A Breeding Bird Census in Itasca State Park: Red Pine Forest with Deciduous Understory

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Abstract

A breeding bird census was conducted in a 10 ha area of a Red Pine forest in the Wilderness Sanctuary of Itasca State Park, Clearwater County, MN. Between 18 June and 7 July, 1991, 128.5 territorial males (representing 18 species) were observed. Also observed were 12 visitor species. Ovenbird, Pine Warbler, and Red-eyed Vireo were the three most common resident species. This census is compared with one done in the same plot in 1990, and with a census in a similar area in 1980.

Introduction

With the increasing loss of habitat in both wintering and breeding grounds, and the increase in edge-affected areas which expose more species to nest parasites such as the Brown-headed Cowbird, song bird populations are becoming increasingly threatened. In order to determine which areas are most affected, and to create effective management techniques geared towards these areas, one must have reliable, quantitative evidence of decline over as long a period as possible. Unfortunately, data tends to be fairly unreliable when it is not collected, year after year, in the same manner.

The Cornell Laboratory of Ornithology has created a repeatable method for censusing breeding birds in order to collect accurate data in all types of habitats, in all areas of concern. Using this method, we have repeated a census done in the Red Pine forest of Itasca State Park in 1990. By comparing the population densities in these two years and populations found in another census done eleven years ago in approximately the same area, perhaps one can draw conclusions about general population trends. Even if conclusions cannot be drawn at this point, this census takes one more step forward in creating a breeding bird database for Itasca State Park.

Confounding any conclusions about species decline because of habitat loss elsewhere is habitat loss here. It may not be obvious, but succession is a subtle way of destroying habitat. The coniferous forest in this plot (and in much of Itasca State Park) is succeeding into deciduous, thus forcing some species out while allowing others to become pioneers into the area. Park policy prohibiting natural burning leads to a change that may not have occurred if the park had been left to burn naturally. A census may be able

to show this, but again, other habitat loss in the wintering grounds creates problems in pin-pointing the cause of change.

Methods

Study Plot

The study plot is located approximately 2.9 mi. from the beginning of the one-way section on Wilderness Drive in Itasca State Park, Clearwater Co., MN. It is a short distance from the "Record White Pine," on the north side of the road. A 20 mph speed limit sign is directly across from the B-0 line. The plot is 10 ha (24.69 acres) divided into 40 grid squares, each 2500 m^2 (50 m per side). Grid lines running north and south are labelled A-F, and lines running west and east are designated 0-9. The plot is basically rectangular with some deviation due to the road. See Figure One for the study site map. The plot contains one completely deciduous opening between A-5 and A-8, and B-5 and B-8, and a 10km^2 sedge meadow on the E line. The A-F 1-2 area by the road is more open pine forest, with dense vegetation and deadfall more in the center of the plot.

Vegetation Survey

Data was taken on vegetation, including trees, shrubs and herbs, in ten random .04 ha plots using vegetation sampling methods described in James and Shugart (1970). At each sampling area, species and diameter of all trees were recorded in order to determine number of trees/ha, relative density, relative dominance, and frequency. Shrub prevalence was measured by walking two diameter transects with arms outstretched, recording the number of shrubs encountered. To measure canopy and ground cover, an observer walked two diameter transects, sighting up and down, and recording the number of times green vegetation occurred in the crosshairs of a sighting tube. Complete survey data are contained in Tables Three and Four and Appendix A.

Trees were defined as having stem diameter of $>$ 3 in. Red Pine (Pinus resinosa) is the predominant live species of mature tree throughout the plot (dominance 33.17%), but dead trees (mainly Red and White Pines) are more abundant (dominance 34.51%). The Red Pine canopy reaches 20-25m, and is 95.5% closed. There is an extensive deciduous understory in the plot,

consisting mainly of immature Maple (Acer sp.) and Aspen (Populus sp.). This sub-canopy height is approximately 8-10m. Other frequently occurring trees (in descending order of density) are Balsam Fir (Abies balsamea), White Pine (Pinus strobus), and Birch (Betula sp.).

Shrubs (< 3 in. stem diameter) occur in a density of stems/ha. Some common species are Beaked Hazelnut (Corylus cornuta), Elderberry (Sambucus sp.), and young Maples.

Ground cover exists on 93.5% of the plot. The most common plants are Bunchberry (Cornis canadensis), Large-leaf Aster (Aster macrophyllus), Canada Mayflower (Maianthemum canadense), Maidenhair Fern (Adiantum pedatum), Blueberry (Vaccinium sp.), Strawberry(Fragaria sp.), Red Raspberry (Rubus strigosis), and Bedstraw (Galium sp.).

Breeding Bird Census

The census was performed according to the Cornell Laboratory of Ornithology instructions for Breeding Bird Censuses (1989). Nine censuses took place on June 18,21,23,25,28,30 and July 5,6,7. Seven took place between the hours of 0530-0915, and two between 1915-2130. Temperatures ranged from 12.8-21.7°C. Kelly Munson and the author were the main observers, with Grant Canterbury and Dr. David Blockstein joining for three censuses. See Table One for a complete listing of observers, times and weather.

To census, observers walked transects so as to be within 50m of every point on the study grid for each census. Two to three observers stopped at each point and recorded all birds heard or seen from that location. Vermont Institute of Natural Science Forest Bird Monitoring Program (Robbins, 1970) symbols for mapping were used (see Figure Three). Simultaneous singing and conflict activities were recorded to determine individual territories and therefore number of breeding birds.

Territories for each day were recorded on one map per species. All days were combined on a final map for each species, and territories were ascertained from the compiled data. See Appendix B for a graphic representation of species' territories.

Results

A total of thirty bird species were seen or heard in the plot during nine census periods. See Appendix B for plotted territories by species. Eighteen species were identified as resident breeding species, and twelve as visitors. 128.5 territorial males were identified. See Table Two for a list of breeding and visiting species. See Figure Two for a graphic representation of number of territorial males. Ovenbirds were most numerous, with 25 territories. Pine Warblers were also prevalent, with 24.5 territories. Red-eyed Vireos increased in number from 9.5 in 1990 to 24 this year. Five Northern Parulas were observed, where only one had been found in 1990. A Ruffed Grouse brood of 6-8 fledglings was observed on 21 June. Three Brown Creepers together on one tree were seen 5 July. These were assumed to be related because of their close proximity to each other on the same tree, and because of their lack of aggression toward each other. A group of five Black-capped Chickadees flying together was observed 30 June. These were not listed as breeders, because they did not appear to have a defended territory, but it was assumed they were a family group. A Canada Warbler nest with three young was found just outside the plot, to the west of the A-2 transect.

Discussion

A number of the species in the Red Pine plot have been listed by Ehrlich (1988) as species generally on the decline. Two reasons for this seem to be habitat loss and nest parasitism by Brown-headed Cowbirds. In our plot, many of these listed species (Eastern Wood Pewee, Red-eyed Vireo, Northern Parula, Black-throated Green Warbler, and Canada Warbler) have actually increased slightly or fairly significantly. Since this plot is located in a protected area not subject to much obvious human manipulation or impact, population stability in these species would be expected. Growth might occur from an influx of birds seeking appropriate habitat as theirs is destroyed: pine stands with cover attractive to birds that nest on the ground are rare, as old stands are logged and replanted with faster-growing species.

Although they have been seen in the park, no Brown-headed Cowbirds were observed in the Red Pine Plot this year or last. Thus, brood parasitism

does not appear to be a problem. An absence of Brown-headed Cowbirds could possibly explain the greater success of Red-eyed Vireos. According to Ehrlich (1988), Red-eyed Vireos in some studies have suffered parasitism up to 70%. Without this drain on Red-eyed Vireo reproductive success, the population may grow more than 100%, as it did in our plot.

But the Red-eyed Vireo population has also increased significantly in areas of the park where Brown-headed Cowbirds have been observed. In the Open Basswood Plot, Red-eyed Vireos increased from 220/km^2 in 1990 to 505/km^2 in 1991 (Iverson, in press). The Mature Aspen Plot experienced an increase from 205/km2 in 1990 to 315/km2 in 1991 (Lambert, in press). Only the Young Aspen Plot stayed relatively constant (Ebaugh, in press). Such large increases in most plots suggests that perhaps Brown-headed Cowbirds have not yet gotten a toehold in the park, and are not yet disturbing its breeding birds. It is also possible that Red-eyed Vireos unsuccessful in other areas have moved to find breeding success at Itasca.

Another possibility for the increase in Red-eyed Vireos in the Red Pine Plot specifically, is the increase in deciduous growth over the past ten years. Mills (1980) reported 102/km^2, while our observations yielded 240/km^2. Last year's data observed a decline from 1980 (down to 95/km^2), perhaps showing that increased deciduous growth is not a great factor in the large population increase.

Although Ovenbird populations have remained stable throughout the past two years, there is an increase to present levels of 250/km^2 from 196/km^2 in 1980. At this time, shrubs were the same, but no maple was recorded (as shrub or canopy). It is possible that an increase in deciduous growth has attracted more Ovenbirds.

Pine Warblers have rivalled the Ovenbird in density for the last two years, and, like the Ovenbird, have increased significantly from 1980. Only 71/km^2 were observed in 1980, where 245/km^2 exist presently. Whittaker (1990) suggests that this increase may be due to the decrease in suitable habitat for Pine Warblers outside the park. This is a good possibility, with the decline of pine in general.

For the past two years, the Canada Warbler has maintained a density of 40-60/km^2 in the Red Pine Plot, up from zero birds in 1980. It is possible these birds had not discovered this area in 1980, but it is probably more likely that the habitat has changed significantly to appeal to the Canada

Warbler, with an increase in deciduous underbrush. The same can be said for the increase in Chestnut-sided Warblers and Mourning Warblers.

An increase in dead trees and deciduous understory appears to have attracted Great-crested Flycatchers to the plot. Snags have also attracted the Pileated Woodpecker and various other species of woodpecker.

The Ruffed Grouse prefers dense deciduous/coniferous forest with dense understory for breeding. We have evidence for one pair's breeding success in the 6-8 young brood we encountered. Since we had four sightings of Ruffed Grouse, it is possible that more territories exist in the plot.

In general, the mix of normally coniferous, normally deciduous, and mixed forest habitat birds reflects the state of the vegetation in the Red Pine Plot. At this point, the rapid succession does not appear to be pushing out the coniferous habitat birds, but that will gradually occur as more pines fall and more maples and aspen develop. A burn to restore new pine growth, however, would be fairly dangerous at this point (the deadfall would create a very hot fire). Even if the deciduous influence were burned out, the high population of deer would probably destroy new pine growth. It appears that the forest will just gradually succeed. Hopefully, the Univ. of MN Biol. Station Ornithology Class will continue to census the area and record species changes. In time, observations of changes in vegetation in the breeding grounds may help to clearly pin-point the effect of that change on bird populations. Any questions about this paper may be directed to the author: Catherine Podeszwa, 7542 Tempo Terrace, Fridley, MN 55432.

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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:	Density[1]								Total	Trees/acro (by species)[2]	Relative Density (by species)[3]
Species	Number of trees in all circles by size class										
	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	16	8	2	/	/	46	46	14.79
2 Spruce sp.	/	/	4	/	/	/	/	/	4	4	1.29
3 Balsam Fir	19	20	6	/	/	/	/	/	45	45	14.47
4 Birch sp.	5	3	6	1	/	/	/	/	15	15	4.82
5 Aspen sp.	1	2	4	/	/	/	/	/	7	7	2.25
6 Ironwood	6	/	/	/	/	/	/	/	6	6	1.93
7 White Pine	/	5	7	5	/	/	/	/	17	17	5.47
8 Maple sp.	17	16	3	/	1	/	/	/	37	37	11.90
9 Oak sp.	4	2	/	/	/	/	/	/	6	6	1.93
10 Basswood	1	/	/	/	/	/	/	/	1	1	0.32
Ash sp.	2	/	/	/	/	/	/	/	2	2	0.64
Dead	51	51	9	6	6	2	/	/	125	125	40.19
TOTAL	107	103	54	28	15	4			311	311	100%
Trees/acre by size class	107	103	54	28	15	4					
Relative Density by size class	34.41	33.12	17.36	9.00	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. 383 x 100 ÷ 20 = 1915

Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 374 x 100 ÷ 400 = 93.5%

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5. 382 x 100 ÷ 400 = 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.) A (0.1)	B (0.3)	C (0.6)	D (1.0)	E (1.8)	F (3.1)	G (4.9)	H (.005d²)	Total Basal Area (sq. feet)	Relative Dominance[7] (by species)	No. of circles in which the species occurred	Frequency[9]
1 Red Pine	0.1	1.2	9.0	16.0	14.4	6.2			46.9	33.17	8	80
2 Spruce sp.	/	/	2.4	/	/	/			2.4	1.70	4	40
3 Balsam Fir	1.9	6.0	3.6	/	/	/			11.5	8.13	8	80
4 Birch sp.	0.5	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 Iron Wood	0.6	/	/	/	/	/			0.6	0.42	3	30
7 White Pine	/	1.5	4.2	5.0	/	/			10.7	7.57	4	40
8 Maple sp.	1.7	4.8	1.8	/	1.8	/			10.1	7.14	9	90
9 Oak sp.	0.4	0.6	/	/	/	/			1.0	0.70	3	30
10 Basswood	0.1	/	/	/	/	/			0.1	0.07	1	10
Ash sp.	0.2	/	/	/	/	/			0.2	0.14	2	20
Dead	5.1	15.3	5.4	6.0	10.8	6.2			48.8	34.51	10	100
										99.98%		
TOTAL	10.7	30.9	32.4	28.0	27.0	12.4			141.4	100%		~~100%~~
Trees/acre by size class	10.7	30.9	32.4	28.0	27.0	12.4						
Relative Density by size class	7.57	21.85	22.91	19.8	19.09	8.77			99.99%			

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 383 x 100 ÷ 20 = 1915

Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 374 x 100 ÷ 400 = 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

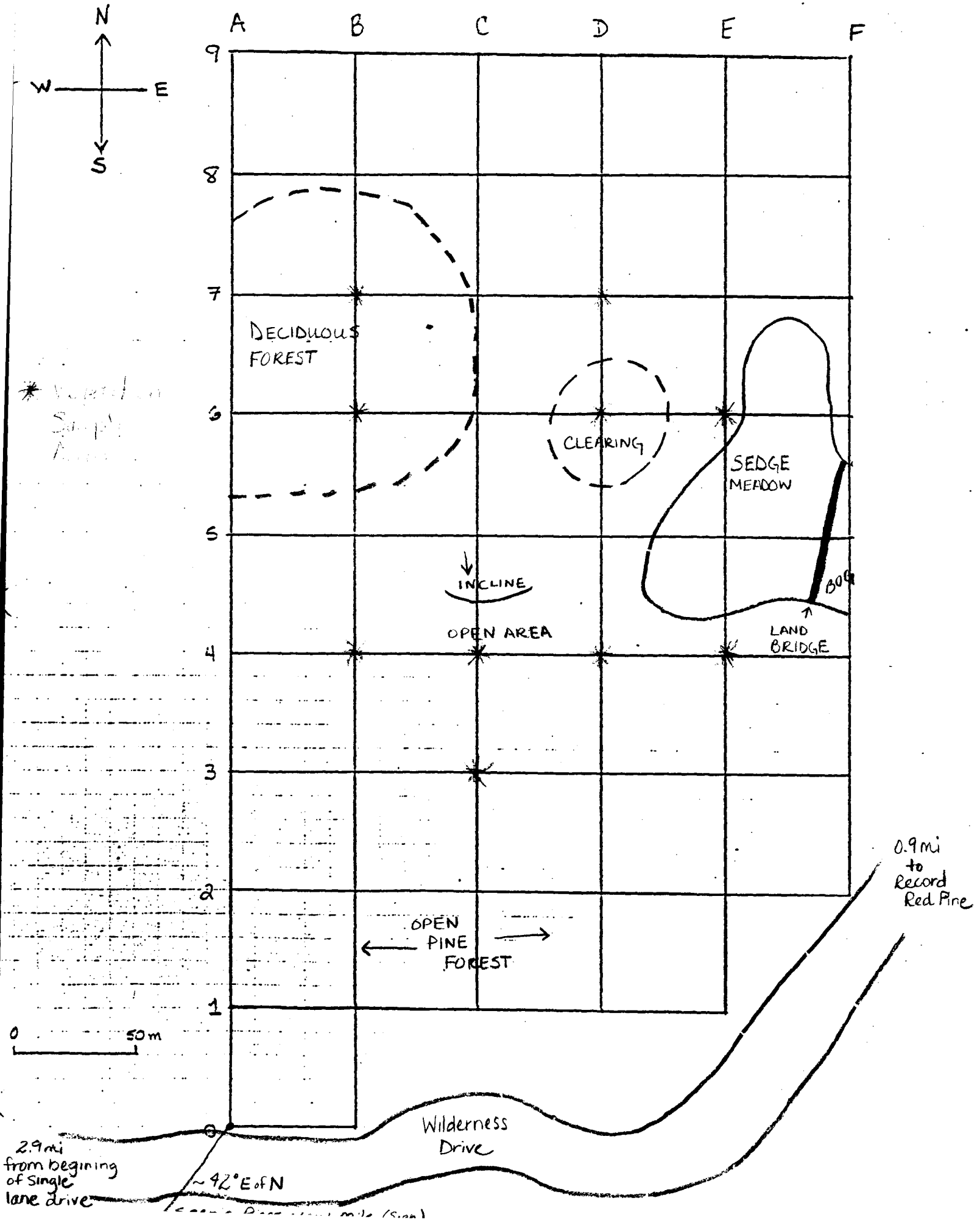


Figure Two

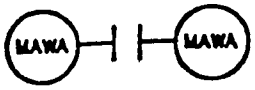
Number of Territorial Males
0
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25
26
Ovenbird
Pine Warbler
Red-eyed Vireo
Black-throated Green Warbler
Canada Warbler
Chestnut-sided Warbler
Hermit Thrush
Northern Parula
Eastern Wood Pewee
Great-crested Flycatcher
Common Yellowthroat
Mourning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

Figure 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

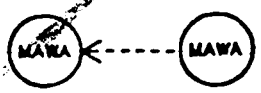
MAWA – observed, sex unknown

– 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

MAWA ✳ – 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.