REPORT ON AN

AVIAN ECOLOGICAL RECONNAISANCE

IN

NORTHERN LOWER MICHIGAN

BY

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INTRODUCTION

This report is the result of the field work of the 1946 Advanced Ornithology class of the University of Michigan Biological Station. The field work was mostly done by the eleven members of the class under the direction of Dr. S. Charles Kendeigh and with the aid of Miss Peggy Muirhead and Dr. Theodora Nelson.

The Area

The topography of the region is quite mild. There is a large portion of the territory in lowlands--bogs and lakes. The soil is predominently sandy becoming loamy on favored highlands. These charecteristics are due mostly to the impottant glacial history.

Northern Lower Michigan is part of the Deciduous-Coniferous Forests Ecotone (SubpCanadian Forest). The climax community is Beech-Maple forest. This community originally was found on good upland soils, while the subclimax Pine occured on the more sandy upland soil, the subclimax Cedar bogs on lowland areas, and lakes in the deeper depressions. The area was logged (the Pines mostly at the end of the nineteenth century and the Hardwoods at the beginning of the present century) which was followed by repetitious fires leading to subclimax Aspen forest. The Aspens have been replaced in small part by the original vegitation; in many areas they are now being replaced, and in some areas where fire has been severe, Aspen is replacing itself.

The Method

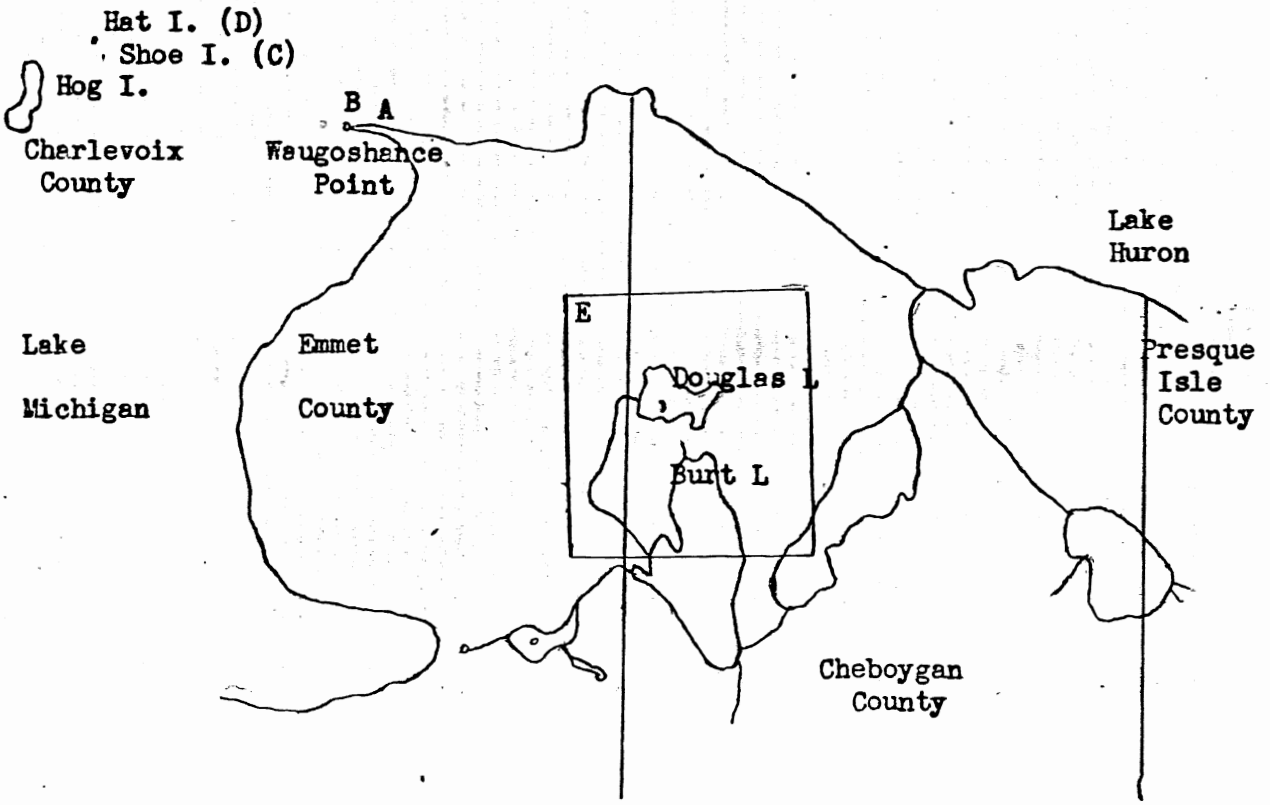
Areas representative of important communities were selected for study (see Maps 1 and 2). Morning trips were made to each area and the 12 to 16 persons in two orthree groups made counts of singing males, family groups, or their equivalent. Judgement was used to avoid duplication and to a

to arrive at a fairly representative figure of the of the number of pairs of birds seen in the community. The results for each group and for the total were calculated to a figure per 10 hours in the field. Additional notes of ecological significance were made.

There are various sources of inaccuracies in this method. Varying conspicuousness is not accounted for. The comparison of one species in different areas would not be seriosly inaccurate since presumably most birds would be as conspicuous (or inconspicuous) in one community as in another (especially as regards to song which is the most important method of identtification in this type of count, but comparisons between a conspicuous/species and an inconspicuous one would be subject to much error. Results of observations of several groups of persons will be subject to variation. Since the total of any one item is the sum of the values of all groups, errors will either be compensated for or magnified. An examination of the to totals often shows a considerable difference in the total numbersof birds seen per unit period; the obvious explanation is that the rates of coverage varies between the groups. The differences of relults between groups for individual species with this fact in mind will not seem so great for many of the numerical differences tend to be quite similar when considered as percentage of the total; thus, the average of the two groups tends to be compensatory. This is especially true of the most common species; analysis of the abundance of the uncommon birds will require additional judgment based on the field experience and general knowledge of the birds behavior and ecology. Inconsistencies of individual species should be discussed along with the results for each community.

The major suggestions for improvement of the system would be to have repeat and similar surveys by groups of only up to 4 or 5.

Map 1 MAP OF NORTHERN LOWER MICHIGAN



Map 1

A. Site of eastern Common Tern Colony (Waugoshance Point)
B. " " western " " " " " "
C. Site of Caspian Tern colony (Shoe Island)
D. Site of Herring Gull colony (Hat Island)
E. Area included in Map 2

Map 2

A

A. Survey area Beech-Maple Hemlock Community
B. " " Bog Forest
C. " " Pine Forest
D. " " Mature Aspen Forest
E. " " Young Aspen Forest
F. " " Field

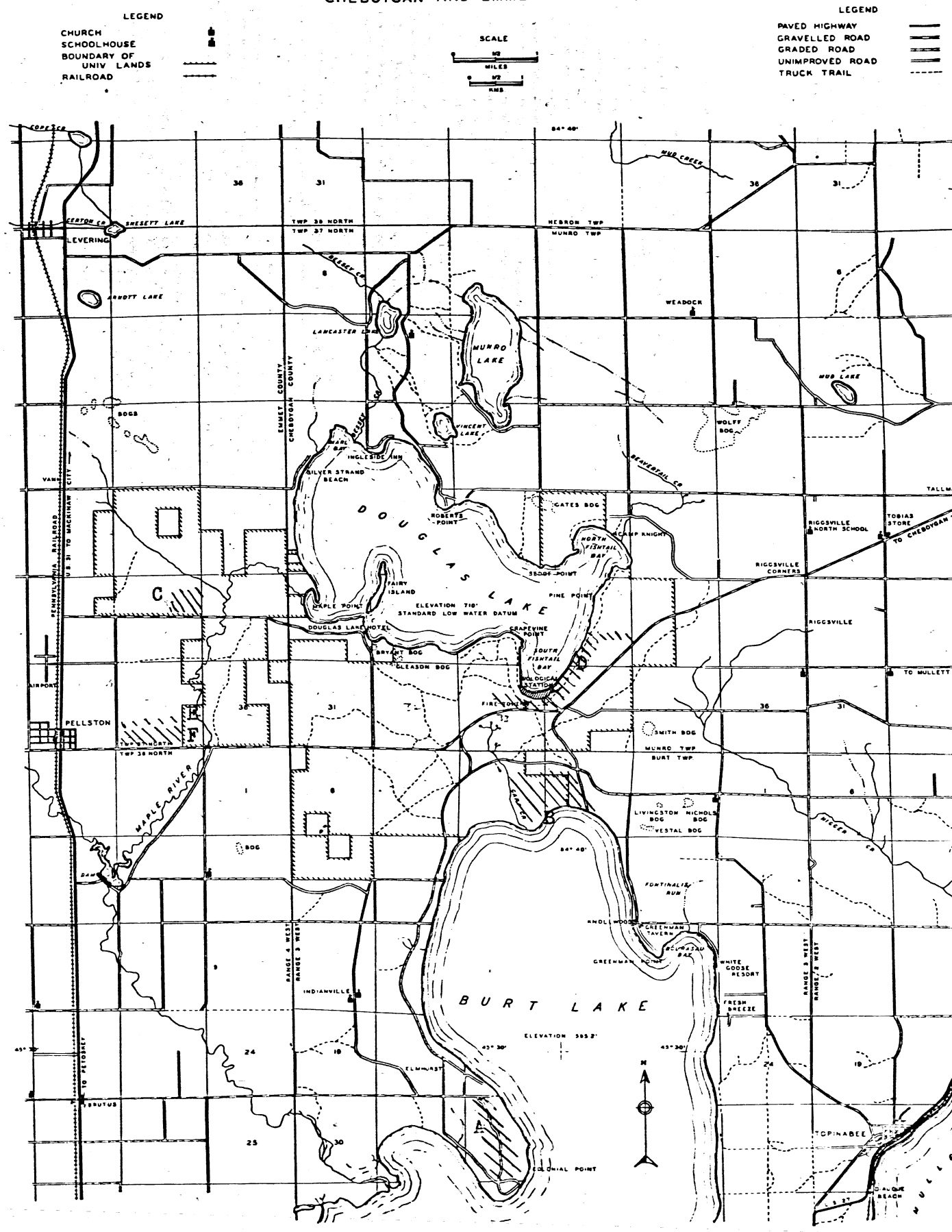
Map 2

VICINITY OF

UNIVERSITY OF MICHIGAN BIOLOGICAL STATION

AND DEMONSTRATION FOREST

CHEBOYGAN AND EMMET COUNTIES, MICH.



COMPILED BY W. F. RAMSDELL, APRIL 1945

COMMUNITIES

Beech-Maple-Hemlock Community

Survey of area. Saturday morning, June 29, 1946; time for Group 1 - 6;40-8.20 AM and 9;20-10;30 AM, time for Group 2 - 6;40-9:00 AM; 9:20 - 10:15 16 persons in two groups; weather warm, only a small amount of clouds, negligable wind. Forest area on both sides of a road bisecting (N-S) Sect. 28, Burt Twp. (T. 35N., R. 3W.), Cheboygan County, Michigan (area on Colonial Point on the west side of Burt Lake).

Description of area. The dominent trees were Hard Maple (Acer saccharum), Beech (Fagus grandifolia), and Hemlock (Tsuga canadensis). Three secondary dominents were Oak (Quercus), White Pine (Pinus Strobus), and Yellow Birch (Betula lutea). It is climax area; all stages of the dominent trees are common, from new seedlings to fully adult trees and massive dead and decayed trees. There are only occasional signs of lumbering and few if any signs of fire; this forest is one of the few extensive areas in the region which closely resemble the original conditions in this type of community. The canopy formed by the taller trees has its lower limits about 36 or 40 feet and its upper limits at the tops of the trees, ranging about 60 feet.

Relative abundence of the birds seen:

Species	Total		Group 1		Group 2	
	#	#/10h	#	#/10h	#	#/10h
1 Redstart	55	92	29	102	26	82
2 Red-eyed Vireo	52	87	27	95	25	79
3 Oven-bird	50	83	28	99	22	70
4 Veery	27	45	12	42	15	47
5 Wood Pewee	22	37	10	35	12	38
6 Least Flycatcher	17	28	11	39	6	19

Species	Total #	Total #/10h	Group 2 #	Group 2 #/10h	Group 1 #	Group 1 #/10h
7 Black-thtd Green Warbler	14	23	6	21	8	25
8 Scarlet Tanager	10	17	5	18	5	16
9 Crested Flycatcher	7	12	3	11	4	13
10 White-breasted Nuthatch	5	8	3	11	2	6
11 Blackburnian Warbler	5	8	1	4	4	13
12 Cowbird	5	8	3	11	2	6
13 Wood Thrush	3	5	1	4	2	6
14 Black-capped Chickadee	2	3	2	7	-	-
15 Robin	2	3	2	7	-	-
16 Purple Finch	2	3	1	4	1	3
17 Cooper's Hawk	1	2	~~1~~	~~4~~	~~1~~	3
18 Ruffed Grouse	1	2	~~1~~	4	~~1~~	~~3~~
19 ~~Baired Owl~~ Flicker	1	2	~~1~~	~~4~~	~~1~~	~~3~~
20 Yellow-shafted Flicker	1	2	1	4	~~1~~	-
21 Pileated Woodpecker	1	2	1	4	-	-
22 Golden-crowned Kinglet	1	2	1	4	-	-
23 Black and White Warbler	1	2	1	4	-	-
Totals	sp 23 285	475	sp 21 149	561	sp 16 136	430

Comment. The rate of coverage is obviously different (the distances covered were nearly equal. Numbers of Veery's suffer from very long detection distances with a corresponding difficulty of locating which leads to duplication. This count is probably the most accurate count in the report.

Bog Forest Community

Survey of area. Saturday morning, July 6, 1946; time for Group 1 - 7:55-10:55 (- 45 min.), time for Group 2 - 7:55-10:25 AM; 16 persons in two groups; weather warm, partly cloudy. Reese's Bog includ-

ing the territory south of the Brutus Road, east of Carp Creek, north of Burt Lake, and west of the No8 road to the north shore of Burt Lake (including a small area east of this road); Sec. 5, 4, Burt Twp. (T. 35N., R.3W.), Cheboygan County, Michigan.

Description of the area. It is a mature bog forest subclimax community. The areas of open water have mostly filled in and most of the trees are fairly large (many 10"-20" in diameter). The most abundant tree is White Cedar (Thuja accidentalis) although there are considerable areas of Black and Red Spruce (Picea mariana and P. rubra), Balsam Fir (Abies balsamea), Hemlock (Tsuga canadensis), and Tamarack (Larix laricina). Some species found on the edge are White Pine (Pinus Strobus), Aspen (Populus tremuloides and P. grandidentata), Hard Maple (Acer saccharum), and some others. There is little shrubbery except in open spots and near the edge. Years age the area was completely cut over and burned followed by the return of the bog trees. Since then the ground has become drier, lumbering has begun again, this and fire and flooding (due to beaver in Carp Creek in the 20's) Have opened up parts of the bog. There is a very small area in the south-central portion that contains cat-tails (Typha latifolia).

Relative abundence of the birds seen:

Species	Total		Group 1		Group 2	
	#	#/10h	#	#/10h	#	#/10h
1 Black-th'd Green Warbler	25	53	12	53	13	52
2 Golden-Crowned Kinglet	18	38	10	44	8	32
3 Robin	12	25	6	27	6	24
4 Parula Warbler	10	21	7	31	3	12
5 Black-capped Chickadee	9	19	5	22	4	16
6 Cedar Waxwing	9	19	4	18	5	20
7 Nashville Warbler	9	19	4	18	5	20
8 Blue Jay	8	17	4	18	4	16

Species	Total		Group 1		Group 2	
	#	#/10h	#	#/10h	#	#/10h
9 Black and White Warbler	7	15	1	4	6	24
10 Blackburnian Warbler	7	15	5	22	2	8
11 Mourning Dove	6	13	2	9	4	16
12 Crested Flycatcher	5	11	2	9	3	12
13 Blue-headed Vireo	5	11	4	18	1	4
14 Cowbird	5	11	4	18	1	4
15 Ovenbird	5	11	2	9	3	12
16 Winter Wren	4	8	2	9	3	12
17 Purple Finch	4	8	3	13	1	4
18 White-throated Sparrow	4	8	-	-	4	16
19 Yellow-shafted Flicker	3	6	2	9	1	4
20 Yellow-throat	3	6	2	9	1	4
21 Scarlet Tanager	3	6	1	4	2	8
22 Song Sparrow	3	6	3	13	-	-
23 Nighthawk	2	4	1	4	1	4
24 Red-breasted Nuthatch	2	4	2	9	-	-
25 Wood Thrush	2	4	1	4	1	4
26 Myrtle Warbler	2	4	1	4	1	4
27 Canada Warbler	2	4	-	-	2	8
28 Red-eyed Towhee	2	4	2	9	-	-
29 Junco	2	4	1	4	1	4
30 Hairy Woodpecker	1	2	-	-	1	4
31 Yellow-bellied Sapsucker	1	2	-	-	1	4
32 Phoebe	1	2	-	-	1	4
33 Wood Pewee	1	2	-	-	1	4
34 Brown Creeper	1	2	-	-	1	4

Species	Total		Group 1		Group 2	
	#	#/10h	#	#/10h	#	#/10h
35 Veery	1	2	1	4	-	-
36 Ruby-crowned Kinglet	1	2	1	4	-	-
37 Red-eyed Vireo	1	2	1	4	-	-
38 Black-throated Blue Warbler	1	2	-	-	1	4
	sp		sp		sp	
	58 187	394	30 95	422	32 92	368

Comment. The differences for the two groups can largely be assigned to the variation in the habitat. Group 2 in particular had many edge birds and in general got a smaller number of birds more restricted to the bog. It can correctly be stated that originally bog areas in general contained greater amounts of edge than upland forests did, and that since this edge was and is a distinctive part of the bog, to include the birds that occur there is a reasonable attitude, but we did not (and could not conveniently) determine if we surveyed the proper proportion of edge. Other factors are concealed by this major difference.

Pine Forest Community

Survey of area. Saturday morning, July 13, 1946; time for Group 1 - 9:55-10:55AM, time for Group 2 - 9:55-11:25AM; 14 persons in two groups; weather warm, scattered clouds. Area north of Douglas Lake Hotel road and west of Maple River; Sect. 26, Twp. 37 N., R. 4 W., Emmet County.

Description of area. The predominant tree is Red Pine (Pinus resinosa) (many 10-20" in diameter) with numerous White Pine (Pinus Strobus). Secondarily there is Aspen (Populus tremuloides and P. grandidentata) especially on the edges of the area. There is a smaller number of deciduous trees. The predominant ground vegitation is Poison Ivy (Rhus Toxicodendron). The area was logged prodigally in the last century and has now returned to a fairly pure stand. The height of leaved branches ranges about 15 to 30 feet.

Relative abundence of the birds seen:

Species	Total #	Total #/10h	Group 1 #	Group 1 #/10h	Group 2 #	Group 2 #/10h
1 Oven-bird	13	52	6	60	7	47
2 Black-Capped Chickadee	7	28	4	40	3	20
3 Hermit Thrush	7	28	4	40	3	20
4 Robin	6	24	5	50	1	7
5 Wood Pewee	5	20	3	30	2	13
6 Red-eyed Towhee	4	16	3	30	1	7
7 Junco	4	16	2	20	2	13
8 Chipping Sparrow	4	16	1	10	3	20
9 Yellow-shafted Flicker	3	12	1	10	2	13
10 Crow	3	12	2	20	1	7
11 Myrtle Warbler	3	12	-	-	3	20
12 Nighthawk	2	8	1	10	1	7
13 Brown Thrasher	2	8	-	-	2	13
14 Cedarwaxwing	2	8	1	10	1	7
15 Cowbird	2	8	1	10	1	7
16 Ruffed Grouse	1	4	-	-	1	7
17 Downy Woodpecker	1	4	-	-	1	7
18 Crested Flycatcher	1	4	1	10	-	-
19 Blue Jay	1	4	-	-	1	7
20 Red-eyed Vireo	1	4	-	-	1	7
21 Black-thtd. Green Warbler	1	4	-	-	1	7
22 Indigo Bunting	1	4	-	-	1	7
23 Purple Finch	1	4	-	-	1	7
24 Vesper Sparrow	1	4	-	-	1	7
	sp 24	76 304	sp 14	85 550	sp 23	41 273

Comment. Edge effect (aspens) was especially important in the accounts of Group 1. The other major factor is that of the time of the morning which probably accounts for the low count of Black-throated Green Warblers and the order of some of the more abundant birds. The value of the results is definitely limited by these factors.

Mature Aspen Forest

Survey of area. Saturday morning, July 13, 1946; time for Group 1 - 5:10-6:40AM, time for Group 2 - 5:10-6:30AM; 12 persons in two groups; weather partly cloudy, warm. Aspen area south and east of the Biological Station; Group 1 starting from fire tower east, across entrance drive northeast on trail to second fire break and east to Cheboygan road; Group 2 from fire tower to about half mile west; Sect. 27, 34, 34, Munro Twp. (T. 37 N., R. 3 W.), Cheboygan County, Michigan.

Description of area. The area back of the station consists mostly of Aspen (Populus grandidentata and Pl tremuloides, about 4 to 1), ½ to 4 inches in diameter and 8 to 25 feet high. The original vegitation was Pine forest which after lumbering and fire changed to Aspen. There are some Pine that were planted (Red, White, and Jack Pine; Pinus resinosa, P. Strobus, and P. Banksiana) some years ago; other than these the Pine are well distributed indicating a futuher return to the original vegitation. In the area immediately east of the entrance drive the aspen are mostly larger (up to 35' in height). Along the lake shore there are a number of older Pine which probably furnish much of the seed for the area. Of secondary importance are moderate numbers of other deciduous trees: Red Maple (Acer rubrum), Red Oak (Quercus rubra), White Birch (Betula alba), and Juneberry (Amelanchier). There are a number of shrubs. The ground cover consists of mosses, but mostly Bracken (Pteris aquilina) and Sumac (Rhus sp.).

Relative abundence of the birds seen:

Species	Total #	Total #/10h	Group 1 #	Group 1 #/10h	Group 2 #	Group 2 #/10h
1. Red-eyed Vireo	22	78	12	80	10	75
2 Oven-bird	21	74	14	93	7	53
3. Robin	11	39	4	27	7	53
4 Cedar Waxwing	9	32	4	27	5	38
5 Cowbird	7	25	4	27	3	23
6 Crow	6	21	3	20	3	23
7 Black-capped Chickadee	6	21	3	20	3	23
8 Wood Pewee	5	18	2	13	3	23
9 Chipping Sparrow	5	18	4	27	1	8
10 Mourning Dove	4	14	1	7	3	23
11 Hermit Thrush	4	14	3	20	1	8
12 Crested Flycatcher	3	10	3	20	-	-
13 Nighthawk	2	7	1	7	1	8
14 Kingbird	2	7	1	7	1	8
15 Purple Martin	2	7	1	7	1	8
16 Vesper Sparrow	2	7	-	-	2	15
17 Black-billed Cuckoo	1	4	-	-	1	8
18 Yellow-shafted Flicker	1	4	-	-	1	8
19 Tree Swallow	1	4	1	7	-	-
20 Pine Warbler	1	4	1	7	-	-
21 Redstart	1	4	1	7	-	-
22 Indig. Bunting	1	4	1	7	-	-
23 Purple Finch	1	4	1	7	-	-
	sp 23	118 417	sp 20	65 433	sp 17	53 397

Comment. Results agree fairly well in most species. More

each group. The lack of Vesper Sparrows reported by one group was evidently due to their attributing the birds to the nearby field association. The abundence of Clay-colored Sparrows, whether it is representative of this type of area or not, is not representative of the young Aspen or field edge in this region. The area as a field edge added birds which would not have been in the area as a young Aspen community surrounded by more young Aspen. In general these statistics are of limited worth.

Open Field Community

Survey of area. Saturday morning, July 13, 1946; time for all three groups - 7:55-8:55AM; 13 persons in three groups; weather warm, scattered clouds. Field running about three-fourths of a mile along, north of, and parallel to the Pellston road just east of Pellston; Sect. 35, Twp. 37N., R. 4W., Emmet County, Michigan.

Description of area. Stumps of thecut and burned original Pine occur frequently over the area. There are only a few dead and dying trees in the area (second growth). Scanty grass, abundant Bracken (Pteris aquilina)and Milkweed (Asclepias) are the only important plants. The field is poor pasture and if neglected will soon be covered with young Aspen similar to the above.

Relative abundence of the Birds seen:

1Species	Total		Group 1		Group2		Group 3	
	#	#/10h	#	#/10h	#	#/10h	#	#/10h
1 Vesper Sparrow	27	90	10	100	9	90	8	80
2 Horned Lark	7	23	1	10	5	50	1	10
3 Eastern Meadowlark	4	13	2	20	1	10	1	10
4 Marsh Hawk	3	10	1	10	1	10	1	10
5 Kingbird	3	10	1	10	2	20	-	-
6 Barn Swallow	3	10	1	10	1	10	1	10

Species	Total		Group 1		Group 2		Group 3	
	#	#/10h	#	#/10h	#	#/10h	#	#/10h
7 Starling	3	10	1	10	1	10	1	10
8 Goldfinch	3	10	1	10	1	10	1	10
9 Upland Plover	2	7	1	10	1	10	-	-
10 Mourning Dove	2	7	-	-	1	10	1	10
11 Cowbird	2	7	2	20	-	-	-	-
12 Bluebird	1	3	1	10	-	-	-	-
13 Bobolink	1	3	-	-	1	10	-	-
	sp —	—	sp —	—	sp —	—	sp —	—
	13 61	203	11 22	270	11 24	240	8 15	150

Comment. The area was not large enough, and the groups were too close together. With several species the same individual was recorded by all groups as the only one of the species identified; to include these records for all three groups would in general tend to raise the relative abundence of the bird (especially larger birds), but to consider the bird as seen only once in the total period would be to lower the rank unduly and counteract the advantages of a per unit (hour, mile) counting scheme. Lack of sufficient area in this case is the equivalent of lack of sufficient field time, the other major factor contributing to the error.

BIRDS

The species are listed in taxonomic groups. The arrangement and nomenclature of passerine birds follows Mayr (Auk 63(1):64-69, Jan. 1946). Tables are given with data as number per 10 hours and per cent of total population of the community (# per 10 hours/ % of total).

Non-Passerine Birds

	Beech Maple	Bog	Pine	Mature Aspen	Young Aspen	Field
Cooper's Hawk	2/0.4					
Marsh Hawk						10/4.9
Ruffed Grouse	2/0.4		4/1.3			
Upland Plover						7/3.3
Mourning Dove		13/22		14/3.4		7/3.5
Black-bill Cuckoo				4/0.8		
Barred Owl	2/0.4					
Nighthawk		4/1	8/2.6	7/1.7	40/14.3	
Flicker	2/0.4	6/1.6		4/0.8		
Pileated Wdpkr	2/0.4					
Ylw-bld Sapsucker		2/0.5				
Downy Wdpkr			4/1.3			
Hairy Wdpkr		2/0.5				

Statistics concerning these families are too spotty to give any suitable results. In the two cases where the numbers are 4% of the total, there is reason to believe that the figures are inaccurate.

Marsh Hawk--nests on ground and harrys terrestrial prey so requires large open area.

Cooper's Hawk--insufficient data; nests in trees and uses trees for watching posts so would need wooded area or edge.

Ruffed Grouse--shade loving(?) ground bird that uses deciduous leaves in its nest so would require presence of underbrush and possibly deciduous trees.

Upland Plover--open upland nesting and feeding ground; so, restricted to fields.

Mourning Dove--requires sufficient ground seed plants for food and shrubs or small trees for nesting (although it will nest on the

ground). The bog birds were probebly all edge; the deciduous forest would probebly yeild some Doves on the edge; I can give no explanation for its abscence in the Pines other than that we missed it.

Black-billed Cuskoo--insufficient data; requires trees for nesting and feeding.

Barred Owl--insufficient data; requires trees for nesting, somewhat open woodland for hunting.

Nighthawk--will feed over any area where there is food.

Yellow-shafted Flicker--needs dead wood (since tree boring is not its regular method of feeding) for nests of sufficient diameter; needs open areas for ground feeding and shrubs for berries and fruit.

Pileated Woodpecker--requires dead timber for feeding (also berries and acorns; large cavities for carpenter ants are only a winter necessity); need large deciduous trees for nesting; these factors tend to keep the Pileated in extensive deciduous forests.

Yellow-bellied Sapsucker--insufficient data; needs trees for nesting and feeding.

Downy and Hairy Woodpecker--insufficient and confusing data.

Tyrannidae-Alaudidae-Hirundinidae-Troglodytidae-Mimidae

	Beech Maple	Bog	Pine	Mature Aspen	Young Aspen	Field
Kingbird				7/1.7		10/4..
Crested Flycatcher	12/2.5	11/2.7	4/1.3	10/2.5		
Phoebe		2/0.5				
Least Flycatcher	28/5.9					
Wood Pewee	37/7.8	2/0.5	20/6.6	18/4.2		
Horned Lark						23/11.5
Tree Swallow				4/0.8	7/2.4	
Barn Swallow						10/4..
Purple Martin				7/1.7		
Winter Wren		6/2.1				
Brown Thrasher			8/2.6			

Swallows which were recorded feeding over open areas may have been feeding over denser areas and escaped detection (no evidence here for such

either choice). The flycatchers show diversity among the species, although in general they would require at least a certain amount of open area to do their flycatching.

Kingbird--occurs where it can have an elevated perch to call from and look over an open area. The occurence in the aspens was in connection with a road. The use of a stump for a nesting site which is frequent in treeless plains cannot be explained here as a lack of nesting sites. Perhaps it was more desireable than a tree nesting site which might have only had one side towards the open area.

Crested Flycatcher--it is of somewhat similar abundence in the wooded habitats where the boles ar of sufficient diameter for the nest sites. The lower density is too subject to statistical error to be analysed.

Phoebe--insufficient data; perhaps we were not near enough to man-made habitations and bridges.

Least Flycatcher--the factors involved are not brought out by these data.

Wood Pewee--the usual nesting site on a horizontal limb or crotch would not be satisfied by bog trees (where it was scarce) or young Aspen and fields (where it was absent).

Horned Lark--requires a baren area at the initiation of nesting which was satisfied only in the field (it was in the area that had less bracken; perhaps earlier it used more of the field).

Tree Swallow, Barn Swallow, Purple Martin--since all three species are predominantly dependant on man made structures, the occurence of feeding birds would probibly correlate with the proximity of such objects.

Winter Wren--requires dense underbrush for a nesting site which was satisfied only in the bog; whether it would nest in dense upland thickets in this area is problematical.

Brown Thrasher--a bird of generalized feeding habits, requires only thick underbrush for nesting; should be found mostly in edge situations.

Muscicapidae (Turdinae (Turdidae), Sylviinae (Sylviidae))-Paridae-Sittidae-Certhidae

	Beech Maple	Bog	Pine	Mature Aspen	Young Aspen	Field
Robin	3/0.7	25/6.8	24/7.9	39/9.5		
Wood Thrush	5/111	4/1.1				
Hermit Thrush			28/9.2	14/3.4		
Veery	45/9.5	2/0.5				
Bluebird				6	13/4.8	3/1.6
Ruby-crowned Knglt		2/0.5				
Golden-crowned K.	5/0.7	38/9.6				
Chickadee	3/0.7	19/4.8	28/9.2	21/5.1		
Red-br. Nuthatch		4/1.1				
White-br Nuth.	8/1.8					
Brown Creeper		2/0.5				

These data do not yeild themselves to analysis very well; there seem to be enough differences in individual species of a family to allow analysis of such meager data.

Robin--generalized habits (but requires trees for nesting) have made this bird well distributed particularly in edge situations; I do not know why it was nearly absent from the Beech-Maple list.

Wood Thrush--this bird ordinarily found in deciduous woods is here found mostly in bogs; the ecology has not been worked out.

Hermit Thrush--this bird ordinarily found in coniferous woods is here quite common in Aspen (although more common in Pine); I don't know why.

Veery--nesting site on mossy hummocks with fairly dense undergrowth for feeding and cover; this would explain the occurence but not the relative abundence of the bird.

Bluebird--found in edge areas; needs cavities in trees or stumps (or artificial boxes) for nesting and open brushy territory for feeding.

Ruby-crowned and Golden-crowned Kinglets--this is at the southern extremity of the Ruby-crown's range, but it is similar to the Golden-crowned in behavior. Both birds nest in the top clumps of evergreens the presence of which restricts them to lowland tree bogs or upland evergreen such as Hemlock in a deciduous forest.

Black-capped Chickadee--requires a dead stump for nesting and dead or ill trees for feeding; this condition corresponds with its distribution except for its scarcity in the Beech-Maple-Hemlock Forest.

Red-breasted and White-breasted Nuthatch--the records show the preference of the first for coniferous growth and the second for deciduous; the reasons for a difference are speculative.

Brown Creeper--insufficient data; needs loose bark.

Fringillidae-Thraupidae

	Beech Maple	Bog	Pine	Mature Aspen	Young Aspen	Field
Indigo Bunting			4/1.3	4/0.8		
Purple Finch	3/0.7	8/2.1	4/1.3	4/0.8		
Towhee		4/1.1	16/5.3			
Goldfinch					7/2.4	10/4.3
Vesper Sparrow			4/1.3	7/1.7	75/26.2	80/44.2
Clay-colored Sp					87/31	
Junco		4/1.1	16/5.3			
Chipping Sparrow			16/5.3	18/4.2	47/16.7	
White-tht Sp.		8/2.1				
Song Sparrow		6/1.6				
Scarlet Tanager	17/3.5	6/1.6				

As might be expected in seed eating birds are buntings are most common in the fields and the field edge (young Aspen). In the other communities there is fair correlation with the amount of ground vegitation and the type (production of seeds mostly). The finchs are quite variable. For tanagers see the one species.

Indigo Bunting--insufficient data; probably edge.

Purple Finch--This shows a rough correlation with the abundence of evergreens which it uses as a nest site.

Red-eyed Towhee--this ground feeder and nester is apparently best satisfied under edge conditions.

Goldfinch--our data only indicates a preference for open localities.

Vesper Sparrow--intimately associated with grasses - it nests among them and eats their seeds; its occurence in young Aspen is due to patches of field.

Clay-colored Sparrow--a short bush sparrow which is quite uncommon in this region; because of this local distribution a figure all out of proportion to its abundence was arrived at.

Junco--prefers Pines for singing but nests on the ground; the resons are obscure.

Chipping Sparrow--bushes or trees for nesting and areas for ground feeding; therefor, it is most abundent as an edge bird.

White-throated Sparrow--the one occurence in edge is insufficient data.

Song Sparrow--the listed occurence in the bog is certainly misleading unless one realizes that all of the birds were in the edge; this data is insufficient for satisfactory analysis.

Scarlet Tanager--the appearance in the bog (it was more abundent in Beech-Maple-Hemlock) is confusing since farther south it has a decided preference for deciduous forest.

Parulidae (Compsothypidae)

(Table on following page.)

The predominence of most species in the bog and its edge is shown clearly in the table. This is largely due to the variety of conditions available, but largely on the presence of evergreen which are preferred by many species (the low warbler count in Pines (except Ovenbird) would have

been partially modified by an earlier trip (by season and day)).

	Beech Maple	Bog	Pine	Mature Aspen	Young Aspen	Field
Blk &White Wblr.	2/0.4	15/3.7				
Nashville Wblr.		19/4.8				
Parula Warbler		21/5.3				
Blk-tht Blue W.		2/0.5				
Myrtle Warbler		4/1.1	12/3.9			
Black-tht Green W	25/4.9	55/13.4	4/1.3			
Blackburnian W.	8/1.8	15/3.7				
Pine Warbler				4/0.8		
Ovenbird	83/17.5	11/3.2	52/17.1	74/17.8		
Yellow-throat		6/1.6				
Canada Warbler		4/1/1				
Redstart	92/19.4			4/0.8		

Black and White Warbler--has a preference for deciduous woodlands (here in edge situations); hummock forming dead logs and ground vegitation would be desireable since it nests in sheltered ground sites.

Nashville Warbler--said to prefer deciduous vegitation (its occurance in the bog is unexplained); has ground nesting site.

Parula Warbler--its requirement for Usnea restricts it to the distribution of this moss which is in moist woods or bogs.

Black-throated Blue Warbler--insufficient data, but an edge bird.

Myrtle Warbler--needs conifers for nesting (usual nest site at lower levels).

Black-throated Green Warbler--preference for conifers explains the distribution; perhaps the Pines in Aspens are too far apart.

Blackburnian Warbler--requires tall trees for singing and a nesting site so that it can be away from the trunk yet very high; this is possible in Hemlock and in the bog. I do not know why Pine is apparently unsuitable.

Pine Warbler--found here only in seed Pine on the lake shore; there is a general restriction to Pine; perhaps it has merely a local occur-

ance here which might explain its abscence from the Pine study area.

Ovenbird--ground feeding and nesting requirements (need deciduous leaves for its nest) explains their distribution. Probebly the most successful bird in the region.

Yellow-throat--the only place where this bird was found was in a small cattail marsh in the bog; this type of territory is one of the few that produces the luxurient grassy grassy growth that it requires for nesting.

Canada Warbler--insufficient data; desires a deciduous undergrowth (ground nester).

Redstart--nests in short deciduous trees; perhaps shade is disireable; our data can take us no further.

Vireonidae-Icteridae-Bombycillidae-Sturnidae-Corvidae

	Beech Maple	Bog	Pine	Mature Aspen	Young Aspen	Field
Blue-hd Vireo		11/2.7				
Red-eyed Vireo	87/18.3	2/1.1	4/1.3	78/18.6		
Bobolink						3/1.6
East Meadowlark						13/6.6
Cowbird	5/1.8	11/2.7	8/2.6	25/6		7/3.3
Cedar Waxwing		19/4.8	8/2.6	22/7.6"	7/2.4	
Starling						10/4.9
Blue Jay		17/4.3	4/1.3			
Crow			12/3.8			

The Icteridae without a good proportion of important species cannot be analized, so all families are treated under the species involved.

Blue-headed Vireo--a rather unusual bird in this region; prefers evergreens.

Red-eyed Vireo--the very decided preference for deciduous forest is well brought out; there are many more sites for a Red-eye's nest in a deciduous forest than in a coniferous forest.

Bobolink--requires fields for feeding (insects) and nesting (with concealing vegitation); needs some singing posts.

Eastern Meadowlark--ground feeding and nesting with a flight song(and regular songs from perchs) are the adaptations of this bird for field life.

Cowbirds-adaptation in reproduction and generalization in other habits removes restrictive boundries.

Cedar Waxwing--prefers woodland edge where there are sufficient nesting sites (usually rather small trees) and presence of fruit(here uses the abundent Amelanchier).

Starling--with omniverous feeding habits the greatest restriction is the nesting site, nearly any cavity or enclosure (fields are not the regular habitat of Starlings, but the presence of a cavity in a dead tree was all that was necessary for the use of these birds).

Blue Jay and Crow--data insufficient and inaccurate for such wide ranging woodland birds.

BIRDS OF A LARGE FRESH WATER LAKE

Visits were made to areas in northern Lake Michigan to study colonial nesting birds. On July 7, 1946, the class had an all day trip to Hat and Shoe Islands (about 8 miles northeast of Hog Island, Beaver Islands, Charlevoix County). The planned stop at the reefs of Waugoshance Point, (ilderness State Park, Emmet County) was cancelled; these reefs were examined on July 20, 1946. (For locations see Map 1).

Birds of Shoe Island. Shoe Island is a small sand and gravel island, about 100 meters long and 0 to 40 meters wide (dimensions guesswork) which would be about one-half acre. The larger end extended about a meter above the water and had about 4 or 5 square meters of bushes, the only vegitation on the island.

Caspian Tern--in all portions of the island; population:

young of	100	pairs banded (estimate from 175 banded young)
young of	10	pairs escaped (estimate)
nests with eggs of	90	pairs (count)
Total	200	pairs

Herring Gull--two partly grown young banded and one nest with eggs; poulation probebly 2 or 3 pairs.

American Merganser--see below.

Birds of Hat Island. Hat Island is slightly oval shaped and about 3/4ths as wide as it is long with a guess of about 350 meters long which would bring the area to about 20 acres. There is a sand and gravel beach 2-3 meters wide, inside of this an area raised about a meter above the beach covered largely with shrubs, and a central area of trees (mostly birch and some cedar) 25-35 feet high), but the very center had been cleared as a bombing target and is now overgrown with shrubs.

Herring Gull--occured mostly in the shrubby area above the beach; population:

young birds banded--19

young too small to band--at least 5 nests

nests with eggs--10 or more nests

many nests where the young had left and were proebly out on the water

Estimated total population--50 to 125 pairs

Spotted Sandpiper-- 8 pairs (estimated) along 1/2 to 3/4 mile of sandy beach; 1 young about 10 days old discovered in the brush; there may have been more in the very center of the island.

Bald Eagle--one seen flying from Hat to Hog Island when we approached; the nest on the island was not used this year; there was a 6 foot deep crater next to the tree. The nest was 18' high at the top edge, about 6' across, 3-4' from top to bottom, and in a 25' high birch (few higher possible sites).

Red-wing Blackbird--3 or 4 seen, probebly more; in inner area.

Yellow Warbler--1 male heard singing.

Mourning Warbler--seen by others.

Song Sparrows--2 males heard.

American Mergansers--see below.

American Mergansers --population on whole trip: (adults and young)

Hat Island	60
Shoe Island	10
Tern reefs	50

additional scattered birds

Total--200 birds or about 100 pairs in a 40 mile round trip

Waugoshance Point Terneries. Off-shore reefs on the north side of the point extend for several miles forming long islands of various shapes and sizes. There were two terneries, the smaller (A) near the end of the road, and the larger (B) by Waugoshance Island.

Common Tern--counts of the nests and their contents are listed below; the young were no more than a very few days old.

Nest content	East Group (A) A0	A1	A2	A3	A Total	West Group (B) B1	B2	B3	B4	B Total	A & B Total
1 egg	1	24		2	27	12	7	7	96	122	149
2	1	95	1	1	98	16	9	17	148	190	288
3		47	1		48	5	6	10	77	96	144
4		2			2		2	2		4	6
5							2			2	2
6							1			1	1
8									1	1	1
1 young		2			2			1	3	4	6
2		1	1		2				1	1	3
	2	171	3	3	179	31	27	38	325	421	600

Total Population--600 pairs.

Piping Plover--at least two pair nested on the reefs, but neither of them on the islands with the Common Terns.