IBS # 1860-A

BREEDING BIRD CENSUS OF A RED PINE FOREST

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FIELD ORNITHOLOGY
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ABSTRACT

A Breeding Bird Census was conducted in a Red Pine plot in Itasca State Park, Clearwater Co., MN. The most prevalent species of birds were Ovenbirds, Pine Warblers, Black-throated Green Warblers, Red-eyed Vireos, and Hermit Thrushes. The dominant tree species, in order of relative dominance was Red Pine, dead trees, and White Pine. The ground cover was 59.8%, and the canopy cover was 73.3% with a canopy height of 70 feet.

INTRODUCTION

There are few long-term studies that have been previously conducted on songbird populations. To observe population changes due to habitat destruction in breeding and wintering grounds, permanent plots have been established in Itasca State Park, MN. In particular, a Red Pine plot was set up by the group. By conducting Breeding Bird Censuses, territories of male birds can be determined, and population sizes can be estimated and studied over a number of years. The Red Pine plot is one of five plots established in the park as a field research project by David Blockstein to study the effects of habitat destruction on songbirds. Habitat analyses were conducted on each plot to allow comparisons with similar habitats in different areas.

METHODS

The Red Pine Plot is located 2.9 miles from the beginning of the one-way portion of Wilderness Drive, on the north side of the road. See appendix 1 for a complete description and map of the site. The Breeding Bird Census (BBC) was conducted using the methods of the Cornell Laboratory of Ornithology. Eight censuses were completed, with seven occurring between 0500-1000, and one between 1930-2145. The weather conditions ranged from a temperature of 45 to 80 degrees Fahrenheit, the sky ranged from clear to overcast, and the wind on the Beaufort scale ranged between 0-7. Observers were Karyn Noyes, Rebecca Sladek, Joe Whittaker, and David Blockstein. The census dates were June 22, July 1,3,6,8,9,10. The method used for recording bird positions was spot mapping with standard symbols from the Vermont Institute of Natural Science, Forest Bird Monitoring Program. See figure 1 for the symbols used.

The habitat analysis was conducted using the methods of Francis C. James (1980), and F.C. James and H.H. Schugart Jr (1970). Ten 0.1 ha samples were randomly chosen and sampled. The most dominant species of tree, as determined by relative density is the Red Pine (Pinus resinosa) with 58%. Dead trees were the next most common with 13.8% relative dominance. White Pines (Pinus strobus), Balsam Fir (Abies balsamea), and Maple (Acer

sp.) were also fairly common. Other trees encountered were Ironwood (Ostrya virginiana), Paper Birch (Betula papyrifera), Big-toothed Aspen (Populus grandidientata), Oak (Quercas sp.), and Spruce (Picea sp.). Shrubs were present in patches, with 1238/acre (3056/ha) or 30,556 shrubs in the plot. Beaked Hazelnut (Corylus cornuta) and young deciduous trees made up most of the shrubs. Ground cover was 59.8% and was composed mainly of Bunchberry (Cornus canadensis), Large-leaf Aster (Aster macrophyllus), Wild Lily-of-the-valley (Maianthenum canadense), Blueberry (Vaccinium angustifolium), and Strawberry (Fragaria sp.). For a complete compilation of the habitat analysis data see figure 2. Appendix 3 also contains a summary of the vegetation and the birds censused.

RESULTS

The plot contained a total of 23 different breeding species, and nine visiting species. Visiting species were determined to be birds that were only sighted once or twice, or family groups that had finished breeding. The total number of breeding males was 116 for the 10 ha plot. This converts to 1160 breeders/ km^2 or 467/100 acres. The most abundant species was the Ovenbird (26.5 breeding males). The second most common bird was the Pine Warbler (20.5), followed by the Black-throated Green Warbler (12), the Red-eyed Vireo (9.5), and the Hermit Thrush (7.5). For a complete listing of the breeding birds and visitors see figure 3. A graph of the number of breeding males on the plot is shown in figure 4. The territories of the breeders is in appendix 2.

DISCUSSION

The large number of Ovenbirds (26.5 breeding males) seems surprising initially, since they prefer deciduous forests. However, since the census plot had a large percent of ground cover (59.8%), and there were many deciduous trees in the plot, the large numbers are reasonable. A past study of a Red Pine plot in the Wilderness Area of Itasca showed a similar number of Ovenbirds (Mills, 1980). Their success may also be partially attributed to the lack of edge in the area, and the correlating lack of Brown-headed Cowbirds, a common brood parasite of the Ovenbird. A 1983 census of a Red Pine Forest in the Chippewa National Forest, MN, with little understory only had two Ovenbirds in a 8.54 ha plot (Rakstad and Probst, 1983). All habitat and nesting information in the discussion is from The Birder's Handbook, 1988.

Pine Warblers (20.5) are abundant in the Red Pine plot. Their numbers have significantly increased over the past ten years, as the Mills study only had nine breeding males. The Rakstad and Probst study only had

2.5 Pine Warblers, which could possibly be explained by the lack of understory in this plot.

The Black-throated Green Warbler (12) remained fairly constant over the ten-year period between censuses in Itasca, as the Mills study contained ten breeding males. The Rakstad and Probst census did not have any Black-throated Green Warblers. Again, the understory may be a factor.

Red-eyed Vireos (9.5) were common in the plot because of the large number of deciduous trees, although they do occasionally breed in coniferous forests. The Mills study had similar results, but the Rakstad and Probst study had only one breeding male, probably because of the lack of deciduous trees and little understory. Another possible factor is cowbird parasitism, as their plot had 2.5 cowbirds and the Red-eyed Vireo is a frequent host.

The Hermit Thrush (7.5) numbers were also similar to the Mills census. The Rakstad and Probst study did not have any Hermit Thrushes. Since they nest either on the ground or low in trees, the abundance of understory in the Itasca plots would explain why these birds were present. The lack of understory would prevent breeding, because of the absence of good cover for the nests.

The Rakstad and Probst census had ten Least Flycatchers, while this study and the Mills study did not have any Least Flycatchers. Since it has been on the Blue List since 1980, and is declining in parts of its range, this may explain the complete absence of Least Flycatchers in the Itasca plots. However, this does not explain why the Rakstad and Probst plot contained so many of these birds.

The differences seen in the abundance of bird species in the three censuses can be explained in part by the difference in the vegetation in the three plots. Another possible factor is the dates of the censuses. The Rakstad and Probst census was done in late May and early June, the Mills study in late June and early July, and the Noyes study, also in late June and early July. The stage of the breeding season in June is sure to be different from July. Fluctuations in weather over the years may also have an effect on the bird abundance.

Overall, the numbers of breeding species remained fairly constant over the ten years between censuses. Future censuses will be better able to determine how the destruction of habitat in both the breeding and the wintering grounds is affecting songbird populations.

MATURE RED PINE-MAPLE-IRONWOOD FOREST.-- Location: Minnesota; Clearwater Co., University of Minnesota Forestry and Biological Station, Itasca State Park Wilderness Sanctuary; 47013' N, 95012' W, USGS Itasca State Park Quadrangle. **Continuity**: New. **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, 260 per acre; total basal area, 265.3 ft2 per acre. Species comprising approx. 90% of the total number of trees [figures after each give number of trees/acre, relative density (%), relative dominance (%), frequency (%), in that sequence]: Red Pine, 56, 21.54, 58.09, 70; dead, 48, 18.46, 13.8, 90; Maple, 41, 15.77, 5.58, 60; Ironwood, 38, 14.62, 2.22, 50; Fir, 32, 12.31, 5.50, 70; Birch, 15, 5.77, 1.92, 50. Trees by diameter size class [figures after each size class give number of trees/acre, relative density (%), basal area (square feet/acre), relative dominance (%)]: A (3-6 in.) 72, 27.69, 7.2, 2.71; B (6-9 in.) 63, 24.23, 18.9, 7.12; C (2-12 in.) 47, 18.08, 28.2, 10.63; D (12-15 in.) 19, 7.31, 19.0, 7.16; E (15-21 in.) 25, 9.62, 45.0, 16.96; F (21-27 in.) 17, 6.54, 52.7, 19.86; G (27-33 in.) 13, 5.0, 63.7, 24.01; H (33-46 in.) 2, .77, 13.0, 4.9; I (46+ in.) 2, .77, 17.6, 6.63. Shrub stems per acre, 1238 (est.); gound cover, 59.8%; canopy cover, 73.3%; mean canopy height, 70 ft. A sedge meadow covered approximately 10 km^2. **Edge**: Bordered on west, north, and east sides by similar forest; three of five columns on south side buffered by a 50 m zone with the remaining two columns beginning at edge of road. **Topography**: Basically flat with a few scattered inclines. **Elevation**: 1475 ft. **Weather**: 45^0 - 80^0 F. Wind, Beaufort 0-7 mph. Clear to overcast, no percipitation. **Coverage**: June 22, July 1,3,6,8,9,10 between 1500 - 1000 and 1930 - 2144. Total observer hours 96.5; average time 12.1 hours. **Census**: Ovenbird, 26.5 (265, 107); Pine Warbler, 21.5 (215, 83); Black-throated Green Warbler, 12 (120, 49); Red-eyed Vireo, 12 (120, 38); Hermit Thrush, 7.5 (75, 30); Chestnut-sided Warbler, 5 (50, 20); Common Yellowthroat, 5 (50, 20); Canada Warbler, 4 (40, 16); Great-crested Flycatcher, 3 (30, 12); Eastern Pewee, 3(30, 12); Red-breasted Nuthatch, 3 (30, 12); Scarlet Tanager, 2.5; Hairy Woodpecker, 2.5; Ruffed Grouse, 2; Downy Woodpecker, 2; Mourning Warbler, 1.5; Pine Siskin, 1; Northern Parula Warbler, 1; Black-capped Chickadee, 1; Black-backed Woodpecker, 1; Brown Creeper, 1; Pileated Woodpecker, 1; Winter Wren , .5. **Total**: 23 species; 116 territorial males (1160/km2, 470/100 acres). **Visitors**: Blue

Jay, American Robin, Broad-winged Hawk, Black-billed Cuckoo, Yellow-bellied Sapsucker, Gray Jay, Black and White Warbler, Song Sparrow and Purple Finch.

Remarks: A dense understory indicates a succession to a deciduous forest, but there were numerous white pine seedlings observed along the many deer trails. Niche requirements are apparent for Yellow Warblers, which were found only by or in the sedge meadow and bog, and for Mourning Warblers, which were found only in thick, concentrated deciduous growths.

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James, F. C. and H. H. Shugart Jr. 1970. A quantitative method of habitat description. Audubon Field Notes 24: 727-736.

Mills, Paul J. 1980. A comparison of breeding bird census results from a coniferous and hardwood forest Unpublished report, Itasca Biological Station.

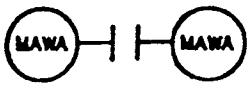
Rakstad, Don and John R. Probst 1983. Red Pine Forest American Birds Vol. 37, No.1, p.72.

FIGURE 1

STANDARD SYMBOLS USED FOR MAPPING – May be helpful
(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

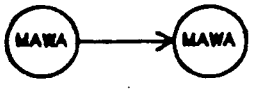
– calling, sex unknown

MAWA – observed, sex unknown

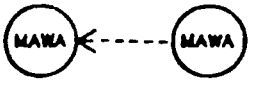
– pair together, assumed mated

– 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

RED PINE CENSUS 1970

Summary Sheet A

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 Birch	6	3	6	–	–	–	–	–	–	15	15	5.77
2 Fir	5	11	13	3	–	–	–	–	–	32	32	12.31
3 Maple	10	20	8	3	–	–	–	–	–	41	41	15.77
4 Oak	3	–	2	1	–	–	–	–	–	6	6	2.31
5 Dead	8	19	10	4	4	1	2	–	–	48	48	18.46
6 Red Pine	–	4	3	5	19	12	9	2	2	56	56	21.54
7 Spruce	1	–	–	1	–	–	–	–	–	2	2	.77
8 White Pine	–	–	4	2	1	4	2	–	–	13	13	5.00
9 Iron wood	35	2	–	–	1	–	–	–	–	38	38	14.62
10 Big-tooth Aspen	4	4	1	–	–	–	–	–	–	9	9	3.46
TOTAL	72	63	47	19	25	17	13	2	2	260	260	100%
Trees/acre by size class	72	63	47	19	25	17	13	2	2			
Relative Density by size class	27.69	24.23	18.08	7.31	9.62	6.54	5.00	.77	.77	= 100.01		

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 1237.5

Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 597.5

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5. 732.5

FIGURE 2A

Summary Sheet for Tenth-acre (0.4 hectare) circles. RED PINE CENSUS 1990

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 (00 sq. in.)	I	Total Basal Area (sq. feet)	Relative Dominance[7] (by species)	No. of circles in which the species occurred	Frequency[8]
1 Birch	0.6	0.9	3.6	—	—	—	—	+		5.1	1.92	5	50%
2 Fir	0.5	3.3	7.8	3.0	—	—	—	+		14.6	5.50	7	70
3 Maple	1.0	6.0	4.8	3.0	—	—	—	+		14.8	5.58	6	60
4 Oak	0.3	—	1.2	1.0	—	—	—	+		2.5	6.94	4	40
5 Dead	0.8	5.7	6.0	4.0	7.2	3.1	9.8	+		36.6	13.86	9	90
6 Red Pine	—	1.2	1.8	5.0	34.2	37.2	44.1	13.0	17.6	154.1	58.09	7	70
7 Spruce	0.1	—	—	1.0	—	—	—	-		1.1	0.41	2	20
8 White Pine	-	—	2.4	2.0	1.8	12.4	9.8	-		28.4	10.70	4	40
9 Iron wood	3.5	0.6	—	—	1.8	—	—	—		5.9	2.22	5	50
10 Big-tooth Aspen	.4	1.2	0.6	—	—	—	—	-		2.2	0.83	2	20
											99.99%		
TOTAL	7.2	18.9	28.2	19.0	45.0	52.7	63.7	13.0	17.6	265.3	100%		~~100%~~
Trees/acre by size class	7.2	18.9	28.2	19.0	45.0	52.7	63.7	13.0	17.6	265.3			
Relative Density by size class	2.71	7.12	10.63	7.16	16.96	19.86	24.01	4.9	6.6	99.98%			

Shrubs: Percent of + readings for interception of woody vegetation < 3" d.b.h. Eg. total pluses (+) in 20 readings x 5. 12375

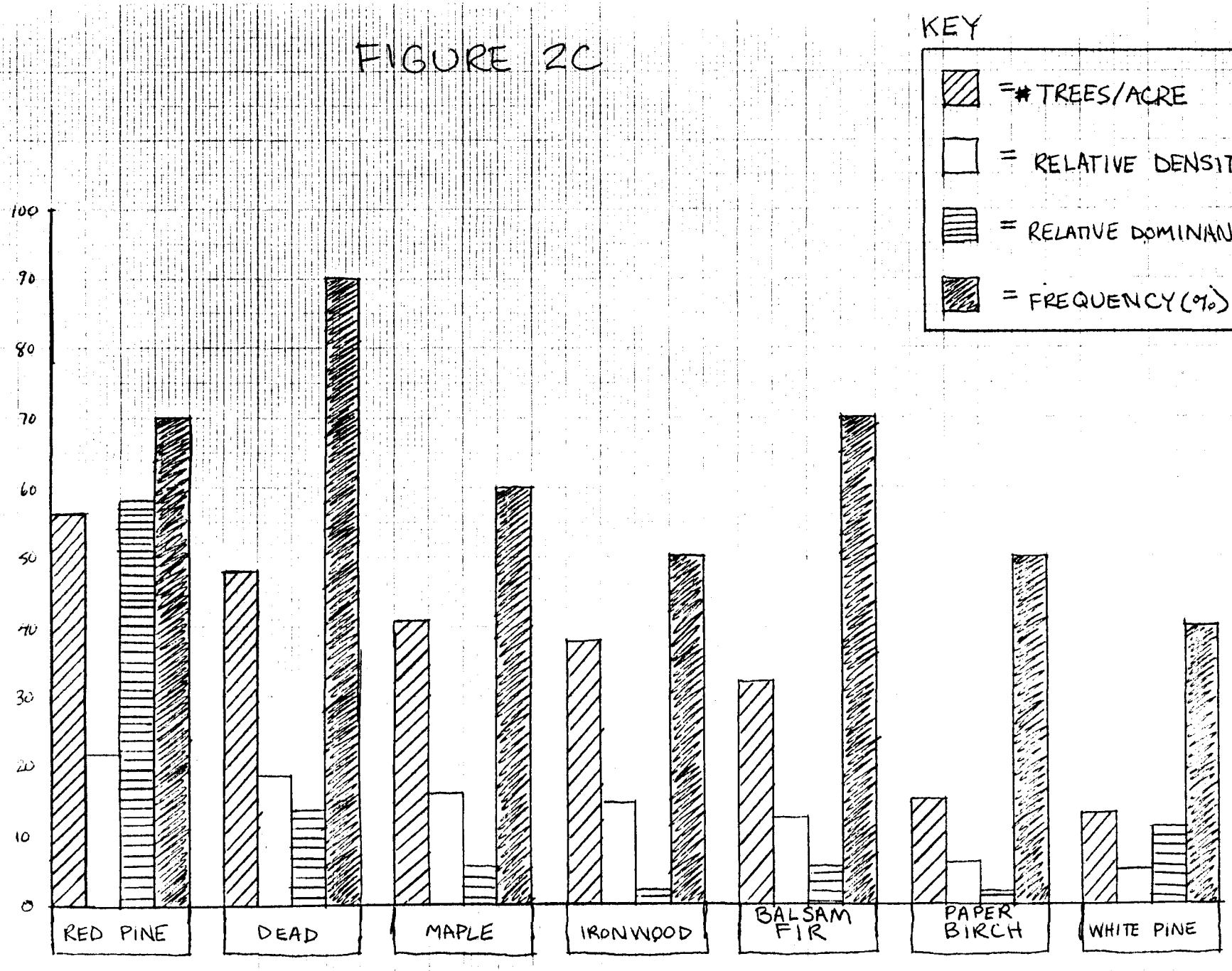
Ground Cover: Percent of plus + readings for green vegetation sighted in ocular tube. Eg. total pluses in 20 sightings x 5. 5975 59.8%

Canopy Cover: Percent of plus (+) readings. Eg. total pluses in 20 sightings x 5. 7325 = 73.3%

mean canopy height = 70 ft.

FIGURE 2B

FIGURE 2C



~~TABLE 3~~

FIGURE 3

BIRD TERRITORIES OF THE RED PINE CENSUS PLOT

BREEDING MALES:	#/PLOT	#/KM^2	#/100 ACRES
Ovenbird	26.5	265	107
Pine Warbler	20.5	205	83
Black-throated Green Warbler	12.0	120	49
Red-eyed Vireo	9.5	95	38
Hermit Thrush	7.5	75	30
Chestnut-sided Warbler	5.0	50	20
Common Yellowthroat	5.0	50	20
Canada Warbler	4.0	40	16
Eastern Wood-Pewee	3.0	30	12
Great-crested Flycatcher	3.0	30	12
Red Breasted Nuthatch	3.0	30	12
Hairy Woodpecker	2.5	25	10
Scarlet Tanager	2.5	25	10
Ruffed Grouse	2.0	20	8
Downy Woodpecker	2.0	20	8
Mourning Warbler	1.5	15	6
Black-backed Woodpecker	1.0	10	4
Pileated Woodpecker	1.0	10	4
Brown Creeper	1.0	10	4
Black-capped Chickadee	1.0	10	4
Northern Parula	1.0	10	4
Pine Siskin	1.0	10	4
Winter Wren	0.5	5	2
VISITORS:			
Blue Jay	2.0	20	8
American Robin	2.0	20	8
Broad-winged Hawk	1.0	10	4
Black-billed Cuckoo	1.0	10	4
Yellow-bellied Sapsucker	1.0	10	4
Gray Jay	1.0	10	4
Black-and-white Warbler	1.0	10	4
Song Sparrow	1.0	10	4
Purple Finch	1.0	10	4

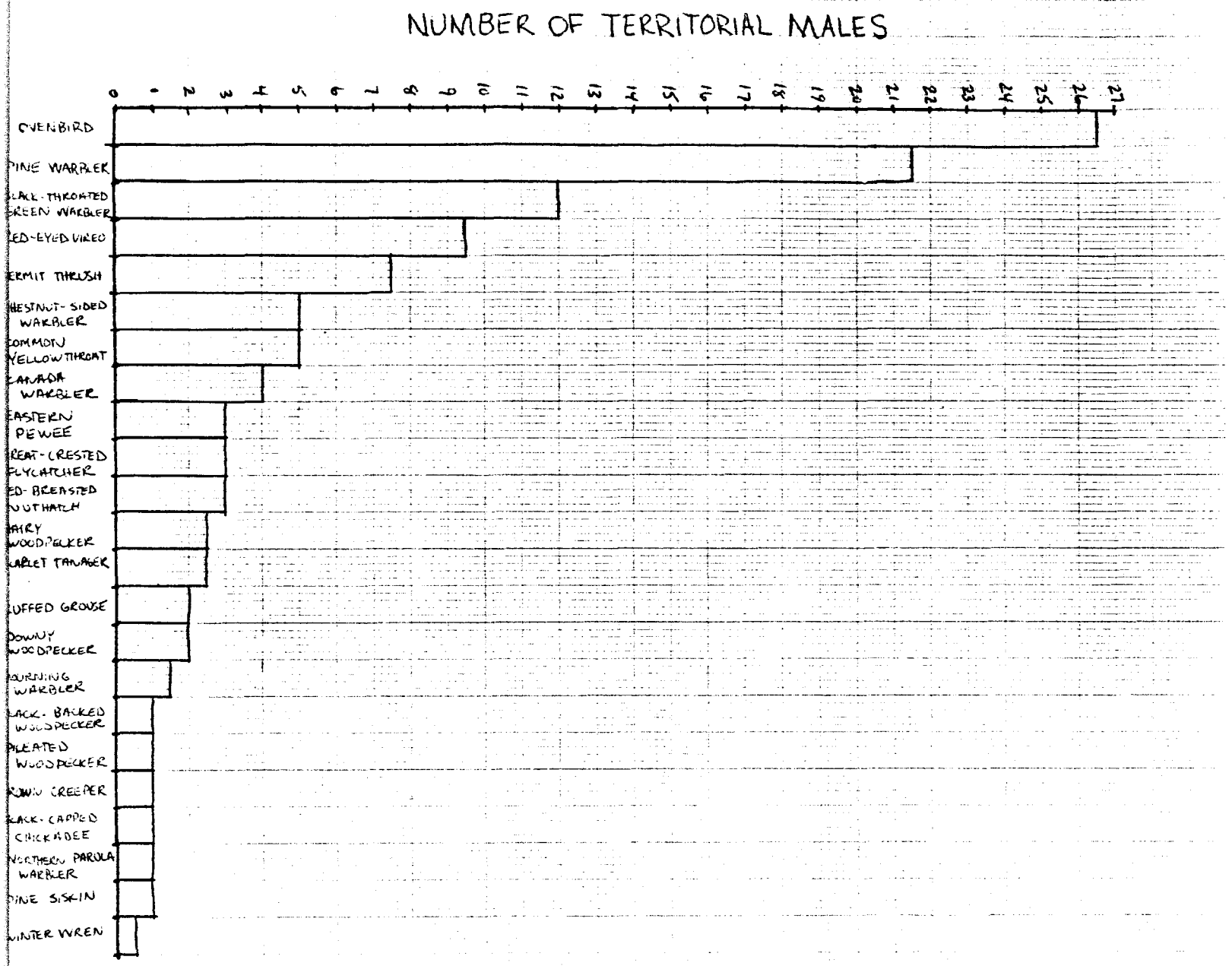

NUMBER OF TERRITORIAL MALES
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27
OVENBIRD
PINE WARBLER
BLACK-THROATED GREEN WARBLER
RED-EYED VIREO
HERMIT THRUSH
CHESTNUT-SIDED WARBLER
COMMON YELLOWTHROAT
CANADA WARBLER
EASTERN PEWEE
GREAT-CRESTED FLYCATCHER
RED-BREASTED NUTHATCH
HAIRY WOODPECKER
SCARLET TANAGER
RUFFED GROUSE
DOWNY WOODPECKER
OVENBIRD WARBLER
BLACK-BACKED WOODPECKER
PILEATED WOODPECKER
BROWN CREEPER
BLACK-CAPPED CHICKADEE
NORTHERN PARULA WARBLER
PINE SISKIN
WINTER WREN

FIGURE 4

Figure:

Adapted from Mills, 1980.

Red Pine Census Plot