

THE IMPACT OF THE 1978 SPRUCE BUDWORM
CHORISTONEURA FUMIFERANA CLEMENS, LARVICIDE
TIMING TRIALS IN QUEBEC UPON FOREST AVIFAUNA

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ABSTRACT

Spruce budworm, *Choristoneura fumiferana* Clemens, larvicide timing trials were conducted in the lower St. Lawrence area of Quebec in 1978. Aminocarb was applied by aircraft at the dosage rate of 0.052 kg AI/ha when fifty percent of second instar budworm had emerged, peak fourth instar and five days following the fourth instar treatment. Breeding bird populations were studied throughout the experimental period. No immediate or short-term impact was determined following any of the treatments and breeding territories remained intact. Population shift of some species resulted from factors other than insecticide treatment and adverse weather caused noticeable fluctuations in singing and foraging activity.

RÉSUMÉ

Des essais synchronisés d'applications de larvicide contre la Tordeuse des bourgeons de l'Epinette, *Choristoneura fumiferana* Clemens, ont été effectués au Québec, dans la région du bas Saint-Laurent en 1978. On a appliqué d'un aéronef un traitement d'aminocarb au taux de 0.052 kg IA/ha, alors que 50 p. cent des larves étaient au deuxième stade, que les larves du quatrième stade étaient au plus haut point et cinq jours après l'application du traitement aux larves du quatrième stade. Durant toute la période d'expérimentation, on a étudié les populations d'oiseaux reproducteurs. Aucun impact immédiate ou à court terme ne fut déterminé à la suite de ces traitements et les territoires de reproduction sont demeurés intacts. Une dérive des populations de certaines espèces fut le résultat de facteurs autres que le traitement d'insecticide et un climat adverse a causé des fluctuations sensibles dans les habitudes de chant et dans la recherche de nourriture des oiseaux.

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INTRODUCTION

Spruce budworm, *Choristoneura fumiferana* Clemens infestations continue to pose a hazard to the spruce-fir stands of the lower St. Lawrence area of Quebec. In 1978, the Quebec Department of Lands and Forests carried out an experimental spray programme designed to determine the optimum timing for budworm control in order to give maximum foliage protection.

The Forest Pest Management Institute carried out studies to determine if any of the spray regimes tested posed a danger to bird populations.

Aminocarb (4-dimethylamino-*m*-tolyl methylcarbamate), a carbamate insecticide, was applied to treatment blocks 101, 108 and 109 by DC-6 aircraft using Litton LTN-51 inertial navigation system (Figure 1).

This report presents the results of the avifauna impact studies carried out under operational conditions over the budworm larval feeding period.

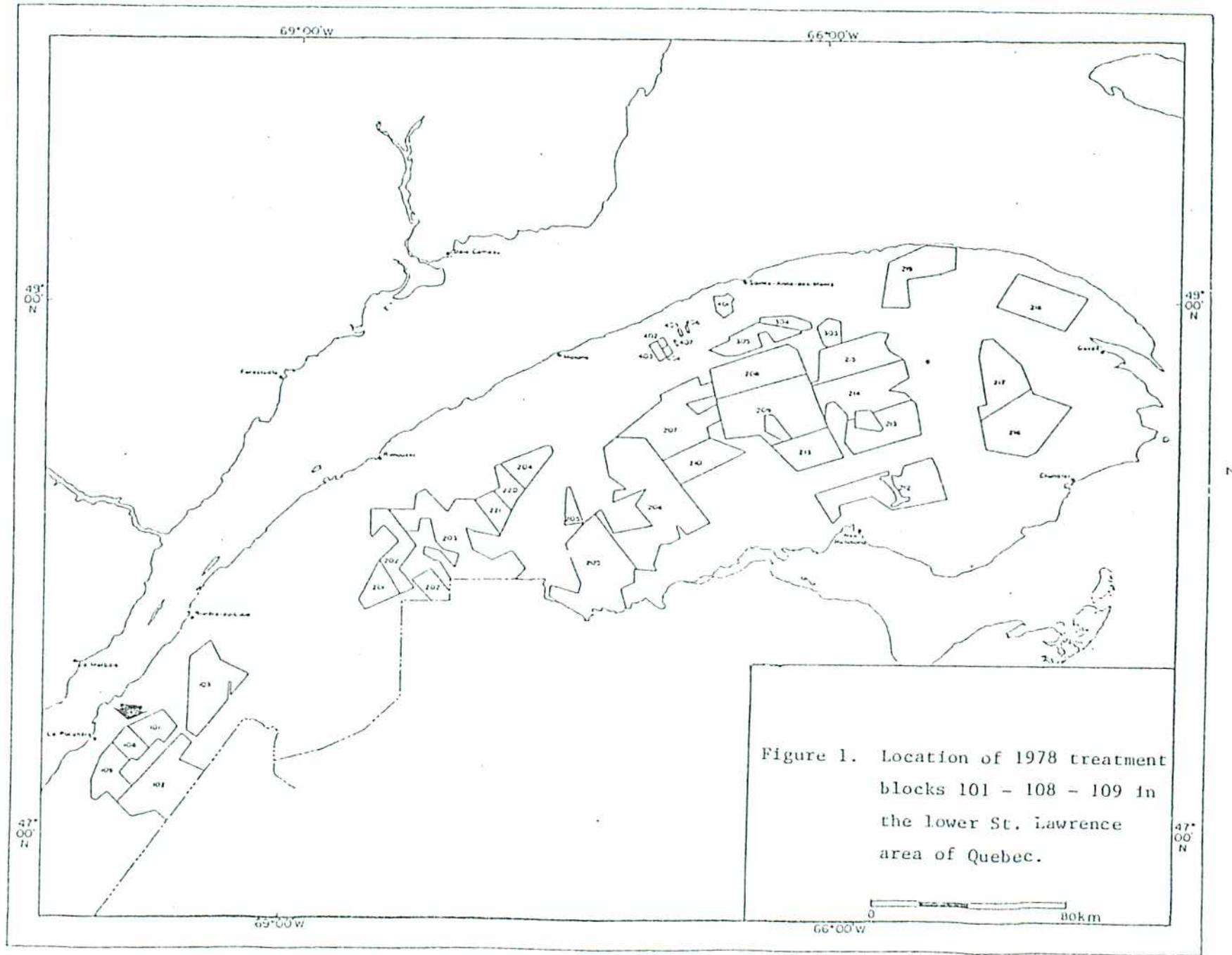
SPRAY REGIME AND METHODS

Aminocarb was applied at the dosage rate of 0.052 kg AI in 1.120 l/ha formulated solution (26% MATACIL®, 74% diluant 585) to the experimental area as follows:

11 May (50% emergence)	block 101	early application
1 June (peak 4th instar)	block 101	mid-application
	108	
	109	
10 June (post peak 4th instar)	block 109	late application

Insecticide deposit was determined by counting and measuring spray drops deposited on Kromekote® cards placed on the ground throughout each plot. Foliage residue data was provided by the Quebec Department of Tourism, Fish and Game.

Breeding bird surveys were carried out by assessing populations on 4 hectare plots established in both treated and untreated control areas using a singing male-territory technique similar to that described by Kendal (1947). Populations were assessed prior to treatment and monitored throughout the experimental period. All singing and sighted birds were recorded on plot maps while slowly traversing lines marked through the plot. Populations surveys commenced five days prior to the initial



application in each area and continued throughout the experimental period, terminating about five days after the final treatment. During the day of each application, intensive plot searches were conducted to recover any birds which may have been affected by the insecticide. Monitoring was carried out early each morning when bird activity is most intense. The order in which the various plots were censured was rotated daily to compensate for such factors as early or late starting, slightly different peak singing activity of various bird species or weather conditions.

The nesting territories of several different species inhabiting various ecological sites were selected to illustrate any possible impact to various components of the avian fauna. The species selected were the ovenbird, *Seiurus aurocapillus* (Linnaeus), Swanson's thrush, *Hylocichla ustulata* (Nuttall), hermit thrush, *Hylocichla guttata* (Pallas), ruby-crowned kinglet, *Regulus calendula* (Linnaeus), bay breasted warbler, *Dendroica castanea* (Wilson), yellow-rumped warbler, *Dendroica coronata* (Linnaeus), common yellowthroat, *Geothlypis trichas* (Linnaeus), dark-eyed junco, *Junco hyemalis* (Linnaeus) and the white-throated sparrow, *Zonotrichia albicollis* (Gmelin).

PLOT DESCRIPTION AND AVIAN COMPOSITION

Study plots were established in various forest habitats representative of the areas to be treated. The untreated control plots (101-1 and 101-2) were established in typical fir-spruce stands with scattered poplar, maple and birch. Two of the four treatment plots on block 101 (plots 101-3 and 101-6) were located in typical spruce-fir forest where the dominant species ranged in height from 12 to 15 metres with a scattered understory of alder and willows. Plots 101-4 and 101-5 were located in old clear cut areas with a regeneration of deciduous trees and shrubs (aspen, poplar, alder and willows) ranging in height from 1 to 5 metres with a dense canopy cover.

Study plots 108-7, 108-8, 109-9 and 109-10 were also located in habitats typical of the budworm infested forests of this region.

Avian composition of all plots were quite similar and typical of the forested areas of the Lower St. Lawrence region (Tables 1-14). The wood warblers (family Parulidae) were the most numerous group recorded throughout the experimental and untreated control areas, followed by the sparrow-finches group (family Fringillidae) and the thrushes (family Turdidae).

Very few birds had migrated into the study area prior to the initial application but numbers increased considerably by 12 May, reached peak activity during the last few days of May and were generally well settled into breeding territories prior to the second treatment.

RESULTS

Block 101. Aminocarb was applied on 11 May and 1 June to coincide with 50 percent budworm emergence and the peak 4th instar. Analysis of Kromekote® cards located in each plot for the initial application (plot 101-3 not available) indicate that 11.05 percent of the emitted formulated material was accounted for on plot 101-4, 4.81 percent on plot 101-5 and 2.23 percent on plot 101-6. Cards analyzed from the 1 June treatment indicate a deposit of 1.82 percent on plot 101-3, 18.59 percent on plot 101-4, 16.49 percent on plot 101-5 and 4.23 percent on plot 101-6. Aminocarb residues on conifer foliage collected following the 11 May application averaged 1.02 mg/g and following the 1 June application 0.53 mg/g.

No immediate or short-term impact occurred to the avifauna of block 101 following either treatment. Few birds had migrated into the experimental area prior to the initial application but substantial numbers had returned and set up breeding territories before the second treatment was applied (Tables 1-6). Warbler populations were not affected on plots 101-3, 101-5 and 101-6 but a decline recorded on 101-4 at the time of the second application (coinciding with a somewhat similar decline on the untreated control plot-2) was mainly due to the sudden influx of Magnolia warblers (*Dendroica magnolia* [Wilson]) into areas not considered suitable habitat for this species and their just as sudden departure (Appendix Tables II and IV). Ruby-crowned kinglet (family Sylviidae) activity declined on plot 101-5 (Table 5 and Appendix Table V) and on the untreated control plot-2 (Table 2 and Appendix Table II) prior to the second application. These plots were also considered to be rather unsuitable habitat for kinglets although territories remained occupied on 101-5 (Figure 31) while gradually disappearing from the untreated control plot-2 (Figure 15). The low activity recorded on plots about the time of the second application (1-3 June) resulted from cool, cloudy and windy weather conditions during the very early census on treatment day. Conditions improved somewhat allowing the treatment to proceed. Untreated control plot 101-1 was the last plot censured on 1 June and reflected the improving weather conditions with near normal bird activity patterns recorded.

Nesting territories for the thrush, kinglet, warbler and sparrow-finch groups (where applicable) are illustrated for the six plots of block 101 (Figures 2-37). Territories for the most part remained occupied throughout the experimental period on block 101 (9 May-6 June) although some shifting of territories from boundary areas to outside the plots was observed. Some species also set up territories in areas of unsuitable habitat and then abandoned them (ruby-crowned kinglet on untreated control plot-2, Figure 15, and dark-eyed juncos in plot 101-4, Figure 23).

Intensive plot searches following each application failed to discover any bird mortality and no observations were made of any birds exhibiting symptoms of pesticide stress.

Table 1

Forest bird population census
Untreated control plot 1
9 May - 6 June, 1978

Family	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2							
	May 9	May 10	May 11	Daily avg.		May 12	May 13	May 14	May 15	May 16	Daily avg.	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 2	June 3	June 4	June 5	June 6	Daily avg.
	-2	-1	-0			+1	+2	+3	+4	+5		-4	-3	-2	-1	-0		+1	+2	+3	+4	+5	
Alcedinidae	0	0	0	0.0		0	0	0	2	0	0.4	0	0	0	1	0	0.2	0	0	0	0	0	0.0
Picidae	0	0	0	0.0		4	2	2	2	2	2.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	0	0	0	0.0		0	0	0	0	0	0.0	2	0	0	2	0	0.8	0	0	0	2	0	0.4
Corvidae	0	0	0	0.0		0	0	0	0	1	0.2	0	2	4	0	0	1.2	0	0	2	0	0	0.4
Paridae	0	0	0	0.0		0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	4	0	0.8
Sittidae	0	0	0	0.0		0	0	0	0	0	0.0	4	2	0	0	0	1.2	0	0	0	2	0	0.4
Mimidae	0	0	0	0.0		0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	2	2	2	1.2
Turdidae	0	0	1	0.3		6	1	1	4	3	3.0	7	6	4	13	6	7.2	4	4	9	9	4	6.0
Sylviidae	2	4	6	4.0		6	6	6	4	2	4.8	6	8	3	4	8	5.8	6	6	4	6	4	5.2
Vireonidae	0	0	0	0.0		0	0	2	0	0	0.4	2	6	0	0	0	1.6	0	0	0	0	2	0.4
Parulidae	0	4	4	2.7		12	10	12	10	10	10.8	52	62	27	42	37	44.0	28	31	46	36	36	35.4
Icteridae	4	7	2	4.4		12	12	19	23	14	16.0	22	23	9	15	19	17.6	13	13	15	10	17	13.6
Thraupidae	0	0	0	0.0		0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Fringillidae	6	4	6	5.3		10	15	27	17	12	16.2	18	20	13	15	17	16.6	18	14	13	11	21	15.4
Total Birds	12	19	19	16.7		50	46	69	62	44	54.2	115	131	60	92	87	97.0	69	68	91	82	86	79.2

Table 2

Forest bird population census
Untreated control plot 2
St. Pascal, Quebec
9 May - 6 June, 1978

Family	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2							
	May 9	May 10	May 11	Daily avg.		May 12	May 13	May 14	May 15	May 16	Daily avg.	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 2	June 3	June 4	June 5	June 6	Daily avg.
	-2	-1	-0			+1	+2	+3	+4	+5		-4	-3	-2	-1	-0		+1	+2	+3	+4	+5	
Tetraonidae	0	1	2	1.0		0	2	2	2	2	1.6	2	0	2	2	0	1.2	0	0	3	0	0	0.6
Charadriidae	0	2	0	0.7		0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Scolopacidae	0	0	0	0.0		0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Picidae	0	0	0	0.0		0	0	1	0	0	0.2	0	0	0	2	0	0.4	0	0	0	0	0	0.0
Tyrannidae	0	0	0	0.0		0	0	0	0	0	0.0	4	4	4	4	0	3.2	2	2	4	10	2	4.0
Corvidae	0	0	0	0.0		0	0	0	0	1	0.2	0	0	4	0	0	0.8	0	0	2	2	0	0.8
Paridae	0	4	0	1.3		0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Sittidae	0	0	0	0.0		0	0	0	0	0	0.0	4	0	0	0	0	0.8	0	0	0	2	0	0.4
Certhiidae	0	0	0	0.0		0	0	0	0	2	0.4	0	0	0	0	0	0.0	2	0	0	0	0	0.4
Troglodytidae	0	0	0	0.0		0	0	0	0	0	0.0	0	0	2	2	0	0.8	0	0	0	0	0	0.0
Turdidae	2	0	4	2.0		0	2	0	0	0	0.4	8	6	2	2	0	3.6	0	6	2	9	11	5.6
Sylviidae	0	2	4	2.0		6	12	2	2	0	2.4	4	0	0	0	2	1.2	0	0	0	0	0	0.0
Vireonidae	0	0	0	0.0		0	0	2	2	4	1.6	2	2	0	2	0	1.2	0	2	4	2	6	2.8
Parulidae	0	0	0	0.0		4	4	4	18	8	7.6	63	57	28	34	6	37.6	28	12	28	24	26	23.6
Icteridae	2	0	0	0.7		0	0	2	0	0	0.4	6	4	0	0	0	2.0	0	0	0	3	0	0.6
Fringillidae	2	0	0	0.7		0	0	6	10	4	4.0	10	8	4	4	0	5.2	4	2	6	14	2	5.6
Unidentified Birds	0	0	0	0.0		0	0	0	0	2	0.4	0	0	0	1	0	0.2	0	2	0	2	2	1.2
Total Birds	6	9	10	8.3		10	10	19	34	23	19.2	105	81	46	53	8	58.6	36	26	49	68	49	45.6

Table 3

Forest bird population census
 Experimental treatment plot 101-3
 St. Pascal, Quebec
 8 May - 6 June, 1978
 (aminocarb applied on 11 May and 1 June at the emitted dosage rate of 52 gm AI/ha)

Family	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2							
	May 8	May 10	May 11	Daily avg.		May 12	May 13	May 14	May 15	May 16	Daily avg.	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 2	June 3	June 4	June 5	June 6	Daily avg.
	-3	-1	-0			+1	+2	+3	+4	+5		-4	-3	-2	-1	-0		+1	+2	+3	+4	+5	
Picidae	0	0	0	0.0		2	2	3	8	4	3.8	0	0	4	0	2	1.2	0	0	4	2	0	1.2
Hirundinidae	0	0	0	0.0		0	0	1	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	0	0	0	0.0		0	0	0	0	0	0.0	2	2	2	0	2	1.6	2	4	2	2	2	2.4
Corvidae	0	0	0	0.0		0	0	1	1	0	0.4	2	2	5	2	0	2.2	0	0	2	3	4	1.8
Paridae	0	0	2	0.7		2	2	5	1	4	2.8	0	0	0	2	0	0.4	0	2	0	2	2	1.6
Sittidae	0	0	0	0.0		0	0	0	0	0	0.0	4	2	4	4	4	3.6	2	0	4	2	2	2.0
Certhiidae	0	0	0	0.0		0	2	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Troglodytidae	0	0	0	0.0		0	2	0	2	2	1.2	2	0	2	0	0	0.8	2	0	2	0	0	0.8
Sylviidae	0	4	6	3.3		6	4	6	14	4	6.8	6	8	10	10	8	8.4	8	6	8	8	6	7.2
Vireonidae	0	0	0	0.0		0	0	0	2	0	0.4	0	0	4	2	0	1.2	0	2	0	2	2	1.2
Parulidae	2	4	2	2.7		6	6	26	22	18	15.6	56	54	54	56	30	50.0	54	40	72	74	79	63.4
Icteridae	0	0	0	0.0		0	2	1	1	0	0.8	0	0	0	2	0	0.4	0	1	1	0	0	0.4
Fringillidae	1	3	5	3.0		8	10	13	23	10	13.2	14	12	14	16	10	13.2	4	5	9	13	15	9.2
Total Birds	4	11	15	10.0		24	30	60	78	46	48.0	92	80	103	105	56	87.2	75	64	107	110	118	94.8

Table 4

Forest bird population census
 Experimental treatment plot 101-4
 St. Pascal, Quebec
 10 May - 6 June
 1978

(aminocarb applied on 11 May and 1 June at the emitted dosage rate of 52 gm Al/ha)

Family	Pre-spray 1			Post-spray 1						Pre-spray 2			Post-spray 2						
	May	May	Daily	May	May	May	May	Daily	May	May	May	June	Daily	June	June	June	June	Daily	
	10	11	avg.	12	13	14	15	16	28	29	30	31	1	2	3	4	5	6	avg.
Tetraonidae	0	0	0.0	1	0	1	0	1	0.6	.2	2	0	0	0	0.8	0	0	2	0.8
Scolopacidae	0	0	0.0	0	1	0	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0.0
Trochilidae	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	1	0.2
Picidae	0	0	0.0	0	2	2	2	2	1.6	1	0	2	0	0	0.6	0	2	0	0.4
Tyrannidae	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	2	0	1.2
Corvidae	0	0	0.0	0	0	0	0	0	0.0	1	0	0	4	0	1.0	0	2	1	4
Paridae	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0.0
Turdidae	3	0	1.5	7	3	7	2	4	4.6	6	0	10	5	2	4.6	4	3	2	5
Sylviidae	0	2	1.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0.0
Vireonidae	0	0	0.0	0	0	0	0	0	0.0	2	2	0	4	0	1.6	4	4	4	2
Parulidae	0	2	1.0	2	2	10	2	4	4.0	32	36	61	52	22	40.6	37	21	40	42
Icteridae	1	0	0.5	0	0	0	3	0	0.6	0	0	0	0	0	0.0	0	0	1	0
Fringillidae	1	10	5.5	14	12	18	13	11	13.6	17	17	10	10	7	12.2	10	10	14	16
Total Birds	5	14	9.5	24	20	39	22	22	25.4	61	57	83	77	31	61.8	55	44	64	74
																			57.0

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Table 5

Forest bird population census
 Experimental treatment plot 101-5
 St. Pascal, Quebec
 10 May - 6 June
 1978

(aminocarb applied on 11 May and 1 June at the emitted dosage rate of 52 gm Al/ha)

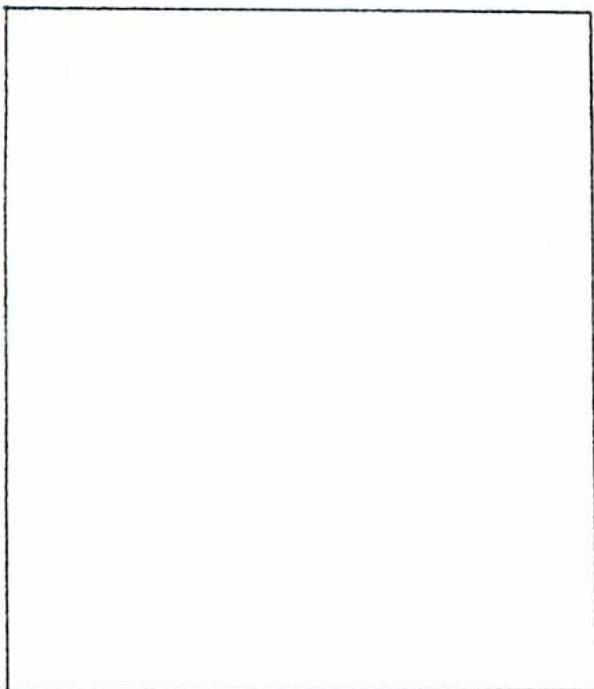
Family	Pre-spray 1						Post-spray 1						Pre-spray 2						Post-spray 2					
	May	May	May	May	May	May	May	May	May	May	May	May	May	May	May	May	May	June	June	June	June	June	June	
	10	11	Daily	12	13	14	15	16	Daily	28	29	30	31	1	Daily	2	3	4	5	6	Daily			
	-1	-0	avg.	+1	+2	+3	+4	+5	avg.	-4	-3	-2	-1	-0	avg.	+1	+2	+3	+4	+5	avg.			
Tetraonidae	0	0	0.0	0	0	1	0	1	0.4	2	0	0	0	0	0.4	0	0	0	0	0	0.0			
Picidae	2	1	1.5	2	0	2	2	3	1.8	0	2	1	0	0	0.6	1	0	1	1	0	0.6			
Tyrannidae	0	0	0.0	0	0	0	0	0	0.0	0	4	4	2	0	2.0	0	4	4	4	4	3.2			
Corvidae	0	0	0.0	0	0	0	0	0	0.0	2	2	0	1	2	1.4	0	0	0	0	0	0.0			
Paridae	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0			
Turdidae	0	0	0.0	3	0	2	3	0	1.6	12	3	6	2	0	4.6	4	2	0	8	4	3.6			
Sylviidae	0	0	0.0	0	6	4	6	3	3.8	2	0	0	0	0	0.4	2	0	0	0	4	1.2			
Vireonidae	0	0	0.0	0	0	0	0	0	0.0	2	0	0	2	0	0.8	0	0	0	0	2	0.4			
Parulidae	0	2	1.0	0	2	8	6	12	5.6	54	53	50	66	20	48.6	60	36	62	45	62	53.0			
Icteridae	0	2	1.0	0	0	0	2	2	0.8	0	2	2	2	2	1.6	4	2	2	4	2	2.8			
Fringillidae	2	12	7.0	14	16	19	15	13	15.4	14	16	19	19	6	14.8	17	20	14	26	26	20.6			
Total Birds	4	17	10.5	19	24	38	34	34	29.8	88	82	82	94	30	75.2	88	64	83	88	104	85.4			

Table 6

Forest bird population census
Experimental treatment plot 101-6
St. Pascal, Quebec
9 May - 6 June
1978

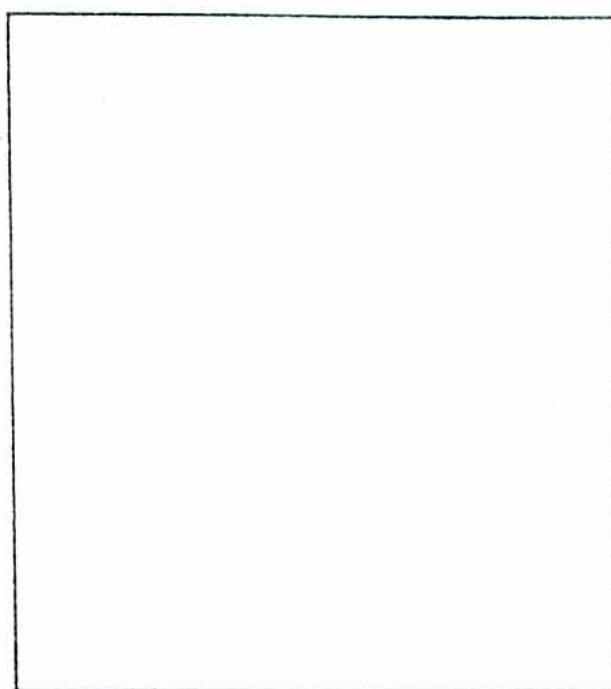
(aminocarb applied on 11 May and 1 June at the rate of 52 gm Al/ha)

Family	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2									
	May 9	May 10	May 11	Daily avg.		May 12	May 13	May 14	May 15	May 16	Daily avg.	May 28	May 29	May 30	June 31	June 1	Daily avg.	June 2	June 3	June 4	June 5	June 6	Daily avg.		
	-2	-1	-0			+1	+2	+3	+4	+5		-4	-3	-2	-1	-0		+1	+2	+3	+4	+5			
Falconidae	0	0	0	0.0		0	0	0	0	0	0.0	0	1	0	1	1	0.6	0	0	0	0	0	0.0		
Tetraonidae	0	0	0	0.0		0	0	0	0	0	0.0	0	2	2	0	0	0.8	0	0	0	0	0	0.0		
Scolopacidae	0	0	0	0.0		0	0	0	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0		
Picidae	0	2	0	0.7		2	0	4	0	3	1.8	1	1	2	1	0	1.0	0	0	1	1	2	0.8		
Tyrannidae	0	0	0	0.0		0	0	0	0	0	0.0	0	2	2	4	0	1.6	2	0	0	4	2	1.6		
Corvidae	0	0	0	0.0		0	0	3	0	1	0.8	5	5	2	0	0	2.4	0	4	1	3	2	2.0		
Paridae	0	0	0	0.0		0	0	9	0	0	1.8	2	0	4	2	4	2.4	2	2	2	0	0	1.2		
Strigidae	0	0	0	0.0		0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4		
Turdidae	5	0	1	2.0		2	1	0	6	3	2.4	8	6	6	1	0	4.2	2	3	11	4	5	5.0		
Sylviidae	2	2	4	2.7		4	8	8	8	8	7.2	6	4	8	6	6	6.0	6	6	4	6	6	5.6		
Vireonidae	0	0	0	0.0		0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	2	0	0	0	0.4		
Parulidae	0	2	0	0.7		4	15	7	15	20	14.2	72	72	54	69	42	61.8	58	62	61	82	40	60.6		
Icteridae	0	0	2	0.7		2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	1	0	0.2		
Fringillidae	1	0	10	3.7		8	10	14	17	15	12.8	17	10	21	14	9	14.2	10	17	10	12	14	12.6		
Total Birds	8	6	17	10.5		22	34	55	46	50	41.4	111	103	104	98	62	95.6	80	96	92	113	71	90.4		

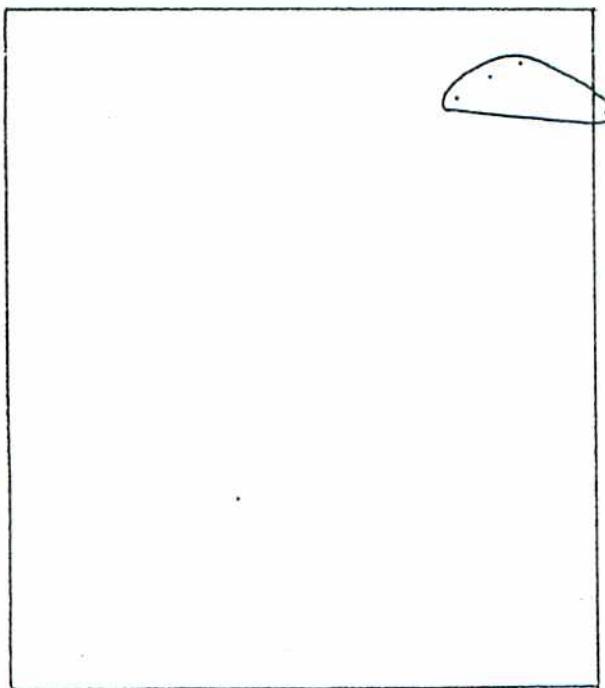


May 9-11

aminocarb 52 gm Al/ha

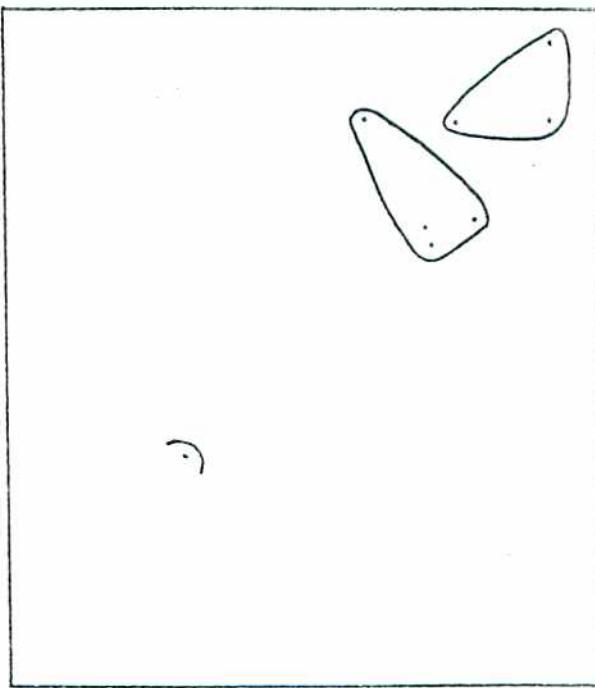


May 12-16



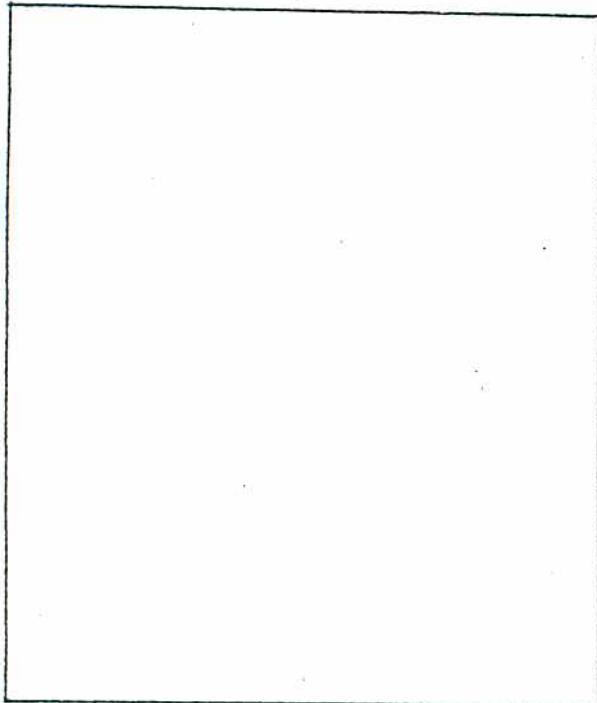
May 28 - June 1

aminocarb 52 gm Al/ha



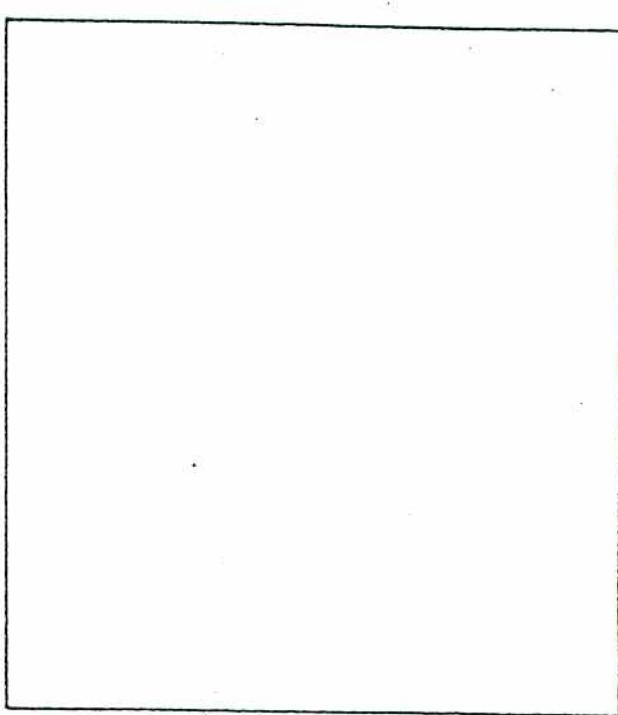
June 2-6

Figure 2 . Nesting territories of the ovenbird, *Seiurus aurocapillus* (Linnaeus), on untreated control plot 1. St. Pascal, Quebec.
8 May - 6 June, 1978

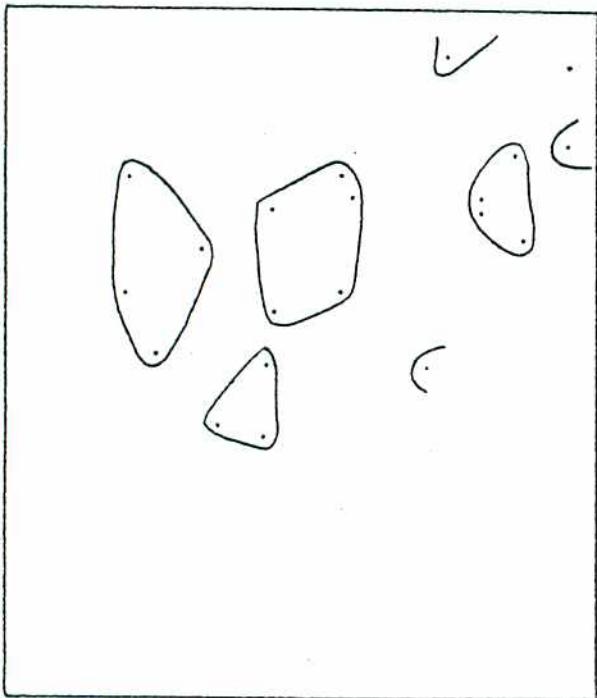


May 9-11

aminocarb 52 gm Al/ha

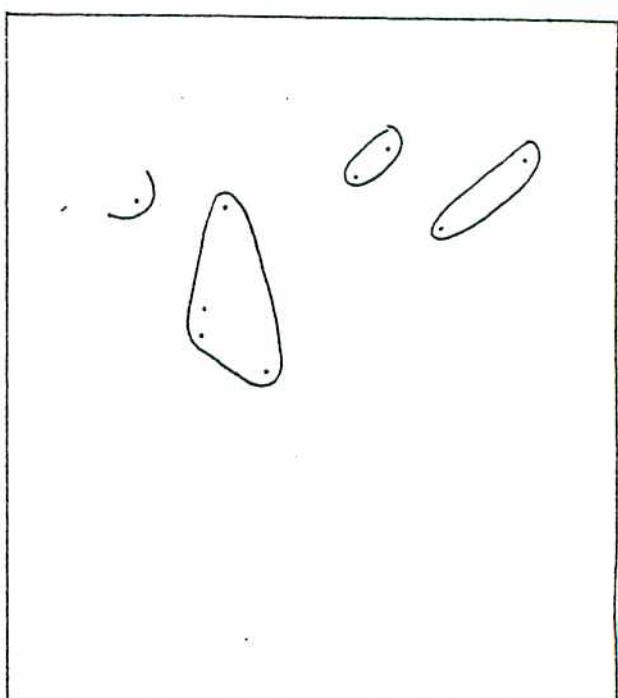


May 12-16



May 28 - June 1

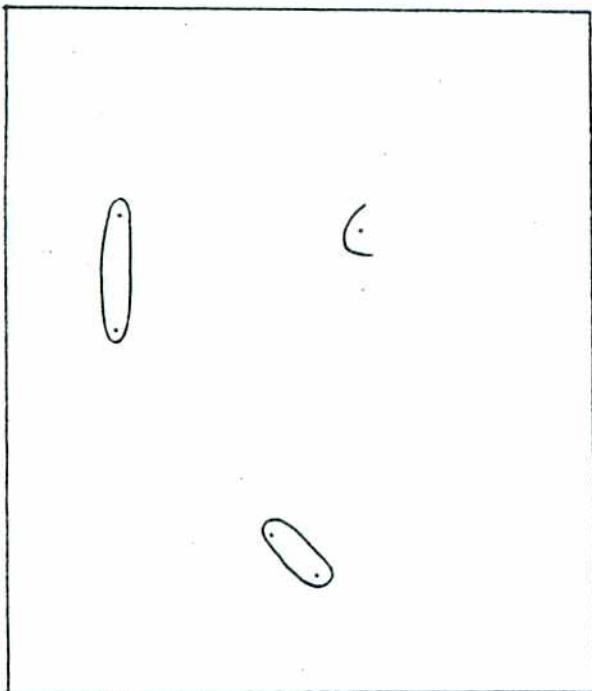
aminocarb 52 gm Al/ha



June 2-6

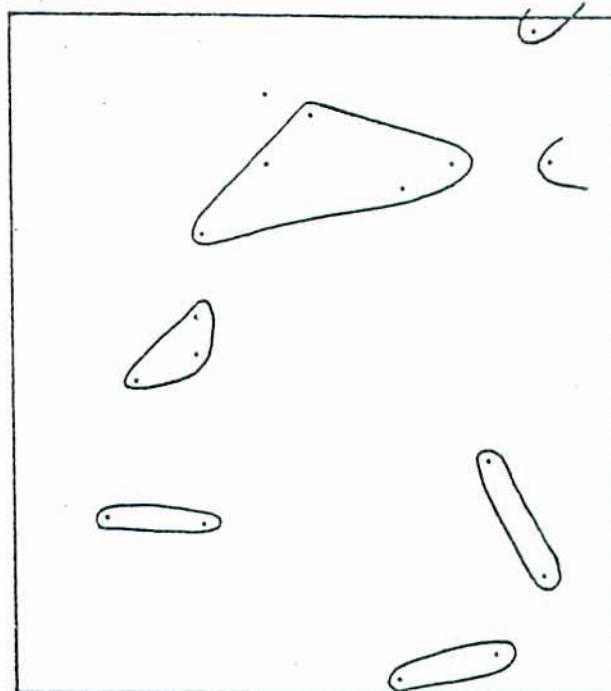
Figure 3 . Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson), on untreated control plot 1. St. Pascal, Quebec.
8 May - 6 June, 1978

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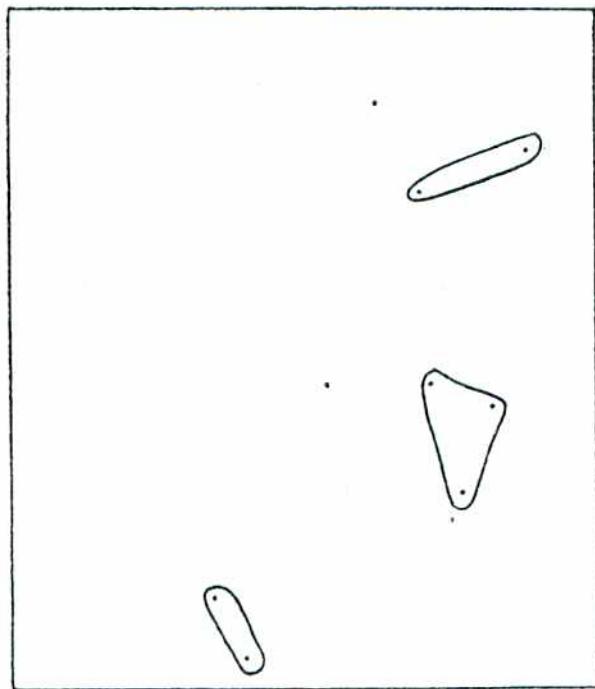


May 9-11

aminocarb
52 gm Al/ha

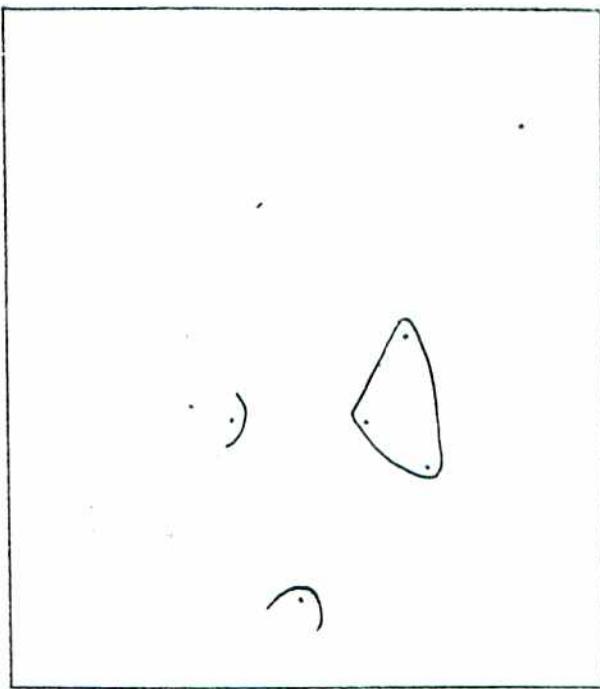


May 12-16



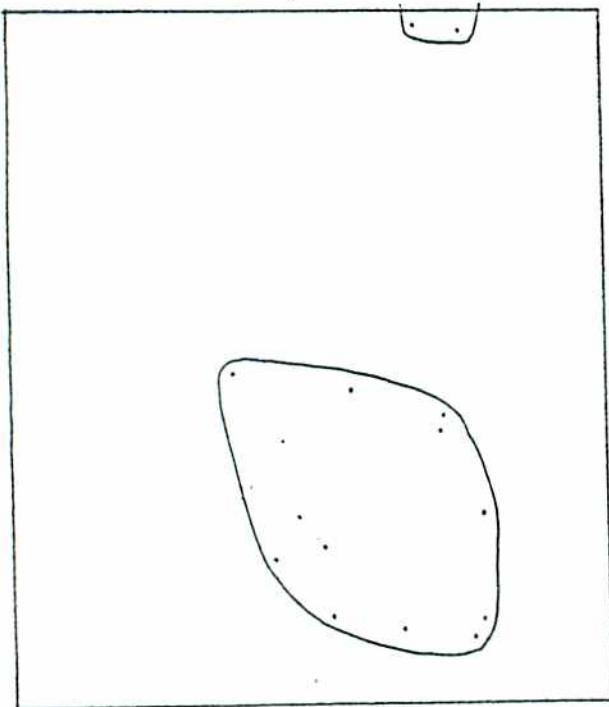
May 28 - June 1

aminocarb
52 gm Al/ha

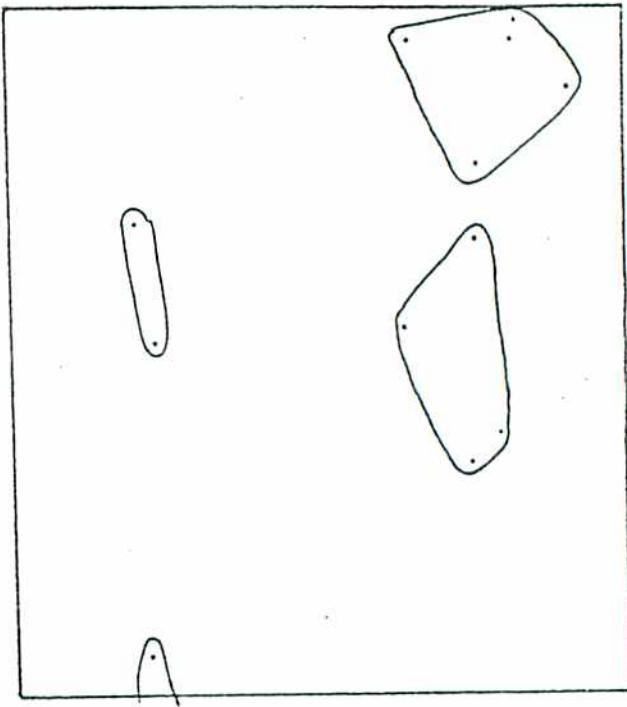


June 2-6

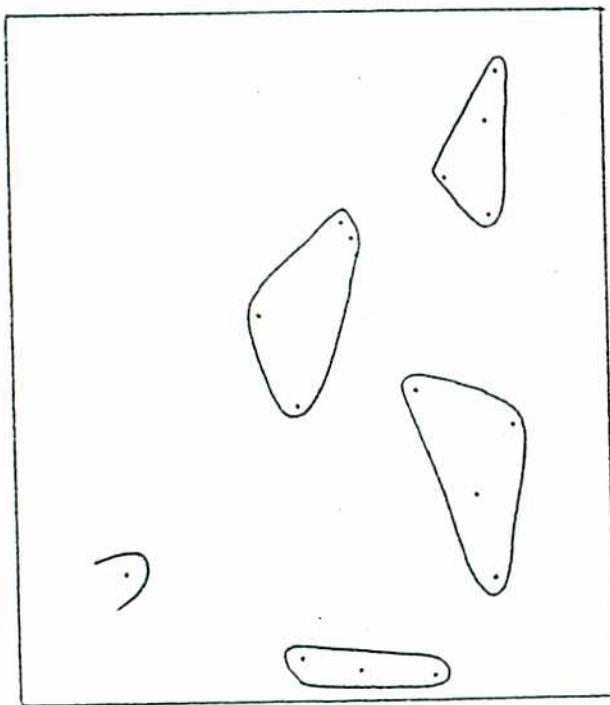
Figure 4 . Nesting territories of the yellow-rumped warbler, *Dendroica coronata* (Linnaeus), on untreated control plot 1. St. Pascal, Quebec.
8 May - 6 June, 1978



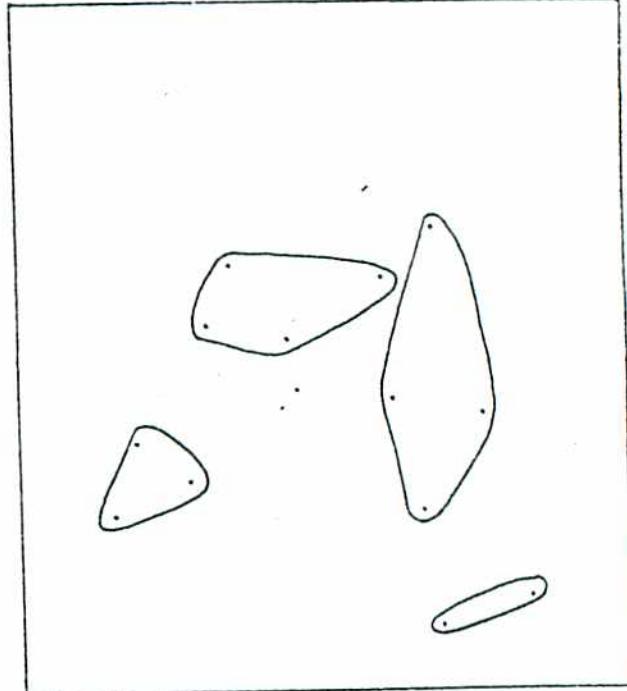
May 9-11



May 12-16

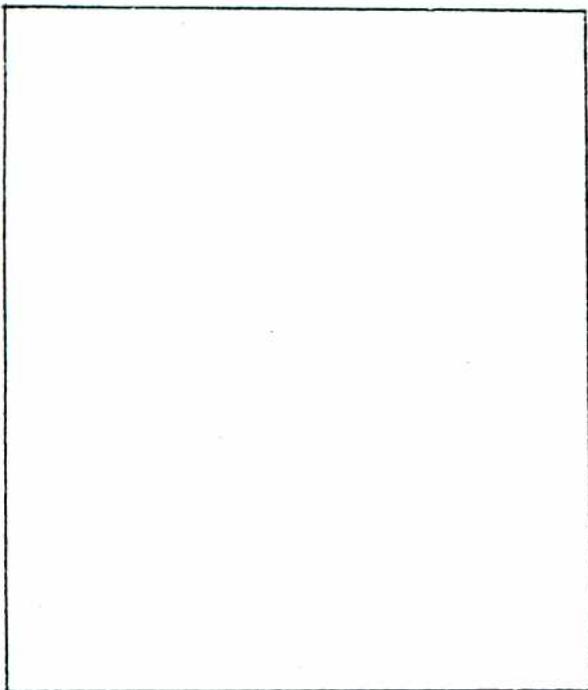


May 28 - June 1

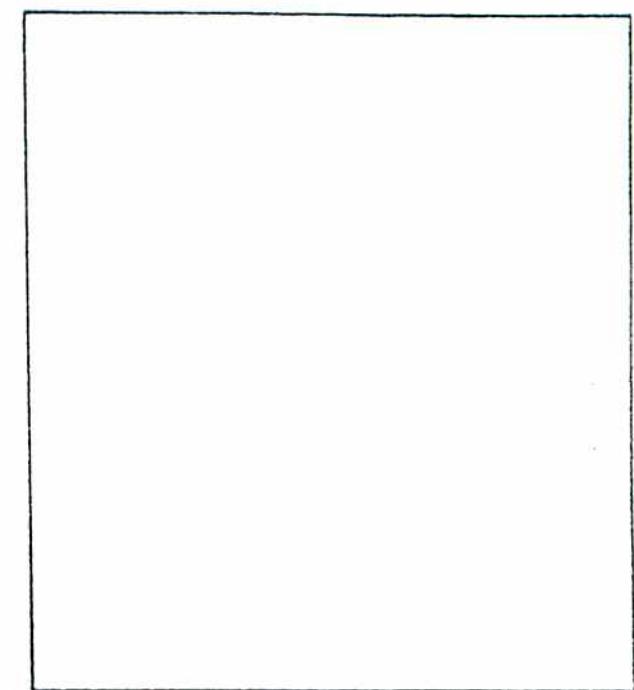


June 2-6

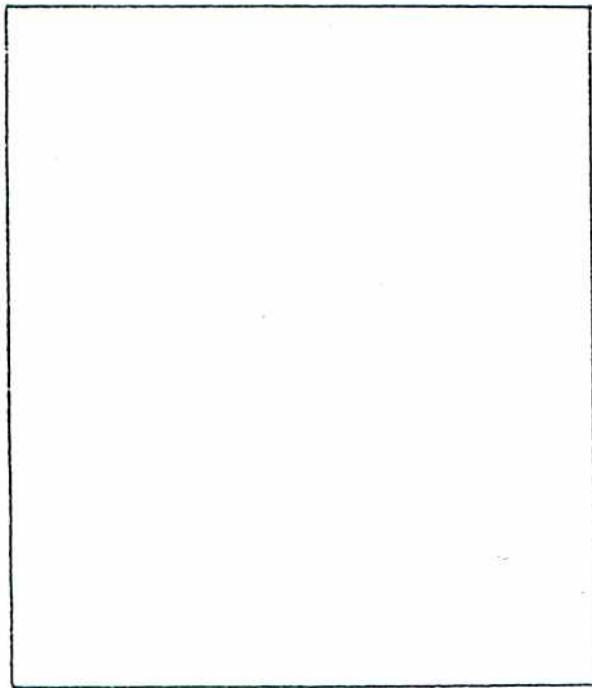
Figure 5 . Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus), on untreated control plot 1. St. Pascal, Quebec.
8 May - 6 June, 1978



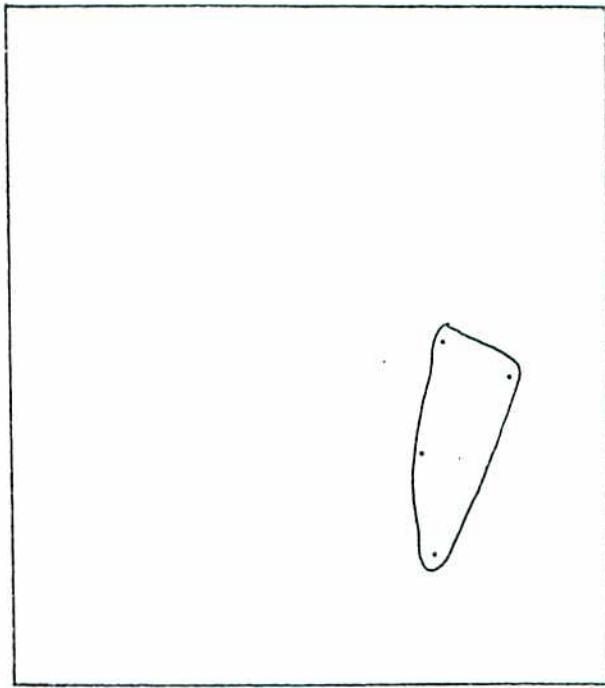
May 9-11



May 12-16

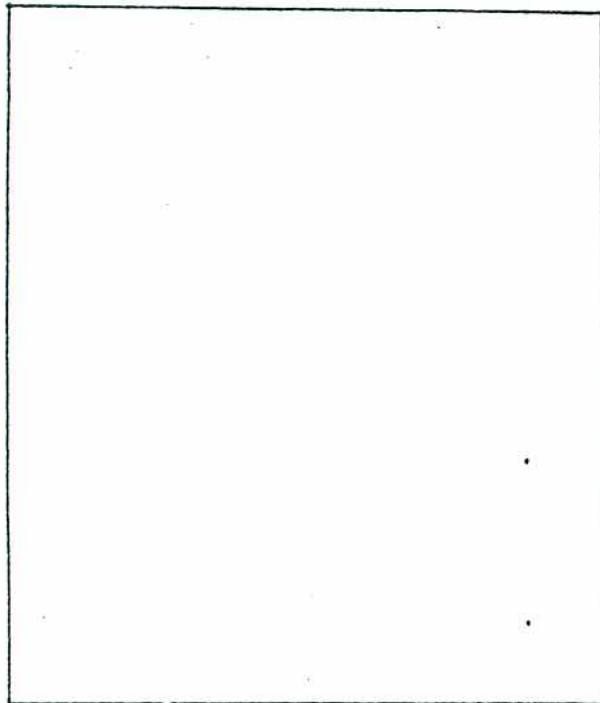


May 28-June 1

aminocarb
52 gm AI/ha

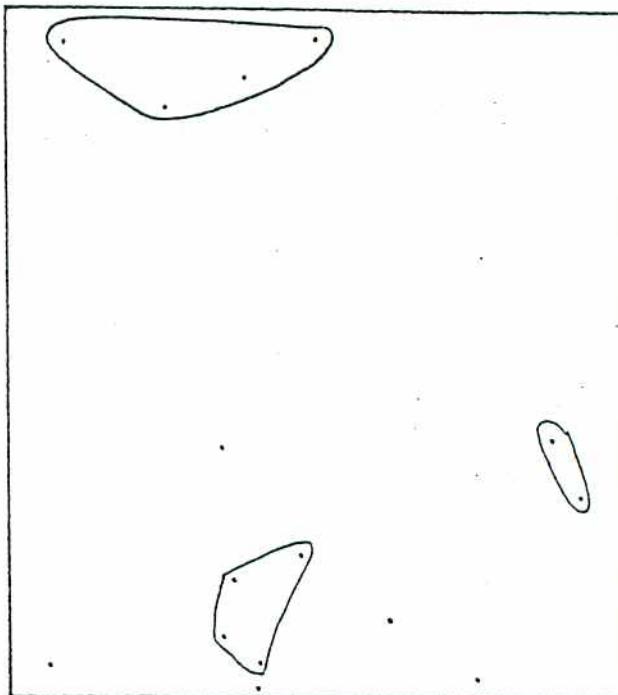
June 2-6

Figure 6 . Nesting territories of the Swainson's thrush, *Hylocichla ustulata* (Nuttall), on untreated control plot 1. St. Pascal, Quebec.
8 May - 6 June, 1978

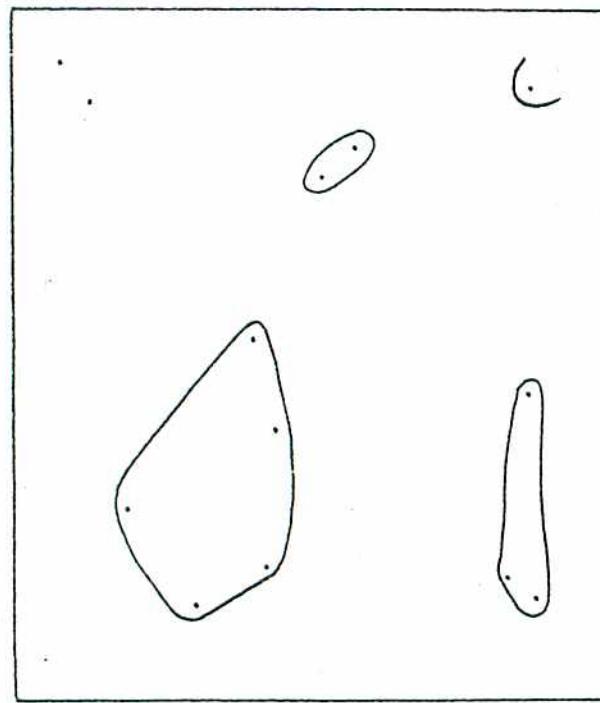


May 9-11

aminocarb 52 gm Al/ha

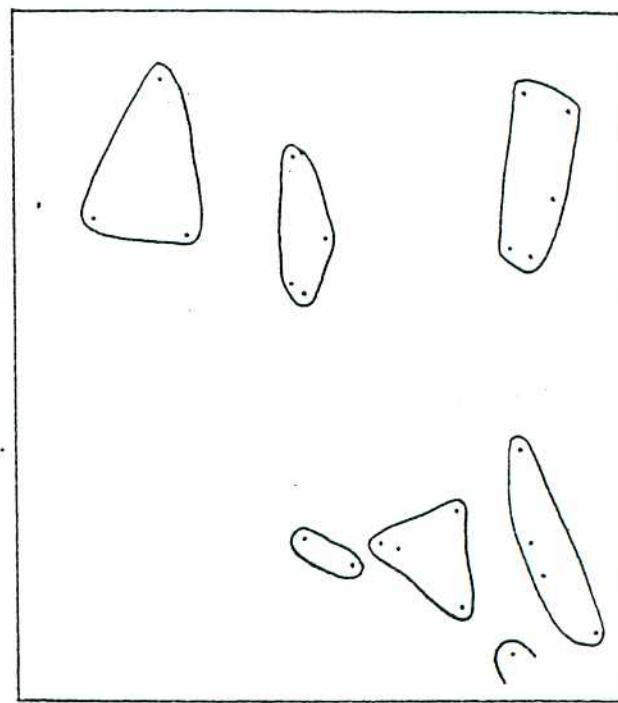


May 12-16



May 28 - June 1

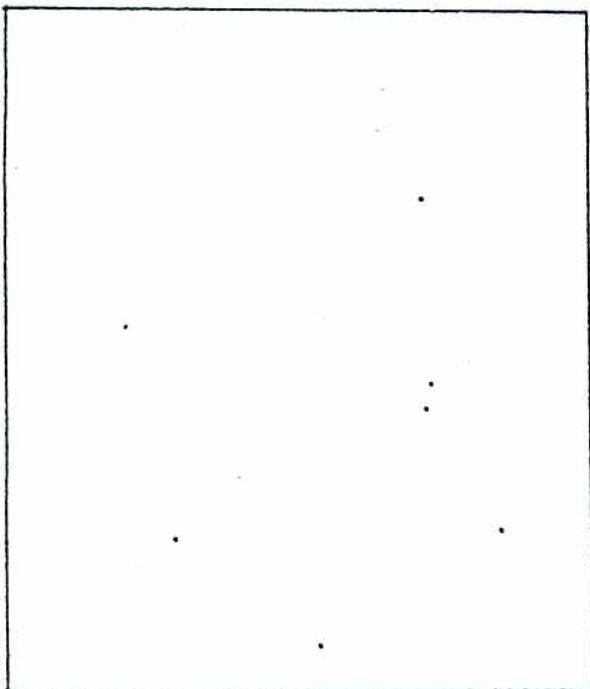
aminocarb 52 gm Al/ha



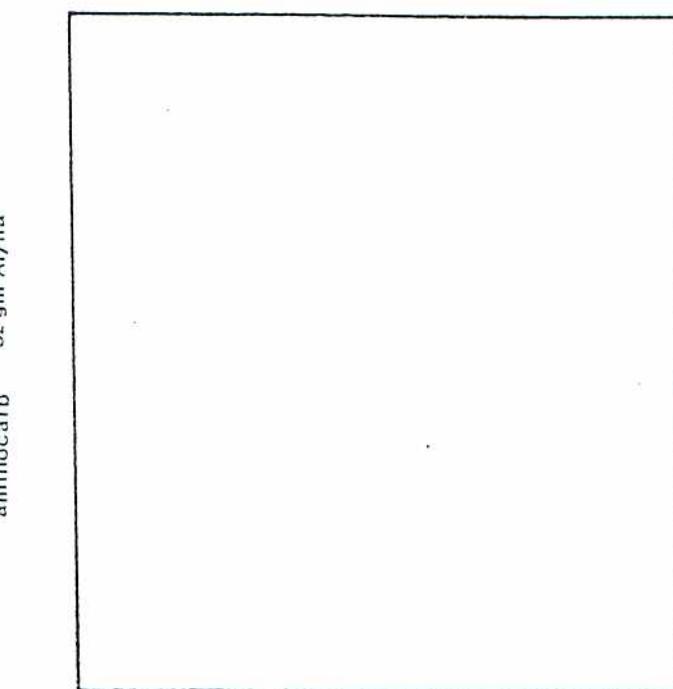
June 2-6

Figure 7. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin), on untreated control plot 1. St. Pascal, Quebec.

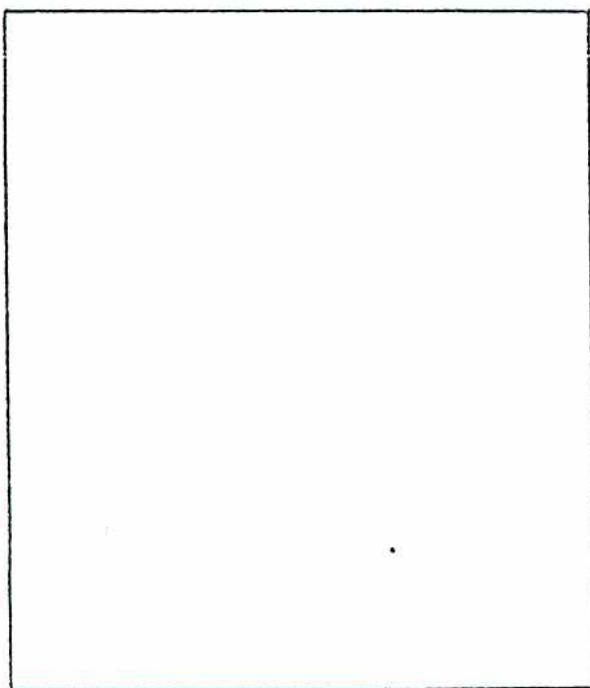
8 May - 6 June, 1978



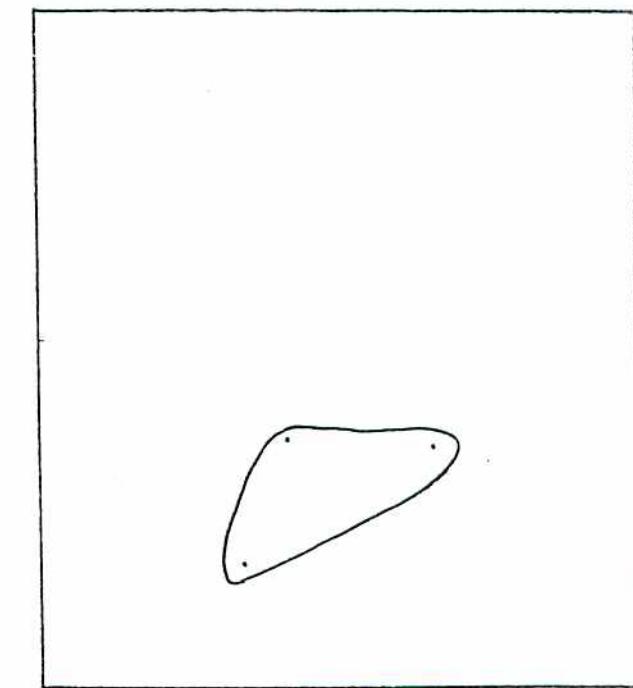
May 9-11



May 12-16

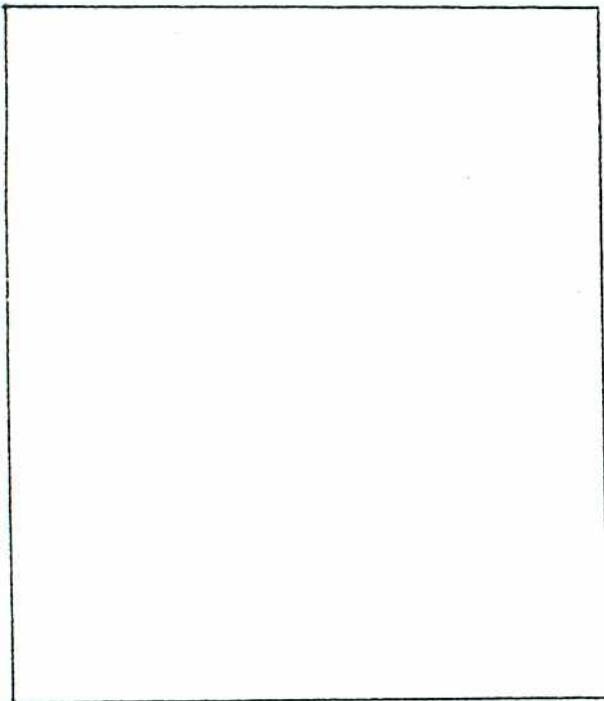


May 28-June 1



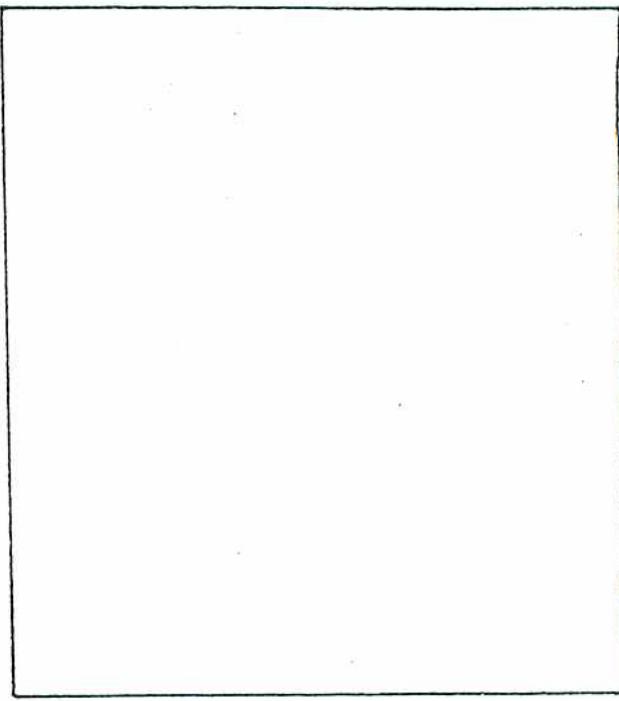
June 2-6

Figure 8 . Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus), on untreated control plot 1. St. Pascal, Quebec.
8 May - 6 June, 1978

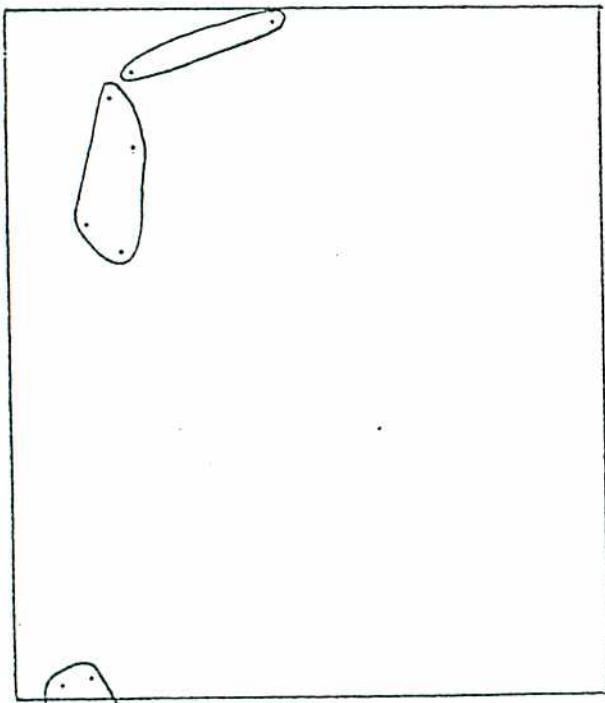


May 9-11

aminocarb 52 gm Al/ha

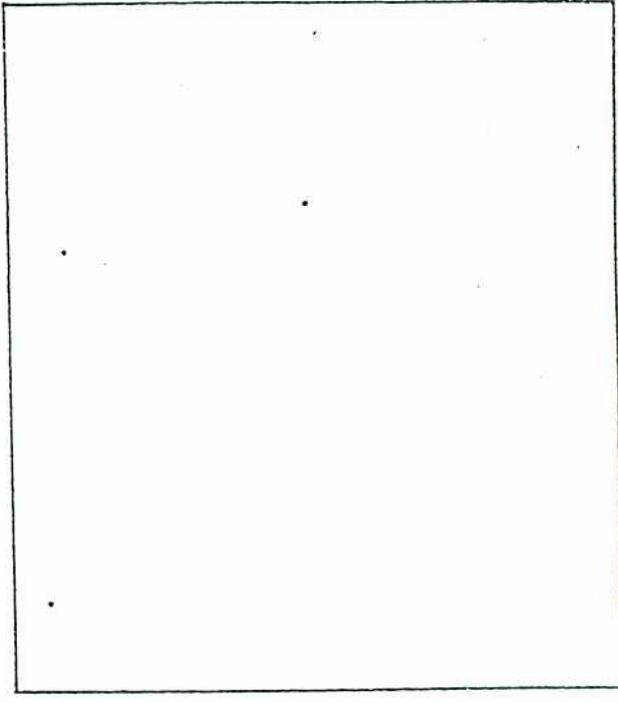


May 12-16



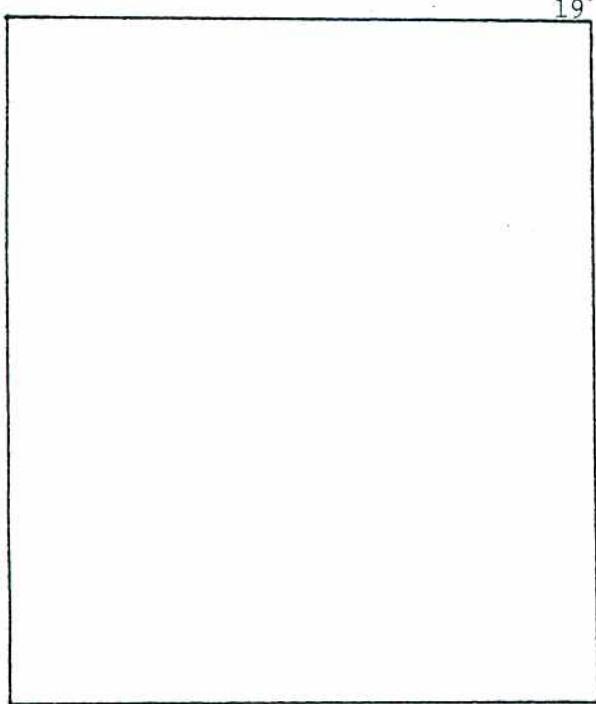
May 28 - June 1

aminocarb 52 gm Al/ha

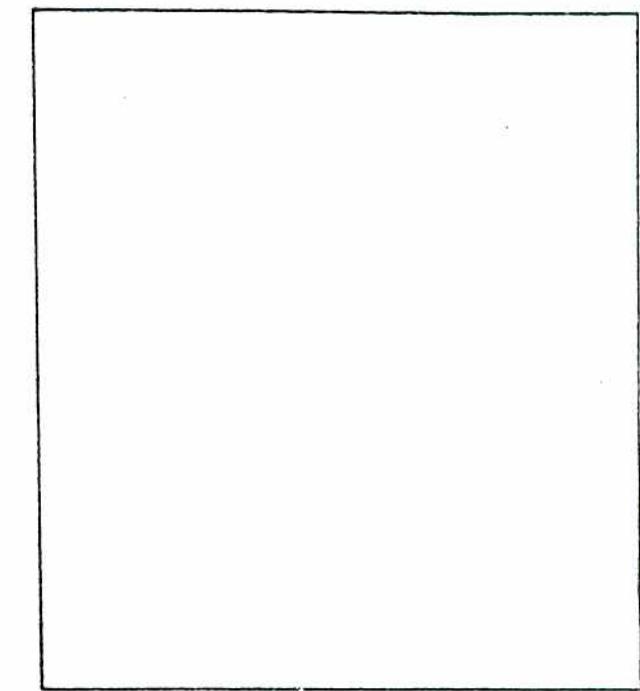


June 2-6

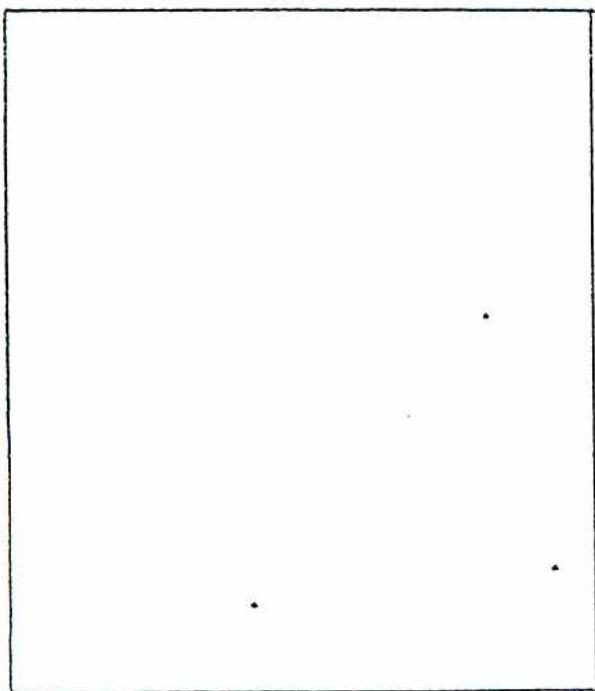
Figure 9 . Nesting territories of the common yellowthroat, *Geothlypis trichas* (Linnaeus), on untreated control plot 1. St. Pascal, Quebec.
8 May - 6 June, 1978



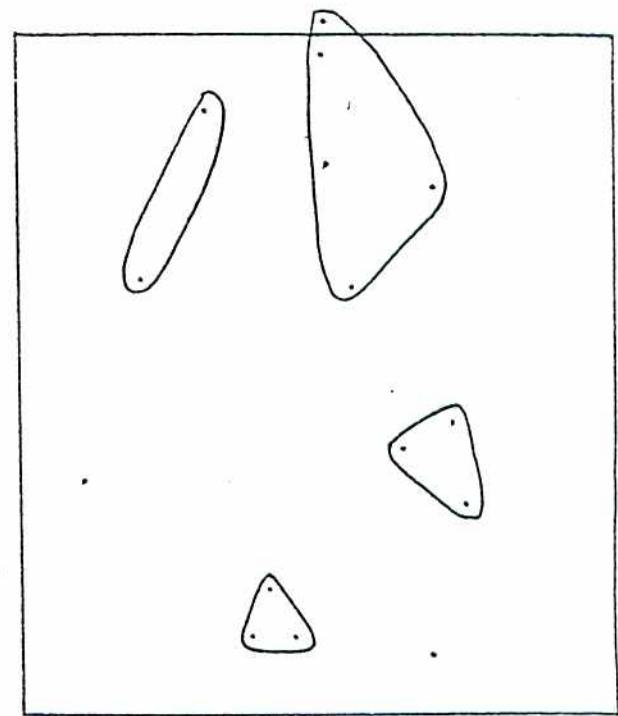
May 9-11



May 12-16

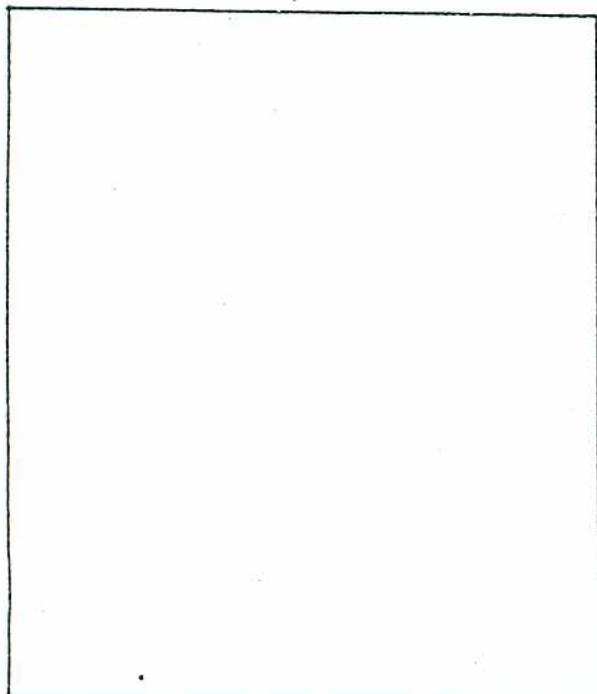


May 28 - June 1

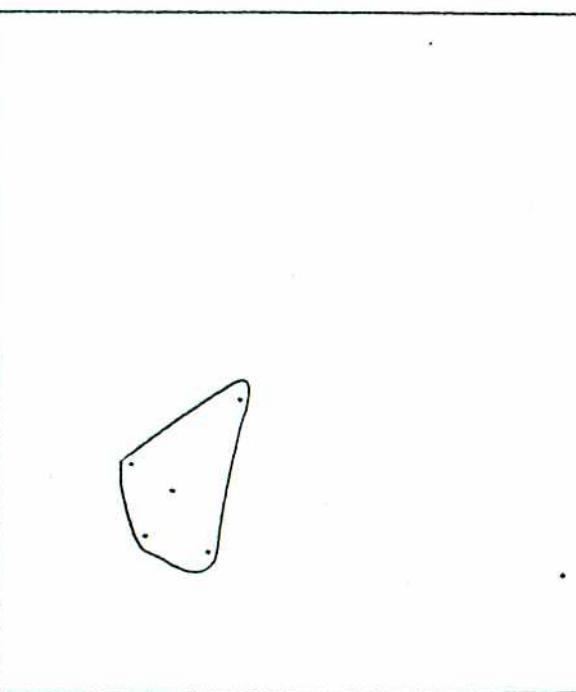


June 2-6

Figure 10. Nesting territories of the Swainson's thrush, *Hylocichla ustulata* (Nuttall), on untreated control plot 2. St. Pascal, Quebec.
8 May - 6 June, 1978

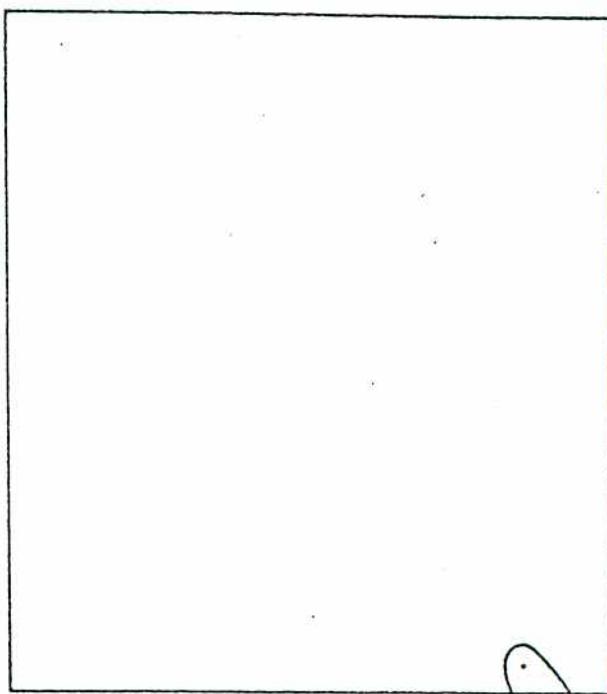


May 9-11

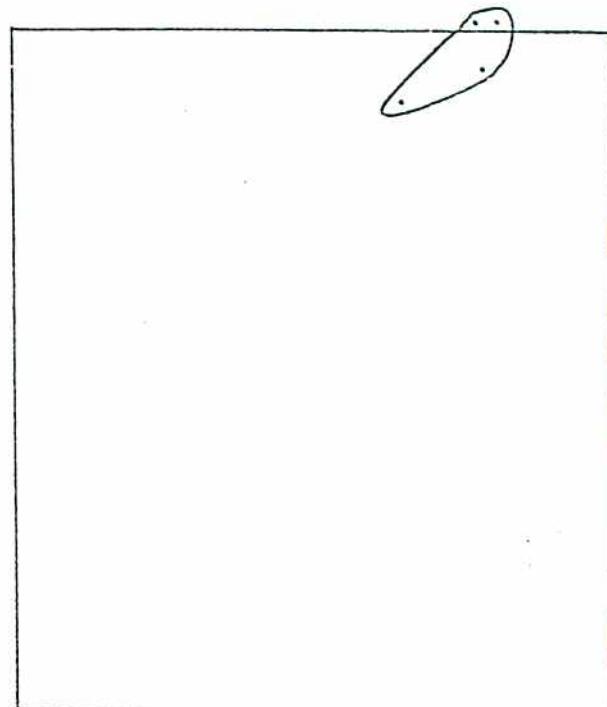


May 28 - June 1

aminocarb 52 gm Al/ha



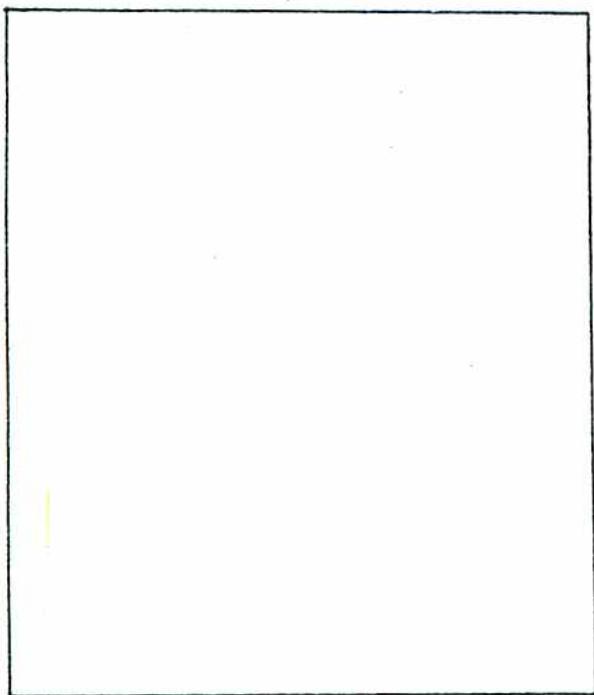
May 12-16



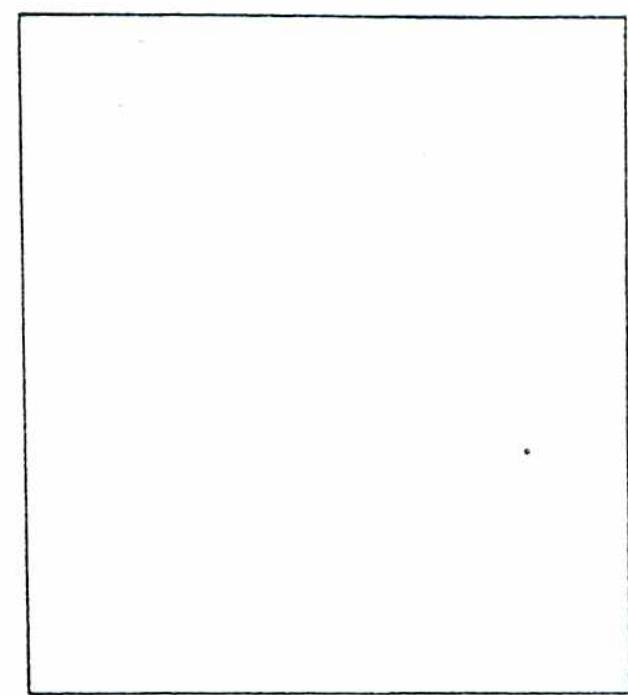
June 2-6

aminocarb 52 gm Al/ha

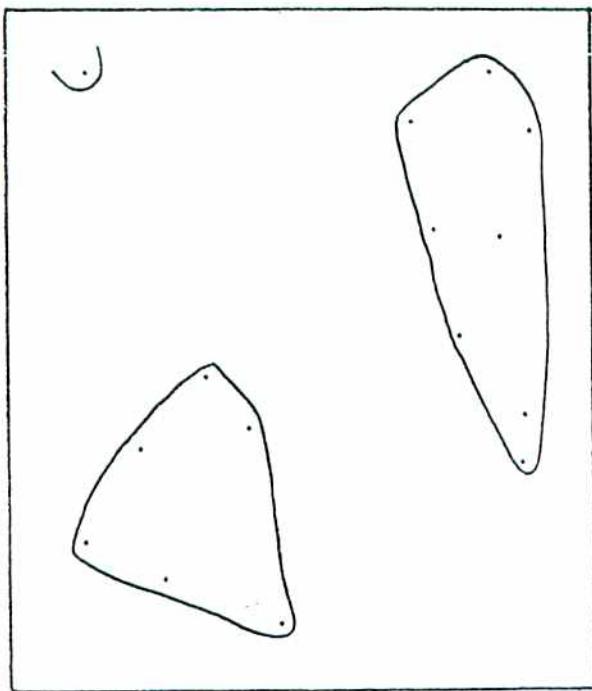
Figure 11. Nesting territories of the hermit thrush, *Hylocichla guttata* (Pallas), on untreated control plot 2. St. Pascal, Quebec.
8 May - 6 June, 1978



May 9-11

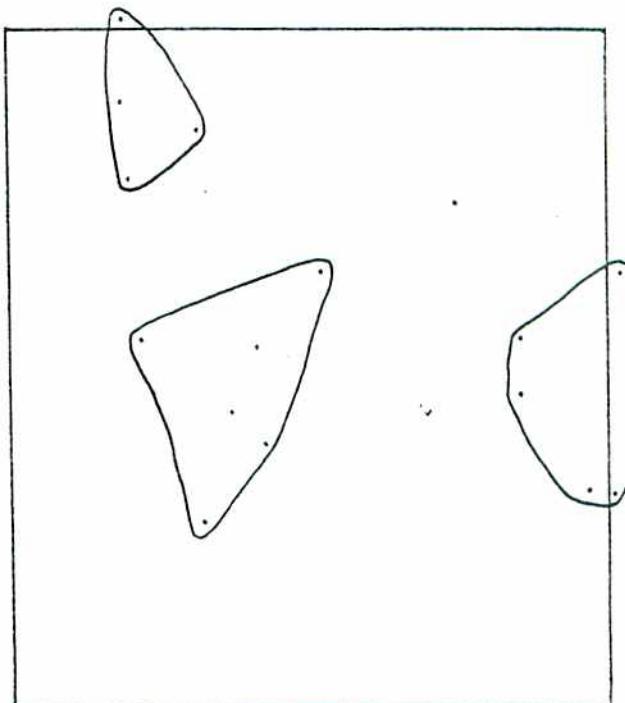


May 12-16



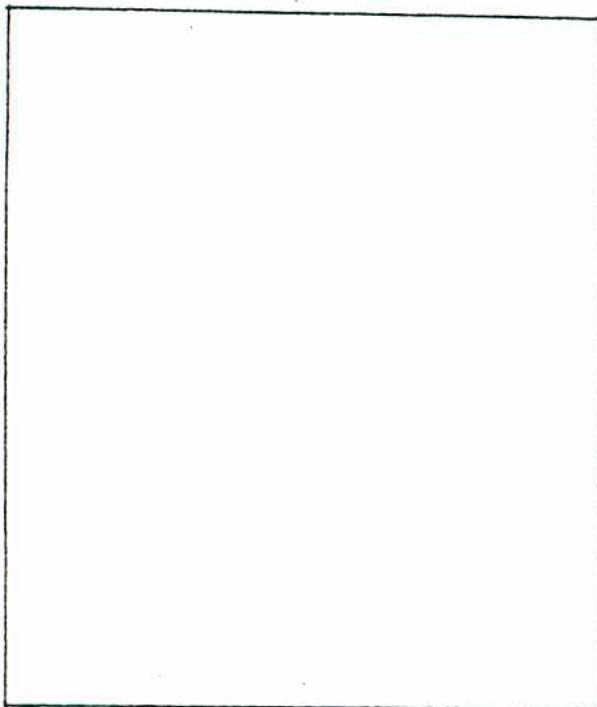
May 28 - June 1

aminocarb 52 gm Al/ha



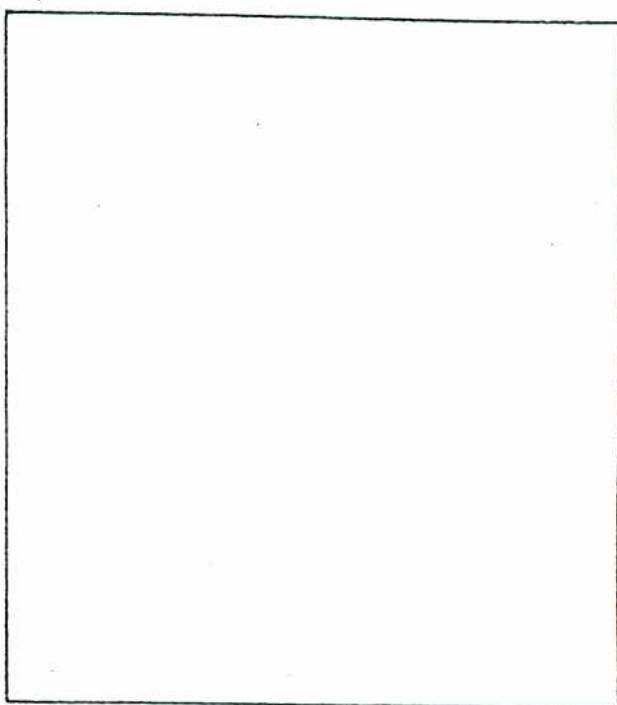
June 2-6

Figure 12. Nesting territories of the ovenbird, *Seiurus aurocapillus* (Linnaeus), on untreated control plot 2. St. Pascal, Quebec.
8 May - 6 June, 1978

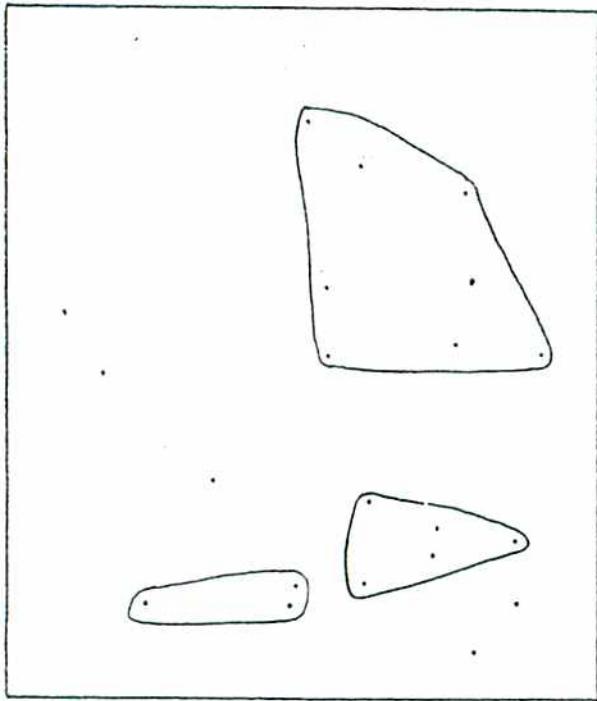


May 9-11

aminocarb 52 gm Al/ha

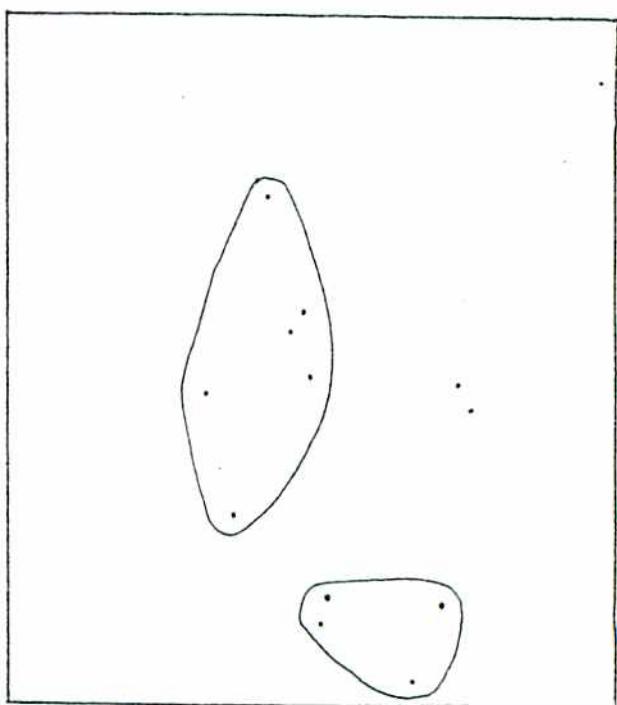


May 12-16



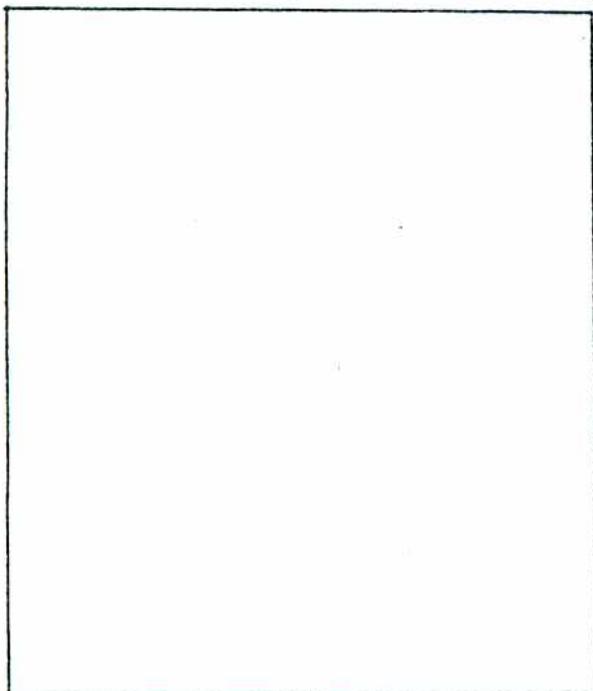
May 28 - June 1

aminocarb 52 gm Al/ha

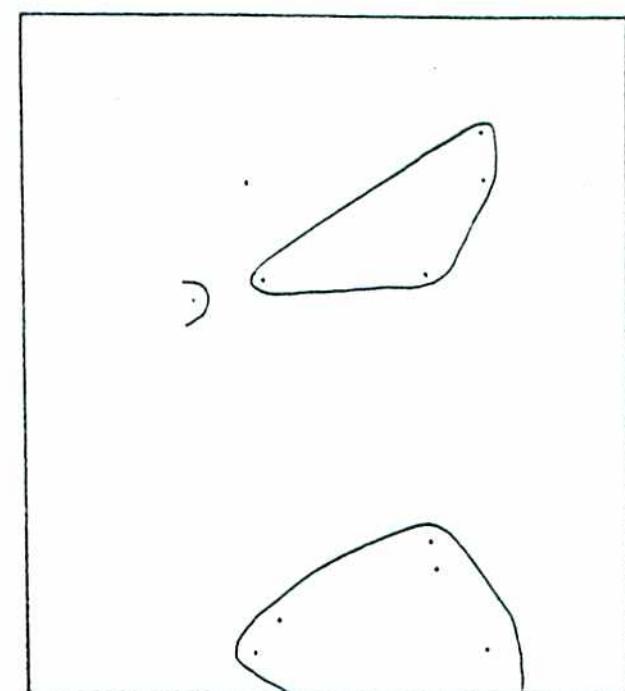


June 2-6

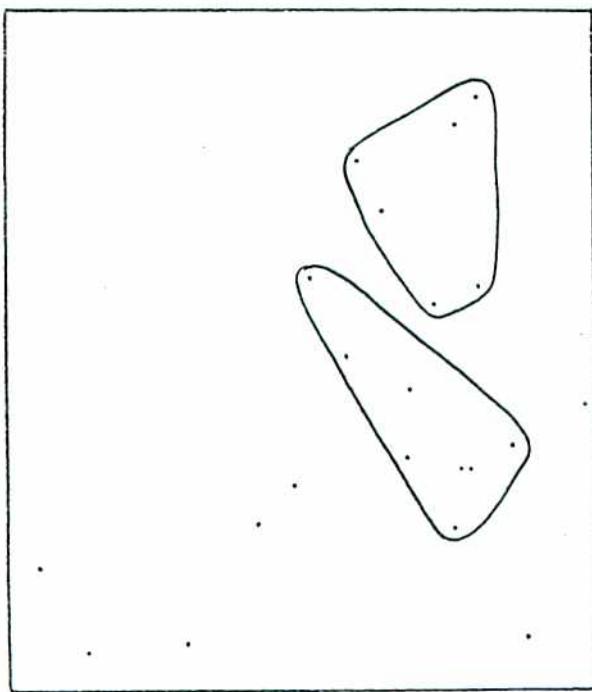
Figure 13. Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson), on untreated control plot 2. St. Pascal, Quebec.
8 May - 6 June, 1978



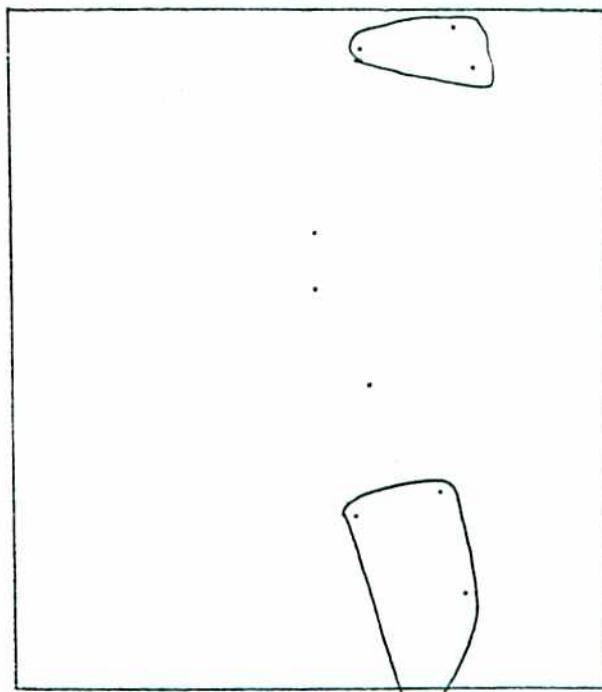
May 9-11



May 12-16

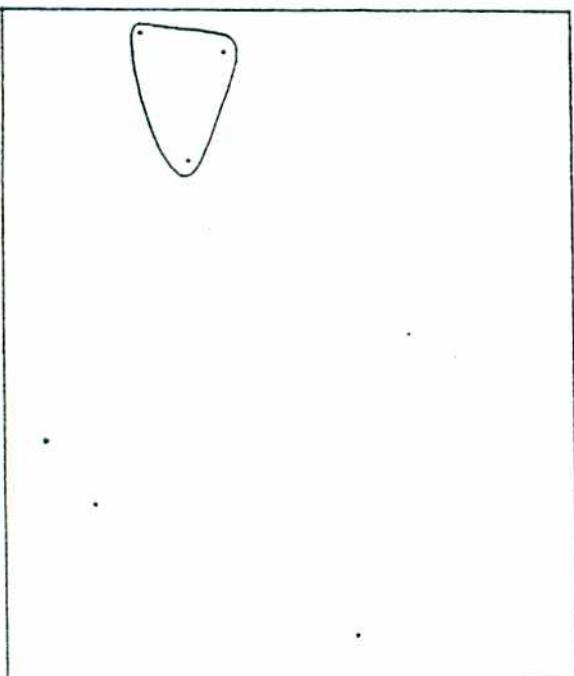


May 28 - June 1

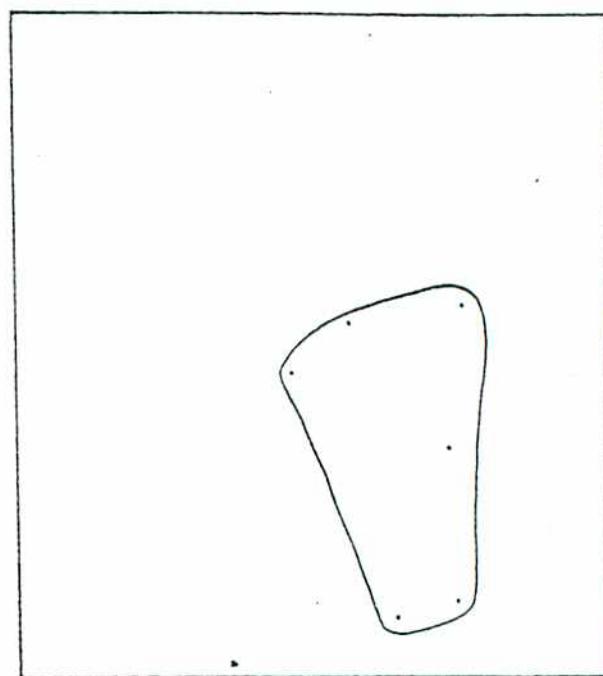


June 2-6

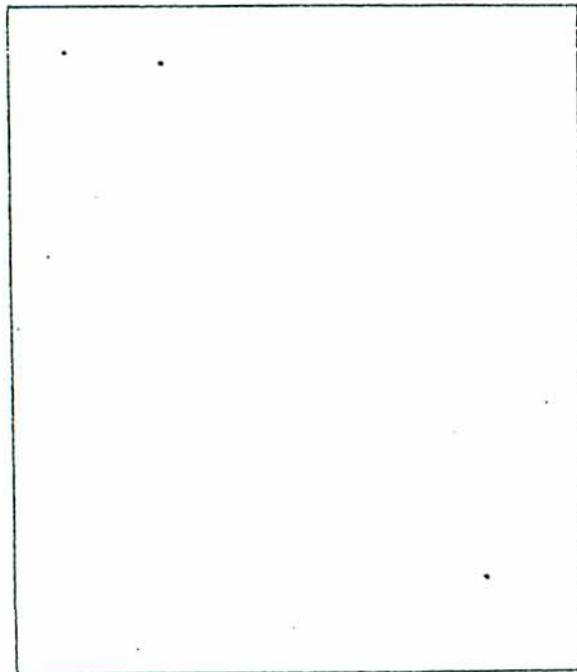
Figure 14. Nesting territories of the yellow-rumped warbler, *Dendroica coronata* (Linnaeus), on untreated control plot 2. St. Pascal, Quebec.
8 May - 6 June, 1978



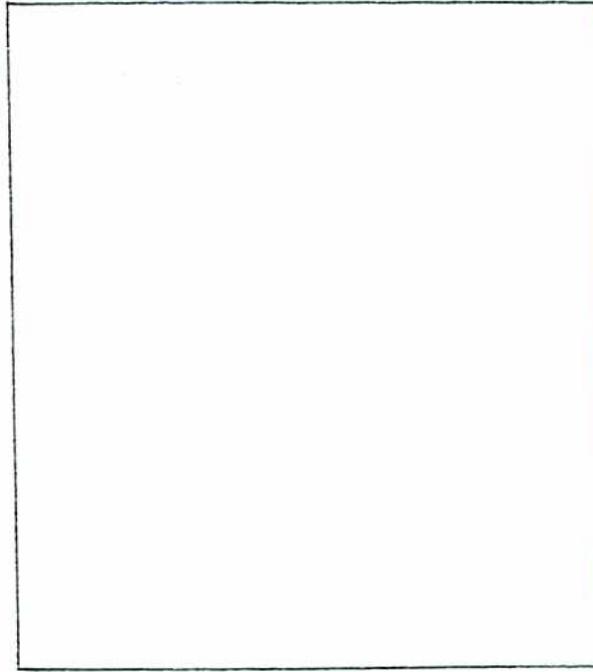
May 9-11



May 12-16

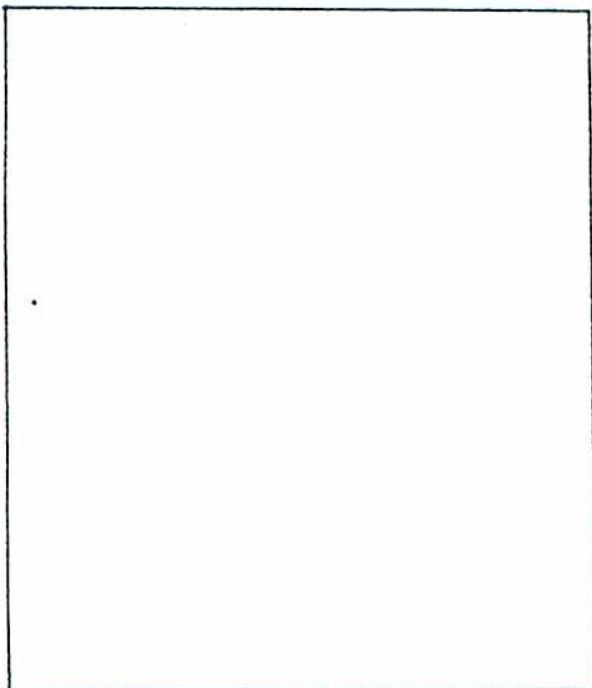


May 26-June 1

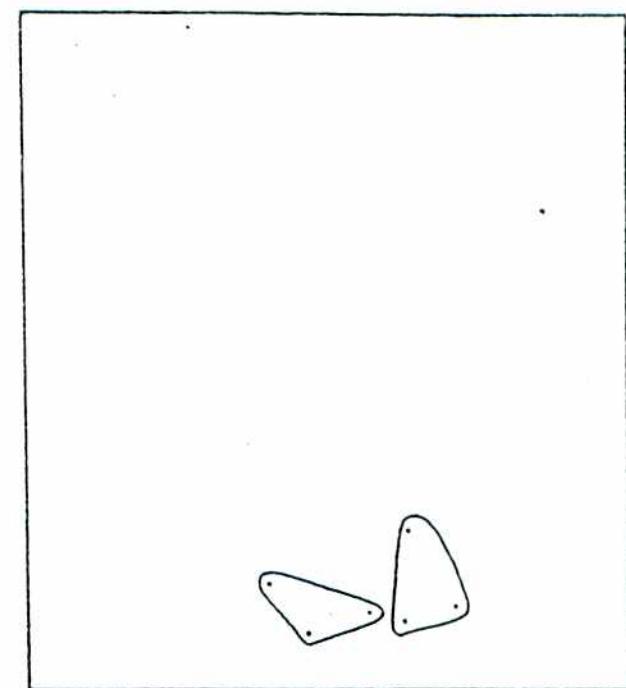


June 2-6

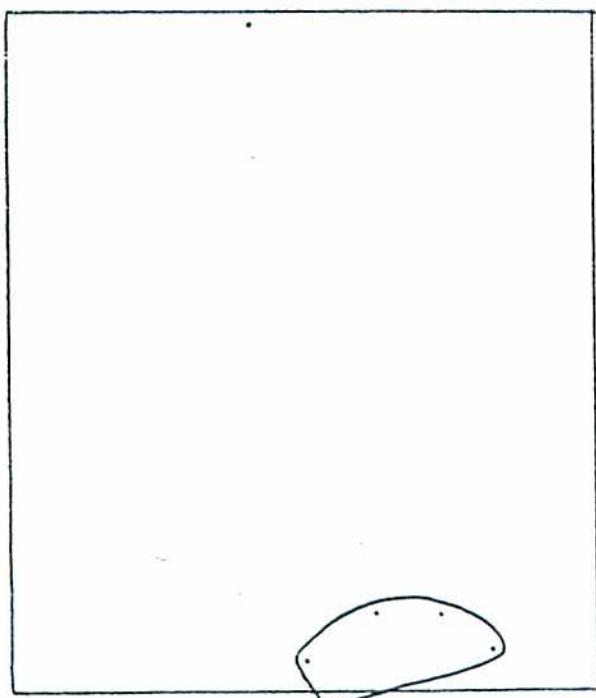
Figure 15. Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus), on untreated control plot 2. St. Pascal, Quebec.
8 May - 6 June, 1978



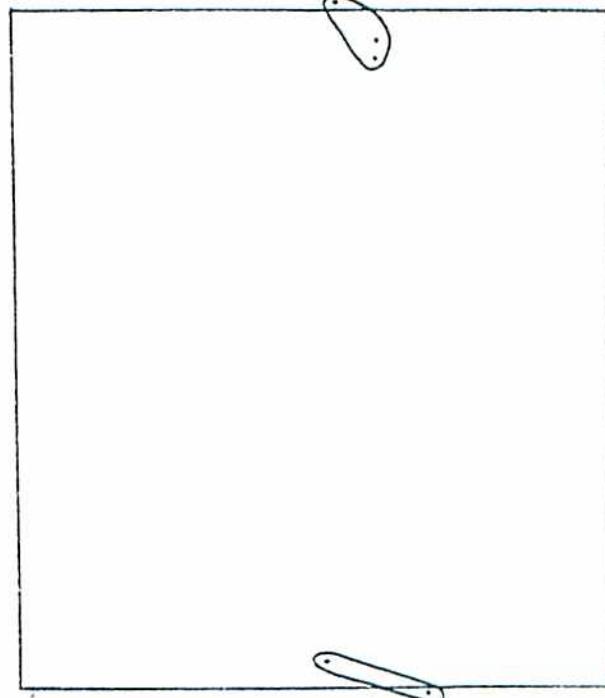
May 9-11



May 12-16



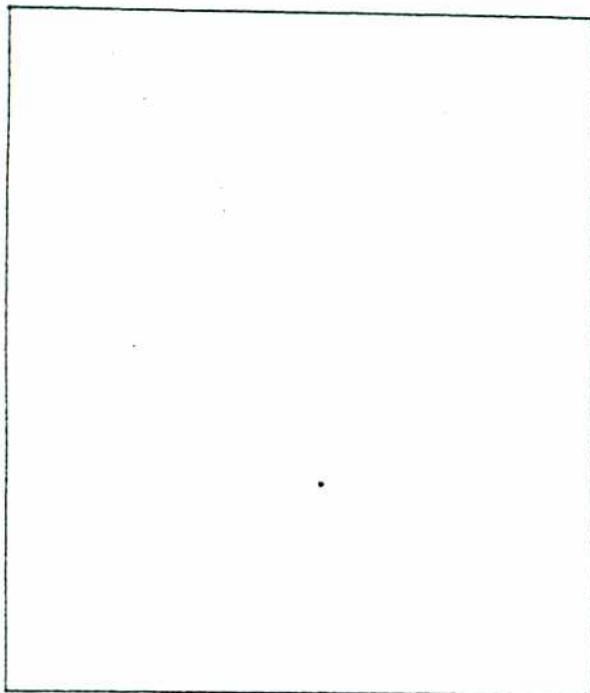
May 28 - June 1



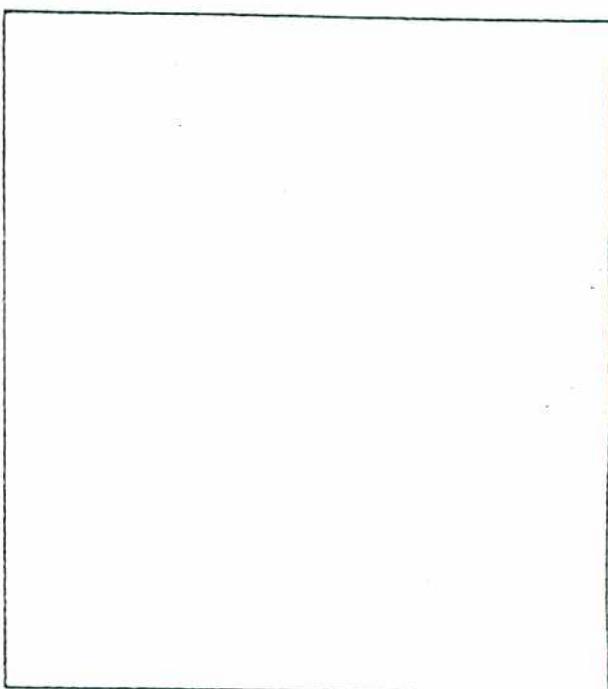
June 2-6

Figure 16. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin), on untreated control plot 2. St. Pascal, Quebec.

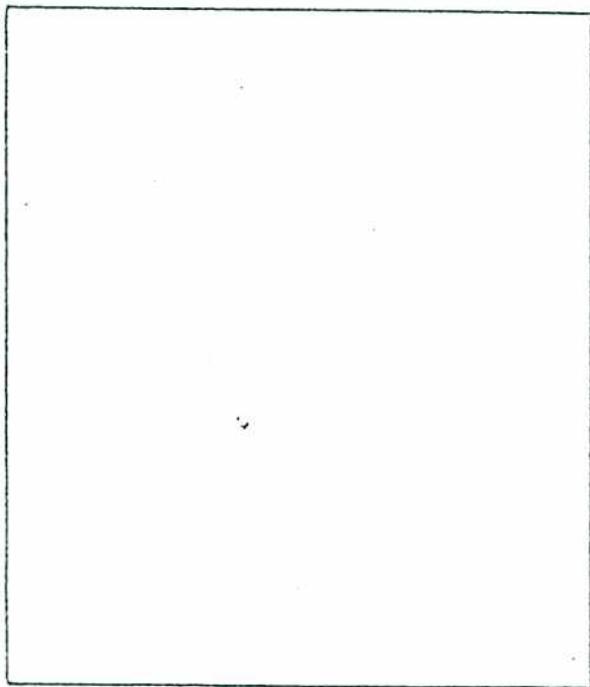
8 May - 6 June, 1978



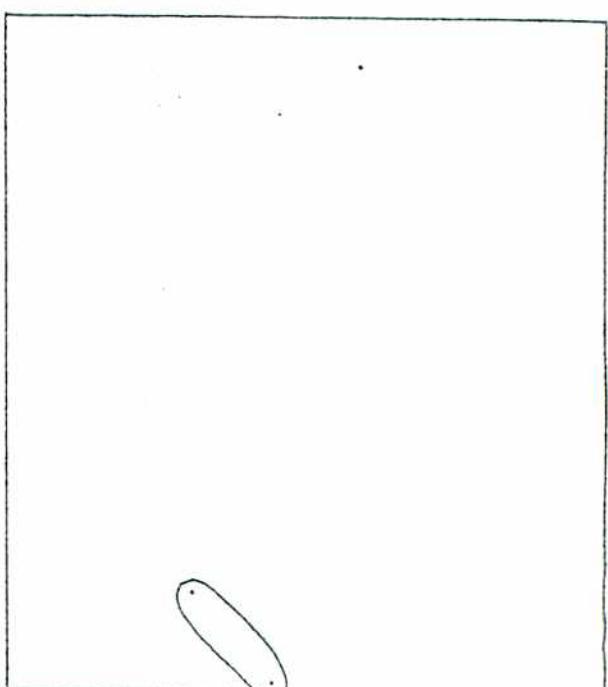
May 9-11



May 12-16

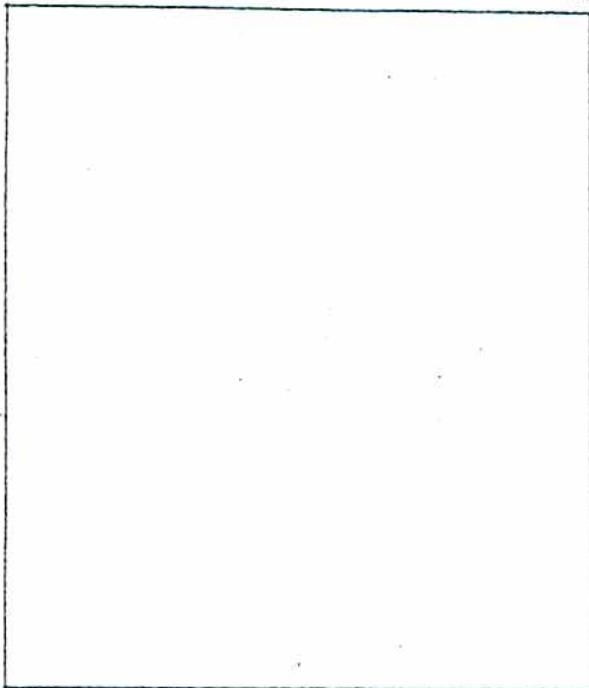


May 28 - June 1

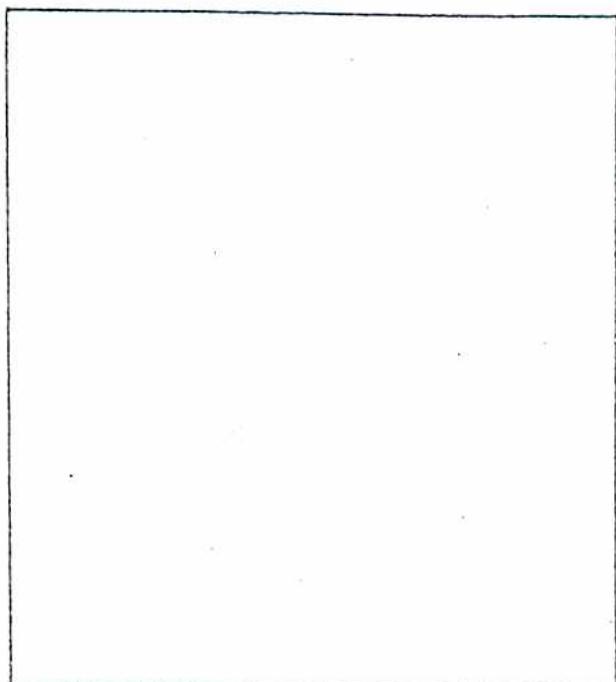


June 2-5

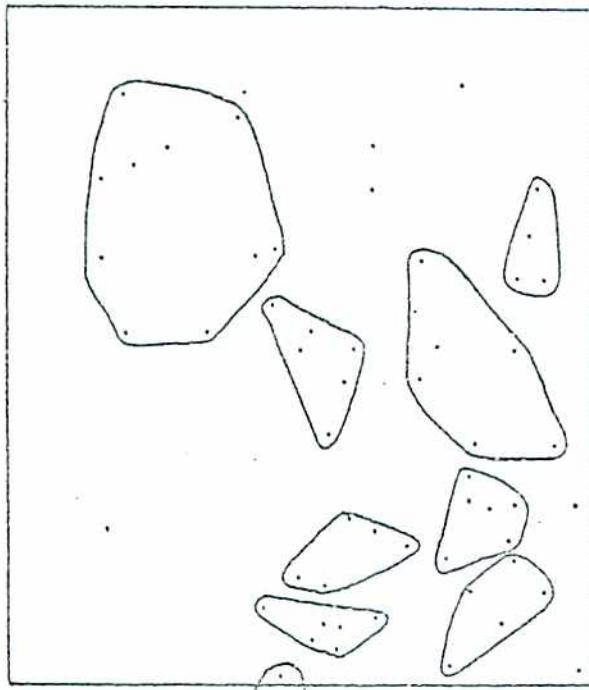
Figure 17. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus), on untreated control plot 2. St. Pascal, Quebec.
8 May - 6 June, 1978



May 9-11

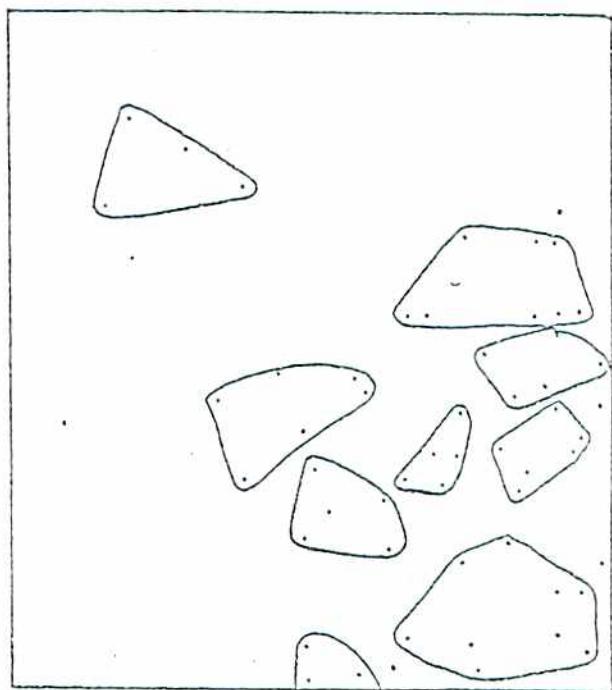


May 12-16



May 28 - June 1

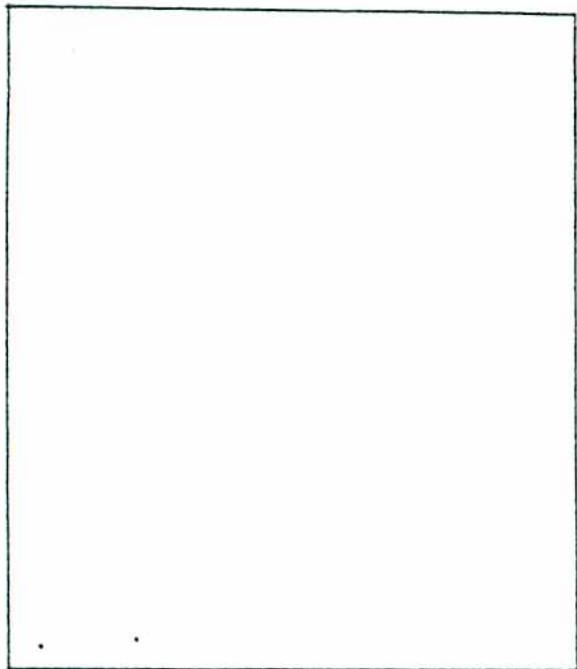
aminocarb 52 gm Al/ha



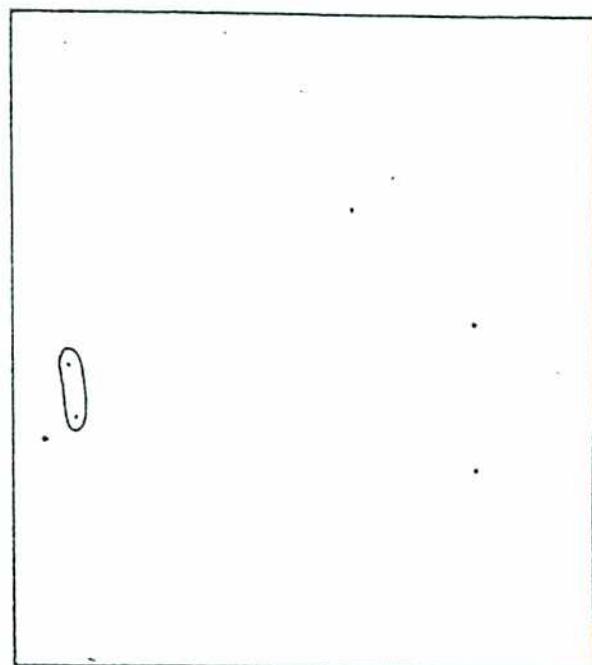
June 2-6

Figure 18. Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson) on experimental treatment plot 101-3, St. Pascal, Quebec.

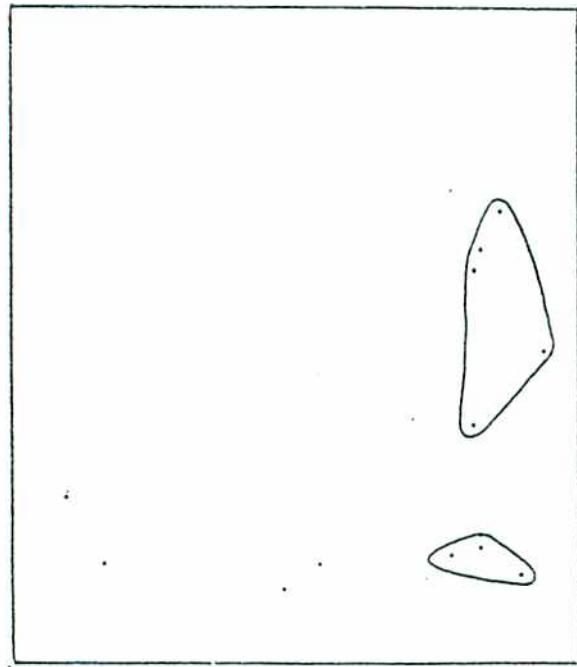
9 May - 6 June, 1978



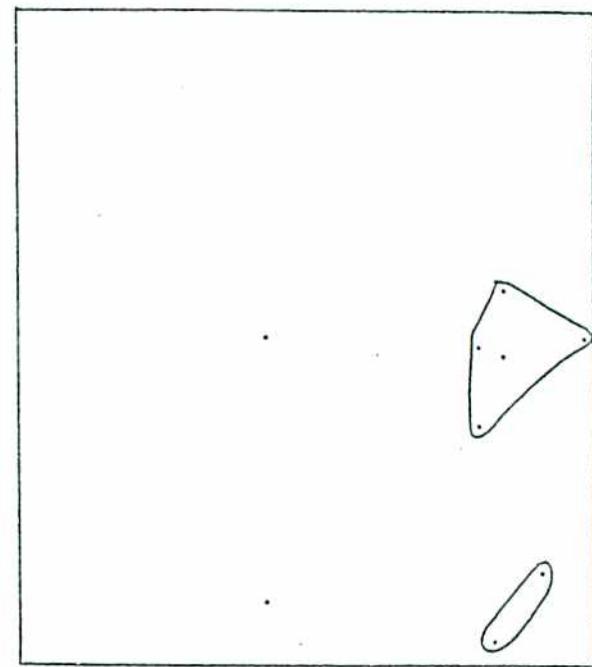
May 9-11



May 12-16



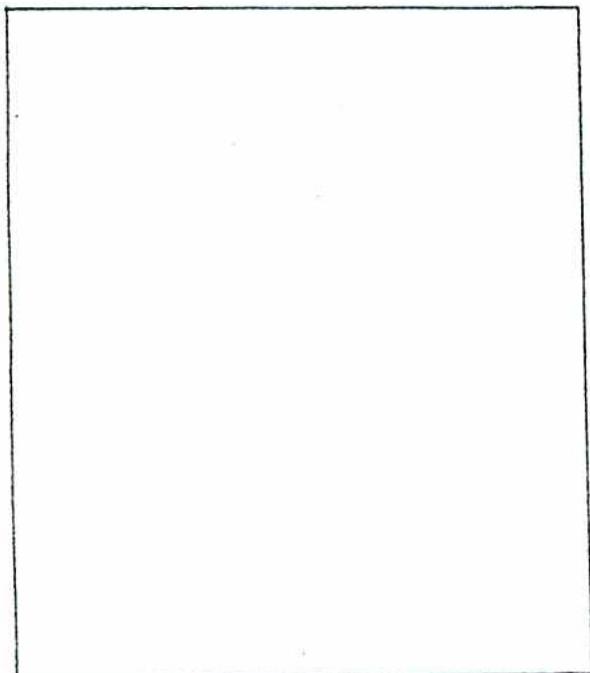
May 28 - June 1



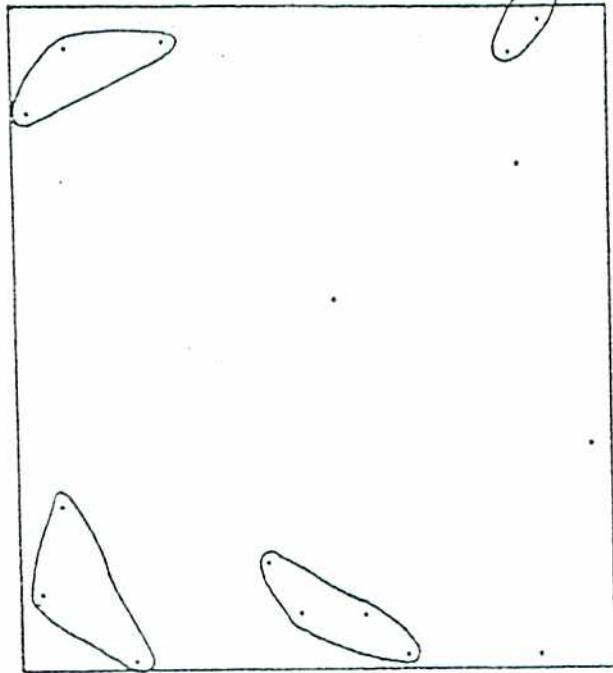
June 2-6

Figure 19. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus) on experimental treatment plot 101-3, St. Pascal, Quebec.

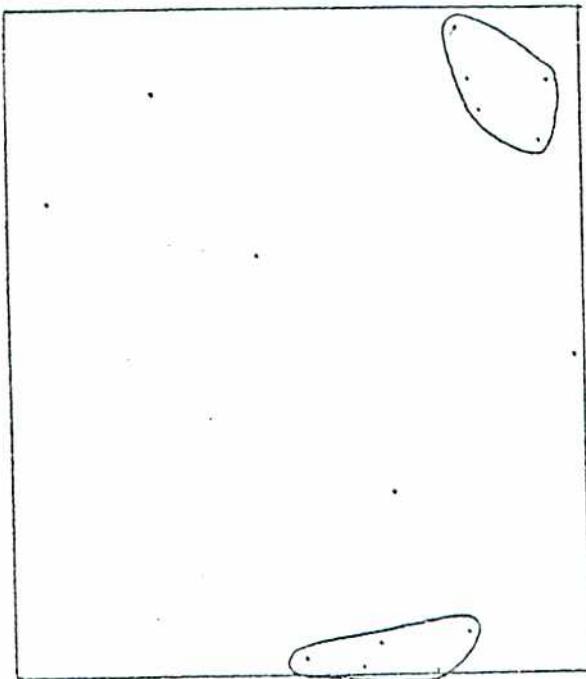
9 May - 6 June, 1978



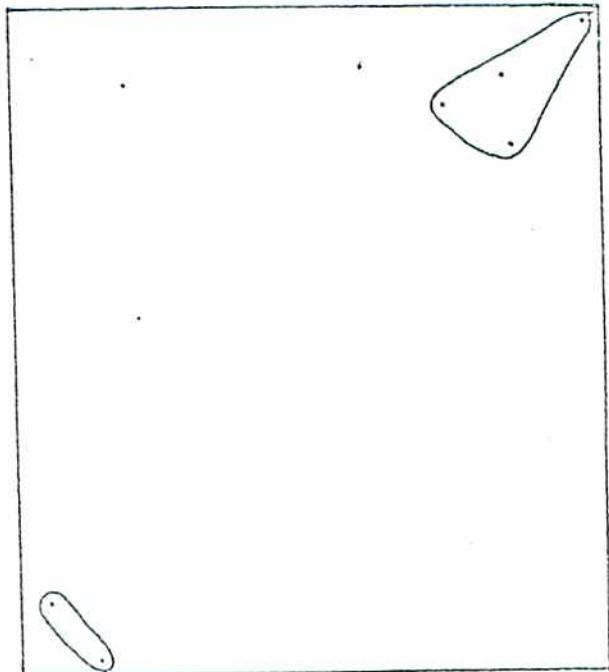
May 9-11



May 12-16



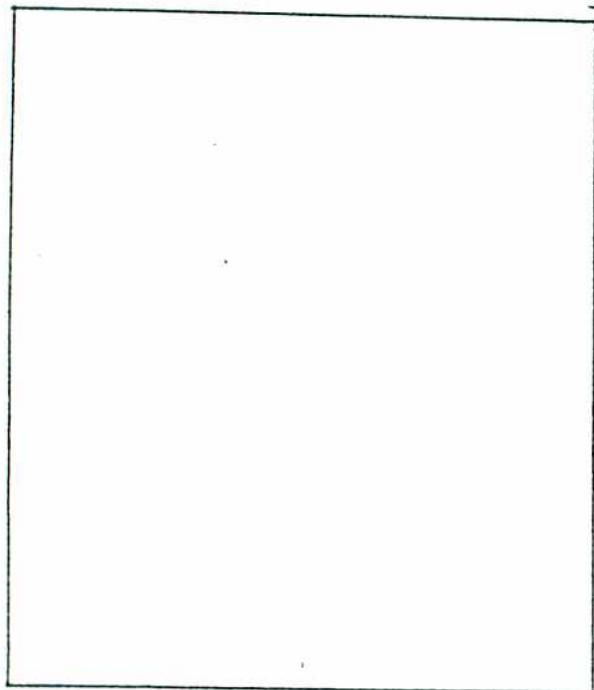
May 28-June 1



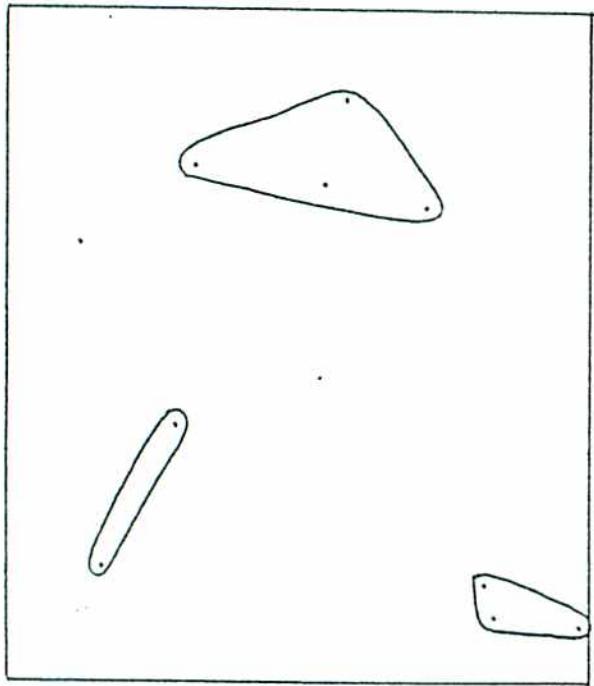
June 2-6

Figure 20. Nesting territories of the white throated sparrow, *Zonotrichia albicollis* (Gmelin) on experimental treatment plot 101-3, St. Pascal, Quebec.

9 May - 6 June, 1978

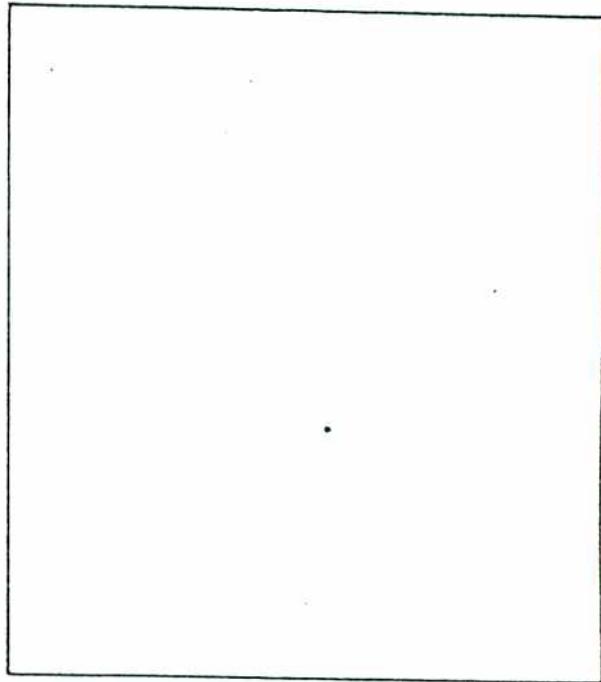


May 9-11

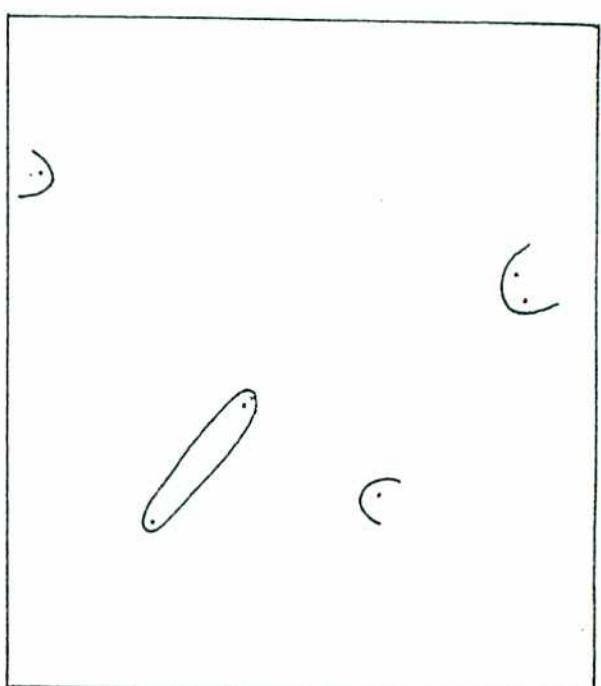


May 28 - June 1

aminocarb 52 gm Al/ha



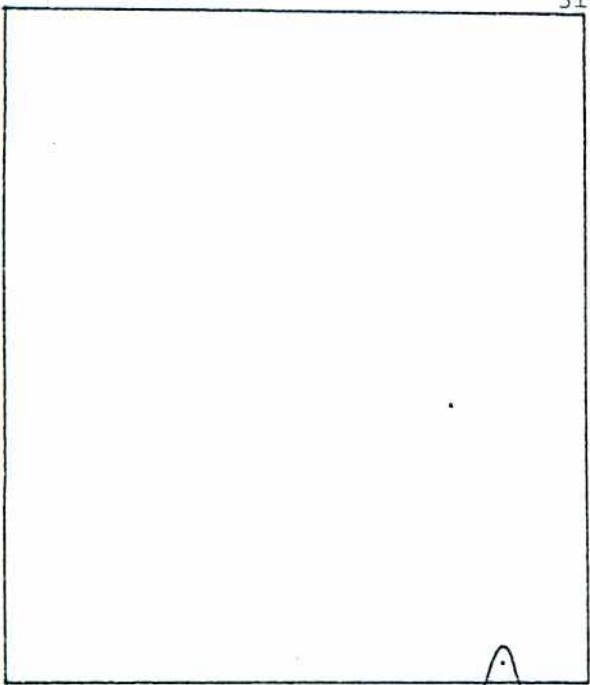
May 12-16



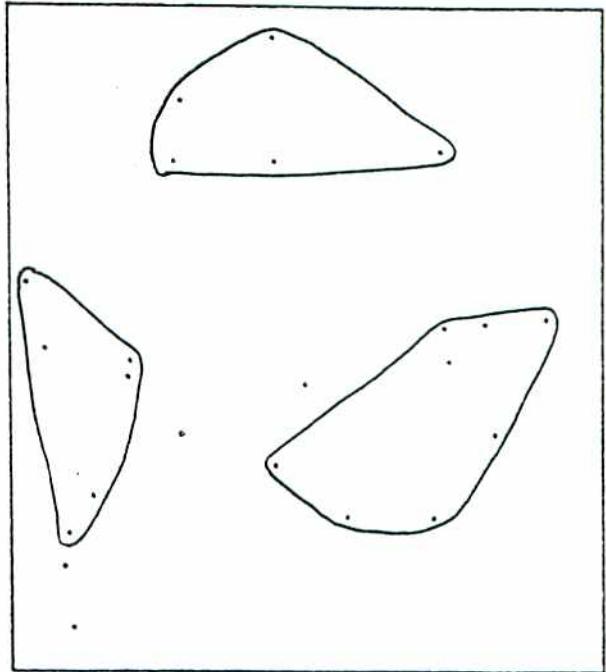
June 2-6

Figure 21. Nesting territories of the Swainson's thrush, *Hylocichla ustulata* (Nuttall) on experimental treatment plot 101-3, St. Pascal, Quebec.
9 May - 6 June, 1978

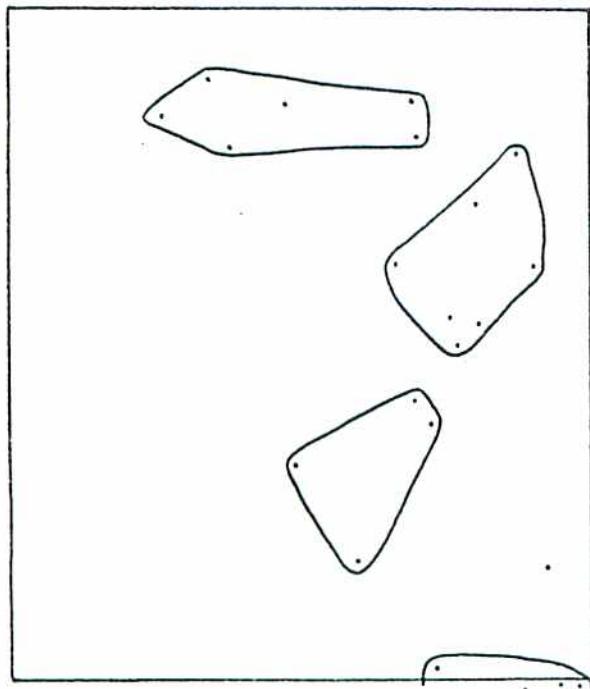
31



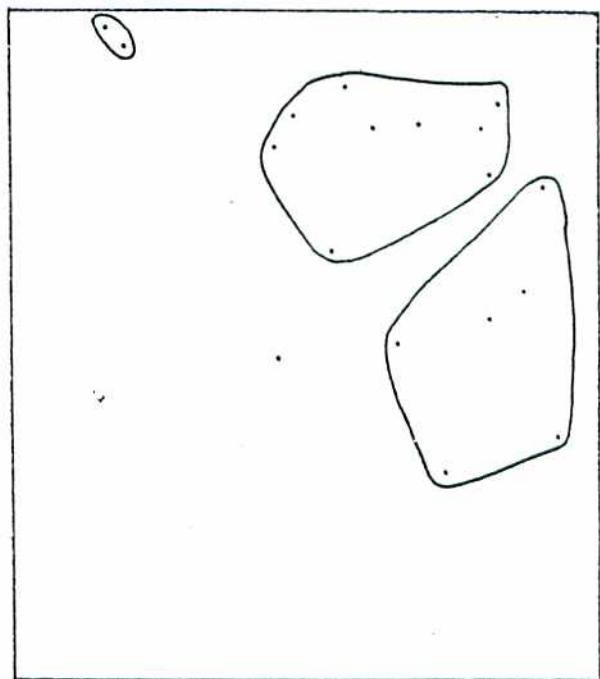
May 9-11

aminocarb
52 gm Al/ha

May 12-16

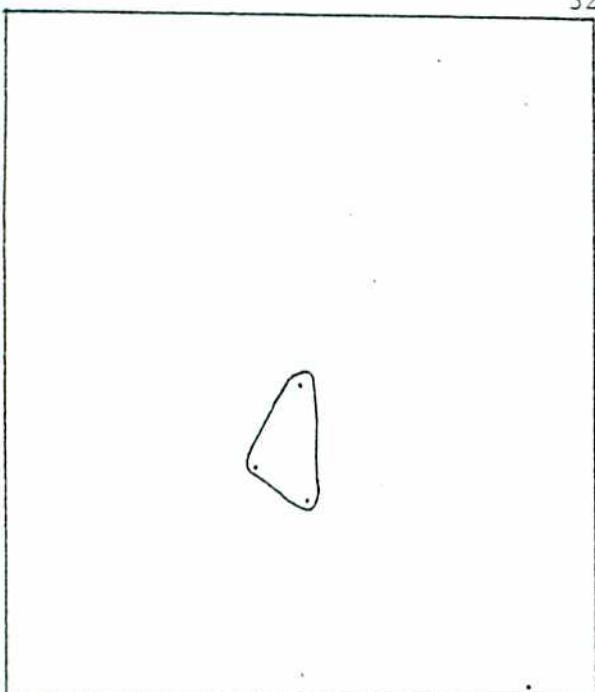


May 28 - June 1

aminocarb
52 gm Al/ha

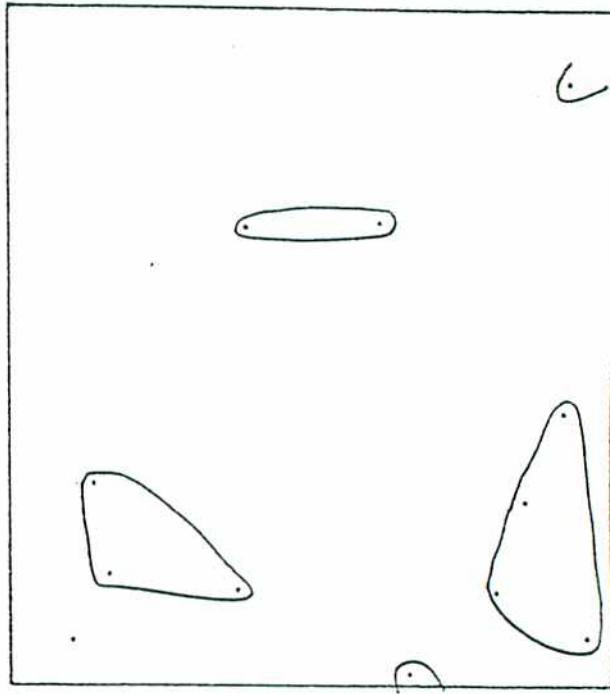
June 2-6

Figure 22. Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus) on experimental treatment plot 101-3, St. Pascal, Quebec.
9 May - 6 June, 1978

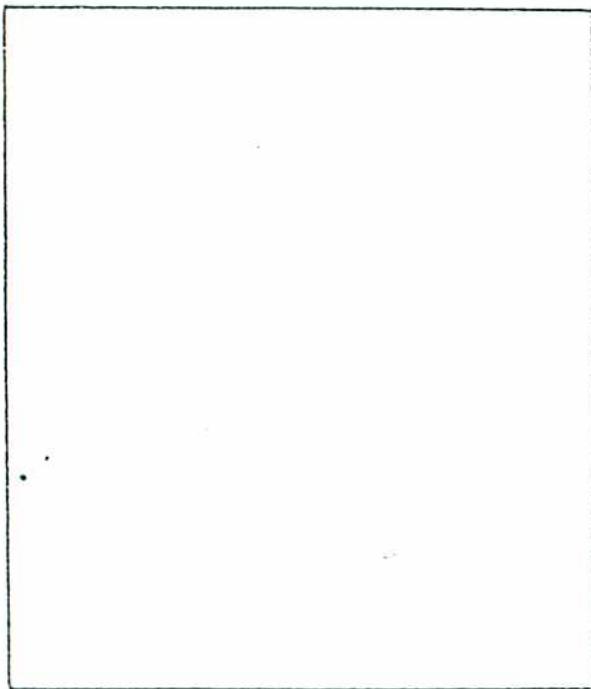


May 9-11

aminocarb 52 gm Al/ha

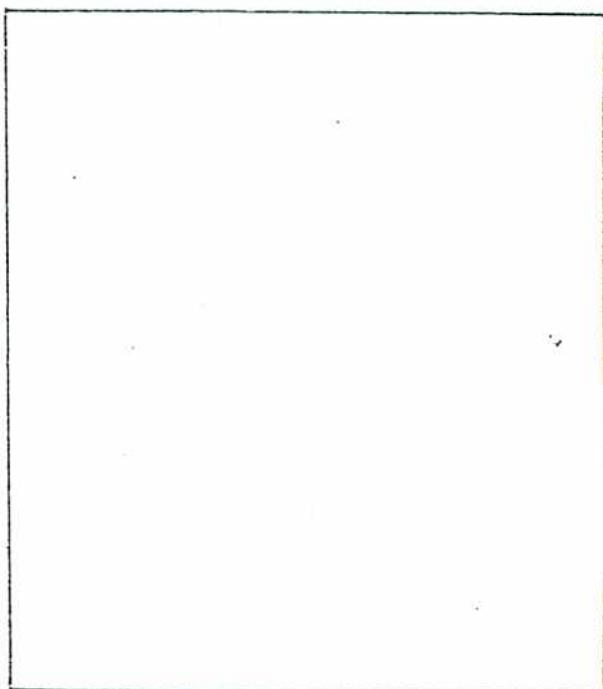


May 12-16



May 28 - June 1

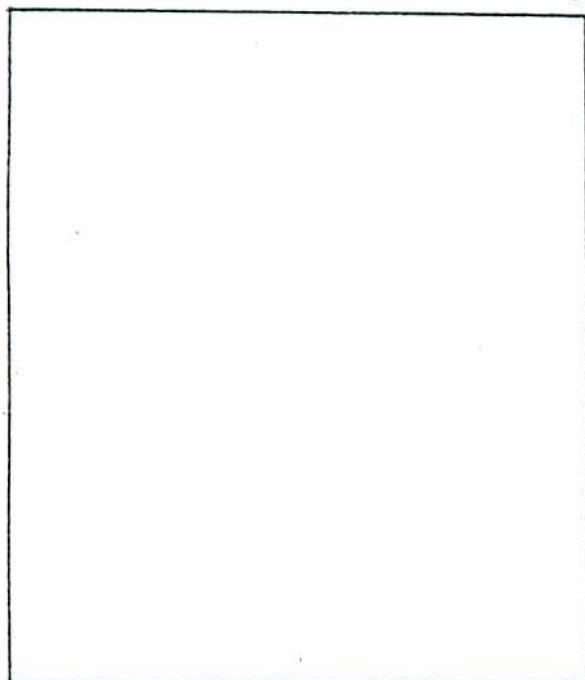
aminocarb 52 gm Al/ha



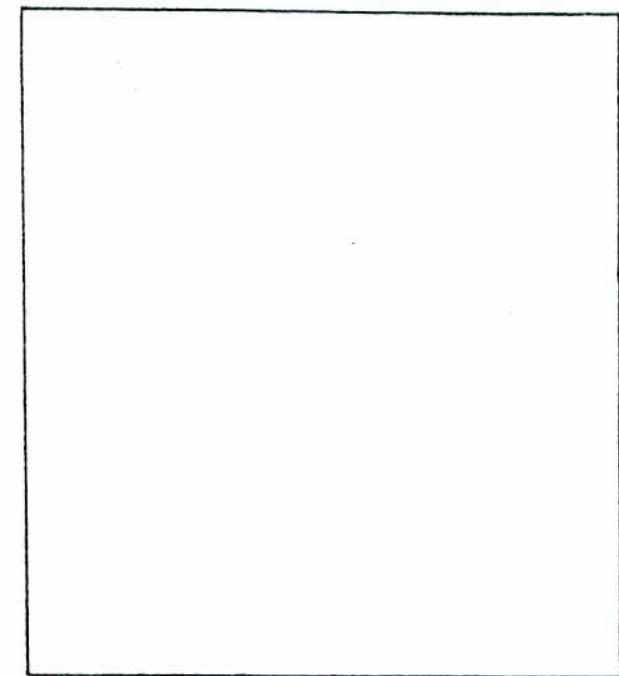
June 2-6

Figure 23. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus), on experimental treatment plot 101-4. St. Pascal, Quebec.

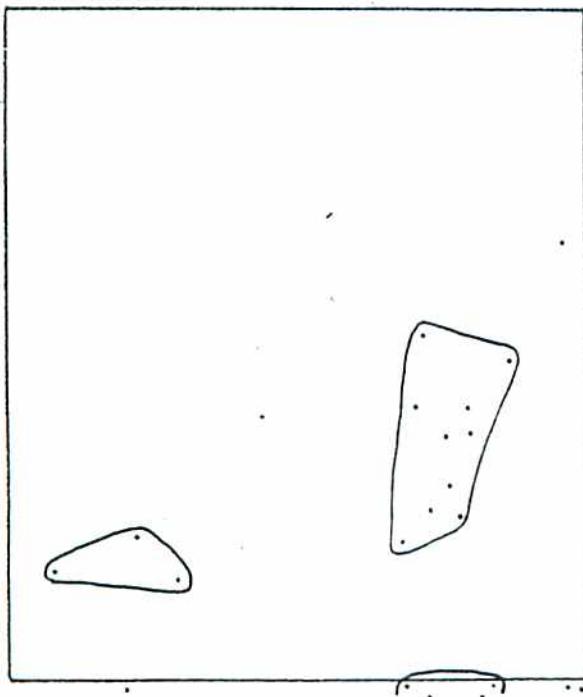
9 May - 6 June, 1978



May 9-11

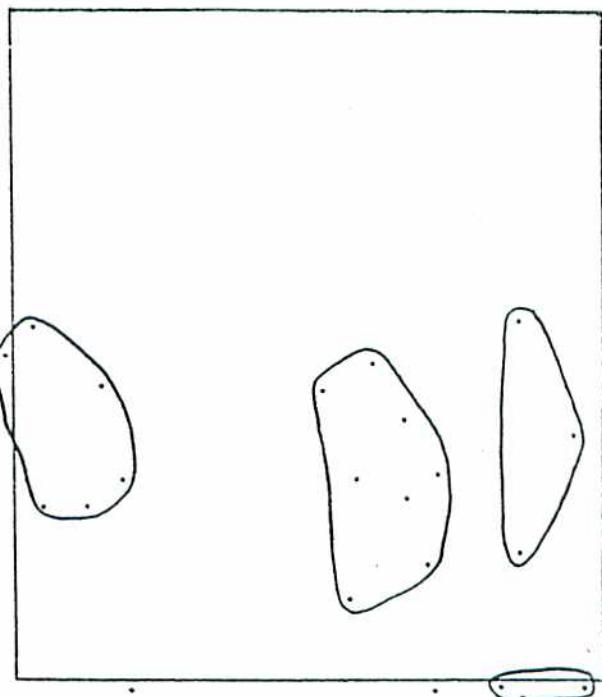


May 12-16



May 28 - June 1

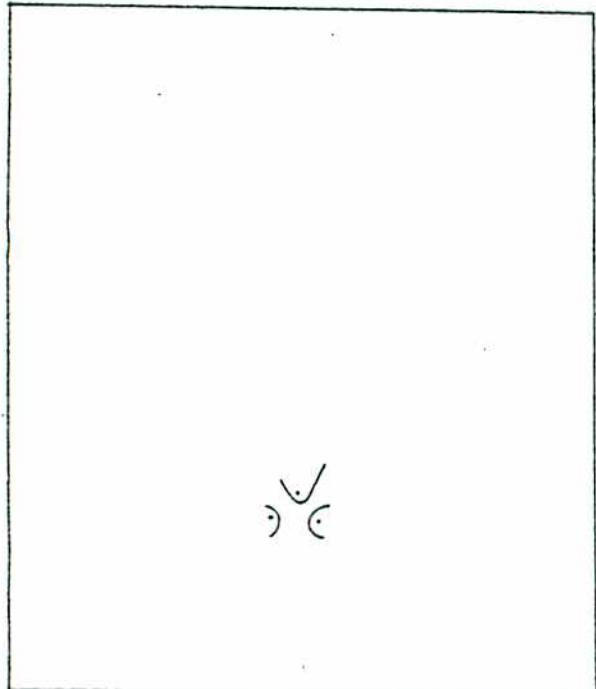
aminocarb 52 gm Al/ha



June 2-6

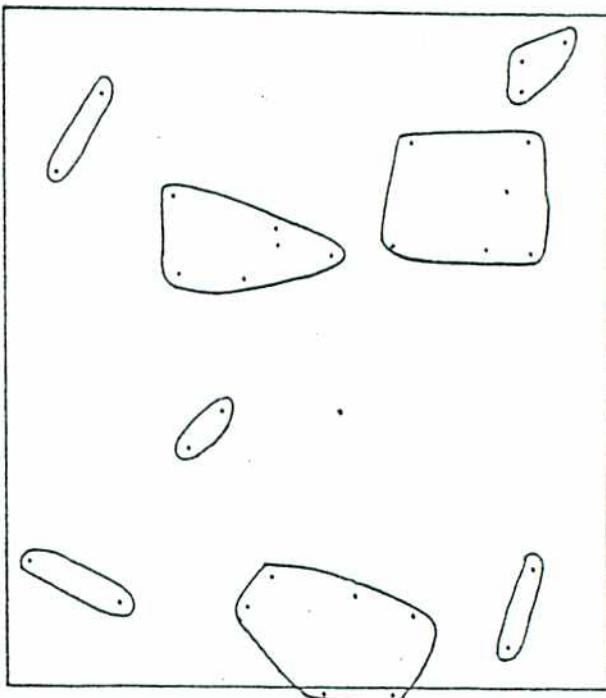
Figure 24. Nesting territories of the ovenbird, *Seiurus aurocapillus* (Linnaeus), on experimental treatment plot 101-4. St. Pascal, Quebec.

9 May - 6 June, 1978

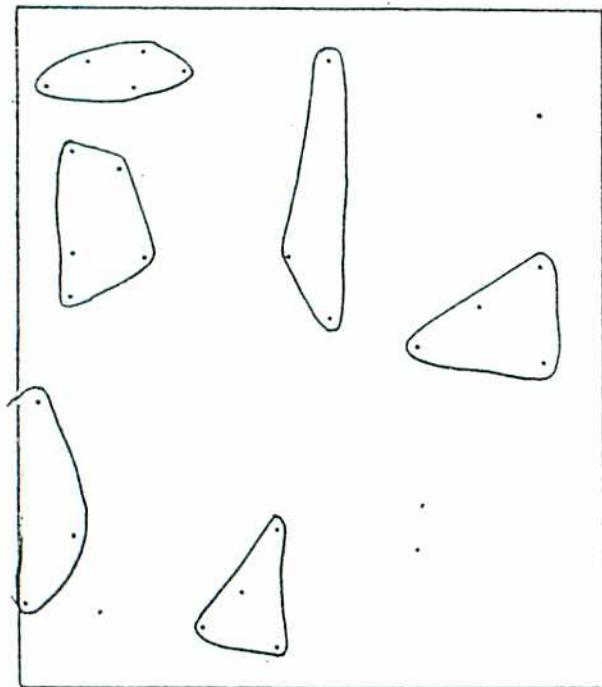


May 9-11

aminocarb 52 gm Al/ha

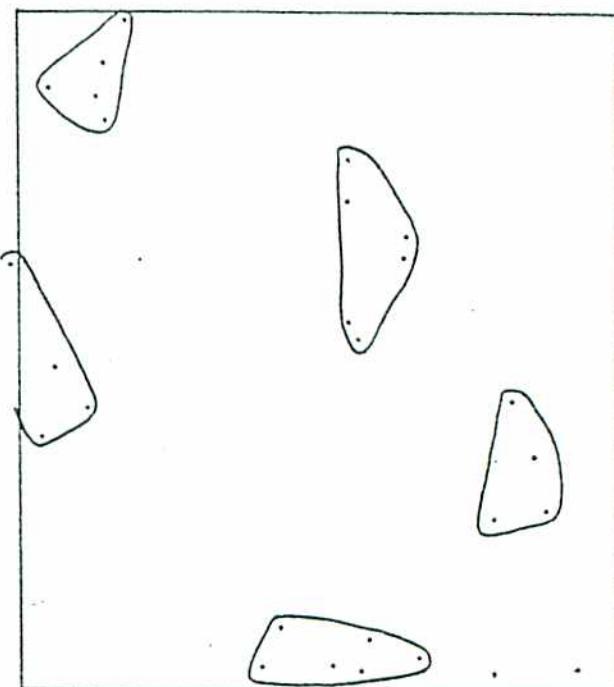


May 12-16



May 28-June 1

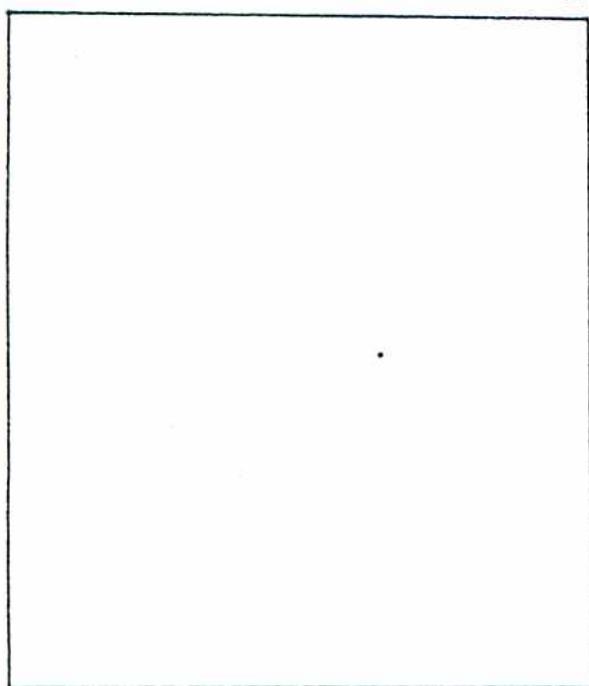
aminocarb 52 gm Al/ha



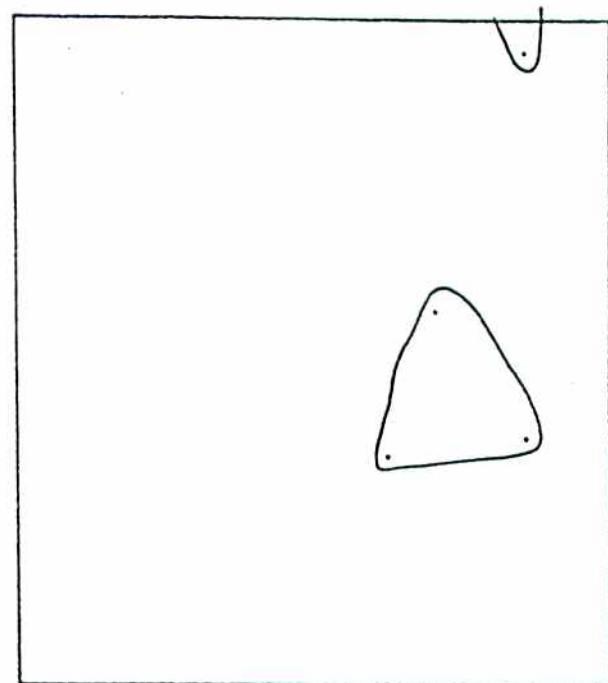
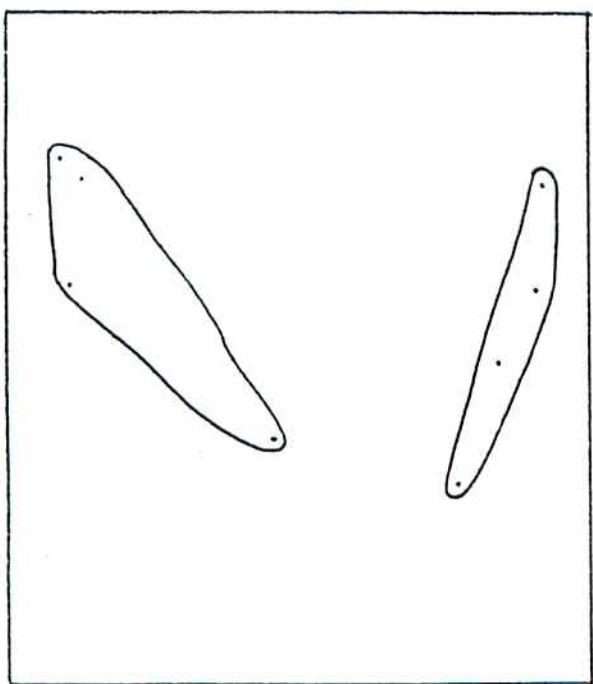
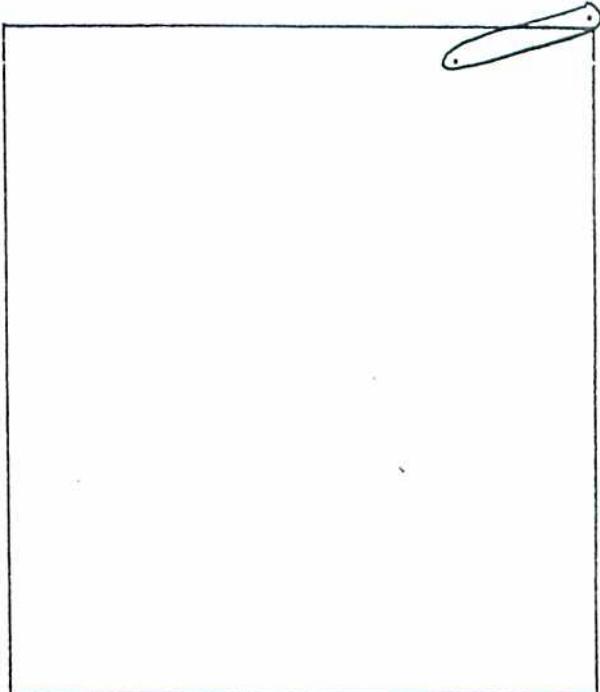
June 2-6

Figure 25. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin), on experimental treatment plot 101-4.
St. Pascal, Quebec.

9 May - 6 June, 1978.



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Figure 26. Nesting territories of the hermit thrush, *Hylocichla guttata* (Pallas), on experimental treatment plot 101-4. St. Pascal, Quebec.

9 May - 6 June, 1978

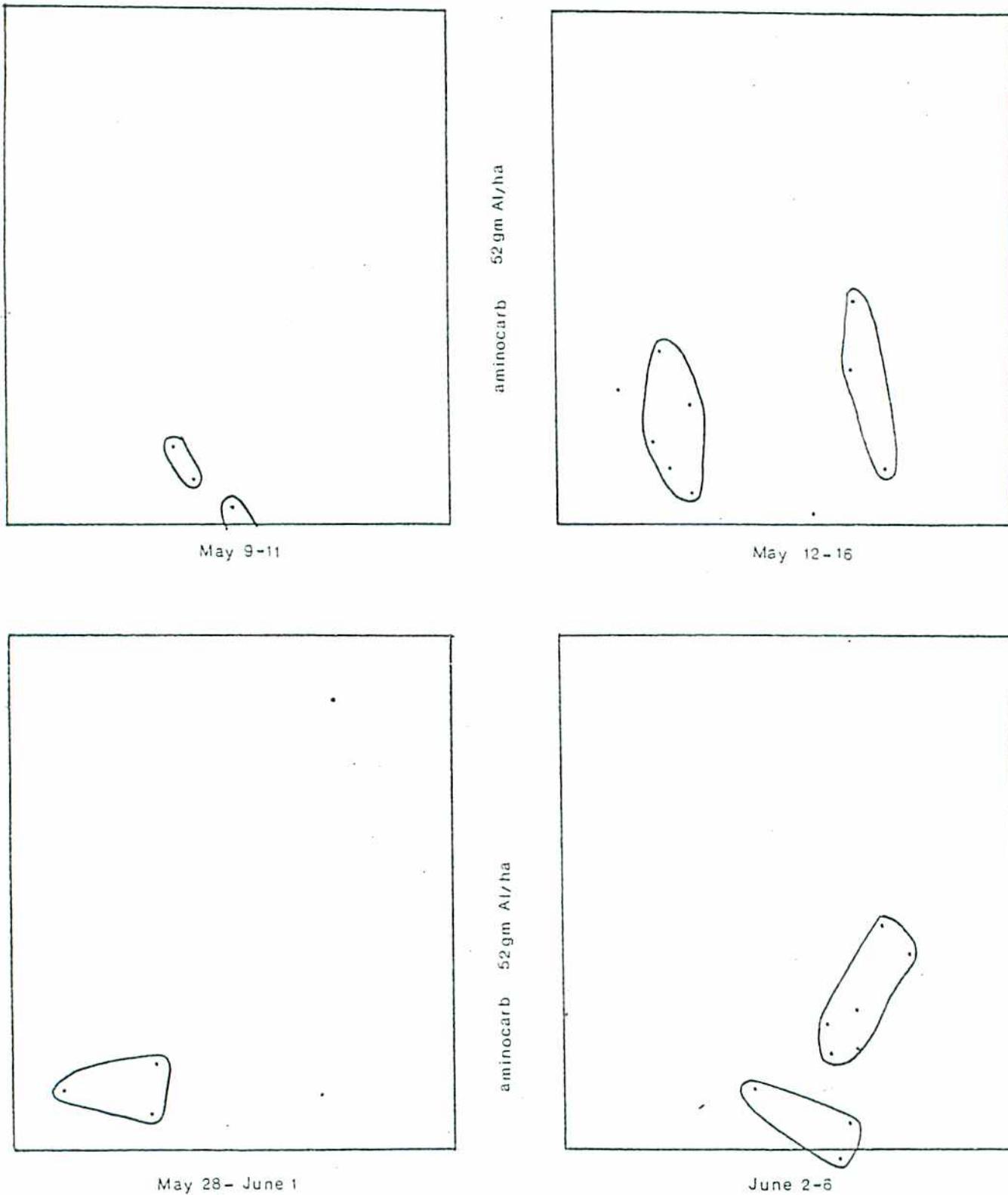
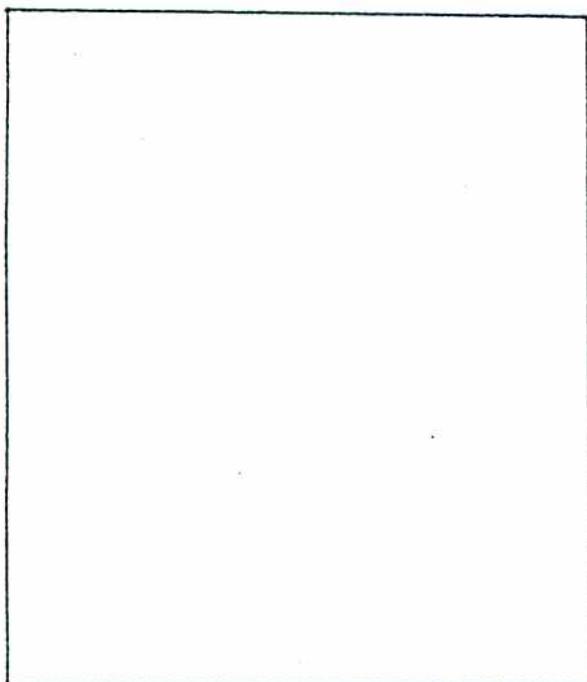
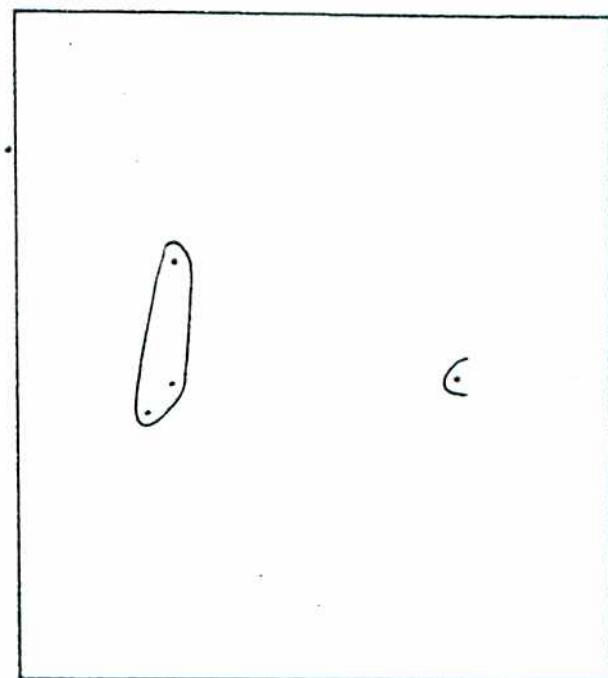


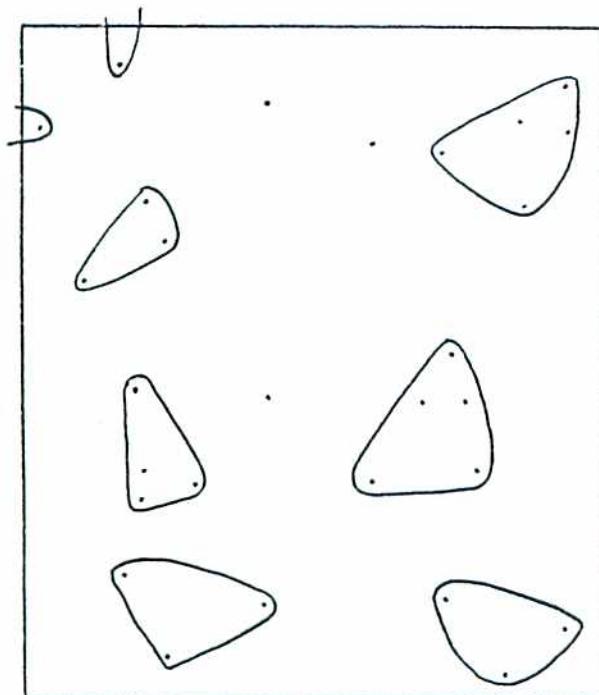
Figure 27. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus) on experimental treatment plot 101-5, St. Pascal, Quebec.
9 May - 6 June, 1978



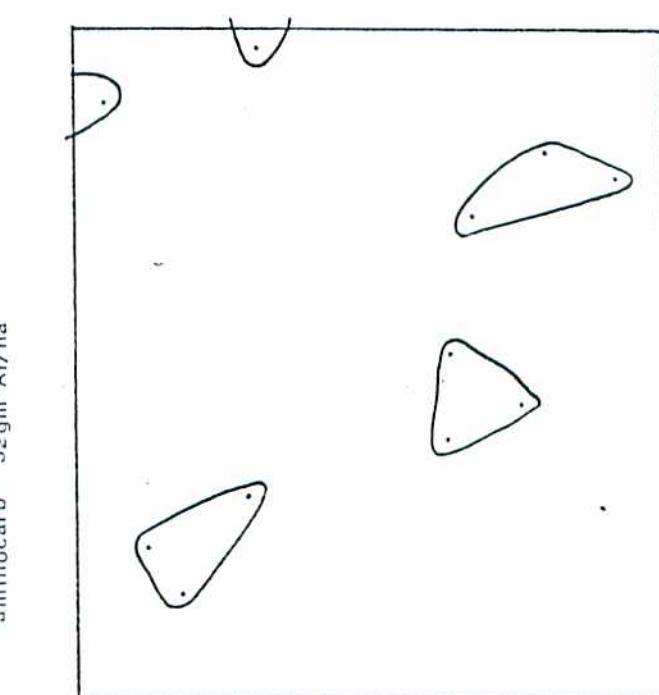
May 9-11



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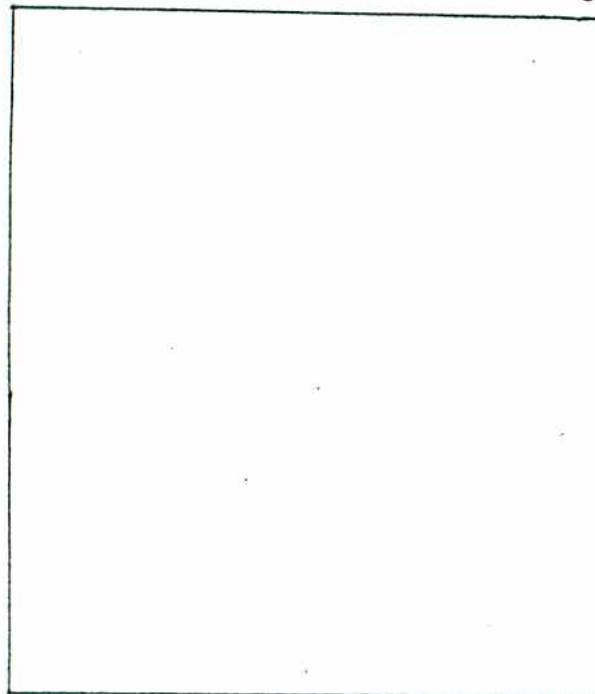


May 28 - June 1



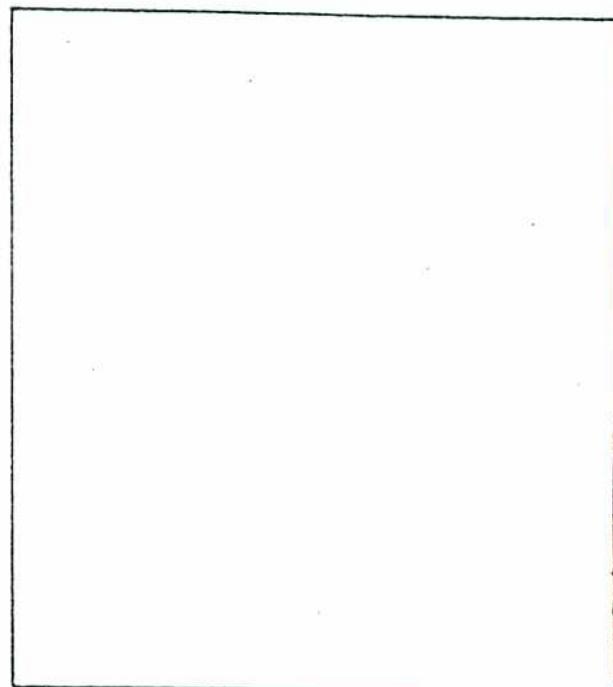
June 2-6

Figure 28. Nesting territories of the common yellowthroat, *Geothlypis trichas* (Linnaeus) on experimental treatment plot 101-5, St. Pascal, Quebec.
9 May - 6 June, 1978

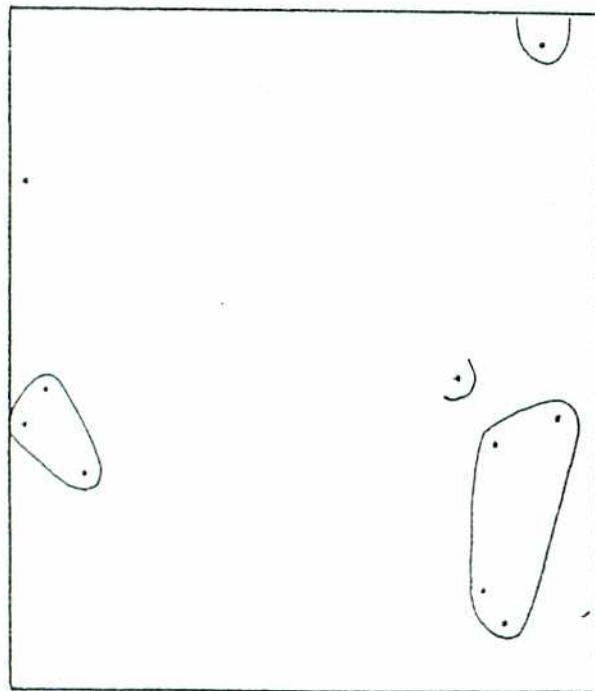


May 9-11

aminocarb 52 gm Al/ha

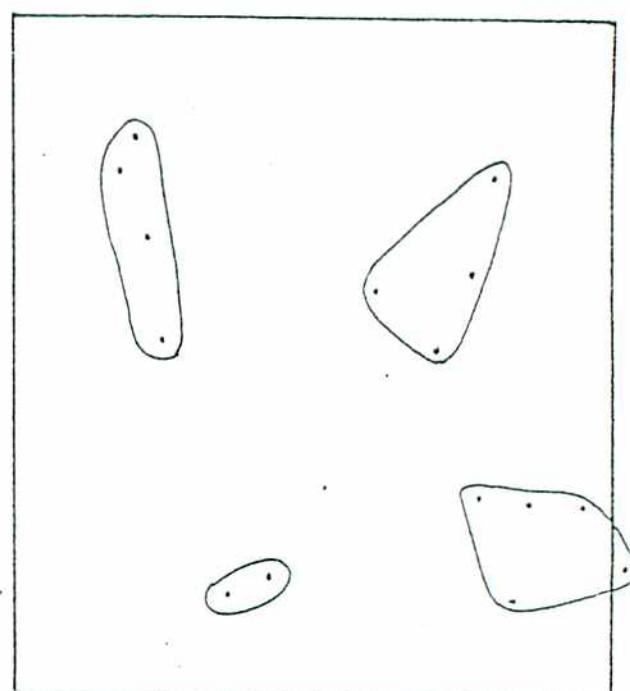


May 12-16



May 28 - June 1

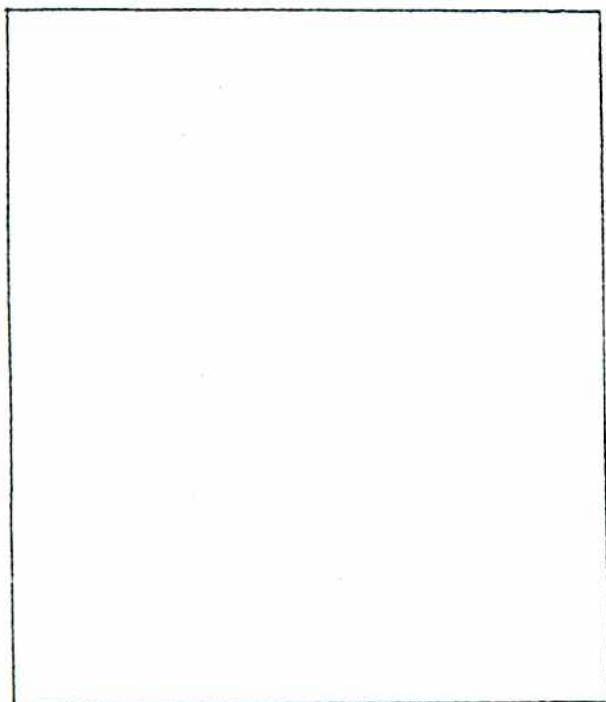
aminocarb 52 gm Al/ha



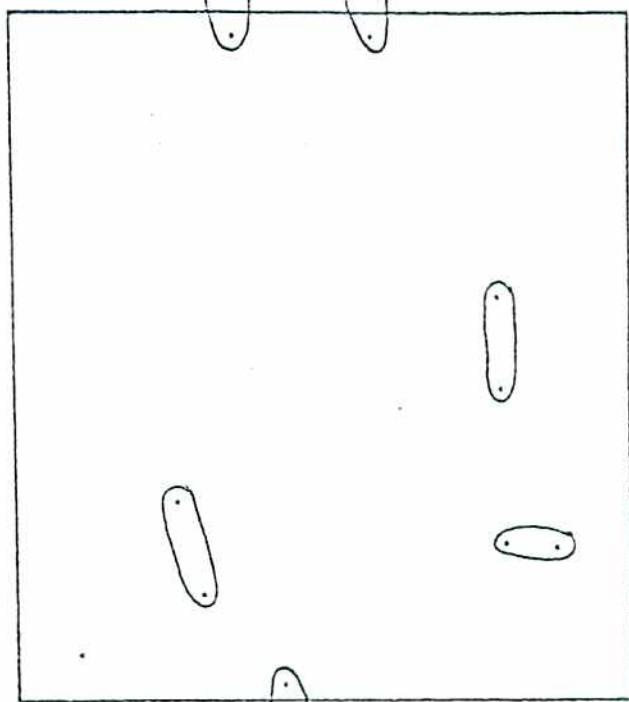
June 2-6

Figure 29. Nesting territories of Swainson's thrush, *Hylocichla ustulata* (Nuttall) on experimental treatment plot 101-5, St. Pascal, Quebec.

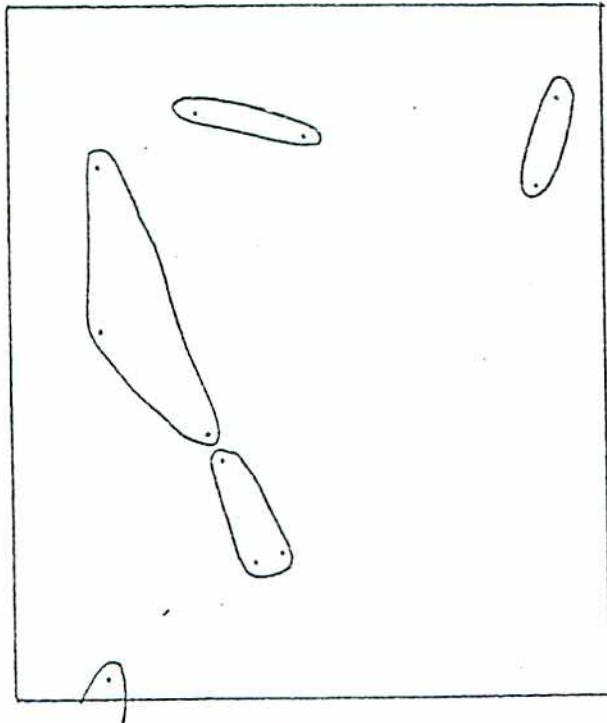
9 May - 6 June, 1978



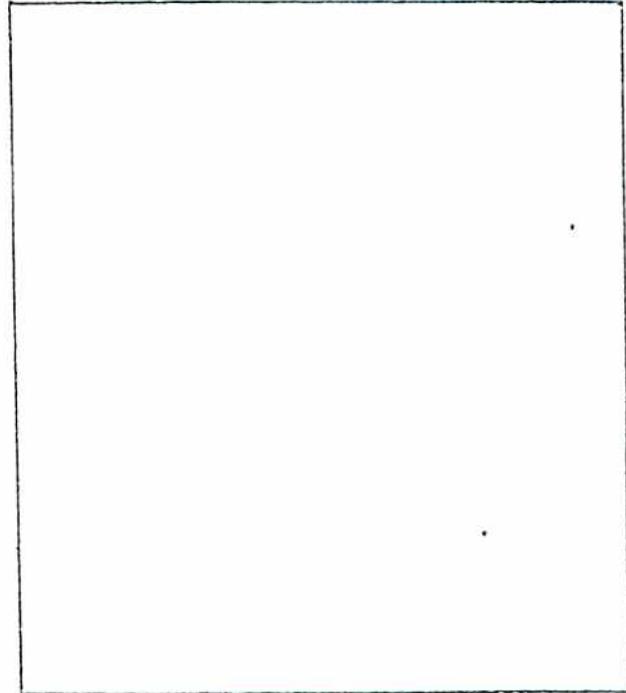
May 9-11



May 12-16



May 28 - June 1

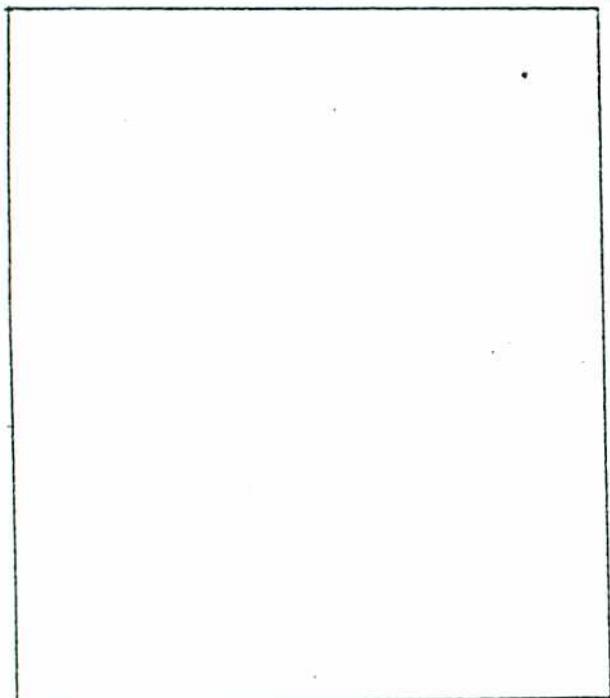


June 2-6

Figure 30. Nesting territories of the yellow-rumped warbler, *Dendroica coronata* (Linnaeus) on experimental plot 101-5, St. Pascal, Quebec.

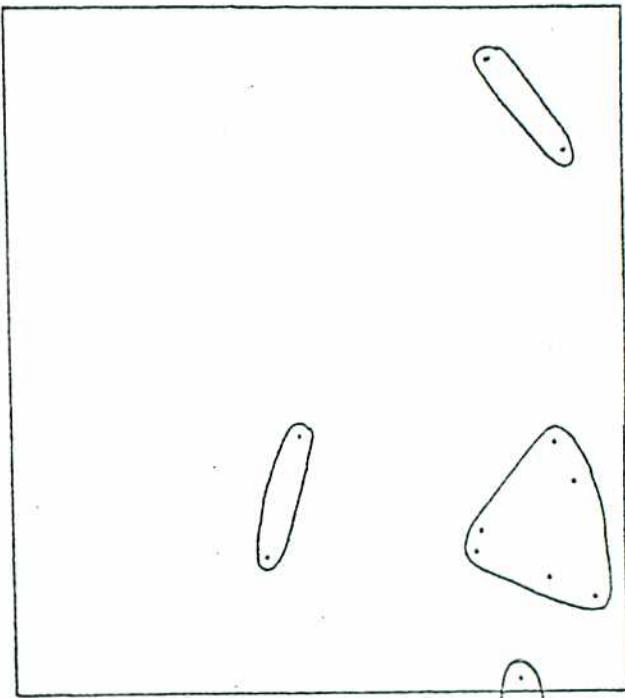
9 May - 6 June, 1978.

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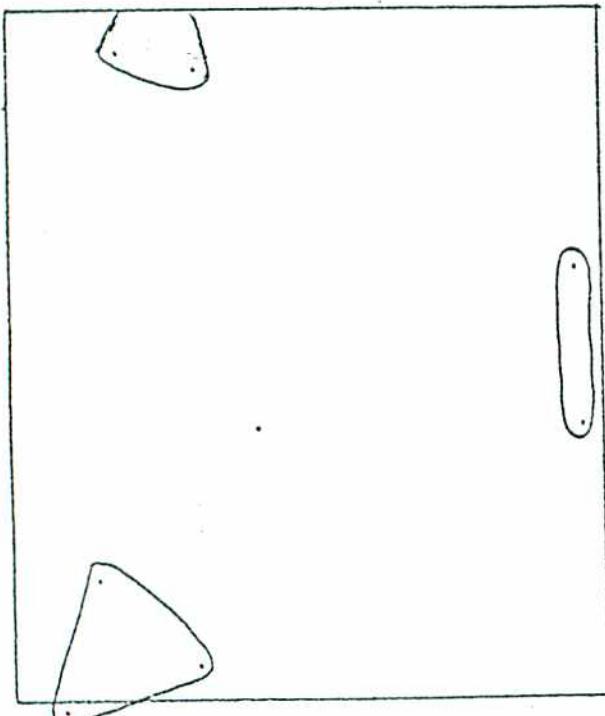


May 9-11

aminocarb 52 gm Al/ha

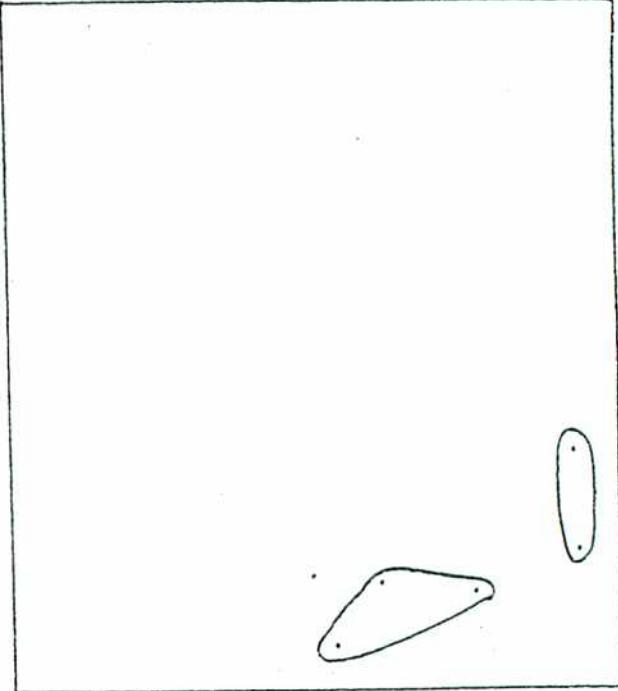


May 12-16



May 26 - June 1

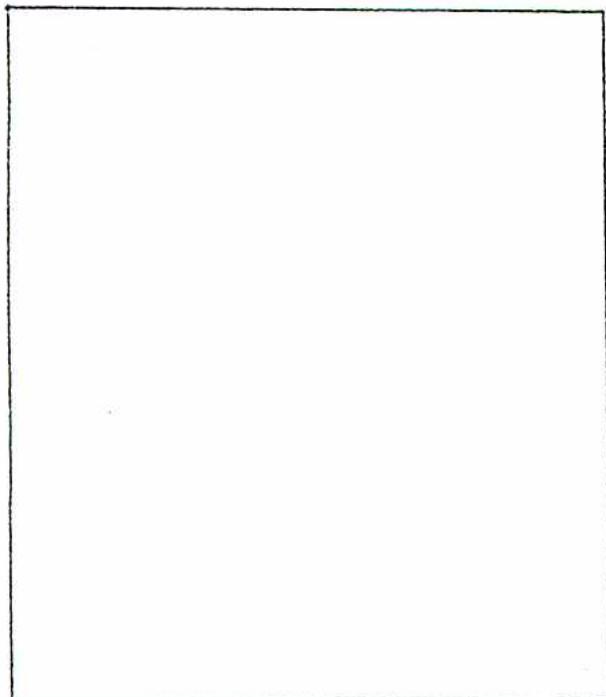
aminocarb 52 gm Al/ha



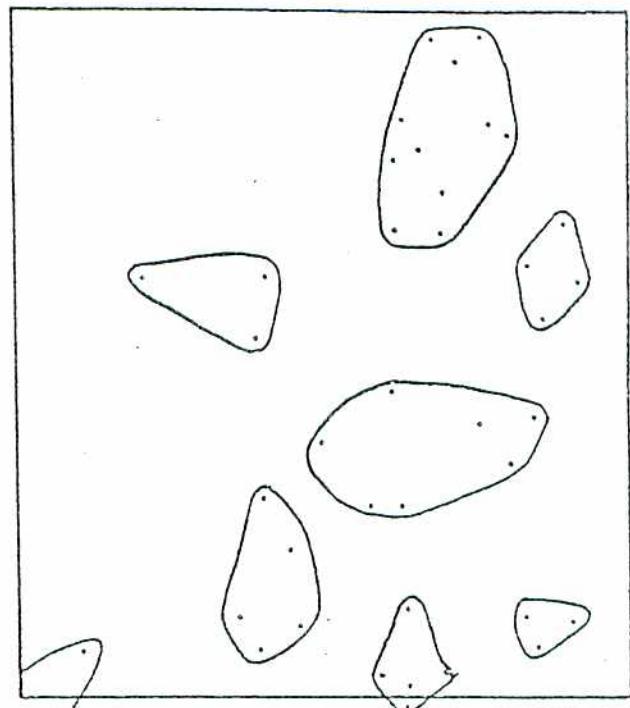
June 2-6

Figure 31. Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus) on experimental treatment plot 101-5, St. Pascal, Quebec

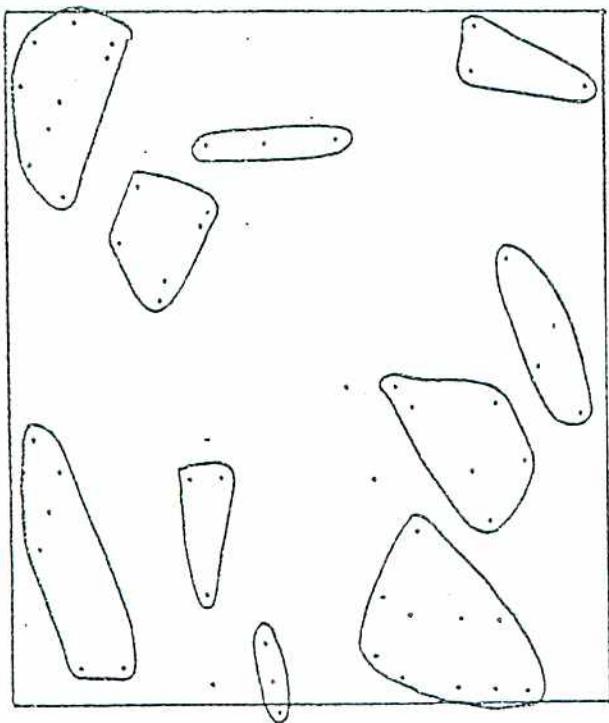
9 May - 6 June, 1978



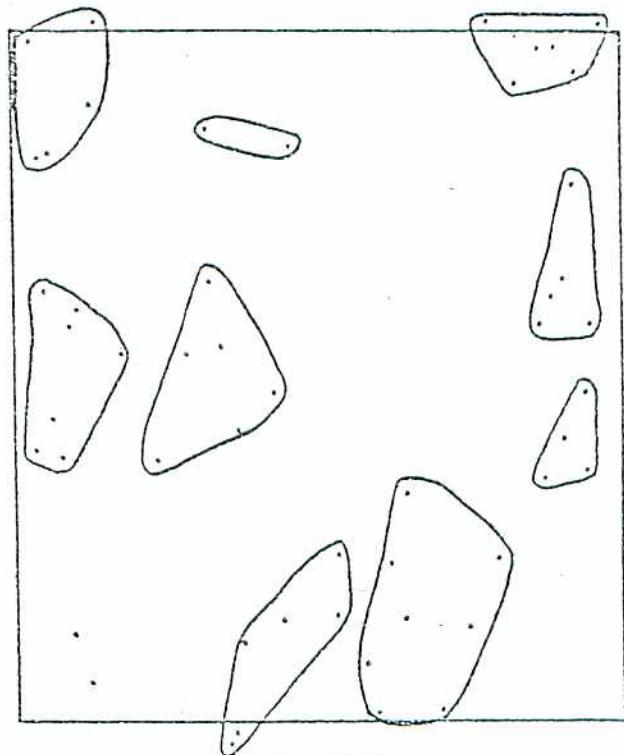
May 9-11



May 12-16



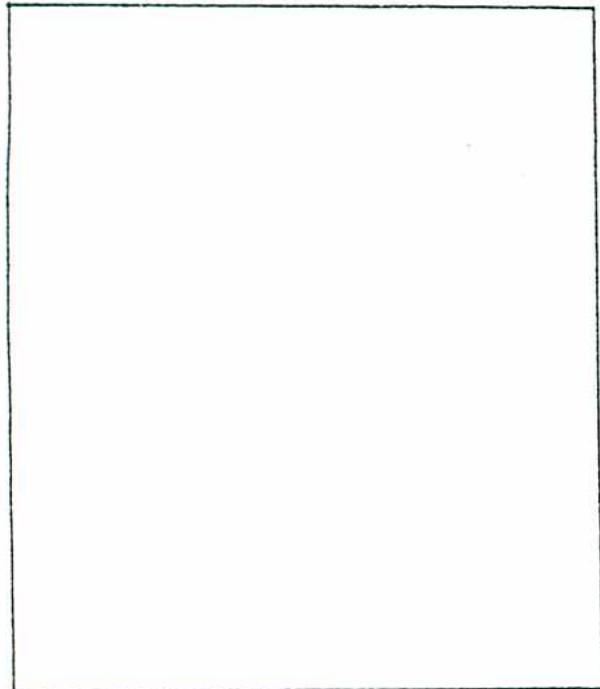
May 28-June 1



June 2-6

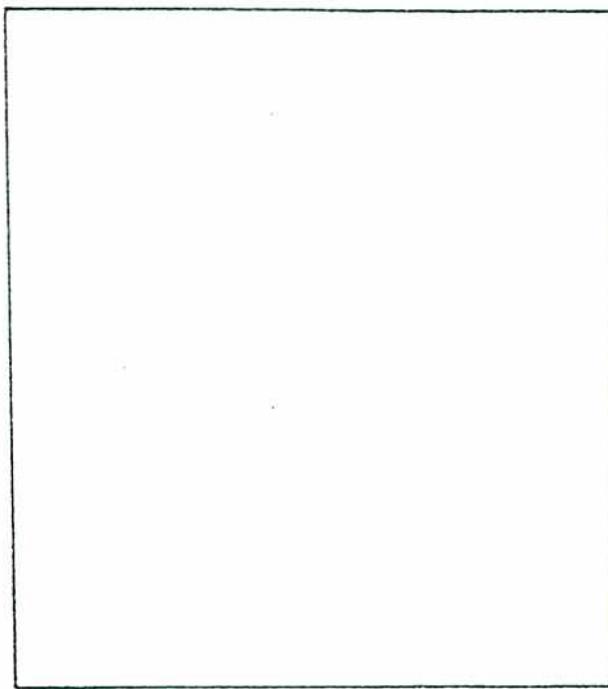
Figure 32. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin) on experimental treatment plot 101-5, St. Pascal, Quebec.

9 May - 6 June, 1978

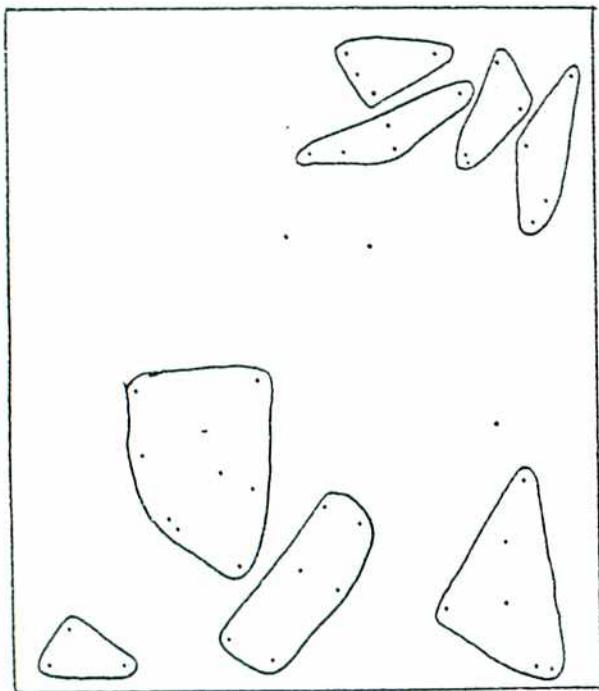


May 9-11

aminocarb 52 gm Al/ha

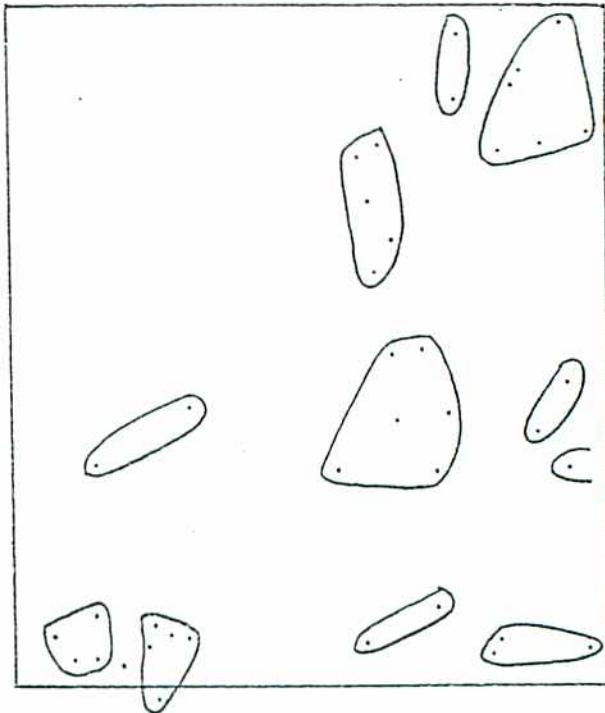


May 12-16



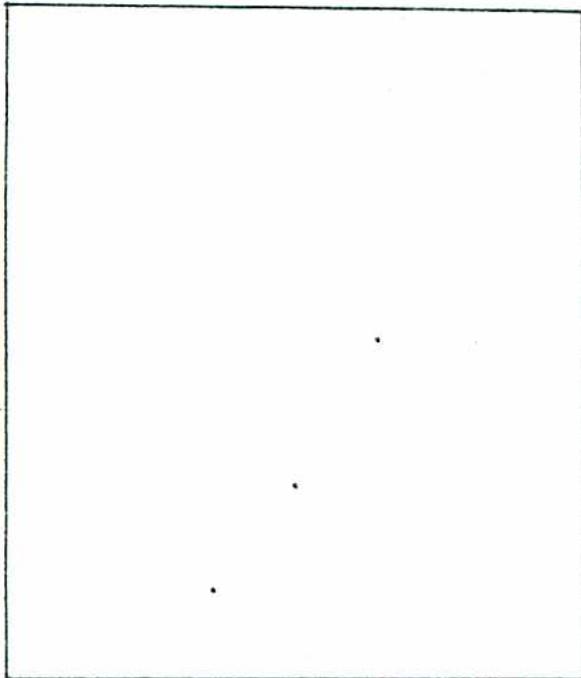
May 28 - June 1

aminocarb 52 gm Al/ha

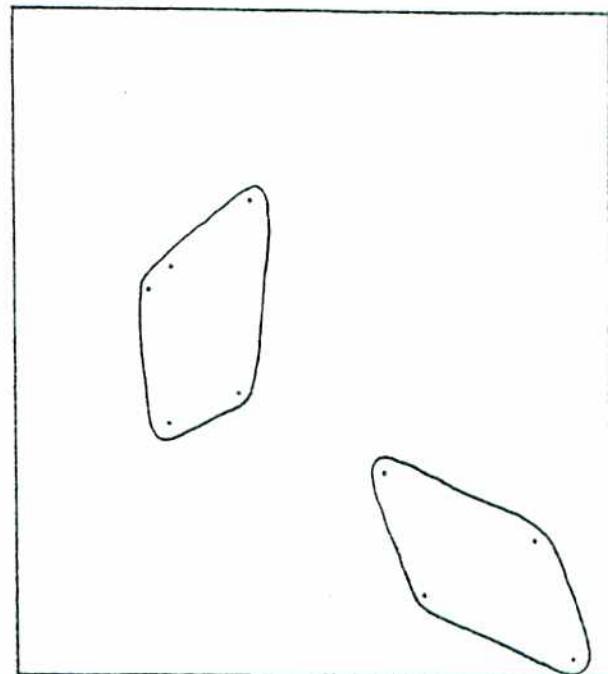


June 2-6

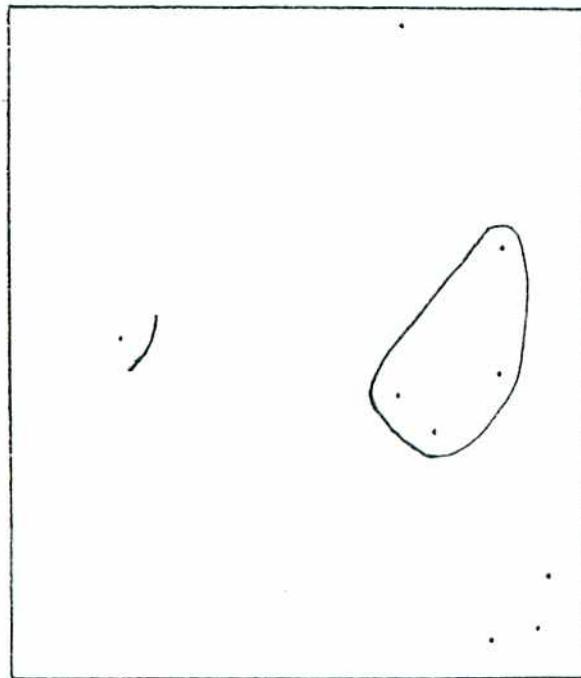
Figure 33. Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson), on experimental treatment block 101-6. St. Pascal, Quebec.
9 May - 6 June, 1978



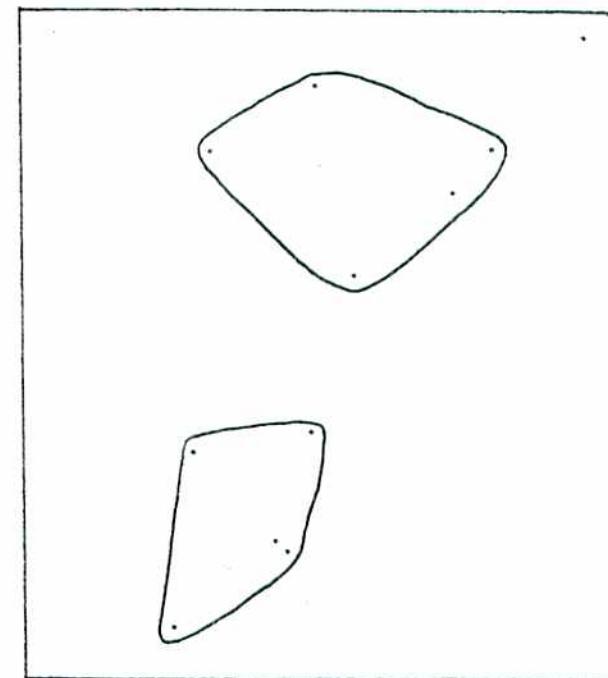
May 9-11



May 12-16

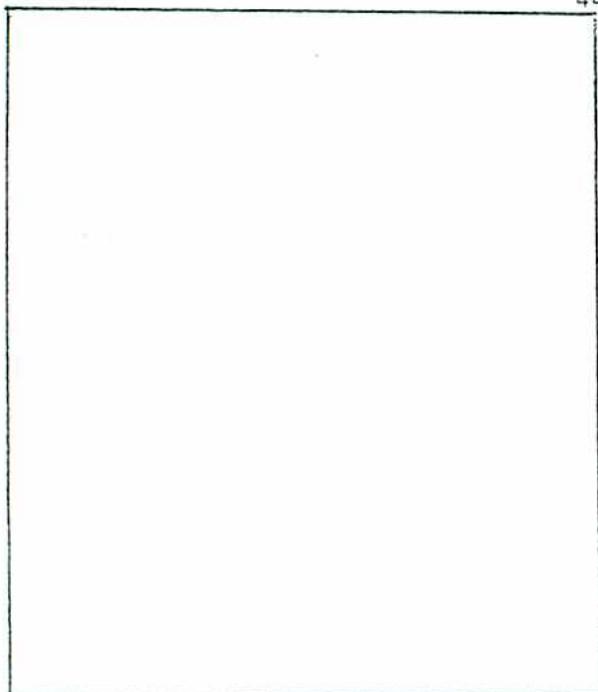


May 28-June 1



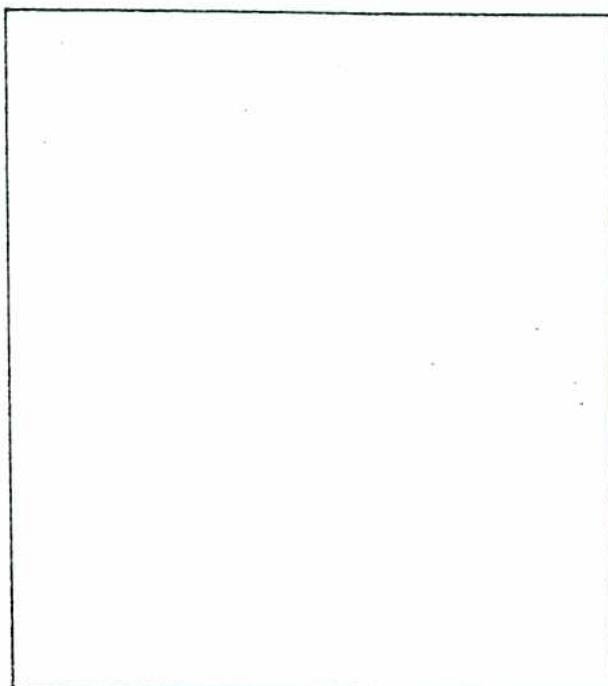
June 2-6

Figure 34. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus), on experimental treatment plot 101-6. St. Pascal, Quebec.
9 May - 6 June, 1978

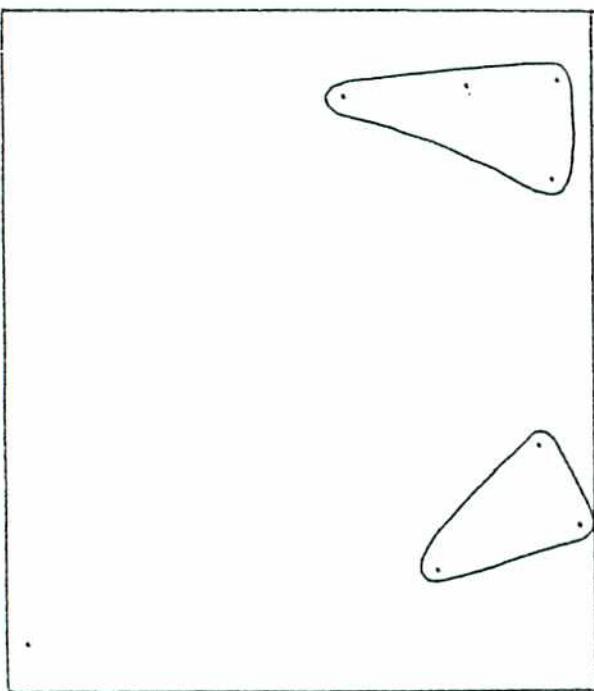


May 9-11

aminocarb 52 gm Al/ha

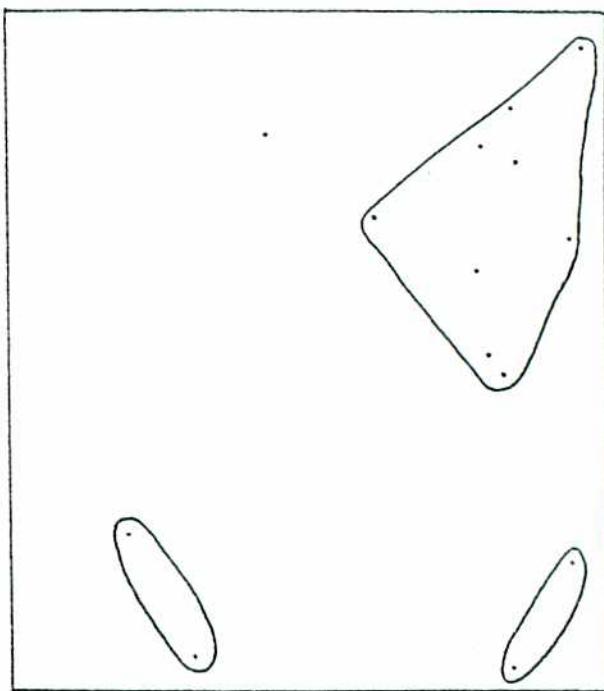


May 12-16



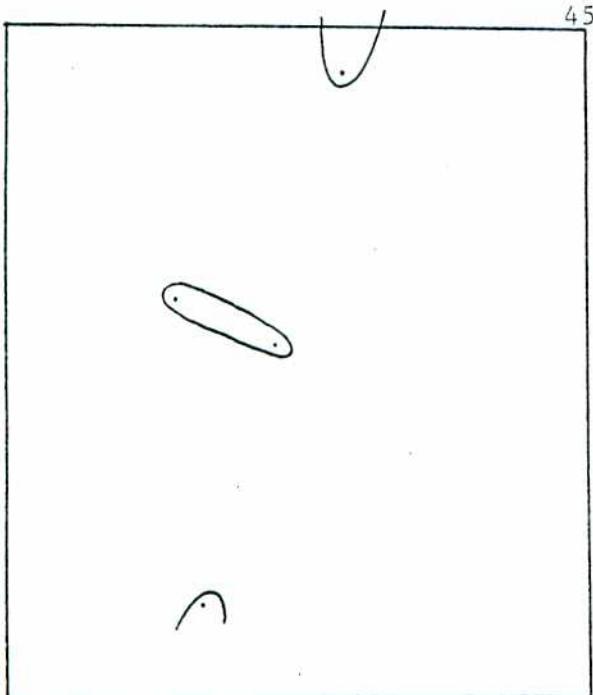
aminocarb 52 gm Al/ha

May 28 - June 1



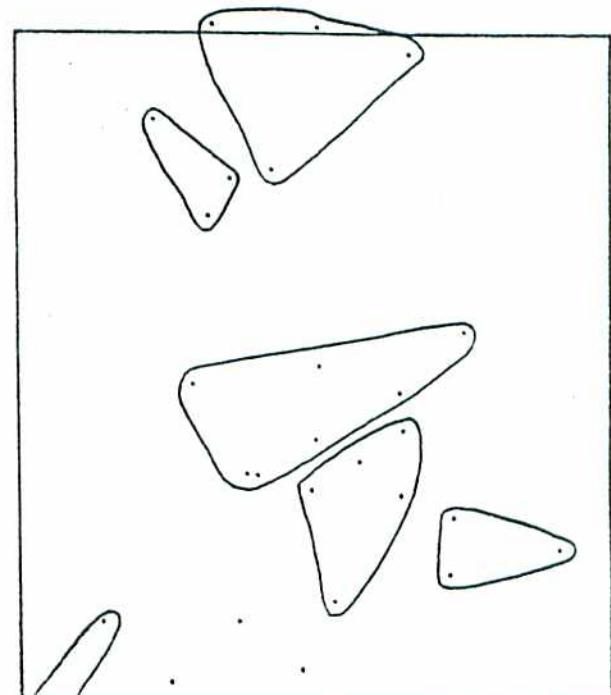
June 2-6

Figure 35. Nesting territories of the Swainson's thrush, *Hylocichla ustulata* (Nuttall), on experimental treatment plot 101-6. St. Pascal, Quebec.
9 May - 6 June, 1978



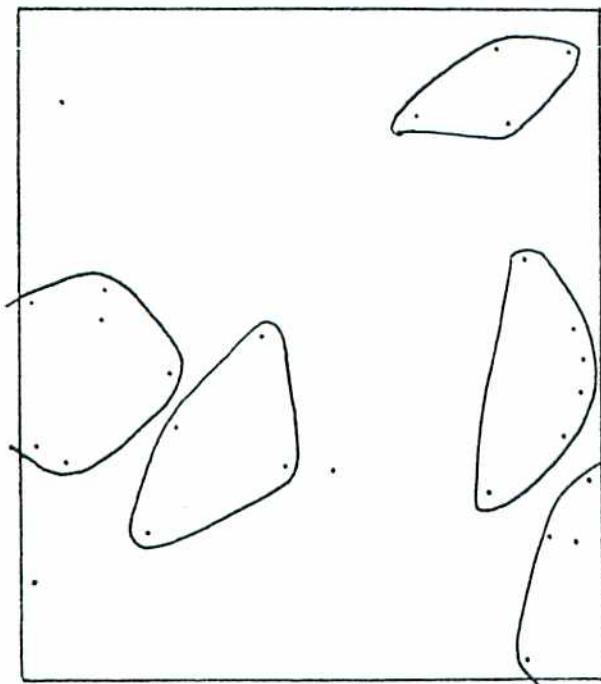
May 9-11

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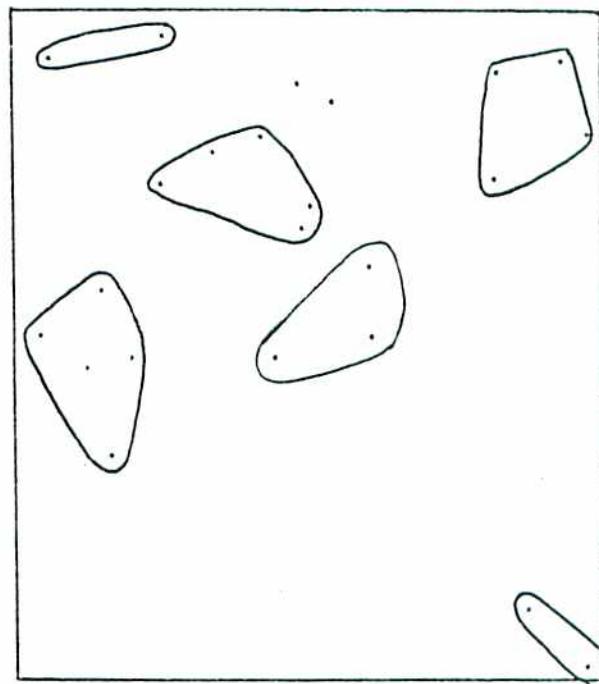
May 12-16

aminocarb
52 gm Al/ha



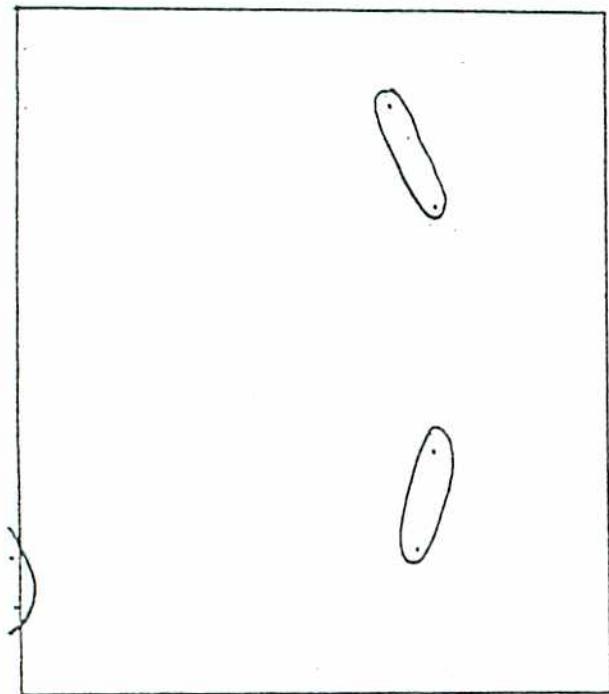
May 28 - June 1

aminocarb
52 gm Al/ha

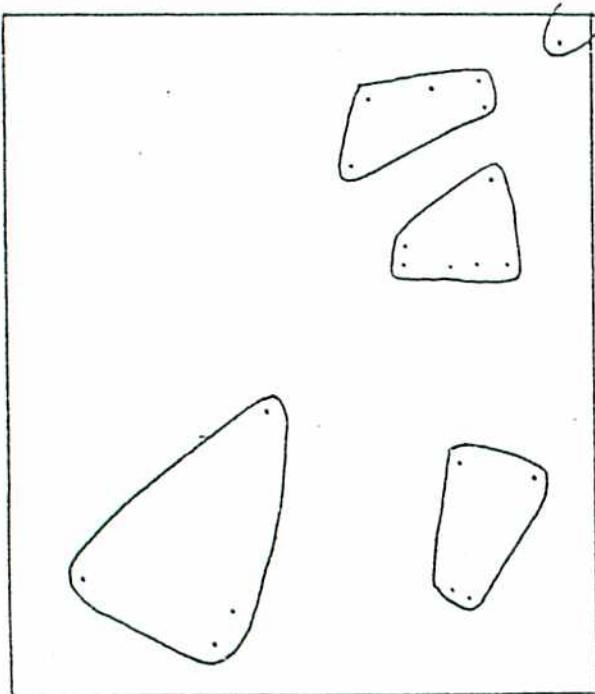


June 2-6

Figure 36. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin), on experimental treatment plot 101-6. St. Pascal, Quebec.
9 May - 6 June, 1978

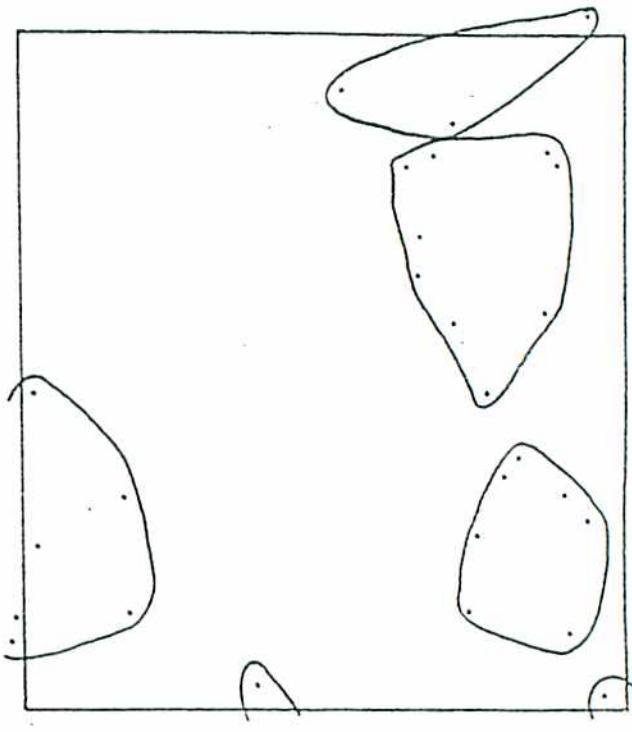


May 9-11



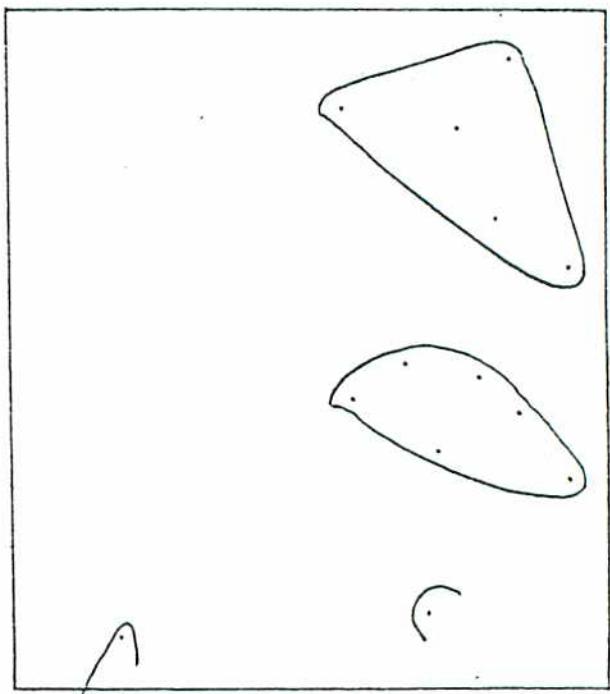
May 28 - June 1

aminocarb 52 gm Al/ha



May 12-16

aminocarb 52 gm Al/ha



June 2-6

Figure 37. Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus), on experimental treatment plot 101-6. St. Pascal, Quebec.
9 May - 6 June, 1978

Block 108. Block 108 received a single application of aminocarb on 2 June (peak 4th instar budworm treatment). Kromekote® cards placed in bird plots 108-7 and 108-8 indicate a deposit of 4.31 and 0.56 percent of the emitted material respectively. No foliage samples were analyzed from this block.

Bird populations had migrated into the experimental area and territories were being defended by resident species at the time of insecticide application. Warblers were again the most abundant group inhabitating the area followed by the sparrow-finch group and the thrushes (Tables 7-10).

No adverse effects of this application were experienced by the avian components of block 108.

Populations of warblers (family Parulidae) and finches (family Fringillidae) remained virtually the same or increased slightly (Tables 9 and 10). Territories for the most part remained occupied throughout the experimental period but some shifting resulted in a few territories lying on or near plot boundaries being relocated in adjoining areas. The 1-3 June weather is again reflected in somewhat reduced activity which returned to near normal by 4 June. Intensive plot searches again failed to identify any signs of pesticide stress amongst the bird community.

Table 7

Forest bird population census
Untreated control plot 1
St. Pascal, Quebec
28 May - 7 June, 1978

Family	Pre-spray treatment 2						Post-spray treatment 2					
	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 3	June 4	June 5	June 6	June 7	Daily avg.
	-5	-4	-3	-2	-1		+1	+2	+3	+4	+5	
Ardeidae	0	0	2	2	0	0.8	1	2	2	0	0	1.0
Acedinidae	0	0	0	1	0	0.2	0	0	0	0	0	0.0
Picidae	0	0	0	0	0	0.0	0	0	0	0	2	0.4
Tyrannidae	2	0	0	2	0	0.8	0	0	2	0	2	0.8
Corvidae	0	2	4	0	0	1.2	0	2	2	0	2	1.2
Paridae	0	0	0	0	0	0.0	0	0	4	0	0	0.8
Sittidae	4	2	0	0	0	1.2	0	0	2	0	0	0.4
Mimidae	0	2	0	0	0	0.4	0	2	2	2	2	1.6
Turdidae	7	6	4	13	6	7.2	4	9	9	4	7	6.6
Sylviidae	6	8	3	4	8	5.8	6	4	6	4	4	4.8
Vireonidae	2	6	0	0	0	1.6	0	0	0	2	0	0.4
Parulidae	52	62	27	42	37	44.0	31	46	36	46	36	39.0
Icteridae	22	23	9	15	19	17.6	13	15	10	17	17	14.4
Thraupidae	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Fringillidae	18	20	13	15	15	16.2	12	11	11	19	16	13.8
Total Birds	115	131	62	94	85	97.4	67	91	86	94	88	85.2

Table 8

Forest bird population census
Untreated control plot 2
St. Pascal, Quebec
28 May - 7 June, 1978

Family	Pre-spray treatment 2						Post-spray treatment 2					
	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 3	June 4	June 5	June 6	June 7	Daily avg.
	-5	-4	-3	-2	-1		+1	+2	+3	+4	+5	
Tetraonidae	2	0	2	2	0	1.2	0	3	0	0	0	0.6
Scolopacidae	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Picidae	0	0	0	2	0	0.4	0	0	0	0	0	0.0
Tyrannidae	4	4	4	4	0	3.2	2	4	10	2	4	4.4
Corvidae	0	0	4	0	0	0.8	0	2	2	0	0	0.8
Sittidae	4	0	0	0	0	0.8	0	0	2	0	0	0.4
Troglodytidae	0	0	2	2	0	0.8	0	0	0	0	0	0.0
Turdidae	8	6	2	2	0	3.6	6	2	9	11	6	6.8
Sylviidae	4	0	0	0	2	1.2	0	0	0	0	0	0.0
Vireonidae	2	2	0	2	0	1.2	2	4	2	6	2	3.2
Parulidae	63	57	28	34	6	37.6	12	28	24	26	24	22.8
Icteridae	6	4	0	0	0	2.0	0	0	3	0	0	0.6
Fringillidae	10	8	4	5	0	5.4	4	6	16	4	3	6.6
Total Birds	105	81	46	53	8	58.6	26	49	68	49	39	46.2

Table 9

Forest bird population census
 Experimental plot 108-7
 28 May - 7 June, 1978
 (aminocarb applied 2 June at the dosage rate of 52 gm Al/ha)

Family	Pre-spray treatment 2						Post-spray treatment 2					
	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 3	June 4	June 5	June 6	June 7	Daily avg.
	-5	-4	-3	-2	-1		+1	+2	+3	+4	+5	
Picidae	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Tyrannidae	0	0	0	0	0	0.0	0	2	2	2	2	1.6
Corvidae	0	0	2	1	0	0.6	0	4	0	3	2	1.8
Paridae	0	0	0	0	0	0.0	2	0	0	0	0	0.4
Turdidae	2	0	0	3	2	1.4	7	2	5	8	2	4.8
Sylviidae	0	0	0	0	0	0.0	0	2	0	0	0	0.4
Vireonidae	0	0	0	2	0	0.4	4	0	2	2	0	1.6
Parulidae	34	36	46	49	32	39.4	35	40	48	24	44	38.2
Icteridae	0	0	1	0	2	0.6	0	0	0	0	0	0.0
Fringillidae	8	12	19	19	21	15.8	9	23	19	20	12	16.6
Total Birds	46	48	68	74	57	58.6	57	73	76	59	62	65.4

Table 10

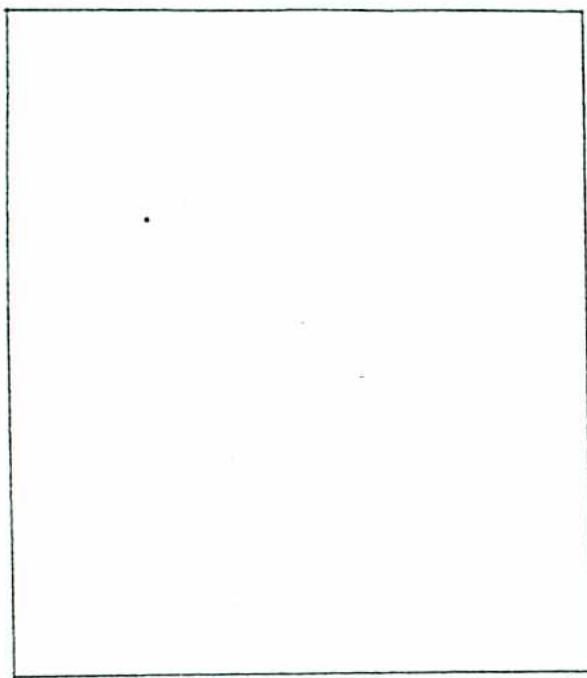
Forest bird population census
 Experimental plot 108-8
 St. Pascal, Quebec
 28 May - 7 June, 1978
 (aminocarb applied on 2 June at the rate of 52 gm Al/ha)

Family	Pre-spray treatment 2						Post-spray treatment 2					
	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 3	June 4	June 5	June 6	June 7	Daily avg.
	-5	-4	-3	-2	-1		+1	+2	+3	+4	+5	
Picidae	0	4	2	0	0	1.2	1	0	2	2	0	1.0
Tyrannidae	0	2	2	2	0	1.2	0	4	0	0	2	1.2
Hirundinidae	0	1	0	0	0	0.2	0	0	0	0	0	0.0
Corvidae	0	3	0	0	0	0.6	0	2	0	2	0	0.8
Paridae	0	0	2	0	0	0.4	0	2	0	2	0	0.8
Turdidae	4	4	2	1	0	2.2	0	3	0	6	2	2.2
Sylviidae	2	0	0	0	0	0.4	2	0	0	0	2	0.8
Vireonidae	0	2	0	0	0	0.4	0	2	0	0	2	0.8
Parulidae	30	28	22	32	22	26.8	34	38	36	36	36	36.0
Icteridae	0	0	0	0	0	0.0	0	1	0	0	0	0.2
Fringillidae	12	8	15	13	4	10.4	12	6	8	14	6	9.2
Unidentified Birds	2	0	0	0	0	0.4	2	1	1	2	0	1.2
Total Birds	50	52	45	48	26	44.2	51	59	47	64	50	54.2

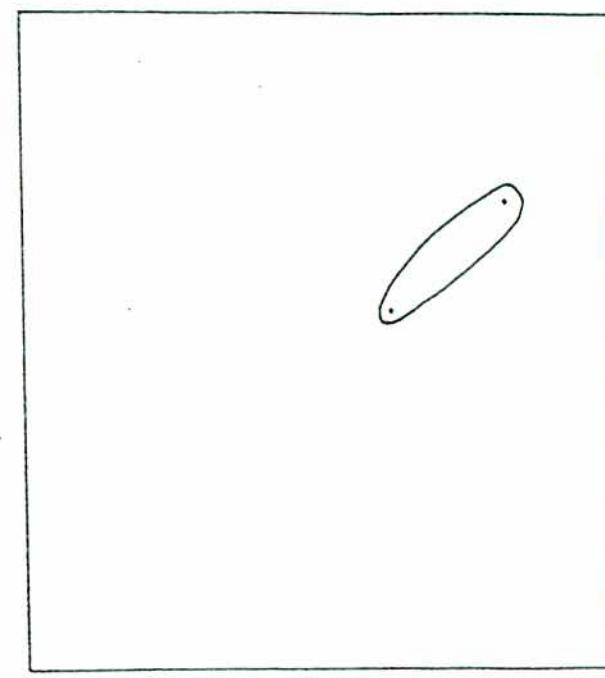
May 28-June 2

52

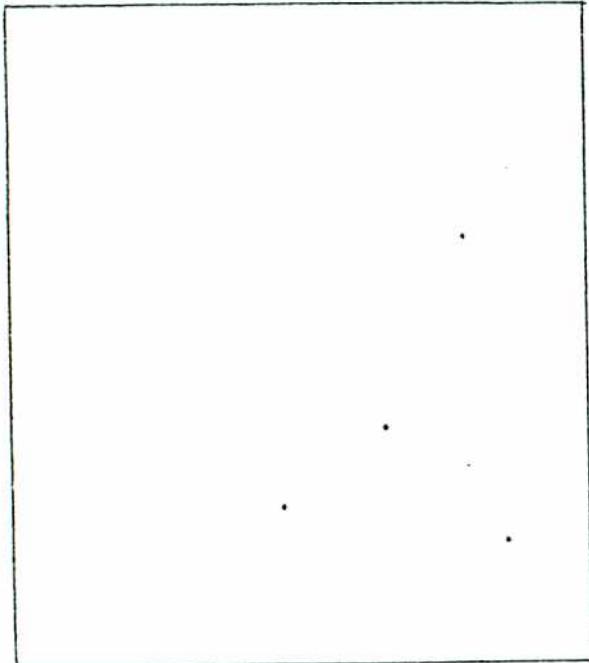
control 1



June 3-7



control 2



52 gm Al/ha
aminocarb

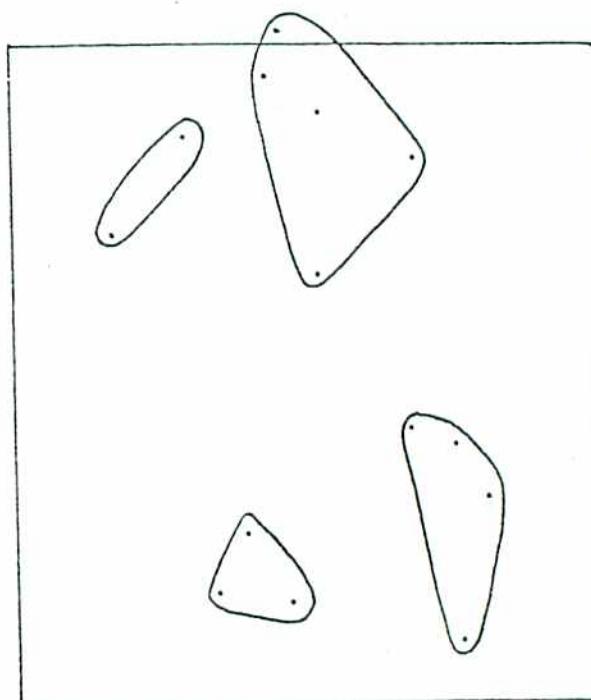


Figure 38. Nesting territories of the Swainson's thrush, *Hylocichla ustulata* (Nuttall) on untreated control plots 1 and 2, St. Pascal, Quebec.

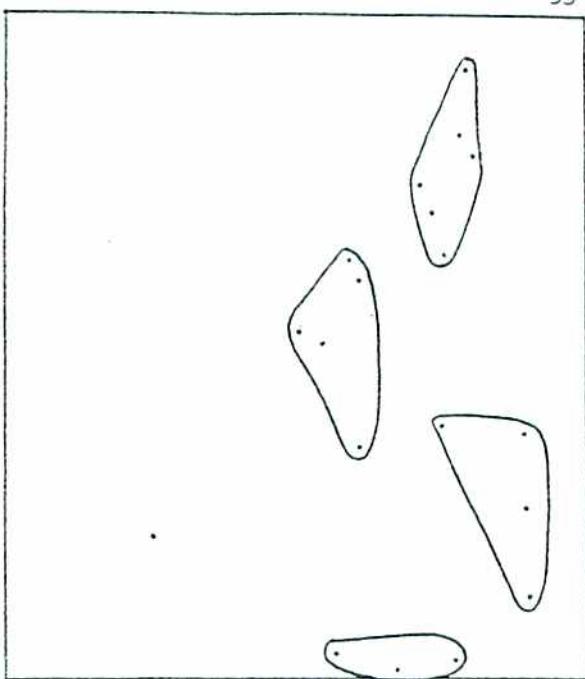
28 May - 7 June, 1978

May 28-June 2

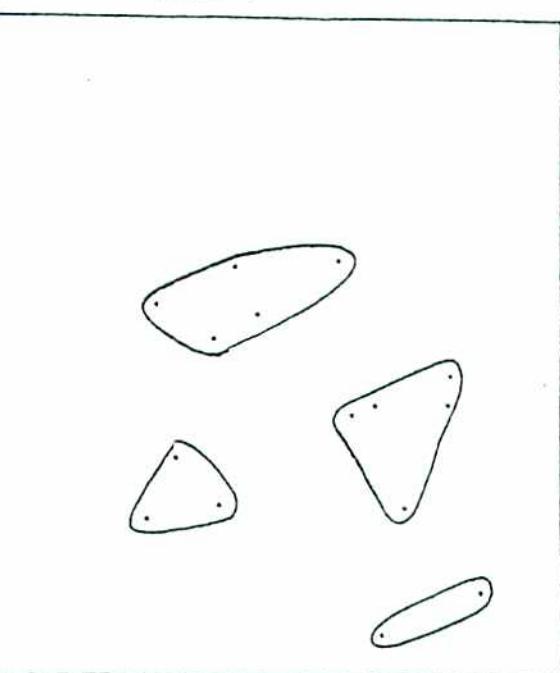
53

June 3-7

control 1



5.2 gm Al/ha



a minocarb

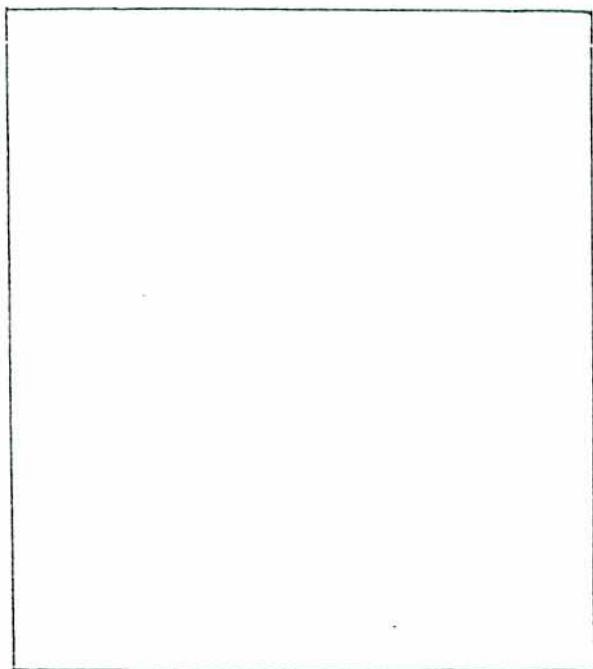
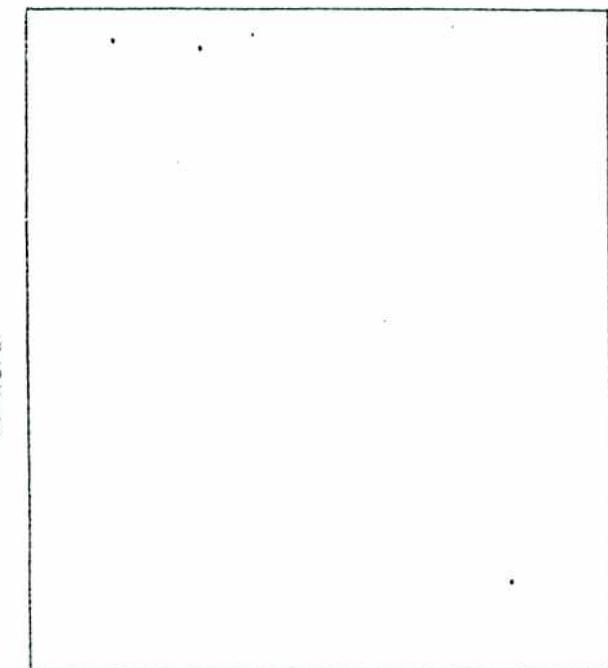


Figure 39. Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus) on untreated control plots 1 and 2, St. Pascal, Quebec.

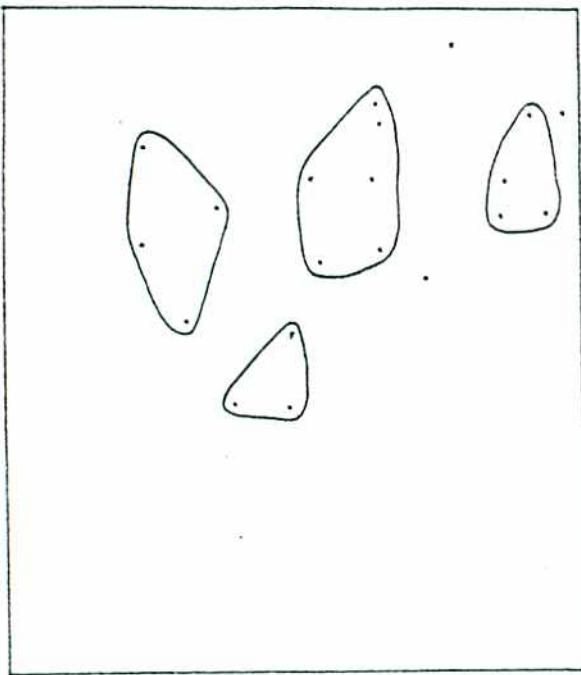
28 May - 7 June, 1978

May 28 - June 2

54

June 3 - 7

control 1



5.2 gm Al/ha

aminocarb

control 2

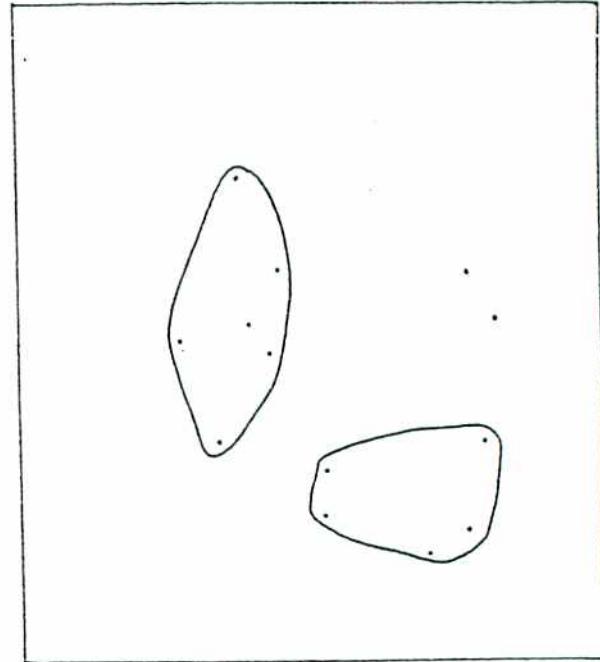
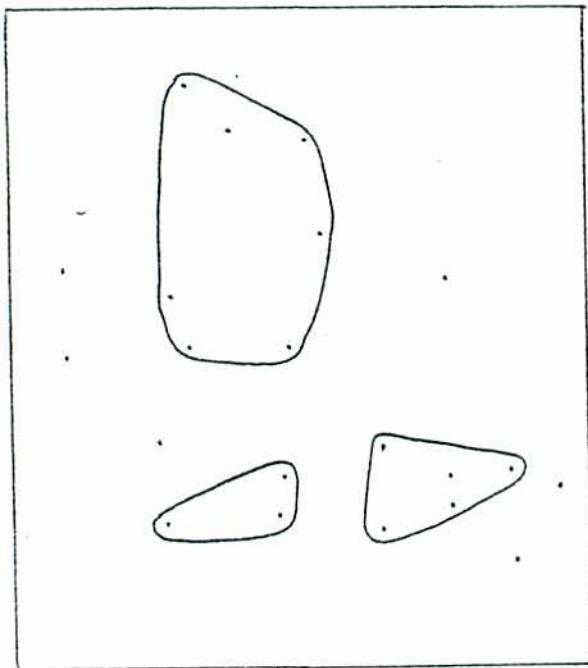


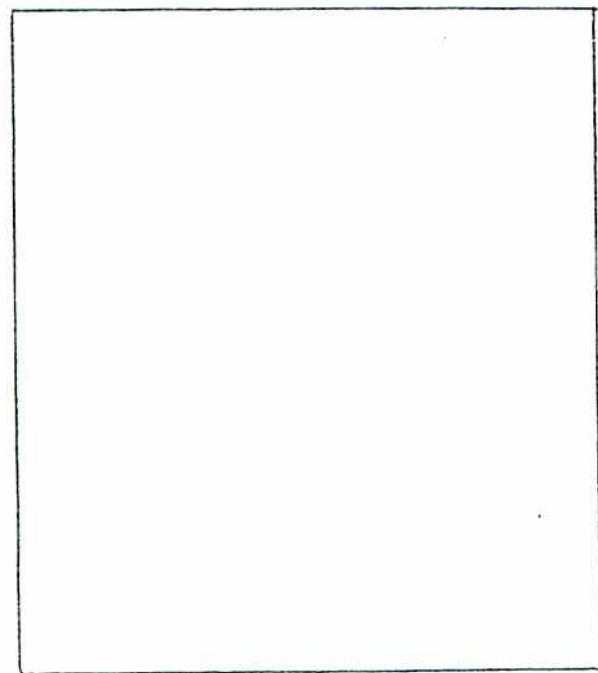
Figure 40. Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson) on untreated control plots 1 and 2, St. Pascal, Quebec.

28 May - 7 June, 1978

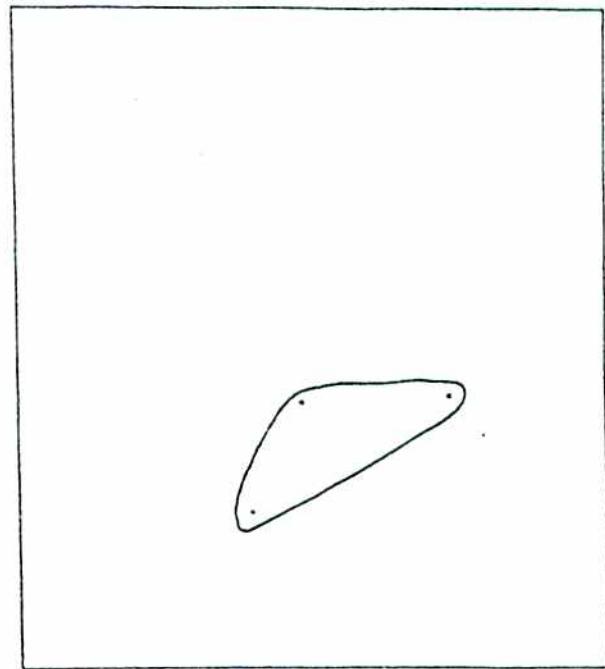
May 28-June 2

55

control 1



June 3-7



control 2

52 gm Al/ha

aminocarb

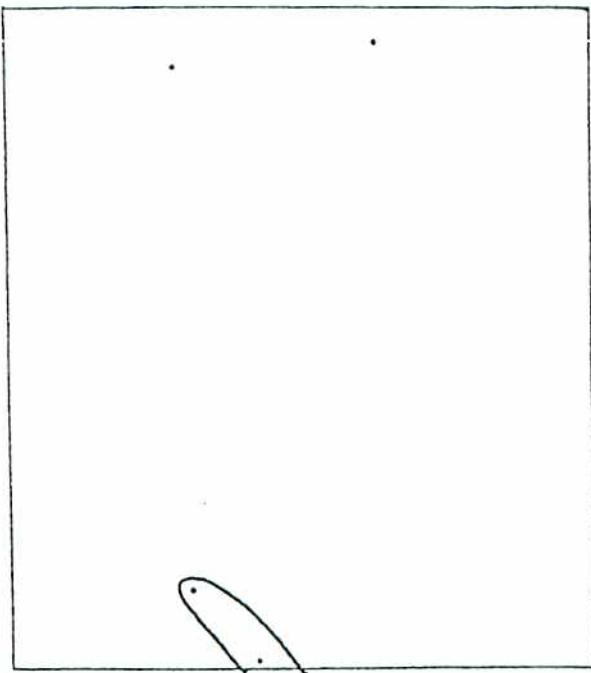
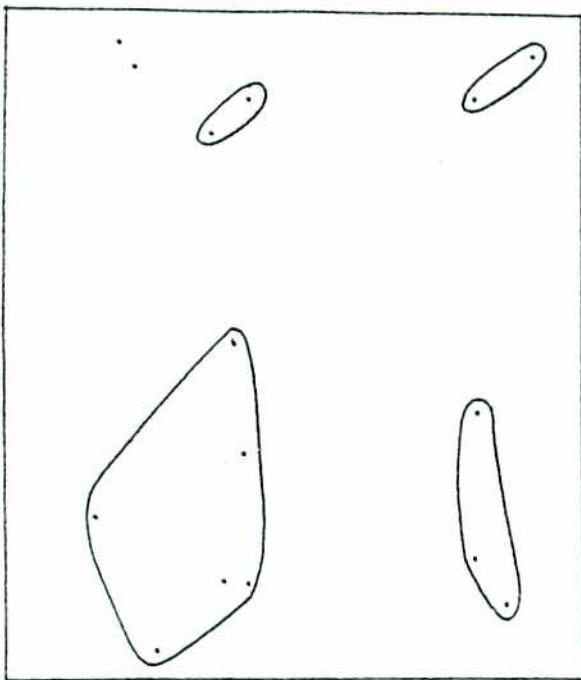


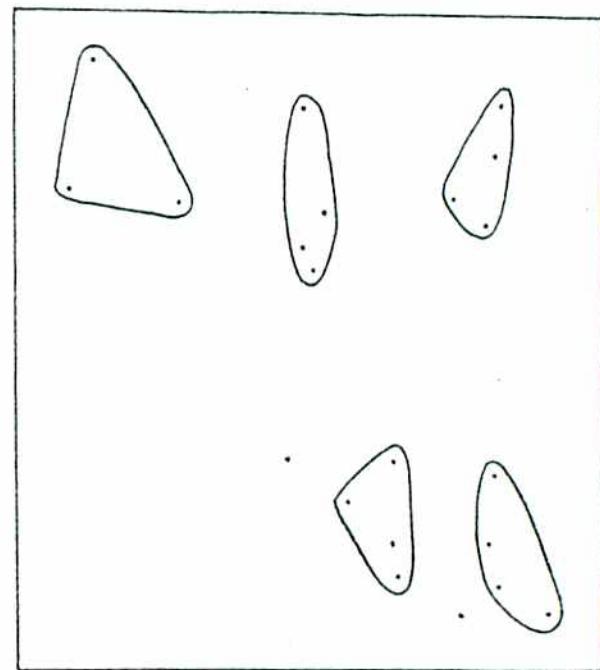
Figure 41. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus) on untreated control plots 1 and 2, St. Pascal, Quebec.
28 May - 7 June, 1978

May 28-June 2

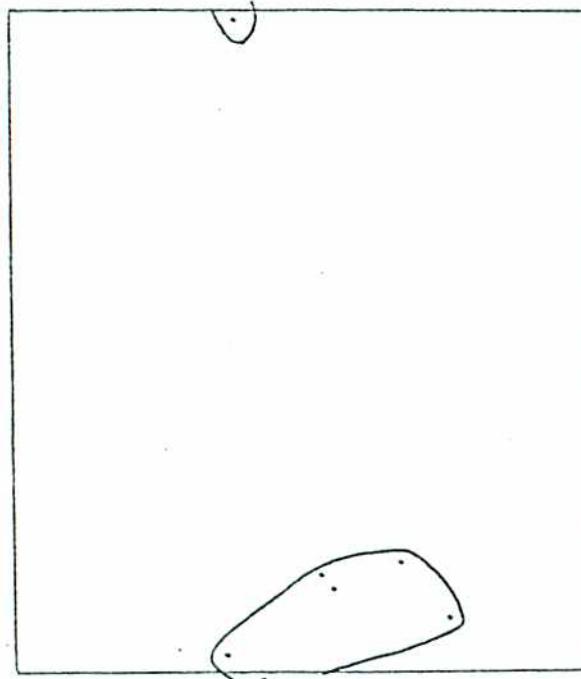
control 1



June 3-7



control 2



aminocarb

5.2 gm Al/ha

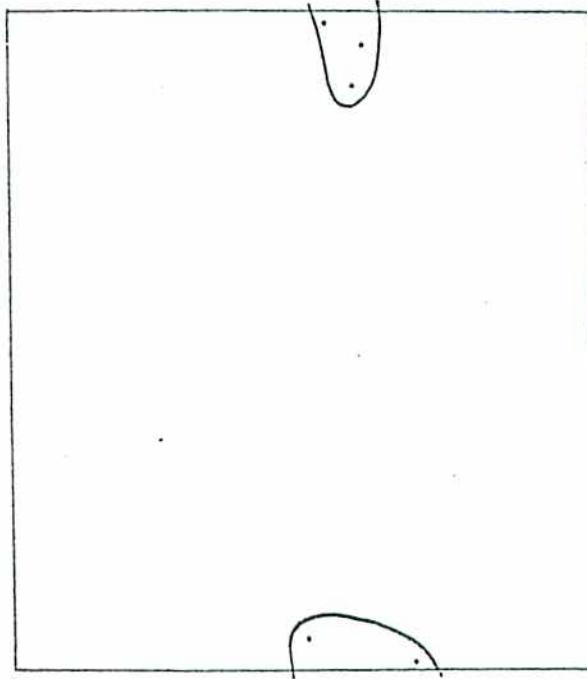


Figure 42. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin) on untreated control plot 1 and 2, St. Pascal, Quebec.

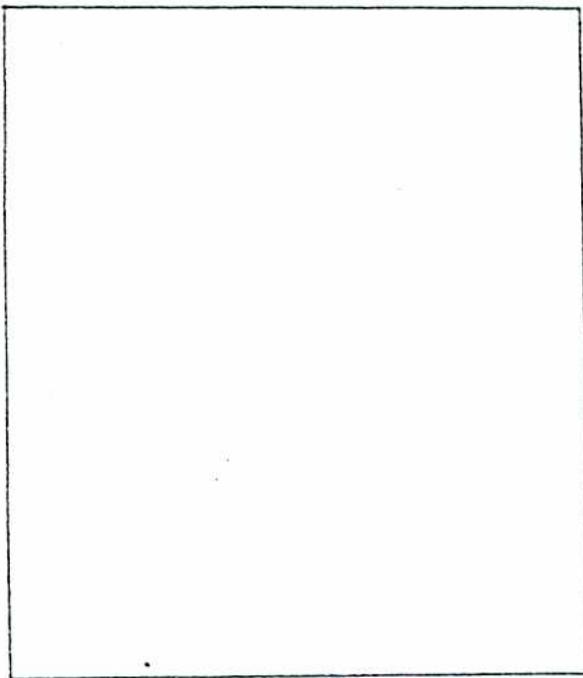
28 May - 7 June, 1978

May 28-June 2

57

June 3-7

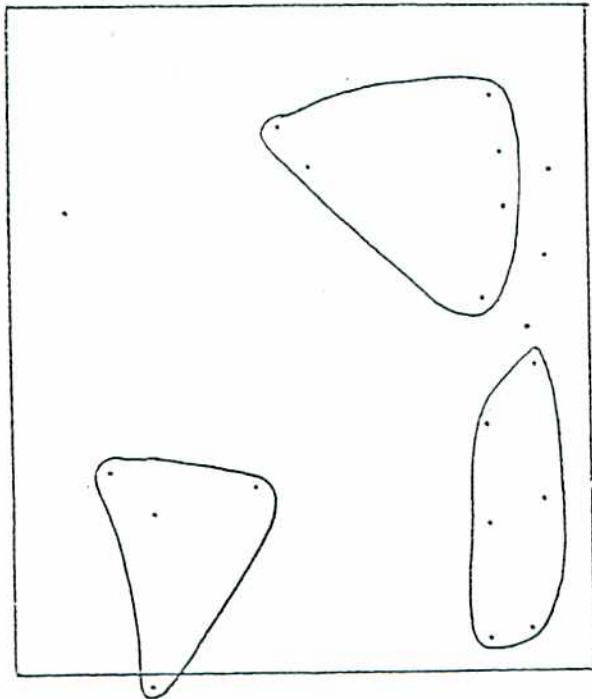
plot 7



52 gm Al/ha



plot 8



a minocarb

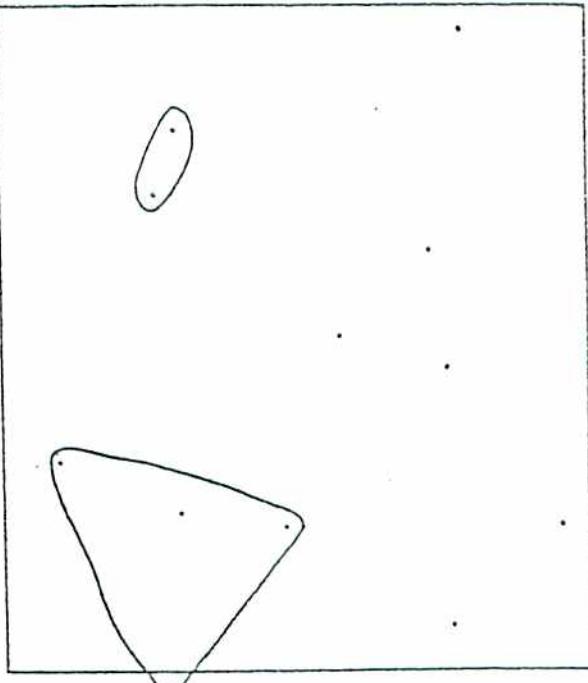


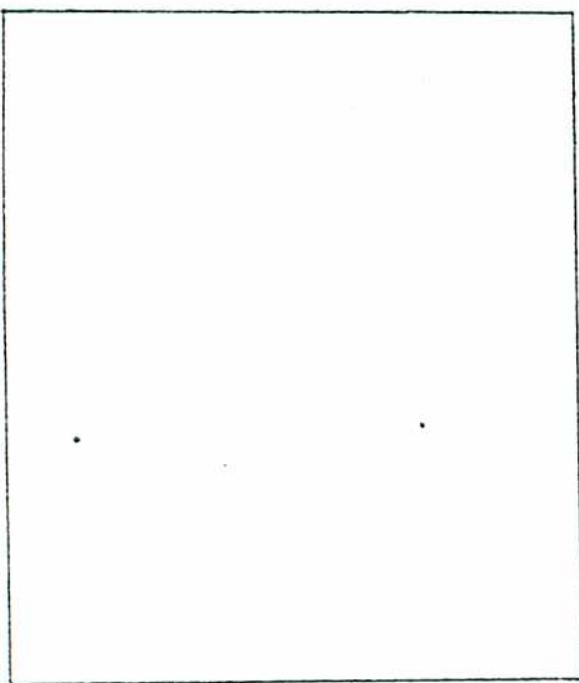
Figure 43. Nesting territories of the Swainson's thrush, *Hylocichla ustulata* (Nuttall) on experimental treatment plots 108-7 and 108-8, St. Pascal, Quebec.
28 May - 7 June, 1978

May 28 - June 2

58

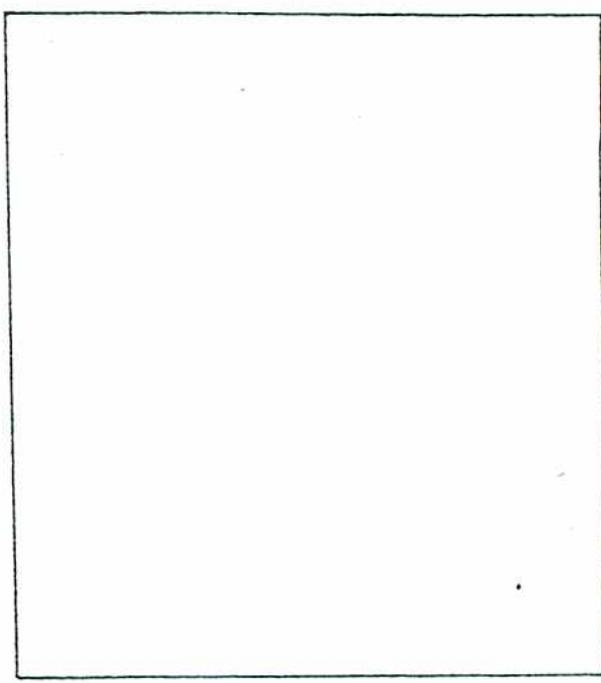
June 3 - 7

plot 7



52 gm Al/ha

aminocarb



plot 8

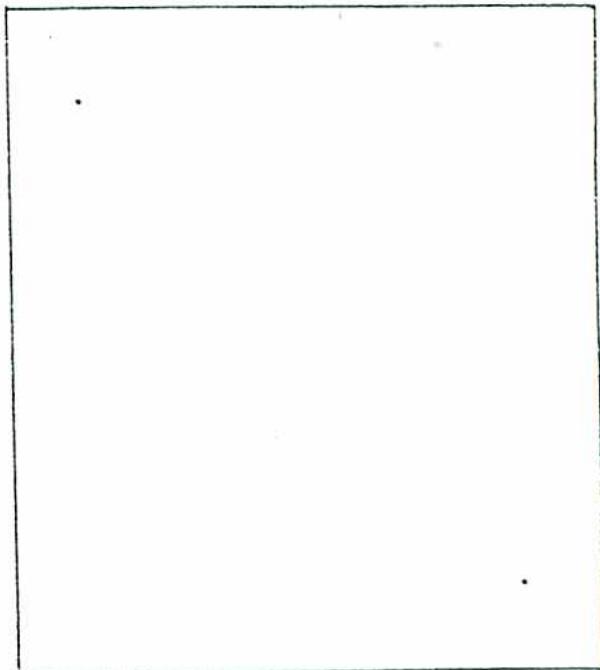
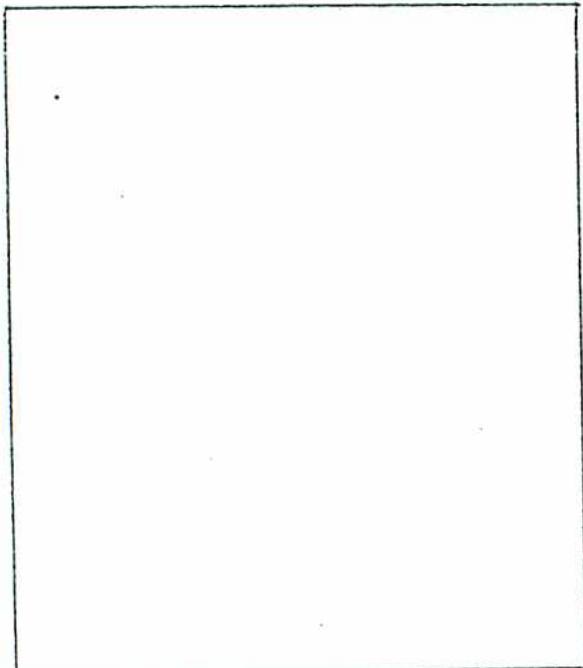


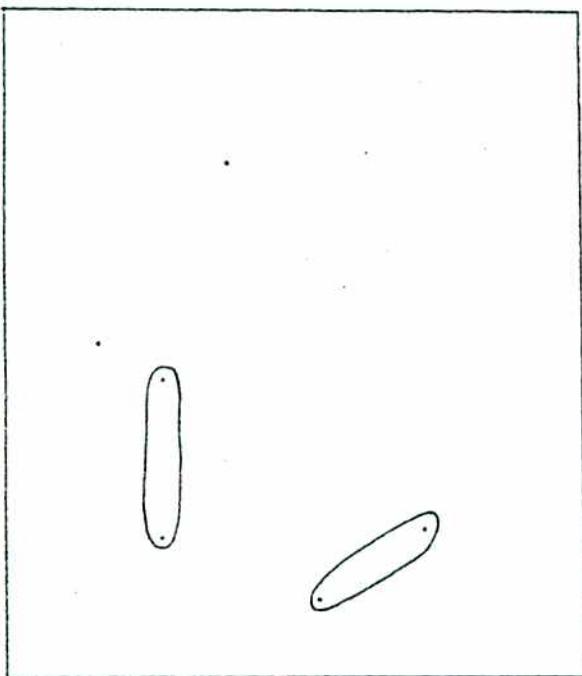
Figure 44. Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus) on experimental treatment plots 108-7 and 108-8, St. Pascal, Quebec.
28 May - 7 June. 1978

May 28 - June 2

59

June 3 - 7

plot 7



52 gm Al/ha

aminocarb



plot 8

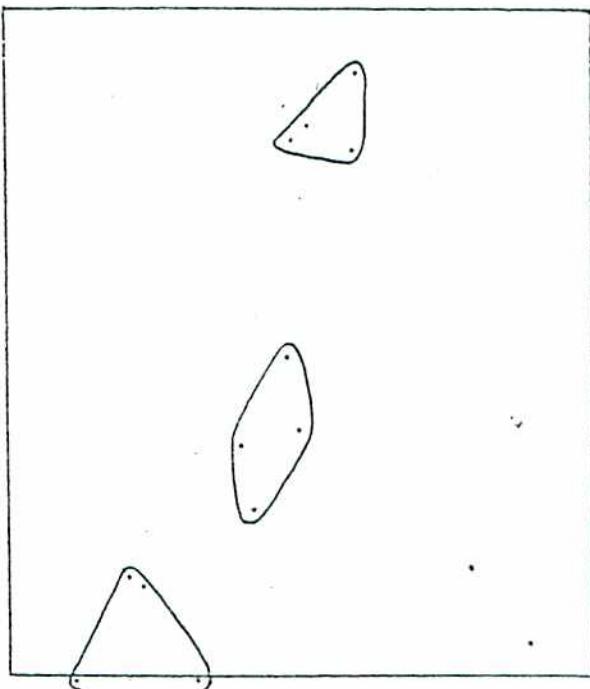
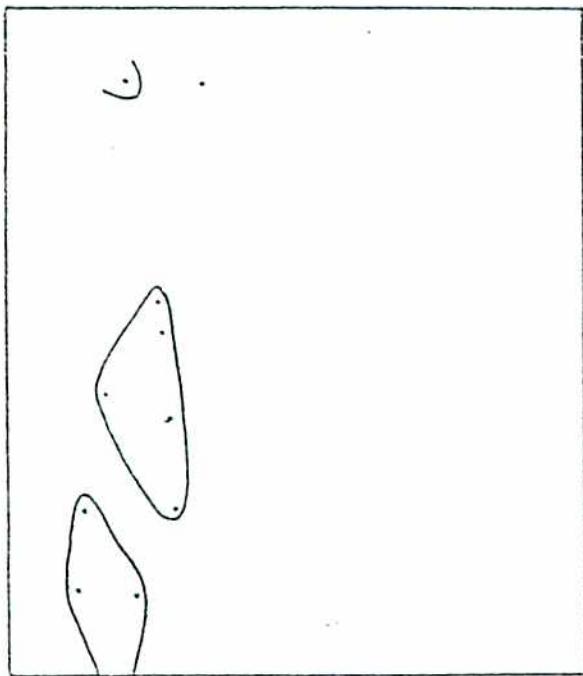


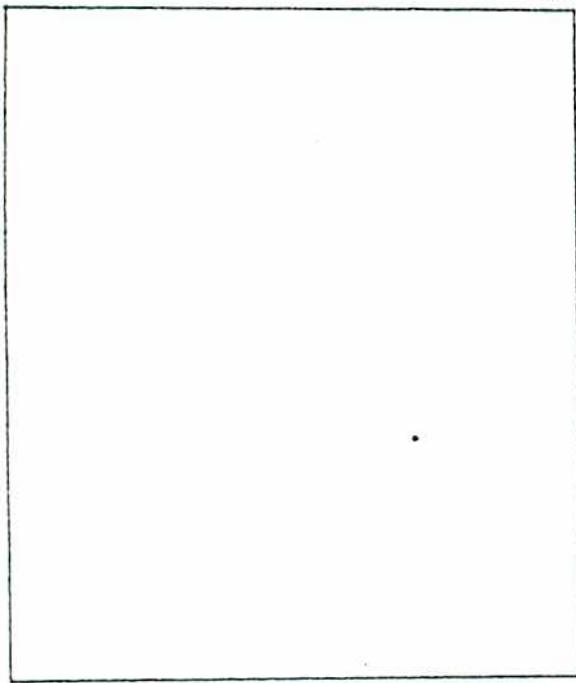
Figure 45. Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson) on experimental treatment plots 108-7 and 108-8, St. Pascal, Quebec.
28 May - 7 June, 1978

May 28-June 2

60

June 3-7

plot 7



5.2 gm Al/ha

a minocarb

plot 8

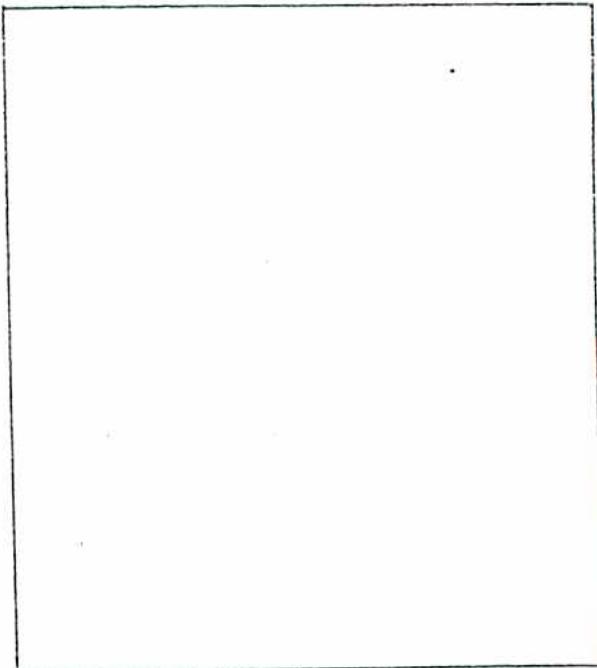
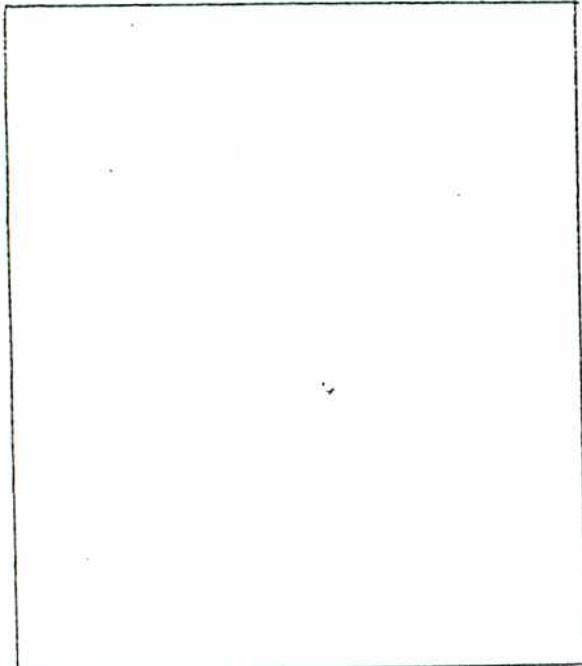


Figure 46. Nesting territories of the dark eyed junco, *Junco hyemalis* (Linnaeus) on experimental treatment plots 108-7 and 108-8, St. Pascal, Quebec.
28 May - 7 June, 1978

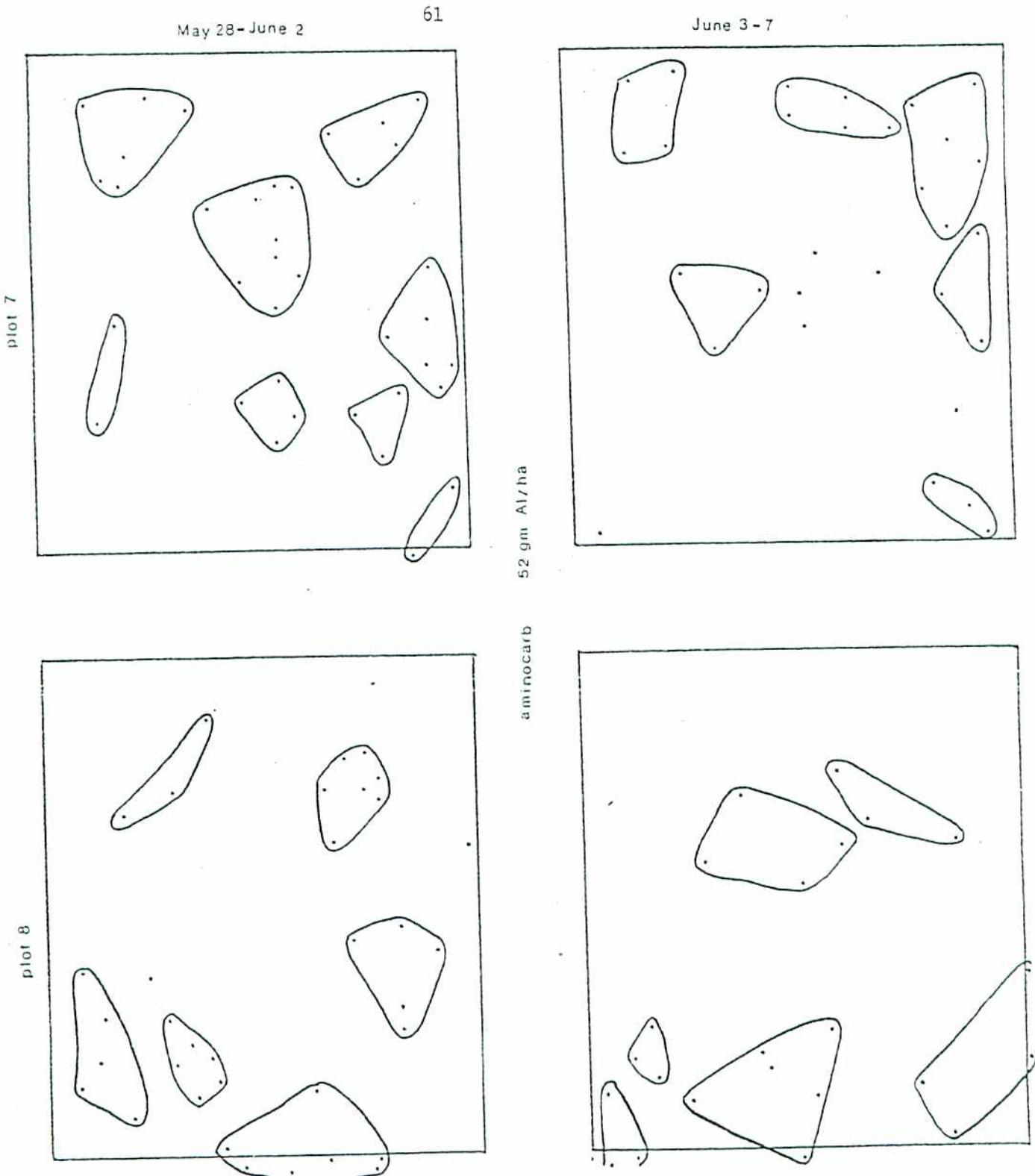


Figure 47. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin) on experimental treatment plots 108-7 and 108-8, St. Pascal, Quebec.
28 May - 7 June, 1978

Block 109. Block 109 received two applications of aminocarb on 2 June and 10 June to assess efficacy to later instar budworm larvae. Kromekote® card assessment indicated a deposit of 6.04 and 0.11 percent of emitted material on plots 109-9 and 109-10 respectively for the 2 June treatment and 1.80 and 0.23 percent respectively for the 10 June application. No foliage analysis is available for these later experiments.

The bird community of block 109 was very similar in structure to those on blocks 101 and 108 (Table 11-14). Territories had been established and were being actively defended by singing males prior to the two experimental treatments being applied. No deleterious effects to bird populations were recorded following either treatment. Intensive plot searches failed to recover any bird mortality and no observations were made of birds exhibiting any symptoms of pesticide stress. Adverse weather conditions (Appendix Table XV) caused reductions in activity on 1-3, 8-13 and 14 June.

Nesting territories of Swainson thrushes (Figures 48 and 49), ruby-crowned kinglets (Figures 50 and 51), bay-breasted warblers (Figures 52 and 53), dark-eyed juncos (Figures 54 and 55) and white-throated sparrows (Figures 56 and 57) remained occupied throughout the experimental period. Some territories lying along plot boundaries occasionally disappeared into areas outside the plot.

Table 11

Forest bird population census
Untreated control plot 1
St. Pascal, Quebec
28 May - 15 June, 1978

Family	Pre-spray treatment 2						Post-spray treatment 2						Post-spray treatment 3					
	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 3	June 4	June 5	June 6	June 8	Daily avg.	June 11	June 12	June 13	June 14	June 15	Daily avg.
	-5	-4	-3	-2	-1		+1	+2	+3	+4	+6		+1	+2	+3	+4	+5	
Ardeidae	0	0	2	2	0	0.8	1	2	2	0	2	1.4	0	1	0	0	2	0.6
Alcedinidae	0	0	0	1	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	2	0	0	2	0	0.8	0	0	2	0	0	0.4	0	0	4	2	2	1.6
Corvidae	0	2	4	0	0	1.2	0	2	2	0	1	1.0	1	2	1	0	0	0.8
Paridae	0	0	0	0	0	0.0	0	0	4	0	0	0.8	0	0	0	0	0	0.0
Sittidae	4	2	0	0	0	1.2	0	0	2	0	0	0.4	2	0	2	2	2	1.6
Mimidae	0	2	0	0	0	0.4	0	2	2	2	0	1.2	0	2	2	2	2	1.6
Turdidae	7	6	4	13	6	7.2	4	9	9	4	5	6.2	4	2	7	5	7	5.0
Sylviidae	6	8	3	4	8	5.8	6	4	6	4	2	4.4	0	2	2	2	2	1.6
Bombycillidae	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	2	1	0	2	1.0
Vireonidae	2	6	0	0	0	1.6	0	0	0	2	0	0.4	0	0	0	0	0	0.0
Parulidae	52	62	27	42	37	44.0	31	46	36	46	26	37.0	24	26	36	12	28	25.2
Icteridae	22	23	9	15	19	17.6	13	15	10	17	16	14.2	14	19	18	19	17	17.4
Thraupidae	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Fringillidae	18	20	13	15	15	16.2	12	11	11	19	4	11.4	6	5	10	10	8	7.8
Total Birds	115	131	62	94	85	97.4	67	91	86	94	56	78.8	51	61	83	52	70	63.4

Table 12

Forest bird population census
 Untreated control plot 2
 St. Pascal, Quebec
 28 May - 7 June, 1978

Family	Pre-spray treatment 2						Post-spray treatment 2						Post-spray treatment 3					
	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 3	June 4	June 5	June 6	June 8	Daily avg.	June 11	June 12	June 13	June 14	June 15	Daily avg.
	-5	-4	-3	-2	-1		+1	+2	+3	+4	+6		+1	+2	+3	+4	+5	
Tetraonidae	2	0	2	2	0	1.2	0	3	0	0	0	0.6	0	0	0	0	0	0.0
Scolopacidae	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Picidae	0	0	0	2	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	4	4	4	4	0	3.2	2	4	10	2	4	4.4	2	2	4	4	2	2.8
Corvidae	0	0	4	0	0	0.8	0	2	2	0	0	0.8	0	0	0	1	0	0.2
Sittidae	4	0	0	0	0	0.8	0	0	2	0	0	0.4	0	0	0	0	0	0.0
Troglodytidae	0	0	2	2	0	0.8	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Turdidae	8	6	2	2	0	3.6	6	2	9	11	7	7.0	4	6	8	9	2	5.8
Sylviidae	4	0	0	0	2	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Vireonidae	2	2	0	2	0	1.2	2	4	2	6	2	3.2	2	2	4	4	4	3.2
Parulidae	63	57	28	34	6	37.6	12	28	24	26	22	22.4	18	10	28	14	22	18.4
Icteridae	6	4	0	0	0	2.0	0	0	3	0	0	0.6	0	0	0	2	0	0.4
Fringillidae	8	6	2	2	0	3.6	2	6	11	2	2	4.6	4	0	4	0	4	2.4
Unidentified Birds	0	0	0	1	0	0.2	2	0	2	2	0	1.2	1	0	0	0	0	0.2
Total Birds	103	79	44	51	8	57.0	26	49	65	49	37	45.2	31	20	48	34	34	33.4

9

Table 13

Forest bird population census
 Experimental plot 109-9
 St. Pascal, Quebec
 28 May - 15 June, 1978
 (aminocarb applied 2 June and 10 June at the rate of 52 gm Al/ha)

Family	Pre-spray treatment 2										Post-spray treatment 2										Post-spray treatment 3									
	May					June					June					June					June									
	28	29	30	31	1	Daily avg.	3	4	5	6	8	Daily avg.	11	12	13	14	15	Daily avg.	11	12	13	14	15	Daily avg.						
Picidae	0	1	0	2	0	0.6	0	2	3	1	0	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0						
Tyrannidae	0	0	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	4	0	2.0	0	0	0	0	0	0						
Corvidae	1	1	1	0	1	0.8	2	1	0	1	0	0.8	1	0	1	1	2	1.0	0	0	0	0	0	0						
Paridae	0	0	1	1	0	0.4	0	0	1	1	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0						
Sittidae	0	0	0	2	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0						
Troglodytidae	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4	0	0	0	0	0	0						
Turdidae	9	8	10	3	0	6.0	9	6	6	9	7	7.4	3	0	2	6	8	3.8	0	0	0	0	0	0						
Sylviidae	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0						
Vireonidae	0	0	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0						
Parulidae	54	50	34	50	30	43.6	54	58	46	48	30	47.2	62	26	52	24	34	39.6	0	0	0	0	0	0						
Icteriidae	0	0	0	1	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0						
Fringillidae	10	14	10	8	4	9.2	9	8	9	7	8	8.2	16	7	4	12	8	9.4	0	0	0	0	0	0						
Total Birds	74	74	56	66	35	61.2	74	75	65	67	45	65.2	86	35	63	49	52	57.0	0	0	0	0	0	0						

Table 14

Forest bird population census
 Experimental plot 109-10
 St. Pascal, Quebec
 28 May - 15 June, 1978
 (aminocarb applied on 2 June and 10 June at the rate of 52 gm Al/ha)

Family	Pre-spray treatment 1						Post-spray treatment 2						Post-spray treatment 3					
	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 3	June 4	June 5	June 6	June 8	Daily avg.	June 11	June 12	June 13	June 14	June 15	Daily avg.
	-5	-4	-3	-2	-1		+1	+2	+3	+4	+5		+1	+2	+3	+4	+5	
Tetraonidae	4	2	0	0	2	1.6	5	2	0	2	0	1.8	2	0	0	0	0	0.4
Picidae	2	2	0	0	2	1.2	0	1	0	0	0	0.2	0	0	0	0	0	0.0
Tyrannidae	0	0	0	4	0	0.8	2	6	6	10	2	5.2	4	2	8	2	2	3.6
Corvidae	0	1	1	0	0	0.4	1	2	3	8	0	2.8	2	0	7	2	2	2.6
Paridae	6	6	0	0	0	2.4	0	0	0	0	0	0.0	0	0	2	2	0	0.8
Sittidae	0	0	0	0	0	0.0	0	0	2	2	0	0.8	2	0	0	0	0	0.4
Troglodytidae	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0.0
Turdidae	4	4	5	8	2	4.6	4	1	12	6	13	7.2	6	8	15	8	6	8.6
Sylviidae	0	0	0	2	0	0.4	0	2	0	0	0	0.4	2	0	2	0	0	0.8
Vireonidae	0	0	0	2	0	0.4	0	4	0	0	0	0.8	4	2	4	2	2	2.8
Parulidae	37	30	28	50	20	33.0	20	37	29	36	30	30.4	42	12	58	26	26	32.8
Icteridae	2	0	2	2	2	1.6	1	4	2	0	1	1.6	0	0	0	0	0	0.0
Fringillidae	14	16	4	12	9	11.0	9	11	11	16	5	10.4	10	2	16	6	16	10.0
Total Birds	69	61	40	80	37	57.4	42	72	65	80	51	62.0	74	26	112	57	48	62.8

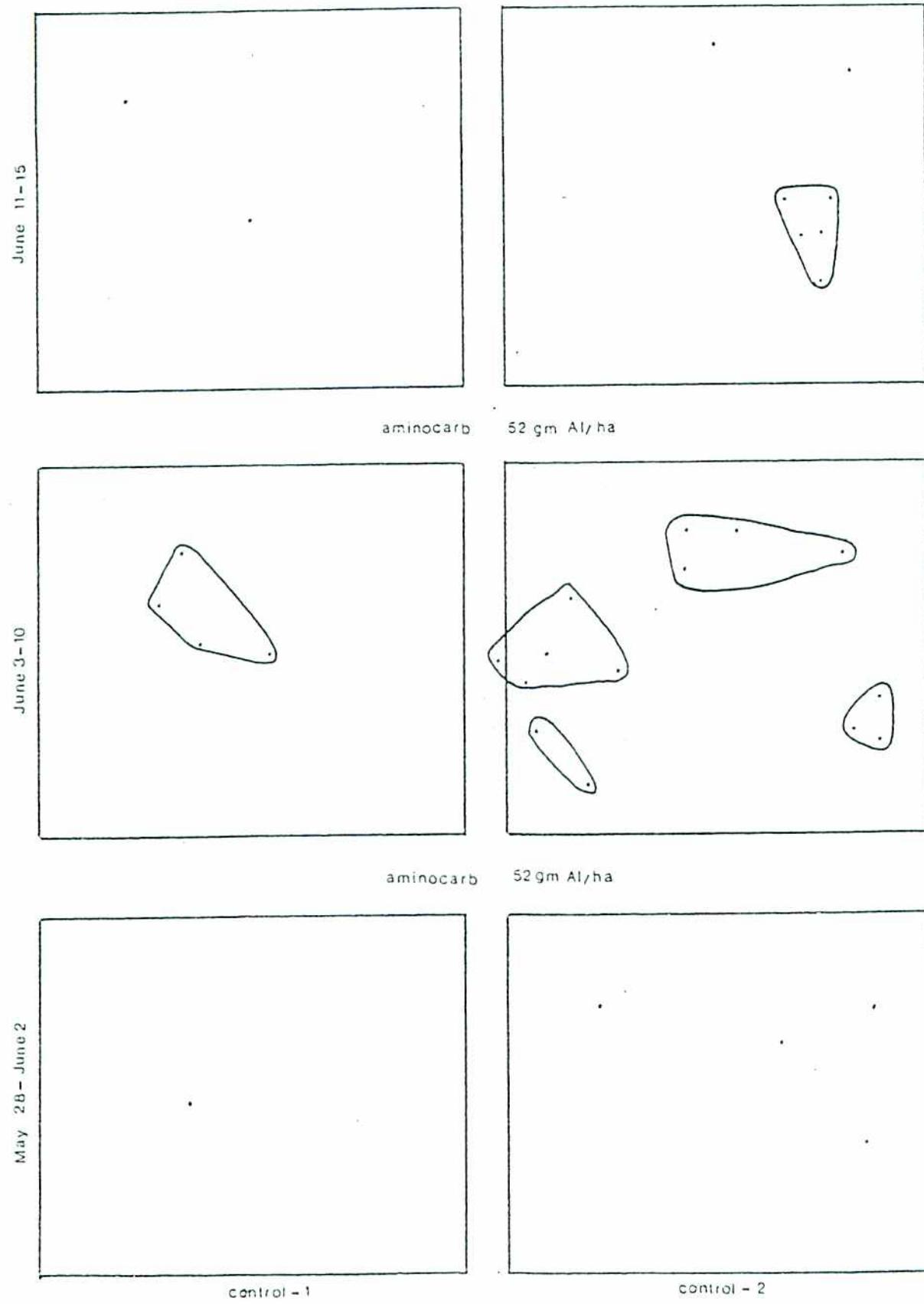
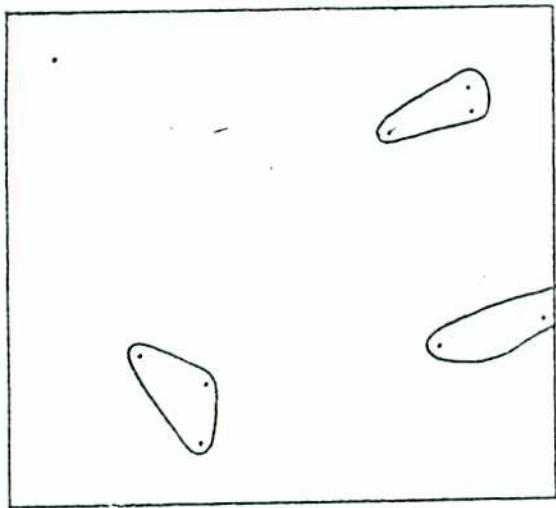


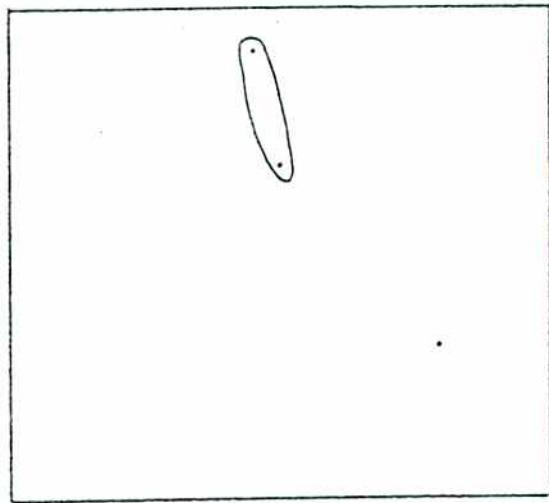
Figure 48. Nesting territories of the Swainson's thrush, *Hylocichla ustulata* (Nuttall), on untreated control plots 1 and 2. St. Pascal, Quebec.

28 May - 15 June, 1978

June 11-15

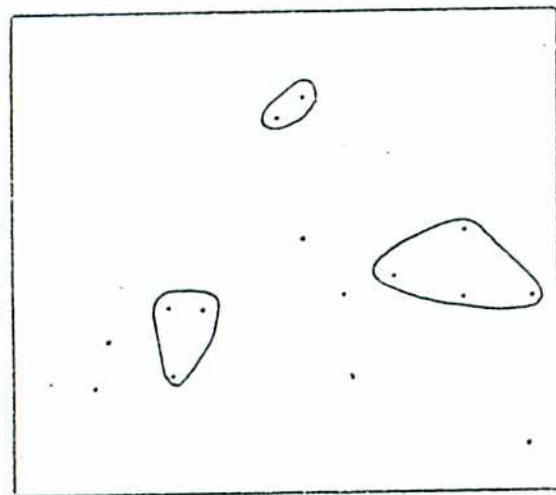


aminocarb

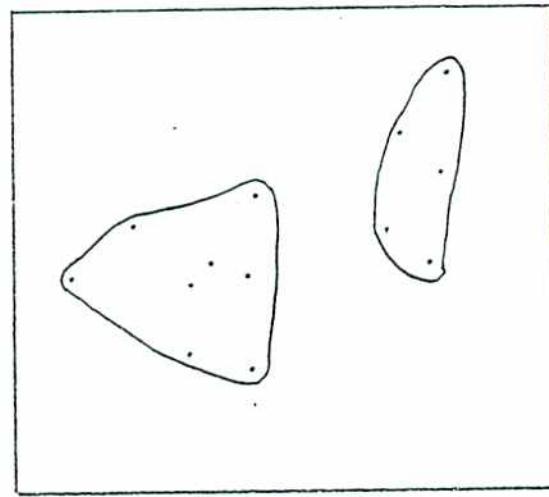


52 gm Al/ha

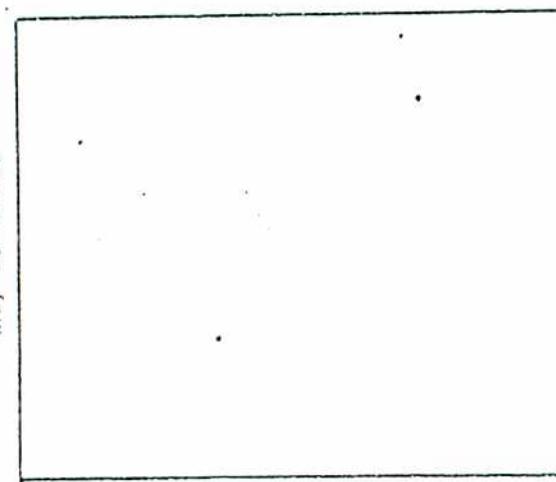
June 3-10



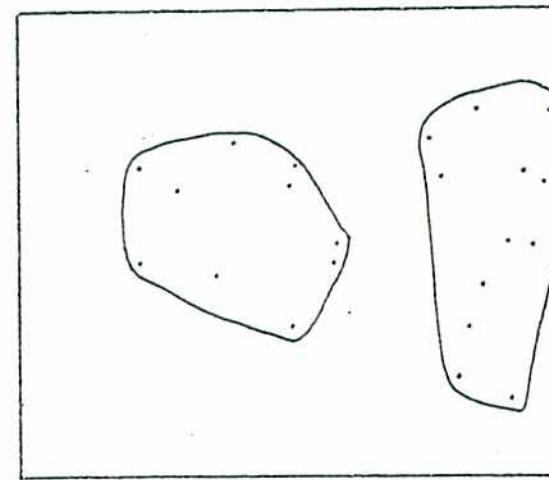
aminocarb 52 gm Al/ha



May 28 - June 2



plot 10



plot 9

Figure 49. Nesting territories of the Swainson's thrush, *Ilyocichla ustulata* (Nuttall), on treated plots 109-9 and 109-10. St. Pascal, Quebec.
28 May - 11 June, 1978

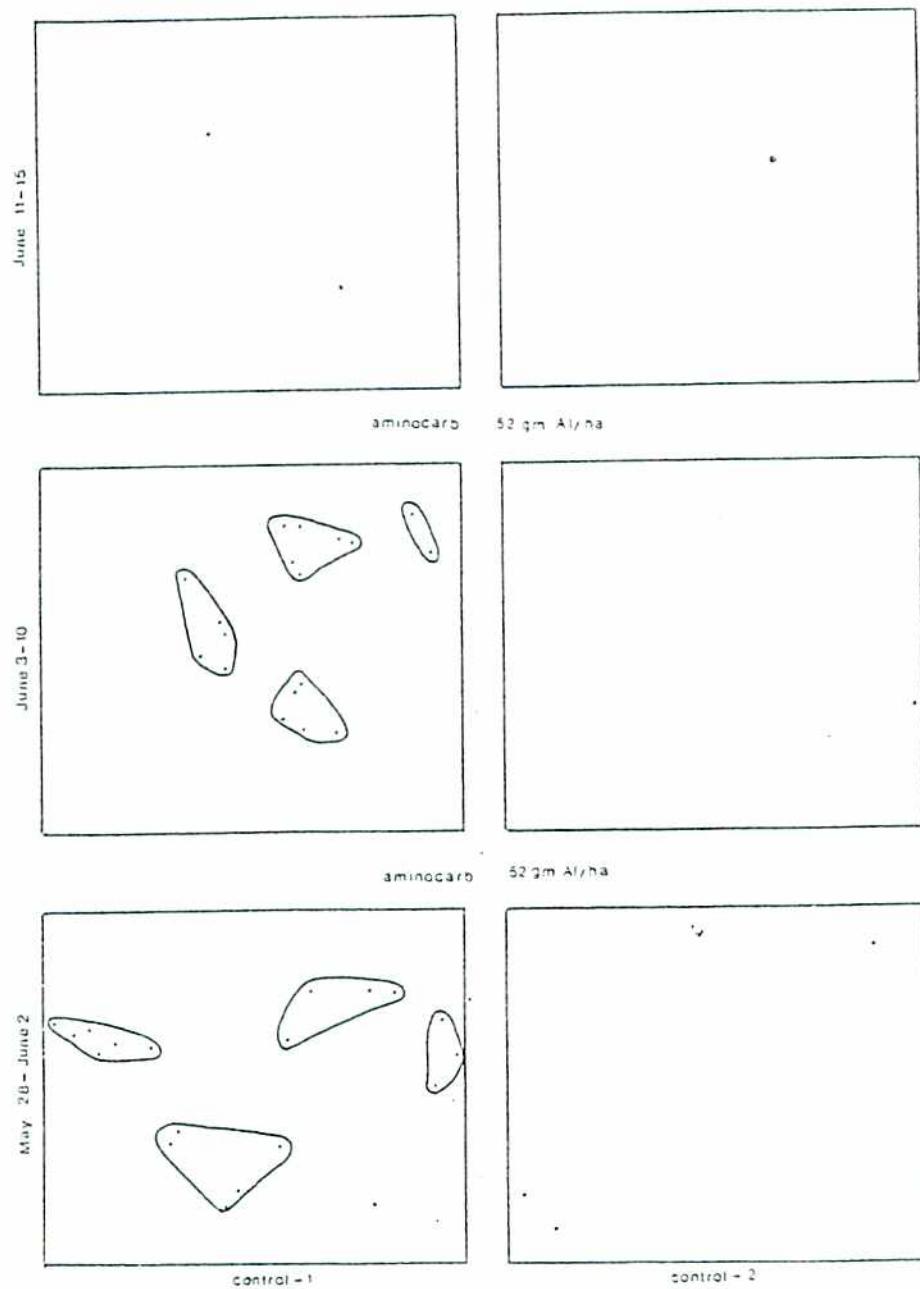


Figure 50. Nesting territories of the ruby-crowned kinglet, *Regulus calendula* (Linnaeus), on untreated control plots 1 and 2, St. Pascal, Quebec.
28 May - 15 June, 1978

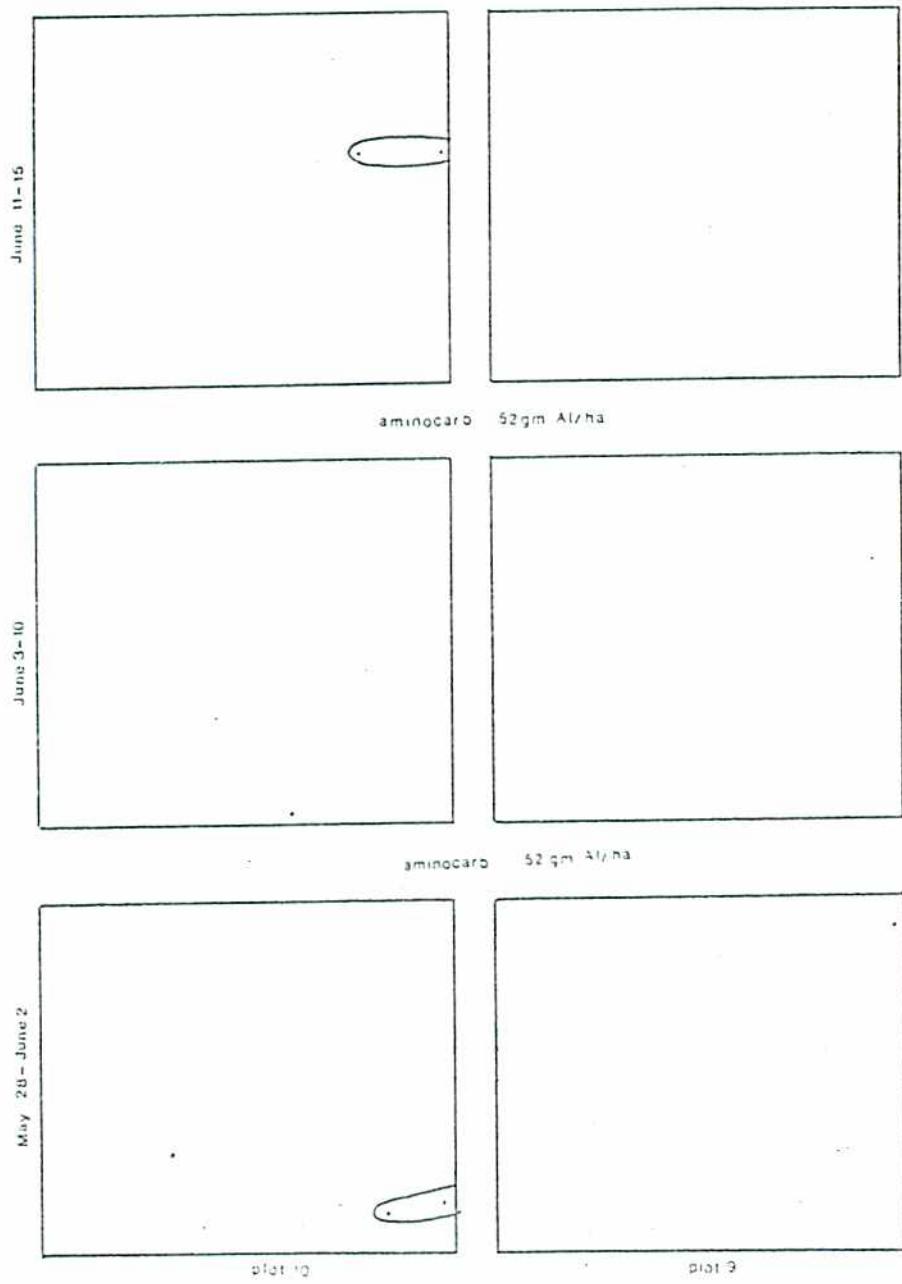


Figure 51. Nesting territories of the ruby-crowned kinglet, *Regulus calendula (linnaeus)*, on treated plots 109-9 and 109-10. St. Pascal, Quebec.
28 May - 11 June, 1978

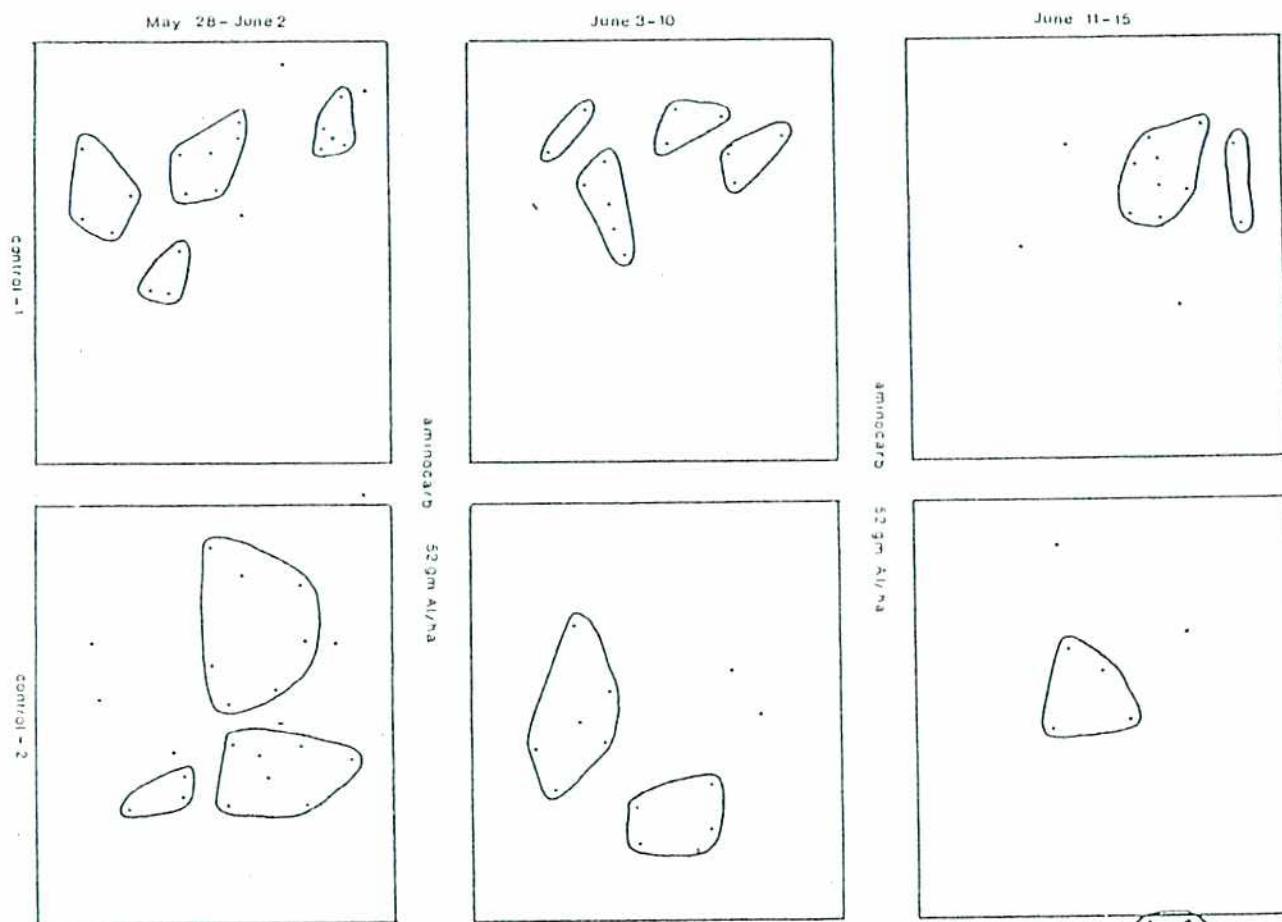
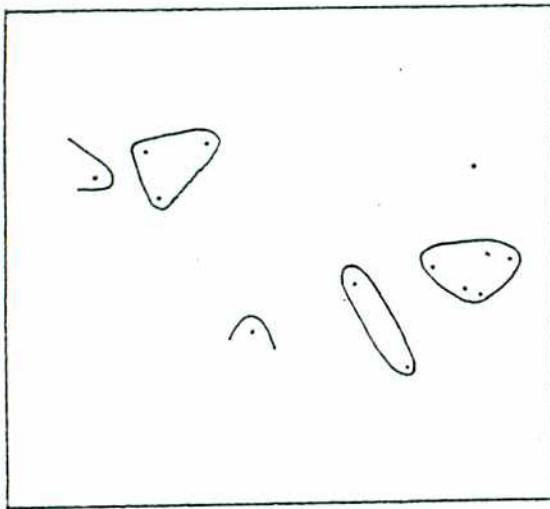
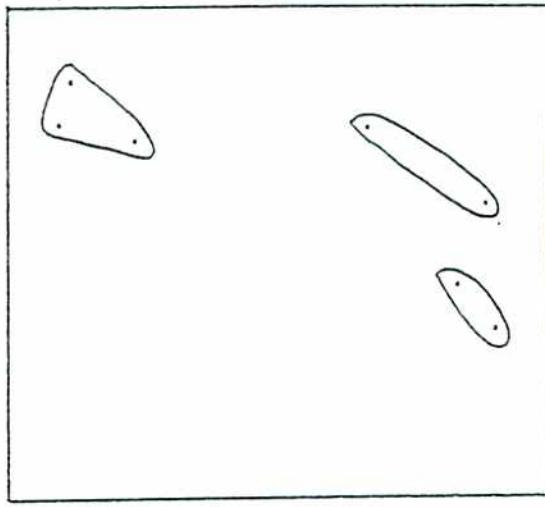


Figure 52. Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson), on the untreated control plots 1 and 2. St. Pascal, Quebec.
28 May - 15 June, 1978

June 11-15

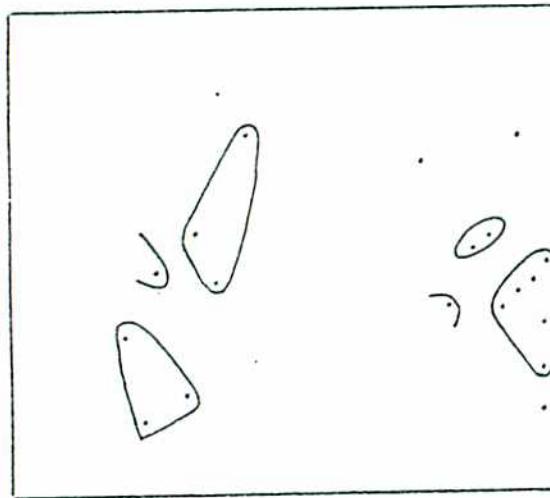


aminocarb

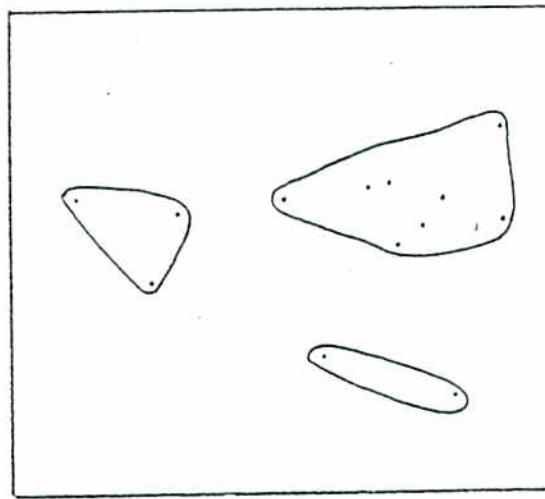


52 gm Al/ha

June 3-10

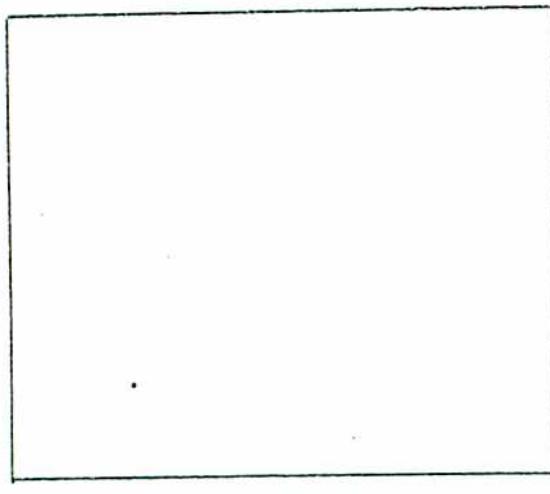


aminocarb

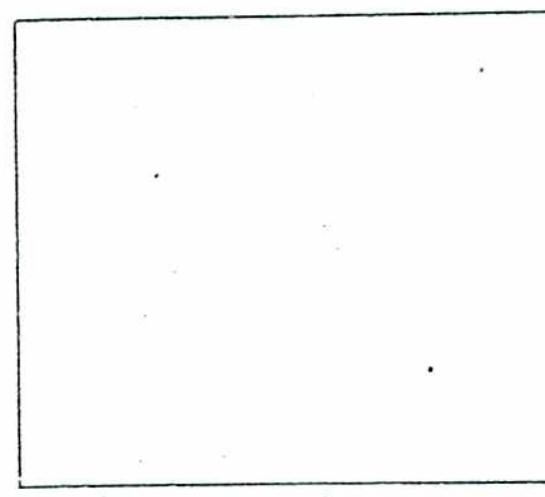


52 gm Al/ha

May 28 - June 2



plot 10



plot 9

Figure 53. Nesting territories of the bay-breasted warbler, *Dendroica castanea* (Wilson), on treated plots 109-9 and 109-10. St. Pascal, Quebec.
28 May - 11 June, 1978

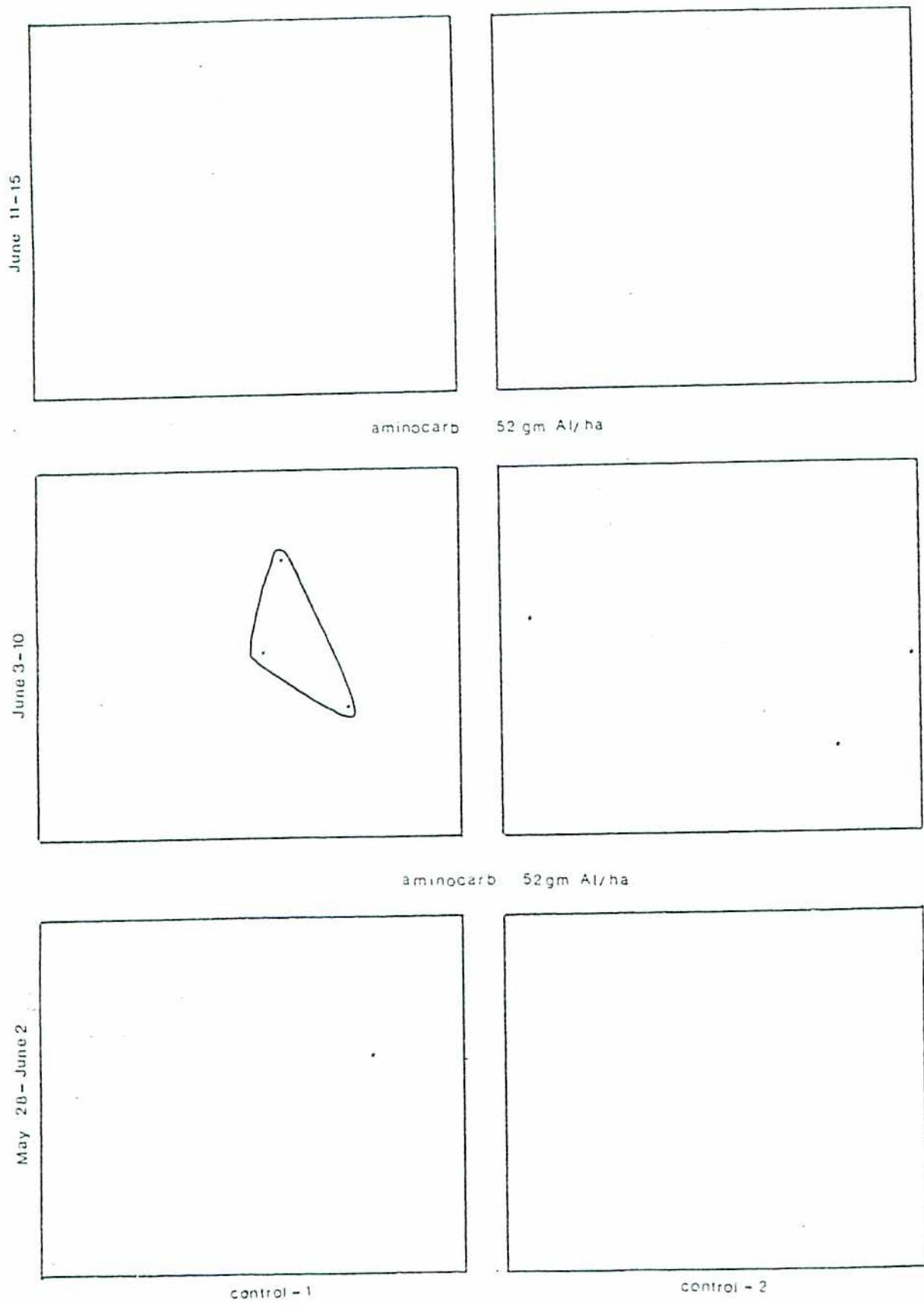
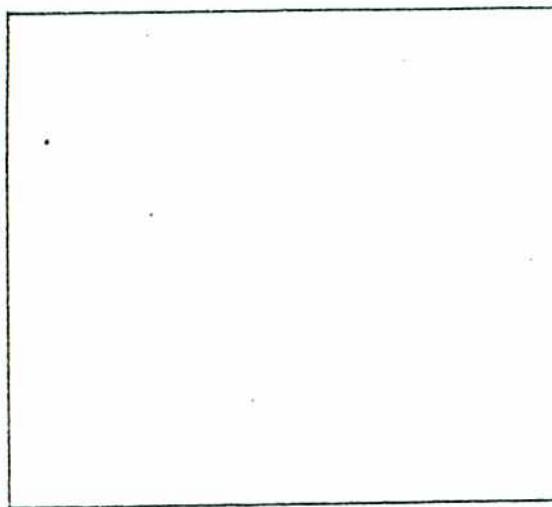


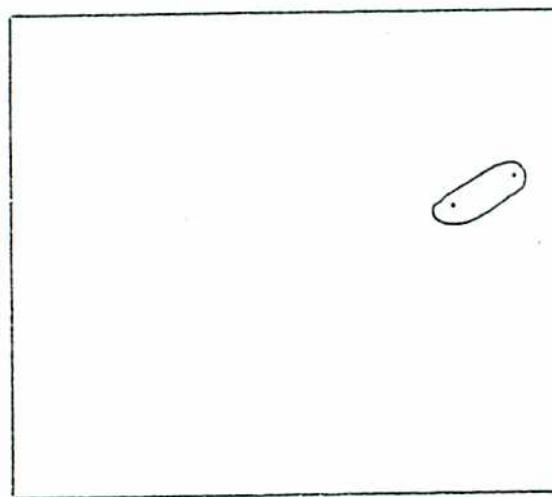
Figure 54. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus),
on untreated control plots 1 and 2. St. Pascal, Quebec.
28 May - 15 June, 1978

June 11-15



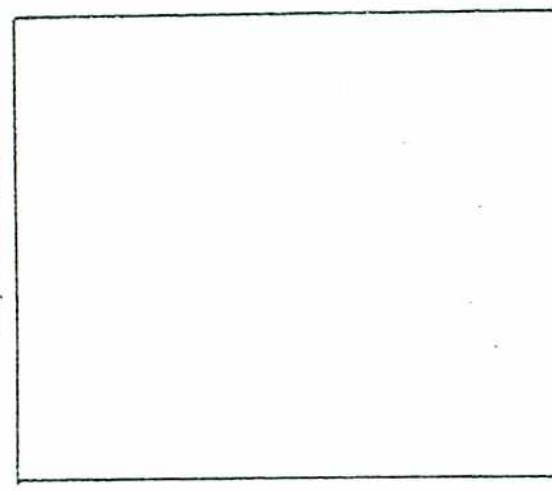
aminocarb 52 gm Al/ha

June 3-10

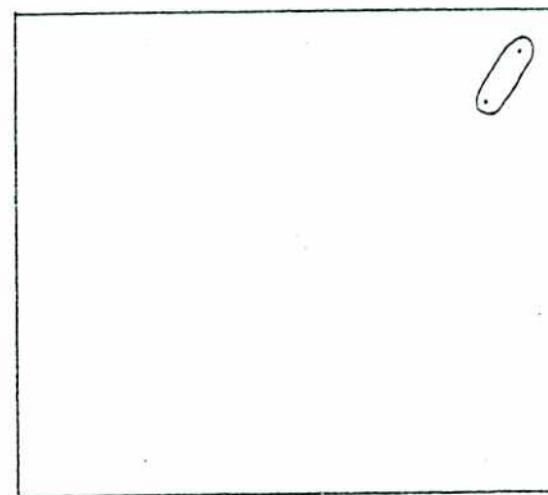
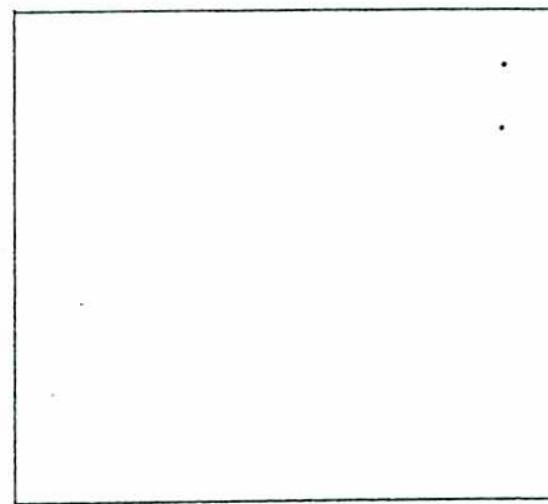


aminocarb 52 gm Al/ha

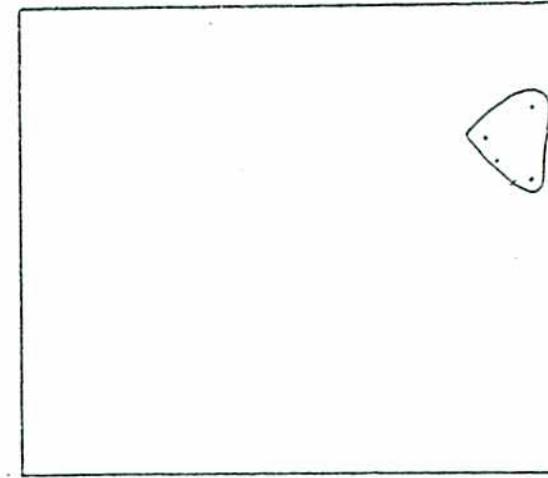
May 28 - June 2



plot 10



aminocarb 52 gm Al/ha



plot 9

Figure 55. Nesting territories of the dark-eyed junco, *Junco hyemalis* (Linnaeus), on treated plots 109-9 and 109-10. St. Pascal, Quebec.

28 May - 15 June, 1978

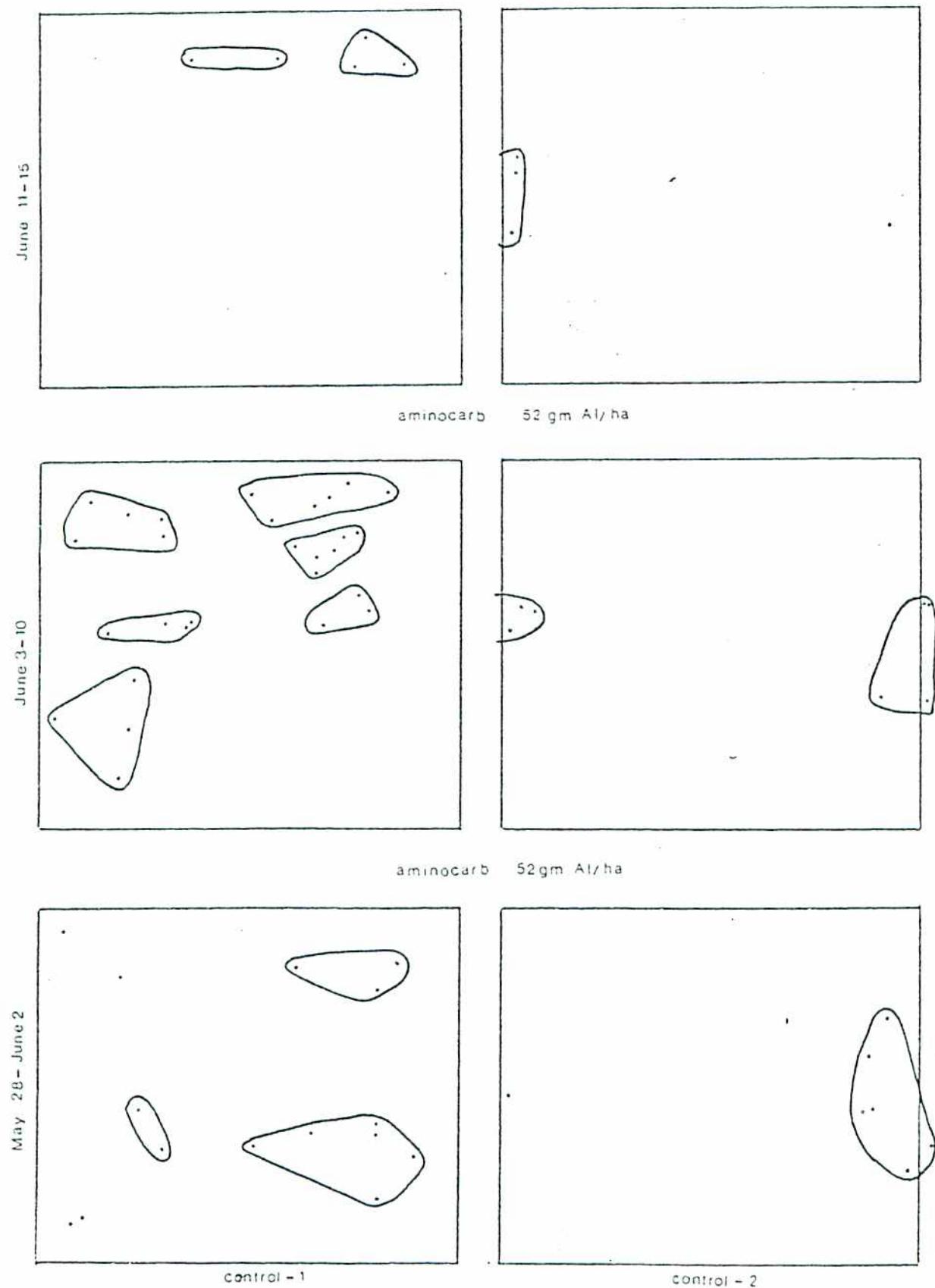


Figure 56. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin), on untreated control plots 1 and 2. St. Pascal, Quebec.
28 May - 15 June, 1978

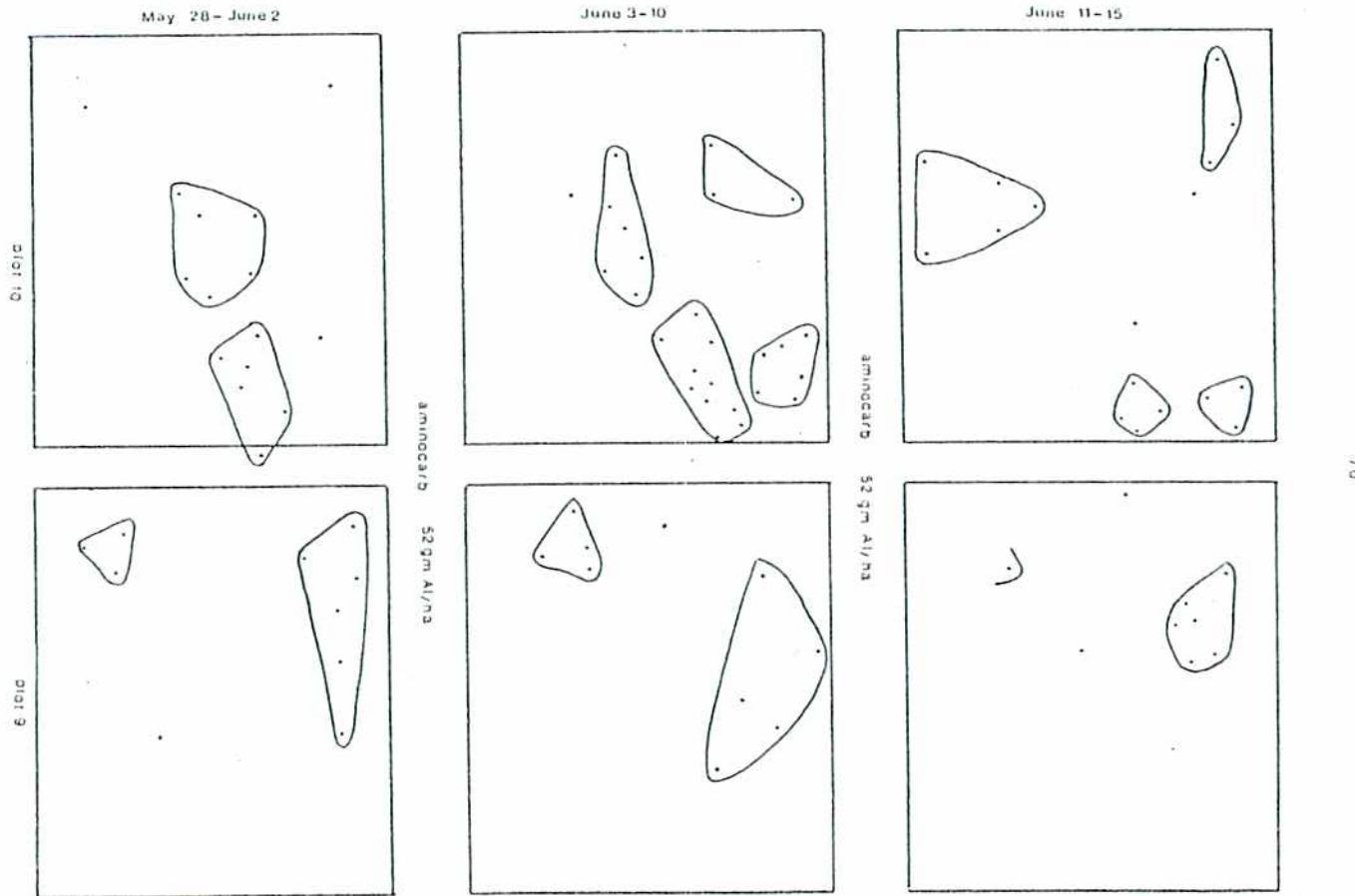


Figure 57. Nesting territories of the white-throated sparrow, *Zonotrichia albicollis* (Gmelin), on treated plots 109-9 and 109-10. St. Pascal, Quebec.
28 May - 15 June, 1978

CONCLUSIONS

An experimental aerial spray programme designed to determine optimum timing for budworm control during the larval stages using aminocarb at the emitted dosage rate of 0.052 kg AI/ha did not harm resident avifauna. Kromecote® cards located on bird census plots at ground level partially screened by upper canopy foliage measured relatively low deposits of the emitted material in most instances. The initial treatment applied against second instar larvae took place prior to the spring arrival of many of the major species of birds which normally breed in the area. The second application was applied against peak fourth instar larvae at a time when most birds had returned and had set up breeding territories. Populations of magnolia warblers apparently shifted from areas (treatment plot 101-4 and untreated control plot 2) which evidently appeared less suitable than other areas (control plot 1, 101-3 and 101-6). Adverse weather conditions on 1-3 June was reflected in the rather low bird activity recorded during this period. No pesticide related population declines are indicated.

The third treatment followed the second application by a five day interval and did not prove harmful to bird populations. Adverse weather experienced during census taking on 8-12 and 14 June resulted in lowered bird activity. Plot searches carried out following the various spray applications failed to record any of the symptoms typical of pesticide stress such as erratic flight, bill wiping, wing droop, etc.

REFERENCES

- Kendeigh, S.C. 1944. Measurement of bird populations. Ecol. Monog. 14:67-106.

APPENDICES

Forest bird population census of plots established on treatment blocks 101, 108 and 109 and plots in untreated control areas and summary of weather conditions recorded during forest bird census monitoring.

Table I

Forest bird population census
Untreated control plot 1
St. Pascal, Quebec
9 May - 6 June, 1978

Family	Species	Pre-spray 1				Post-spray 1						Pre-spray 2				Post-spray 2							
		May 9	May 10	May 11	Daily avg.	May 12	May 13	May 14	May 15	May 16	Daily avg.	May 28	May 29	May 30	May 31	June 1	Daily avg.	June 2	June 3	June 4	June 5	June 6	Daily avg.
		-2	-1	-0		+1	+2	+3	+4	+5		-4	-3	-2	-1	-0		+1	+2	+3	+4	+5	
Alcedinidae	Belted Kingfisher	0	0	0	0.0	0	0	0	2	0	0.4	0	0	0	1	0	0.2	0	0	0	0	0	0.0
Picidae	Common Flicker	0	0	0	0.0	4	2	2	2	2	2.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	Least Flycatcher	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	2	6	0.8	0	0	0	2	0	0.4
Corvidae	Gray Jay	0	0	0	0.0	0	0	0	0	1	0.2	0	0	4	0	0	0.8	0	0	2	0	0	0.0
	Blue Jay	0	0	0	0.0	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0.0
Paridae	Black-capped Chickadee	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4
	Boreal Chickadee	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4
Sittidae	Red-breasted Nuthatch	0	0	0	0.0	0	0	0	0	0	0.0	4	2	0	0	0	1.2	0	0	0	2	0	0.4
Mimidae	Catbird	0	0	0	0.0	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	2	2	2	1.2
Turdidae	American Robin	0	0	1	0.3	6	1	1	4	3	3.0	4	4	2	5	4	3.8	2	2	2	6	2	2.8
	Hermit Thrush	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	4	0	0.8	0	0	5	0	0	1.0
	Swainson's Thrush	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	2	1	0	0.6
	Veery	0	0	0	0.0	0	0	0	0	0	0.0	1	2	2	4	2	2.2	2	2	0	2	2	1.6
Sylviidae	Golden-crowned Kinglet	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	0	0	1.2
	Ruby-crowned Kinglet	2	4	6	4.0	6	6	6	4	2	4.8	6	8	3	4	8	5.8	4	4	2	6	4	4.0
Vireonidae	Solitary Vireo	0	0	0	0.0	0	0	2	0	0	0.4	2	6	0	0	0	1.6	0	0	0	0	0	0.0
	Red-eyed Vireo	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4
Parulidae	Black-and-white Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	2	0	0	0	0.4
	Tennessee Warbler	0	0	0	0.0	0	0	0	0	0	0.0	12	14	8	16	10	12.0	8	6	8	10	10	8.4
	Nashville Warbler	0	0	0	0.0	0	0	4	4	0	1.6	2	0	2	0	0	0.8	2	2	4	2	4	2.8
	Parula Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	2	2	2	2	1.6	0	2	0	2	0	0.8
	Magnolia Warbler	0	0	0	0.0	0	0	0	0	0	0.0	6	6	2	8	6	5.6	8	5	12	4	4	6.6
	Cape May Warbler	0	0	0	0.0	0	0	4	2	4	2.0	4	10	4	4	4	5.2	6	6	6	8	0	5.2
	Yellow-rumped Warbler	0	4	4	2.7	12	8	4	4	6	6.8	8	8	2	0	1	3.8	2	2	4	0	2	2.0
	Black-throated Green Warbler	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0

(Cont'd)

Table I (Concl)

Family	Species	Pre-spray 1						Post-spray 1						Pre-spray 2						Post-spray 2					
		May	May	May		May	May	May	May	May	May	June		June	June	June	June	June	June	June	June	June	June	June	Daily
		9	10	11	Daily	12	13	14	15	16	Daily	28	29	30	31	1	Daily	2	3	4	5	6	Daily	avg.	
Parulidae (cont'd.)	Blackburnian Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	0	1	2	2	1.0	0	0	4	0	4	1.6		
	Bay-breasted Warbler	0	0	0	0.0	0	0	0	0	0	0.0	8	10	2	8	6	6.8	2	4	4	0	4	2.8		
	Blackpoll Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	6	0	0	0	1.2	0	0	0	0	0	0.0		
	Ovenbird	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	2	0	0.8	0	2	2	4	4	2.4		
	Northern Waterthrush	0	0	0	0.0	0	2	0	0	0	0.4	0	0	4	0	2	1.2	0	0	0	2	0	0.4		
	Common Yellowthroat	0	0	0	0.0	0	0	0	0	0	0.0	8	6	0	0	2	3.2	0	0	0	4	0	0.8		
	Canada Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4	0	0	2	0	4	1.2		
Icteridae	Redwinged Blackbird	4	2	2	2.7	8	5	10	18	10	10.2	20	17	9	15	17	15.6	13	11	13	10	13	12.0		
	Rusty Blackbird	0	2	0	0.7	1	7	2	1	0	2.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
	Common Grackle	0	3	0	1.0	0	0	0	0	2	0.4	2	4	0	0	2	1.6	0	2	2	0	2	1.2		
	Brown-headed Cowbird	0	0	0	0.0	3	0	7	4	2	3.2	0	2	0	0	0	0.4	0	0	0	0	0	0.4		
Thraupidae	Scarlet Tanager	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0		
	Rose-breasted Grosbeak	0	0	0	0.0	0	0	0	0	0	0.0	4	2	4	4	6	4.0	2	4	0	3	6	3.0		
Fringillidae	Evening Grosbeak	0	0	0	0.0	0	0	0	0	0	0.0	0	0	1	0	1	0.4	1	0	1	0	0	0.4		
	Purple Finch	0	0	2	0.7	2	1	7	1	0	2.2	0	2	0	0	0	0.4	0	2	0	4	2	1.6		
	Dark-eyed Junco	2	2	2	2.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4	0	0	2	0	0	0.4		
	Chipping Sparrow	0	0	0	0.0	0	4	0	0	0	0.8	2	2	2	0	0	1.2	4	2	0	2	0	1.6		
	White-crowned Sparrow	0	0	0	0.0	0	0	3	0	1	0.8	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
	White-throated Sparrow	4	0	2	2.0	4	6	5	4	5	4.8	4	4	2	2	6	5.0	9	4	6	2	11	6.4		
	Swamp Sparrow	0	0	0	0.0	2	0	8	12	6	5.6	8	10	4	2	0	4.8	2	0	2	0	0	0.8		
	Song Sparrow	0	2	0	0.7	2	4	4	0	0	2.0	0	0	0	0	2	0.4	0	2	2	0	2	1.2		
Total Birds		12	19	19	16.7	50	46	69	62	44	54.2	115	131	60	92	87	97.0	69	68	91	82	86	79.2		

Table II

Forest bird population census
Untreated control plot 2
St. Pascal, Quebec
9 May - 6 June
1978

Family	Species	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2						
		May 9	May 10	May 11	Daily	May 12	May 13	May 14	May 15	May 16	Daily	May 28	May 29	May 30	May 31	June 1	Daily	June 2	June 3	June 4	June 5	June 6	Daily
		-2	-1	-0	avg.	+1	+2	+3	+4	+5	avg.	-4	-3	-2	-1	-0	avg.	+1	+2	+3	+4	+5	avg.
Tetraonidae	Ruffed Grouse	0	1	2	1.0	0	2	2	2	2	1.6	2	0	2	2	0	1.2	0	0	3	0	0	0.6
Charadriidae	Killdeer	0	2	0	0.7	0	0	0	0	0	0.0	0	0	0	0	0	0.4	0	0	0	0	0	0.0
Scolopacidae	Common Snipe	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Picidae	Common Flicker	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0.0
	Hairy Woodpecker	0	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	Yellow-bellied Flycatcher	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	4	0.8
	Least Flycatcher	0	0	0	0.0	0	0	0	0	0	0.0	4	4	4	4	0	3.2	2	2	4	6	2	3.2
Corvidae	Gray Jay	0	0	0	0.0	0	0	0	0	1	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Blue Jay	0	0	0	0.0	0	0	0	0	0	0.0	0	0	4	0	0	0.8	0	0	2	2	0	0.0
Paridae	Black-capped Chickadee	0	4	0	1.3	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4
Titidae	Red-breasted Nuthatch	0	0	0	0.0	0	0	0	0	0	0.0	4	0	0	0	0	0.8	0	0	0	0	0	0.4
Certhiidae	Brown Creeper	0	0	0	0.0	0	0	0	0	2	0.4	0	0	0	0	0	0.0	2	0	0	0	0	0.0
Troglodytidae	Winter Wren	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	2	0	0.8	0	0	0	0	0	0.0
Turdidae	American Robin	2	0	2	1.3	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.8
	Hermit Thrush	0	0	2	0.7	0	2	0	0	0	0.4	1	4	2	2	0	1.8	0	2	0	0	2	2.4
	Swainson's Thrush	0	0	0	0.0	0	0	0	0	0	0.0	4	2	0	0	0	1.2	0	2	2	5	4	2.4
	Vireo	0	0	0	0.0	0	0	0	0	0	0.0	3	0	0	0	0	0.6	0	2	0	4	6	2.4
Sylviidae	Ruby-crowned Kinglet	0	2	4	2.0	6	2	2	2	0	2.4	4	0	0	0	2	1.2	0	0	0	0	0	0.0

(Cont'd)

Table II (Concl)

Family	Species	Pre-spray 1						Post-spray 1						Pre-spray 2						Post-spray 2					
		May 9	May 10	May 11	Daily -2	May 12	May 13	May 14	May 15	May 16	Daily +1	May 28	May 29	May 30	May 31	June 1	Daily -4	June 2	June 3	June 4	June 5	June 6	Daily +1		
		-1	-0	avg.	+3	+2	+3	+4	+5	avg.	-3	-2	-1	-0	avg.	+1	+2	+3	+4	+5	avg.	+1			
Vireonidae	Solitary Vireo	0	0	0	0.0	0	0	2	2	4	1.6	2	2	0	2	0	1.2	0	2	4	0	2	1.6		
	Red-eyed Vireo	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
Parulidae	Black-and-white Warbler	0	0	0	0.0	0	0	0	0	0	0.0	1	0	2	6	0	1.8	0	0	0	0	0	0.0		
	Tennessee Warbler	0	0	0	0.0	0	0	0	0	0	0.0	12	8	10	6	2	7.6	2	2	2	0	6	2.4		
	Magnolia Warbler	0	0	0	0.0	0	0	0	0	0	0.0	6	9	0	2	0	3.4	0	0	2	2	0	0.8		
	Cape May Warbler	0	0	0	0.0	0	0	2	8	2	2.4	8	12	2	2	2	5.2	6	0	4	8	2	4.0		
	Black-throated Blue Warbler	0	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0	0	0	2	0	0	0.4		
	Yellow-rumped Warbler	0	0	0	0.0	4	4	0	6	4	3.6	6	4	4	0	0	3.6	6	4	6	2	0	3.6		
	Black-throated Green Warbler	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	0	1.6	0	0	0	0	0	0	0.0		
	Blackburnian Warbler	0	0	0	0.0	0	0	0	0	0	0.0	6	4	0	0	0	2.0	0	0	0	0	6	2		
	Chestnut-sided Warbler	0	0	0	0.0	0	0	0	0	0	0.0	2	2	0	0	0	0.8	0	0	0	0	0	0.0		
	Bay-breasted Warbler	0	0	0	0.0	0	0	0	0	0	0.0	14	10	4	4	0	6.4	6	2	2	0	4	2.8		
	Blackpoll Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.4	2	2	0	2	2	1.6		
	Ovenbird	0	0	0	0.0	0	0	0	0	0	0.0	6	6	4	6	0	4.4	4	2	6	2	4	3.6		
	Northern Waterthrush	0	0	0	0.0	0	0	0	4	2	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
	Horned Lark	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.4	0	0	0	0	0	0.0		
	Canada Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	2	0	4	2	4	2.4		
	American Redstart	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4		
Icteridae	Rusty Blackbird	2	0	0	0.7	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
	Brown-headed Cowbird	0	0	0	0.0	0	0	2	0	0	0.4	6	4	0	0	0	2.0	0	0	0	0	3	0		
Fringillidae	Rose-breasted Grosbeak	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	2	0	1.6	0	0	0	0	1	0.2		
	Evening Grosbeak	0	0	0	0.0	0	0	0	0	0	0.0	2	2	0	0	0	0.8	0	0	0	0	4	0		
	Purple Finch	0	0	0	0.0	0	0	0	6	4	2.0	2	2	2	0	0	1.2	2	2	2	0	2	0.8		
	Dark-eyed Junco	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	2	0	0.8		
	White-throated Sparrow	2	0	0	0.7	0	0	6	4	0	2.0	4	2	0	2	0	1.6	2	0	2	4	2	2.0		
Unidentified Birds		0	0	0	0.0	0	0	0	0	2	0.4	0	0	0	1	0	0.2	0	2	0	2	2	1.2		
Total Birds		6	9	10	8.3	10	10	19	34	23	19.2	105	81	46	53	8	58.6	36	26	49	68	49	45.6		

Table III

Forest bird population census
 Experimental treatment plot 101-3
 St. Pascal, Quebec
 8 May - 6 June
 1978

(aminocarb applied on 11 May and 1 June at the emitted dosage rate of 52 g/m³/ha)

Family	Species	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2						
		May	May	May		May	May	May	May	May	May	May	May	June	June	June	June	June	June	June	June	Daily	
		8	10	11	Daily	12	13	14	15	16	Daily	28	29	30	31	1	Daily	2	3	4	5	6	Daily
-3	-1	-0	avg.	+1	+2	+3	+4	+5	avg.	-4	-3	-2	-1	-0	avg.	+1	+2	+3	+4	+5	avg.		
Picidae	Common Flicker	0	0	0	0.0	0	0	2	6	4	2.4	0	0	2	0	0	0.4	0	0	2	2	0	0.8
	Yellow-bellied Sapsucker	0	0	0	0.0	2	2	1	2	0	1.4	0	0	2	0	2	0.8	0	0	2	0	0	0.4
Hirundinidae	Tree Swallow	0	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	Least Flycatcher	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	0	2	1.6	2	4	2	2	2	2.4
Corvidae	Gray Jay	0	0	0	0.0	0	0	1	1	0	0.4	2	0	2	0	0	0.8	0	0	2	1	2	1.0
	Blue Jay	0	0	0	0.0	0	0	0	0	0	0.0	0	2	3	2	0	1.4	0	0	0	2	2	0.8
Paridae	Boreal Chickadee	0	0	2	0.7	2	2	5	1	4	2.8	0	0	0	2	0	0.4	0	2	0	2	2	1.2
Sittidae	White-breasted Nuthatch	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0.0
	Red-breasted Nuthatch	0	0	0	0.0	0	0	0	0	0	0.0	4	2	4	2	4	3.2	2	0	4	2	2	2.0
Certhiidae	Brown Creeper	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Troglodytidae	Winter Wren	0	0	0	0.0	0	2	0	2	2	1.2	2	0	2	0	0	0.8	2	0	2	0	0	0.8
Turdidae	American Robin	1	0	0	0.3	0	0	2	2	3	1.4	0	0	1	2	0	0.6	0	0	0	0	1	0.2
	Hermit Thrush	0	0	0	0.0	0	0	2	2	1	1.0	0	0	0	2	0	0.4	0	1	0	0	0	0.2
	Swainson's Thrush	0	0	0	0.0	0	0	0	0	0	0.0	4	0	2	4	0	2.0	2	1	0	0	1	0.8
	Veery	0	0	0	0.0	0	0	0	0	0	0.0	2	0	1	3	0	1.2	1	2	3	2	4	2.4
Sylviidae	Golden-crowned Kinglet	0	2	4	2.0	2	0	0	4	0	1.2	0	0	4	6	2	2.4	4	4	2	2	2	2.8
	Ruby-crowned Kinglet	0	2	2	1.3	4	4	6	10	4	5.6	6	8	6	4	6	6.0	4	2	6	6	4	4.4
Vireonidae	Solitary Vireo	0	0	0	0.0	0	0	0	2	0	0.4	0	0	4	2	0	1.2	0	2	0	0	2	0.8
	Philadelphia Vireo	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4

(Cont'd)

Table III (Concl)

Family	Species	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2						
		May	May	May	May	May	May	May	May	May	May	May	May	June	June	June	June	June	June	June	June		
		-3	-1	-0	-avg.	+1	+2	+3	+4	+5	avg.	-4	-3	-2	-1	-0	avg.	+1	+2	+3	+4	+5	avg.
Parulidae	Tennessee Warbler	0	0	0	0.0	0	0	0	0	0	0.0	20	18	14	12	8	14.4	12	10	14	14	16	13.2
	Nashville Warbler	0	0	0	0.0	2	2	3	4	2	2.6	0	2	2	4	2	2.0	2	6	8	6	7	5.8
	Magnolia Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	4	6	8	2	4.0	4	0	4	6	4	3.6
	Yellow Warbler	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Cape May Warbler	0	0	0	0.0	0	0	5	8	8	4.2	8	8	4	2	2	4.8	4	0	10	14	18	9.2
	Black-throated Blue Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	2	0.8	2	2	2	2	2	2.0
	Yellow-rumped Warbler	2	4	2	2.7	4	0	10	8	4	5.2	1	0	0	0	0	0.2	0	0	4	2	8	2.8
	Black-throated Green Warbler	0	0	0	0.0	0	0	0	0	0	0.0	4	2	2	2	2	2.4	2	2	2	2	2	2.0
	Blackburnian Warbler	0	0	0	0.0	0	2	0	0	0	0.4	0	0	4	2	2	1.6	2	2	4	4	4	3.2
	Bay-breasted Warbler	0	0	0	0.0	0	0	0	0	0	0.0	18	14	17	16	8	14.6	20	16	18	16	10	16.0
	Ovenbird	0	0	0	0.0	0	0	6	0	4	2.0	3	2	3	4	2	2.8	4	2	2	4	4	3.2
	Northern Waterthrush	0	0	0	0.0	0	0	2	2	0	0.8	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Mourning Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	2	2	1.2
	Common Yellowthroat	0	0	0	0.0	0	0	0	0	0	0.0	0	2	0	0	0	0.4	2	0	0	0	0	0.4
	Canada Warbler	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	2	0	1.6	0	0	2	2	2	1.2
	American Redstart	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0.0
Icteridae	Redwinged Blackbird	0	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Common Grackle	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	1	1	0	0	0.4
	Brown-headed Cowbird	0	0	0	0.0	0	2	0	1	0	0.6	0	0	0	2	0	0.4	0	0	0	0	0	0.0
Fringillidae	Rose-breasted Grosbeak	0	0	0	0.0	0	0	0	0	0	0.0	3	0	0	0	0	0.6	0	0	0	0	0	0.0
	Evening Grosbeak	0	0	0	0.0	0	0	0	6	4	2.0	2	0	2	0	0	0.8	0	0	0	2	5	1.4
	Purple Finch	0	2	2	1.3	4	4	2	1	0	2.2	2	4	0	4	2	2.4	2	0	2	2	2	1.6
	Pine Grosbeak	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	0	2	1.6	0	0	0	0	0	0.0
	American Goldfinch	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	1	0	0.2
	Dark-eyed Junco	1	1	1	1.0	2	0	1	2	4	1.8	4	2	6	4	2	3.6	2	3	2	6	4	3.4
	White-throated Sparrow	0	0	2	0.7	4	6	10	14	2	7.2	4	4	4	8	4	4.8	0	2	5	2	4	2.6
Total Birds		4	11	15	10.0	26	30	60	78	46	48.0	95	80	103	105	56	87.8	75	64	107	110	118	94.8

Table IV

Forest bird population census
 Experimental plot 101-4
 St. Pascal, Quebec
 10 May - 6 June
 1978

(aminoacarb applied on 11 May and 1 June at the emitted dosage rate of 52 gm AI/ha)

Family	Species	Pre-spray 1						Post-spray 1						Pre-spray 2						Post-spray 2								
		May			May			May			May			May			June			June			June					
		10	11	Daily	12	13	14	15	16	Daily	28	29	30	31	1	Daily	2	3	4	5	6	Daily	11	12	13			
-1	-0	avg.	+1	+2	+3	+4	+5	avg.	+4	-3	-2	-1	-0	avg.	+1	+2	+3	+4	+5	avg.	+1	+2	+3	+4	+5	avg.		
Tetraonidae	Ruffed Grouse	0	0	0.0	1	0	1	0	1	0.6	2	2	0	0	0	0.8	0	0	2	0	2	0.8	0	0	0	0	0	0.0
Scolopacidae	Common Snipe	0	0	0.0	0	1	0	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Trochilidae	Ruby-throated Hummingbird	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.2	0	0	0	1	0	0.2
Picidae	Common Flicker	0	0	0.0	0	2	2	2	2	1.6	1	0	2	0	0	0.6	0	2	0	0	2	1.2	0	2	0	0	0	0.4
Tyrannidae	Eastern Phoebe	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	2	0	2	2	1.2	0	0	1	0	0	0.2
Corvidae	Gray Jay	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	0	1	0	0	0.2	0	2	0	4	4	2.0
	Blue Jay	0	0	0.0	0	0	0	0	0	0.0	1	0	0	2	0	0.6	0	2	0	4	4	2.0	0	2	0	4	4	2.0
Paridae	Black-capped Chickadee	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Turdidae	American Robin	1	0	0.5	3	3	3	2	4	3.0	2	0	0	1	0	0.6	0	1	0	2	0	0.6	0	0	0	0	0	0.0
	Wood Thrush	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	2	0	0	0	0	0	0.4	
	Hermit Thrush	2	0	1.0	4	0	4	0	0	1.6	4	0	4	0	0	1.6	0	0	0	0	2	1.6	4	2	2	1	1	2.0
	Veery	0	0	0.0	0	0	0	0	0	0.0	0	0	4	4	2	2.0	4	2	2	1	1	2.0	0	0	0	0	0	0.0
Sylviidae	Ruby-crowned Kinglet	0	2	1.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Vireonidae	Solitary Vireo	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	4	4	4	2	3.6
	Philadelphia Vireo	0	0	0.0	0	0	0	0	0	0.0	0	2	0	4	0	1.2	4	4	4	4	4	2.0	0	0	0	0	0	0.0
Parulidae	Black-and-white Warbler	0	0	0.0	0	0	0	0	0	0.0	2	0	0	4	0	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Tennessee Warbler	0	0	0.0	0	0	0	0	0	0.0	8	14	15	4	2	8.6	2	0	5	4	2	0.0	0	0	0	5	4	2.0
	Nashville Warbler	0	0	0.0	0	0	2	0	0	0.4	0	0	8	8	2	3.6	6	6	6	8	2	5.6	0	0	0	0	0	0.0
	Magnolia Warbler	0	0	0.0	0	0	0	0	0	0.0	6	0	14	6	4	6.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Cape May Warbler	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Black-throated Blue Warbler	0	0	0.0	0	0	0	0	0	0.0	0	0	2	6	0	1.6	0	0	0	0	0	0.0	0	0	0	0	0	0.0

(Cont'd)

Table IV (Concl)

Family	Species	Pre-spray 1			Post-spray 1					Pre-spray 2					Post-spray 2							
		May 10 -1	May 11 -0	Daily avg.	May 12 +1	May 13 +2	May 14 +3	May 15 +4	May 16 +5	Daily avg.	May 28 -4	May 29 -3	May 30 -2	May 31 -1	June	June 2 +1	June 3 +2	June 4 +3	June 5 +4	June 6 +5	Daily avg.	
Parulidae (cont'd.)	Yellow-rumped Warbler	0	2	1.0	2	2	6	2	4	3.2	0	0	0	0	0	0.0	0	0	0	0	0.0	
	Black-throated Green Warbler	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4	3	0	2	2	0	1.4
	Chestnut-sided Warbler	0	0	0.0	0	0	0	0	0	0.0	4	4	8	2	5.2	6	6	6	8	6	6.4	
	Bay-breasted Warbler	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0
	Blackpoll Warbler	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	2	0	0	0	0.4
	Ovenbird	0	0	0.0	0	0	0	0	0	0.0	4	2	4	3	2	3.0	6	2	4	6	4	4.4
	Mourning Warbler	0	0	0.0	0	0	0	0	0	0.0	0	2	0	0	0	0.4	2	0	0	2	2	1.2
	Common Yellowthroat	0	0	0.0	0	0	0	0	0	0.0	2	6	2	2	0	2.4	0	0	2	0	0	0.4
Icteridae	Canada Warbler	0	0	0.0	0	0	0	0	0	0.0	0	6	6	9	10	6.2	8	3	13	10	8	8.4
	American Redstart	0	0	0.0	0	0	0	0	0	0.0	4	2	0	2	0	1.6	4	2	2	2	0	2.0
	Rusty Blackbird	1	0	0.5	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Turdidae	Common Grackle	0	0	0.0	0	0	0	1	0	0.2	0	0	0	0	0	0.0	0	0	1	0	0	0.2
	Brown-headed Cowbird	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Red-winged Blackbird	0	0	0.0	0	0	0	0	0	0.0	4	3	2	0	0	1.8	1	2	0	2	2	1.4
Fringillidae	Evening Grosbeak	0	0	0.0	0	0	0	0	0	0.0	2	2	0	0	0	0.8	0	0	0	2	1	0.6
	Purple Finch	0	0	0.0	0	0	0	2	0	0.4	0	0	2	0	0	0.4	2	0	2	0	2	1.2
	American Goldfinch	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0
	Dark-eyed Junco	1	4	2.5	5	4	6	2	4	4.2	0	0	0	2	0	0.4	0	0	0	0	0	0.0
	Chipping Sparrow	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0
	White-throated Sparrow	0	6	3.0	9	8	12	9	7	9.0	9	12	4	8	7	8.0	5	6	10	10	8	7.8
	Lincoln's Sparrow	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	2	2	2	2	0	1.6
Total Birds		5	14	9.5	24	20	39	22	22	25.4	61	57	83	77	31	61.8	55	44	64	74	48	57.0

Table V

Forest bird population census
 Experimental plot 101-5
 St. Pascal, Quebec
 10 May - 6 June
 1978

(aminocarb applied on 11 May and 1 June at the emitted dosage rate of 52 g a.i./ha)

Family	Species	Pre-spray 1			Post-spray 1					Pre-spray 2			Post-spray 2							
		May	May	Daily	May	May	May	May	Daily	May	May	May	June	June	June	June	June			
		10	11	-1	12	13	14	15	+5	28	29	30	31	1	Daily	2	3	4		
Tetraonidae	Ruffed Grouse	0	0	0.0	0	0	1	0	1	0.4	2	0	0	0	0.4	0	0	0	0.0	
Picidae	Common Flicker	2	1	1.5	2	0	2	2	2	1.6	0	2	1	0	0	0.6	1	0	1	0.6
	Yellow-bellied Sapsucker	0	0	0.0	0	0	0	0	1	0.2	0	0	0	0	0	0.0	0	0	0	0.0
Tyrannidae	Eastern Phoebe	0	0	0.0	0	0	0	0	0	0.0	0	2	2	2	0	1.2	0	4	4	3.2
	Yellow-bellied Flycatcher	0	0	0.0	0	0	0	0	0	0.0	0	2	2	0	0	0.8	0	0	0	0.0
Corvidae	Blue Jay	0	0	0.0	0	0	0	0	0	0.0	0	0	0	1	0	0.2	0	0	0	0.0
	Common Crow	0	0	0.0	0	0	0	0	0	0.0	2	2	0	0	2	1.2	0	0	0	0.0
Paridae	Boreal Chickadee	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0.0
Turdidae	American Robin	0	0	0.0	0	0	0	1	0	0.2	2	0	0	0	0	0.4	0	0	0	0.0
	Hermit Thrush	0	0	0.0	3	0	2	2	0	1.4	6	0	2	0	0	1.6	2	0	0	1.2
	Swainson's Thrush	0	0	0.0	0	0	0	0	0	0.0	3	3	4	2	0	2.4	2	2	0	2.4
	Veery	0	0	0.0	0	0	0	0	0	0.0	1	0	0	0	0	0.2	0	0	0	0.0
Sylviidae	Golden-crowned Kinglet	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0.0	0	0	0	0.0
	Ruby-crowned Kinglet	0	0	0.0	0	6	4	4	3	3.4	2	0	0	0	0	0.4	2	0	0	4
Vireonidae	Red-eyed Vireo	0	0	0.0	0	0	0	0	0	0.0	2	0	0	2	0	0.8	0	0	0	0.4
Parulidae	Black-and-white Warbler	0	0	0.0	0	0	0	0	0	0.0	2	2	0	0	0	0.8	0	2	2	1.6
	Tennessee Warbler	0	0	0.0	0	0	0	0	0	0.0	18	14	12	14	8	13.2	22	10	16	14
	Nashville Warbler	0	0	0.0	0	0	0	4	4	1.6	0	1	2	6	4	2.6	6	4	12	7.2
	Cape May Warbler	0	0	0.0	0	0	0	2	0	0.4	14	8	10	14	0	9.2	8	8	12	9.2
	Yellow-rumped Warbler	0	2	1.0	0	2	8	0	8	3.6	0	2	6	2	0	2.0	0	2	0	1.0

(Cont'd)

Table V (Concl)

Family	Species	Pre-spray 1						Post-spray 1						Pre-spray 2						Post-spray 2									
		May			May			May			May			May			June			June			June						
		10 -1	11 -0	Daily avg.	12 +1	13 +2	14 +3	15 +4	16 +5	Daily avg.	28 -4	29 -3	30 -2	31 -1	1 -0	Daily avg.	2 +1	3 +2	4 +3	5 +4	6 +5	Daily avg.	2 +1	3 +2	4 +3	5 +4	6 +5	Daily avg.	
Parulidae (cont'd.)	Chestnut-sided Warbler	0	0	0.0	0	0	0	0	0	0.0	0	4	2	8	0	2.8	0	0	0	0	0	0.0	0	0	0	0	0	0.8	
	Bay-breasted Warbler	0	0	0.0	0	0	0	0	0	0.0	0	0	4	2	0	1.2	4	0	0	0	0	0	0	0	0	0	0	10.4	
	Blackpoll Warbler	0	0	0.0	0	0	0	0	0	0.0	10	12	6	12	6	9.2	10	6	14	8	14	10.4	6	2	2	4	6	4.0	
	Common Yellowthroat	0	0	0.0	0	0	0	0	0	0.0	10	10	8	6	2	7.2	6	2	2	2	2	2	1.2	0	0	2	2	2	2.0
	Wilson's Warbler	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	4	2	2	0	2	2	0	0	2	2	2	2.0	
	Canada Warbler	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0.0	
Icteridae	Redwinged Blackbird	0	0	0.0	0	0	0	0	2	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0.0	
	Rusty Blackbird	0	0	0.0	0	0	0	2	0	0.4	0	0	2	0	2	0.8	2	2	2	4	2	2.4	2	0	0	0	0	0.4	
	Brown-headed Cowbird	0	2	1.0	0	0	0	0	0	0.0	0	2	0	2	0	0.8	2	0	0	0	0	0	0	0	0	0	0	0.4	
Fringillidae	Rose-breasted Grosbeak	0	0	0.0	0	0	0	0	0	0.0	0	2	0	2	0	0.8	0	0	2	2	2	0.8	0	0	2	2	2	0.8	
	Evening Grosbeak	0	0	0.0	0	4	0	0	0	0.8	2	2	0	0	0	0.8	0	0	0	0	0	0	0	0	0	0	0	0.0	
	Purple Finch	0	0	0.0	0	0	3	0	0	0.6	0	0	0	0	0	0.0	0	0	2	0	0	0	0	0	0	0	0	0.4	
	American Goldfinch	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	4	4	1.6	0	0	0	0	0	0.0	
	Dark-eyed Junco	2	0	1.0	4	2	4	4	2	3.2	0	0	2	0	0	0.4	17	12	6	14	16	13.0	0	0	0	0	0	0.0	
	White-throated Sparrow	0	12	6.0	10	10	12	11	9	10.4	11	12	17	17	6	12.6	0	6	4	6	6	4.4	0	0	0	0	0	0.0	
	Lincoln's Sparrow	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	
	Song Sparrow	0	0	0.0	0	0	0	0	2	0.4	1	0	0	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0	
Total Birds		4	17	10.5	19	24	38	34	34	29.8	88	82	82	94	30	75.2	88	64	83	88	104	85.4							

Table VI
Forest bird population census
Experimental plot 101-6
St. Pascal, Quebec
9 May - 6 June
1978
(aminoacarb applied on 11 May and 1 June at the emitted dosage rate of 52 gm AI/ha)

Family	Species	Pre-spray 1					Post-spray 1					Pre-spray 2					Post-spray 2										
		May 9	May 10	May 11	Dally -2	May avg.	May 12	May 13	May 14	May 15	May 16	Dally +1	May avg.	May 28	May 29	May 30	May 31	June 1	Dally -4	June avg.	June 2	June 3	June 4	June 5	June 6	Dally +1	June avg.
		0	0	0	0.0	0	0	0	0	0	0	0.0	0	0	1	0	1	1	0.6	0	0	0	0	0	0	0.0	
Falconidae	American Kestrel	0	0	0	0.0	0	0	0	0	0	0	0.0	0	1	0	1	1	0.6	0	0	0	0	0	0	0.0		
Tetraonidae	Ruffed Grouse	0	0	0	0.0	0	0	0	0	0	0	0.0	0	2	2	0	0	0.8	0	0	0	0	0	0	0.0		
Scolopacidae	Common Snipe	0	0	0	0.0	0	0	0	0	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0	0.0		
Picidae	Common Flicker	0	2	0	0.7	2	0	4	0	2	1.6	1	1	2	1	0	1.0	0	0	1	1	2	0.8	0	0.0		
	Yellow-bellied Sapsucker	0	0	0	0.0	0	0	0	0	1	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0.0		
Tyrannidae	Eastern Phoebe	0	0	0	0.0	0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0	0.4		
	Least Flycatcher	0	0	0	0.0	0	0	0	0	0	0	0.0	0	2	2	4	0	1.6	2	0	0	2	2	0	1.2		
Corvidae	Gray Jay	0	0	0	0.0	0	0	1	0	0	0.2	2	2	1	0	0	1.0	0	2	0	1	1	1	0.8			
	Blue Jay	0	0	0	0.0	0	0	0	0	0	0.0	1	1	0	0	0	0.2	0	0	1	1	0	1	0.2			
	Common Crow	0	0	0	0.0	0	0	2	0	1	0.6	2	2	1	0	0	1.0	0	2	0	1	1	1	0.8			
Paridae	Boreal Chickadee	0	0	0	0.0	0	0	9	0	0	1.8	2	0	4	2	4	2.4	2	2	2	0	0	0	1.2			
Sittidae	Red-breasted Nuthatch	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0	0.4			
Turdidae	American Robin	0	0	1	0.3	0	0	0	1	2	0.6	0	2	2	0	0	0.8	0	0	3	0	2	1	1.0			
	Hermit Thrush	5	0	0	1.7	2	1	0	5	1	1.8	4	4	0	0	0	1.6	0	0	4	2	0	1.2	0	0.0		
	Swainson's Thrush	0	0	0	0.0	0	0	0	0	0	0.0	4	0	4	1	0	1.8	2	3	4	2	3	2.8	0	0.0		
Sylviidae	Ruby-crowned Kinglet	2	2	4	2.7	4	8	8	8	7.2	6	4	8	6	6	6.0	6	6	4	6	6	5.6	0	0.0			
Vireonidae	Solitary Vireo	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	2	0	0	0	0	0.4			
Parulidae	Black-and-white Warbler	0	0	0	0.0	0	0	0	0	0	0.0	4	6	0	0	2	2.4	0	2	4	4	2	2.4	0	0.0		
	Tennessee Warbler	0	0	0	0.0	0	0	0	0	0	0.0	26	24	12	15	8	17.0	18	20	8	16	22	16.8	0	0.0		
	Nashville Warbler	0	0	0	0.0	0	6	8	4	2	4.0	0	0	2	4	4	2.0	2	10	4	8	0	4.8	0	0.0		
	Parula Warbler	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0.0		
	Magnolia Warbler	0	0	0	0.0	0	0	0	0	0	0.0	8	6	6	4	2	5.2	6	4	6	6	2	4.8	0	0.0		

(Cont'd)

Table VI (Concl)

Family	Species	Pre-spray 1						Post-spray 1						Pre-spray 2						Post-spray 2					
		May 9	May 10	May 11	Daily -2	May 12	May 13	May 14	May 15	May 16	Daily +1	May 28	May 29	May 30	May 31	June 1	Daily -4	June 2	June 3	June 4	June 5	June 6	Daily +1		
		-1	-0	avg.	+2	+3	+4	+5	avg.	+2	+3	+4	+5	avg.	-3	-2	-1	-0	avg.	+2	+3	+4	+5	avg.	
Parulidae (cont'd.)	Cape May Warbler	0	0	0	0.0	0	0	0	2	8	2.0	16	16	12	10	6	12.0	8	12	12	12	2	9.2		
	Yellow-rumped Warbler	0	2	0	0.7	4	9	9	9	8	7.8	4	0	6	6	4	4.0	4	8	4	8	0	4.8		
	Blackburnian Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	2	4	8	4	3.6	0	0	3	6	2	2.2		
	Chestnut-sided Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	4	0	0	0	0.8	0	0	0	0	0	0.0		
	Bay-breasted Warbler	0	0	0	0.0	0	0	0	0	0	0.0	4	8	10	16	12	10.0	20	6	16	14	10	13.2		
	Blackpoll Warbler	0	0	0	0.0	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	4	0	0	0.8		
	Ovenbird	0	0	0	0.0	0	0	0	0	2	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
	Common Yellowthroat	0	0	0	0.0	0	0	0	0	0	0.0	4	4	2	6	0	3.2	0	0	0	6	0	1.2		
	Canada Warbler	0	0	0	0.0	0	0	0	0	0	0.0	4	0	0	0	0	0.8	0	0	0	2	0	0.4		
Icteridae	Brown-headed Cowbird	0	0	2	0.7	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
	Rusty Blackbird	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	1	0.2		
Fringillidae	Evening Grosbeak	0	0	0	0.0	0	3	0	0	0	0.6	1	1	0	2	0	0.8	0	0	0	0	0	0.0		
	Purple Finch	0	0	0	0.0	0	2	0	2	2	1.2	2	0	2	2	2	1.6	0	2	0	2	4	1.6		
	Pine Siskin	0	0	2	0.7	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0		
	American Goldfinch	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0		
	Dark-eyed Junco	1	0	2	1.0	4	3	2	4	4	3.4	2	2	6	4	2	3.2	4	4	2	2	2	2.8		
	White-crowned Sparrow	0	0	0	0.0	0	0	0	0	0	0.0	1	0	0	0	0	0.2	0	0	0	0	0	0.0		
	White-throated Sparrow	0	0	6	2.0	4	2	12	11	9	7.6	11	7	11	6	5	8.0	6	11	8	8	8	8.2		
Total Birds		8	6	17	10.5	22	34	55	46	50	41.4	111	103	104	98	62	95.6	80	96	92	113	71	90.4		

Table VII
 Forest bird population census
 Untreated control plot 1
 St. Pascal, Quebec
 28 May - 7 June, 1978

Family	Species	Pre-spray treatment 1						Post-spray treatment 2					
		May 28	May 29	May 30	May 31	June 1	Avg. per day	June 3	June 4	June 5	June 6	June 7	Avg. per day
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+5	
Ardeidae	American Bittern	0	0	2	2	0	0.8	1	2	2	0	0	1.0
Acedinidae	Belted Kingfisher	0	0	0	1	0	0.2	0	0	0	0	0	0.0
Picidae	Common Flicker	0	0	0	0	0	0.0	0	0	0	0	2	0.4
Tyrannidae	Least Flycatcher	2	0	0	2	0	0.8	0	0	2	0	2	0.8
Corvidae	Gray Jay	0	0	4	0	0	0.8	0	2	0	0	0	0.4
	Blue Jay	0	2	0	0	0	0.4	0	0	0	0	2	0.4
	Common Raven	0	0	0	0	0	0.0	0	0	1	0	0	0.2
	Common Crow	0	0	0	0	0	0.0	0	0	1	0	0	0.2
Paridae	Black-capped Chickadee	0	0	0	0	0	0.0	0	0	2	0	0	0.4
	Boreal Chickadee	0	0	0	0	0	0.0	0	0	2	0	0	0.4
Sittidae	Red-breasted Nuthatch	4	2	0	0	0	1.2	0	0	2	0	0	0.4
Mimidae	Catbird	0	2	0	0	0	0.4	0	2	2	2	2	1.6
Turdidae	American Robin	4	4	2	5	4	3.8	2	2	6	2	2	2.8
	Hermit Thrush	0	0	0	4	0	0.8	0	5	0	0	0	1.0
	Swainson's Thrush	2	0	0	0	0	0.4	0	2	1	0	0	0.6
	Veery	1	2	2	4	2	2.2	2	0	2	2	5	2.2
Sylviidae	Golden-crowned Kinglet	0	0	0	0	0	0.0	2	2	0	0	0	0.0
	Ruby-crowned Kinglet	6	8	3	4	8	5.8	4	2	6	4	4	4.0
Vireonidae	Solitary Vireo	2	6	0	0	0	1.6	0	0	0	0	0	0.0
	Red-eyed Vireo	0	0	0	0	0	0.0	0	0	0	2	0	0.4

(Cont'd)

Table VII (Concl)

Family	Species	Pre-spray treatment 2						Post-spray treatment 2					
		May 28 -5	May 29 -4	May 30 -3	May 31 -2	June 1 -1	Avg. per day	June 3 +1	June 4 +2	June 5 +3	June 6 +4	June 7 +5	Avg. per day
Parulidae	Black-and-White Warbler	0	0	0	0	0	0.0	2	0	0	0	0	0.4
	Tennessee Warbler	12	14	8	16	10	12.0	6	8	10	10	4	7.6
	Nashville Warbler	2	0	2	0	0	0.8	2	4	2	4	0	2.4
	Parula Warbler	0	2	2	2	2	1.6	2	0	2	0	0	0.8
	Magnolia Warbler	6	6	2	8	6	5.6	5	12	4	4	8	6.6
	Cape May Warbler	4	10	4	4	4	5.2	6	6	8	10	10	8.0
	Yellow-rumped Warbler	8	8	2	0	1	3.8	2	4	0	2	4	2.4
	Black-throated Green Warbler	2	0	0	0	0	0.4	0	0	0	0	0	0.0
	Blackburnian Warbler	0	0	1	2	2	1.0	0	4	0	4	2	2.0
	Bay-breasted Warbler	8	10	2	8	6	6.8	4	4	0	4	4	3.2
	Blackpoll Warbler	0	6	0	0	0	1.2	0	0	0	0	0	0.0
	Ovenbird	2	0	0	2	0	0.8	2	2	4	4	2	2.8
	Northern Waterthrush	0	0	4	0	2	1.2	0	0	2	0	0	0.4
	Common Yellowthroat	8	6	0	0	2	3.2	0	0	4	0	2	1.2
	Canada Warbler	0	0	0	0	2	0.4	0	2	0	4	0	1.2
Icteridae	Redwinged Blackbird	20	17	9	15	17	15.6	11	13	10	13	15	12.4
	Common Grackle	2	4	0	0	2	1.6	2	2	0	2	2	1.6
	Brown-headed Cowbird	0	2	0	0	0	0.4	0	0	0	2	0	0.4
Thraupidae	Scarlet Tanager	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Fringillidae	Rose-breasted Grosbeak	4	2	4	4	6	4.0	4	0	3	6	2	3.0
	Evening Grosbeak	0	0	1	0	1	0.4	0	1	0	0	0	0.2
	Purple Finch	0	2	0	0	0	0.4	2	0	4	2	0	1.6
	Dark-eyed Junco	0	0	0	0	2	0.4	0	2	0	0	1	0.6
	Chipping Sparrow	2	2	2	0	0	1.2	2	0	2	0	4	1.6
	White-throated Sparrow	4	4	2	9	6	5.0	4	6	2	11	7	6.0
	Swamp Sparrow	8	10	4	2	0	4.8	0	2	0	0	2	0.8
Total Birds		115	131	62	94	85	97.4	67	91	86	94	88	85.2

Table VIII
 Forest bird population census VIII
 Untreated control plot 2
 St. Pascal, Quebec
 28 May - 7 June, 1978

Family	Species	Pre-spray treatment 2						Post-spray treatment 2					
		May 28	May 29	May 30	May 31	June 1	Avg. per day	June 3	June 4	June 5	June 6	June 7	Avg. per day
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+5	
Tetraonidae	Ruffed Grouse	2	0	2	2	0	1.2	0	3	0	0	0	0.6
Scolopacidae	Common Snipe	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Picidae	Common Flicker	0	0	0	2	0	0.4	0	0	0	0	0	0.0
Tyrannidae	Yellow-bellied Flycatcher	0	0	0	0	0	0.0	0	0	4	0	0	0.8
	Least Flycatcher	4	4	4	4	0	3.2	2	4	6	2	4	3.6
Corvidae	Blue Jay	0	0	4	0	0	0.8	0	2	2	0	0	0.8
Sittidae	Red-breasted Nuthatch	4	0	0	0	0	0.8	0	0	2	0	0	0.4
Troglodytidae	Winter Wren	0	0	2	2	0	0.8	0	0	0	0	0	0.0
Turdidae	Hemmit Thrush	1	4	2	2	0	1.8	2	0	0	2	0	0.8
	Swainson's Thrush	4	2	0	0	0	1.2	2	2	5	3	4	3.2
	Veery	3	0	0	0	0	0.6	2	0	4	6	2	2.8
Sylviidae	Ruby-crowned Kinglet	4	0	0	0	2	1.2	0	0	0	0	0	0.0
Vireonidae	Solitary Vireo	2	2	0	2	0	1.2	2	4	0	2	0	1.6
	Red-eyed Vireo	0	0	0	0	0	0.0	0	0	2	4	2	1.6

(Cont'd)

Table VIII (Concl)

Family	Species	Pre-spray treatment 2							Post-spray treatment 2						
		May 28 -5	May 29 -4	May 30 -3	May 31 -2	June 1	Avg. per day	June 3 +1	June 4 +2	June 5 +3	June 6 +4	June 7 +5	Avg. per day		
Parulidae	Black-and-white Warbler	1	0	2	6	0	1.8	0	0	0	0	0	0.0		
	Tennessee Warbler	12	8	10	6	2	7.6	2	2	0	6	0	2.0		
	Magnolia Warbler	6	9	0	2	0	3.4	0	2	2	0	2	1.2		
	Cape May Warbler	8	12	2	2	2	5.2	0	4	8	2	4	3.6		
	Black-throated blue Warbler	0	0	0	0	0	0.0	0	2	0	0	0	0.4		
	Yellow-rumped Warbler	6	4	4	4	0	3.6	4	6	2	0	0	2.4		
	Black-throated green Warbler	2	2	2	2	0	1.6	0	0	0	0	0	0.0		
	Blackburnian Warbler	6	4	0	0	0	2.0	0	0	6	2	2	2.0		
	Chestnut-sided Warbler	2	2	0	0	0	0.8	0	0	0	0	0	0.0		
	Bay-breasted Warbler	14	10	4	4	0	6.4	2	2	0	4	6	2.8		
	Blackpoll Warbler	0	0	0	0	2	0.4	2	0	2	2	0	1.2		
	Ovenbird	6	6	4	6	0	4.4	2	6	2	4	8	4.4		
	Mountain Warbler	0	0	0	2	0	0.4	0	0	0	0	0	0.0		
	Canada Warbler	0	0	0	0	0	0.0	0	4	2	4	2	2.4		
	American Redstart	0	0	0	0	0	0.0	0	0	0	2	0	0.4		
Icteridae	Brown-headed Cowbird	6	4	0	0	0	2.0	0	0	3	0	0	0.6		
Fringillidae	Rose-breasted Grosbeak	2	2	2	2	0	1.6	0	0	3	0	0	0.6		
	Evening Grosbeak	2	2	0	0	0	0.8	0	0	1	0	3	0.8		
	Purple Finch	2	2	2	0	0	1.2	2	2	4	0	0	1.6		
	Dark-eyed Junco	0	0	0	0	0	0.0	0	2	2	0	0	0.8		
	White-throated Sparrow	4	2	0	2	0	1.6	0	2	4	2	0	1.6		
	Unidentified birds	0	0	0	1	0	0.2	2	0	2	2	0	1.2		
Total birds		105	81	46	53	8	58.6	26	49	68	49	39	46.2		

Table IX
 Forest bird population census
 Experimental plot 108-7
 St. Pascal, Quebec
 28 May - 7 June, 1978
 (amfocarb applied 2 June at the dosage rate of 52 gm Al/ha)

Family	Species	Pre-spray treatment 2					Avg. per day	Post-spray treatment 2					Avg. per day
		May 28 -5	May 29 -4	May 30 -3	May 31 -2	June 1 -1		June 3 +1	June 4 +2	June 5 +3	June 6 +4	June 7 +5	
Picidae	Common Flicker	2	0	0	0	0	0.4	0	0	0	0	0	0.0
Tyrannidae	Eastern Phoebe	0	0	0	0	0	0.0	0	2	2	2	2	1.6
Corvidae	Gray Jay	0	0	1	1	0	0.4	0	4	0	3	2	1.8
	Blue Jay	0	0	1	0	0	0.2	0	0	0	0	0	0.0
Paridae	Boreal Chickadee	0	0	0	0	0	0.0	2	0	0	0	0	0.4
Turdidae	American Robin	2	0	0	0	1	0.6	3	0	0	4	0	1.4
	Hermit Thrush	0	0	0	2	0	0.4	3	0	0	0	2	1.0
	Swainson's Thrush	0	0	0	0	0	0.0	1	0	2	0	0	0.6
	Veery	0	0	0	1	1	0.4	0	2	3	4	0	1.8
Sylviidae	Ruby-crowned Kinglet	0	0	0	0	0	0.0	0	2	0	0	0	0.4
Vireonidae	Solitary Vireo	0	0	0	2	0	0.4	4	0	0	0	0	0.8
	Philadelphia Vireo	0	0	0	0	0	0.0	0	0	2	2	0	0.8
Parulidae	Black-and-white Warbler	0	2	0	2	0	0.8	0	0	0	0	0	0.0
	Tennessee Warbler	4	2	0	3	2	2.2	2	0	2	0	0	0.8
	Nashville Warbler	2	2	4	0	6	2.8	6	4	2	0	2	2.8
	Yellow Warbler	0	0	0	2	0	0.4	0	0	0	0	0	0.0
	Magnolia Warbler	6	4	8	12	8	7.6	10	8	8	4	6	7.2
	Cape May Warbler	2	2	0	0	2	1.2	0	2	0	0	2	0.8
	Black-throated Blue Warbler	2	2	6	2	2	2.8	2	2	2	2	2	2.0
	Yellow-rumped Warbler	0	2	4	0	0	1.2	0	6	2	0	2	2.0
	Black-throated Green Warbler	2	2	2	2	2	2.0	0	0	0	0	6	1.2
	Blackburnian Warbler	2	0	0	4	0	1.2	0	0	4	2	2	1.6
	Chestnut-sided Warbler	8	8	8	6	4	6.8	2	6	8	4	6	5.2
	Bay-breasted Warbler	2	0	4	6	0	2.4	4	2	0	2	2	2.0
	Ovenbird	2	2	4	0	0	1.6	0	2	4	2	2	2.4
	Mourning Warbler	2	4	6	6	2	4.0	2	0	4	2	2	2.0
	Common Yellowthroat	0	4	0	4	2	2.0	3	4	10	4	4	5.0
	Wilson's Warbler	0	0	0	0	0	0.0	0	0	2	0	2	0.8

(Cont'd)

Table IX (Concl)

Family	Species	Pre-spray treatment 2					Avg. per day	Post-spray treatment 2					Avg. per day
		May 28	May 29	May 30	May 31	June 1		June 3 +1	June 4 +2	June 5 +3	June 6 +4	June 7 +5	
		-5	-4	-3	-2	-1							
Parulidae (Cont'd)	Canada Warbler	0	0	0	0	0	0.0	2	4	0	2	0	1.6
	American Redstart	0	0	0	0	2	0.4	2	0	0	0	2	0.8
Icteridae	Brown-headed Cowbird	0	0	1	0	2	0.6	0	0	0	0	0	0.0
Fringillidae	Rose-breasted Grosbeak	0	2	4	4	4	2.8	2	6	4	2	2	3.2
	Evening Grosbeak	6	0	0	1	0	1.4	0	0	2	0	2	0.8
	Purple Finch	0	0	0	0	0	0.0	0	2	0	0	2	0.8
	Pine Siskin	0	0	2	2	0	0.8	0	0	0	2	0	0.4
	American Goldfinch	0	0	0	0	6	1.2	0	2	2	0	0	0.8
	Dark-eyed Junco	0	0	0	0	0	0.0	0	2	2	0	0	0.8
	White-throated Sparrow	2	10	13	12	11	9.6	7	13	11	12	6	9.8
	Lincoln's Sparrow	0	0	0	0	0	0.0	0	0	0	4	0	0.8
Total birds:		46	48	68	74	57	58.6	57	73	76	59	62	65.4

Table X
 Forest bird population census
 Experimental plot 108-8
 St. Pascal, Quebec
 1978
 (aminocarb applied on 2 June at the rate of 52 gm Al/ha)

Family	Species	Pre-spray treatment 2						Post-spray treatment 2					
		May 28	May 29	May 30	May 31	June 1	Avg. per day	June 3	June 4	June 5	June 6	June 7	Avg. per day
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+5	
Picidae	Common Flicker	0	4	2	0	0	1.2	0	0	2	2	0	0.8
	Yellow-bellied Sapsucker	0	0	0	0	0	0.0	1	0	0	0	0	0.2
Tyrannidae	Eastern Phoebe	0	0	0	0	0	0.0	0	4	0	0	2	1.2
	Least Flycatcher	0	2	2	2	0	1.2	0	0	0	0	0	0.0
Hirundinidae	Tree Swallow	0	1	0	0	0	0.2	0	0	0	0	0	0.0
Corvidae	Blue Jay	0	2	0	0	0	0.4	0	2	0	1	0	0.6
	Common Raven	0	1	0	0	0	0.2	0	0	0	1	0	0.2
Paridae	Black-capped Chickadee	0	0	0	0	0	0.0	0	2	0	2	0	0.8
	Boreal Chickadee	0	0	2	0	0	0.4	0	0	0	0	0	0.0
Turdidae	Swainson's Thrush	4	4	2	1	0	2.2	0	3	0	6	2	2.2
Sylviidae	Ruby-crowned Kinglet	2	0	0	0	0	0.4	2	0	0	0	2	0.8
Vireonidae	Solitary Vireo	0	2	0	0	0	0.4	0	2	0	0	2	0.8
Parulidae	Black-and-white Warbler	2	0	0	0	0	0.4	0	2	0	0	0	0.4
	Tennessee Warbler	12	14	8	10	8	10.4	14	18	16	10	12	14.0
	Nashville Warbler	0	0	0	2	0	0.4	2	0	0	0	0	0.4
	Magnolia Warbler	8	10	6	12	6	8.4	6	10	12	16	12	11.2
	Cape May Warbler	2	4	0	0	0	1.2	0	0	0	0	2	0.4
	Yellow-rumped Warbler	0	0	2	0	0	0.4	0	2	4	2	0	1.6
	Black-throated Green Warbler	0	0	0	0	0	0.0	2	0	0	0	0	0.4
	Chestnut-sided Warbler	2	0	0	0	0	0.4	0	0	0	0	0	0.0
	Bay-breasted Warbler	0	0	0	2	2	0.8	4	4	2	4	4	3.6
	Blackpoll Warbler	0	0	0	0	0	0.0	0	0	0	0	2	0.4
	Ovenbird	2	0	0	0	0	0.4	0	0	0	0	0	0.0
	Mourning Warbler	0	0	0	0	0	0.0	2	0	0	0	0	0.4
	Common Yellowthroat	2	0	4	4	4	2.8	4	2	2	4	4	3.2
	Canada Warbler	0	0	2	2	2	1.2	0	0	0	0	0	0.0

(Cont'd)

Table X (Concl)

Table XI
 Forest bird population census
 Untreated control plot 1
 St. Pascal, Quebec
 28 May - 15 June, 1978

Family	Species	Pre-spray treatment 1						Post-spray treatment 2						Post-spray treatment 3						Avg. per day
		May 28	May 29	May 30	May 31	June 1	Avg. per day	June 3	June 4	June 5	June 6	June 8	Avg. per day	June 11	June 12	June 13	June 14	June 15		
		-5	-4	-3	-2	-1	day	+1	+2	+3	+4	+6	day	+1	+2	+3	+4	+5		
Ardeidae	American Bittern	0	0	2	2	0	0.8	1	2	2	0	2	1.4	0	1	0	0	2	0.6	
Alcedinidae	Belted Kingfisher	0	0	0	1	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0	
Tyrannidae	Least Flycatcher	2	0	0	2	0	0.8	0	0	2	0	0	0.4	0	0	2	2	2	1.2	
	Olive-sided Flycatcher	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4	
Corvidae	Gray Jay	0	0	4	0	0	0.8	0	2	0	0	0	0.4	0	1	0	0	0	0.2	
	Blue Jay	0	2	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0	
	Common Raven	0	0	0	0	0	0.0	0	0	1	0	1	0.4	1	1	1	0	0	0.6	
	Common Crow	0	0	0	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0	
Paridae	Black-capped Chickadee	0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0	
	Boreal Chickadee	0	0	0	0	0	0.0	0	0	2	0	0	0.4	0	0	0	0	0	0.0	
Sittidae	Red-breasted Nuthatch	4	2	0	0	0	1.2	0	0	2	0	0	0.4	2	0	2	0	0	0.8	
Mimidae	Catbird	0	2	0	0	0	0.4	0	2	2	2	0	1.2	0	2	2	2	2	1.6	
Turdidae	American Robin	4	4	2	5	4	3.8	2	2	6	2	2	2.8	2	2	5	5	5	3.8	
	Hemmit Thrush	0	0	0	4	0	0.8	0	5	0	0	0	1.0	0	0	0	0	0	0.0	
	Swainson's Thrush	2	0	0	0	0	0.4	0	2	1	0	1	0.8	0	0	0	0	0	0.0	
	Veery	1	2	2	4	2	2.2	2	0	2	2	2	1.6	2	0	2	0	2	1.2	
Sylviidae	Golden-crowned Kinglet	0	0	0	0	0	0.0	2	2	0	0	0	0.8	0	2	0	0	2	0.8	
	Ruby-crowned Kinglet	6	8	3	4	8	5.8	4	2	6	4	2	3.6	0	0	2	2	0	0.8	
Bombycillidae	Cedar Waxwing	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	2	1	0	2	1.0	
Vireonidae	Solitary Vireo	2	6	0	0	0	1.6	0	0	0	0	0	0.0	0	0	0	0	0	0.0	
	Red-eyed Vireo	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0.0	
Parulidae	Black-and-white Warbler	0	0	0	0	0	0.0	2	0	0	0	2	0.8	0	0	0	0	0	0.0	
	Tennessee Warbler	12	14	8	16	10	12.0	6	8	10	10	6	8.0	0	0	4	0	4	1.6	
	Nashville Warbler	2	0	2	0	0	0.8	2	4	2	4	0	2.4	0	4	2	4	2	2.4	
	Parula Warbler	0	2	2	2	2	1.6	2	0	2	0	0	0.8	0	2	2	0	2	1.2	

(Cont'd)

Table XI (Concl)

Family	Species	Pre-spray treatment 2							Post-spray treatment 2							Post-spray treatment 3						
		May 28	May 29	May 30	May 31	June 1	Avg. per day	June 3	June 4	June 5	June 6	June 8	Avg. per day	June 11	June 12	June 13	June 14	June 15	Avg. per day			
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+6		+1	+2	+3	+4	+5				
Parulidae (Cont'd)	Magnolia Warbler	6	6	2	8	6	5.6	5	12	4	4	2	5.4	14	0	4	2	0	4.0			
	Cape May Warbler	4	10	4	4	4	5.2	6	6	8	10	8	7.6	2	6	12	2	4	5.2			
	Yellow-rumped Warbler	8	8	2	0	1	3.8	2	4	0	2	0	1.6	0	4	0	0	0	0.8			
	Black-throated Green Warbler	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0			
	Blackburnian Warbler	0	0	1	2	2	1.0	0	4	0	4	4	2.4	2	0	0	0	0	0.4			
	Bay-breasted Warbler	8	10	2	8	6	6.8	4	4	0	4	0	2.4	4	4	4	2	8	4.4			
	Blackpoll Warbler	0	6	9	0	0	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0			
	Ovenbird	2	0	0	2	0	0.8	2	2	4	4	2	2.8	0	4	2	2	2	2.0			
	Northern Waterthrush	0	0	4	0	2	1.2	0	0	2	0	2	0.8	0	0	0	0	0	0.0			
	Common Yellowthroat	8	6	0	0	2	3.2	0	0	4	0	0	0.8	2	0	4	0	0	1.2			
	Canada Warbler	0	0	0	0	2	0.4	0	2	0	4	0	1.2	0	2	2	0	6	2.0			
Icteridae	Redwinged Blackbird	20	17	9	15	17	15.6	11	13	10	13	14	12.2	14	16	18	16	17	16.2			
	Common Grackle	2	4	0	0	2	1.6	2	2	0	2	0	1.2	0	3	0	3	0	1.2			
	Brown-headed Cowbird	0	2	0	0	0	0.4	0	0	0	2	2	0.8	0	0	0	0	0	0.0			
Thraupidae	Scarlet Tanager	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0			
Fringillidae	Rose-breasted Grosbeak	4	2	4	4	6	4.0	4	0	3	6	4	3.4	2	4	6	2	2	3.2			
	Evening Grosbeak	0	0	1	0	1	0.4	0	1	0	0	0	0.2	0	1	0	2	2	1.0			
	Purple Finch	0	2	0	0	0	0.4	2	0	4	2	0	1.6	0	0	0	2	2	0.8			
	Pine Grosbeak	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4			
	Dark-eyed Junco	0	0	0	0	2	0.4	0	2	0	0	0	0.4	0	0	0	0	0	0.0			
	Chipping Sparrow	2	2	2	0	0	1.2	2	0	2	0	0	0.8	2	0	0	0	0	0.4			
	White-throated Sparrow	4	4	2	9	6	5.0	4	6	2	11	0	4.6	2	0	4	2	2	2.0			
	Swamp Sparrow	8	10	4	2	0	4.8	0	2	0	0	0	0.4	0	0	0	0	0	0.0			
Total birds:		115	131	62	94	85	97.4	67	91	86	94	56	78.8	51	61	83	52	70	63.4			

Table XII
 Forest bird population census
 Untreated control plot 2
 St. Pascal, Quebec
 28 May - 7 June, 1978

Family	Species	Pre-spray treatment 1						Post-spray treatment 2						Post-spray treatment 3					
		May 28	May 29	May 30	May 31	June 1	Avg per day	June 3	June 4	June 5	June 6	June 8	Avg per day	June 11	June 12	June 13	June 14	June 15	Avg per day
Tetraonidae	Ruffed Grouse	2	0	2	2	0	1.2	0	3	0	0	0	0.6	0	0	0	0	0	0.0
Scolopacidae	Common Snipe	2	0	0	0	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Picidae	Common Flicker	0	0	0	2	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Tyrannidae	Yellow-bellied Flycatcher	0	0	0	0	0	0.0	0	0	4	0	0	0.8	0	0	0	2	0	0.4
	Least Flycatcher	4	4	4	4	0	3.2	2	4	6	2	4	3.6	2	2	4	2	2	2.4
Corvidae	Gray Jay	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	1	0	0.2
	Blue Jay	0	0	4	0	0	0.8	0	2	2	0	0	0.8	0	0	0	0	0	0.0
Sittidae	Red-breasted Nuthatch	4	0	0	0	0	0.8	0	0	2	0	0	0.4	0	0	0	0	0	0.0
Troglodytidae	Winter Wren	0	0	2	2	0	0.8	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Turdidae	American Robin	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	1	0	0.2
	Hemmit Thrush	1	4	2	2	0	1.8	2	0	0	2	2	1.2	0	0	2	2	0	0.8
	Swainson's Thrush	4	2	0	0	0	1.2	2	2	5	3	5	3.4	2	4	2	4	0	2.4
	Veery	3	0	0	0	0	0.6	2	0	4	6	0	2.4	2	2	4	2	2	2.4
Sylviidae	Ruby-crowned Kinglet	4	0	0	0	2	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Vireonidae	Solitary Vireo	2	2	0	2	0	1.2	2	4	0	2	0	1.6	0	0	0	2	2	0.8
	Red-eyed Vireo	0	0	0	0	0	0.0	0	0	2	4	2	1.6	2	2	4	2	2	2.4
Parulidae	Black-and-White Warbler	1	0	2	6	0	1.8	0	0	0	0	0	0.0	0	0	0	2	2	0.8
	Tennessee Warbler	12	8	10	6	2	7.6	2	2	0	6	0	2.0	2	2	2	2	2	2.0
	Nashville Warbler	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	2	0.8

(Cont'd)

Table XII (Concl)

Family	Species	Pre-spray treatment 2						Post-spray treatment 2						Post-spray treatment 3					
		May 28	May 29	May 30	May 31	June 1	Avg per day	June 3	June 4	June 5	June 6	June 8	Avg per day	June 11	June 12	June 13	June 14	June 15	Avg per day
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+6		+1	+2	+3	+4	+5	
Parulidae (cont'd)	Magnolia Warbler	6	9	0	2	0	3.4	0	2	2	0	2	1.2	2	0	2	0	0	0.8
	Cape May Warbler	8	12	2	2	2	5.2	0	4	8	2	2	3.2	4	2	6	2	4	3.6
	Black-throated Blue Warbler	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0.0
	Yellow-rumped Warbler	6	4	4	4	0	3.6	4	6	2	0	2	2.8	2	0	0	0	0	0.8
	Black-throated Green Warbler	2	2	2	2	0	1.6	0	0	0	0	4	0.8	0	0	0	0	2	0.4
	Blackburnian Warbler	6	4	0	0	0	2.0	0	0	6	2	0	1.6	0	0	0	0	2	0.4
	Chestnut-sided Warbler	2	2	0	0	0	0.8	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Bay-breasted Warbler	14	10	4	4	0	6.4	2	2	0	4	2	2.0	4	0	6	4	0	2.8
	Blackpoll Warbler	0	0	0	0	2	0.4	2	0	2	2	0	1.2	0	0	0	0	0	0.0
	Ovenbird	6	6	4	6	0	4.4	2	6	2	4	6	4.0	2	4	6	0	4	3.2
	Mourning Warbler	0	0	0	2	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Canada Warbler	0	0	0	0	0	0.0	0	4	2	4	4	2.8	2	2	4	2	4	2.8
	American Redstart	0	0	0	0	0	0.0	0	0	0	2	0	0.4	0	0	0	0	0	0.0
Icteridae Fringillidae	Brown-breasted Cowbird	6	4	0	0	0	2.0	0	0	3	0	0	0.6	0	0	0	2	0	0.4
	Evening Grosbeak	2	2	0	0	0	0.8	0	0	1	0	0	0.2	0	0	2	0	2	0.8
	Purple Finch	2	2	2	0	0	1.2	2	2	4	0	2	2.0	0	0	0	0	0	0.0
	Pine Grosbeak	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	2	0.4
	Dark-eyed Junco	0	0	0	0	0	0.0	0	2	2	0	0	0.8	0	0	0	0	0	0.0
	White-throated Sparrow	4	2	0	2	0	1.6	0	2	4	2	0	1.6	4	0	2	0	0	1.2
	Unidentified Birds	0	0	0	1	0	0.2	2	0	2	2	0	1.2	1	0	0	0	0	0.2
Total Birds		105	81	46	53	8	58.6	26	49	68	49	37	45.8	31	20	48	34	34	33.4

Table XIII
Forest bird population census
Experimental plot 109-9
St. Pascal, Quebec
28 May - 15 June, 1978
(aminocarb applied 2 June and 10 June at the rate of 52 gm Al/ha)

Family	Species	Pre-spray treatment 1						Post-spray treatment 2						Post-spray treatment 3					
		May 28	May 29	May 30	May 31	June 1	Avg per day	June 3	June 4	June 5	June 6	June 8	Avg per day	June 11	June 12	June 13	June 14	June 15	Avg per day
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+6		+1	+2	+3	+4	+5	
Picidae	Common Flicker	0	0	0	2	0	0.4	0	2	2	0	0	0.8	0	0	0	0	0	0.0
	Yellow-bellied Sapsucker	0	1	0	0	0	0.2	0	0	1	1	0	0.4	0	0	0	0	0	0.0
Tyrannidae	Yellow-bellied Flycatcher	0	0	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4
	Least Flycatcher	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	2	2	4	0	1.6
Corvidae	Gray Jay	1	0	0	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Blue Jay	0	1	1	0	1	0.6	2	1	0	1	0	0.8	1	0	1	1	2	1.0
Paridae	Black-capped Chickadee	0	0	0	0	0	0.0	0	0	1	0	0	0.2	0	0	0	0	0	0.0
	Boreal Chickadee	0	0	1	1	0	0.4	0	0	0	1	0	0.2	0	0	0	0	0	0.0
Sittidae	Red-breasted Nuthatch	0	0	0	2	0	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Troglodytidae	Winter Wren	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	0	0.4
Turdidae	American Robin	3	2	2	1	0	1.6	0	2	0	0	0	0.4	0	0	0	0	0	0.0
	Hermits Thrush	2	2	6	0	0	2.0	4	0	2	2	1	1.8	2	0	0	2	1	1.0
	Swainson's Thrush	4	4	2	2	0	2.4	3	2	2	3	2	2.4	1	0	0	2	4	1.4
	Veery	0	0	0	0	0	0.0	2	2	2	4	4	2.8	0	0	2	2	3	1.4
Sylviidae	Golden-crowned Kinglet	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	2	0	0	0.4
Vireonidae	Red-eyed Vireo	0	0	0	0	0	0.0	0	0	0	0	0	0.0	2	0	0	0	0	0.4

(Cont'd)

Table XIII (Concl)

Family	Species	Pre-spray treatment 2						Post-spray treatment 2						Post-spray treatment 3					
		May 28	May 29	May 30	May 31	June 1	Avg per day	June 3	June 4	June 5	June 6	June 8	Avg per day	June 11	June 12	June 13	June 14	June 15	Avg per day
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+6		+1	+2	+3	+4	+5	
Parulidae	Black-and-White Warbler	2	2	0	1	2	1.6	2	0	1	0	0	0.6	0	0	0	0	0	0.0
	Tennessee Warbler	18	22	14	18	10	14.4	10	12	6	6	4	7.6	6	4	8	2	2	4.4
	Nashville Warbler	4	6	4	6	2	4.4	8	2	4	2	2	3.6	4	4	8	0	6	4.4
	Magnolia Warbler	12	10	8	10	6	9.2	14	12	14	6	8	10.8	16	0	10	8	6	8.0
	Cape May Warbler	12	6	2	4	0	4.8	4	4	4	6	4	4.4	4	4	12	4	2	5.2
	Black-throated Blue Warbler	0	0	0	0	2	0.4	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Yellow-rumped Warbler	2	0	0	2	0	0.8	4	2	0	4	0	2.0	2	0	2	2	2	1.6
	Blackburnian Warbler	0	2	0	0	2	0.8	6	8	6	3	4	6.4	12	6	2	2	8	6.0
	Chestnut-sided Warbler	0	0	0	0	0	0.0	0	2	2	2	0	1.2	0	0	0	0	0	0.0
	Bay-breasted Warbler	0	0	0	0	0	0.0	0	6	3	6	2	3.4	6	2	2	2	2	2.8
	Blackpoll Warbler	0	0	2	2	2	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Ovenbird	4	2	2	6	4	3.6	4	6	4	6	4	4.8	8	4	4	4	4	4.8
	Mourning Warbler	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0.0
	Canada Warbler	0	0	2	0	0	0.4	2	2	2	2	2	2.0	4	2	4	0	2	2.4
Icteridae	Brown-headed Cowbird	0	0	0	1	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0.0
Fringillidae	Rose-breasted Grosbeak	2	4	2	2	0	2.0	0	2	6	2	4	2.8	4	2	0	2	2	2.0
	Evening Grosbeak	2	1	4	0	0	1.4	5	2	1	2	2	2.4	6	1	1	4	2	2.8
	Purple Finch	4	2	2	2	2	2.4	0	0	2	0	0	0.4	2	2	0	2	0	1.2
	Dark-eyed Junco	0	2	0	0	2	0.8	0	2	0	0	0	0.4	2	0	0	0	0	0.4
	White-throated Sparrow	2	5	2	4	0	2.6	4	2	0	3	2	2.2	2	2	3	4	4	3.0
Total Birds		74	74	56	67	35	62.3	74	75	65	67	45	65.2	86	35	63	49	52	57.0

Table XIV
 Forest bird population census
 Experimental plot 109-10
 St. Pascal, Quebec
 28 May - 15 June, 1978
 (amidinocarb applied on 2 June and 10 June at the rate of 52 gm/ha)

Family	Species	Pre-spray treatment 1							Post-spray treatment 2							Post-spray treatment 3											
		May		May		May		June	Avg.	June		June		June		Avg.	June		June		June		Avg.				
		28	29	30	31	1	per day		+1	12	13	14	16	per day		+1	12	13	14	15	per day		+1	12	13	14	15
Tetraonidae	Ruffed Grouse	4	2	0	0	2	1.6	5	2	0	2	0	1.8	2	0	0	0	0	0	0	0	0	0	0	0	0	0.4
Picidae	Common Flicker	2	2	0	0	2	1.2	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Yellow-bellied Sapsucker	0	0	0	0	0	0.0	0	1	0	0	0	0.2	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Tyrannidae	Yellow-bellied Flycatcher	0	0	0	0	0	0.0	0	2	0	4	0	1.6	2	0	2	0	0	0	0	0	0	0	0	0	0	0.8
	Least Flycatcher	0	0	0	4	0	1.2	2	4	2	4	2	3.0	2	2	2	2	2	2	2	2	2	2	2	2	2	2.0
	Eastern Wood Pewee	0	0	0	0	0	0.0	0	0	4	2	0	1.6	0	0	4	0	0	0	0	0	0	0	0	0	0	0.8
Corvidae	Gray Jay	0	0	1	0	0	0.2	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Blue Jay	0	1	0	0	0	0.2	1	2	3	8	0	2.8	2	0	7	2	2	2	2	2	2	2	2	2	2.6	
Paridae	Boreal Chickadee	6	4	0	0	0	2.0	0	0	0	0	0	0.0	0	0	2	2	0	0	0	0	0	0	0	0	0	0.8
Sittidae	Red-breasted Nuthatch	0	0	0	0	0	0.0	0	0	2	2	0	0.8	2	0	0	0	0	0	0	0	0	0	0	0	0	0.4
Troglodytidae	Winter Wren	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Turdidae	American Robin	0	0	1	2	2	1.0	0	0	0	0	2	0.4	2	0	2	0	0	0	0	0	0	0	0	0	0	0.8
	Bermitt Thrush	4	4	4	2	0	2.8	4	0	6	2	6	3.6	2	4	6	6	2	4.0								
	Swainson's Thrush	0	0	0	3	0	0.6	0	0	3	4	2	2.2	2	2	5	2	2	2	2	2	2	2	2	2	2.6	
	Veery	0	0	0	1	0	0.2	0	1	3	0	3	1.4	0	2	2	0	2	2	0	2	2	0	2	1.2		
Sylviidae	Ruby-crowned Kinglet	0	0	0	2	0	0.4	0	2	0	0	0	0.4	2	0	2	0	0	0	0	0	0	0	0	0	0	0.8
Vireonidae	Solitary Vireo	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4
	Red-eyed Vireo	0	0	0	2	0	0.4	0	2	0	0	0	0.4	4	2	4	0	0	0	0	0	0	0	0	0	0	2.4
	Philadelphia Vireo	0	0	0	0	0	0.0	0	2	0	0	0	0.4	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
Parulidae	Black and White Warbler	0	0	4	0	0	0.8	0	0	0	0	0	0.0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.0
	Tennessee Warbler	16	10	6	10	4	10.0	2	6	5	10	2	6.4	10	0	2	0	0	0	2	0	0	0	0	0	0	2.4
	Nashville Warbler	0	0	2	4	0	1.2	4	4	0	0	6	3.2	2	0	4	0	0	0	0	0	0	0	0	0	1.2	
	Magnolia Warbler	0	0	4	8	4	3.4	0	3	2	2	0	1.4	0	4	0	6	2	2	2	6	2	2	2	2	2.4	
	Cape May Warbler	6	6	0	0	0	2.4	2	0	0	0	0	0.4	2	2	8	0	0	0	0	0	0	0	0	6	3.6	
	Black-throated Blue Warbler	0	0	4	2	2	1.6	0	4	2	2	2	2.0	2	0	0	2	2	4	0	0	2	4	1.6			
	Yellow-rumped Warbler	6	4	0	2	0	2.4	0	2	0	2	0	0.8	2	2	4	2	2	2	2	2	2	2	2	2.4		

(Cont'd)

Table XIV (Concl)

Family	Species	Pre-spray treatment 2						Post-spray treatment 2						Post-spray treatment 3					
		May 28	May 29	May 30	May 31	June 1	Avg. per day	June 3	June 4	June 5	June 6	June 7	Avg. per day	June 11	June 12	June 13	June 14	June 15	Avg. per day
		-5	-4	-3	-2	-1		+1	+2	+3	+4	+5		+1	+2	+3	+4	+5	
Parulidae (Cont'd)	Black-throated Green Warbler	4	4	4	6	4	4.4	4	2	2	0	6	3.2	6	0	6	2	0	2.8
	Blackburnian Warbler	0	0	0	8	0	1.6	2	2	6	6	4	4.0	4	0	14	4	4	5.2
	Chestnut-sided Warbler	0	0	0	0	0	0.0	2	0	0	0	0	0.8	0	0	0	0	0	0.0
	Bay-breasted Warbler	0	0	0	0	2	0.4	0	6	4	6	4	4.0	4	2	10	8	0	4.8
	Ovenbird	4	6	4	2	2	3.6	2	2	2	2	2	2.0	2	0	2	0	2	1.2
	Mourning Warbler	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	0	0	0.0
	Common Yellowthroat	1	0	0	2	2	1.0	0	2	0	0	0	0.4	0	0	2	0	2	0.8
	Canada Warbler	0	0	0	6	0	1.6	2	4	6	6	4	4.4	8	2	6	2	4	4.5
Icteridae	Brown-headed Cowbird	28	0	2	2	2	3.2	1	4	2	0	1	1.8	0	0	0	0	0	0.0
Fringillidae	Rose-breasted Grosbeak	4	6	0	4	4	3.6	6	2	4	5	0	3.6	4	0	2	4	4	2.8
	Evening Grosbeak	3	4	0	4	1	2.4	0	1	0	0	0	0.2	0	0	3	0	6	1.8
	Purple Finch	0	0	0	0	2	0.4	0	2	0	0	0	0.4	0	0	2	0	0	0.4
	Dark-eyed Junco	0	0	0	0	0	0.0	0	2	0	2	0	0.8	0	0	1	0	0	0.2
	White-throated Sparrow	7	6	4	4	2	4.4	3	4	7	10	5	6.0	6	2	8	0	4	5.8
	Parula Warbler	0	0	0	0	0	0.0	0	0	0	0	0	0.0	0	0	0	2	2	0.8
Total birds:		95	59	40	80	37	62.2	42	72	65	80	51	62.0	74	26	112	57	54	64.6

Table XV

Summary of weather conditions recorded during forest bird census monitoring of blocks 101, 108 and 109 and untreated control plots 1 and 2, St. Pascal, Quebec.

8 May - 15 June 1978

Census Date	Temperature (° C)	Humidity	Cloud cover 1/10's	Precipitation type	Wind Speed (km/hr)	Remarks
May 8	8	low	0/10	nil	0-5	sunny - very little wind, good AM
9	9	100%	10/10	rain	10-20	high winds and rain - drizzle, clearing PM
10	11	100%	10/10	rain	25+	high winds, intermittent rain, clearing PM
11	11	low	1/10	nil	0-5	good AM, can hear birds
12	8	low	1/10	nil	0-5	cool early AM, warming by noon
13	14	low	0/10	nil	0-5	sunny, good day
14	6	low	0/10	nil	0-5	sunny
15	6	moderate	9/10	nil	0-5	cloudy cool AM, winds light
16	5	low	5/10	nil	0-5	cool - winds light
17	12	moderate	8/10	nil	5-10	cloudy - windy
18	10	low	0/10	nil	0	clear warm day
19	12	high	10/10	rain	0-5	weather reduced singing activity
20	6	high	10/10	rain/drizzle	0-5	foggy - drizzle weather, fairly good census weather
22	6	low	8/10	nil	0-5	windy on plot 109-10, remainder OK
23	1	low	0/10	nil	0	frost on ground
24	8	low	0/10	nil	5-10	warming, very heavy dew
25	8	moderate	3/10	nil	5-10	windy, cool in AM, warming during day
26	10	low	0/10	nil	10-25	windy, warm in AM, hot humid later in day
27	10	high	6/10	nil	15	haze, warm at census time - humid later
28	20	high	8/10	nil	calm	rain last night, woods very wet, hot humid during day
29	15	high	4/10	nil	calm	cool, hazy in AM, humid, scattered showers overnight
30	13	high	9/10	nil	5-10	sunny warm, wind gusts makes hearing difficult
31	8	high	0/10	nil	20-30	rain stop after census, humid, windy - hearing birds singing difficult
June 1	15	high	10/10	showers	10-30+	windy, hard to hear birds singing
2	10	high	10/10	showers	10-30	rain overnight, clearing later, windy
3	17	high	6/10	nil	0-5	very heavy dew
4	15	low	0/10	nil	0-5	clearing during AM
5	10	low	5/10	nil	0-5	rain overnight, cool AM, clearing during day
6	13	moderate	5/10	nil	10-25	windy, sunny, warm
7	15	low	1/10	nil	15	windy
8	18	moderate	0/10	nil	-	very heavy rains, no census work
9	-	high	10/10	rain	-	cool AM, very windy, hard to hear birds
10	5	low	0/10	nil	10-30	rain early in AM, clearing later in day
11	8	high	10/10	rain/showers	5-20	very windy, hard to hear birds, humid
12	19	high	5/10	nil	10-30	very hazy, humid and warm, cloudy later in day
13	20	very high	1/10	nil	10-25	windy, wet, rain earlier in day
14	7	high	10/10	rain/showers	5-20+	light rain, cool, and windy
15	7	moderate	10/10	rain	5-20	