since it is an ~~open~~ thicket bird it cannot be considered as belonging to Area I. *usually associated with swamps at breeding season*

57. Canada Warbler.- 1 pair at the western end of Area II, and another 200 feet southeast of the Carp Creek Bridge are the only records. Nesting on or near the ground, in heavy thickets, often in semi-open places, this situation may be the chief niche requirement. Kendeigh (1945) finds it most numerous in the ^{but} hemlock-beech community, that it is not confined, and shows some liking for edge, requiring undergrowth; "the nest is usually sunken in a moist mossy bank, in ferns...".

58. Redstart.- None whatever in either Area I or II; four times recorded, June 29 to July 4 along the shore of Burt Lake; Two birds found July 25 in the center of the bog were probably transients or wanderers from elsewhere. A crotch in a sapling for nesting is probably one of the chief niched requirements; few proper crotches are found in the bog. Baker (1944) states that the preferred habitat of the Redstart is in second growth Acer

- saccharum. Blanchard and Nelson (1946) state that the bird is "abundant in the region. It lives in the aspens, hardwoods, and bogs". Root (1941) found none in the area studied. On ornithology class field trips July 20 and August 10, 1946 an abundance of Redstarts were found at Waughoshance Point in Wilderness State Park in which ^{many spots} were often almost wholly cedar and balsam. The reason for this abundance (60 in 3 hrs., July 20 and 77 in 3 hrs., August 10) is as obscure as the absence in Reege's Bog. ^{Where is the obscurity? The birds are travelling about in flocks with chats etc}
59. Baltimore Oriole.- One pair in ^{the} northwestern part of Area II were probably nesting in the tall aspens. A pensile nest could be hung anywhere and I doubt whether ^{nest-building} requirements would prevent its entering a bog. Primarily it is an edge bird.
60. Cowbird.- I have almost no information as to its possible status; about 10-12 were recorded June 23-July 13 flying over various parts of the bog. Mostly they were recorded on the outer fringes. Among the bog birds it is known to parasitize are the junco, Purple Finch and Myrtle Warblers (See Blanchard and Nelson, 1946, and Root, 1942).
61. Scarlet Tanager.- 10 pairs/100 acres in Area II, and 2 pairs/100 acres in Area I contrast strongly. Although primarily a deciduous forest bird, there are apparently just enough deciduous trees within Area I to support a few; the bird might be expected to increase gradually as the bog matures and hardwoods begin to replace the cedars.
62. Rose-breasted Grosbeak.- One was found by Dr. Kendeigh and others in the western part of Area II, July 2. A bird heard 200 ft. in from the southeast corner of Area I, July 21 is probably too late to record to be considered with the census.

63. Indigo Bunting.- One pair just west of the house on Burt Lake was within Area I but on the edge, and is therefore excluded from the list for Area I.
64. Purple Finch.- 3-4 pairs/100 acres in both Areas I and II. This bird is by no means confined to coniferous forests, but generally prefers to place its nest at the top of an evergreen.
65. Goldfinch.- The only records are of those seen flying over the bog or just outside. The limits of the census areas (especially near the house where there is at least one pair).
66. Red-eyed Towhee.- Two pairs discovered July 6 by the Advanced Bird Class 250 yards west of the house, one pair within Area I, and the other outside near the shore of Burt Lake. I feel, however, that these birds probably belong more the area bordering the lake than to the bog proper and have therefore, excluded them from the list.
67. Slate-colored Junco.- Two pairs discovered, one in the dry, predominately red-pine-aspen area of the northern part of Area II and the other 200 feet east along the road from Carp Creek, generally singing 25 up in a Red Pine.
68. Chipping Sparrow.- At least 4 pairs along the roads bordering Area I are excluded from the census as extraneous and not truly inhabitants ^{ants} of the bog.
69. White-throated Sparrow.- 1 pair was found in Area I in a natural opening in the forest: such an open spot is their only excuse for being there. 9 pairs/100 acres in Area II is reasonable: there are many semi-open places full of underbrush.
70. Song Sparrow.- Unrecorded except along the borders of the area, and excluded on the same basis as the Chipping Sparrow,

SUMMARY

A study was made of a 69 acre cedar-balsam bog and an adjacent 35 acre cut over-area which revealed estimated bird populations of 148 pairs per 100 acres (25 species, 103 pairs) and 164 pairs per 100 acres (30 species, 63 pairs) respectively. A total of 70 species were recorded in the region. Ten nests of nine species were found: Goshawk, Mourning Dove, Flicker (2), Sapsucker, Crested Flycatcher, Phoebe, Redbreasted Nuthatch, Robin and Wood Thrush. The Blueheaded Vireo, Wood Thrush, and Parula Warbler were found to be more common than previously supposed. The Ruby-crowned Kinglet was found for the first time summering in Lower Michigan, ^{*possibly?} probably nesting. The Mourning Warbler was found in a new local site. A discussion of niche requirements is included which suggests that relative brittleness of trees may be a factor in bird distribution.

* No evidence to substantiate this. T.N.

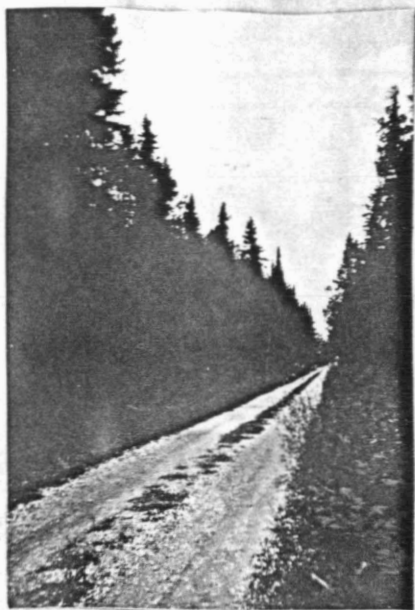


Fig. 1. From road looking
North *along tree I*



Fig. 2. Result of lumbering
in mid-July, 1946. From
road's edge.

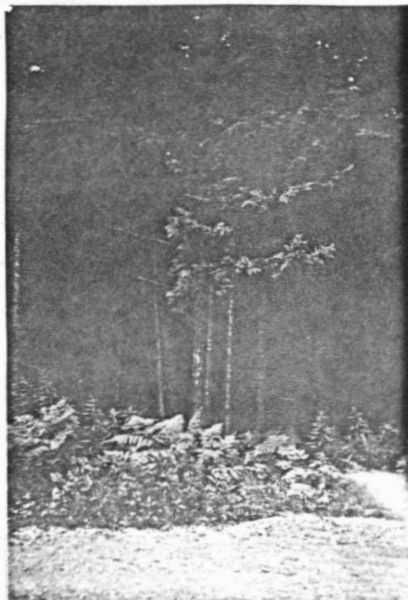


Fig. 3. Looking north into the
interior of the bog. *tree*

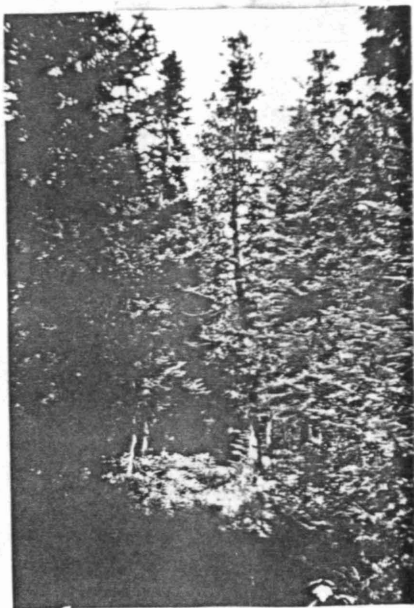


Fig. 4. Along a trail
looking North, *(Area I)*

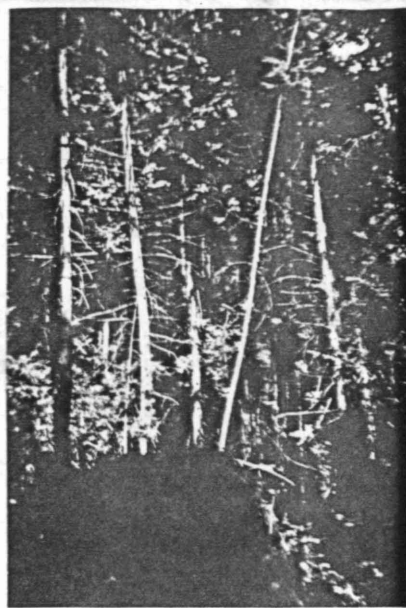


Fig. 5. The edge of this trail
shows the difficulty of pen-
etrating the bog. *(Area I)*



Fig. 6. Opening in center
of Area II, showing density
of trees. *(Area I)*



Fig. 7. A clearing soon after lumbering in Area II, looking north.

Fig. 8. Open Area north of cottage showing edge of bog.



Fig. 9. Carp Creek from bridge, looking south.

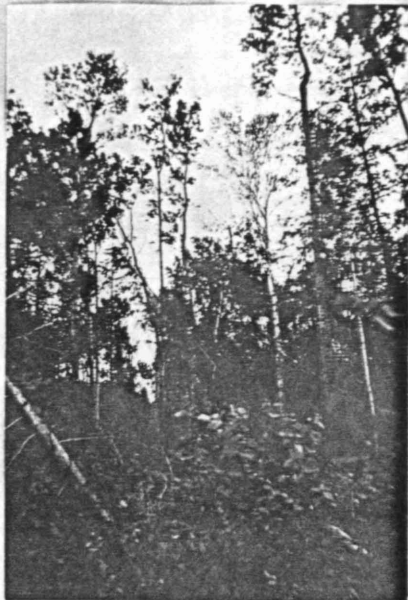
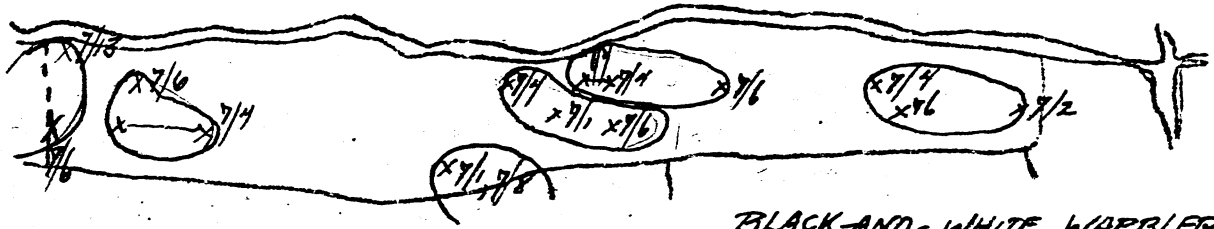


Fig. 10. Tall aspens and underbrush, western part of Area II, looking south.

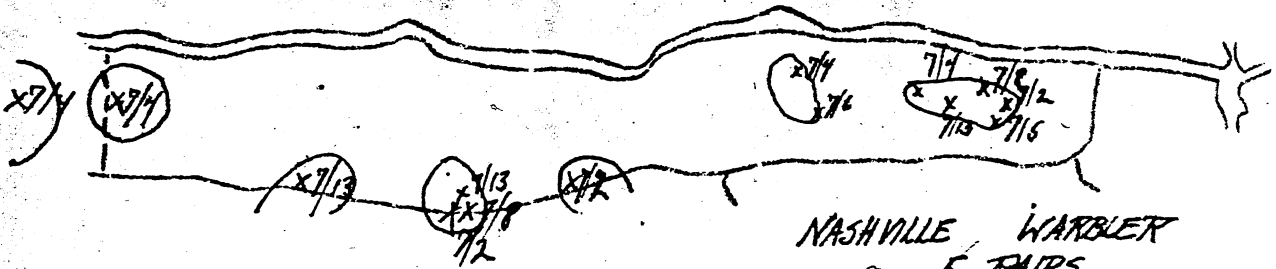
Mourning warbler, and Say's vickers were found here.



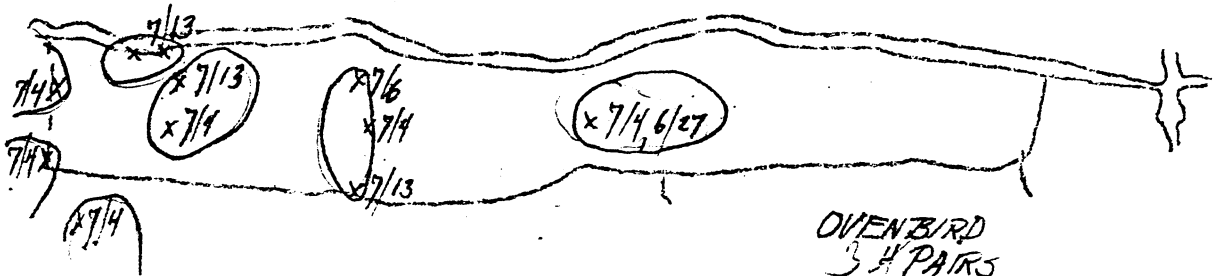
Fig. 11. Mouth of Carp Creek



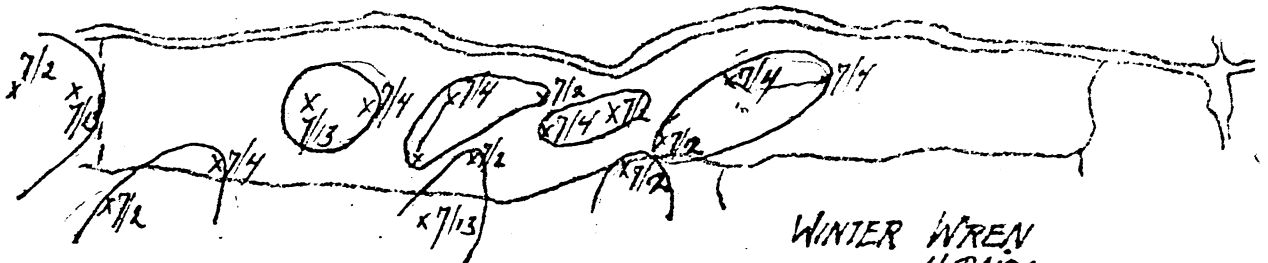
BLACK-AND-WHITE WARBLER
 4 5 PAIRS
 15 PAIRS/100 ACRES



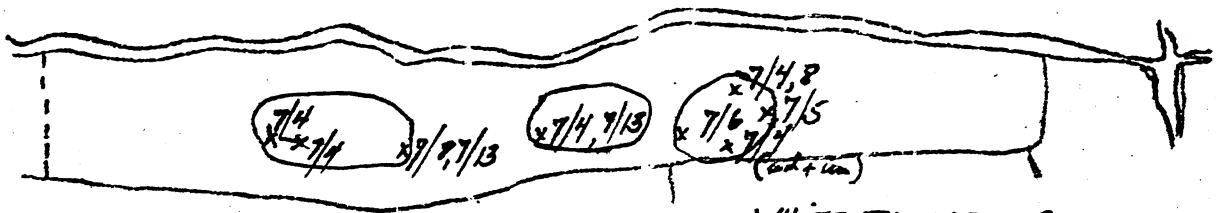
NASHVILLE WARBLER
 5 PAIRS
 15 " 100 ACRES



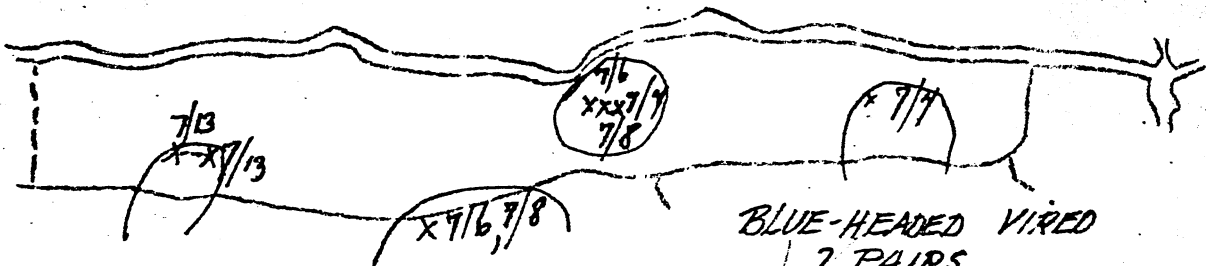
OVENBIRD
 3 1/2 PAIRS
 12 " 100 ACRES



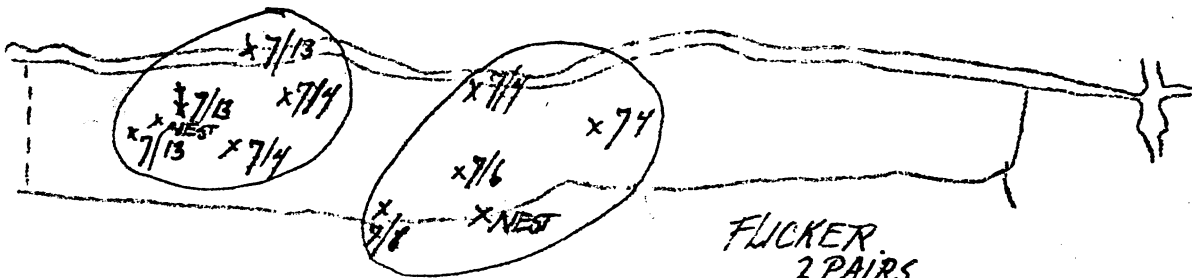
WINTER WREN
 4 PAIRS
 13 " 100 ACRES



WHITE-THROATED SPARROW
 3 PAIRS
 9 " 100ACRES



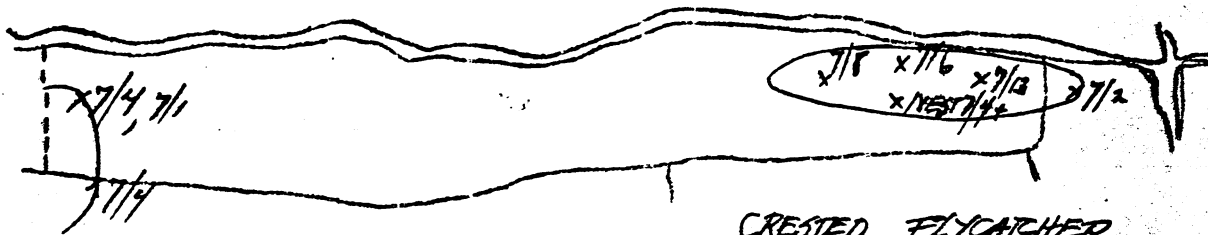
BLUE-HEADED VIREO
 2 PAIRS
 6 " 100 ~~PAIRS~~ ACRES



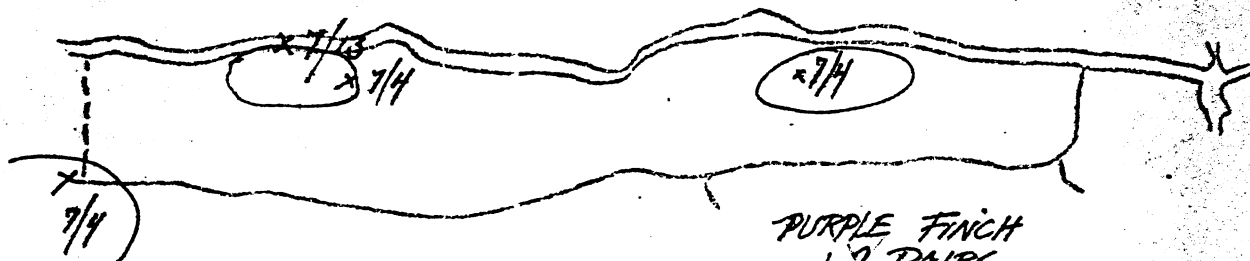
FLICKER
 2 PAIRS
 2 " 100ACRES



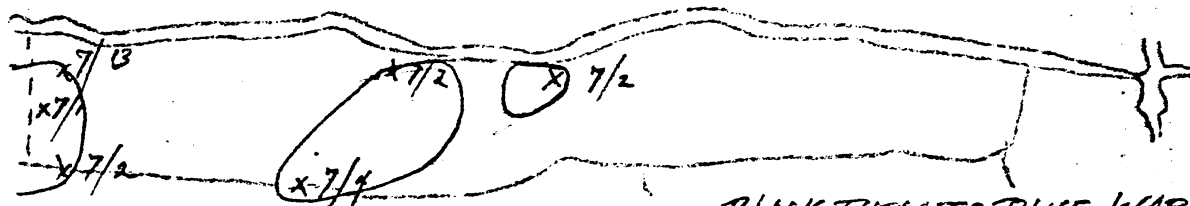
YELLOW-BELLIED SAPSUCKER
 2 PAIRS
 2 " 100ACRES



CRESTED FLYCATCHER
1 PAIR
4 " /100 ACRES



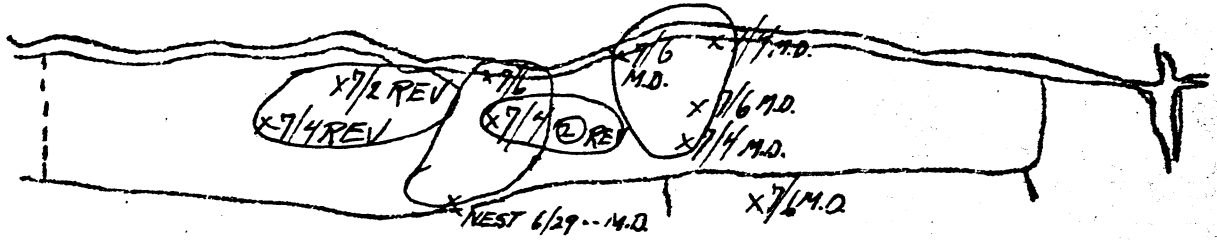
PURPLE FINCH
1 2 PAIRS
3 " /100 ACRES



BLACK-THROATED BLUE WARBLER
1 PAIRS
7 " /100 ACRES

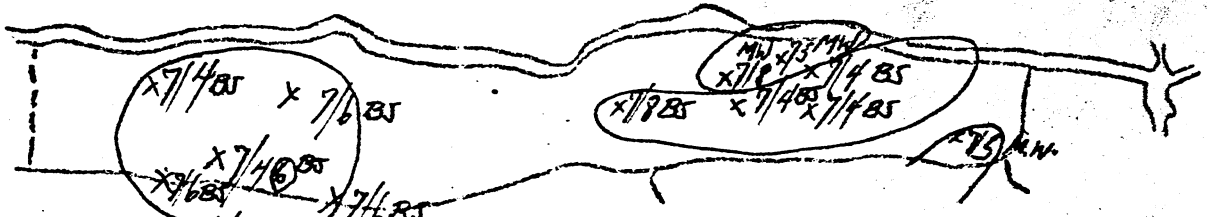


WOOD PEWEE
1 2 PAIRS
6 " /100 ACRES



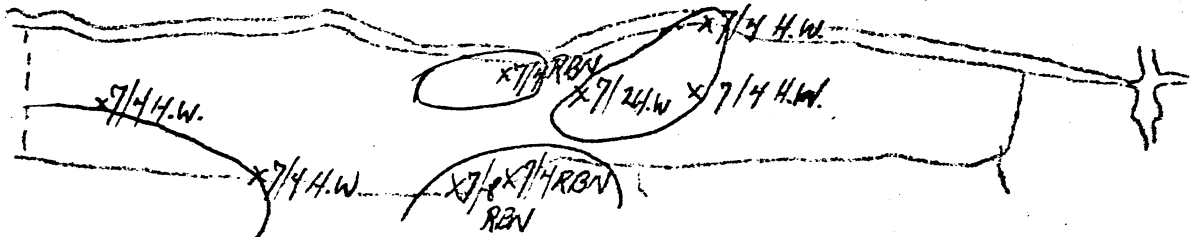
MOURNING DOVE
 1 PAIR
 4 " / 100 ACRES

RED-EYED VIREO
 1 PAIR
 6 " / 100 ACRES



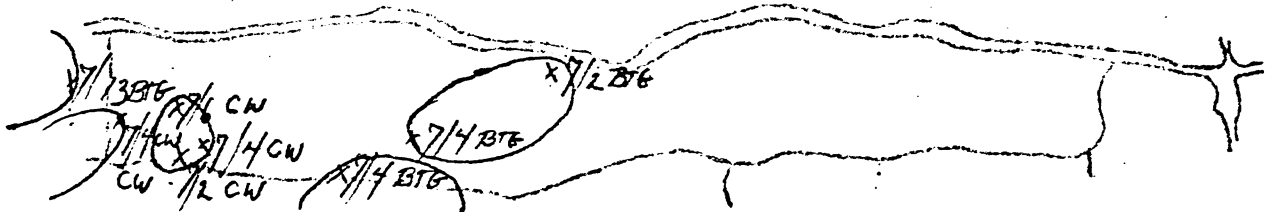
BLUE JAY
 1 PAIR
 3 " / 100 ACRES

MYRTLE WARBLER
 1 PAIR
 3 " / 100 ACRES



HAIRY WOODPECKER
 1 PAIR
 3 " / 100 ACRES

RED-BREASTED NUTHATCH
 1 PAIR
 3 " / 100 ACRES



BLACK-THROATED GREEN WARBLER
 1 PAIR
 3 " / 100 ACRES

CANADA WARBLER
 1 PAIR
 2 " / 100 ACRES

x 6/29 DM
 x 7/2 BC.
 DOWNY WOODPECKER
 + 1 PAIR
 2 " / 100 ACRES

BROWN CREEPER
 + 1 PAIR
 2 " / 100 ACRES

x 7/13 BO
 x 7/6 BO
 x 6/29 BO

x 7/6 SCS
 x 7/4 SCS
 x 7/5 SCS
 x 7/8 SCS

SLATE-COLORED JUNCO
 1 PAIR
 3 " / 100 ACRES

BALTIMORE ORIOLE
 1 PAIR
 2 " / 100 ACRES

x 6/29, 7/1, 7/6 M.W.

x 7/6 GCK
 x 7/8 GCK
 x 7/13 GCK
 x 7/8 GCK

MOURNING WARBLER
 1 PAIR
 2 " / 100 ACRES

GOLDEN-CROWNED KINGLET
 1 PAIR
 2 " / 100 ACRES

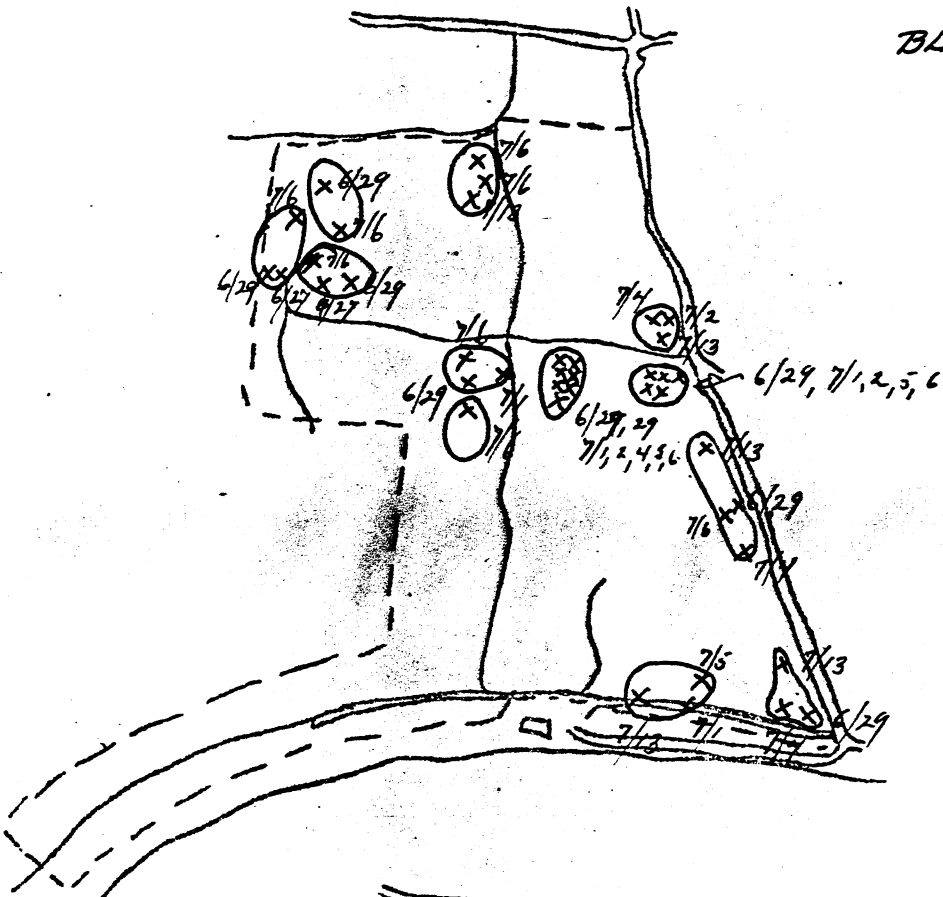
(Empty section)

46

BLACK-THROATED GREEN WARBLER

12 PAIRS

18 PAIRS / 100 ACRES

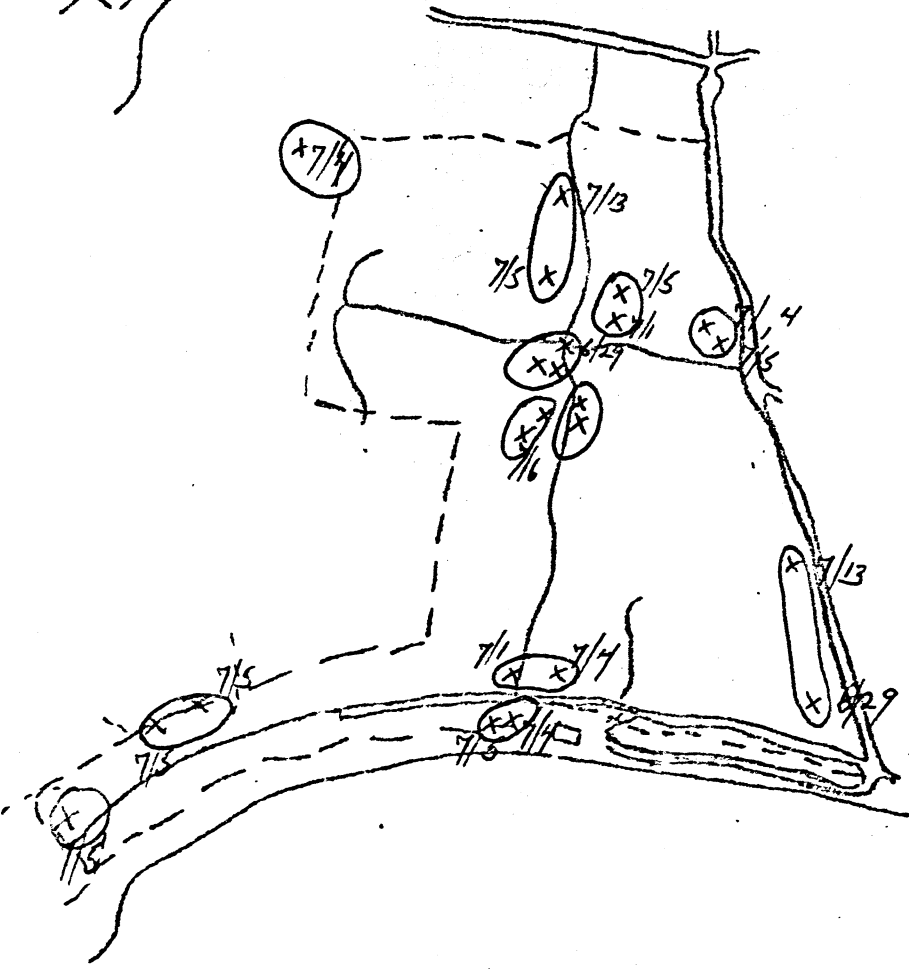


10

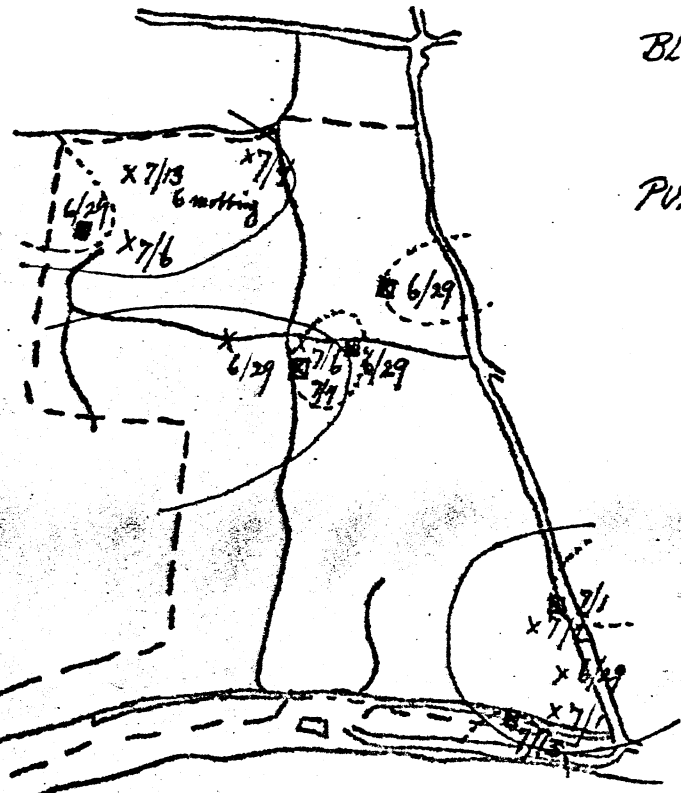
GOLDEN-CROWNED KINGLET

11 PAIRS

17 PAIRS / 100 ACRES

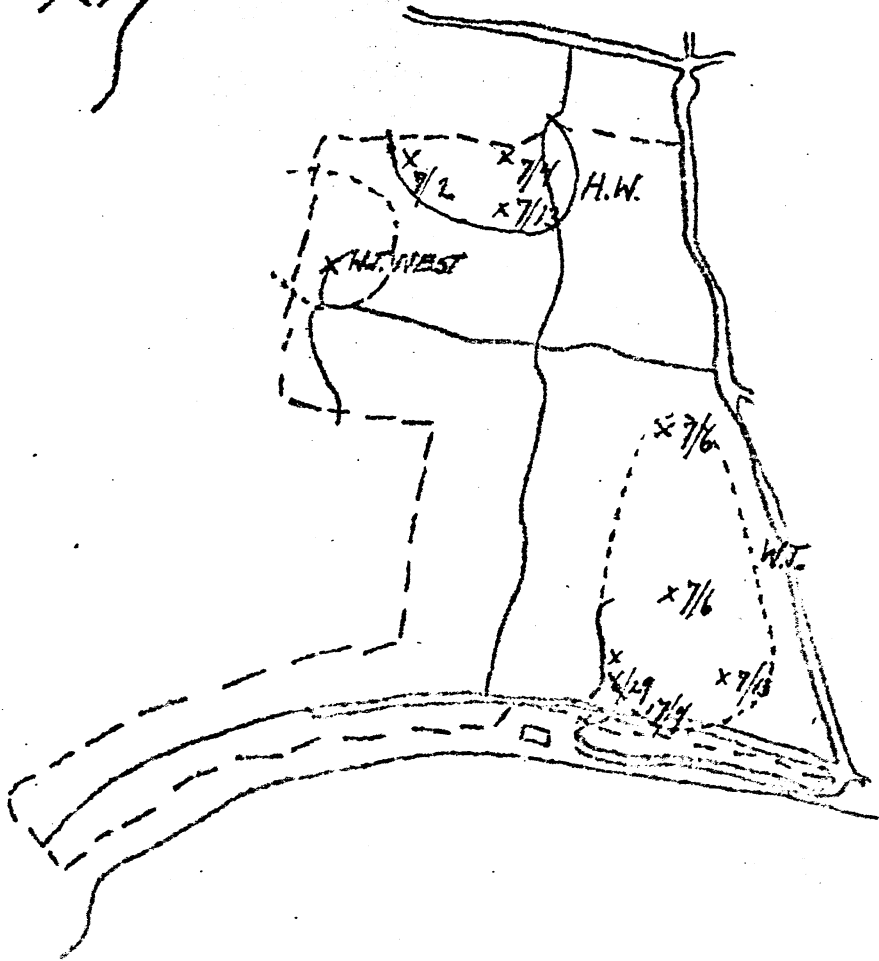


47



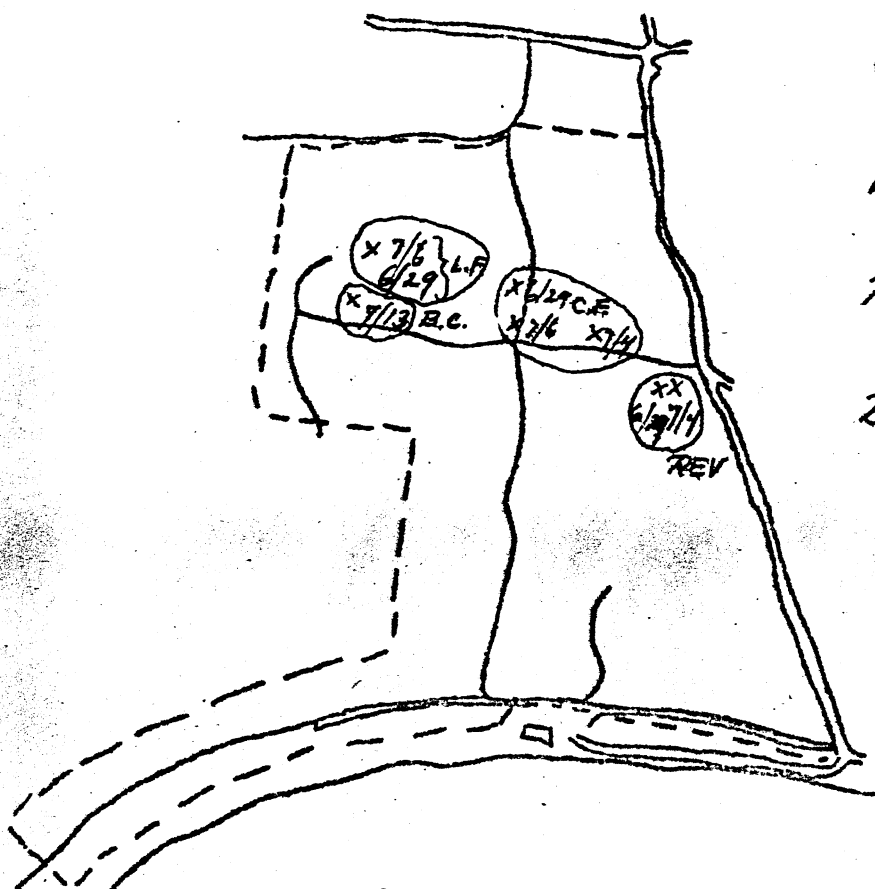
BLUE JAY ——— x
 2 PAIRS
 3 PAIRS / 100 ACRES

PURPLE FINCH ——— ■
 3 PAIRS
 4 PAIRS / 100 ACRES

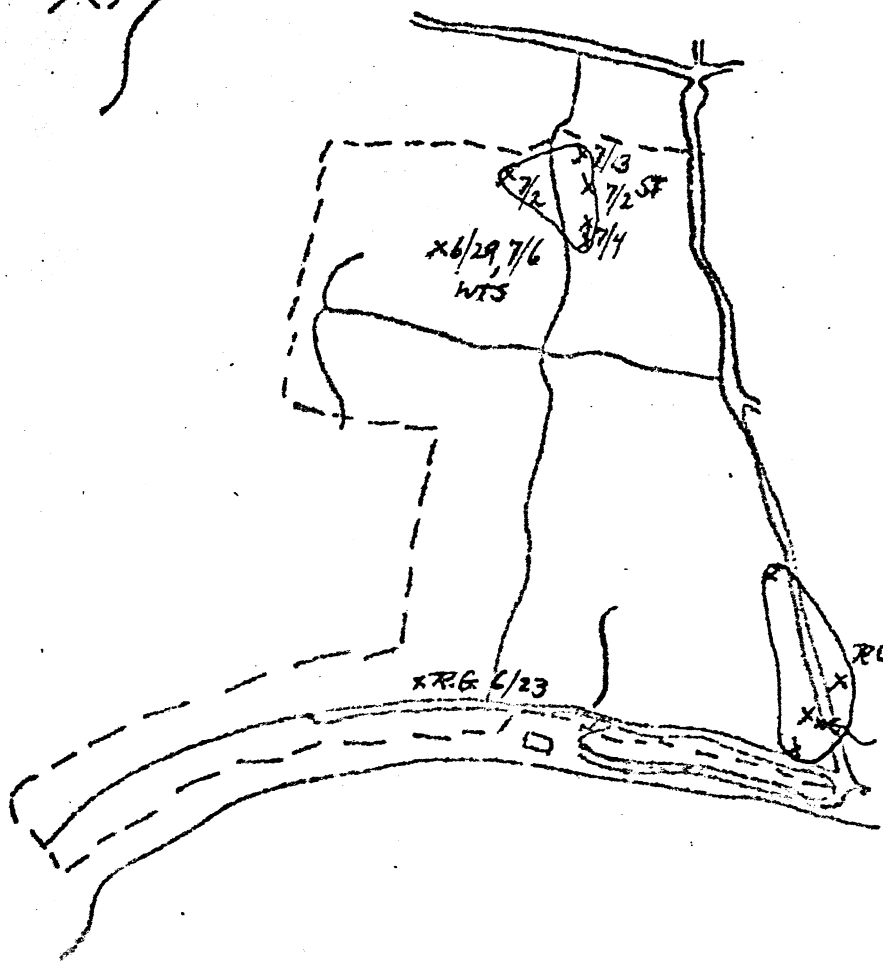


WOOD THRUSH
 2 PAIRS
 2 PAIRS / 100 ACRES

HAIRY WOODPECKER
 1 PAIR
 2 PAIRS / 100 ACRES



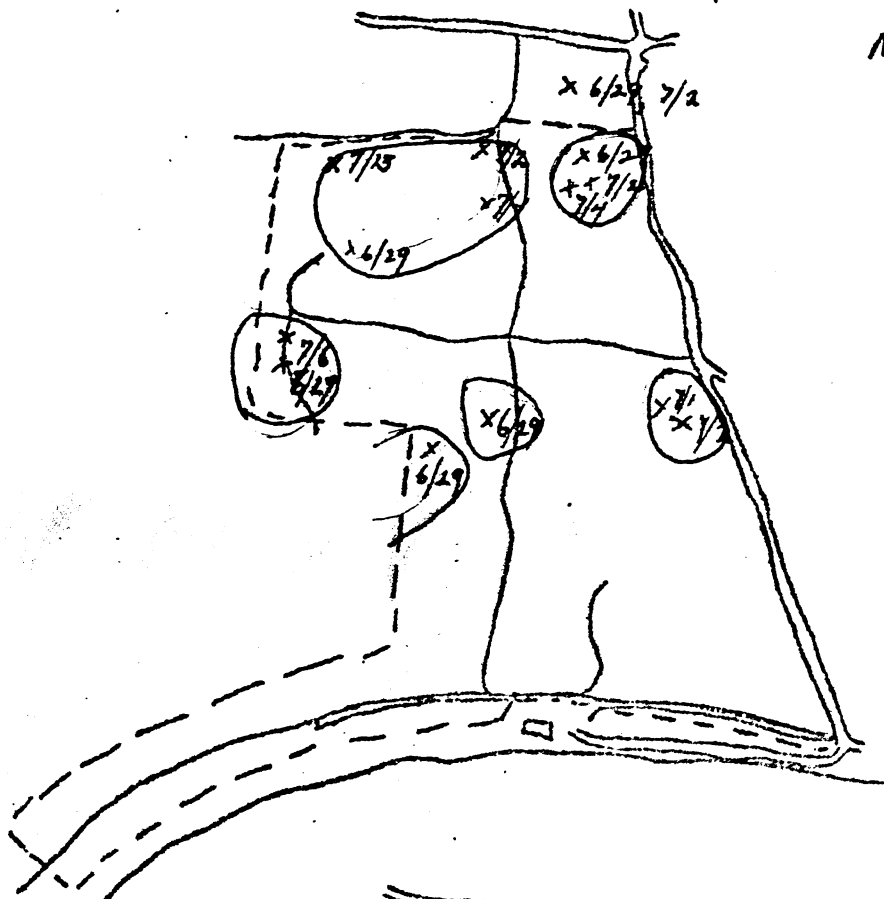
- CRESTED FLYCATCHER
1 PAIR
2 PAIRS / 100 ACRES
- LEAST FLYCATCHER
1 PAIR
2 PAIRS / 100 ACRES
- RED-EYED VIREO
1 PAIR
2 PAIRS / 100 ACRES
- BROWN CREEPER
1 PAIR
2 PAIRS / 100 ACRES



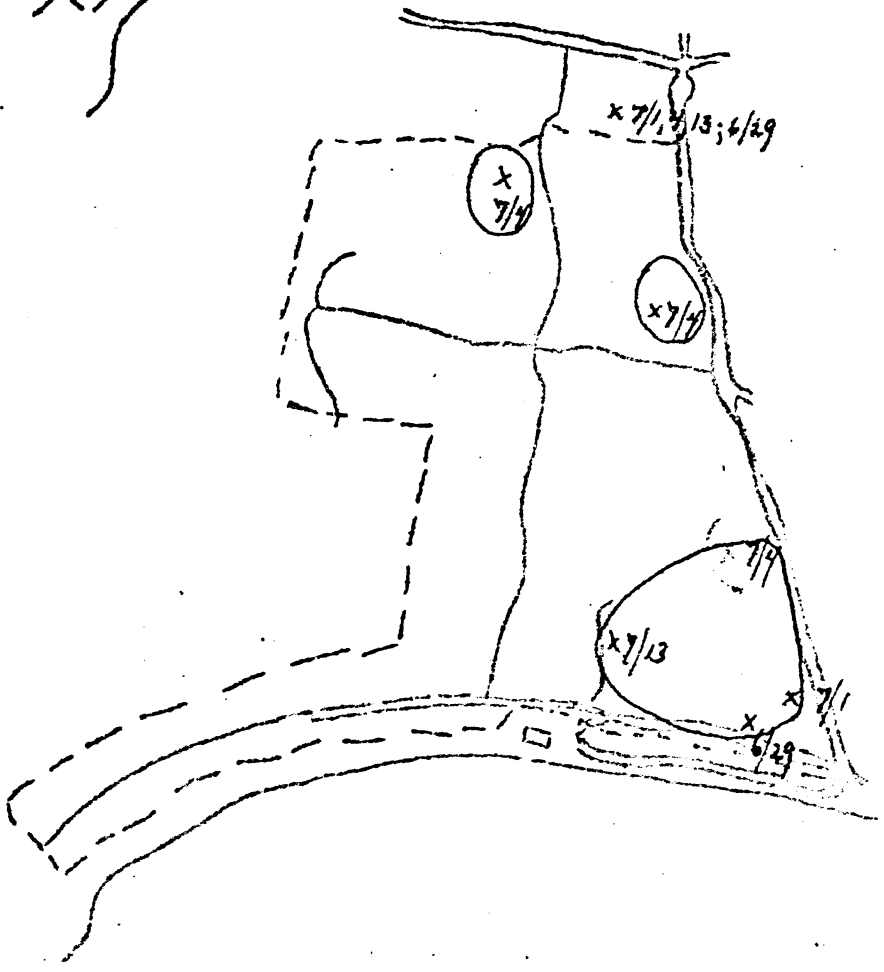
- WHITE-THROATED SPARROW
1 PAIR
1 PAIR / 100 ACRES
 - SCARLET Tanager
1 PAIR
2 PAIR / 100 ACRES
 - RUBY-CROWNED KINGLET
1 PAIR
1 PAIR
 - RUFFED GROUSE
1 PAIR
 - GREAT HOODED OWL
- RCK 6/23, 6/24, 6/27, 29, 7/1, 2, 4, 11
GHO FLEW PAST HERE.

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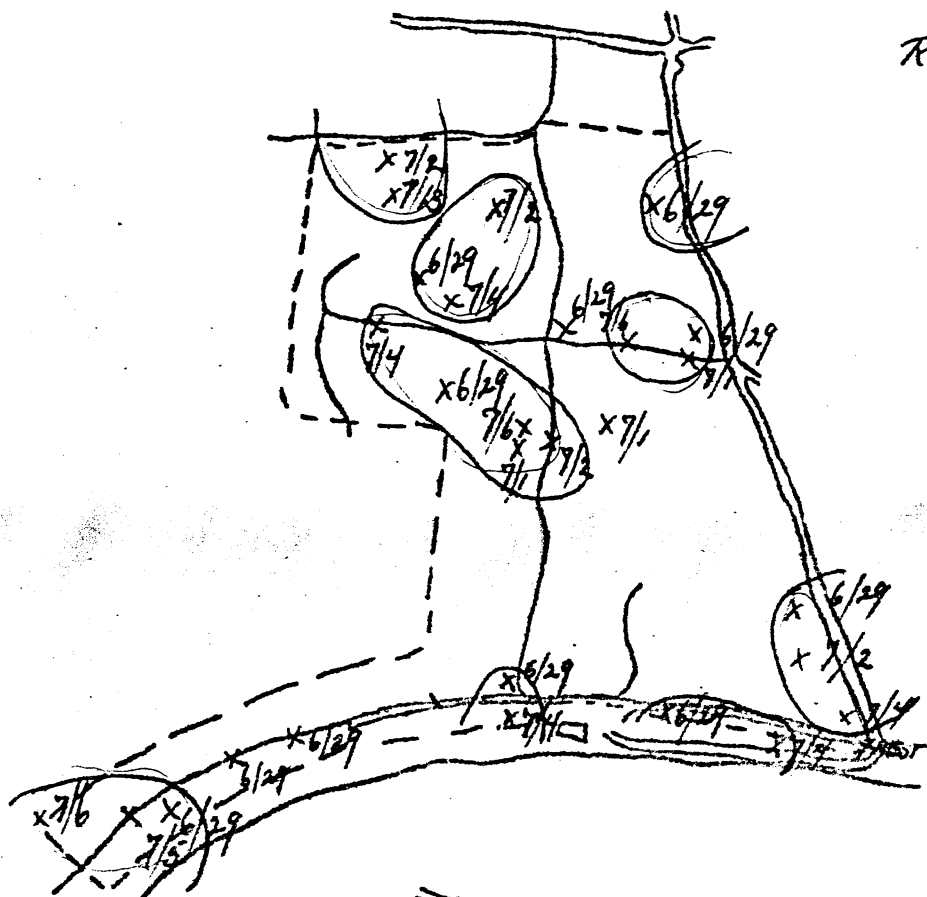
NASHVILLE WARBLER
6 PAIRS
9 PAIRS / 100 ACRES



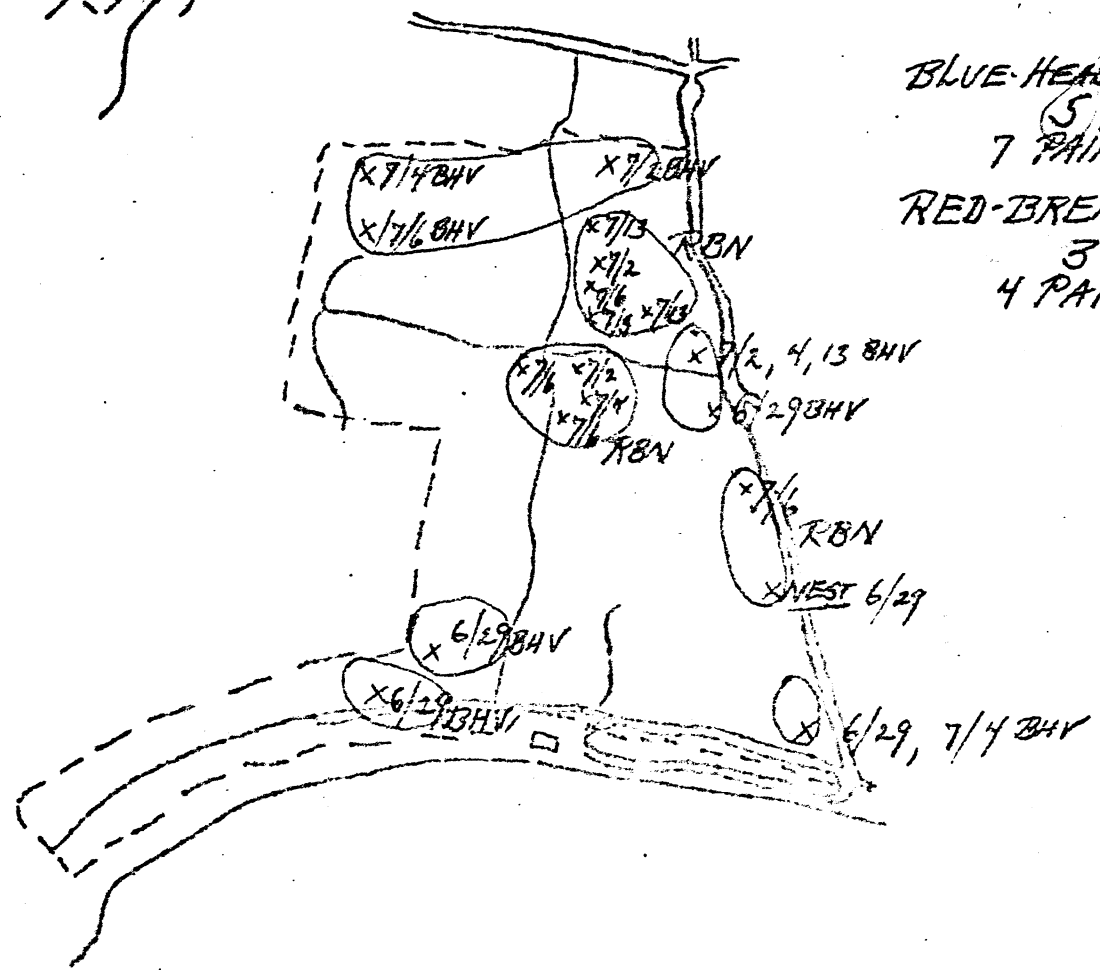
OVENBIRD
3 PAIRS
4 PAIRS / 100 ACRES



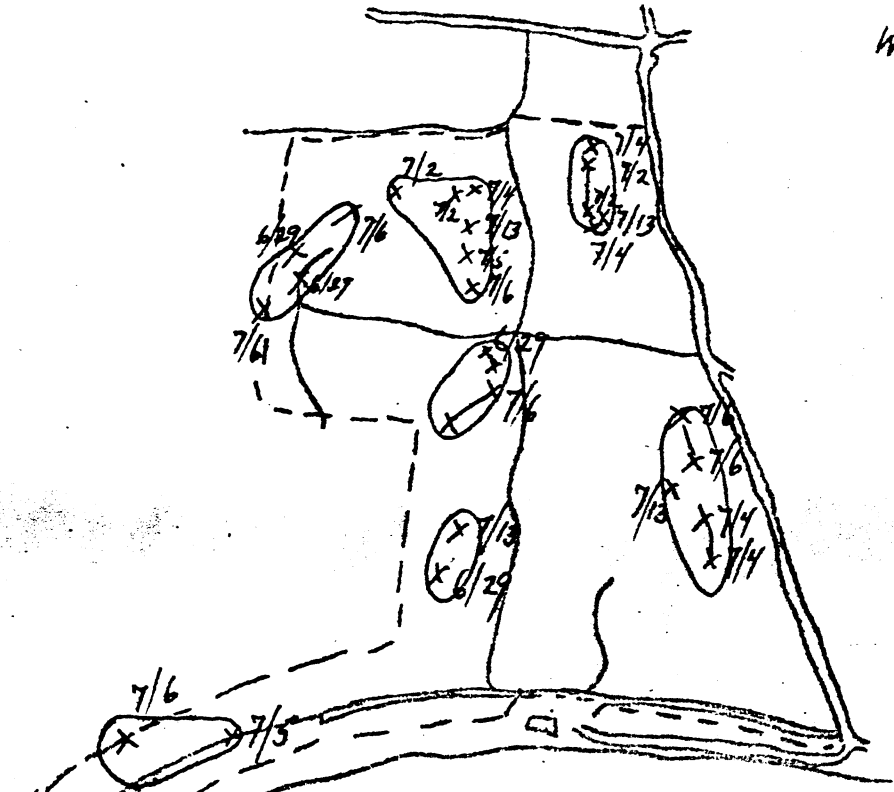
ROBIN
5 PAIRS
7 PAIRS 100 ACRES



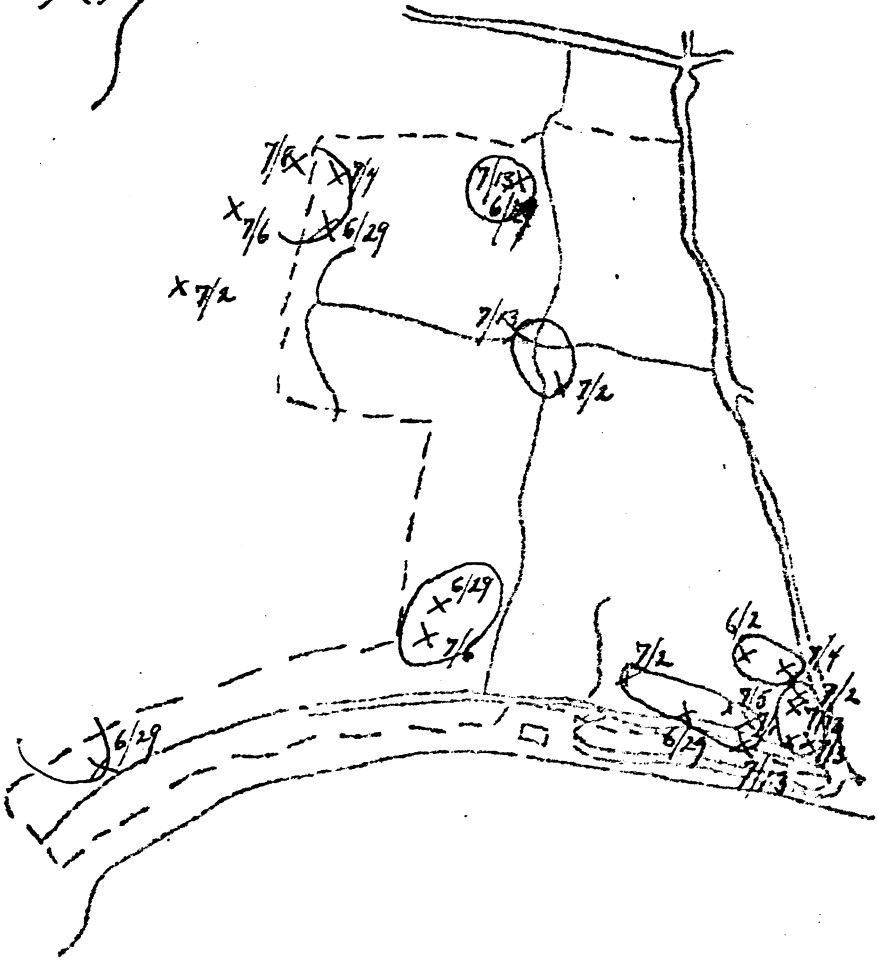
BLUE-HEADED VIREO
5 PAIRS
7 PAIRS 100 ACRES
RED-BREASTED NUTHATCH
3 PAIRS
4 PAIRS 100 ACRES



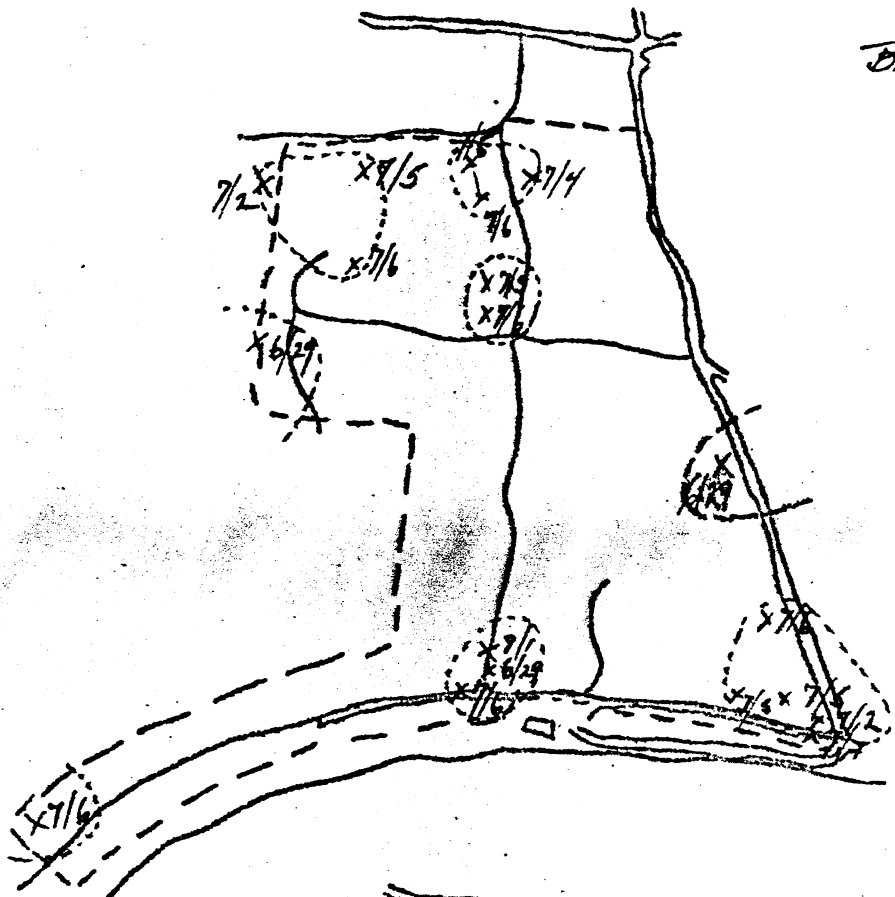
WINTER WREN
7 PAIRS
10 PAIRS/100 ACRES



PARULA WARBLER
7 PAIRS
10 PAIRS/100 ACRES

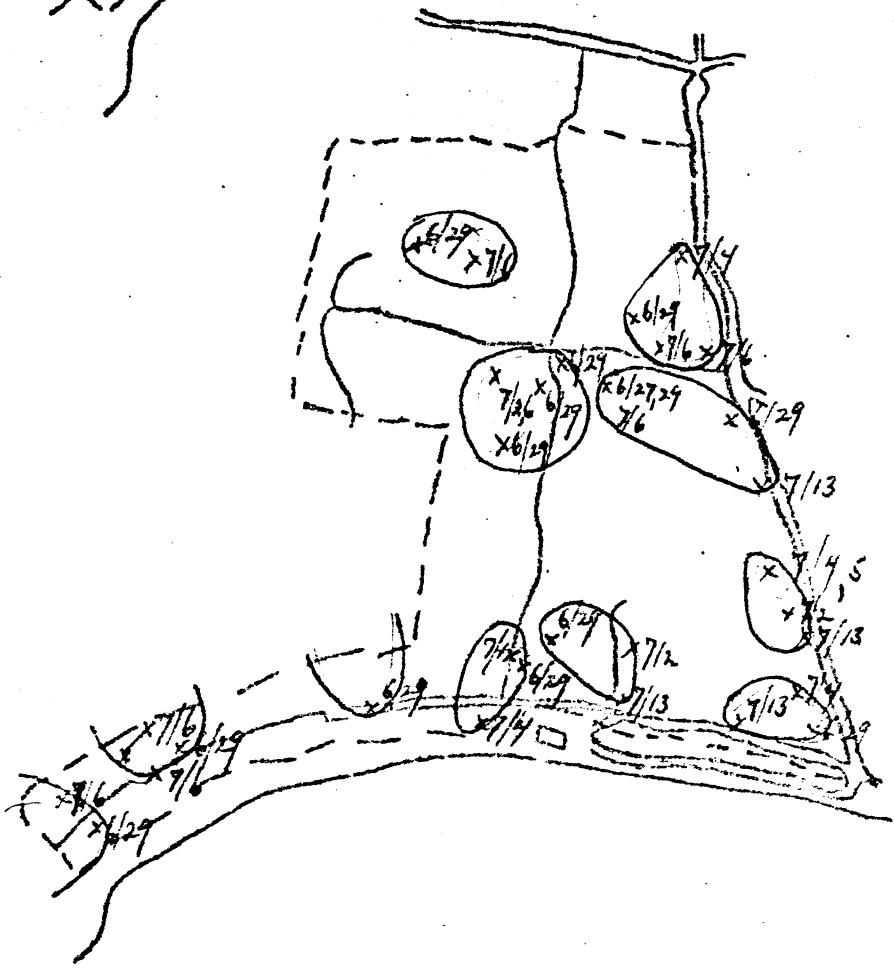


BLACK-CAPPED CHICKADEE
7 PAIRS
10 PAIRS / 100 ACRES



9

BLACKBURNIAN WARBLER
8 PAIRS
12 PAIRS / 100 ACRES



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