IBS #1392-B

A COMPARISON OF BREEDING BIRD CENSUS RESULTS FROM A CONIFEROUS AND HARDWOOD FOREST.

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IN FULFILLMENT OF CREDIT FOR

BIOL. 5890

Independent study and Field Ornithology Course
Very nice job. FCJ

Introduction

The character of Itasca State Parks' forests have been in constant flux for the last 45,000 years. The forces responsible for such fluctuations are numerable and have been extensively researched. They include glaciation, (Wright and Rhue 1965) climatic changes, (McAndrews 1966 and Janssen 1967) fire, (Frissell 1971 and 1973) forest pathogens, (Hansen et. al. 1974) animal overpopulation, (Dobie 1959 and Anfang 1972) and logging (Aasang 1976).

Of these factors, logging and fire have most recently had the most dramatic influences. Between the years 1901 and 1919, through the combined efforts of 12 lumber companies, 5,305 hectares of the park were either partially or completely cut over (Aasang 1976). Between the years 1650 and 1922 a total of 32 fires significantly altered forest species distribution. Fire size ranged from 234.8 hectares in 1913 to 12,522 hectares in 1864-leaving 99% of the original park burned. (Frissell 1973).

The consideration of statistics such as these often raises a question researched extensively in the fields of ecology and ornithology: How dramatic have these events been on the original animal distributions of the areas involved? Or more specifically, for the purposes of this research, to what extent has the original bird species frequency and distribution been affected as a result of the fires and logging operations at Itasca?

To answer such a question on species distribution a number of approaches could be taken. One approach would be to consult the literature regarding the two prominent distribution theories with special reference taken to species-specific avian habitats. Each of these two theories have divided the

continent into different regions, each of which has its own unique species present.

The"Life Zone Theory", developed by Merriam (1895) places emphasis on temperature as an important limiting factor in species distribution and proposed a set of laws to explain the phenomenon. The "life zones" are temperature zones mapped out in accordance with certain lines (isotherms) across the continent that have the same temperature at the same period of the year. Consequently, life zones appear on the map as broad transcontinental bands each containing characteristic bird populations. North America is divided into ten life zones with Minnesota falling into two, the Canadian and Transitional.

The second theory, the "Biotic Community Theory" uses the concept that the world is divided into natural biomes in which, under conditions undisturbed by man, the vegetation eventually reseaches a stable climax. Theoretically, this climax will maintain itself indefinitely. Of the 18 different biomes in North America, Minnesota falls into 4; coniferous forest, coniferous-deciduous forest ecotone, deciduous forest, and deciduous forest - grassland ecotone. Through the information compiled in conjunction with these theories we could construct a species distribution throughout the varying habitats of the park.

Another method to approach this question of bird species distribution is to utilize the present character of the park itself. Itasca still has representatives of the original forest stands- both coniferous and hardwood forests. By censusing such representative groups and utilizing information on the park's pre-and post-settlement habitat distribution we could, as with the

distributional theories, construct tables illustrating both the original and present species frequencies of the park.

Investigations of historic journals and land survey records indicate that the presettlement forests of Itasca were composed primarily of aspen (Populus tremuloides)and white birch (Betula papyrifera)with red,(Pinus resinosa) white, (Pinus strobus)and jack pine stands (Pinus banksiana).(Frissell 1971). The distribution was approximately 65% coniferous and 35% hardwood stands. In contrast the present distribution is approximately 25% coniferous and 75% hardwood (Frissell 1973).

Since the park has representatives of both original forest stands and as information on the parks original vegetation is available, the method of censusing was decided upon to determine how such factors as fire and logging have altered the bird species distribution of Itasca State Park.

Methods

Two stands were selected to represent the parks coniferous and hardwood forests. The first was a 12.75 hectare portion of the Wilderness Sanctuary located west of Lake Itasca on wilderness drive. The stand originated after a major fire in 1712 (Frissell 1973), was acquired by the park in 1892 (Aasang 1976), and contains primarily red pine (53%), balsam fir (12.9%) and white birch (7.6%). The second site, located on Bear Paw Point, was originally a red pine forest when acquired by the park in 1892, but was clear cut during logging operations in 1912. The 8.75 hectare plot chosen contains primarily elm(31.8%), black ash (22%)

and white birch (13%).

Both of the areas were gridded according to the guidelines set by the National Audubon Societys' breeding bird census (American Birds 1972). Teams of 4, using a tripod mounted Brunton pocket transit, set stakes at 50 meter intervals until the desired acreage was established.(appendix A) The red pine stand was gridded specifically for this study by the author and members of the field ornithology class from June 19-25. The actual census dates were June 29,30,July 2,3,5,9-11 between 0500-0900 and 1830-2130 hours. The hardwood stand was originally gridded in June 1979 by the field ornithology class FOR A CENSUS conducted July 1979 (IBS 1307-B). The data used for this study was collected by B.Bell and M. Candee for a census conducted July 1-13 between 0500-1000, 1330-1530 and 1900-2300 hours.

Results

Frequency tables 1 and 2 list the species found in the two censused areas. Table 3 lists the species unique to each area while table 4 lists the species common to both. The comparative information of tables 3 and 4 is given in # of territorial males/ km.^{2} rather than the original # of territorial males/ area censused. This conversion provides uniformity for comparing forest stands of equivalent acreage.

All of the frequency variation among the species can be dicussed in terms of the habitat SIMILarities and differences between the two areas. For example, the nearly identical % ground cover and shrub cover(coniferous 79.3% gc, 48.5% sc ; hardwood 77.5 gc, 49.5%sc) accounts for the similarities of the ovenbird

populations of 196/km.^{2} coniferous; 137/km.^{2} hardwood. The presence of the yellow-bellied sapsucker was found to vary directly with the % differences of white birch, with which it was commonly associated (feeding and nesting) throughout the censuses(7.6% white birch to 23males/km.^{2} coniferous; 13.04% white birch to 29males/km.^{2} hardwood).

With species such as the red-eyed vireo and pine warbler frequency differences were a result of the overall composition of each forest. The red-eyed vireo is commonly found in deciduous forests and the pine warbler is commonly found in pine woodlands (red-eyed vireo 229males/km.^{2} hardwood; 101 males/km.^{2} coniferous: pine warbler 11 males/ km.^{2} hardwood; 70 males/ km.^{2} coniferous).

The frequency differences in the winter wren and common yellowthroat, associated with low vegetation in bogs and marshes, is a result of the unequal number of such habitats between the two areas. The coniferous stand had one wetland clearing near the center of the plot where the adult male of each species was found, and the hardwood forest had two such habitats within which the two adult males of each species was found.

Of the 17 species found only in the hardwood stand (table #3) all are typically found in a temperate deciduous forest biome. (with the exception of the two species cited above common to cleared wetland) Of the 12 species found only in the coniferous stand, the goshawk,black-backed three-toed woodpecker, eastern wood pewee, gray jay, red-breasted nuthatch, swainson's thrush and red crossbill are considered primary breeding species in a pine community. The remaining 6 are considered residents of mixed communities.

We are now in a position to answer the original question

posed for this study. However, such an answer involves more than simply altering species population numbers in accordance with the original habitat distributions. In order to envision a presettlement bird distribution we must integrate into our understanding the random influences of fire prior to the logging operations of 1901. The populations of many of the species listed in tables 4 and 7 would have fluctuated directly with fire frequency. Fires which completely cleared the deciduous growth in the red pine stands would eliminate the species associated with mixed stands. With a major fire occuring every 10.3 years (Frissell 1973) we can imagine a very dynamic redistribution process. As the deciduous grouth regained its former momentum species such as the ovenbird, red-eyed vireo, black and white warbler, yellow-bellied sapsucker and veery would begin to repopulate the area.

Those birds considered residents of the coniferous forests would have remained relatively stable. Therefore, pre-settlement populations would have been primarily composed of pine community species -nearly 3 times the present size. Hardwood and mixed community species would have been less than the numbers found today. These populations would have been dependent on forest fire frequency.

Today the high % of ground and shrub cover and complete lack of pine seedlings in the red pine forest indicate the succession present today. This strong development of shrubs and hardwoods is a direct result of Itasca's fire protection management practices during the last 60 years. Since the development of red pine understory is possible only in open stands with little brush or other competitive vegetation, it is strongly recommended that a program of active management replace past protectionistic practices.

The preservation of such primitive areas is desirable not only from an aesthetic point of view, which was the original impetus of the parks establishment, but from a practical one as well. ' Through the study of its many plants and animals man may yet understand and appreciate the life of this region in its primeval condition.' (Taken from the dedication plaque at the entrance to the wilderness sactuary)

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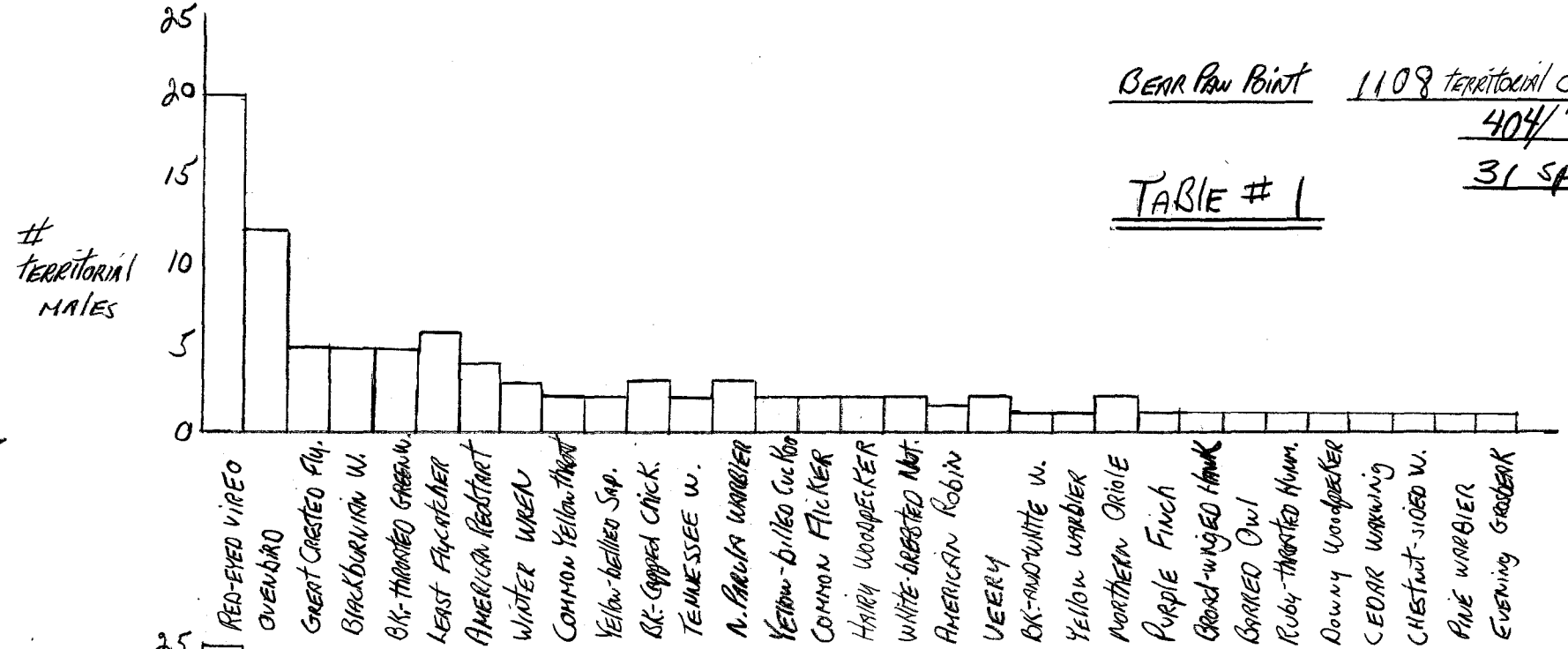
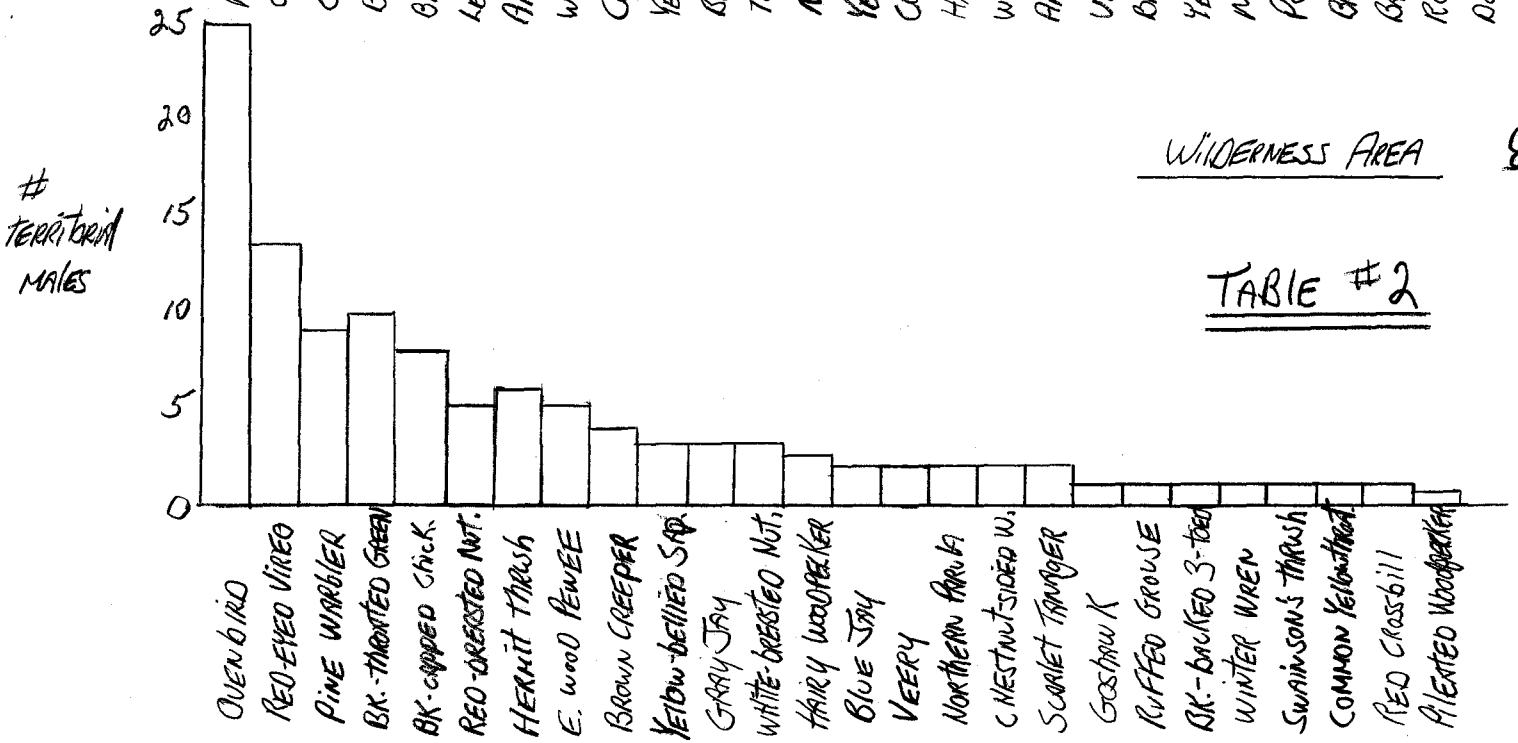


Bear Paw Point — 1108 territorial ♂/Km²
404/100 acres
31 species

TABLE #1



Wilderness Area — 894 territorial ♂/Km²
361/100 acres
26 species

TABLE #2

FREQUENCY VARIATIONS AMONG SPECIES UNIQUE TO EACH AREA.

TABLE #3

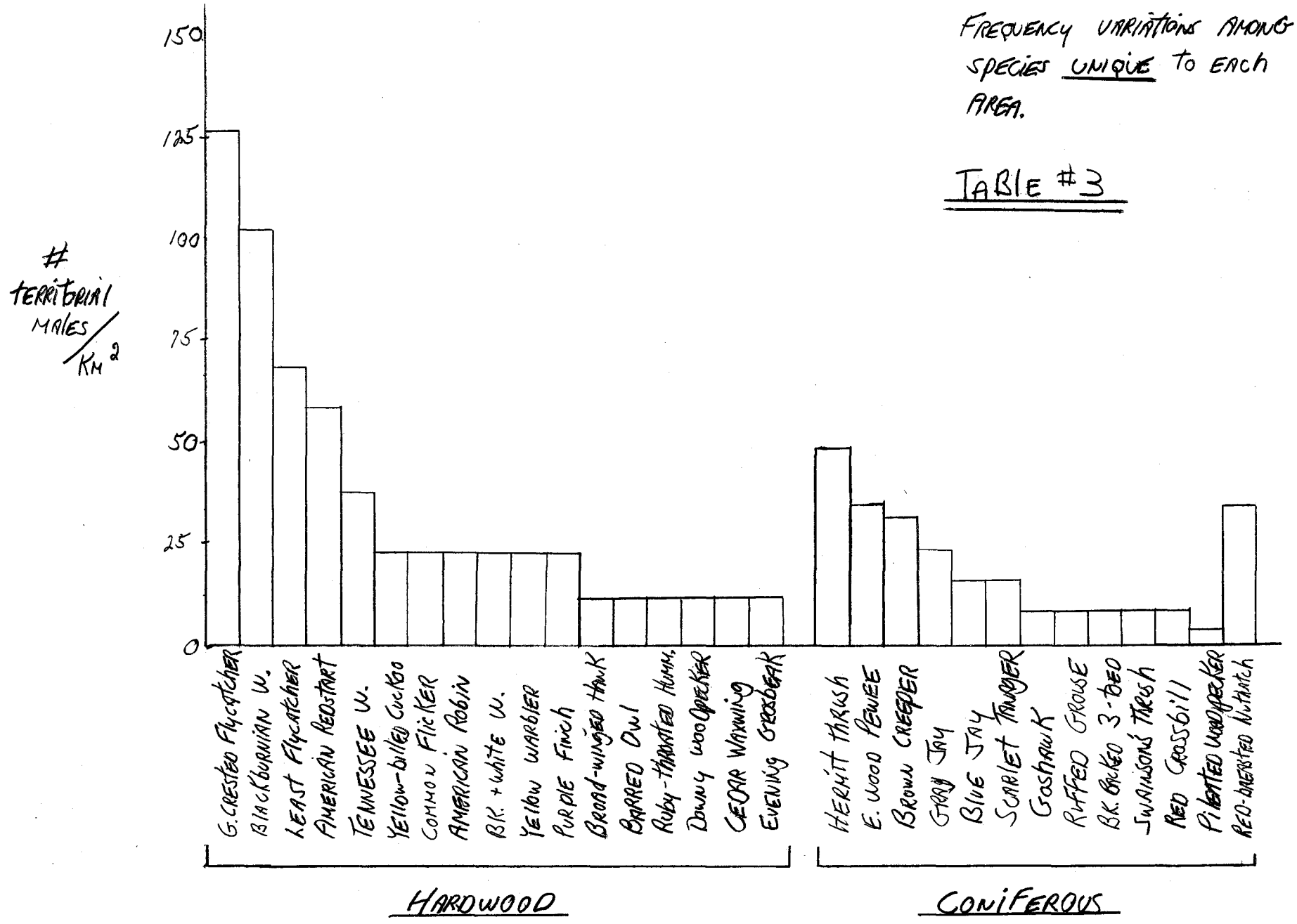


TABLE #4

FREQUENCY VARIATIONS BETWEEEN SPECIES COMMON TO BOTH THE CONIFEROUS (OPEN BARS) AND HARDWOOD FORESTS.

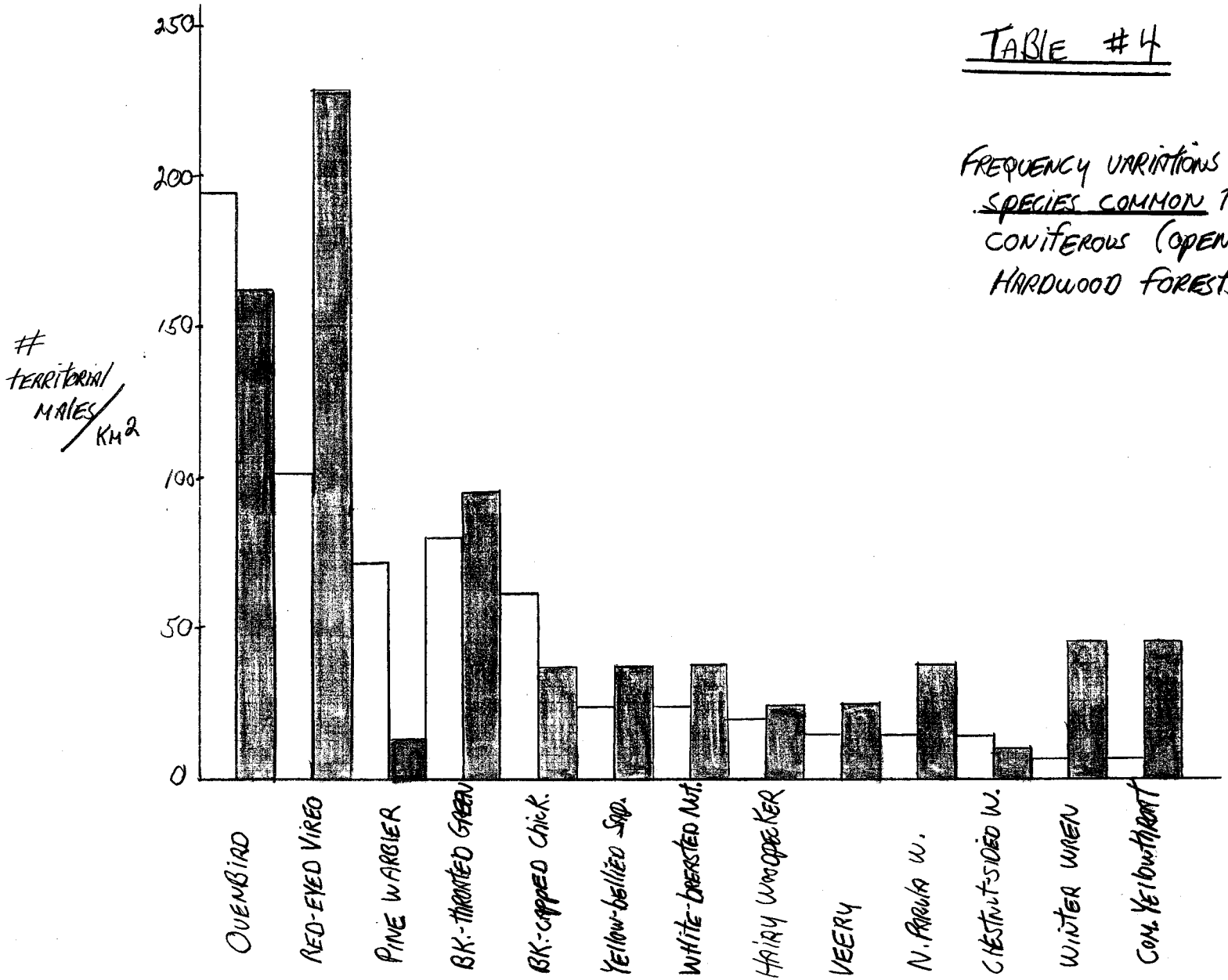


TABLE #5

A COMPARISON between the STRUCTURE of the VEGETATION IN the CONIFEROUS (OPEN BARS) AND HARDWOOD FORESTS.

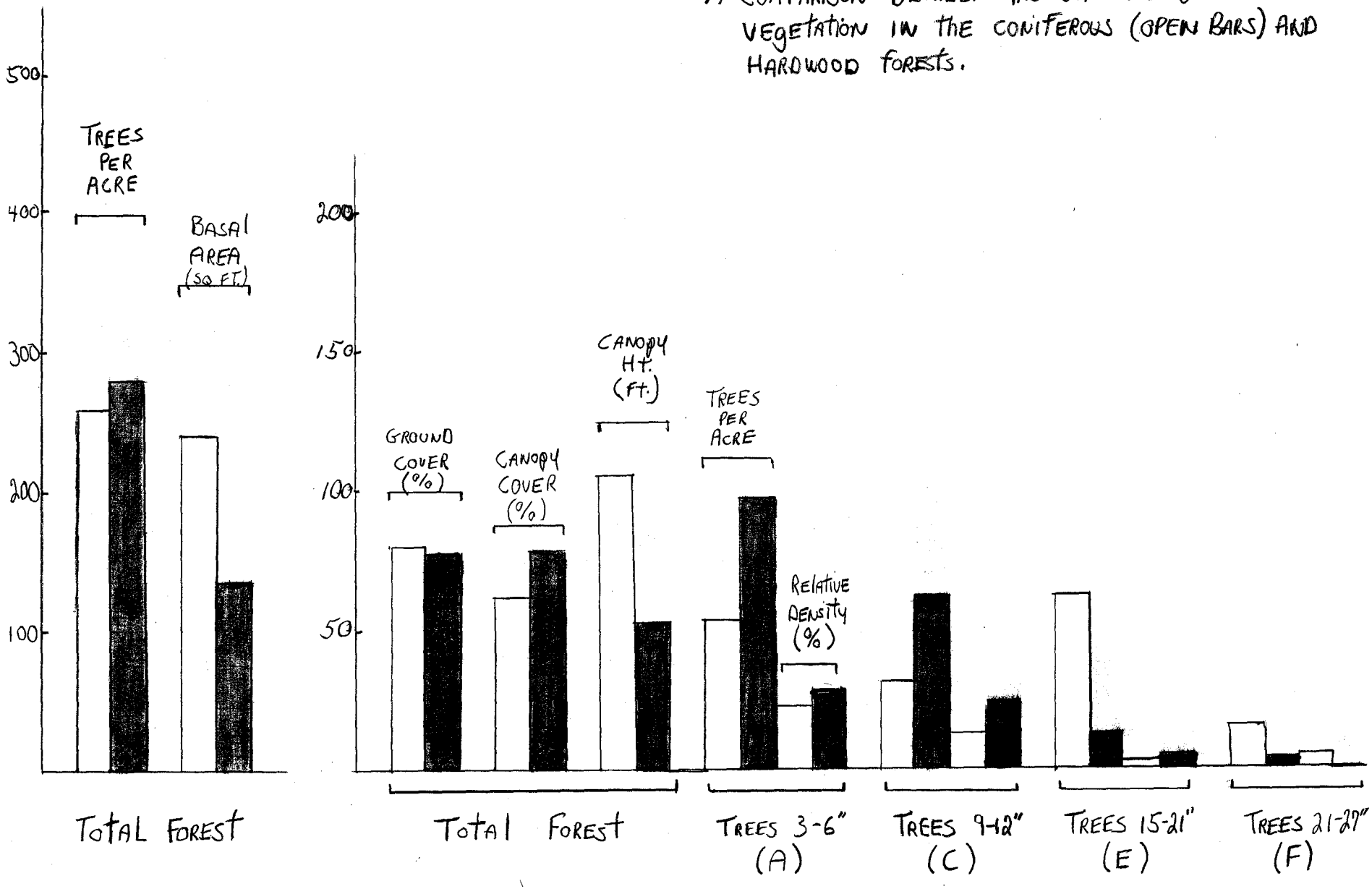


Table #6

A comparison of the major species of trees for the coniferous (open bars) and hardwood forests.

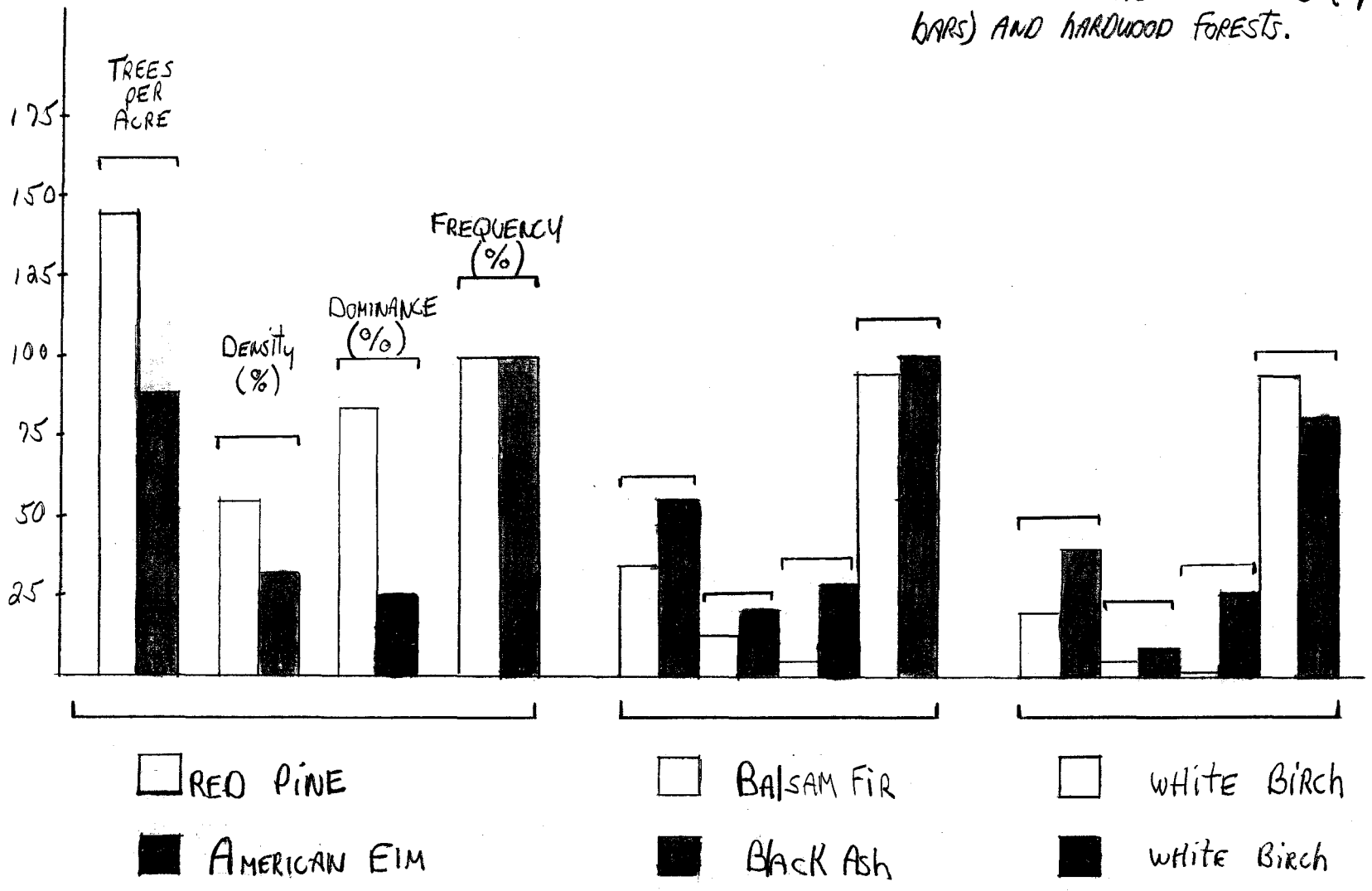


TABLE #7

FOUND IN HARDWOOD ONLY

SPECIES	MALES/KM²
GREAT CRESTED FLYCATCHER	57
BLACKBURNIAN WARBLER	57
LEAST FLYCATCHER	69
AMERICAN REDSTART	46
TENNESSEE WARBLER	23
YELLOW-BILLED CUCKOO	23
COMMON FLICKER	23
AMERICAN ROBIN	17
BLACK-AND-WHITE WARBLER	11
PURPLE FINCH	11
BROAD-WINGED HAWK	11
BARRED OWL	11
RUBY-THROATED HUMMINGBIRD	11
DOWNY WOODPECKER	11
CEDAR WAXWING	11
EVENING GROSBEAK	11

FOUND IN CONIFEROUS ONLY

SPECIES	MALES/KM²
HERMIT THRUSH	47
E. WOOD PEWEE	39
BROWN CREEPER	31
GRAY JAY	23
BLUE JAY	15
SCARLET TANAGER	15
GOSHAWK	7.5
RUFFED GROUSE	7.5
BLACK-BACKED 3-TOED	7.5
SWAINSON'S THRUSH	7.5
RED CROSSBILL	7.5
PILEATED WOODPECKER	4
RED-BREASTED NUTHATCH	39

FOUND IN HARDWOOD AND CONIFEROUS

SPECIES	MALES/KM² HARDWOOD	MALES/KM² CONIFEROUS
OVENBIRD	137	196
RED-EYED VIREO	229	101
PINE WARBLER	11	70
BLACK-THROATED GREEN	57	78
BLACK-CAPPED CHICKADEE	34	62
YELLOW-BELLIED SAPSUCKER	29	23
WHITE-BREASTED NUTHATCH	23	23
VEERY	23	15
N. PARULA WARBLER	34	15
CHESTNUT-SIDED WARBLER	11	15
WINTER WREN	23	8
COMMON YELLOWTHROAT	23	8
HAIRY WOODPECKER	23	19

MATURE PINE-FIR-BIRCH FOREST.--Location: Minnesota; Clearwater Co., University of Minnesota Forestry and Biological Station, Itasca State Park Wilderness Sanctuary; 47°13' N, 95°12'W, USGS Itasca State Park Quadrangle. Continuity: New. Size: 12.75 ha= 31.5 acres(250x 550 m rectangle minus 110 sq. m of NWcorner, surveyed). Description of Plot: The dominant canopy tree is Red Pine (Pinus Resinosa). Most prominent in the understory are Balsum Fir (Abies Balsamea) AND White Birch (Betula Papyrifera). The ground cover is primarily Beaked Hazelnut (Corylus cornuta), Early Meadow Rue (Thalictrum dioicum), Bracken Fern (Pteridium aquilinum), Wild Lily of-the-Valley (Maianthenum canadense) and Large Leaf Aster (Aster macrophyllus). A quantitative survey of the vegetation gave the following results: Trees 3- inches diameter and over, based on ten 0.1-acre circular samples, 263/acre; total basal area 242.2 ft.^{2}/acre. Species comprising 90% of the total number of trees:(figures after each give number of trees/ acre, relative density (%), relative dominance (%), frequency (%).) Red Pine,142,53,80,100; dead trees,52,19.7,6.6,100; Balsam Fir, 34,12.9, 3.4,90; White Birch,20,7.6,2.0, 90. Trees by diameter size class: (figures after each size class give number of trees/ acre, relative density (%), basal area (sq. ft./acre), relative dominance (%).) A(3-6in.) 57, 21.6, 5.7,2.3; B(6-9in.) 52,19.7, 15.6,6.4; C(9-15in.) 79,30,59.7,24.6; D(15-21in.) 59,2.2,106.2, 43.8; E(21-27in.) 13,4.9,40.3,16.6; F(27-33in.) 3,1.1,14.7,6.0.

Shrub cover,48.5% (shrub stem count not taken); ground cover 79.3%;canopy cover 64.5%; average canopy height 80 ft. (range 45-110 ft.); average shrub height 6.8 ft. Plant names are from H. Gleason and A. Cronquist, Manual of Vascular Plants, 1963. Edge: Bordered on all sides by similar forest except for a 100 m bog on the NW portion. Topography: One small rise of approximately 25 ft. at NE end. Elevation: 1475 ft. Weather: 81° to 93°F. Wind, Beaufort 0-10 mph. Clear to overcast, no precipitation. Coverage: June 29-30, July 2,3,5,9-11 between 0500-0900 and 1830-2130 hours. Total man hours 26. Census: Ovenbird,25 (196,79); Red-eyed Vireo, 13 (101,41); Black-throated Green Warbler,10 (78,32); Pine warbler,9 (70,28); Black-capped Chickadee,8 (63,25); Hermit Thrush,6 (47,19); Eastern Wood Pewee, 5 (39,16); Red-breasted Nuthatch,5 (39,16); Brown Creeper,4 (31,12); Yellow-bellied Sapsucker, 3 (23,9); Gray Jay,3 (23,9); White-breasted Nuthatch, 3 (23,9); Hairy Woodpecker, 2.5 (19,8); Blue Jay,2; Veery,2; Northern Parula Warbler, 2; Chestnut-sided Warbler,2; Scarlet Tanager,2; Goshawk,1; Ruffed Grouse,1; Black-backed Three-toed Woodpecker,1; Winter Wren,1; Swainson's Thrush,1; Common Yellowthroat,1; Red Crossbill,1; Pileated Woodpecker, 0.5,+. Total: 26 species; 114 territorial males (894/km.^{2}, 361/100 acres). Visitors: Bald Eagle, Broad-winged Hawk,Common Raven, Evening Grosbeak. Remarks: Many birds had finished nesting and territorial boundaries were breaking down. The following species

were feeding young that had fledged: Goshawk, Hairy Woodpecker, Yellow-bellied Sapsucker, Gray Jay, Blue Jay, Red-breasted Nuthatch, Black-capped Chickadee and Chestnut-sided Warbler. High % of ground and shrub cover and complete lack of pine seedlings indicate succession to a hardwood forest. Most of the dead trees were young Balsam Firs with diameters less than 10 in.. Red Squirrels (Tamiasciurus hudsonicus), White-tailed Deer (Odocoileus virginianus) and Wood Frogs (Rana sylvatica)were frequently seen. Special thanks to Barb Bell, Mary Candee, Laura Greffenius, Roberta Sorensen and Mindy Bell for assistance in surveying and habitat description,-- Paul J.J. Mills, 6800 16th Ave. S. Richfield, Mn. 55423.

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Summary Sheet A

Summary Sheet for Tenth-acre (0.4 hectare) Circles

Number of Circles = 10

Trees: RED PINE WILDERNESS AREA

Species	Density[1] Number of trees in all circles by size class								Total	Trees/acre (by species)[2]	Relative Density (by species)[3]
	A 3-6	B 6-9	C 9-12	D 12-15	E 15-21	F 21-27	G 27-33	H 33			
1 RED PINE	1	12	19	41	55	13	1		142	142	53%
2 DEAD TREES	29	14	4	3	2				52	52	19.7%
3 BALSAM FIR	14	18	1	1					34	34	12.9%
4 WHITE BIRCH	10	7	3						20	20	7.6%
5 RED MAPLE	3	1	3						7	7	2.6%
6 WHITE PINE			2				2		4	4	1.5%
7 BALSAM POPLAR			1		2				3	3	1.1%
8 RED OAK			1						1	1	.38%
9											
10											
TOTAL	57	52	34	45	59	13	3		263		100%
Trees/acre by size class	57	52	34	45	59	13	3				
Relative Density by size class	21.6	19.7	12.9	17.1	2.2	4.9	1.1				

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 48.5%

Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 79.3%

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5. 64.5%

PAUL MILLS

Summary Sheet B

Summary Sheet for Tenth-acre (0.4 hectare) circles

Number of Circles = 10

Trees RED PINE WILDERNESS AREA

Species	Basal Area[5] Cross sectional area of the trunk at 4.5 feet from the ground (d.b.h.) A (0.1)	B (0.3)	C (0.6)	D (1.0)	E (1.8)	F (3.1)	G (4.9)	H (.005 d²)	Total Basal Area (sq. feet)	Relative[7] Dominance (by species)	No. of circles in which the species occurred	Frequency[9]
1 RED PINE	.1	3.6	5.7	41	99	40.3	4.9		194.6	80 %	10	100
2 DEAD TREES	2.9	4.2	2.4	3	3.6				16.1	6.6 %	10	100
3 BALSAM FIR	1.4	5.4	.6	1					8.4	3.4 %	9	90
4 WHITE BIRCH	1.0	2.1	1.8						4.9	2.0 %	9	90
5 RED MAPLE	.3	.3	1.8						2.4	.99 %	5	50
6 WHITE PINE			1.2				9.8		11.0	4.5 %	2	20
7 BALSAM POPLAR			.6		3.6				4.2	1.7 %	1	10
8 RED OAK			.6						.60	.24 %	1	10
9												
10												
RELATIVE DOMINANCE	2.3%	6.4	6.0	18.5	43.8	16.6	6.0	= 100%				
TOTAL	5.7	15.6	14.7	45	106.2	40.3	14.7		242.2	100%		
Trees/acre by size class	57	52	34	45	59	13	3					
Relative Density by size class	21.6	19.7	12.9	17.1	2.2	4.9	1.1					

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 48.5 %

Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 79.3 %

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5. 64.5 %

Summary Sheet A

Summary Sheet for tenth-acre (0.4 hectare) Circles

Number of Circles = 10

Trees: BEAR PAW POINT

Species	Density[1] Number of trees in all circles by size class								Total	Trees/acre (by species)[2]	Relative Density (by species)[3]
	A 3-6	B 6-9	C 9-12	D 12-15	E 15-21	F 21-27	G 27-33	H 33			
1 Basswood	12	2	3	2					19	-	6.88
2 Ash Black	12	19	15	8	5	2			61		22.10
3 Paper Birch	-	5	10	16	4	1			36		13.04
4 Other Birch	7	-							7		2.54
5 Elm American	31	30	21	4	1	1			88		31 88
6 White Spruce	15	2							17		6.16
7 Balsam Fir	7	7			1				15		5.43
8 Red Maple	1	1		1					3		1.09
9											
10											
Dead Trees	8	9	9	2	2				30		10.87
TOTAL	93	75	58	33	13	4			276		100%
Trees/acre by size class	93	75	58	33	13	4					
Relative Density by size class	33.7	27.17	21.01	11.96	4.71	1.45					

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 99/200 · 100 = 49.5%

Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 155/200 = 77.5%

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5. 157/200 = 78.5%

Summary Sheet 8

Summary Sheet for Tenth-acre (0.4 hectare) circles

Number of Circles = 10

Trees 276 Poles Pts. Points

Species	Basal Area[5] Cross sectional area of the trunk at 4.5 feet from the ground (d.b.h.) A (0.1)	B (0.3)	C (0.6)	D (1.0)	E (1.8)	F (3.1)	G (4.9)	H (.005 d²)	Total Basal Area (sq. feet)	Relative % Dominance (by species)	No. of circles in which the species occurred	Frequency %
1 Basswood	1.2	.6	1.8	2	—	—			5.6	4.14	8	80%
2 Ash	1.2	5.7	9	8	9	6.2			39.1	28.88	10	100
3 Paper Birch		1.5	6	16	7.2	3.1			33.8	24.96	8	80
4 Other Birch	.7		—	—	—	—			.7	.52	1	10
5 Elm	5.1	9	12.6	4	1.8	3.1			33.6	24.82	10	100
6 White Spruce	1.5	.6	—	—	—	—			2.1	1.55	1	10
7 Balsam Fir	.7	2.1	—	—	1.8	—			4.6	3.40	6	60
8 Red Maple	1	3	—	1	—	—			1.4	1.03	2	20
9 Dead Trees	8	27	5.4	2	3.6	—			14.5	10.71	7	70
10												
TOTAL	7.3	29.5	34.8	33	25.4	12.4			135.4	100%		[redacted]
Trees/acre by size class	93	75	58	35	13	2			276			
Relative Density by size class	33.7	27.17	21.01	12.7	4.71	1.45						

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5.

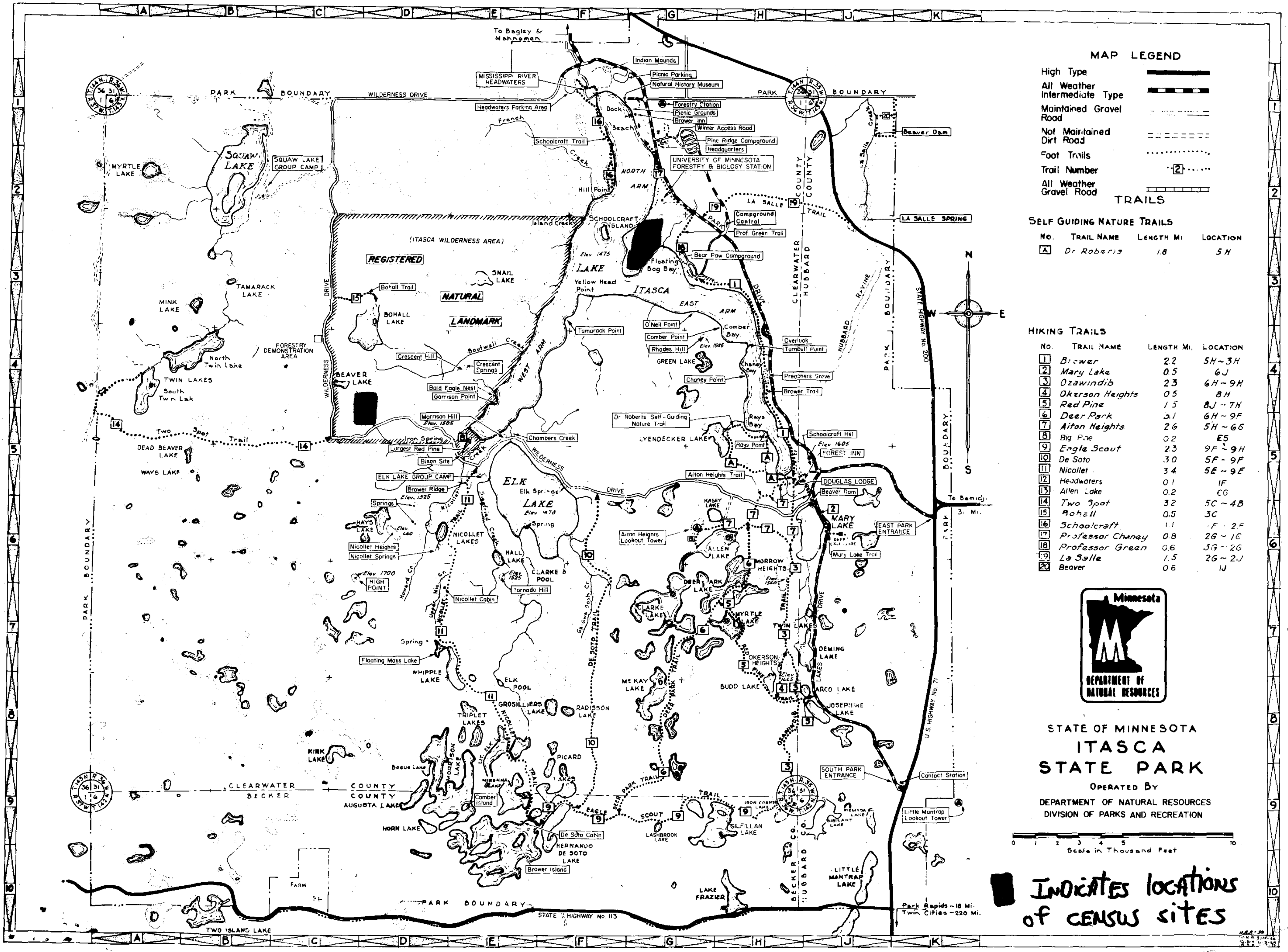
Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5.

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5.

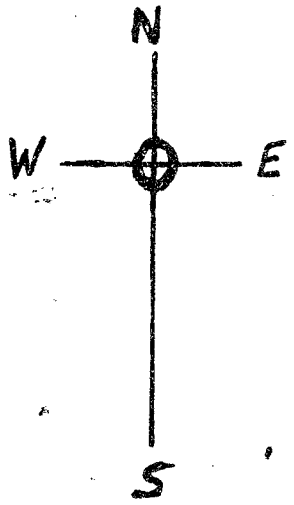
MATURE PINE-FIR-BIRCH FOREST.--Location: Minnesota; Clearwater Co., University of Minnesota Forestry and Biological Station, Itasca State Park Wilderness Sanctuary; 47°13' N, 95°12'W, USGS Itasca State Park Quadrangle. Continuity: New. Size: 12.75 ha= 31.5 acres(250x 550 m rectangle minus 110 sq. m of NWcorner, surveyed). Description of Plot: The dominant canopy tree is Red Pine (Pinus Resinosa). Most prominent in the understory are Balsum Fir (Abies Balsamea) AND White Birch (Betula Papyrifera). The ground cover is primarily Beaked Hazelnut (Corylus cornuta), Early Meadow Rue (Thalictrum dioicum), Bracken Fern (Pteridium aquilinum), Wild Lily of-the-Valley (Maianthenum canadense) and Large Leaf Aster (Aster macrophyllus). A quantitative survey of the vegetation gave the following results: Trees 3- inches diameter and over, based on ten 0.1-acre circular samples, 263/acre; total basal area 242.2 ft.^{2}/acre. Species comprising 90% of the total number of trees:(figures after each give number of trees/ acre, relative density (%), relative dominance (%), frequency (%).) Red Pine,142,53,80,100; dead trees,52,19.7,6.6,100; Balsam Fir, 34,12.9, 3.4,90; White Birch,20,7.6,2.0, 90. Trees by diameter size class: (figures after each size class give number of trees/ acre, relative density (%), basal area (sq. ft./acre), relative dominance (%).) A(3-6in.) 57, 21.6, 5.7,2.3; B(6-9in.) 52,19.7, 15.6,6.4; C(9-15in.) 79,30,59.7,24.6; D(15-21in.) 59,2.2,106.2, 43.8; E(21-27in.) 13,4.9,40.3,16.6; F(27-33in.) 3,1.1,14.7,6.0.

Shrub cover,48.5% (shrub stem count not taken); ground cover 79.3%;canopy cover 64.5%; average canopy height 80 ft. (range 45-110 ft.); average shrub height 6.8 ft. Plant names are from H. Gleason and A. Cronquist, Manual of Vascular Plants, 1963. Edge: Bordered on all sides by similar forest except for a 100 m bog on the NW portion. Topography: One small rise of approximately 25 ft. at NE end. Elevation: 1475 ft. Weather: 81° to 93°F. Wind, Beaufort 0-10 mph. Clear to overcast, no precipitation. Coverage: June 29-30, July 2,3,5,9-11 between 0500-0900 and 1830-2130 hours. Total man hours 26. Census: Ovenbird,25 (196,79); Red-eyed Vireo, 13 (101,41); Black-throated Green Warbler,10 (78,32); Pine warbler,9 (70,28); Black-capped Chickadee,8 (63,25); Hermit Thrush,6 (47,19); Eastern Wood Pewee, 5 (39,16); Red-breasted Nuthatch,5 (39,16); Brown Creeper,4 (31,12); Yellow-bellied Sapsucker, 3 (23,9); Gray Jay,3 (23,9); White-breasted Nuthatch, 3 (23,9); Hairy Woodpecker, 2.5 (19,8); Blue Jay,2; Veery,2; Northern Parula Warbler, 2; Chestnut-sided Warbler,2; Scarlet Tanager,2; Goshawk,1; Ruffed Grouse,1; Black-backed Three-toed Woodpecker,1; Winter Wren,1; Swainson's Thrush,1; Common Yellowthroat,1; Red Crossbill,1; Pileated Woodpecker, 0.5,+. Total: 26 species; 114 territorial males (894/km.^{2}, 361/100 acres). Visitors: Bald Eagle, Broad-winged Hawk,Common Raven, Evening Grosbeak. Remarks: Many birds had finished nesting and territorial boundaries were breaking down. The following species

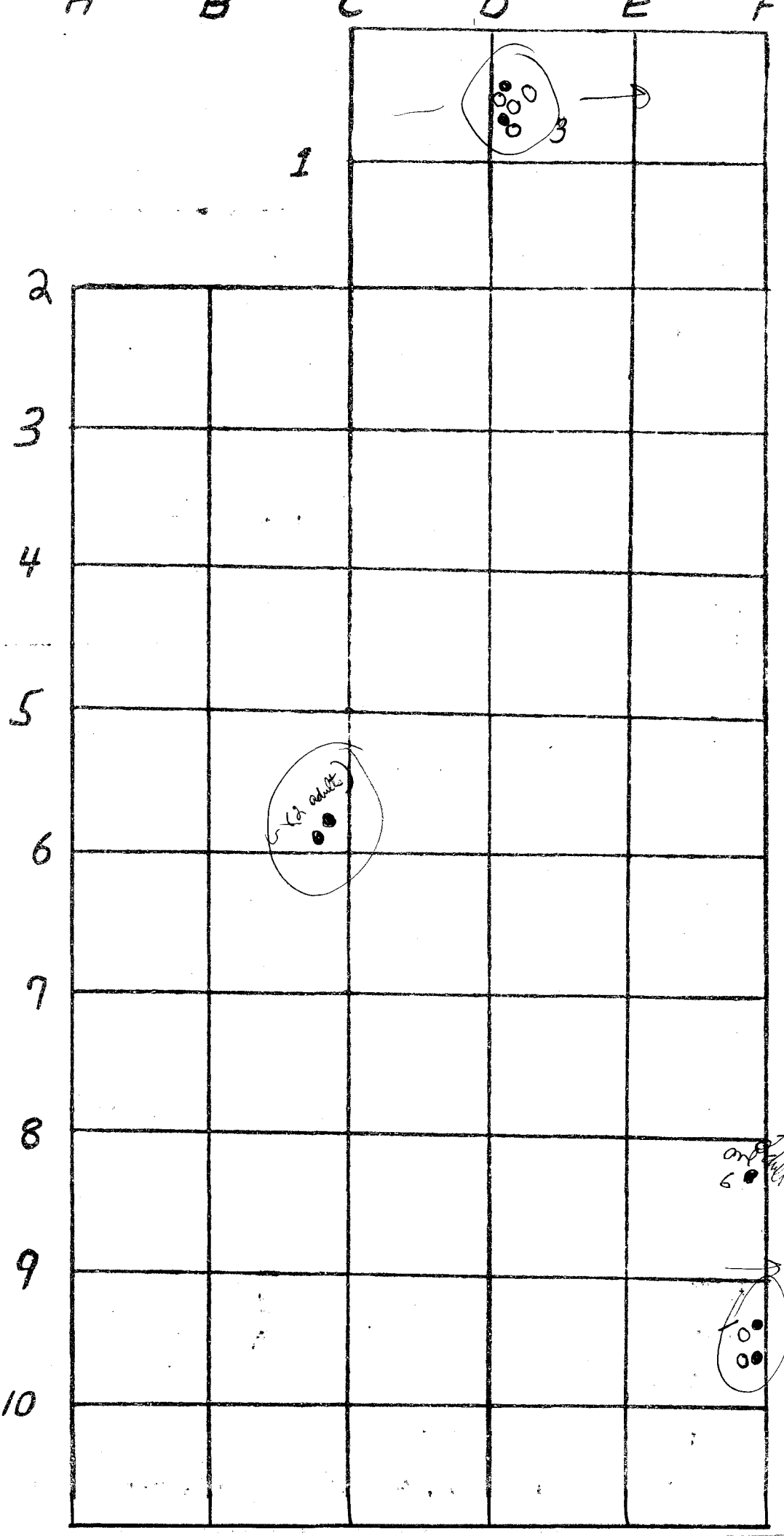
were feeding young that had fledged: Goshawk, Hairy Woodpecker, Yellow-bellied Sapsucker, Gray Jay, Blue Jay,Red-breasted Nuthatch, Black-capped Chickadee and Chestnut-sided Warbler. High % of ground and shrub cover and complete lack of pine seedlings indicate succession to a hardwood forest. Most of the dead trees were young Balsam Firs with diameters less than 10 in.. Red Squirrels (Tamiasciurus hudsonicus), White-tailed Deer (Odocoileus virginianus) and Wood Frogs (Rana sylvatica)were frequently seen. Special thanks to Barb Bell, Mary Candee, Laura Greffenius, Roberta Sorensen and Mindy Bell for assistance in surveying and habitat description,-- Paul J.J. Mills, 6800 16th Ave. S. Richfield, Mn. 55423.


MAP LEGEND
High Type
All Weather Intermediate Type
Maintained Gravel Road
Not Maintained Dirt Road
Foot Trails
Trail Number
All Weather Gravel Road
TRAILS
SELF GUIDING NATURE TRAILS
No. TRAIL NAME LENGTH MI LOCATION
A Dr Roberts 1.8 5H
HIKING TRAILS
No. TRAIL NAME LENGTH MI. LOCATION
1 Brower 2.2 5H ~ 3H
2 Mary Lake 0.5 6J
3 Ozawindib 2.3 6H ~ 9H
4 Okerson Heights 0.5 8H
5 Red Pine 1.5 8J ~ 7H
6 Deer Park 3.1 6H ~ 9F
7 Aiton Heights 2.6 5H ~ 6G
8 Big Pine 0.2 E5
9 Eagle Scout 2.3 9F ~ 9H
10 De Soto 3.0 5F ~ 9F
11 Nicollet 3.4 5E ~ 9E
12 Headwaters 0.1 1F
13 Allen Lake 0.2 6G
14 Two Spot 3.2 5C ~ 4B
15 Bohall 0.5 3C
16 Schoolcraft 1.1 1F ~ 2F
17 Professor Chaney 0.8 2G ~ 1G
18 Professor Green 0.6 3G ~ 2G
19 La Salle 1.5 2G ~ 2J
20 Beaver 0.6 1J
Minnesota
DEPARTMENT OF NATURAL RESOURCES
STATE OF MINNESOTA
ITASCA
STATE PARK
OPERATED BY
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF PARKS AND RECREATION
Scale in Thousand Feet
To Bagley & Mahnomen
MISSISSIPPI RIVER HEADWATERS
Indian Mounds
Picnic Parking
Natural History Museum
Forestry Station
Picnic Grounds
Brower Inn
Winter Access Road
Pine Ridge Campground
Headquarters
UNIVERSITY OF MINNESOTA FORESTRY & BIOLOGY STATION
Headwaters Parking Area
Schoolcraft Trail
PARK BOUNDARY
WILDERNESS DRIVE
SQUAW LAKE
SQUAW LAKE GROUP CAMP
MYRTLE LAKE
TAMARACK LAKE
MINK LAKE
North Twin Lake
South Twin Lake
TWIN LAKES
FORESTRY DEMONSTRATION AREA
(ITASCA WILDERNESS AREA)
REGISTERED NATURAL LANDMARK
SNAIL LAKE
BOHALL LAKE
Bohall Trail
BEAVER LAKE
Two Spot Trail
DEAD BEAVER LAKE
WAYS LAKE
SCHOOLCRAFT ISLAND
LAKE ITASCA
NORTH ARM
EAST ARM
WEST ARM
Hill Point
Yellow Head Point
Floating Bog Bay
Bear Paw Campground
Campground Control
Prof. Green Trail
LA SALLE TRAIL
LA SALLE SPRING
Beaver Dam
Tamarack Point
O'Neil Point
Comber Point
Rhodes Hill
Comber Bay
GREEN LAKE
Overlook
Turnbull Point
Chaney Point
Chaney Bay
Preachers Grove
Brower Trail
Crescent Hill
Crescent Springs
Bald Eagle Nest
Garrison Point
Morrison Hill Elev. 1505
Iron Spring
Largest Red Pine
Bison Site
Chambers Creek
ELK LAKE GROUP CAMP
Brower Ridge Elev. 1525
ELK LAKE Elev. 1478
Elk Springs
WILDERNESS DRIVE
Dr Roberts Self-Guiding Nature Trail
LYENDECKER LAKE
Rays Bay
Rays Point
Aiton Heights Trail
Schoolcraft Hill
Elev 1605
FOREST INN
DOUGLAS LODGE
Beaver Dam
MARY LAKE
EAST PARK ENTRANCE
Mary Lake Trail
To Bemidji 31 Mi.
STATE HIGHWAY No. 200
U.S. HIGHWAY No. 71
CLEARWATER COUNTY
HUBBARD COUNTY
HAYS LAKE
Springs
Nicollet Heights
Nicollet Springs
HIGH POINT Elev 1700
NICOLLET LAKES
HALL LAKE
CLARKE POOL
Tornado Hill
Nicollet Cabin
Aiton Heights Lookout Tower
ALLEN LAKE
MORROW HEIGHTS
DEER PARK LAKE
CLARKE LAKE
MYRTLE LAKE
TWIN LAKES
DEMING LAKE
OKERSON HEIGHTS
BUDD LAKE
ARCO LAKE
JOSEPHINE LAKE
Floating Moss Lake
WHIPPLE LAKE
ELK POOL
GROSILLIERS LAKE
RADISSON LAKE
McKAY LAKE
TRIPLET LAKES
KIRK LAKE
MORRISON LAKE
PICARD LAKES
Comber Island
AUGUSTA LAKE
HORN LAKE
De Soto Cabin
HERNANDO DE SOTO LAKE
Brower Island
LASHBROOK LAKE
SILFILLAN LAKE
SOUTH PARK ENTRANCE
Contact Station
Little Mantrap Lookout Tower
LITTLE MANTRAP LAKE
LAKE FRAZIER
CLEARWATER COUNTY
BECKER COUNTY
FARM
PARK BOUNDARY
STATE HIGHWAY No. 113
TWO ISLAND LAKE
Park Rapids ~ 18 Mi.
Twin Cities ~ 220 Mi.
Indicates locations of census sites

SPECIES:
GRAY JAY



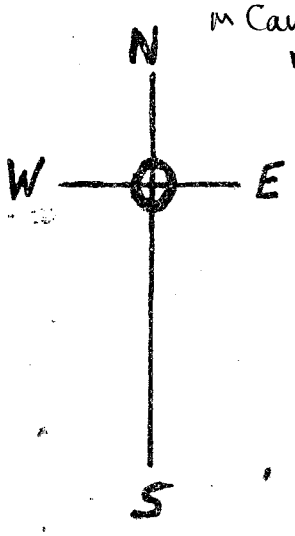
12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.



SPECIES:
Goshawk

RED PINE - SPECIES MAPS.

(BEAR PAN PT. MAPS FILED SEPERATELY)



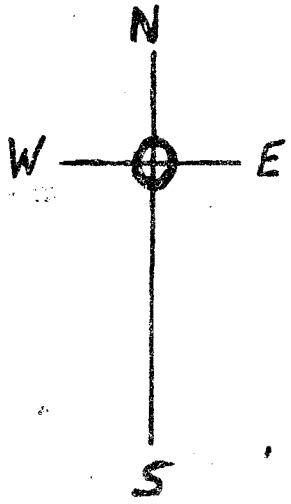
in Candee, Bell report

1

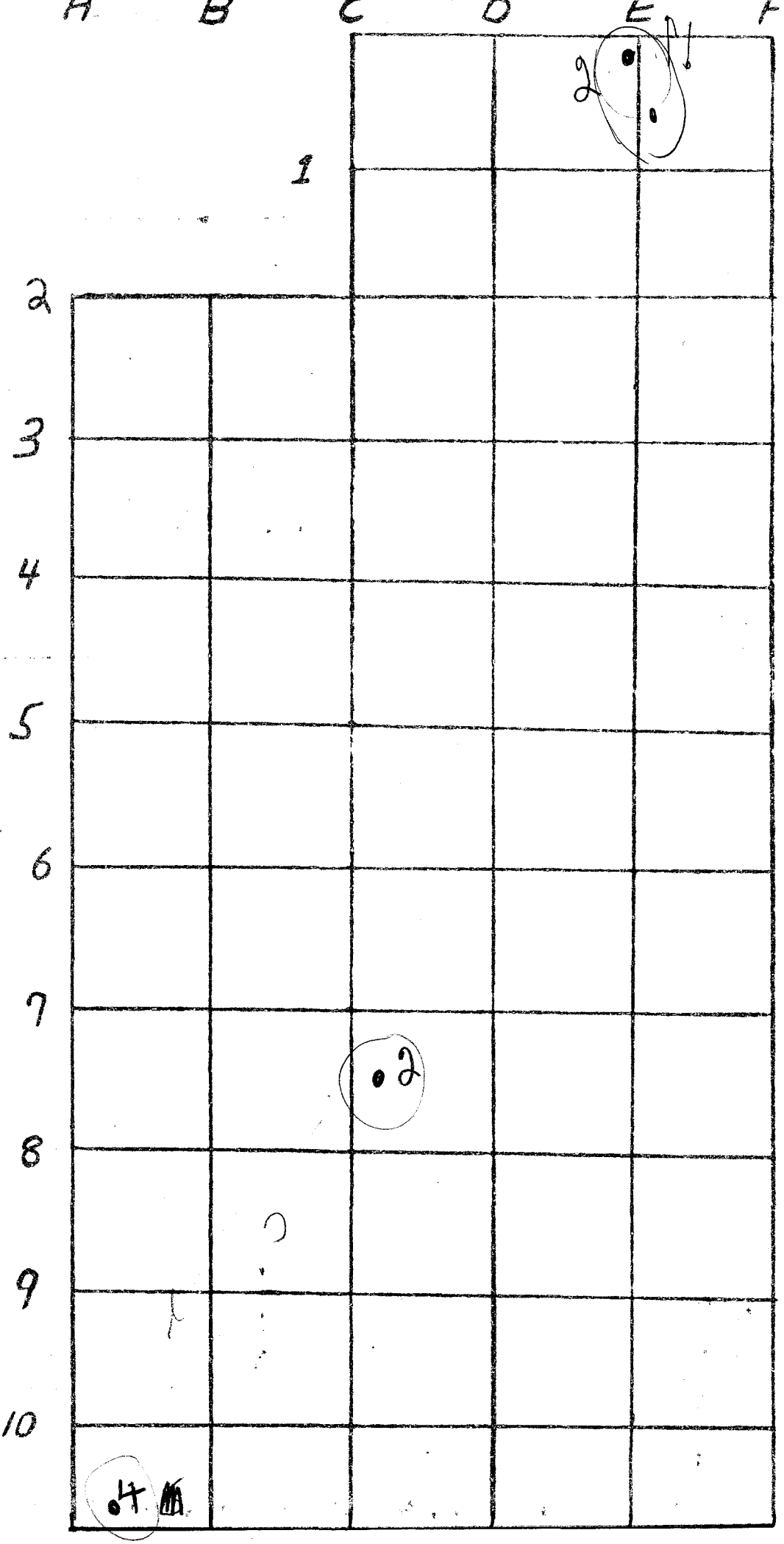
12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

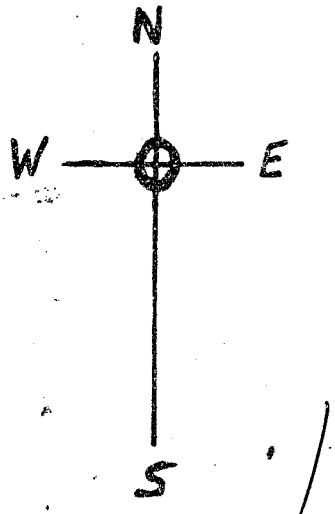
SPECIES:
VEERY

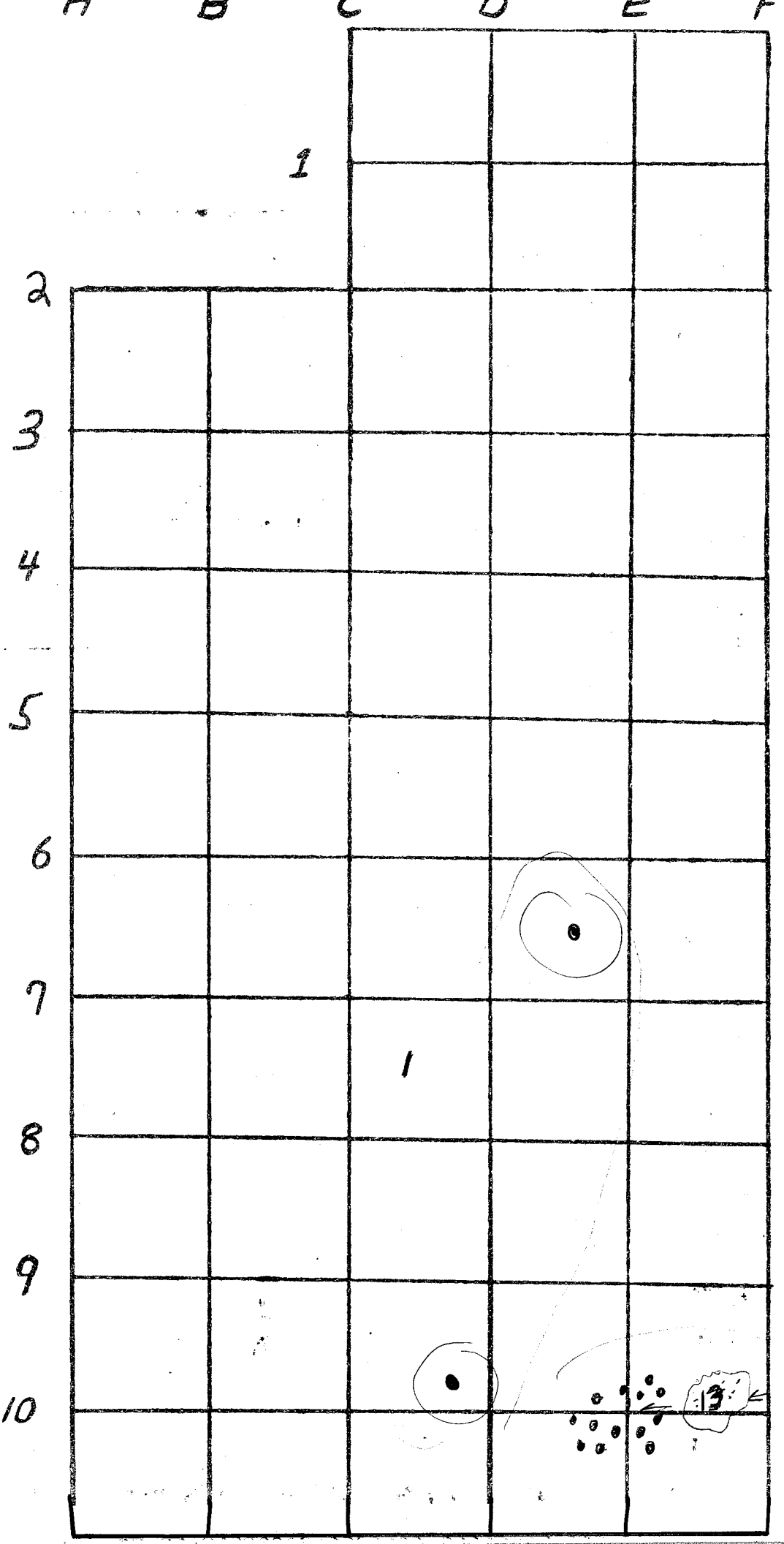


12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.



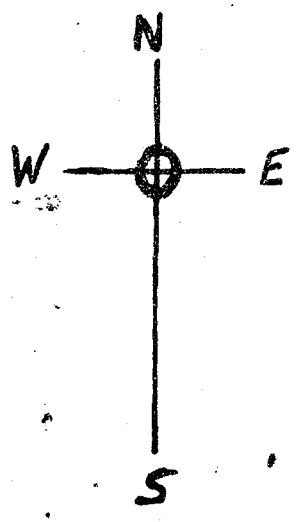
SPECIES:
RED Crossbill



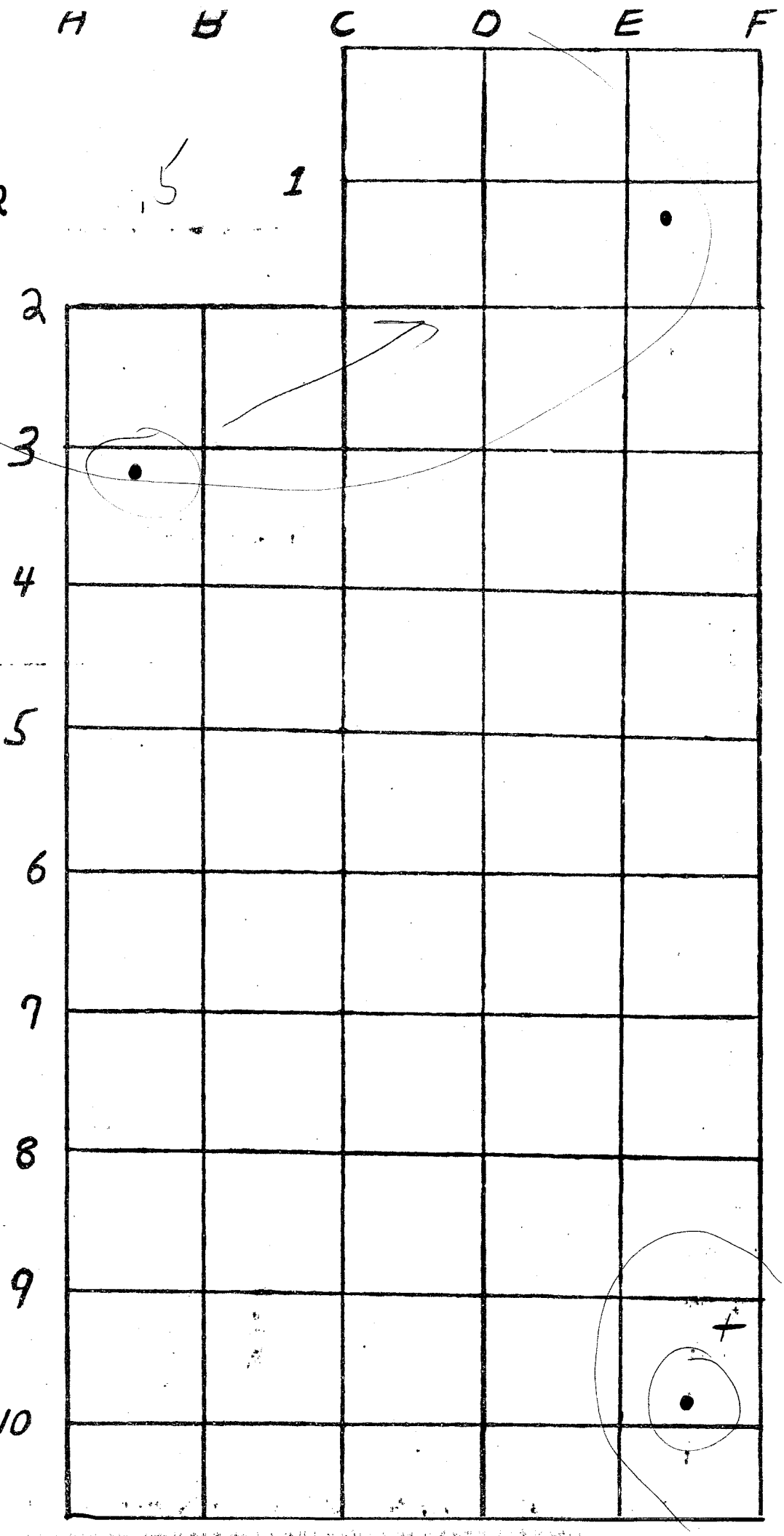


12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

SPECIES:
PILEATED WOODPECKER

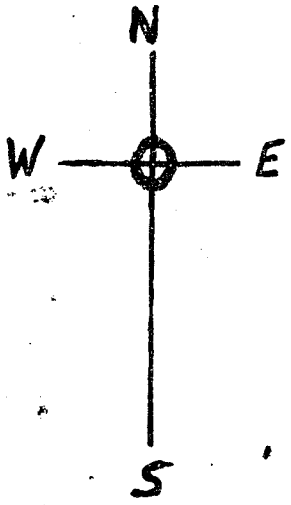


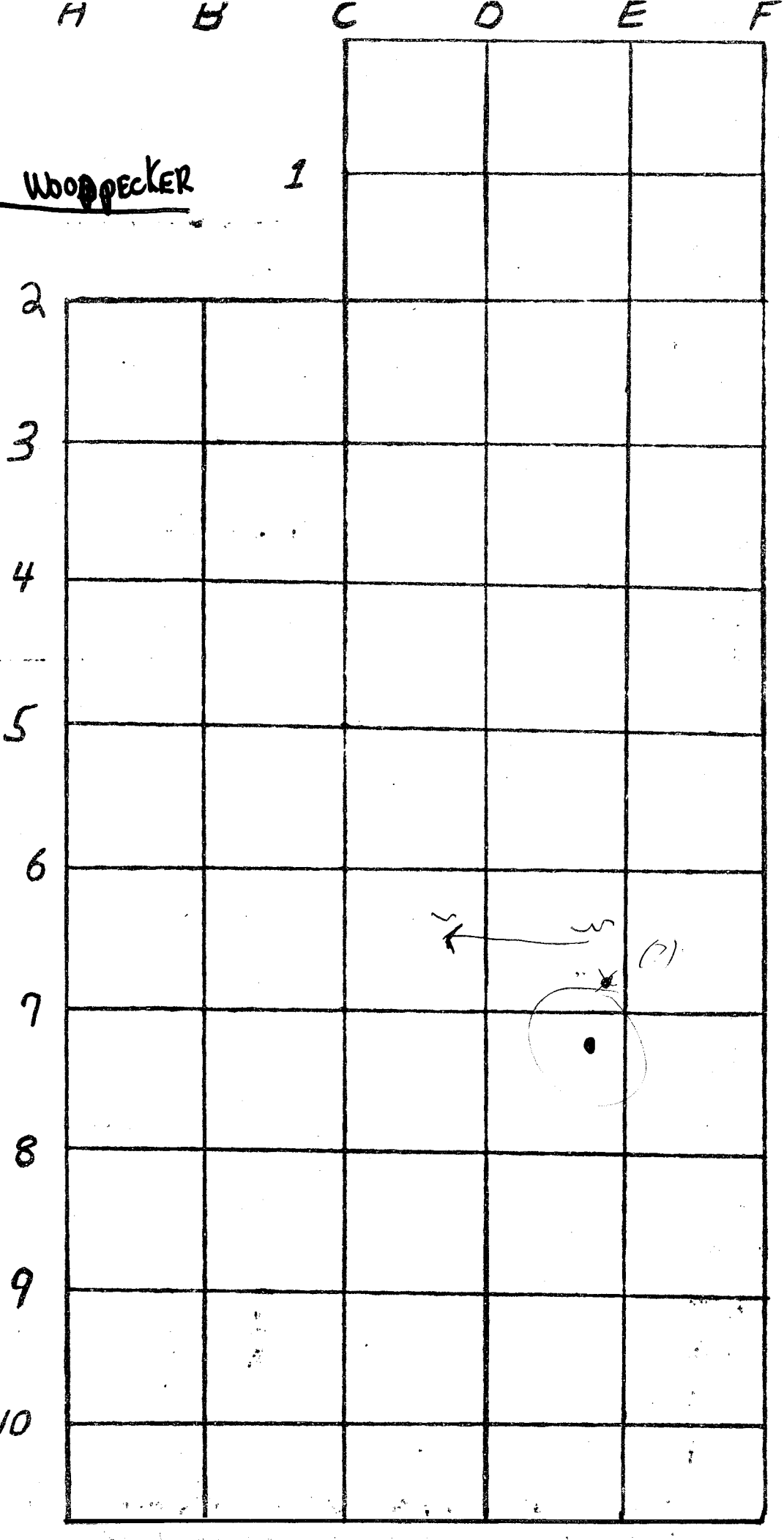
12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.



SPECIES:

Black-backed Three-toed Woodpecker

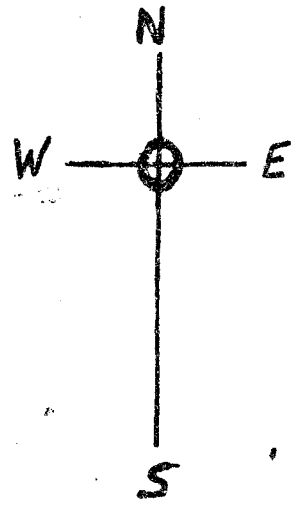


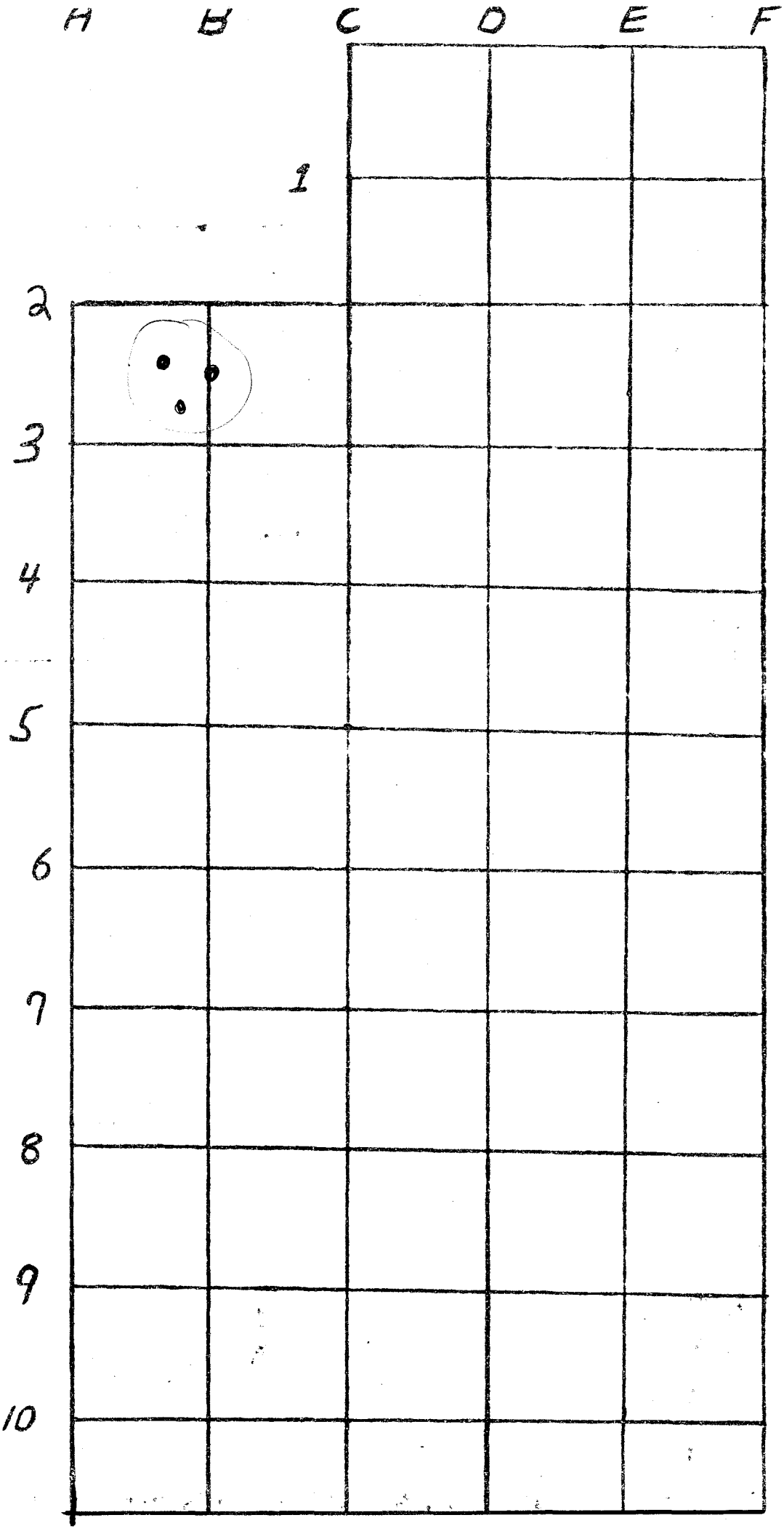


12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

SPECIES:
RUFFED GROUSE

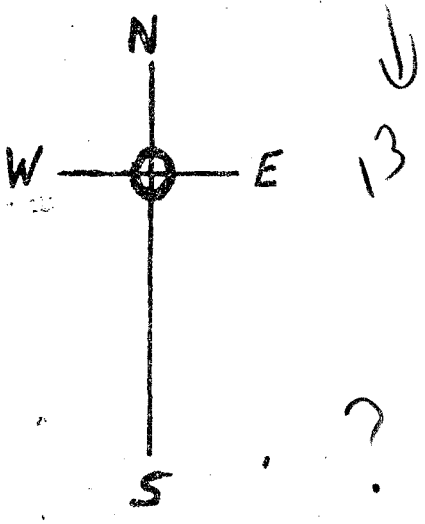




12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

SPECIES:

RED EYED VIREO



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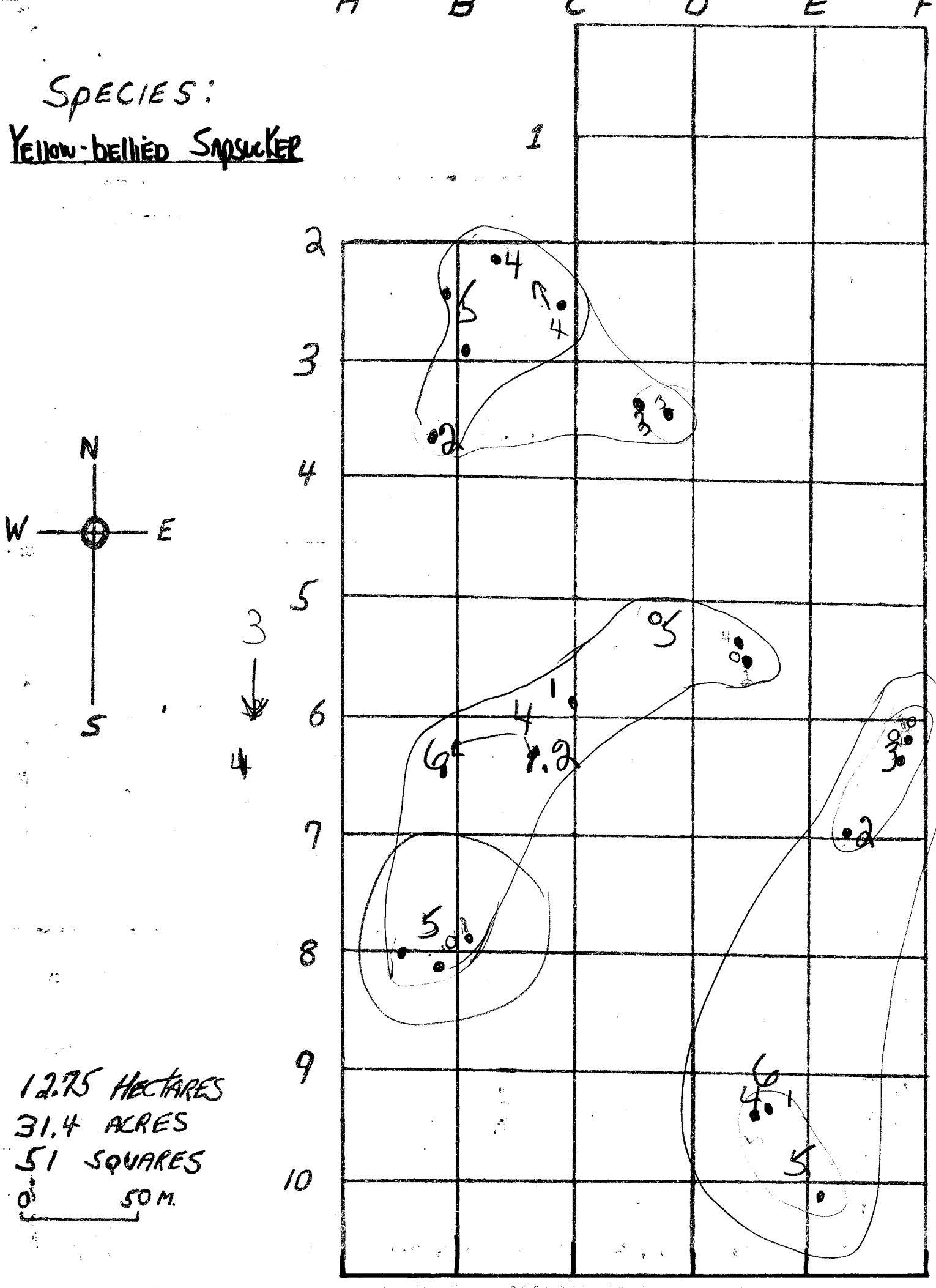
12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

SPECIES:

YELLOW-BELLIED SAPSUCKER

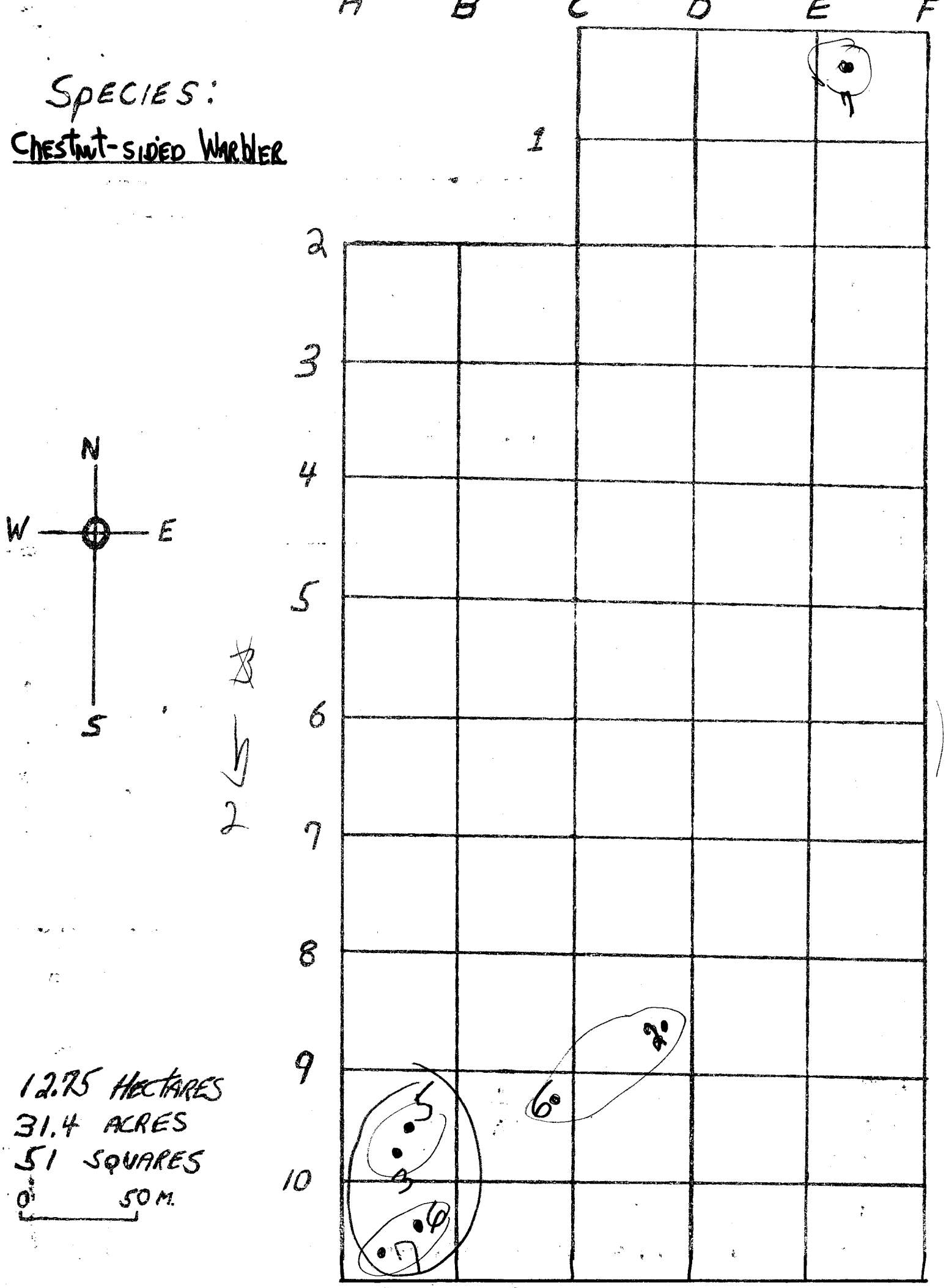


12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

SPECIES:

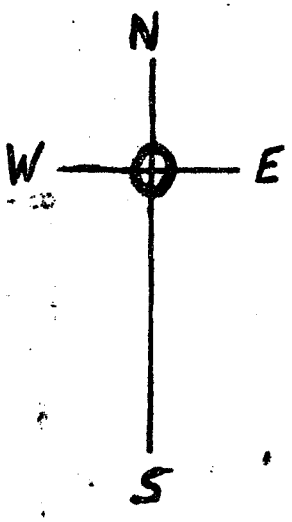
CHESTNUT-SIDED WARBLER

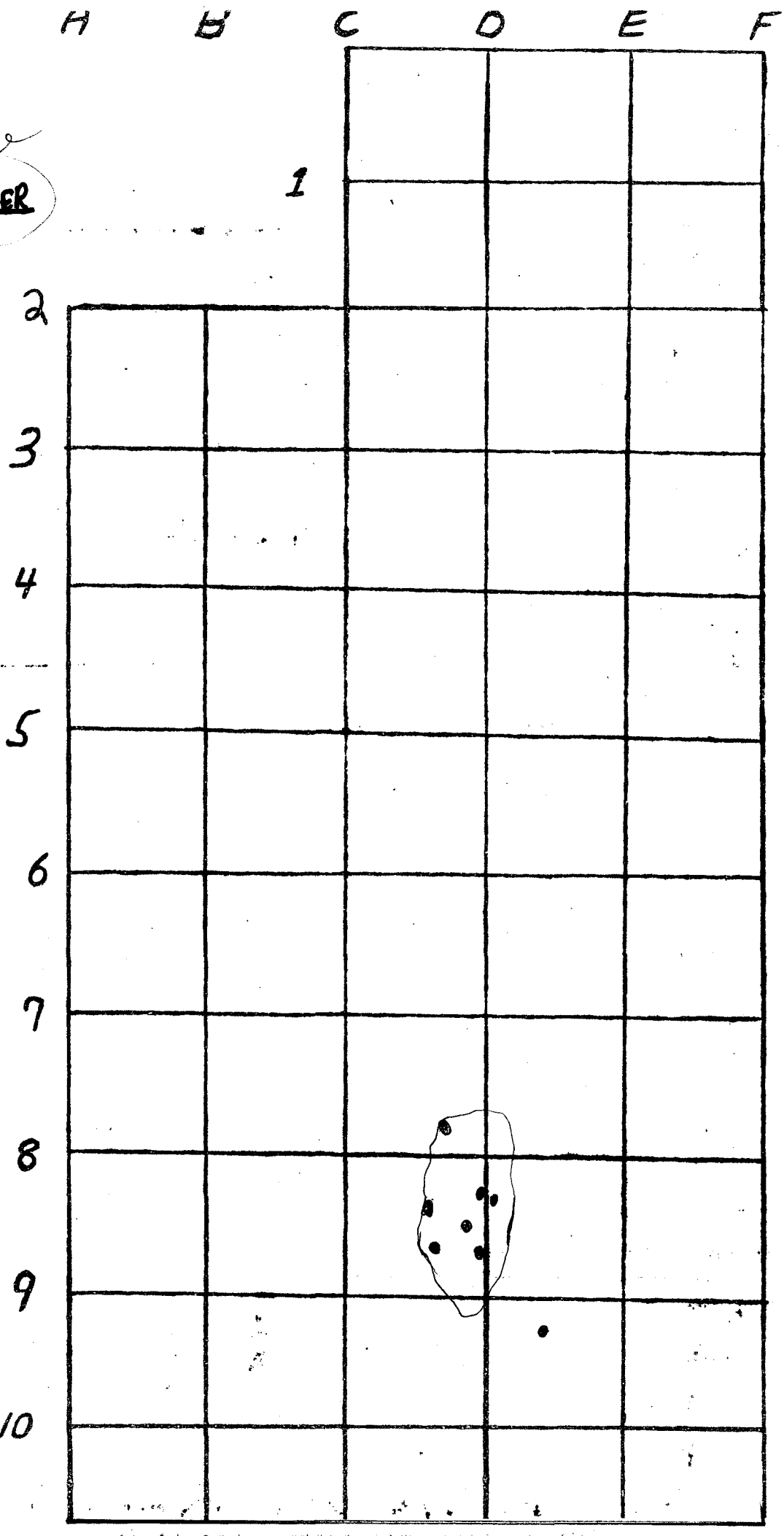


12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

SPECIES:

Yelow Throat WARBLER

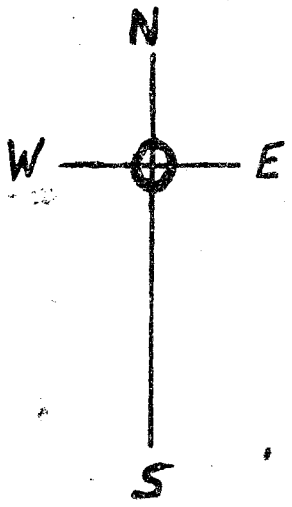




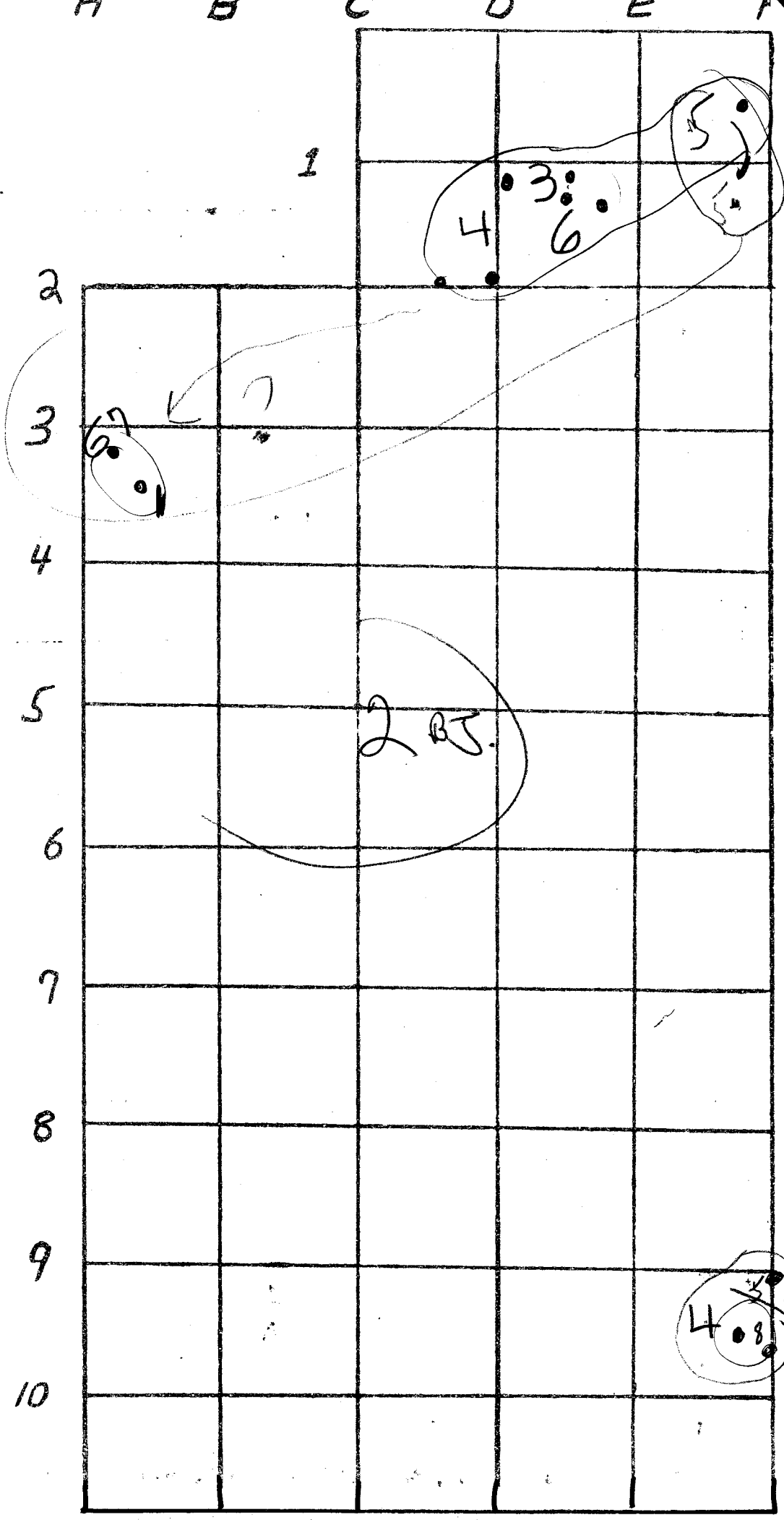
12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

SPECIES:
BLUE JAY

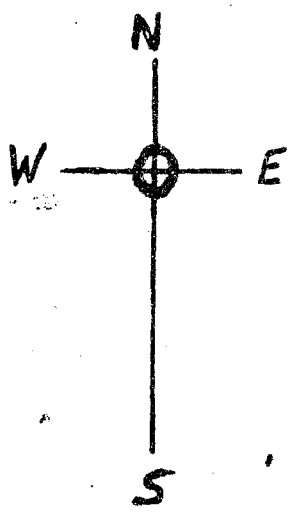


12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.



SPECIES:

HAIRY WOODPECKER



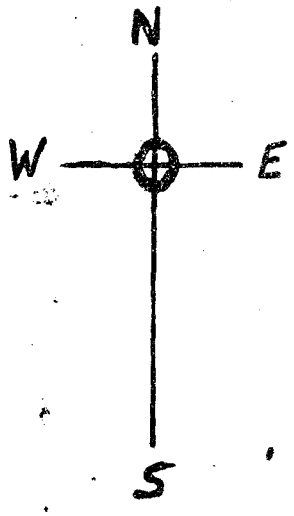
2.5

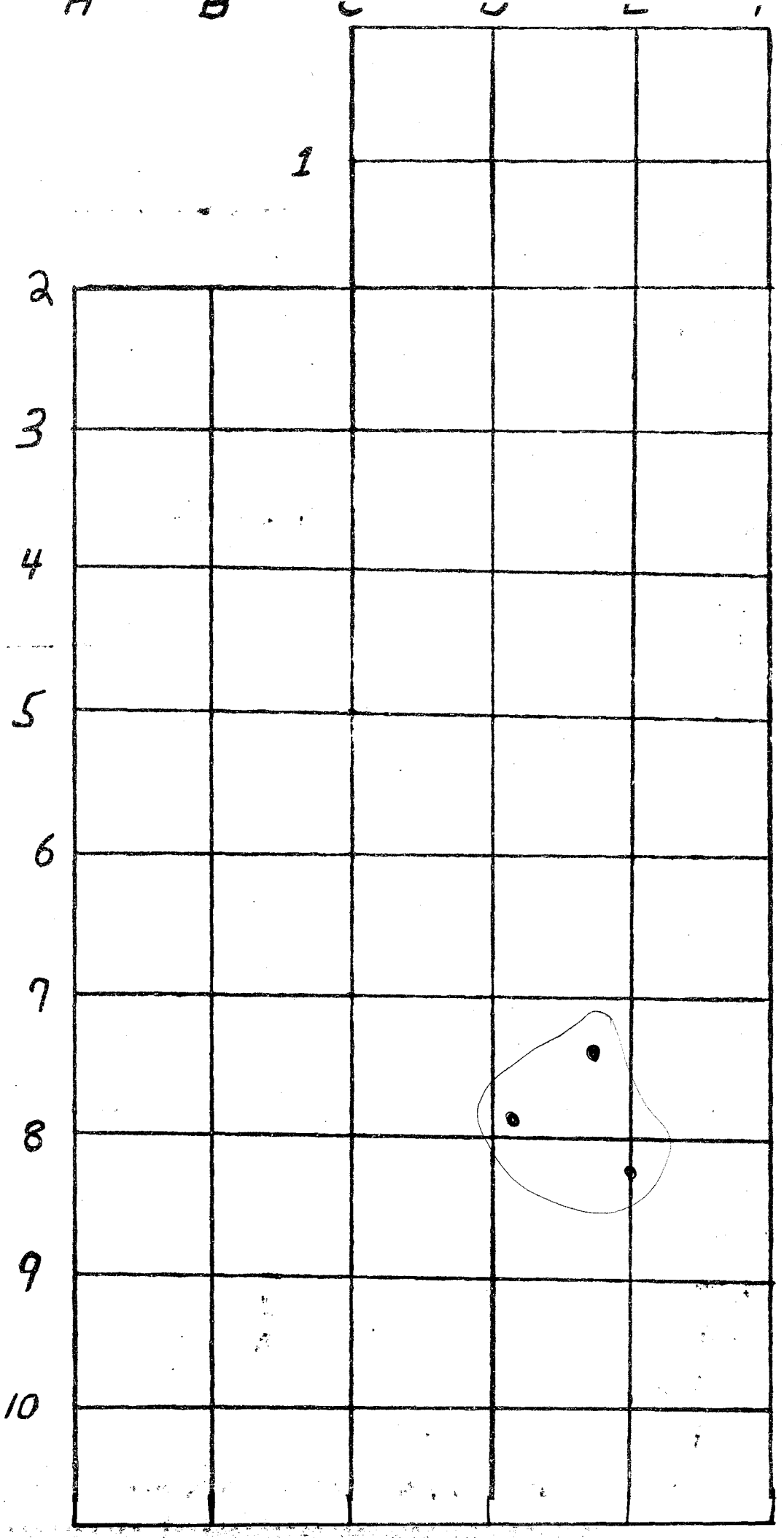
12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.


Frenchs
Creek
Hill
Point
Univ of M
Forestry Sc
Schoolcraft
Island
Bear Paw
Point
Floating Bog
Bay
LAKE 11
Yellow Head
Point
ITASCA
O'Neil
Point
Tamarack
Point
Comber Point
Snail
Lake
Bohall
Lake
West
Arm
Tamarack
Lake
Green
Lake
15
14
5233
5232
5231
5230
5229
12'30"

SPECIES:
SWAINSON'S THRUSH

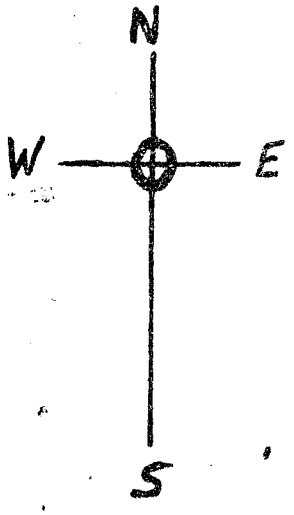




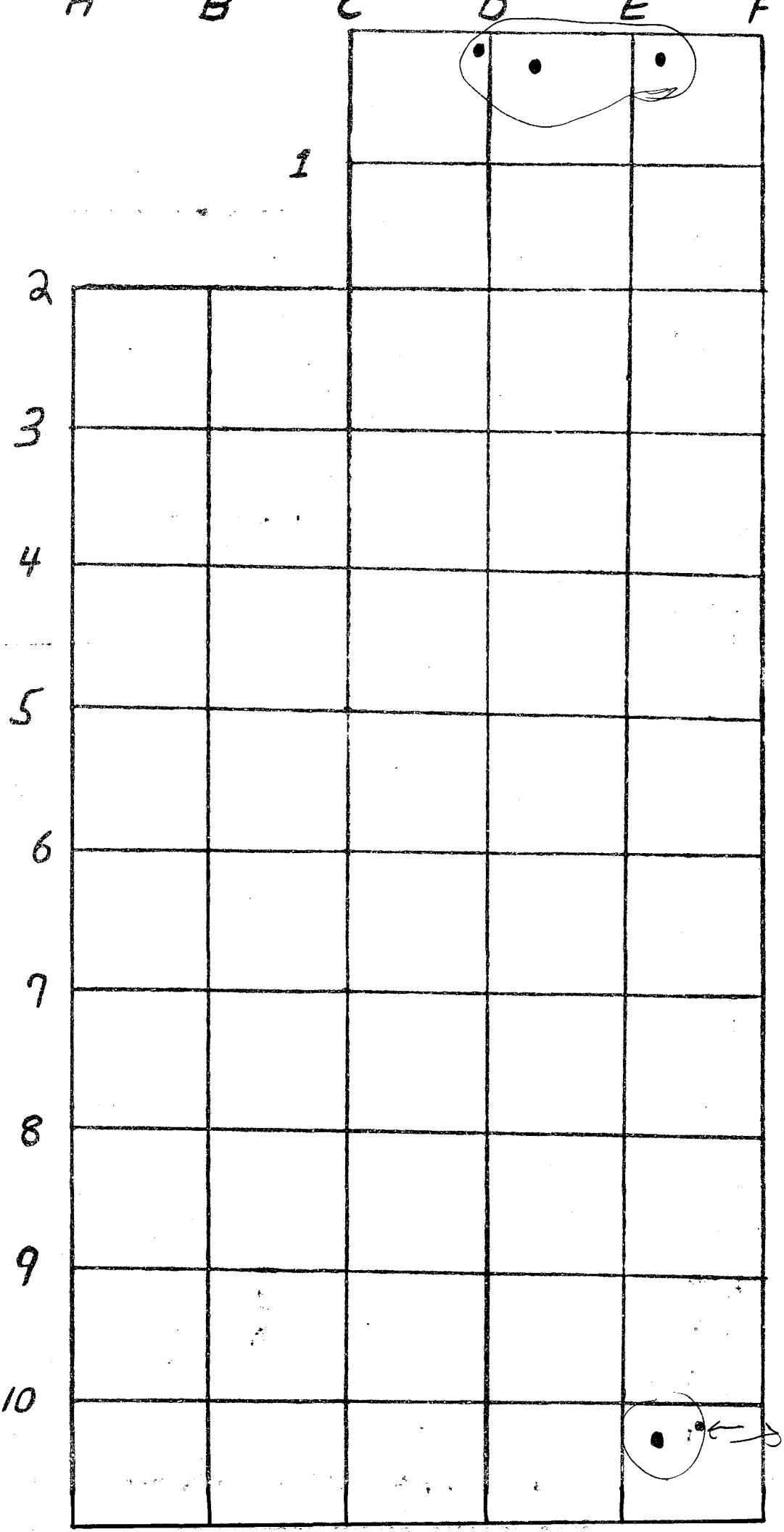
12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

SPECIES:

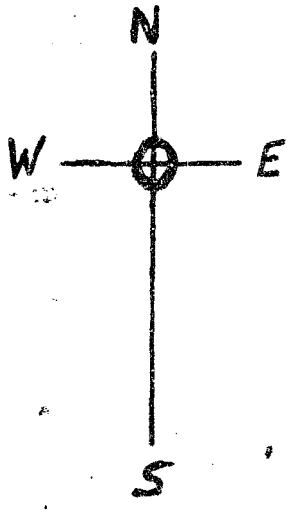
N. PARULA WARBLER

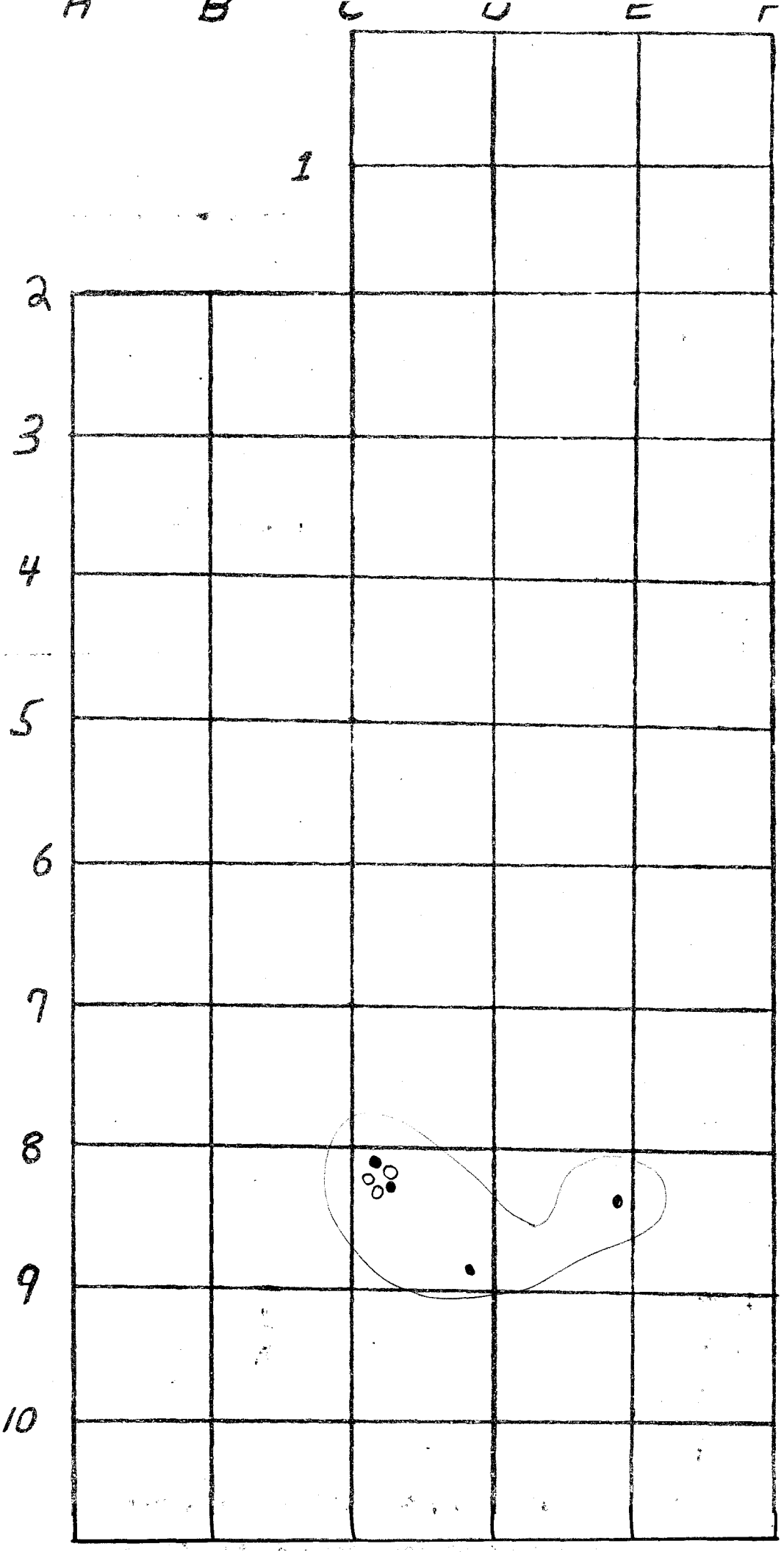


12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.



SPECIES:
WINTER WREN

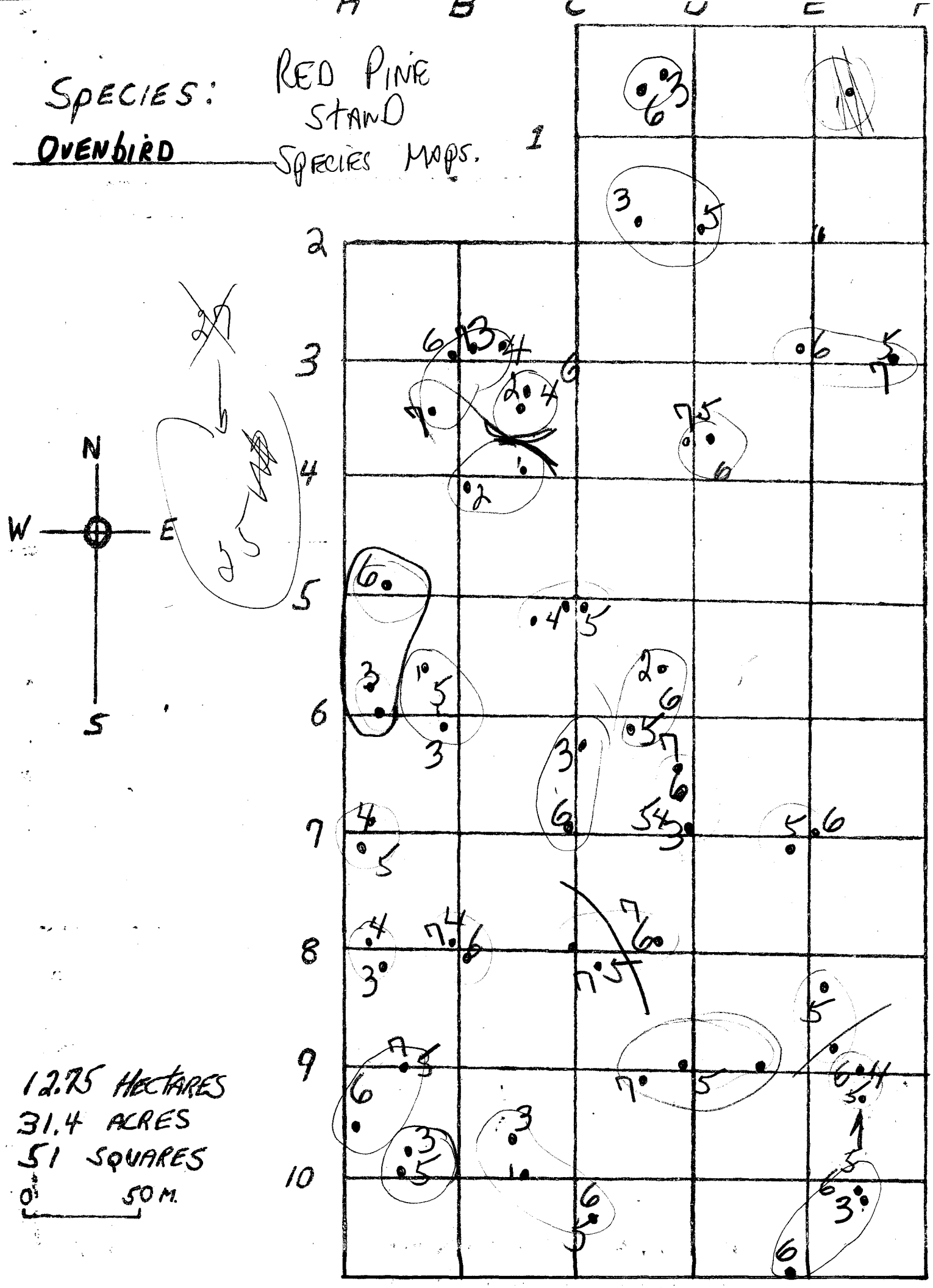




12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

SPECIES: OVENBIRD

RED PINE STAND
SPECIES MAPS. 1

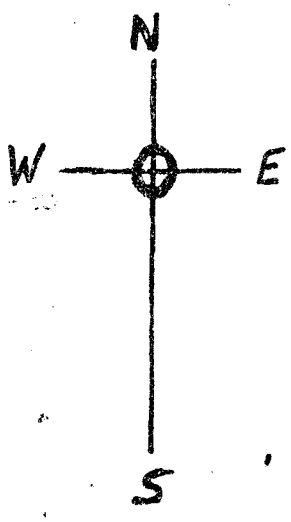


12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

SPECIES:

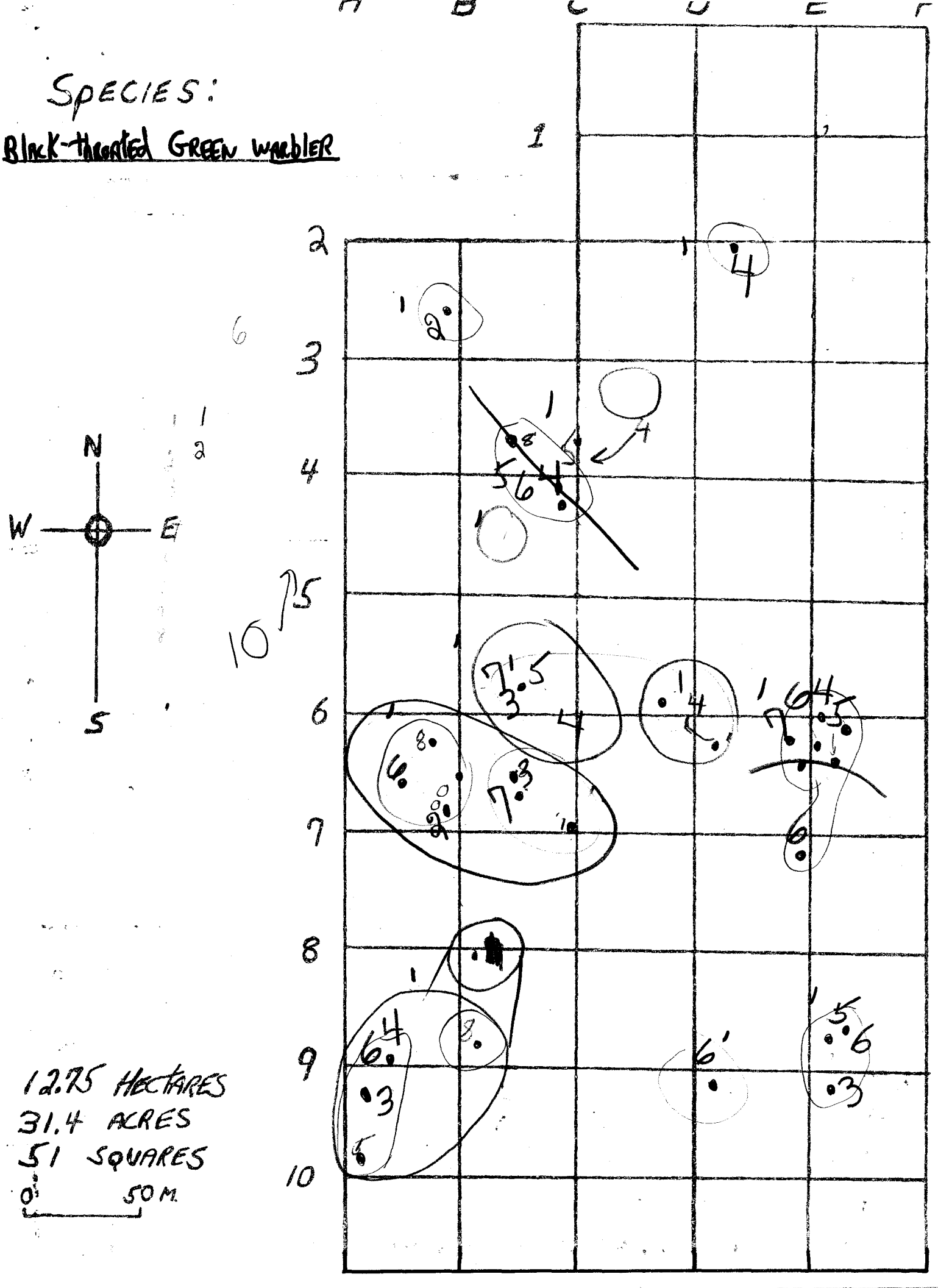
BLACK-CAPPED CHICKADEE



12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

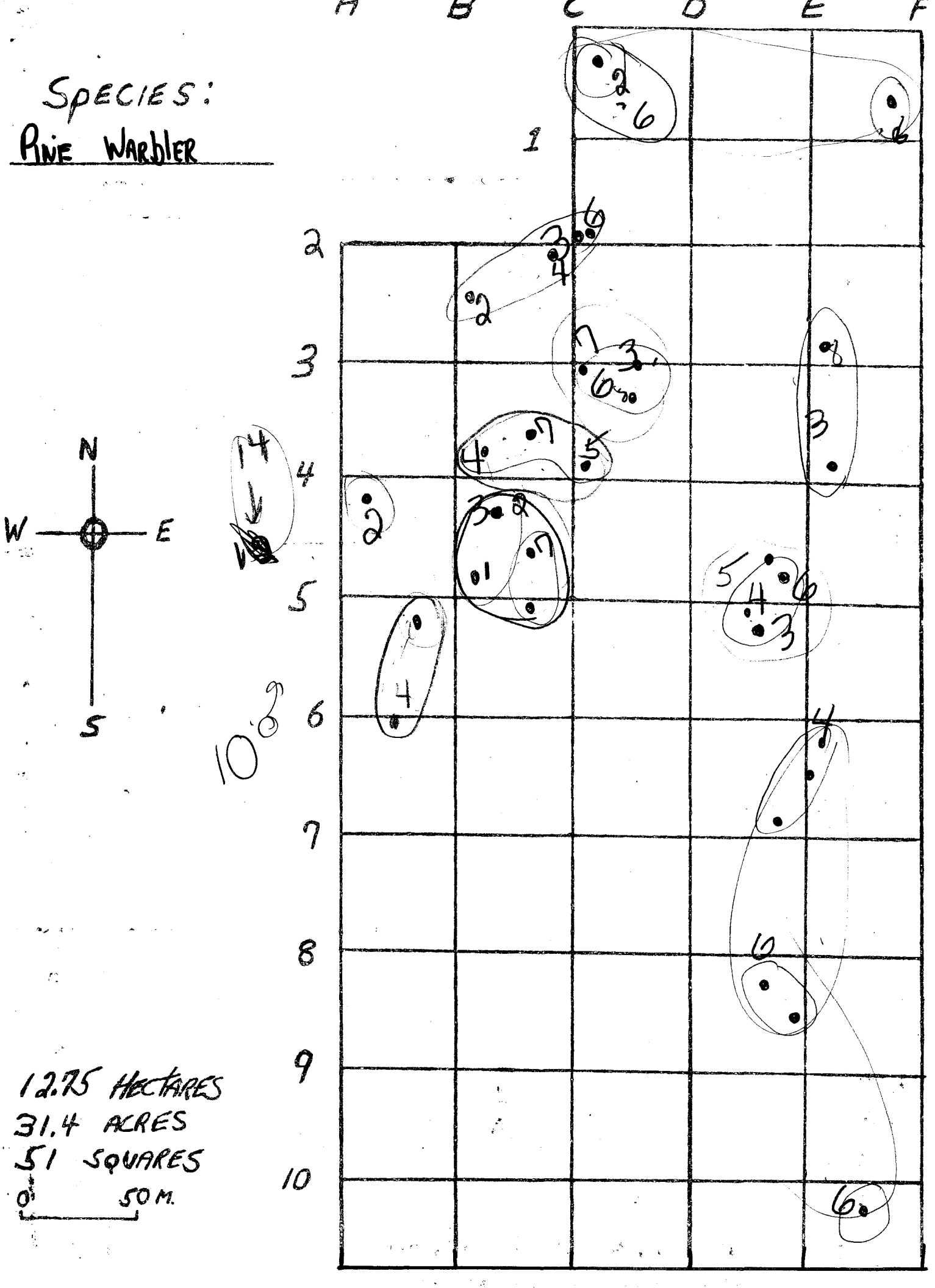
SPECIES:

Black-throated Green Warbler



SPECIES:

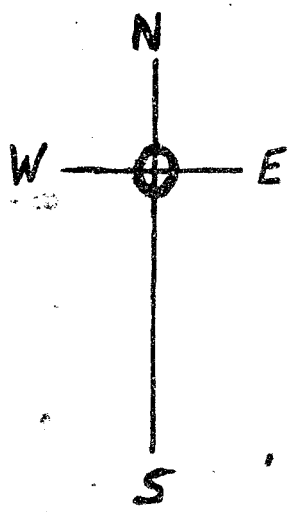
PINE WARBLER



12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

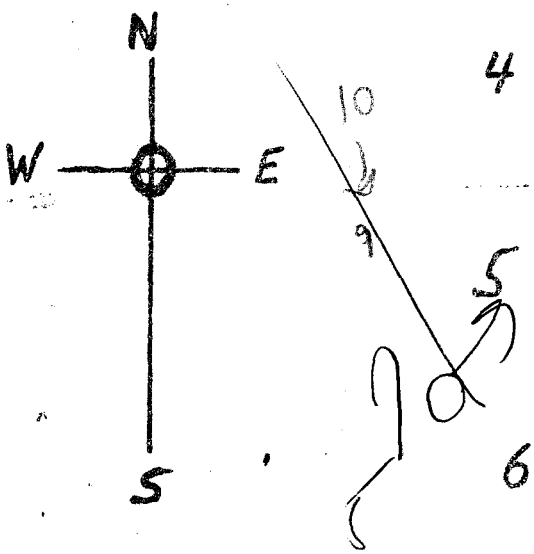
SPECIES:
HERMIT THRUSH



12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

SPECIES:

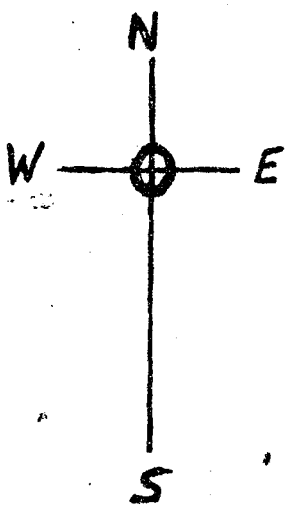
RED-BREASTED NUTHATCH



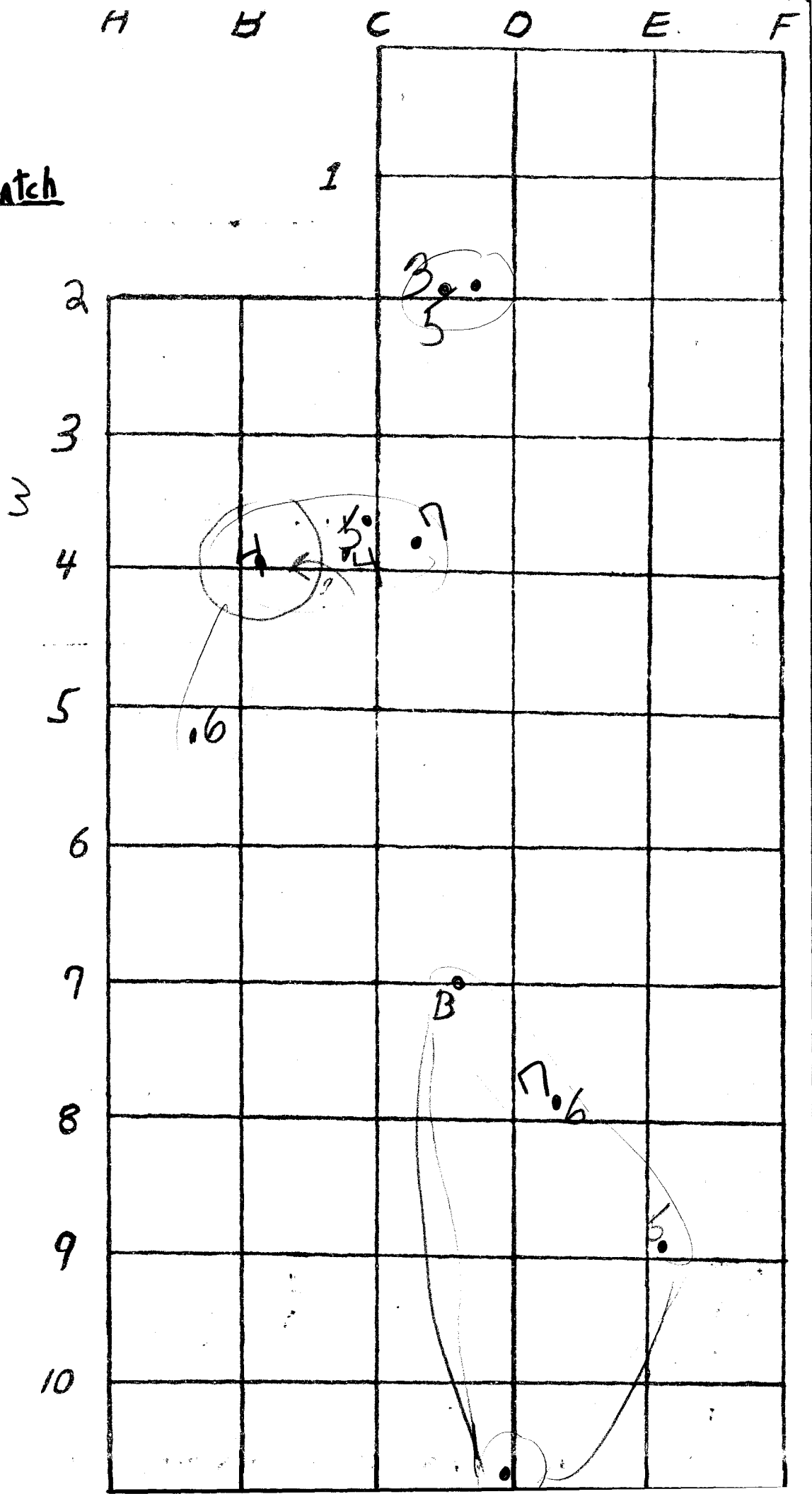
12.75 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.

SPECIES:

White-breasted Nuthatch

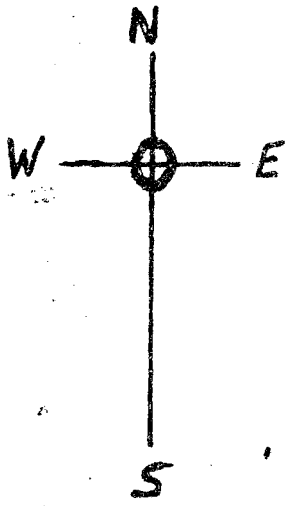


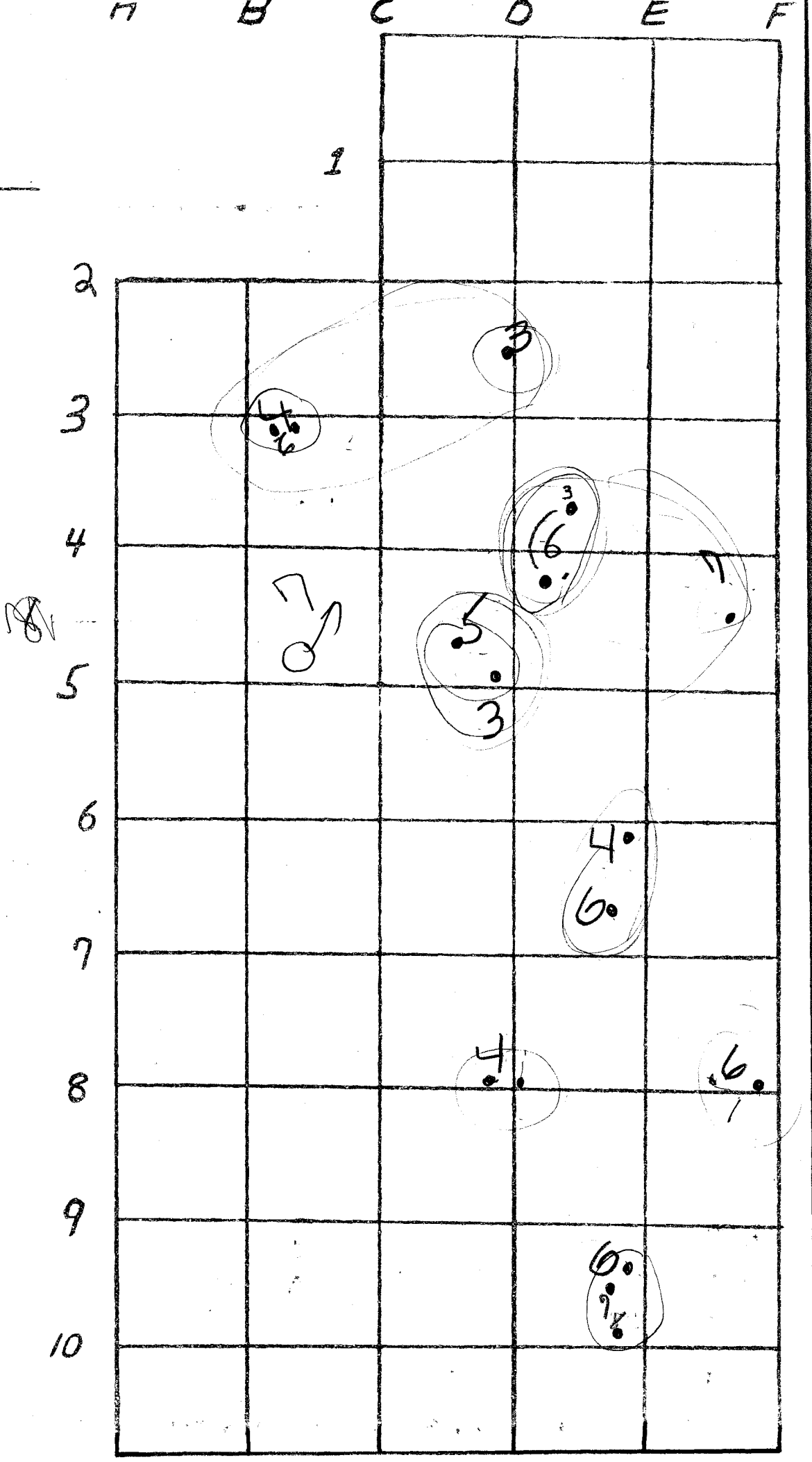
12.25 HECTARES
31.4 ACRES
51 SQUARES
0 50 M.



SPECIES:

WOOD PEWEE



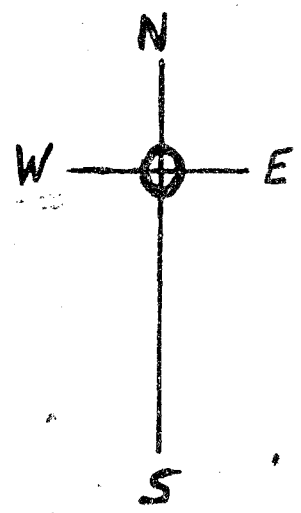


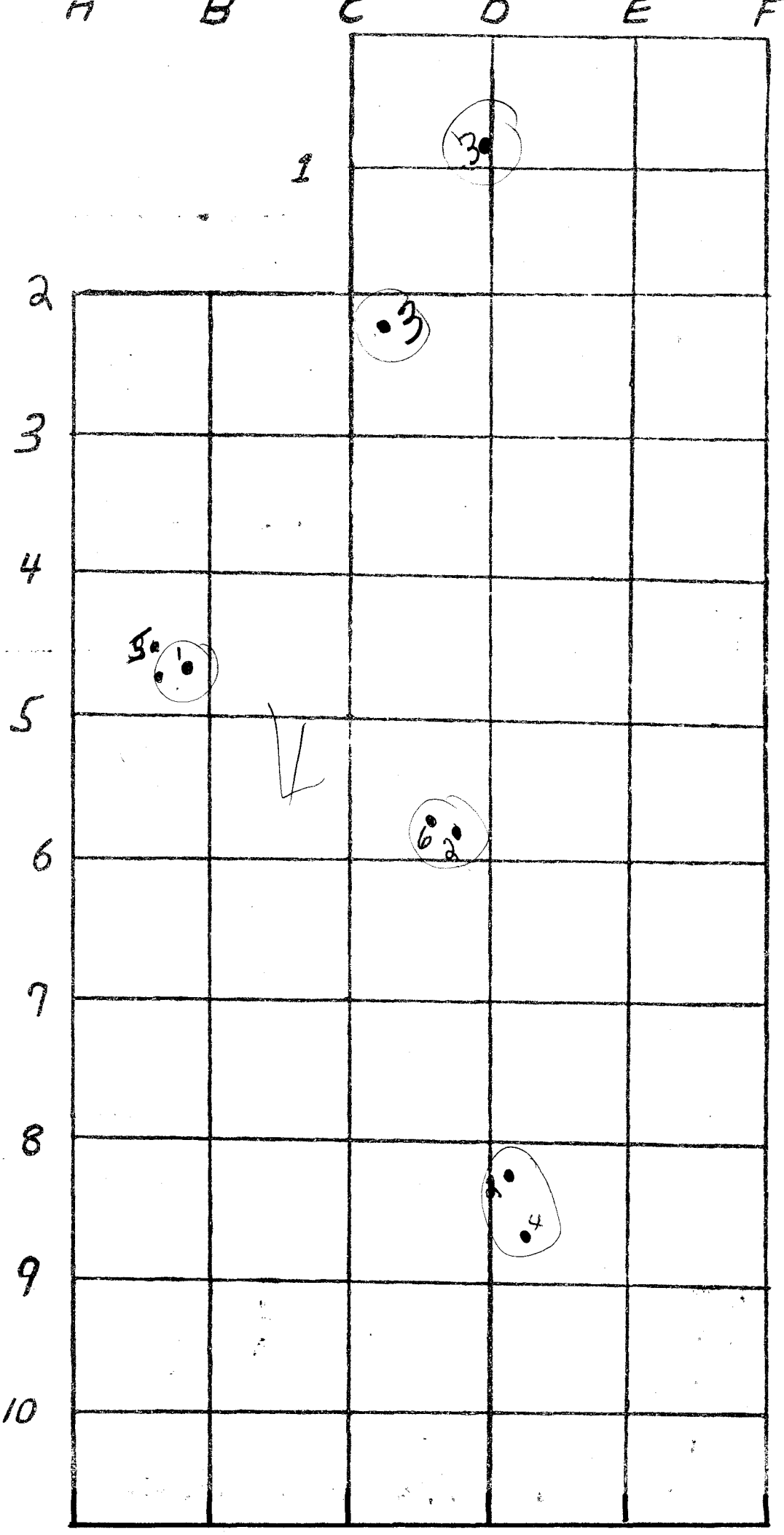
12.25 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

SPECIES:

BROWN CREEPER

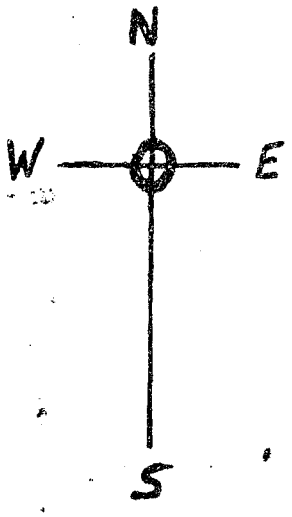


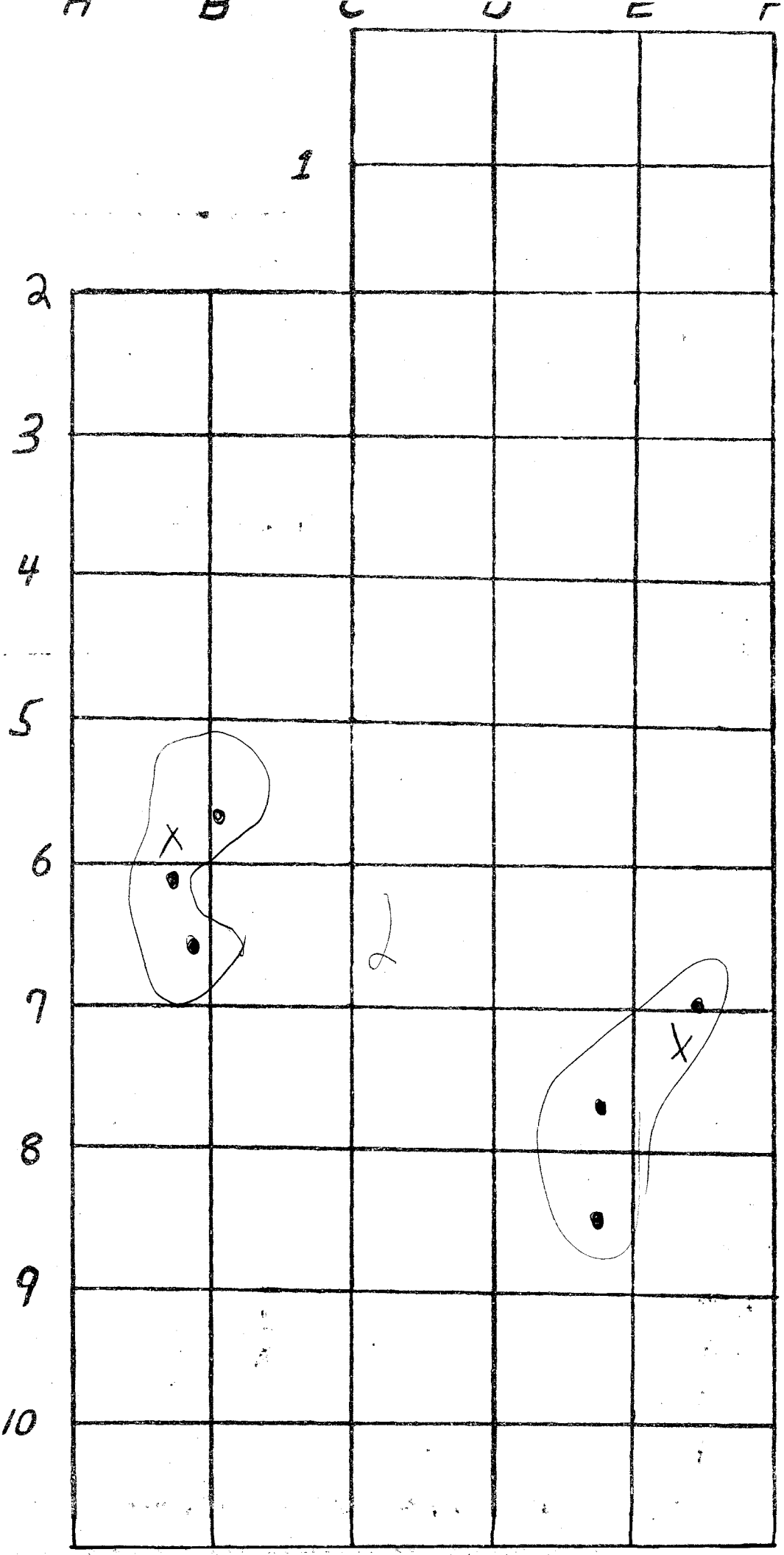


12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.

SPECIES:
SCARLET TANAGER





12.75 HECTARES
31.4 ACRES
51 SQUARES

0 50 M.