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A preliminary catalogue of bird census plot studies in Canada, Part 5.by Anthony J. Erskine¹**Introduction**

Estimates of bird population density are essential for most environmental studies of terrestrial ecosystems, whether for academic curiosity or for direct application in impact assessment. Much recent effort (e.g. Ralph and Scott, eds. 1981) has been devoted to improving and standardizing methods of censusing birds, but the mapping census of measured plots remains the method least sensitive to observers' biases. For this reason, the Canadian census plot catalogue continues to be restricted to mapping censuses. The first four parts of the catalogue (Erskine 1971, 1972, 1976, 1980) presented data from over 460 plots surveyed before 1980. The present issue gives a summary of results from another 193 plots covered in the last 5 years. The presentation is the same as in the last two issues except that I have provided some sub-groupings within the five major habitat categories. I would re-emphasize that the catalogue should be considered as a key to sources of census plot data, rather than as a primary source in itself.

Methods

As before, this report includes only the results of mapping censuses as interpreted by outlining clusters of bird registrations (song or visual) that are taken to represent their territories.

Habitat classification of the study areas continues to pose problems, as no system allows unambiguous placing of all plots. Several other census-takers have encouraged me to attempt again something more specific than the broad groupings used in Part 4. Therefore, after some experimentation, I have devised a two-level, hierarchical system, with 16 sub-categories within the five major groupings used previously, as follows:

- I. Broad-leafed stands
 - (a) Acadian, (b) Great Lakes - St. Lawrence, (c) Sub-boreal (including parkland, montane, and western), (d) Boreal.

The sub-groups roughly follow the forest regions of Rowe (1959).
- II. Conifer and mixed (less than 50% broad-leafed) stands
 - (a) to (d) as under I.
- III. Wetlands
 - (a) Marshes and swamps (largely temperate), (b) Fens and bogs (largely boreal).
- IV. Open lands
 - (a) Clear-cuts less than 7 years old, (b) Farmlands,

- (c) Prairies, (d) Tundra (including low subarctic or subalpine scrub).

V. Urban areas

- (a) Built-up areas, (b) Urban parks.

Note: These sub-divisions do not always coincide with those used in Parts 1-3, and the prefixed letters do not correspond to those given earlier.

Using a three-level hierarchy would have meant having 45 or more different categories, which seemed likely to confuse as much as it would aid understanding. Within each grouping, I entered plots in the sequence that would have been followed in the three-level system; for example, under I.(a), mature stands would be listed first, followed by disturbed or successional stands. This may help in finding particular types, but may be awkward for persons seeking data on a particular province.

Results and discussion

As in past issues, I have summarized the geographical distribution of plots by major habitat types (Table 1). I have not attempted to sort out the cases where the revised habitat classification would have required moving a plot reported in another category in an earlier issue; for example, swamp forests were reported earlier as "broad-leafed stands", but now appear under "wetlands". The successional and disturbed areas censused in recent years (an increasing proportion of the total) defy completely systematic treatment, especially in view of the varying detail provided in the habitat descriptions.

As noted in Part 4 of the catalogue, some census workers recently have used plots of only 4 ha or even smaller. In some studies of forest succession following cutting, the small plot size has reflected the smallness of available cutover areas of the desired age. In other cases it has been argued that larger plots were unnecessary inasmuch as no territories found exceeded 2 ha in area, excluding those of grouse, raptors, and woodpeckers. Actually, crows and jays also have territories larger than 2 ha, but a more serious difficulty with the smaller plots exists for most species if we want to be more accurate than just to note the presence or absence of a breeding species. The problem is that usually a number of territories of a species will overlap the boundaries of a plot, and the only way to estimate what proportion of a territory those fractional areas represent is by comparison with those territories that lie completely within the plot. However, a plot as small as 4 ha seldom has more than two or three complete territories of a species available for comparison, and this greatly reduces the possible accuracy.

Another frequent departure from the recommendations of the International Bird Census Committee (1970) is in the number of visits used to assess the territories, recommended as 8 to 10. Because one-half to two-thirds of all territories typically are detected in a single visit, 94% will have been detected after five visits, and some argue

¹ CWS, Sackville, New Brunswick E0A 3C0.

that this is sufficient. What is ignored here is that, with only five visits, many territories still will be represented by only one or two registrations, rather than the preferred three or more spanning a period of 2 weeks or more. Where densities of breeding birds on a plot are very low, one may find it difficult to justify making more than five visits, but usually the desire for greater precision should urge at least eight.

Prince Edward Island remains unsampled. As in the past, more new plots were reported from Ontario than any other province, but the number in Alberta was also large as a result of the Alberta Oil Sands impact assessment studies (Francis and Lumbis 1980) and the national parks resource inventories (K. Van Tighem and G. Holroyd, unpubl. data in CWS files). Considerable additional work was done in Nova Scotia and New Brunswick.

Nowadays I do not hear of all unpublished studies promptly, as my work no longer takes me from coast to coast. Undoubtedly much other work remains unknown and unusable (cf. Table 2). Several of my colleagues have made available as yet unpublished material, and others have provided information on censuses completed but not yet worked up; the latter are included in Appendix 1. Published references reporting additional coverage of plots previously included in the catalogue are given in the "References to plot data", with cross-references to the earlier accounts; these data are not reported herein.

The people doing censuses are drawn more and more from professional and applied fields. The number of volunteers for this work in Canada has never been large (but note the studies summarized by McCracken *et al.* 1981) and seems to be dwindling. Are people being drawn away by less time-demanding exercises such as the Breeding Bird Survey and the new breeding bird atlas projects? In this issue I report only one thesis study involving census work, and the only other university research included was of a directly applied nature and was supported by government contracts. The vast bulk of the work included here was sponsored by government agencies and carried out by government employees or by contractors. It includes bird inventories of national parks and national wildlife areas, studies of the impacts of forestry practices on bird populations, and environmental impact studies on both large and small projects. I am uncertain as to whether this apparent bias in the affiliations of census-takers is real or only reflects a deterioration in my communications network.

Acknowledgements

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Appendix 1

Summary of bird census plot studies in Canada not available for this compilation. (Note: Plots listed in appendices of earlier issues of the catalogue are not repeated here, although some are still unreported.)

CWS, Ontario Region: 18 plots in boreal mixedwood stands and cut-overs, Manitouwadge, Ont., 1979-83.

Parks Canada, through consultants: 2 plots in broad-leaved stands in Georgian Bay Islands National Park, Ont., 1982.

C.C. Hawley and Associates, Anchorage, Alaska: 10 plots in disturbed bottomland woodland or shrubbery, Klondike area, YT, 1980.

Table 1

Numbers of plots reported in various habitat groups, by province or territory

Province or territory	Broad-leaved stands		Conifer stands		Wetlands		Open lands		Urban areas	
	1-4	5*	1-4	5	1-4	5	1-4	5	1-4	5
Newfoundland	—	1	5	2	2	1	—	—	—	—
Nova Scotia	5	12	4	—	—	—	—	7	—	—
New Brunswick	2	—	21	13	4	—	1	6	1	—
Quebec	13	10	85	11	2	2	1	1	1	—
Ontario	32	23	47	19	11	13	36	6	32	3
Manitoba	11	3	25	—	6	—	1	2	1	—
Saskatchewan	2	—	2	—	1	—	9	1	—	—
Alberta	10	14	2	21	1	6	12	6	—	1
British Columbia	5	—	34	2	2	1	—	1	6	—
Yukon	—	—	—	—	—	—	6	—	—	—
Mackenzie	—	—	8	—	1	—	3	—	—	—
Keewatin	—	—	—	—	—	—	2	—	—	—
Franklin	—	—	—	—	—	—	9	4	—	—
Total	80	63	233	68	30	23	80	34	41	4

* Numbers of plots reported in Parts 1-4 and in Part 5 of census plot catalogue.

Table 2

Numbers of bird census plots initiated, by 5-year period, and reported in Canadian census plot catalogue. Each plot listed only in 1st year censused, though some done in 2 or more years

Period	No. plots reported in catalogue					Mean no. plots started per year
	Part 1	Part 2	Part 3	Part 4	Part 5	
1925-29	3	—	—	—	—	—
1935-39	1	—	—	—	—	—
1945-49	13	5(+3*)	—	—	—	4.2
1950-54	23(+4*)	4	—	—	—	6.2
1955-59	12(+2*)	—	1	—	—	3.0
1960-64	19	8	4	—	—	6.2
1965-69	54(+3*)	19	9	—	—	17.0
1970-74	—	36(+5*)	93	11	2	29.4
1975-79	—	—	7(+1*)	131(+19*)	97(+18*)	54.6
1980-82	—	—	—	—	93†(+2*)	31.7

* Data for these plots (known to have been censused) are still unavailable. The number of plots censused in 1975-82 and as yet unreported is uncertain. Plots listed as unavailable in earlier issues for which data have been received subsequently were transferred to the "Plots reported" column; such data accounted for a large part of the present issue.

† Includes one plot censused in 1983, not included in mean.

Bird census plot studies by major habitat groupings and sub-categories

I. Broad-leaved forest, climax and successional. All plots in mature stands are listed first, followed by plots in disturbed or successional stands. Successional stands less than 7 years after cutting are included under "Open lands"

(a) Acadian Forest

Ref. no.*	Area		Size		Density		Commonest species with densities	
	Description	Location	ha	acres	Males/100 ha	Year		
302	Birch - maple - beech stand (73-74 years after cutting)	Lake George, NS, 45° (3-C)†	3.3	8.2	756	1980-81	Least Flycatcher	234
322			7.2‡	17.8‡	range		Ovenbird	142
324					754-758		Red-eyed Vireo	100
							American Redstart	77
							Bl.-th. Gn. Warbler	49
302	Birch - maple stand (73-74 years after cutting)	Lake George, NS, 45° (6-B)	5.6	13.8	888.5	1980-81	Least Flycatcher	179
323					range		Ovenbird	152
324					720-1057		American Redstart	130
							Red-eyed Vireo	80
							Bl.-and-wh. Warbler	54
302	Birch - maple stand (73 years after cutting)	Lake George, NS, 45° (8)	3.4	8.4	525	1980	Ovenbird	204
324							American Redstart	102
							Bl.-and-wh. Warbler	44
							Parula Warbler	44
							Hermit Thrush	
							Red-eyed Vireo	29
							Bl.-th. Blue Warbler	} each
							Bl.-th. Gn. Warbler	
302	Birch - maple stand, with clear-cut strips	Lake George, NS, 45° (#2)	6.2	15.3	475	1980	American Redstart	90
							Bl.-and-wh. Warbler	70
							Least Flycatcher	60
							Ovenbird	60
							Chestnut-sided Warbler	50
324	Birch - maple stand (60 years after cutting)	Lake George, NS, 45° (2)	4.8	11.8	708	1982	American Redstart	135
							Least Flycatcher	125
							Ovenbird	83
							Veery	63
							Red-eyed Vireo	63
324	Birch - maple stand (50 years after cutting)	Lake George, NS, 45° (4)	4.2	10.4	907	1982	Least Flycatcher	131
							Ovenbird	131
							American Redstart	107
							Red-eyed Vireo	71
							Veery	60
							Parula Warbler	60
							Bl.-and-wh. Warbler	60

I. Broad-leaved forest, climax and successional (cont'd)

(a) Acadian Forest

Ref. no.	Description	Location	Area		Density		Commonest species with densities	
			Size		Males/100 ha	Year		
			ha	acres				
324	Sugar maple stand (50 years after cutting)	Lake George, NS, 45° (3)	3.9	9.6	899	1982	Red-eyed Vireo	192
							Ovenbird	154
							Least Flycatcher	77
							Hermit Thrush	77
							American Redstart	77
324	Sugar maple - red maple stand (40 years after cutting)	Lake George, NS, 45° (7)	3.4	8.4	1134	1982	Least Flycatcher	206
							Ovenbird	177
							Red-eyed Vireo	162
							Hermit Thrush	132
							American Redstart	103
324	Sugar maple stand (30 years after cutting)	Lake George, NS, 45° (6)	3.3	8.1	1061	1982	Ovenbird	227
							American Redstart	182
							Red-eyed Vireo	121
							Veery	106
							Hermit Thrush	76
							Bl.-th. Gn. Warbler	76
324	Dense hardwood regeneration (12 years after cutting)	Lake George, NS, 45° (I)	7.4	18.3	592	1981	Chestnut-sided Warbler	122
							American Redstart	88
							Red-eyed Vireo	61
							Bl.-and-wh. Warbler	61
							Common Yellowthroat	61
324	Dense hardwood regeneration (8 years after clearcut)	Lake George, NS, 45° (8)	7.1	17.5	822	1982	Common Yellowthroat	181
							Chestnut-sided Warbler	92
							Veery	85
							American Redstart	85
							White-throated Sparrow	85
324	Dense hardwood regeneration (8 years after clearcut)	Lake George, NS, 45° (H)	4.1	10.1	1059	1981	Chestnut-sided Warbler	317
							Common Yellowthroat	317
							Bl.-and-wh. Warbler	61
							American Redstart	61
							Alder Flycatcher	49
							Red-eyed Vireo	49

(b) Great Lakes/St. Lawrence Forest

319	Beech - white ash stand, no understory	St -Lazare, Que., 45° (3)	4.0	10.0	300	1978	Ovenbird	125
320							Red-eyed Vireo	75
							Hermit Thrush	50
							Veery	25
							Rose-breasted Grosbeak	25

* See "References to plot data" at end of tabulations.

† Census-worker's designation of plot.

‡ Area was 3.3 ha in 1980 and was enlarged to 7.2 ha in 1981.

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I. Broad-leafed forest, climax and successional (cont'd)

(b) Great Lakes/St. Lawrence Forest

Ref. no.	Description	Location	Area		Density		Commonest species with densities
			Size		Males/100 ha	Year	
			ha	acres			
319 320	Mature sugar maple - beech stand	Rigaud, Que., 45° (4)	4.0	10.0	400	1978	Gt. Cr. Flycatcher } Eastern Wood Pewee } 75 Red-eyed Vireo } each Rose-breasted Grosbeak } White-breasted Nuthatch } Wood Thrush } Ovenbird } 25 Scarlet Tanager } each
319 320	Mature sugar maple - basswood stand	Mont Orford, Que., 45° (14)	4.0	10.0	775	1978	Red-eyed Vireo } 150 Ovenbird } 125 Least Flycatcher } 100 American Redstart } 100 Veery } 75
319 320	Sugar maple - yellow birch stand	Val Racine, Que., 45° (17)	4.0	10.0	475	1978	Ovenbird } 150 Red-eyed Vireo } 125 Veery } 100 Least Flycatcher } 75 American Robin } 25
319 320	White birch - gray birch stand with dense subcanopy	Val Racine, Que., 45° (18)	4.0	10.0	675	1978	Ovenbird } 125 Veery } 100 Canada Warbler } 100 Bl.-and-wh. Warbler } 50 Bl.-th. Gn. Warbler } 50
319 320	Mature sugar maple - yellow birch stand	Woburn, Que., 45° (19)	4.0	10.0	575	1978	Least Flycatcher } 300 Red-eyed Vireo } 100 Ovenbird } 75 Swainson's Thrush } Blackburnian Warbler } 25 American Redstart } each Purple Finch } 25
289	Sugar maple - yellow birch stand (40 years)	N of Beauport, Que., 47°	4.0	10.0	525	1979	Least Flycatcher } 125 Red-eyed Vireo } 75 Ovenbird } 75 10 other species } 25
289	Mature sugar maple - yellow birch stand (70 years)	N of Beauport, Que., 47°	4.0	10.0	300	1979	Red-eyed Vireo } 100 Ovenbird } 75 Least Flycatcher } 50 Yellow-b. Sapsucker } 25 Bl.-thr. Gn. Warbler } 25 Purple Finch } 25

(cont'd)

I. Broad-leafed forest, climax and successional (cont'd)

(b) Great Lakes/St. Lawrence Forest

Ref. no.	Description	Location	Area		Density		Commonest species with densities
			Size		Males/100 ha	Year	
			ha	acres			
289	Young sugar maple - yellow birch stand (15 years)	N of Beauport, Que., 47°	4.0	10.0	450	1979	Veery } 125 Canada Warbler } 50 Rose-breasted Grosbeak } 50 7 other species } 25
335	Upland maple forest	Milton, Ont., 44°	10.0	24.7	350	1981	Red-eyed Vireo } 45 Eastern Wood Pewee } 30 Wood Thrush } 30 Rose-breasted Grosbeak } 30 Veery } 25 Ovenbird } 25 Northern Oriole } 25
341	Large-tooth aspen - sugar maple forest	Fitzroy Hbr., Ont., 45°	10.0	24.7	310	1978	Ovenbird } 90 Red-eyed Vireo } 50 Scarlet Tanager } 30 Brown Creeper } 20 Veery } 20
297	Rich hardwood forest	Beausoleil Is., GBINP, Ont. (Huron Trail), 45°	17.5	43.2	859	1980	American Redstart } 141 Least Flycatcher } 70 Yellow Warbler } 64 Red-winged Blackbird } 57 Red-eyed Vireo } 44 Wood Thrush } 43
297	Mature hardwood forest	Beausoleil Is., GBINP, Ont. (Christian Trail - decid. subpl. #1), 45°	12.9	31.9	482	1981	Red-eyed Vireo } 105 Ovenbird } 47 American Redstart } 47 Veery } 41 Eastern Wood Pewee } 35
297	Mature hardwoods with hemlock understory	Beausoleil Is., GBINP, Ont. (Christian Trail - decid. subpl. #2) 45°	5.9	14.6	632	1981	Ovenbird } 122 Red-eyed Vireo } 114 Bl.-thr. Gn. Warbler } 42 Blackburnian Warbler } 42 Gr. Cr. Flycatcher } 34 Veery } 34 American Redstart } 34
297	Heterogeneous broad-leafed forest with rocky openings (red oak - red maple)	Beausoleil Is., GBINP, Ont. (Tonch Point) 45°	15.4	38.0	610	1980	Red-winged Blackbird } 78 Yellow Warbler } 67 American Redstart } 60 Song Sparrow } 58 Veery } 39
297	Open mixed forest with rock barren openings	Beausoleil Is., GBINP, Ont. (Fairy Lake) 45°	39.2	96.8	401	1981	Song Sparrow } 57 White-throated Sparrow } 41 American Redstart } 33 Prairie Warbler } 30 Cedar Waxwing } 24 (Br.-hd. Cowbird } 24)

(cont'd)

I. Broad-leafed forest, climax and successional (cont'd)

(b) Great Lakes/St. Lawrence Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
297	Disturbed hardwood/mixed woodland (campground)	Beausoleil Is., GBINP, Ont. (Cedar Spring) 45°	25.6	63.2	530	1981	(Br.-hd. Cowbird 53) American Redstart 49 Song Sparrow 28 Red-eyed Vireo 26 Warbling Vireo 23 Ovenbird 23 Red-winged Blackbird 23
297	Open to disturbed oak forest with dense understory	Beausoleil Is., GBINP, Ont. (Treasure Bay) 45°	18.4	45.0	359	1981	Ovenbird 56 Red-eyed Vireo 31 (Br.-hd. Cowbird 29) Chipping Sparrow 26 Gr. Cr. Flycatcher 20 Rose-breasted Grosbeak 20
351	Red oak - sugar maple savannah	Long Point, Ont., 43°	7.5	18.5	1316	1979	Eastern Wood Pewee 234 Red-winged Blackbird 234 Tree Swallow 147 Yellow Warbler 120 Common Yellowthroat 87
352 315	Red oak - American basswood savannah	Long Point, Ont., 43°	7.5	18.5	1165 range 1089-1242	1979, 1981	Red-winged Blackbird 364 Tree Swallow 174 Starling 147 Common Grackle 120 Eastern Wood Pewee 84
345	Regenerating old fields with hawthorn - pine plantations	Milton, Ont., 44°	7.3	17.7	1151	1981	American Redstart 253 Gray Catbird 219 Field Sparrow 110 Mourning Dove 55 American Goldfinch 55
293 280 279	Transitional mixed forest - field	Midland, Ont., 45°	6.1	15.0	1378 range 1063-1870	1979-80, 1982	Yellow Warbler 185 American Redstart 177 Bl.-capped Chickadee 105 Gray Catbird 94 Cedar Waxwing 94
319 320	Mature sugar maple - beech stand	Mont Orford, Que., 45° (13)	4.0	10.0	500	1978	Ovenbird 125 Red-eyed Vireo 100 American Redstart 100 Veery 75 Least Flycatcher } White-br. Nuthatch } 25 Bl.-th. Blue Warbler } each Rose-br. Grosbeak }

(cont'd)

I. Broad-leafed forest, climax and successional (cont'd)

(b) Great Lakes/St. Lawrence Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
308	Hinterland ravine (70% mixed woods, 30% open)	Little Rouge R., Scarborough, Ont., 44°	41.4	102.3	234	1980	Gray Catbird 19 Rough-winged Swallow 19 Song Sparrow 19 Blue Jay 17 (Common Crow 17)* Bl.-capped Chickadee 12 American Robin 12

(c) Sub-boreal (including parkland, montane, and western forests)

313	Aspen forest	Assiniboine Park, Winnipeg, Man., 50°	6.0	14.8	950	1980	Least Flycatcher 326 Northern Oriole 150 Warbling Vireo 117 Gr. Cr. Flycatcher 109 House Wren 83
285	Aspen forest	nr. Brandon, Man., 50°	16.0	39.5	312	1982	Least Flycatcher 84 American Redstart 25 Red-eyed Vireo 22 Warbling Vireo 19 Ovenbird 19
377	Mature poplar stand over alders, 80 years after fire	Medicine Lake, Alta., 53°	11.9	29.4	244	1982	White-th. Sparrow 51 Chipping Sparrow 42 Mourning Warbler 32 Tennessee Warbler 17 Red-eyed Vireo 13 Yellow-rumped Warbler 13
377	Mature poplar stand over alders, 60 years after fire	Medicine Lake, Alta., 53° (A)	11.9	29.4	446 range 379-514	1981-82	White-th. Sparrow 78 Tennessee Warbler 44 Mourning Warbler 44 Ovenbird 38 Red-eyed Vireo 36
377	Mature poplar stand over alders, 60 years after fire	Medicine Lake, Alta., 53° (B)	11.9	29.4	248	1982	Chipping Sparrow 59 Tennessee Warbler 46 Ovenbird 34 Swainson's Thrush 25 White-th. Sparrow 25

* Parentheses indicate species included in the census results but not suited to territorial mapping, either because they are found in a plot through accidental inclusion of a minor pocket of suitable habitat, or because their breeding habits do not allow determination of a territory, as in colonial, promiscuous, or parasitic species.

(cont'd)

I. Broad-leaved forest, climax and successional (cont'd)

(c) Sub-boreal (including parkland, montane, and western forest)

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
377	Young poplar stand over alders, 30 years after fire	Medicine Lake, Alta., 53° (A)	11.9	29.4	345 range 328-362	1981-82	Red-eyed Vireo 50 White-th. Sparrow 42 Tennessee Warbler 30 Yellow Warbler 28 Mourning Warbler 28
377	Young poplar stand over alders, 30 years after fire	Medicine Lake, Alta., 53° (B)	11.9	29.4	274	1982	Ovenbird 76 Mourning Warbler 34 White-th. Sparrow 34 Red-eyed Vireo 30 Tennessee Warbler 25
377	Young poplar stand over alders, 30 years after fire	Medicine Lake, Alta., 53° (C)	10.3	25.4	281	1982	Ovenbird 82 Chipping Sparrow 44 Northern Junco 29 Red-eyed Vireo 19 Tennessee Warbler 19 Yellow-rumped Warbler 19
348	Aspen woodland	Carrot Creek, Banff National Park, Alta., 51°	12.0	29.6	179 range 154-204	1977-78	Least Flycatcher 25 American Robin 21 Bl.-capped Chickadee 17 Warbling Vireo 17 Northern Junco 17
377	Hardwood regeneration (poplar, willow, alder), 12 years after fire (6 m tall)	Medicine Lake, Alta., 53° (A)	5.6	13.8	750 range 746-755	1981-82	Least Flycatcher 244 White-th. Sparrow 93 American Redstart 62 Yellow Warbler 58 Tennessee Warbler 44
377	Hardwood regeneration (poplar, willow, alder), 12 years after burn (6 m tall)	Medicine Lake, Alta., 53° (B)	6.2	15.3	485	1982	Red-eyed Vireo 65 Least Flycatcher 57 Yellow Warbler 57 Alder Flycatcher 48 Clay-coloured Sparrow 48 White-th. Sparrow 48
348	Aspen avalanche slope	Mt. Coleman, Banff National Park, Alta., 52°	14.0	34.6	164	1978	Orange-cr. Warbler 57 Dusky Flycatcher 43 MacGilliv. Warbler 36 Northern Junco 14 Warbling Vireo 7 Chipping Sparrow 7
348	Tall willow woodland	Jacques Creek, Jasper National Park, Alta., 53°	13.5	33.3	187 range 141-233	1978-79	Clay-coloured Sparrow 37 Warbling Vireo 20 Rufous Hummingbird 18 Orange-cr. Warbler 15 MacGilliv. Warbler 15 Lincoln's Sparrow 15

(cont'd)

I. Broad-leaved forest, climax and successional (cont'd)

(d) Boreal Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
296	Aspen forest	Mantagao Lake, Man., 51°	16.0	39.5	231	1979	Least Flycatcher 75 Red-eyed Vireo 38 Ovenbird 19 House Wren 19 Mourning Warbler 19
298	Mature aspen forest	Bitumount, AOSERP, Alta., 57°	30.0	74.1	452	1976	Ovenbird 148 Least Flycatcher 103 Tennessee Warbler 53 Red-eyed Vireo 47 Swainson's Thrush 24
298	Mature aspen forest	McClelland Lake, AOSERP, Alta., 57°	42.25	104.4	142	1976	Ovenbird 48 Tennessee Warbler 47 Red-eyed Vireo 15 Least Flycatcher 9 Hermit Thrush 7
283	Second-growth hardwoods with softwood remnants (alder, birch, maple and spruce, fir)	Louil Hills, Terra Nova National Park, Nfld. 49°	6.3	15.6	1587	1980	Ovenbird 220 Fox Sparrow 214 Ruby-cr. Kinglet 143 Yellow-b. Flycatcher 135 White-th. Sparrow 135
360	Boreal mixedwood - 17-year-old upland cutover (mixed-age hardwoods)	Mildred Twp., Ont., 49°	9.0	22.2	783	1978	Magnolia Warbler 122 Ches.-s Warbler 117 Red-eyed Vireo 106 Veery 72 Ovenbird 61
362	Boreal conifer - 17-year-old lowland cutover (alder thicket)	Mildred Twp. Ont., 49°	9.0	22.2	1033	1978	Tennessee Warbler 283 White-th. Sparrow 267 Magnolia Warbler 83 Nashville Warbler 67 Cape May Warbler 67
363	Boreal mixedwood - 13-year-old upland cutover (mixed-age hardwoods)	Mildred Twp., Ont., 49°	9.0	22.2	1194	1978	Bl.-th. Gn. Warbler 206 Magnolia Warbler 183 Ches.-s Warbler 167 Red-eyed Vireo 122 Mourning Warbler 100
364	Boreal conifer - 13-year-old lowland cutover (alder thicket)	Mildred Twp., Ont., 49°	9.0	22.2	1778	1978	Tennessee Warbler 622 Common Yellowthroat 222 White-th. Sparrow 211 Alder Flycatcher 206 Lincoln's Sparrow 133

(cont'd)

I. Broad-leaved forest, climax and successional (cont'd)

(d) Boreal Forest

Ref. no.	Description	Location	Area		Density		Commonest species with densities
			Size		Males/100 ha	Year	
			ha	acres			
365	Boreal mixedwood - 11-year-old upland cutover (mixed-age hardwoods)	Mildred Twp., Ont., 49°	9.0	22.2	1167	1978	Ches.-s Warbler 406 Red-eyed Vireo 111 American Redstart 106 White-th. Sparrow 72 Veery 67
366	Boreal conifer - 11-year-old lowland cutover (low alder and scattered trees)	Mildred Twp., Ont., 49°	9.0	22.2	1022	1978	Tennessee Warbler 217 White-th. Sparrow 183 Alder Flycatcher 133 Common Yellowthroat 133 Magnolia Warbler 106
367	Boreal mixedwood - 9-year-old upland cutover (mixed-age hardwoods)	Mildred Twp., Ont., 49°	9.0	22.2	1022	1978	Ches.-s Warbler 272 Magnolia Warbler 194 Bl.-and-wh. Warbler 72 Red-eyed Vireo 61 Ovenbird 56
298	Tall bottomland willow stand	Muskeg River, AOSERP, Alta., 57°	28.0	69.2	499	1977	White-th. Sparrow 65 Northern Waterthrush 62 American Redstart 56 Tennessee Warbler 49 Fox Sparrow 46

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional. All plots in mature stands are listed first, followed by plots in disturbed or successional stands. Successional stands less than 7 years after cutting are included under "Open lands"

(a) Acadian Forest

Ref. no.	Description	Location	Area		Density		Commonest species with densities
			Size		Males/100 ha	Year	
			ha	acres			
329	Spruce - cedar forest	Lord's Cove, NB, 45°	4.3	10.7	880	1980	Tennessee Warbler 255 White-th. Sparrow 185 Bl.-th. Gn. Warbler 162 Nashville Warbler 93 Bl.-and-wh. Warbler 58 Yellow-r. Warbler 58
330	Red spruce stand (7 m tall)	E of Hammondvale, NB, 46° (#2)	12.2	30.0	598	1981	Bay-breasted Warbler 135 Tennessee Warbler 74 Myrtle Warbler 49 Yellow-b. Flycatcher 45 Bl.-th. Gn. Warbler 45
330	Spruce stand (6 m tall)	N of Alma, NB, 46° (#8)	12.2	30.0	533	1981	Bay-breasted Warbler 127 Yellow-b. Flycatcher 82 Tennessee Warbler 66 Northern Junco 47 Swainson's Thrush 41
330	Spruce - fir stand (8 m tall)	Black Brook Depot, NB 47° (#16)	12.2	30.0	312	1982	Cape May Warbler 74 Magnolia Warbler 61 Golden-cr. Kinglet 33 Northern Junco 31 Swainson's Thrush 27
330	Natural regeneration, 8 years after clear-cut (3 m fir and birch)	Riverside-Albert, NB, 46° (#10)	12.0	29.6	290	1981	White-th. Sparrow 100 Magnolia Warbler 46 Common Yellowthroat 33 Lincoln's Sparrow 31 Song Sparrow 25
330	Jack pine plantation 8 years after clear-cut (4 m)	Mechanic Settlement, NB, 46° (#9)	10.0	24.7	353	1981	Alder Flycatcher 70 Common Yellowthroat 60 White-th. Sparrow 50 Palm Warbler 48 Magnolia Warbler 45
330	Jack pine plantation 10 years after clear-cut (5 m)	N of Berwick, NB, 46° (#7)	10.5	26.0	662	1981	Palm Warbler 119 Magnolia Warbler 91 Common Yellowthroat 81 Nashville Warbler 62 Yellow-b. Flycatcher 48

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(a) Acadian Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
330	Spruce - fir plantation, 11 years after clear-cut	N of Berwick, NB, 46° (#6)	11.2	27.7	683	1981	Magnolia Warbler 134 Nashville Warbler 94 White-th. Sparrow 76 Common Yellowthroat 71 Palm Warbler 54
330	Spruce plantation 17 years after clear-cut (4 m tall)	Black Brook Depot, NB, 47° (#14)	12.2	30.0	420	1982	Magnolia Warbler 72 Swainson's Thrush 53 Bay-br. Warbler 51 Tennessee Warbler 43 Red-eyed Vireo 27
330	Spruce plantation 16 years old (4 m tall)	Black Brook Depot, NB, 47° (#17)	12.2	30.0	392	1982	Magnolia Warbler 74 Yellow-rumped Warbler 66 Veery 41 Swainson's Thrush 37 Tennessee Warbler 27
330	Spruce plantation 15 years old (4 m tall)	Black Brook Depot, NB, 47° (#15)	12.2	30.0	413	1982	Bay-breasted Warbler 90 Magnolia Warbler 69 Yellow-rumped Warbler 40 Ovenbird 35 Swainson's Thrush 27
330	Spruce plantation 12 years old (4-5 m tall)	Black Brook Depot, NB, 47° (#13)	12.2	30.0	313	1982	Magnolia Warbler 79 Yellow-rumped Warbler 53 White-th. Sparrow 49 Swainson's Thrush 39 Fox Sparrow 31
330	Jack pine plantation 11 years old (4 m tall)	Black Brook Depot, NB, 47° (#18)	12.2	30.0	103	1982	Mourning Warbler 23 White-th. Sparrow 16 Hermit Thrush 14 Ovenbird 10 Alder Flycatcher } Veery } 8 Nashville Warbler } each Bl.-th Blue Warbler } Fox Sparrow }

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(b) Great Lakes/St. Lawrence Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
319 320	White pine stand with white oaks	Oka, Que., 45° (2)	4.0	10.0	325	1978	Ovenbird 100 Scarlet Tanager 75 Gr. Cr. Flycatcher 50 Bl.-cap. Chickadee } Eastern Wood Pewee } 25 Hermit Thrush } each Blackburnian Warbler }
319 320	Scots pine - Norway spruce plantation	Lachute, Que., 46° (5)	4.0	10.0	225	1978	Eastern Wood Pewee 50 Northern Junco 50 Red-breasted Nuthatch } American Robin } 25 Solitary Vireo } each Yellow-rumped Warbler }
319 320	Young balsam fir - red maple stand	Lachute, Que., 46° (6)	4.0	10.0	900	1978	Blackburnian Warbler 150 Canada Warbler 100 Gr. Cr. Flycatcher } Veery } 75 Red-eyed Vireo } each Bl.-and-wh. Warbler }
319 320	Hemlock stand with red maples	St -Augustin, Que., 46° (7)	4.0	10.0	425	1978	Ovenbird 100 Blackburnian Warbler 75 10 other species 25
319 320	Hemlock - yellow birch stand	St -Augustin, Que., 46° (8)	4.0	10.0	600	1978	Ovenbird 150 Veery 100 Blackburnian Warbler 75 Canada Warbler 50 9 other species 25
319 320	Mature hemlock stand with sugar maples	Lachute, Que., 46° (9)	4.0	10.0	525	1978	Northern Junco 100 Ovenbird 100 Blackburnian Warbler 75 10 other species 25
319 320	Hemlock - red maple stand	St -Canut, Que., 46° (10)	4.0	10.0	525	1978	Veery 100 Ovenbird 100 13 other species 25
319 320	Balsam fir - hemlock stand	Cowansville, Que., 45° (11)	4.0	10.0	400	1978	Red-breasted Nuthatch 50 Brown Creeper 50 Wood Thrush 50 10 other species 25

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(b) Great Lakes/St. Lawrence Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
319 320	Low balsam fir - paper birch forest	Mont Mégantic, Que., 45° (15)	4.0	10.0	300	1978	Brown Creeper 75 Blackpoll Warbler 75 Yellow-rumped Warbler 50 Swainson's Thrush } Gray-cheeked Thrush } 25 each Nashville Warbler } White-th. Sparrow }
319 320	Balsam fir - paper birch forest	Mont Mégantic, Que., 45° (16)	4.0	10.0	775	1978	Brown Creeper } Swainson's Thrush } 75 each Yellow-rumped Warbler } Bl.-th. Gn. Warbler } Yellow-b. Flycatcher 50 Golden-cr. Kinglet 50
319 320	Mature balsam fir stand with paper birch	Woburn, Que., 45° (20)	4.0	10.0	1000	1978	Bay-breasted Warbler 150 Solitary Vireo 125 Brown Creeper 100 Swainson's Thrush 100 Blackburnian Warbler 100
342	Hemlock - cedar - pine and aspen - birch forests	Fitzroy Hbr., Ont., 45°	10.0	24.7	435	1978	Red-breasted Nuthatch 40 Ovenbird 40 Northern Waterthrush 30 Scarlet Tanager 25 7 other species 20
343	White pine - white birch coniferous forest	Fitzroy Hbr., Ont., 45°	8.4	20.8	417	1978	Red-breasted Nuthatch 36 Ovenbird 36 8 other species 24
297	Open-canopy mixed stand with balsam fir understory	Beausoleil Is., GBINP, Ont., (Christian Trail - mixed subpl. #3) 45°	13.0	32.1	768	1981	Ovenbird 161 Blackburnian Warbler 83 (Ruffed Grouse 48) Bl.-and-wh. Warbler 40 Red-eyed Vireo 36 Magnolia Warbler 35 (Cowbird 35)
337	Mature maple - hemlock forest	S of Guelph, Ont., 43°	16.0	39.5	381	1981	Eastern Wood Pewee 31 Ovenbird 28 American Robin 25 Red-eyed Vireo 25 Rose-br. Grosbeak 25
338	White cedar - tamarack swamp	S of Guelph, Ont., 43° (I)	12.0	29.6	475	1981	Song Sparrow 66 Common Yellowthroat 58 Red-winged Blackbird 38 Swamp Sparrow 29 Bl.-capped Chickadee 25 White-th. Sparrow 25

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(b) Great Lakes/St. Lawrence Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
339	White cedar - tamarack swamp	S of Guelph, Ont., 43° (II)	14.0	34.6	425	1981	Song Sparrow 75 Bl.-capped Chickadee 25 Common Yellowthroat 25 Gray Catbird } Cedar Waxwing } 21 each Red-winged Blackbird } American Goldfinch }
290	Abandoned pasture scrubland and mixed woodland	Ottawa, Ont., 45°	9.0	22.2	650	1982	Yellow Warbler 94 White-th. Sparrow 89 Song Sparrow 56 Gray Catbird 44 Nashville Warbler 44
331	Golf and country club (50% mixed woods, 25% wet, 25% mowed)	Ancaster, Ont., 43°	45.5	112.4	391	1981	American Robin 46 Common Grackle 34 Cedar Waxwing 33 Northern Cardinal 31 Gray Catbird 26

(c) Sub-boreal (including parkland, montane, and western forests)

379	White spruce forest	Sheep River, Alta., 51°	14.8	36.6	402	1979	Golden-cr. Kinglet 61 Ruby-cr. Kinglet 54 Swainson's Thrush 51 Northern Junco 47 Yellow-rumped Warbler 44
348	Subalpine spruce - fir forest	Hilda Creek, Banff NP, Alta., 52°	10.5	25.9	86	1977	Hermit Thrush 29 Ruby-cr. Kinglet 19 Mountain Chickadee } Varied Thrush } 10 each Yellow-rumped Warbler } Northern Junco }
348	Subalpine spruce - fir forest	Moraine Lake, Banff NP, Alta., 51°	10.2	25.1	88 range 54-123	1975, 1977	Yellow-rumped Warbler 20 Golden-cr. Kinglet 15 Hermit Thrush 12 Townsend's Warbler 12 Spruce Grouse 8 Mountain Chickadee 8 Northern Junco 8
348	Lodgepole pine forest	Eisenhower Jct., Banff NP, Alta., 51°	10.2	25.1	69	1975	Northern Junco 34 Swainson's Thrush 20 American Robin 15 (Other spp. visiting only)

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(c) Sub-boreal (including parkland, montane, and western forests)

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
348	Lodgepole pine forest	Eisenhower Jct., Banff NP, Alta., 51°	10.2	25.1	68 range 34-103	1975, 1977	Northern Junco 32 Swainson's Thrush 15 American Robin 8 Spruce Grouse 5 Boreal Chickadee 5 Yellow-rumped Warbler 5
305	Interior western hemlock forest	Glacier Nat. Park, BC, 51°	10.3	25.5	150	1982	Swainson's Thrush 53 Ches.-backed Chickadee 34 Golden-cr. Kinglet 24 Townsend's Warbler 19 Red-br. Nuthatch 10
348	Open Douglas fir - lodgepole pine woodland	Jasper, Alta., 53°	13.5	33.3	142 range 140-144	1978-79	Yellow-rumped Warbler 54 Northern Junco 20 Western Tanager 18 American Robin 15 Swainson's Thrush 9
348	White spruce groveland	Jasper Lake, Jasper Nat. Park, Alta., 53°	14.0	34.6	119 range 100-139	1978, 1980	Chipping Sparrow 41 Northern Junco 22 Yellow-rumped Warbler 14 Common Flicker 10 White-cr. Sparrow 7
348	Lodgepole pine forest - recent burn	Saskatchewan Crossing, Banff NP, Alta., 52°	14.0	34.6	50	1978	Northern Junco 29 Swainson's Thrush 7 Yellow-rumped Warbler 7 Chipping Sparrow 7 (Other spp. visiting only)
348	Campground - lodgepole pine forest	Tunnel Mtn., Banff NP, Alta., 51°	30.2	74.6	60	1979	American Robin 15 Yellow-rumped Warbler 15 Northern Junco 10 Mountain Chickadee 7 Ruby-cr. Kinglet 5 Chipping Sparrow 5
348	Trailer campground - lodgepole pine forest	Tunnel Mtn., Banff NP, Alta., 51°	31.2	77.1	26	1979	American Robin 8 Yellow-rumped Warbler 8 (Brown-headed Cowbird 5) Chipping Sparrow 3 Mountain Chickadee 2
348	Timberline fir krummholz	Parker Ridge, Banff NP, Alta., 52°	10.5	25.9	53	1977	Golden-cr. Sparrow 15 American Robin } Chipping Sparrow } 10 Brewer's Sparrow } each Fox Sparrow }

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(c) Sub-boreal (including parkland, montane, and western forests)

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
348	Timberline fir tree island	Wilcox Pass, Jasper NP, Alta., 52°	10.5	25.9	33	1977	Wh.-tailed Ptarmigan 10 Wh.-crowned Sparrow 10 American Robin 5 Water Pipit 5 Brewer's Sparrow 5
307	Scattered subalpine fir forest in alpine meadows	Mt. Revelstoke, BC, 51°	12.3	30.3	65	1982	Northern Junco 32 Fox Sparrow 20 Chipping Sparrow 8 Hermit Thrush 4 (Canada Jay possible)
(d) Boreal Forest							
282	Mature black spruce - balsam fir forest	Tidewaters, Terra Nova Nat. Park, Nfld., 48°	6.3	15.6	857	1980	Ruby-cr. Kinglet 167 Yellow-rumped Warbler 160 White-th. Sparrow 55 American Robin 47 Bl.-and-wh. Warbler 47 Tennessee Warbler 47
281	Mature balsam fir forest with alders and bog	Ochre Hill, Terra Nova Nat. Park, Nfld. 48°	9.0	22.2	300	1980	Yellow-rumped Warbler 88 Ruby-cr. Kinglet 33 Northern Waterthrush 22 Northern Junco 22 White-th. Sparrow 22
375	Boreal mixedwood - uncut upland (mature mixed stand)	Mildred Twp., Ont., 49°	9.0	22.2	1511	1978	Tennessee Warbler 278 Magnolia Warbler 222 Nashville Warbler 156 Blackburnian Warbler 122 (Evening Grosbeak 100) Cape May Warbler 83
376	Boreal conifer - uncut lowland (black spruce "island")	Mildred Twp., Ont., 49°	6.0	14.8	559	1978	Tennessee Warbler 100 Yellow-rumped Warbler 67 (Spruce Grouse 50) Least Flycatcher 50 Nashville Warbler 50 Cape May Warbler 50
332	Jack pine forest	Ignace, Ont., 49°	6.6	16.3	311	1979	Least Flycatcher 106 Ovenbird 61 Brown Creeper 46 6 other species 15
298	Mature black spruce forest	Hartley Creek, AOSERP, Alta., 57°	16.5	40.8	203	1977	Chipping Sparrow 35 Yellow-rumped Warbler 32 Western Wood Pewee 21 Northern Junco 20 Ruby-cr. Kinglet 17

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II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(d) Boreal Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			298	Overmature white spruce - aspen - pine forest	Bitumount, AOSERP, Alta., 57°	32.5	
298	Middle-age pine - aspen - spruce forest	nr. Kearn Lake, AOSERP, Alta., 57°	37.0	91.4	230	1977	Yellow-rumped Warbler 38 Ovenbird 32 Tennessee Warbler 27 Swainson's Thrush 26 Chipping Sparrow 20
298	Mixed aspen - jack pine forest	Bitumount, AOSERP, Alta., 57°	43.0	106.2	206	1977	Tennessee Warbler 31 Chipping Sparrow 20 White-th. Sparrow 20 Ovenbird 18 Northern Junco 17
298	Poplar - spruce - shrub creek valley	Hartley Creek, AOSERP, Alta., 57°	16.0	39.5	352	1977	Tennessee Warbler 75 Bl.-and-wh. Warbler 33 Northern Waterthrush 31 White-th. Sparrow 31 Swainson's Thrush 30
298	Mixed aspen - spruce forest and shrubby muskeg	N of Muskeg River, AOSERP, Alta., 57°	37.5	92.6	289	1977	Tennessee Warbler 76 Ovenbird 45 White-th. Sparrow 31 Swainson's Thrush 17 Solitary Vireo 13
298	Mature jack pine forest	McClelland Lake, AOSERP, Alta., 57°	43.0	106.2	67	1976	Yellow-rumped Warbler 24 Chipping Sparrow 23 Northern Junco 8 Canada Jay 4 Boreal Chickadee 4
355	Boreal mixedwood - 24-year-old upland cutover (mixed-age mixedwood)	Mildred Twp., Ont., 49°	9.0	22.2	828	1978	Magnolia Warbler 94 Swainson's Thrush 78 Red-eyed Vireo 72 Bl.-and-wh. Warbler 72 Tennessee Warbler 72
356	Boreal conifer - 24-year-old lowland cutover (low conifer regeneration)	Mildred Twp. Ont., 49°	9.0	22.2	1517	1978	Tennessee Warbler 489 Magnolia Warbler 167 White-th. Sparrow 128 Cape May Warbler 117 Nashville Warbler 78

(cont'd)

II. Coniferous and mixed (less than 50% broad-leaved) forests, climax and successional (cont'd)

(d) Boreal Forest

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			358	Boreal mixedwood - 19-year-old lower slope cutover (mixed-age conifer)	Mildred Twp., Ont., 49°	9.0	
357	Boreal mixedwood - 19-year-old upland cutover (mixed-age mixedwood)	Mildred Twp., Ont., 49°	9.0	22.2	1044	1978	Bl.-th. Gn. Warbler 217 Bl.-th. Blue Warbler 128 Red-eyed Vireo 100 Magnolia Warbler 100 Ches.-s. Warbler 72
359	Boreal conifer - 19-year-old lowland cutover (open bog forest)	Mildred Twp., Ont., 49°	9.0	22.2	1972	1978	Tennessee Warbler 678 White-th. Sparrow 256 Common Yellowthroat 244 Alder Flycatcher 200 Magnolia Warbler 139
361	Boreal mixedwood - 17-year-old lower slope cutover (disturbed conifer regeneration)	Mildred Twp., Ont., 49°	9.0	22.2	1611	1978	Tennessee Warbler 617 White-th. Sparrow 211 Nashville Warbler 206 Magnolia Warbler 178 Swainson's Thrush 56
368	Boreal mixedwood - 9-year-old lowland cutover (low shrubs, conifer regeneration)	Mildred Twp., Ont., 49°	9.0	22.2	850	1978	White-th. Sparrow 228 Common Yellowthroat 106 Lincoln's Sparrow 100 Alder Flycatcher 83 Tennessee Warbler 78
298	Low black spruce forest	S of Muskeg River, AOSERP, Alta., 57°	35.0	86.5	233	1977	Palm Warbler 68 White-th. Sparrow 28 Northern Junco 23 Swainson's Thrush 19 Yellow-rumped Warbler 17 Chipping Sparrow 17
298	Dense young jack pine forest	McClelland Lake, AOSERP, Alta., 57°	35.0	86.5	86	1976	Yellow-rumped Warbler 30 Chipping Sparrow 24 Hermit Thrush 9 Northern Junco 9 Swainson's Thrush 7

(cont'd)

III. Wetlands

(a) Marsh and swamp

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
317	Cat-tail marsh	Port Rowan, Ont., 43°	7.5	18.5	3219	1981	Red-winged Blackbird 1857 Common Grackle 681 (Long-billed) Marsh Wren 321 Black Tern 187 Common Moorhen 53 Pied-billed Grebe 40 Mallard 40
349	Cat-tail shoreline	St. Clair NWA, Paincourt, Ont., 42°	5.5	13.6	1472	1980	Red-winged Blackbird 727 (Long-billed) Marsh Wren 182 Common Yellowthroat 182 Swamp Sparrow 127 Common Moorhen 109
350	Bur-reed - sedge marsh	St. Clair NWA, Paincourt, Ont., 42°	2.0	4.9	2874	1980	(area too small to extrapolate) Red-winged Blackbird (Long-billed) Marsh Wren Common Moorhen Virginia Rail Sora
346	Cat-tail - bur-reed marsh	Fesserton, Ont., 45°	5.6	13.8	1199	1982	(Long-billed) Marsh Wren 573 Red-winged Blackbird 277 Swamp Sparrow 188 Virginia Rail 90 American Coot 63
318	Wet grassy marsh	Big Creek NWA, Ont., 43°	10.0	24.7	715	1978	Red-winged Blackbird 260 (Long-billed) Marsh Wren 205 Swamp Sparrow 90 Common Moorhen 50 Sora 25 Common Yellowthroat 25
318	Wet grassy marsh	Big Creek NWA, Ont., 43°	10.0	24.7	755 range 720-790	1978-79	Red-winged Blackbird 305 (Long-billed) Marsh Wren 172 Swamp Sparrow 118 Common Yellowthroat 40 Virginia Rail 25
318	Wet grassy marsh	Big Creek NWA, Ont., 43°	10.0	24.7	910 range 865-955	1978-79	(Long-billed) Marsh Wren 300 Red-winged Blackbird 265 Swamp Sparrow 87 Common Moorhen 40 Common Yellowthroat 38
347	Sedge meadow	Fesserton, Ont., 45°	5.6	13.8	868	1982	Swamp Sparrow 439 (Long-billed) Marsh Wren 197 Red-winged Blackbird 143 Sedge (Sh.-b.) Marsh Wren 36 Common Yellowthroat 36

(cont'd)

III. Wetlands (cont'd)

(a) Marsh and swamp

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
333	Marshy pond with bushy field	Whitby Twp., Ont., 44°	16.6	41.0	771	1980	Red-winged Blackbird 96 Barn Swallow 84 Bank Swallow 78 (Mallard 48) (Tree Swallow 48) Common Grackle 42 Song Sparrow 36
380	Buttonbush swamp	Long Point, Ont., 43°	5.0	12.4	1230	1980	Red-winged Blackbird 740 Yellow Warbler 330 Eastern Kingbird 40 Common Yellowthroat 40 Common Grackle 20 (Brown-hd. Cowbird 20) Song Sparrow 20
318	Dense grassy marsh - shrub carr	Big Creek NWA, Ont., 43°	5.5	13.6	577 range 500-655	1978-79	Red-winged Blackbird 209 Swamp Sparrow 191 Common Yellowthroat 105 Song Sparrow 18 (Canada Goose 14) Common Grackle 14
319	Silver maple - black ash swamp forest	Oka, Que., 45° (1)	4.0	10.0	75	1978	Gt. Cr. Flycatcher 25 Eastern Wood Pewee 25 Wh.-br. Nuthatch 25 (only spp. recorded)
319	Red maple - black ash swamp forest	Dunham, Que., 45° (12)	4.0	10.0	475	1978	Common Yellowthroat 100 Veery 50 Red-eyed Vireo 50 White-th. Sparrow 50 9 other species 25
318	Wet woodland (silver maple swamp)	Big Creek NWA, Ont., 43°	6.5	16.0	1204 range 1131-1277	1978-79	Common Grackle 251 Tree Swallow 181 Starling 92 Red-winged Blackbird 73 (Canada Goose 69) Mourning Dove 66
334	Silver maple swamp	Campbellville, Ont., 43°	9.9	24.5	616	1981	Song Sparrow 71 Eastern Wood Pewee 51 Bl.-capped Chickadee } Northern Waterthrush } 40 each Northern Oriole } Common Grackle }

(cont'd)

III. Wetlands (cont'd)

(a) Marsh and swamp

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
306	Mixed mountain bottomland (alder/cedar swamp)	Mt. Revelstoke Nat. Park, BC, 51°	6.4	15.8	922	1982	Song Sparrow 211 Yellow Warbler 172 MacGilliv. Warbler 133 Common Yellowthroat 94 American Redstart 62
381	Riparian sedge marsh - alder thickets, some spruce	Godaleich Pond, Nfld., 48°	20.0	49.4	500	1983	Swamp Sparrow 167 Yellow Warbler 90 Wilson's Warbler 60 Yellow-r. Warbler 22 Bl.-and-wh. Warbler 20 Northern Waterthrush 20

(b) Bog and fen

298	Swamp birch - willow shrubby fen	Muskeg River, AOSERP, Alta., 57°	30.0	74.1	358	1977	Swamp Sparrow 88 Common Yellowthroat 74 Clay-coloured Sparrow 72 Lincoln's Sparrow 35 Wilson's Warbler 22
298	Open swamp birch bog	nr. Hartley Creek, AOSERP, Alta., 57°	16.0	39.5	273	1977	Lincoln's Sparrow 122 LeConte's Sparrow 38 Swamp Sparrow 38 Clay-coloured Sparrow 31 Palm Warbler 13
298	Open tamarack - swamp birch muskeg	N of Muskeg River, AOSERP, Alta., 57°	37.0	91.4	176	1977	Lincoln's Sparrow 63 Chipping Sparrow 44 Savannah Sparrow 18 Western Wood Pewee 15 Eastern Kingbird 7
298	Black spruce - tamarack - willow muskeg/fen	Bitumont, AOSERP, Alta., 57°	30.0	74.1	494 range 418-571	1976-77	Tennessee Warbler 67 White-th. Sparrow 55 Lincoln's Sparrow 48 Palm Warbler 47 Clay-coloured Sparrow 45
348	Black spruce - sedge bog	Poboktan, Jasper NP, Alta., 52°	10.5	25.9	124	1980	Savannah Sparrow 38 Blackpoll Warbler 19 Northern Junco 19 Lincoln's Sparrow 19 American Robin 10 Ruby-cr. Kinglet 10
348	Montane wetlands	Pocohontas Ponds, Jasper NP, Alta., 53°	80.0	197.6	51	1980	Lincoln's Sparrow 13 Alder Flycatcher 9 Common Yellowthroat 8 Tennessee Warbler 8 Clay-coloured Sparrow 6

(cont'd)

IV. Open lands

(a) Clear-cuts less than 7 years old

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
302 324	Hardwood regeneration (3 years after clearcut)	Lake George, NS, 45° (1)	4.1	10.2	423	1980	Ches.-s. Warbler 97 White-th. Sparrow 85 Song Sparrow 85 Northern Junco 48 Ruby-th. Hummingbird 24 Solitary Vireo 24 Common Yellowthroat 24
302 324	Dense hardwood regeneration (5-6 years after clearcut)	Lake George, NS, 45° (5-D)	3.4 4.5*	8.4 11.1*	746 range 594-899	1980-81	Ches.-s Warbler 252 Common Yellowthroat 211 White-th. Sparrow 96 Mourning Warbler 61 Bl.-and-wh. Warbler 56
302 324	Hardwood regeneration (3 years after clearcut)	Lake George, NS, 45°(7)	3.4	8.4	741	1980	Common Yellowthroat 296 White-th. Sparrow 193 Northern Junco 74 Song Sparrow 74 Ches.-s. Warbler 44
324	Clear-cut area (1 year after cutting)	Lake George, NS, 45° (A)	7.6	18.7	132	1981	Song Sparrow 59 Northern Junco 26 White-th. Sparrow 20 Common Snipe 13 American Robin 7 Ches.-s Warbler 7
324	Clear-cut area (1-2 years after cutting)	Lake George, NS, 45° (F-5)	5.1	12.6	285 range 236-334	1981-82	Northern Junco 88 White-th. Sparrow 68 American Robin 49 Hermit Thrush 20 Common Yellowthroat 20
324	Dense hardwood regeneration (3 years after clearcut)	Lake George, NS, 45° (G)	5.3	13.1	802	1981	Ches.-s. Warbler 302 Common Yellowthroat 160 White-th. Sparrow 132 Bl.-and-wh. Warbler 57 Northern Junco 47
324	Dense hardwood regeneration (5 years after clearcut)	Lake George, NS, 45° (1)	4.7	11.6	670	1982	Common Yellowthroat 319 Ches.-s Warbler 117 White-th. Sparrow 85 Northern Junco 32 Alder Flycatcher } Veery } 21 Mourning Warbler } each Song Sparrow }

* Area was 3.4 ha in 1980 and was enlarged to 4.5 ha in 1981.

(cont'd)

IV. Open lands (cont'd)

(a) Clear-cuts less than 7 years old

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			330	Clear-cut area 2 years after planting to spruce, with scattered trees	E of Hammond-vale, NB, 46° (#3)	7.0	
330	Clear-cut with 4-year jack pine plantation (2 m tall)	nr. Mechanic Settlement, NB, 46° (#4)	10.5	26.0	329	1981	Common Yellowthroat 152 Lincoln's Sparrow 67 Song Sparrow 52 Palm Warbler 29 White-th. Sparrow 29
330	Natural regeneration, 4 years after clear-cut (mostly 2-3 m birch)	Germantown, NB, 46° (#12)	11.5	28.4	369	1981	Common Yellowthroat 85 Mourning Warbler 78 White-th. Sparrow 70 Alder Flycatcher 26 Song Sparrow 26
330	Clear-cut with 5-yr jack pine plantation (2-3 m)	S of Mechanic Settlement, NB, 46° (#5)	11.0	27.2	359	1981	Common Yellowthroat 100 White-th. Sparrow 82 Song Sparrow 50 Lincoln's Sparrow 45 Magnolia Warbler 18 Palm Warbler 18
330	Clear-cut with 6-yr jack pine plantation (2-3 m)	E of Hammond-vale, NB, 46° (#1)	11.5	28.4	467	1981	White-th. Sparrow 165 Common Yellowthroat 162 Lincoln's Sparrow 50 Northern Junco 17 Song Sparrow 17
330	White spruce plantation 7 years after clear-cut (2-3 m)	nr. Germantown, NB, 46° (#11)	12.2	30.0	309	1981	Common Yellowthroat 156 White-th. Sparrow 58 Song Sparrow 56 Lincoln's Sparrow 33 Alder Flycatcher 8
289	Hardwood regeneration (3 years after cutting)	N of Beauport, Que., 47°	4.0	10.0	275	1979	White-th. Sparrow 150 Olive-s. Flycatcher } American Robin } 25 Swainson's Thrush } each Northern Junco } Lincoln's Sparrow }
344	Open electric transmission corridor	Fitzroy Hbr., Ont., 45°	7.0	17.3	707	1978	Song Sparrow 193 Common Yellowthroat 114 American Robin 86 White-th. Sparrow 86 (Br.-hd. Cowbird 71) Eastern Kingbird 28 Red-winged Blackbird 28 Chipping Sparrow 28

(cont'd)

IV. Open lands (cont'd)

(a) Clear-cuts less than 7 years old

Ref. no.*	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			370	Boreal conifer - 6-year-old lowland clearcut (grass and forbs)	Mildred Twp., Ont., 49°	9.0	
374	Boreal conifer - 3-year-old lowland cutover (forbs and bare ground)	Mildred Twp., Ont., 49°	18.0	44.5	194	1978	Lincoln's Sparrow 61 Savannah Sparrow 33 Song Sparrow 25 White-th. Sparrow 14 Common Yellowthroat 11
373	Boreal mixedwood - 3-year-old upland cutover (low scrub and scattered trees)	Mildred Twp., Ont., 49°	9.0	22.2	783	1978	Ches.-s. Warbler 239 Mourning Warbler 133 White-th. Sparrow 94 Magnolia Warbler 56 Alder Flycatcher 44
377	Clear-cut area (1 year after cutting)	Medicine Lake, Alta., 53° (A)	5.2 8.9*	12.7 22.0*	101 range 78-124	1981-82	Lincoln's Sparrow 24 Clay-coloured Sparrow 22 Mourning Warbler 11 Killdeer 10 Common Snipe 10 Solitary Sandpiper 10
371	Boreal mixedwood - 5-year-old upland cutover (low hardwood thicket)	Mildred Twp., Ont., 49°	9.0	22.2	1000	1978	Ches.-s. Warbler 372 White-th. Sparrow 144 Magnolia Warbler 122 Mourning Warbler 100 Bl.-and-wh. Warbler 67
372	Boreal mixedwood - 5-year-old lowland cutover (low alder scrub)	Mildred Twp., Ont., 49°	9.0	22.2	694	1978	Common Yellowthroat 150 White-th. Sparrow 111 Tennessee Warbler 94 Lincoln's Sparrow 78 Alder Flycatcher 67
369	Boreal mixedwood - 6-year-old upland cutover (disturbed mixed stand)	Mildred Twp., Ont., 49°	9.0	22.2	1694	1978	Ches.-s. Warbler 322 Tennessee Warbler 183 Mourning Warbler 150 Canada Warbler 128 Magnolia Warbler 117

* Area was 5.2 ha in 1981 and was enlarged to 8.9 ha in 1982.

(cont'd)

IV. Open lands (cont'd)

(b) Farmlands

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			340	Old field and gravel pit	S of Guelph, Ont., 43°	16.00	
378	Old field	Wellington Co., Ont., 43°	8.10	20.00	259	1982	Savannah Sparrow 111 Bobolink 43 Eastern Meadowlark 31 Clay-coloured Sparrow 18 Field Sparrow 18
286	Grassy field with alder and broom thickets	North Vancouver, BC, 49°	2.26	5.58	642	1983	(area too small for meaningful density figures) Willow Flycatcher White.-cr. Sparrow Bewick's Wren Rufous-s. Towhee Bl.-capped Chickadee Orange-cr. Warbler Yellow Warbler American Goldfinch Savannah Sparrow

(c) Prairies

284	Whitetop meadow	Delta, Man., 50°	15.0	37.1	727	1980	Red-winged Blackbird 260 Sedge (Sh.-b.) Marsh Wren 163 LeConte's Sparrow 77 Common Yellowthroat 57 Savannah Sparrow 43
309	Spear grass - June grass - Alkali grass mixed prairie	Webb, Sask., 50°	20.0	49.4	172	1982	Savannah Sparrow 42 Western Meadowlark 32 Sprague's Pipit 30 Baird's Sparrow 22 (Br.hd. Cowbird 10) Ches.-collared Longspur 7 Clay-coloured Sparrow 7

* Bank Swallow omitted from total density.

(cont'd)

IV. Open lands (cont'd)

(d) Tundra (including low subarctic or subalpine scrub)

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			299	Lowland tundra in high Arctic	Alexandra Fjord, Ellesmere Is., NWT, 79°	1200	
316	Lowland tundra with ponds	Polar Bear Pass, Bathurst Is., NWT, 76°	100	247	12 range 3-18	1970-73	Red Phalarope 7 Black-bellied Plover 1.3 Parasitic Jaeger 1.0 (King Eider 0.8) Sanderling 0.5 Long-tailed Jaeger 0.5 Lapland Longspur 0.5
316	Upland tundra	Polar Bear Pass, Bathurst Is., NWT, 76°	200	494	4 range 2.5-4.5	1970-73	Sanderling 1.5 (King Eider 1.0) Long-tailed Jaeger 0.8 (Oldsquaw 0.4) (Red-th. Loon 0.1) Rock Ptarmigan 0.1 Black-bellied Plover 0.1
321	Vegetated tundra	Sarcpa Lake, Melville Pena., NWT, 69°	1300	3211	35 range 34-36	1981-82	Lapland Longspur 13 Snow Bunting 8 Horned Lark 5 Golden Plover 4 Baird's Sandpiper 4
295	Low Arctic tundra	Churchill, Man., 59°	16.2	39.9	103 range 102-105	1981-82	Savannah Sparrow 19 Smith's Longspur 16 Golden Plover 15 Dunlin 12 Whimbrel 11 Hudsonian Godwit 11
348	Alpine tundra	Wilcox Pass, Jasper NP, Alta., 52°	10.5	25.9	38	1977	White-tailed Ptarmigan } Horned Lark } 10 American Robin } each Water Pipit } trace
348	Alpine meadow	Signal Mtn., Jasper NP, Alta., 53°	30.0	74.1	20	1980	Water Pipit 12 Horned Lark 6 Golden-cr. Sparrow 2 Townsend's Solitaire } each + Fox Sparrow } trace

(cont'd)

IV. Open lands (cont'd)

(d) Tundra (including low subarctic or subalpine scrub)

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			348	Subalpine grassland	Scotch Camp, Banff NP, Alta., 52°	10.5	
348	Shrubby cinquefoil meadow	Eldon siding, Banff NP, Alta., 51°	10.2	25.2	98	1975	Northern Junco 29 American Robin 25 Chipping Sparrow 20 Yellow-rumped Warbler 10 (Br.-hd. Cowbird 10) Swainson's Thrush 5
348	Subalpine willow meadow	Bow Meadows, Banff NP, Alta., 52°	14.0	34.6	89	1978	Savannah Sparrow 32 Water Pipit 14 White-cr. Sparrow 11 Common Snipe 7 Spotted Sandpiper 7 Solitary Sandpiper 7

(cont'd)

V. Urban areas

(a) Built-up areas

Ref. no.	Area		Size		Density		Commonest species with densities
	Description	Location	ha	acres	Males/100 ha	Year	
			348	Park townsite	Jasper, Alta., 53°	10.0	
(b) Urban parks							
287	Urban park	Kitchener, Ont., 43°	10.9	26.9	503	1981-82	Gray Catbird 46
288	Urban park with pond				range 494-513		Red-winged Blackbird 46 Song Sparrow 46 Common Grackle 33 Northern Cardinal 33 American Goldfinch 33
336	City ravine (urban park)	Toronto, Ont., 44°	20.9	51.6	330	1979	Red-winged Blackbird 43 Northern Cardinal 38 Gray Catbird 34 American Robin 34 Common Grackle 29
303	City ravine (open woodland and scrub and open)	Toronto, Ont. (Wigmore Park ravine) 44°	34.0	84.0	312	1980	Red-winged Blackbird 47 Bank Swallow 44 Northern Oriole 41 Northern Cardinal 29 Gray Catbird 26

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