IBS # 1898-A

Red Pine Forest Breeding Bird Census

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Abstract

We conducted a breeding bird census in a mature red pine forest in Itasca State Park, Minnesota. There were eight visits between 18 June and 7 July 1991. A total of 128 resident males (representing 18 species) and 12 visitors were identified. Increases in Red-eyed Vireo territory density since 1990 appears to have occurred in two other sites. Increases in territory densities of Ovenbirds and Chestnut-sided Warblers and the appearance of Great-crested Flycatcher, Canada Warbler and Mourning Warbler over the past ten years are due to changes in the habitat.

Introduction

A study was set up by Dr. David Blockstein to monitor breeding bird populations in Itasca State Park. Several different censusing sites were set up in different habitat types: a mature red pine forest; an open basswood-black ash forest with standing dead elm and birch; a mature aspen forest; and a young aspen forest with an incomplete overstory of mature red and white pines (Blockstein 1991). Long term studies of birds in native habitats are important because habitats are quickly disappearing, over time this data can show the changes in bird species composition as the habitat changes and population changes (Blockstein 1990).

The purpose of this paper is to estimate breeding bird densities in the red pine plot and compare these findings with earlier censuses.

Methods

The census was conducted in Itasca State Park (Clearwater Co., Minnesota; $47^0$13' N, $95^0$12' W). The study area is located 2.9 miles from the beginning of the one-way portion of the Wilderness Drive on the north side of the road. The plot was set up and first censused in 1990. It is 10 ha in size and made up of forty 50 meter grid blocks. It is relatively rectangular in shape with five grid blocks west to east and eight grid blocks north to south (Figure 1).

A vegetation survey was conducted in the plot using the methods of James and Shugart (1970)(Table 3, 4, Appendix A). Ten 0.1 ha randomly distributed circular plots were located (Figure 1). All of the trees in the 0.1 area circle that were larger than 3inches were identified and their DBH (diameter beast height) was recorded. The percent canopy cover and ground cover were estimated by taking tansects across the circle and checking the presence or absence of canopy cover and ground cover. Shrub density was determined by crossing the circle with out-stretched arms and counting the number of times shrub stems were intercepted. The dominant canopy trees are Red Pine (*Pinus resinosa*) and White Pine (*Pinus strobus*) with a canopy height of 23 meters. The sub-canopy is dominated by Maple (*Acer sp.*), down and standing dead trees are common throughout the plot. The shrub layer consists primarily of Beaked Hazelnut (*Corylus cornuta*), Elderberry (*Sambucus sp.*) and young deciduous trees. The ground layer contains Bunchberry (*Cornus canadensis*), Large-leaf Aster (*Aster macrophyllus*), Canada Mayflower (*Maianthemum canadense*), Round-lobed Hepatica (*Hepatica americana*), Strawberry (*Fragaria sp.*), Blueberry (*Vaccinium sp.*), Starflower (*Trientalis borealis*), Raspberry (*Rubus sp.*), Maidenhair fern (*Adiantum pedatum*), and Bedstraw (*Galium sp.*), There is a sedge meadow approxamatly 0.7 ha located east and a deciduous forest aproxamatly 1 ha northwest in the plot. The topography is flat with scattered inclines.

The breeding bird census was conducted from 18 June through 7 July using the methods described by the Cornell Laboratory of Ornithology (1989). There was a total of eight visits, 7 in the early morning and 2 in the early evening. There were two observers for 5 of the visits and three observers for 3 of the visits (Table 1). Censuses were not conducted during hard rain or strong wind. The census consisted of walking alternate south-north grid lines and stopping every 50 m and recording the approximate position of the birds seen and/or heard. The symbols used for recording bird positions and interactions are given in Robbins (1970)(Figure 3). The starting and ending locations were alternated at each visit to ensure even coverage. Breeding bird territories were mapped after all visits were completed. Individual species territories were determined by simultaneous singing, species interactions and repeated sightings in the same locations (Appendix B). Non-breeding species were listed as visitors.

Results

During the census period a total of 128.5 resident males were identified, eighteen resident species and twelve species listed as visitors (Table 2). Ovenbirds, Pine Warbler, Red-eyed Vireo and Black-throated Green Warbler were the most abundant species accounting for 68% of the total number of resident males (Figure 2).

One Canada Warbler nest was found just outside the plot along the A line between A2 and A3. The nest was burrowed in a vertical bank of a small incline.

Seven grouse fledglings were stirred up on the D line (6/21) between D2 and D1 the adult made aggressive noises and moved in a half circle in front of us. A group of five Black-capped Chickadees and three Brown Creepers were observed in the plot. Two Veerys were heard one night(6/25), simultaneously singing just out side the plot along the F line, between F8 and F9.

Discussion

The most significant change between this years and last years red pine census is the number of Red-eyed Vireo territorial males (Table 2). In 1990 they identified 95 breeding male territories/km^2 and we identified 240 breeding male territories/km^2 this year. The red pine plot has not gone through any dramatic habitat changes in the past year to account for the increase. Two other census groups also noticed increases in the number of Red-eyed Vireos this year. The number of territories/plot doubled in the open basswood plot (Bear Paw Point) from 25 to 50 territorial males from 1990 to 1991 (Storbakken, 1991). The mature aspen plot group observed a increase of 11 territories/plot, from 20.5 territories/plot in 1990 to 31 territories/plot in 1991 (Lambert, 1991).

The number of Northern Parula territories increased between 1990 and 1991 (Table 2). The territories that were mapped in 1990 were rather large (Whittaker, 1990) when compared to the territories that we mapped this year (Appendix B). There may have been some error in mapping the Northern Parula territories in 1990 (Canterbury, personal communication). Northern Parula breed in open conifer and/or deciduous forests (Ehrlich et al., 1988). All of the Northern Parula territories we identified were close to or overlapped the deciduous or open areas of our plot.

There was not a large difference in the number of Pine Warbler territories/km^2 between 1990 and 1991, but Mills (1980) observed a much lower number of territories (Table 2). The increase in the Pine Warblers over the past 10 years is related to the change in the habitat. Presently there is maple sub-canopy and a shrub layer scattered throughout the plot that was absent 10 years ago. The canopy cover has increased from 64.5% in 1980 to 95.5% in 1991. The ground cover has similarly increased. The habitat succession has increased the food supply which can support a higher population of Pine Warblers. Since there is not much red and white pine regeneration in the plot,[1] it would be interesting to note the Pine Warbler population trends as the mature red pine forest continues to shifts to a deciduous forest.

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[1]

The Canada Warbler, Ovenbird, Great-Crested Flycatcher, Chestnut-sided Warbler and Mourning Warbler territories/km^2 determined in 1991 were consistent with the 1990 territories (Table 2). When compared to 1980, the Great-crested Flycatcher, Mourning Warbler and Canada Warbler were not present and the number of Ovenbird and Chestnut-sided Warbler territories/km^2 were much less (Table 2). The habitat preference of all of these species is deciduous forest, with the Chestnut-sided Warbler and the Mourning Warbler found in dense shrub areas. The Canada Warbler, Ovenbird and Mourning Warbler nest on or near the ground, while the Great-crested Flycatcher and the Chestnut-sided Warbler occupy different nesting niches (Ehrlich et al., 1988). The habitat changes over the past 10 years have increased the available nesting sites. This has allowed species like the Great-crested Flycatcher, Mourning Warbler and Canada Warbler to breed in the plot and for the number of Ovenbird and Chestnut-sided Warbler territories to increase.

The Black-throated Green Warbler has remained fairly constant from 1980 to 1991 (Table 2). They prefer an open conifer or an open conifer/deciduous forest (Ehrlich et al., 1988). The Black-throated Green Warblers occupy a niche they are competitively successful in.

Mills (1980) does not mention a sedge meadow in his plot this could account for the low numbers of Common Yellowthroat territories/km^2 in 1980, while the 1990 and 1991 territories/km^2 are consistent. The Common Yellowthroats territory is concentrated around the sedge meadow.

Brown Creeper and Black-capped Chickadee breeding male territories/km^2 remained constant from 1990 to 1991, while the number of territories/km^2 has decreased from 1980. Brown Creepers and Black-capped Chickadees tend to travel in groups, since Mills (1980) does not have any recorded sightings of Brown Creepers or Black-capped Chickadees he may have overestimated the number of territories by hearing the same group in different areas. The new species in the plo (since 1980): Great-crested Flycatcher, Canada Warbler and Mourning Warbler maybe competing against the Brown Creepers and Black-capped Chickadees additional censuses over the next few year may give more definite answers.

In comparing the census data from 1990 and 1991 the territorial numbers are similar, except for the Red-eyed Vireos. There were large differences between the 1980 census and the 1990/1991 censuses which is due to habitat changes. The conclusions reached should be regarded with caution, since bird populations are often changing (Blockstein, 1991). Continued censusing in the red pine plot will provide useful data in determining bird population trends and habitat preferences.

Literature Cited

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TABLE 1

Visit	Date	Time Start-End	Temp(°C)	Wind(mph)	Sky	number of Observers
1	6/18	0530-0900	13.9	1-3	overcast	3
2	6/21	1915-2130	21.1	4-7	p. cloud	2
3	6/23	1930-2030	21.7	4-7	p. cloudy	2
4	6/25	0530-0900	16.1	4-7	p. cloudy	2
5	6/28	0530-0830	12.8	1-3	p. cloudy	2
6	6/30	0540-0915	13.9	1-3	overcast	3
7	7/5	0550-0915	12.8	1-3	overcast	2
8	7/6	0545-0830	15.6	1-3	clear	3
9	7/7	0545-0830	17.2	1-3	overcast	2

Visit	Starting point-Ending Point	
1	A0-E9	
2	B0-D9	
3	F2-F9	
4	E1-A1	
5	F2-B9	
6	A0-E6	*had to stop, began raining hard
7	B1-F9	
8	E1-A9	
9	F2-B9	

Table Two
Bird Territories of the Red Pine Plot

Breeding Males	#/Plot	1991 #/km^2	1990 #/km^2	1980 #/km^2
Ovenbird	25	250	265	196
Pine Warbler	24.5	245	215	71
Red-eyed Vireo	24	240	95	102
Black-throated Green Warbler	13	130	120	78
Canada Warbler	6	60	40	0
Chestnut-sided Warbler	5.5	55	50	16
Hermit Thrush	5	50	75	47
Northern Parula	5	50	10	16
Eastern Wood Pewee	4.5	45	30	39
Great-crested Flycatcher	4	40	30	0
Common Yellowthroat	3.5	35	50	8
Mourning Warbler	2	20	15	0
Brown Creeper	1.5	15	10	31
Scarlet Tanager	1.5	15	25	16
Black-capped Chickadee	1	10	10	63
Pileated Woodpecker	1	10	10	0
Ruffed Grouse	1	10	20	8
Winter Wren	.5	5	5	8

Visitors

Broad-winged Hawk
Screech Owl
Yellow-bellied Sapsucker
Hairy Woodpecker
Black-backed Woodpecker
Gray Jay
Blue Jay
Common Raven
Red-breasted Nuthatch
American Redstart
Pine Siskin
Song Sparrow

Summary Sheet A

Table three

Summary Sheet for Tenth-acre (0.4 hectare) Circles

Number of Circles = 10

Trees:

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	4	15	6	1	2			41	41	14.79
2 Spruce sp.			4						4	4	1.29
3 Balsam Fir	19	10	6						45	45	14.47
4 Birch sp.	5	3	6	1					15	15	4.82
5 Poplar sp.	1	2	4						7	7	2.25
6 Ironwood	6								6	6	1.93
7 White Pine		5	2	5					12	12	3.86
8 Maple sp.	17	12	8		1				37	37	11.90
9 Oak sp.	4	2							6	6	1.93
10 Butternut	1								1	1	0.32
Ash sp.	2								2	2	0.64
Dead	51	51	9		1	2			113	113	42.19
TOTAL	107	103	54	12	15	4			311	311	100%
Trees/acre by size class	107	103	54	12	15	4					
Relative Density by size class	34.41	33.12	17.36	3.86	4.82	1.29					

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 1915

Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 93.5%

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5. 95.5%

Summary Sheet B

Table Four

Summary Sheet for Tenth-acre (0.4 hectare) circles

Number of Circles = 10

Trees

Species	Basal Area[5] Cross sectional area of the trunk at 4.5 feet from the ground (d.b.h.)								Total Basal Area (sq. feet)	Relative Dominance[7] (by species)	No. of circles in which the species occurred	Frequency[9]
	A (0.1)	B (0.3)	C (0.6)	D (1.0)	E (1.8)	F (3.1)	G (4.9)	H (.005 d.)[2]				
1 Lodge Pole	0.1	1.2	9.0	16.0	14.7	[illegible]			46.9	33.17	8	80
2 Spruce sp	/	/	2.4	/	/	/			2.4	1.70	4	40
3 Balsam fir	1.9	6.0	3.3	/	/	/			11.5	8.13	8	80
4 Birch sp	2.5	0.9	3.6	1.0	/	/			6.0	4.24	6	60
5 Aspen sp	0.1	0.6	2.4	/	/	/			3.1	2.19	3	30
6 Tamarack	0.6	/	/	/	/	/			0.6	.42	3	30
7 Lodge Pole	/	4.5	4.2	5.0	/	/			10.7	7.57	4	40
8 Birch sp	1.3	4.8	1.8	/	/	/			7.1	5.14	9	90
9 Oak sp.	0.4	/	/	/	/	/			1.0	.70	3	30
10 Basswood	0.1	/	/	/	/	/			0.1	.07	1	10
Ash sp.	0.2	/	/	/	/	/			0.2	.14	2	20
Dead	5.1	15.3	5.4	/	/	/			28.8	20.51	10	100
										99.983		
TOTAL	10.7	30.9	32.4	25.0	27.0	15.4			141.4	100%		100%
Trees/acre by size class	10.7	30.9	32.4	25.0	27.0	15.4						
Relative Density by size class	7.57	21.85	22.91	17.7	19.09	10.89			99.999			

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 1915

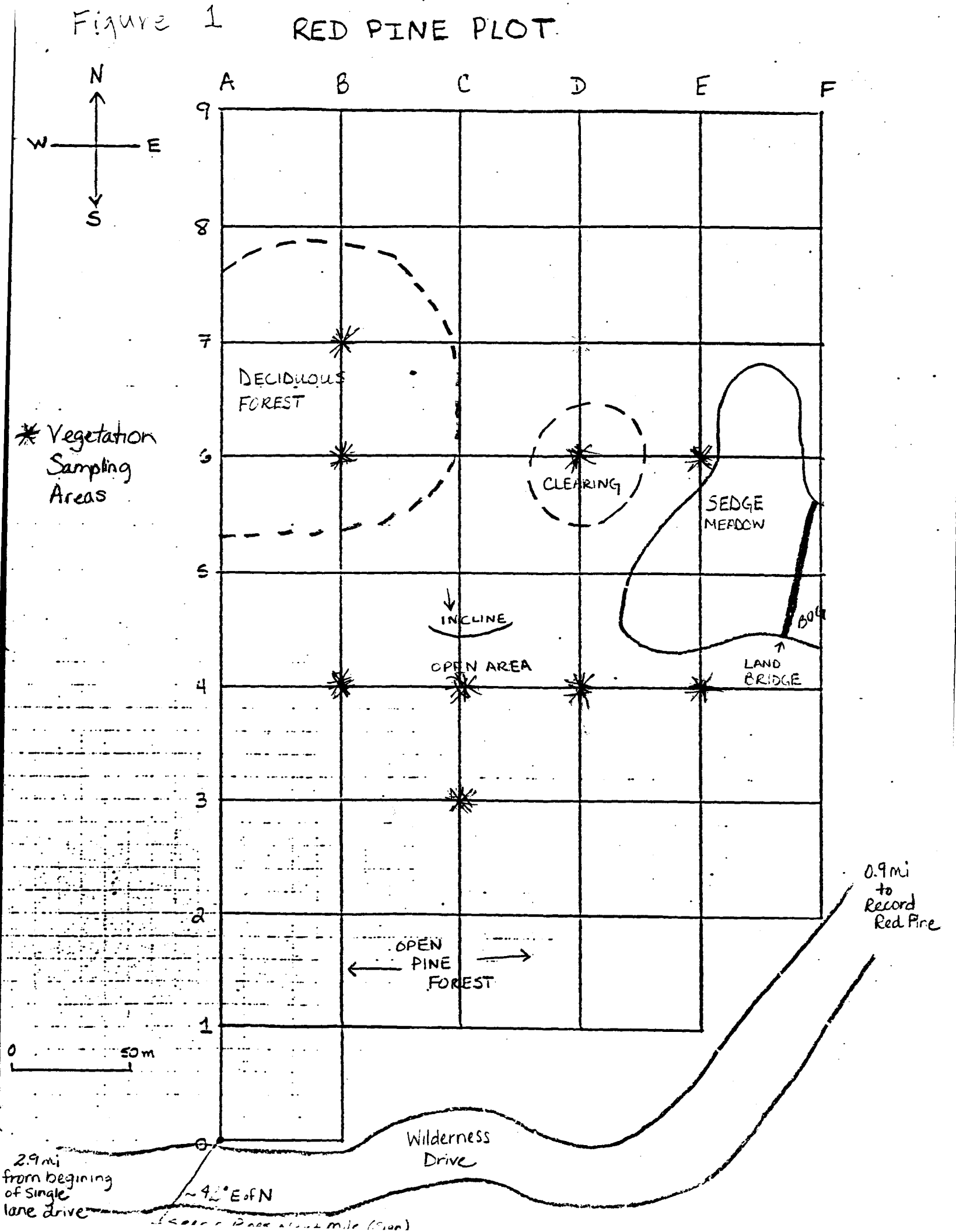
Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 93.5%

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

382 x 100 ÷ 400 = 95.5%

Figure 1

RED PINE PLOT



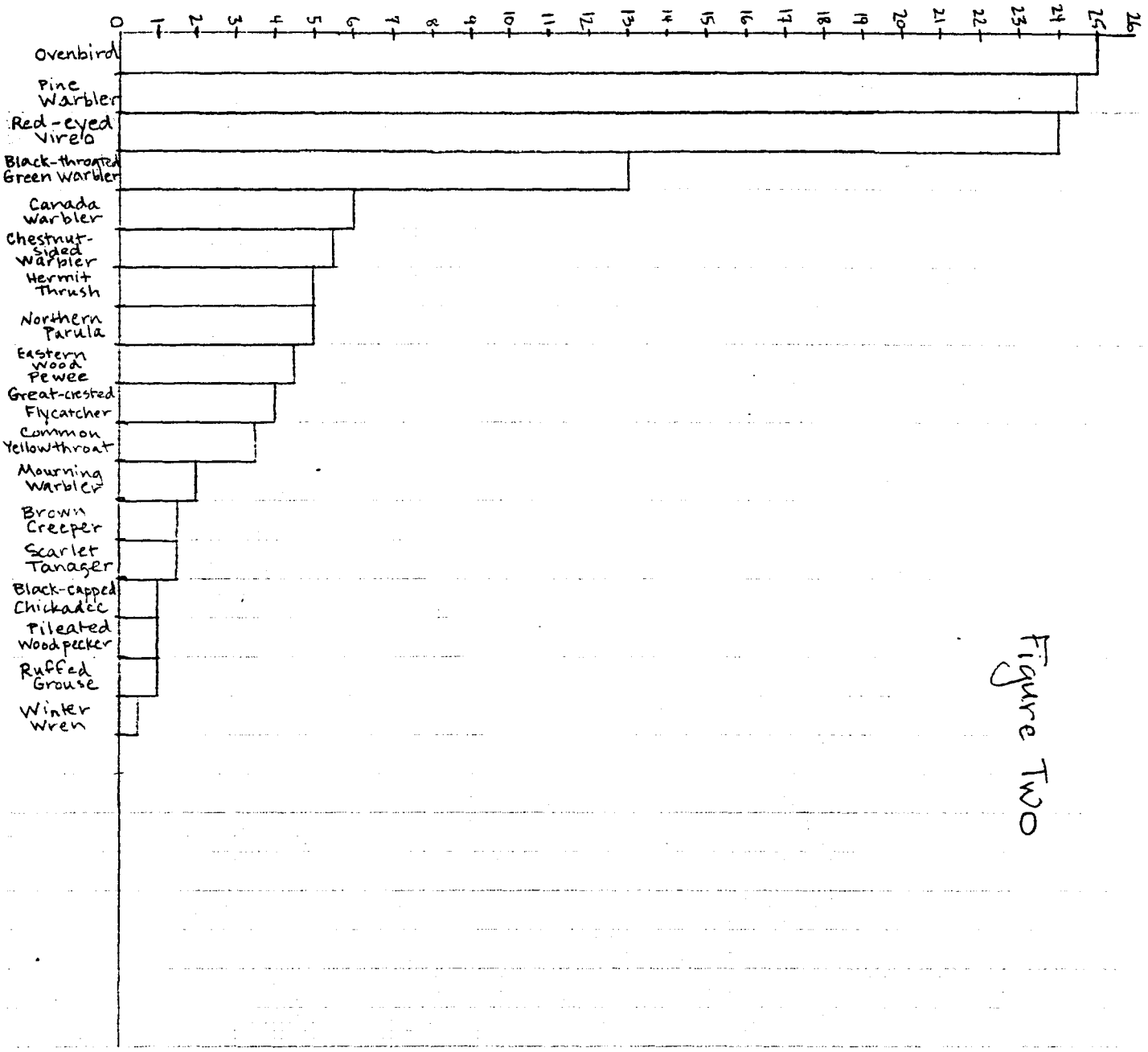

Number of Territorial Males
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26
Ovenbird
Pine Warbler
Red-eyed Vireo
Black-throated Green Warbler
Canada Warbler
Chestnut-sided Warbler
Hermit Thrush
Northern Parula
Eastern Wood Pewee
Great-crested Flycatcher
Common Yellowthroat
Mourning Warbler
Brown Creeper
Scarlet Tanager
Black-capped Chickadee
Pileated Woodpecker
Ruffed Grouse
Winter Wren

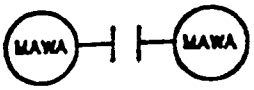
Figure Two

Figure Three

STANDARD SYMBOLS USED FOR MAPPING – May be helpful (Robbins, 1970) (Magnolia Warbler in this example)

– position of singing male

– approximate position of singing male (can be enlarged to indicate area of uncertainty)



– simultaneous registration of song within a short time period indicates 2 interacting males

– male observed

– female observed

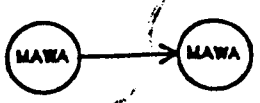
– calling, sex unknown

MAWA – observed, sex unknown

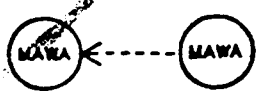
– pair together, assumed mated

– observed conflict between males dispute over boundary

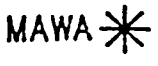
– vocal defence of territories between males this specifically implies a territory boundary



– known change in position



– assumed change in postion



– nest

APPENDIX A

RED PINE FOREST WITH DEAD TIMBER.

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:** Established and censused 1990. **Size:** 10.0 ha = 24.69 acres (40 squares 50 m x 50 m). **Description of Plot:** A quantitative survey of the vegetation gave the following results: Trees 3-inches diameter and over, based on ten 0.4 ha circular samples; 768.17 trees/ha; total basal area 32.46 m^2/ha. Species comprising the total number of trees [figures after each species give number of trees/acre, relative density (%), relative dominance (%), frequency (%)]: Dead Trees, 125, 40.19, 34.51, 100; Red Pine (*Pinus resinosa*), 46, 14.79, 33.17, 80; Balsam Fir (*Abies balsamea*), 45, 14.47, 8.13, 80; Maple (*Acer sp.*), 37, 11.9, 7.14, 90; White Pine (*Pinus strobus*), 17, 5.47, 7.57, 40; Birch (*Betula sp.*), 15, 4.82, 4.24, 60; Ironwood (*Ostrya virginiana*), 6, 1.93, 0.42, 30; Oak (*Quercus sp.*), 6, 1.93, 0.70, 30; Spruce (*Picea sp.*), 4, 1.29, 1.70, 40; Ash (*Fraxinus sp.*) 2, 0.64, 0.14, 20; Basswood (*Tilia americana*), 1, 0.32, 0.07, 10. Trees by diameter size class [figures after each size class give number of trees/acre, relative density (%), basal area in square feet/acre, relative dominance (%)]: A (3-6 in.) 107, 34.41, 10.7, 7.57; B (6-9 in.) 103, 33.12, 30.9, 21.85; C (9-12 in.) 54, 17.36, 32.4, 22.91; D (12-15 in.) 28, 9.0, 28.0, 19.8; E (15-21 in.) 15, 4.82, 27.0, 19.09; F (21-27 in.) 4, 1.29, 12.4, 8.77. Shrub stems/ha, 4730, ground cover, 93.5%, canopy cover, 95.5%, Mean canopy height 23 m. A sedge meadow covered approximately 10 km^2. **Edge:** Bordered by similar forest on the west, north and east sides. On the south side three grid squares are buffered by 50 m zones and two begin at the edge of the road. **Topography:** Basically flat with a few scattered inclines. **Elevation:** 1475 ft. **Weather:** 12.8-21.7°C, wind, Beaufort 1-2, clear to overcast, slight precipitation during one census. **Coverage:** June 18, 21, 23, 25, 28, 30, July 5, 6, 7 between 0530-0915 and 1915-2130. Total obs.-hours: 61.25. **Census:** (Number of territorial males of each species in census plot; figures in parentheses give the number of territorial males/km2): Ovenbird, 25 (250); Pine Warbler 24.5 (245); Red-eyed Vireo 24 (240); Black-throated Green Warbler 13 (130); Canada Warbler 6 (60); Chestnut-sided Warbler 5.5 (55); Hermit Thrush 5 (50); Northern Parula 5 (50); Eastern Wood Pewee 4.5 (45), Great-crested Flycatcher 4 (40); Common Yellowthroat 3.5 (35); Mourning Warbler 2 (20); Brown Creeper 1.5 (15); Scarlet Tanager 1.5 (15); Black-capped Chickadee 1 (10); Pileated

Woodpecker 1 (10); Ruffed Grouse 1 (10); Winter Wren .5 (5). Total: 28 species; 128.5 territorial males (1285/km^2). Visitors: Broad-winged Hawk, Screech Owl, Yellow-bellied Sapsucker, Hairy Woodpecker, Black-backed Woodpecker, Gray Jay, Blue Jay, Common Raven, Red-breasted Nuthatch, American Redstart, Pine Siskin and Song Sparrow. KELLY MUNSON, 2719 Johnson St. NE, Minneapolis, MN 55418. CATHERINE PODESZWA, 7542 Tempo Terr., Fridley, MN 55432.