Non-Game Bird Census

Introduction

The non-game Bird census is designed to define the variables of habitat structure that are related to the distribution of breeding birds within the Minesite area. Recent Studies (MacArthur and MacArthur, 1961; Weins 1969; Shugart and Patten, 1972; Anderson and Shugart, 1974) have documented the correlation between many structural features of the vegetation and habitat selection by breeding birds. These structual features are speculated by Hilden (1965) to convey information regarding the ultimate factors (eg. nest sites, food and shelter) necessary for the birds survival. The field methods used to realize this objective included a quantitative analysis of both the avifauna and flora present along 35 road transects within Minesite area. Principal component analysis (PCA), a statistical tool that will isolate the vegatation parameters most important in determining a bird species distribution, will be the primary method of analysis. These methods will provide a characterization of habitat types by the composition of their bird communities and provide a means for assessing the potential impact of various aspects of mining technology.

Materials and Methods

Road Transects

Census transects, similar to those used by Kendugh (1956), were established on 35 different sites (figure 1.) Each was soon long and marked with plastic flagging at 50m intervals. Thirty-four of the transects were established along improved gavel roads or logging trails. Transect #34 (the 1975 clear-cut) was established along an E-W line through the middle of the clear-cut.

All bird sounds and sightings, within 100m of either side of the transect, were recorded on a data sheet by their approximate location within each 50m x 50m area (figure PT-2). Appropriate markings were used to indicate whether the bird was sighted and/or heard singing or calling.

Morning census periods began at sunrise and ran 4-5 hours. Heavy rain was the only environmental condition that prevented the transects from being censused. Two separate transects were run simultaneously by two researchers. The route was covered twice, with 20 minutes spent walking each leg of the transect (40 minute census/1 transect/1 morning). The 35 transects were sectioned into 4 different census loops, with 8 to 10 transects per loop. One of the 4 loops was censused each morning. Each site was visited 6 to 8 times during the breeding season (June and early July), including one evening census at each site. The order in which each of the transects were censused in the morning was systematically rotated to avoid bias due to timing of the census period relative to sunrise.

The 35 transects were selected to represent as many of the habitat types found within the Minesite area as possible. Because the vegetation is naturallly quite variable and often highly disturbed from the effects of logging, fewer than one-third of the transects included a homogeneous stand of predominantly one specie throughout the 10ha area.

Mist Netting

Mist nets were used to capture non-game bird species in July and early August on 11 of the census transects (figure TB-2). Three to six, 12m nets were erected in areas where the understory could be easily cleared away. The nets were raised at sunrise and lowered between 10am and noon. All birds caught in the nets were banded with official U.S. Fish and Wildlife Service Bands, and the sex, age and species recorded (figure TB-4). Birds were banded in the mist-nets during

two seperate 3-day trapping periods. Nets in the north half of the study area were run July 19-July 21, 1976 while nets in the south half of the study area were run August 4, 1976. A team of 4 people were required for each trapping period.

Mist-netting was included as part of the non-game bird census in order to test the usefulness of the method in yeilding additional information concerning bird populations. Our primary interest was to observe whether mist-netting would collect birds on the transects that were not previously recorded during the census period. Net locations were selected to cover as many habitat types as possible.

Quantitative Vegitation Analysis

Quantitative vegetation data was collected on 12, 15m x 15m plots along each of the 35 bird transects. Materials and methods are described in the vegetation section (p. ____ - _____).

Results and Discussion

Bird species were observed on the 35 transects [illegible]

A _____ Results from censuses along road transects.

Δ _____ General species list and observations--A total of 87 transects furing the months of June and July. Table TB-__ is a list of all species along with a summary of the number of transects on which each species was recorded and the total number of observations per species. Twenty -one of the species are commonly recognized as being rare or very rare in the Superior National Forest (Green, 1971) and 27 as being uncommon. Together these 48 species comprised 12.8 % of the observations made in June and 20.9% of the observations made in July. In addition, one species, Vermivora chrysoptera (Golden-winged Warbler), has not previously been recorded as a breeding bird in the Superior National Forest (Jansen and Green, 1975). This specie was observed on 4 transects in June (7 observations) and 2 transects (2 observations) during July.

Many of the more ubiquitous and commonly observed species (for example Oporornis philadelphia (Morning Warbler), Dendroica pensylvanica (Chestnut-sided Warbler), Turdus migratorius (American Robin)) are very abundant in areas that have been recently disturbed from logging and/or burning (Niemi, 1976). Such areas are characteristic of a large portion of the minesite area. The most abundant bird encountered during the summer census period was Seiurus aurocopillus (Oven bird). Other studies (Anderson and Shugart, 1974) indicate that the Overn bird selects habitats with open canopy and subcanopy layers and with a dense understory. This structural profile is characteristic of many of the successional stages following disturbance.

Figures TB-___ and TB-___ illustrate the distribution of observations among the major bird families. During both June and July, the families Parulidae (Wood Warbler) and Fringillidae (Grosbeaks, Finches, Sparrows and Buntings) contribute the largest number of observations (68.40% in June, 48.96% in July). The smaller number of observations made during July largely results from the transects being censused less frequently. In addition, birds are also less conspicuous during July because many adults have completed the breeding cycle and have begun mothering. However, there are some exceptions. For example, the family Paridae (Chickadees) were observed three times as often during July as compared to June.

Preliminary results for 12 transects selected for uniformity of habitat- The majority of census transects include more than one habitat type. However, 12 of the 35 transects are homogeneous and were selected in order that preliminary generalizations about bird communities and habitat may be made. The following resul include only those birds sun and heard within 50m of either side of the transect (total area of 5ha) during the month of June.

Figure TB-___ illustrates the total number of species observed along each of the 12 transects. The 1975 clear-cut (Site B-35) is structurally the least diverse of the habitats and has fewer species than any other transect. The number of species ranges from a low of 8 in the clear-cut to a high of 27 found along the older-willow transect (site B35 a & b). Two of the transects are also unique in containing a large number of raw or uncommon species. On the black spruce transect (site B29) 35.4 percent of the observations were of 9 rare and uncommon species and on the 1975 clear-cut (site B34) 32.0 percent of the observations were of 5 rare and uncommon species. These percentages are significantly higher than the average of 12.8 percent for all 35 transects.

The total number of breeding pairs of birds was calculated using the method of summation (Palmgrin, 1930, referenced in Emlen, 1971). The methods used for obtaining population estimates will be discussed in a later section. The total number of breeding pairs of birds per transect is illustrated in Figure TB-___.

The population estimates range from a low of 14 breeding pairs in the 1975 clear-cut (site B34) to a high of 64 breeding pairs in the older-willow. (site B35a & b). The relative contribution of the three major bird families (when greater than 10%) to the total population is also shown. On all but one of the transects (the mature aspen, Site B14) the families Parulidae, Fringillidae and/or Verionidae contribute 50% or more of the total population. The mature aspen was unique in that 16% of the population consisted of woodpeckers. Table TB-___ summarizes all these results for each of the 12 transects.

One major point made by these results is that the two most hydrophitic (wet-soiled) transects, the black spruce (#29) and the alder-willow (#35a-b), support both a larger number of species and a larger breeding population than any other transect. The extremely dry conditions experienced this summer may have increased

the importance of the normally wet communities.

Methods used to obtain population estimates--The use of census transects to characterize different habitat types by the composition of their bird communities also allows relative population estimates to be calculated. The necessary assumption is that singing males represent a breeding pair of birds, This assumption however, is not always correct. Transient and non-breeding resident males may also be heard singing and unmated males may sing more than mated males (Best, 1975). In addition, in some species, like Zonotichia allricollis (White-throated Sparrow), the female may also sing regularly (Bent, 1968). Therefore, the methods used in this study for obtaining population estimates must not be interpreted as yielding absolute population counts, but relative estimates only.

Three
Thorough methods will be used to calculate the population estimates for each transect. The first, the summation method (Palmgren, 1930 in Emlen, 1971), uses the largest number of observations/40 minute suncus census period recorded in June, as the population estimate. Only the observations of singing birds within 50m of the transect will be counted. For example, at site B31 (mixed upland) 3 ovenbirds were heard on June 14, one on June 17, 4 on June 23 and 6 on June 28. The maximun number, 6 will then be used as the population estimate for the 5ha transect. However, bird densities are commonly expressed as the number of breeding pairs per100 acres, therefore the summation method yields a density of 49 ovenbirds. The results for other species observed on Site B31 are listed in table TB-4.

The second and third population estimates are calculated using the territory mapping method (Williams, 1936; Robbins, 1970). This method attempts to delimit bird territories by mapping the distribution of observations accumulated during

the entire census. The first step in analysing the data is to compile a composite map for each species. All observations are mapped on one data form and are distinguished according to the census morning on which they were recorded (Figure TB-9 - 15). An attempt is then made to delimit those observations belonging to a single individual. Population estimate II requires a minimum of 2 recorded observations to map a territory and population estimate III requires a minimum of 3 recorded observations. Fractions of territories (eg. one half of a territory) result when some of the observations defining a territory are more than 50m from the transect. The interpretational variability of the mapping method has been recently discussed by Best (1975). Population estimates derived from the mapping method are listed in Table TB-4.

For transect B31, the three population estimates are extremely variable. This variability largely results from the small number of censuses conducted along each transect. It has not yet been determined which of the above methods will be used in the final analysis.

Mist-netting--Results from the mist-netting periods are summarized in Tables TB- and TB-. After completion of the two trapping periods, it was felt that the amount of time and effort required to yield information additional to that obtained from the census transects could not be justified. Unless the objectives of the terrestial biology section change during the 1977 fields season, the use of mist-netting will be discontinued.

Conclusion

At present, data analysis has included the compilation of summary information regarding the abundance of each of the bird species observed on the 35 census transects. Composite maps for obtaining population estimates by the mapping method have been compiled for [illegible] transects. Future analysis will include the calcul

population nad biomass estimates and the use of principal component analysis (or a similar statitic) to determine the habitat parameters important to the distribution of breeding birds.

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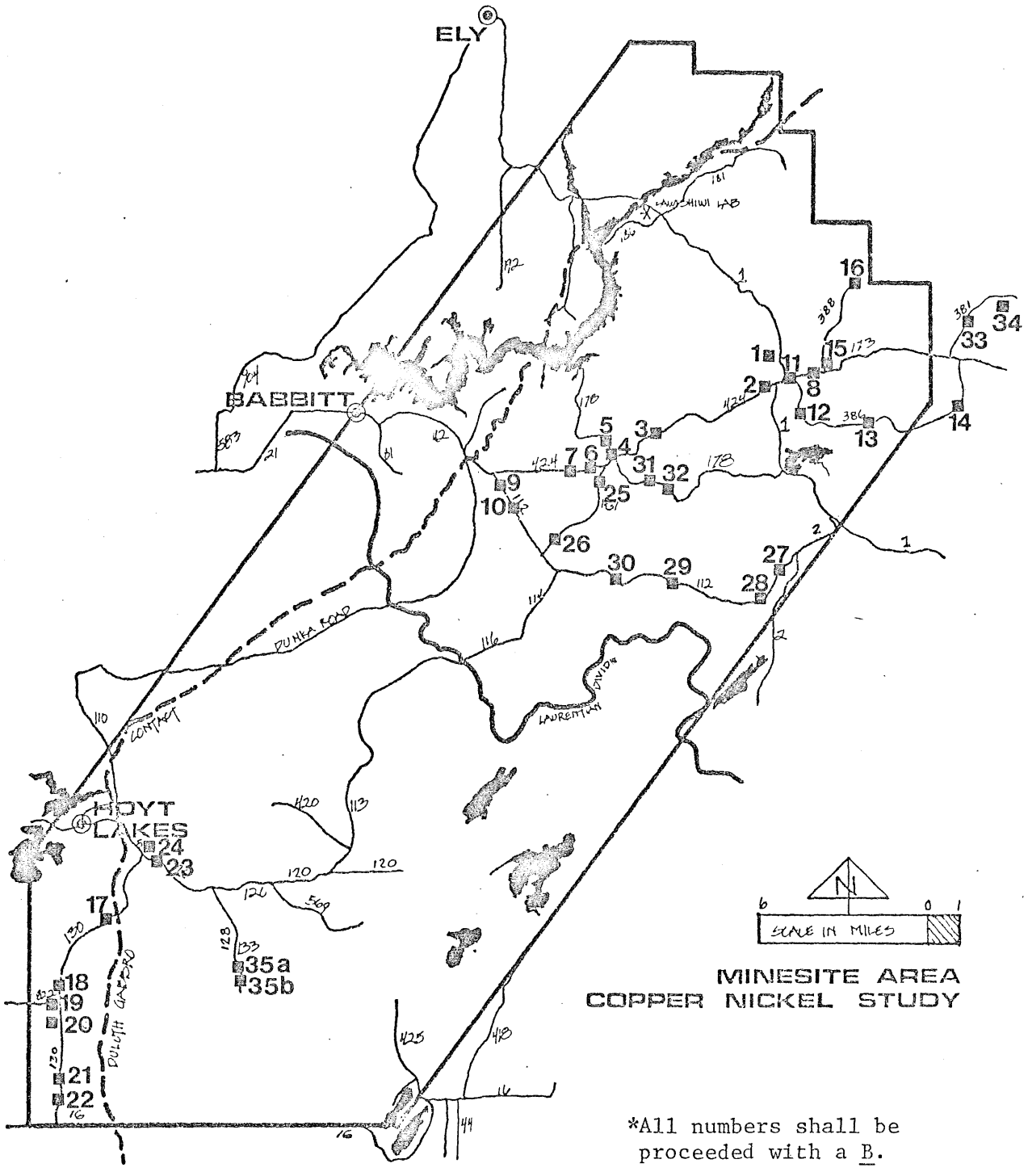
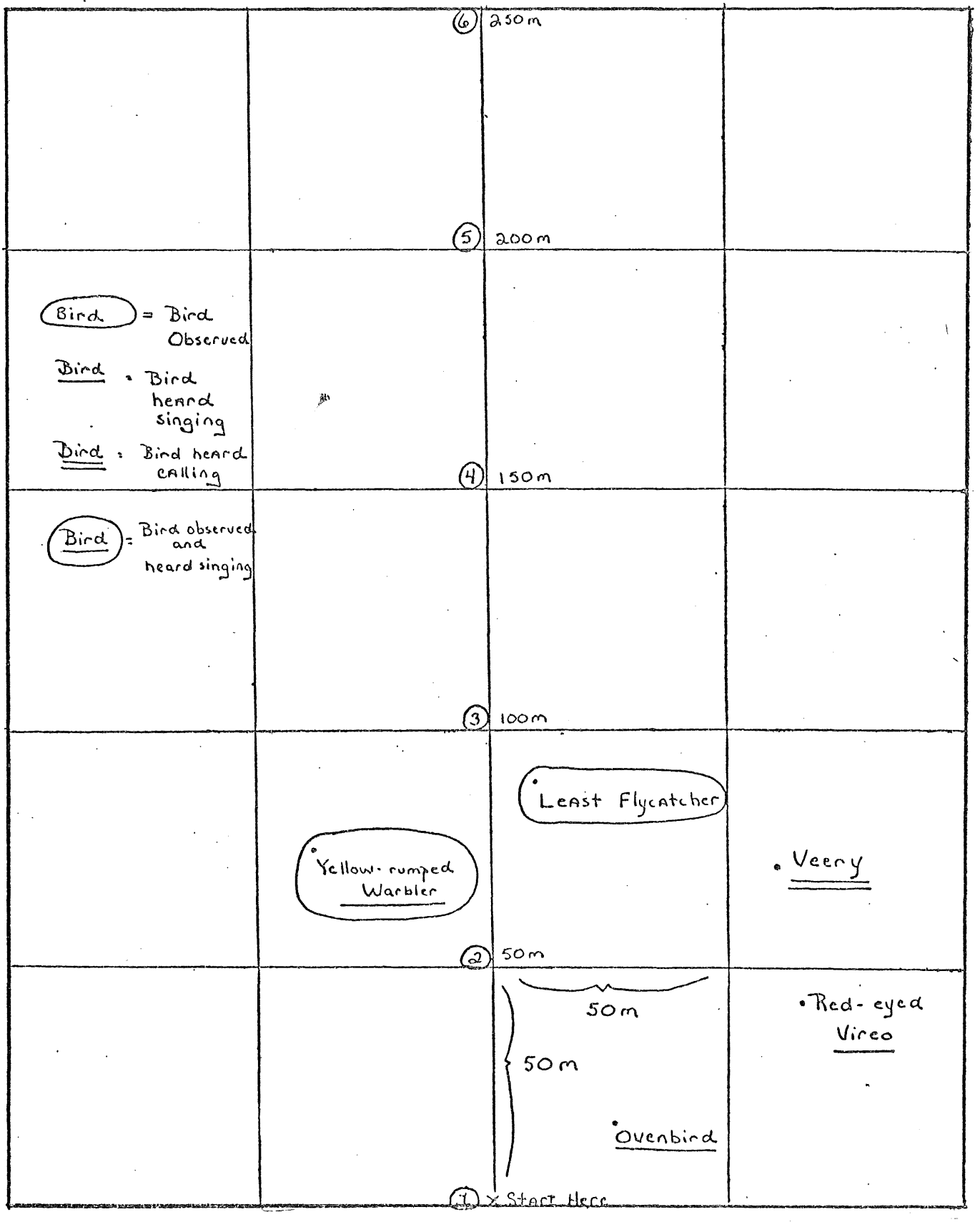
Figure BT- 1

Map locations of the 35 bird transects.



*All numbers shall be proceeded with a B.

Figure BT-
Sample data sheet for nongame bird census.



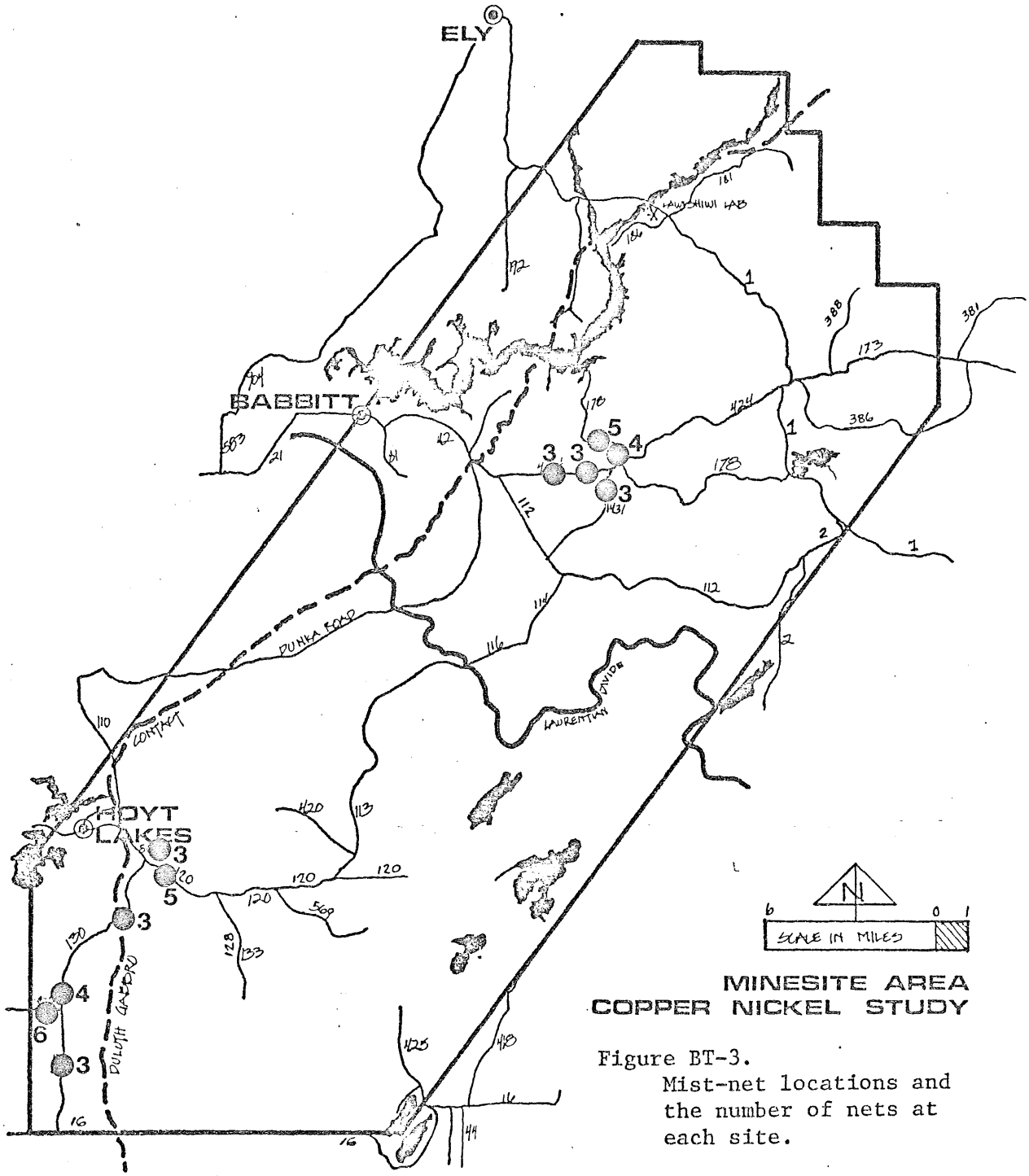


Figure BT-3.
Mist-net locations and the number of nets at each site.

Figure BT-4.
Sample data sheet for banding nongame birds.

Bird-Banding Data Record

Location:

Date:

Bander:

Time nets raised:

Time nets lowered:

Sky:

Wind:

Temperature:

Remarks:

Band No.	Common Name	Band Size	Age	Sex	Remarks

Figure BT- 5 Percent of total number of recorded observations (2997) for major bird families during the month of June.

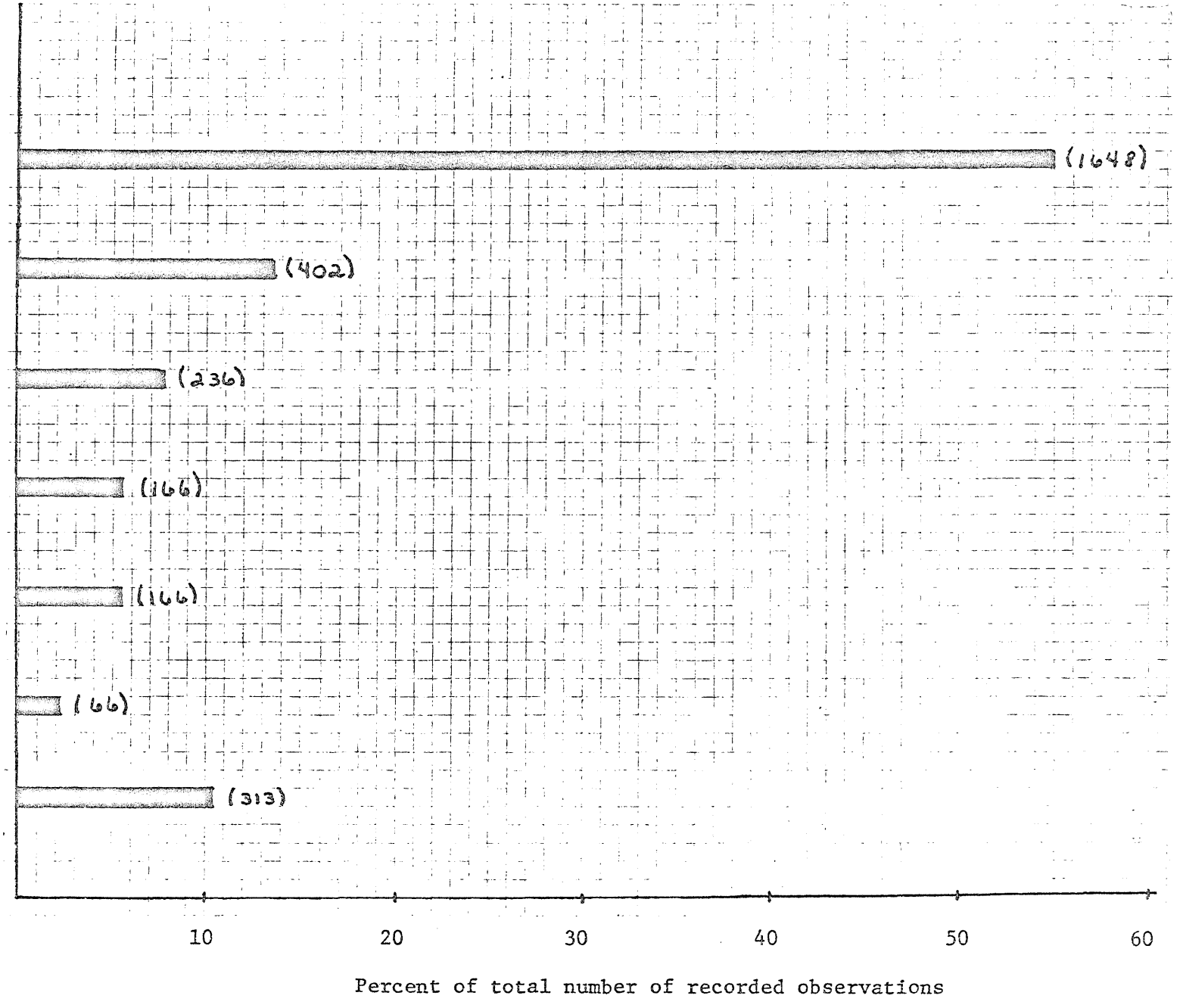


Figure BT-
Percent of total number of recorded observations (1395)
for major bird families during the month of July

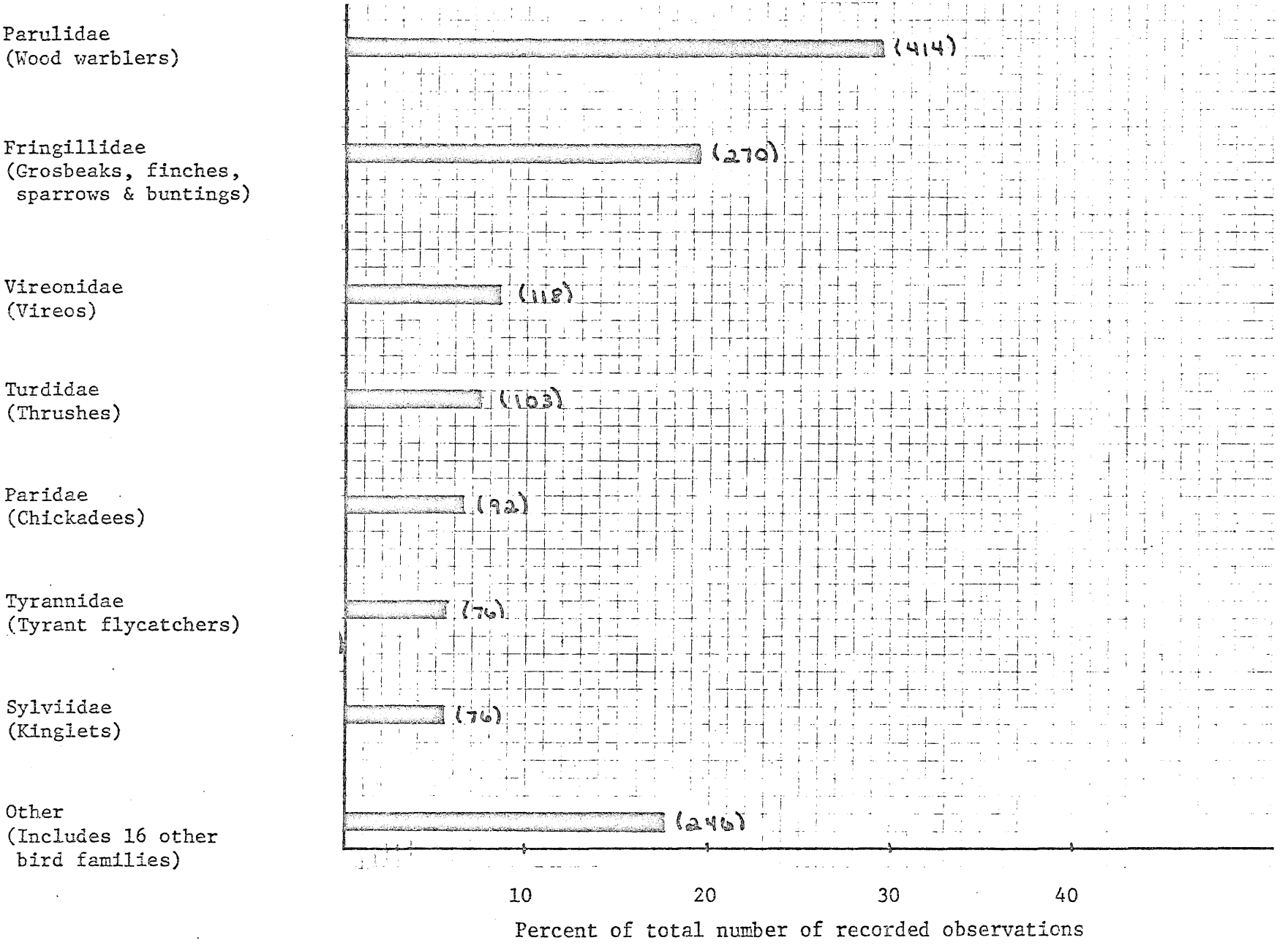


Figure BT-7
Number of Species Recorded along 12 Different
Road Transects Chosen for Uniformity of Habitat

Transect Cover Types	Transect No.
Alder-Willow	(B35a & b)
Black Spruce	(B29)
Mature Aspen	(B14)
Young Jack Pine	(B26)
Clear Cut	(B1)
Red Pine	(B10)
Mixed Upland	(B15)
Pole Aspen	(B17)
Jack Pine	(B18)
Tamarack	(B7)
Mixed Aspen	(B12)
1975 Clear Cut	(B34)

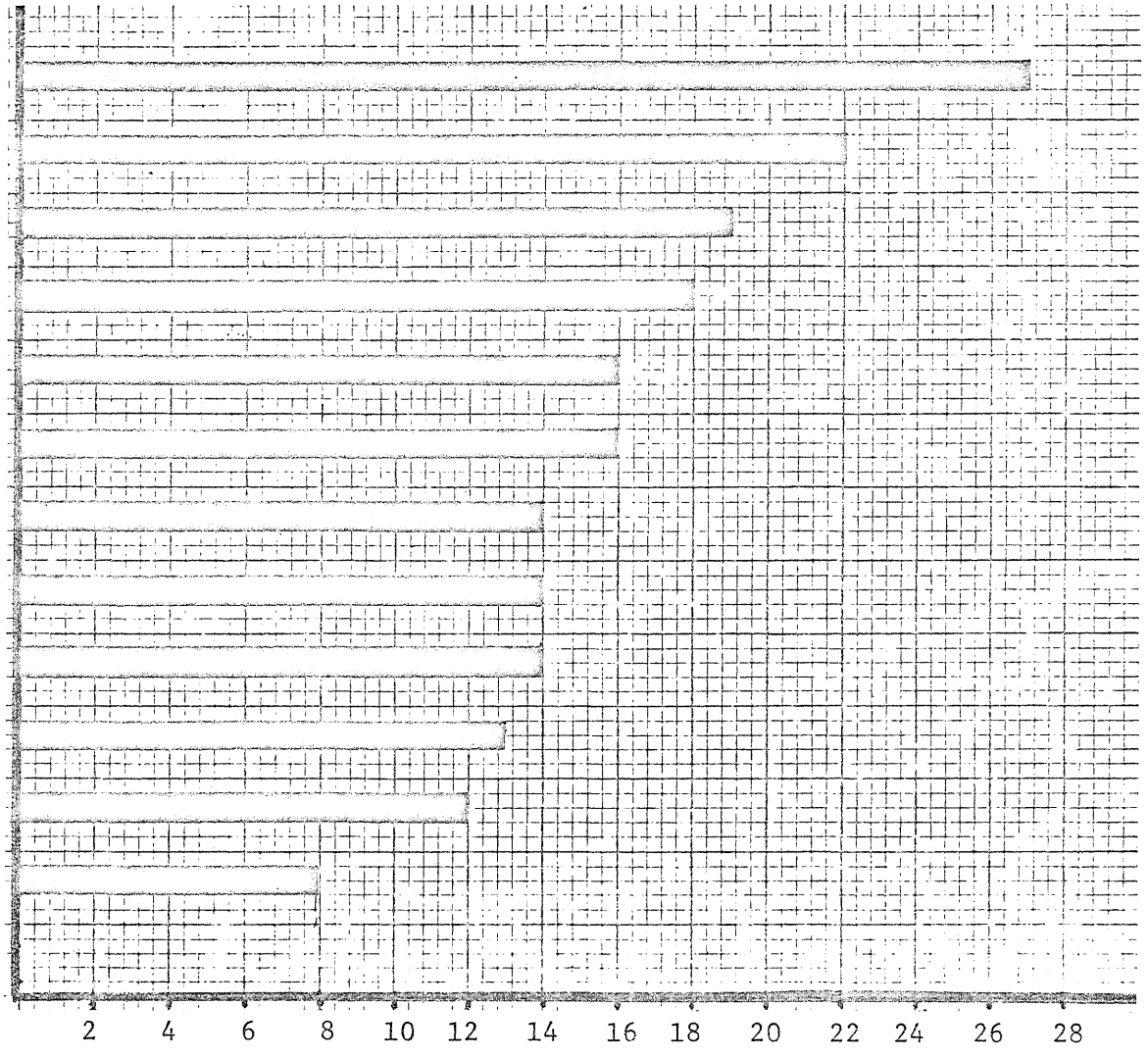


Figure BT-

Total Number of Breeding Pairs of Birds along 12 Different Road Transects chosen for Uniformity of Habitat

Transect Cover Types	Transect No.
Alder-Willow	(B35a & b)
Black Spruce	(B29)
Pole Aspen	(B17)
Young Jack Pine	(B26)
Tamarack	(B7)
Mature Aspen	(B14)
Jack Pine	(B18)
Mixed Upland	(B15)
Clear Cut	(B1)
Mixed Aspen	(B12)
Red Pine	(B10)
1975 Clear Cut	(B34)

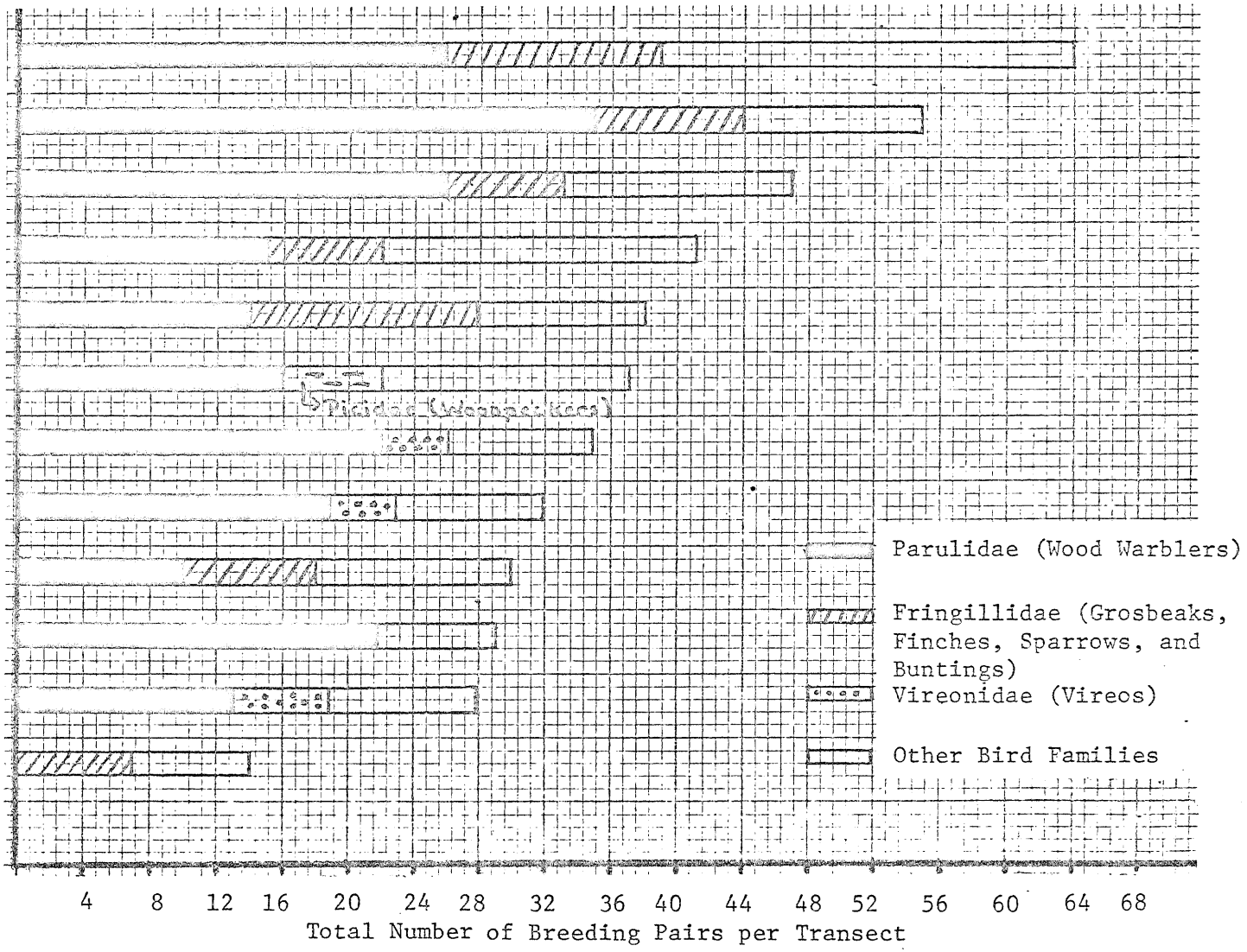


Figure BT .
Composite map and Territory map for Seiurus aurocapillus (ovenbird) on transect B31.

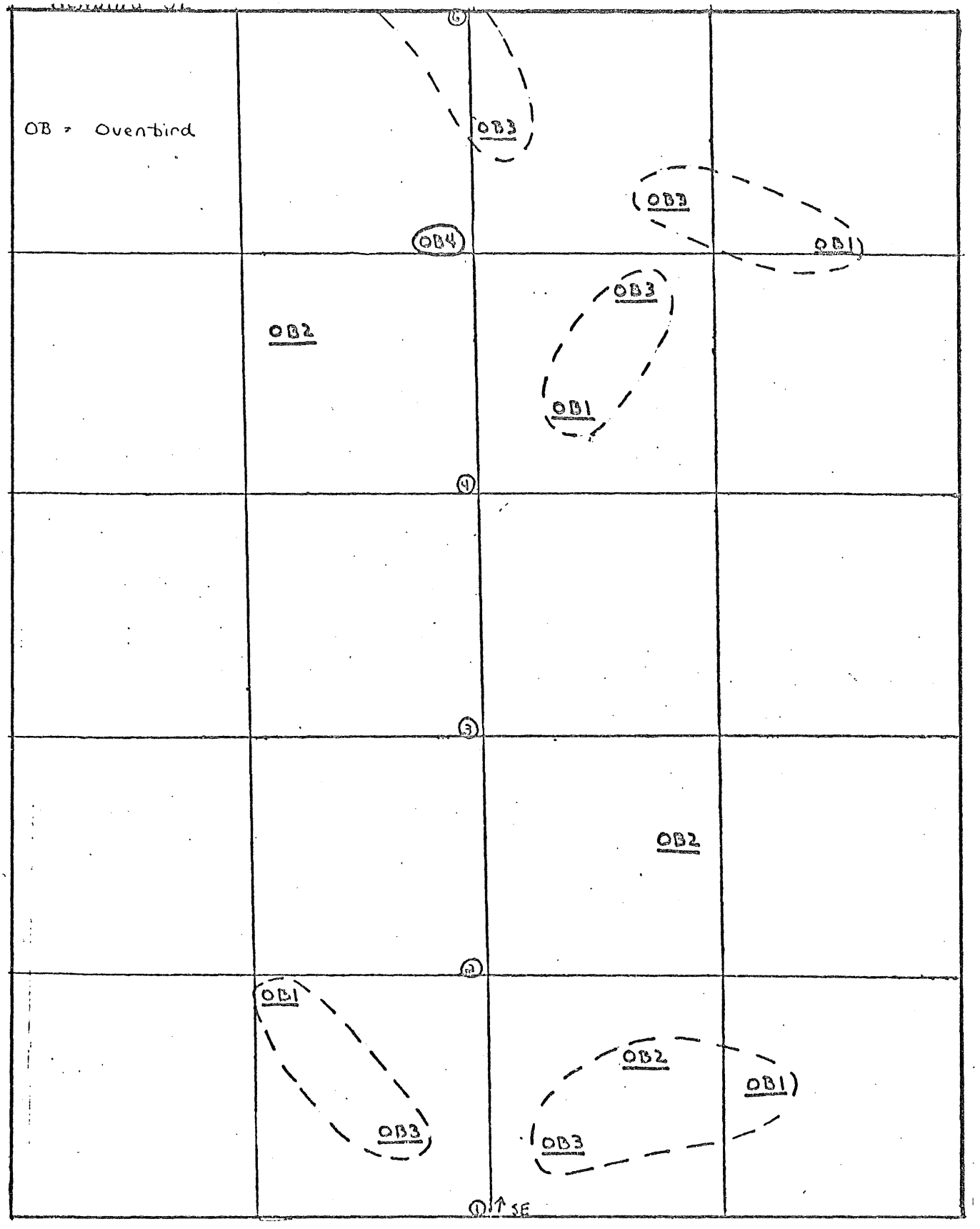


Figure BT-9. (cont.)

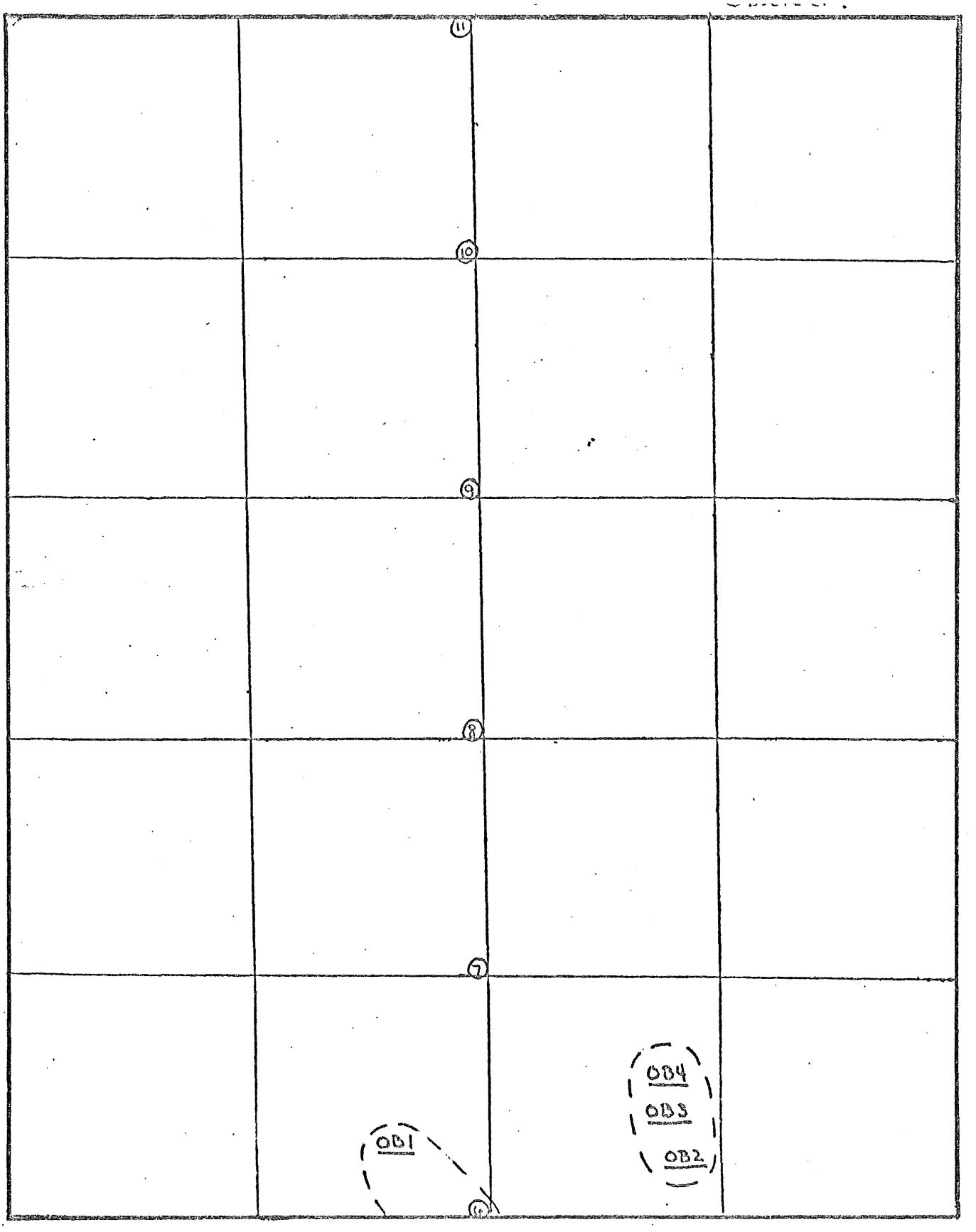


Figure BT-

Composite map and territory map for Vireo olivaceus (Red-eyed Vireo) on transect B31.

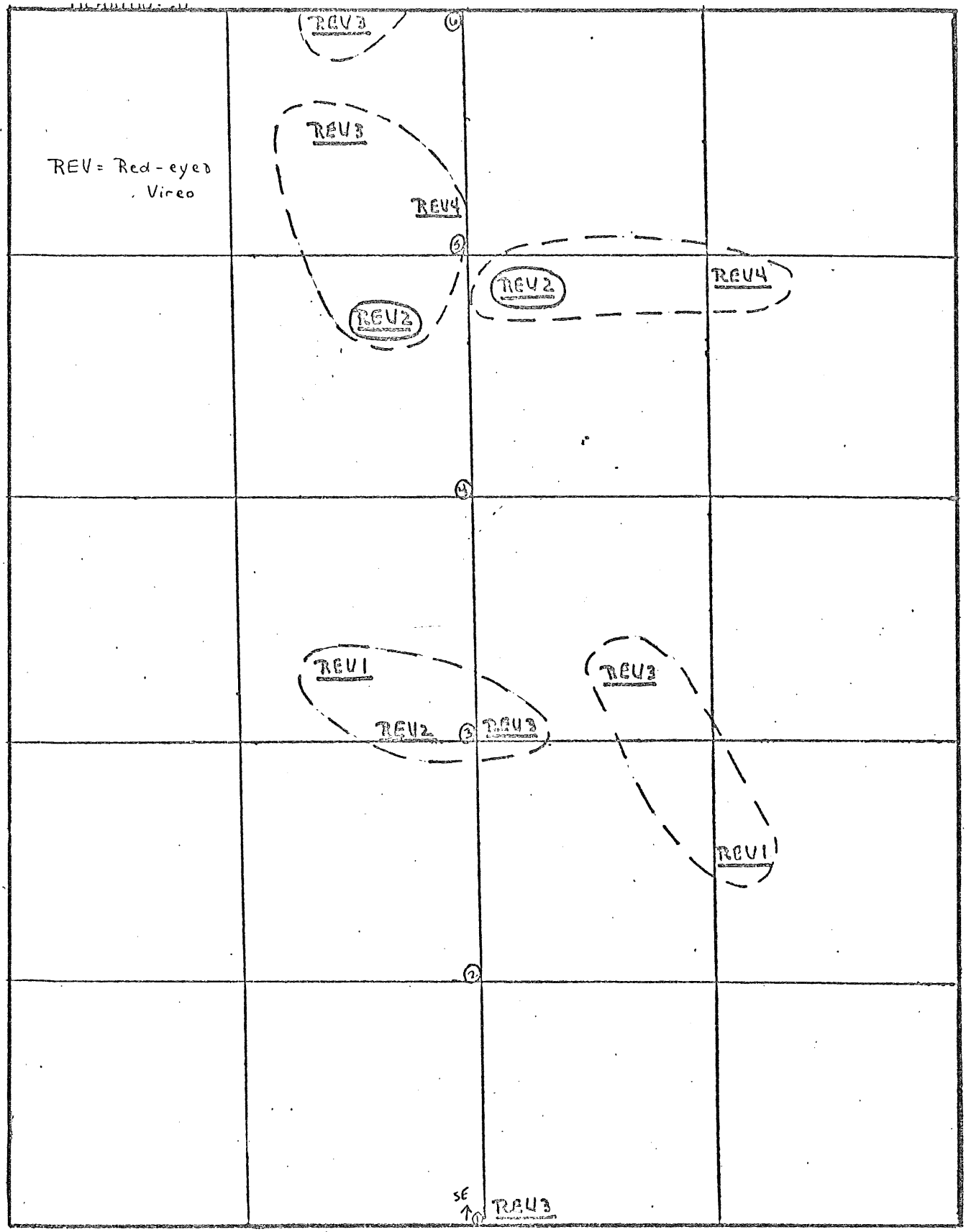


Figure BT [illegible]. (cont.)

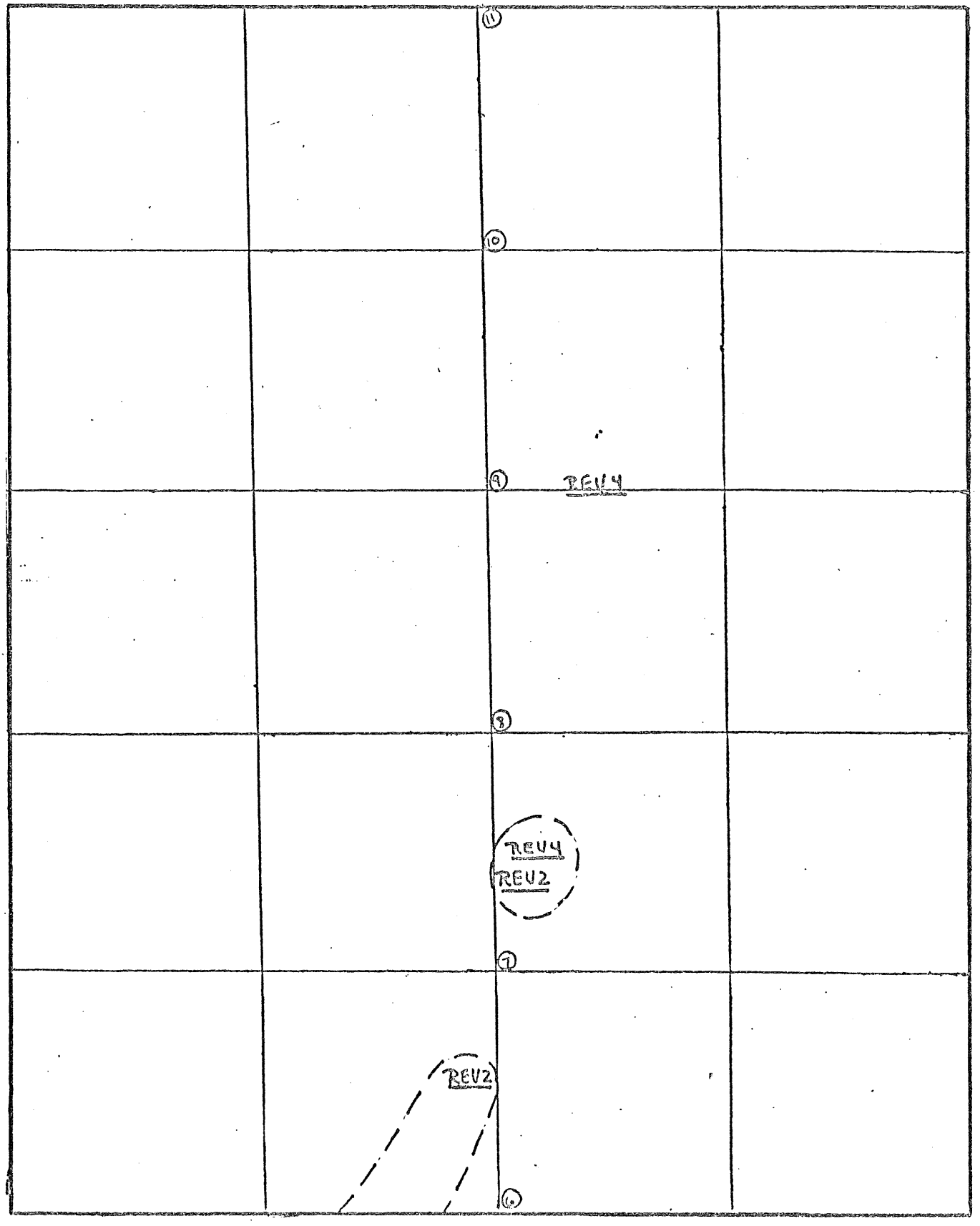


Figure BT 1.
Composite map and Territory map for Dendroica pensylvanica (Chestnut-sided Warbler) on transect B31.

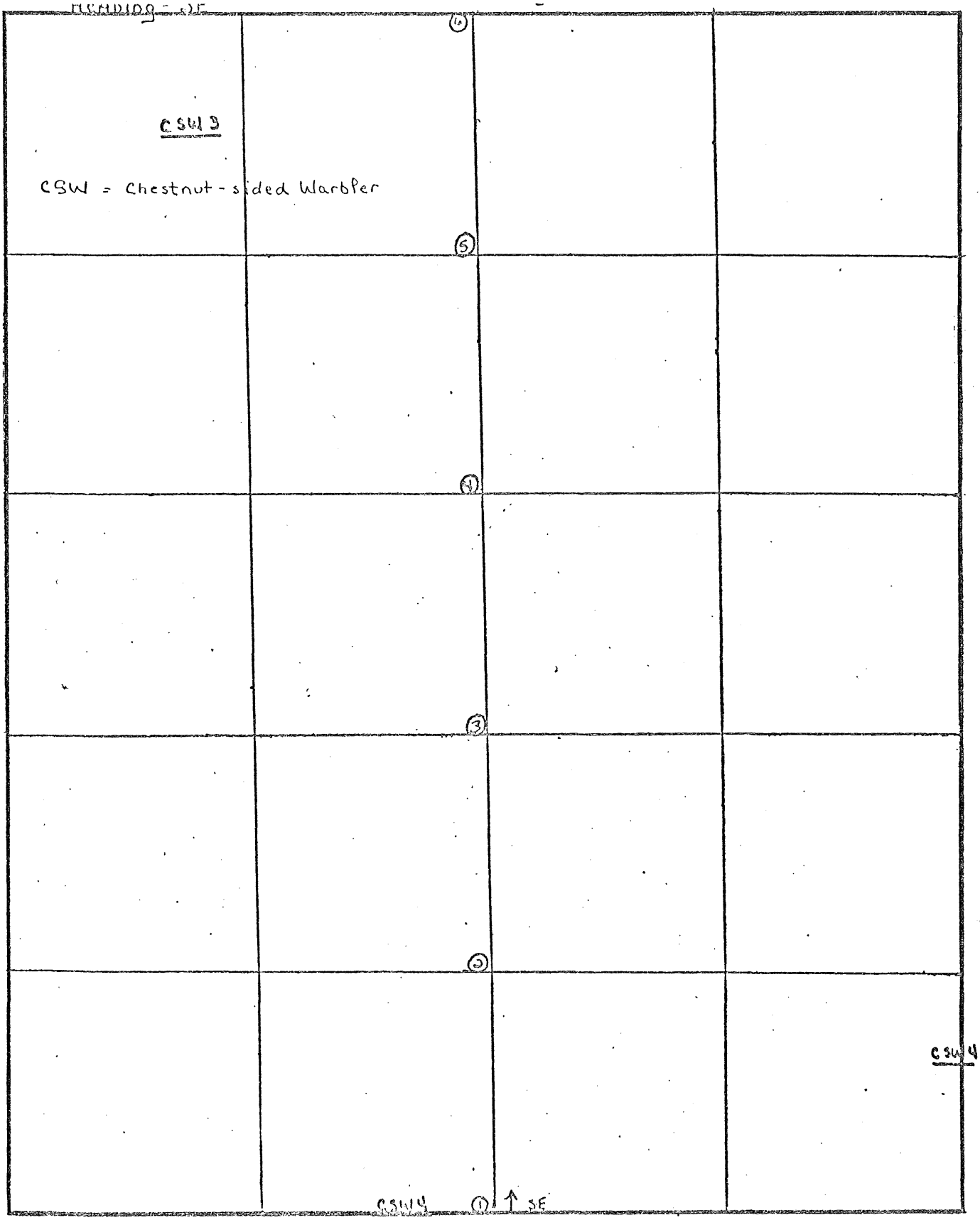


Figure BT . (cont.)

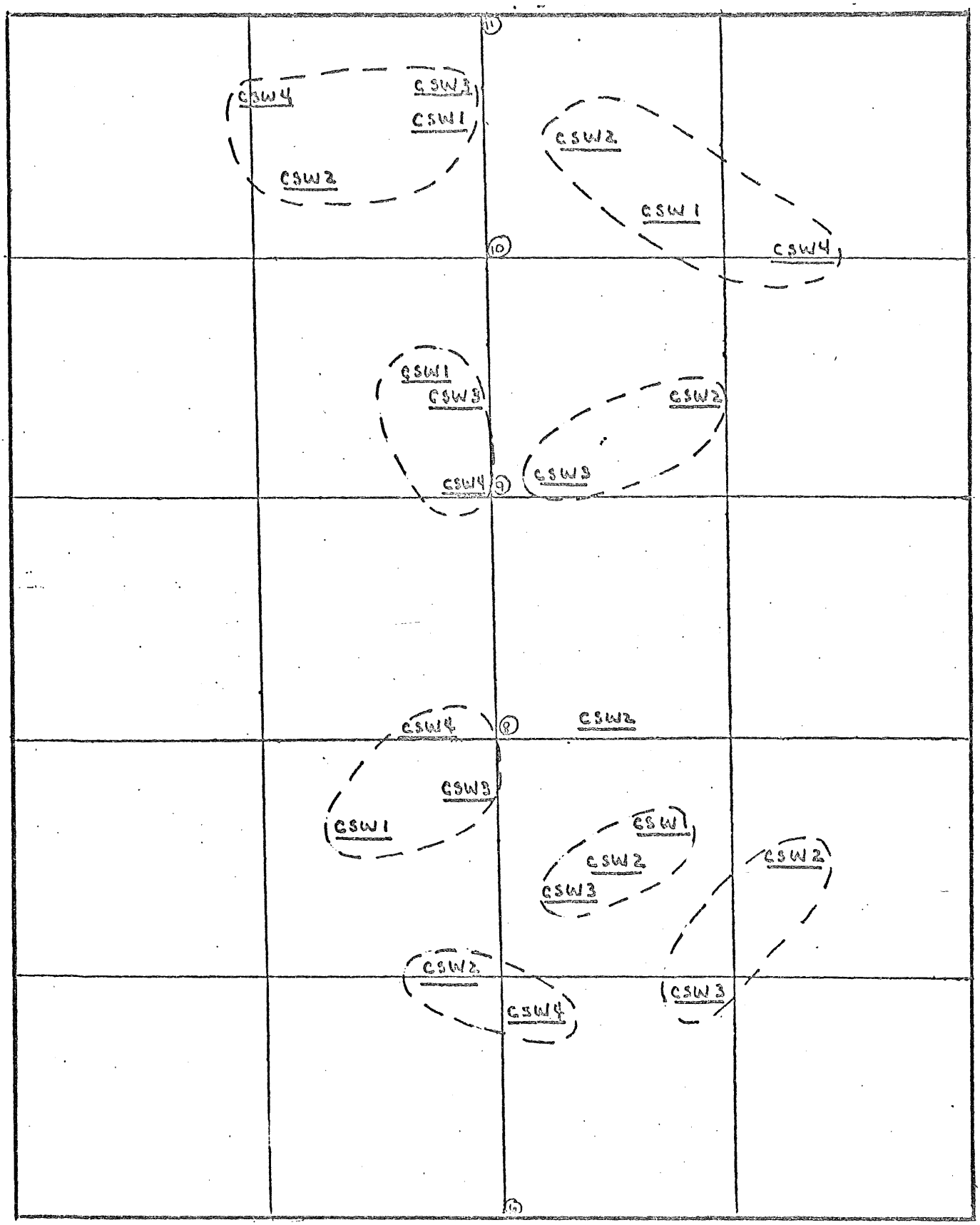


Figure BT .
Composite map and territory map for Empidonax minimus (Least Flycatcher) on transect B31.

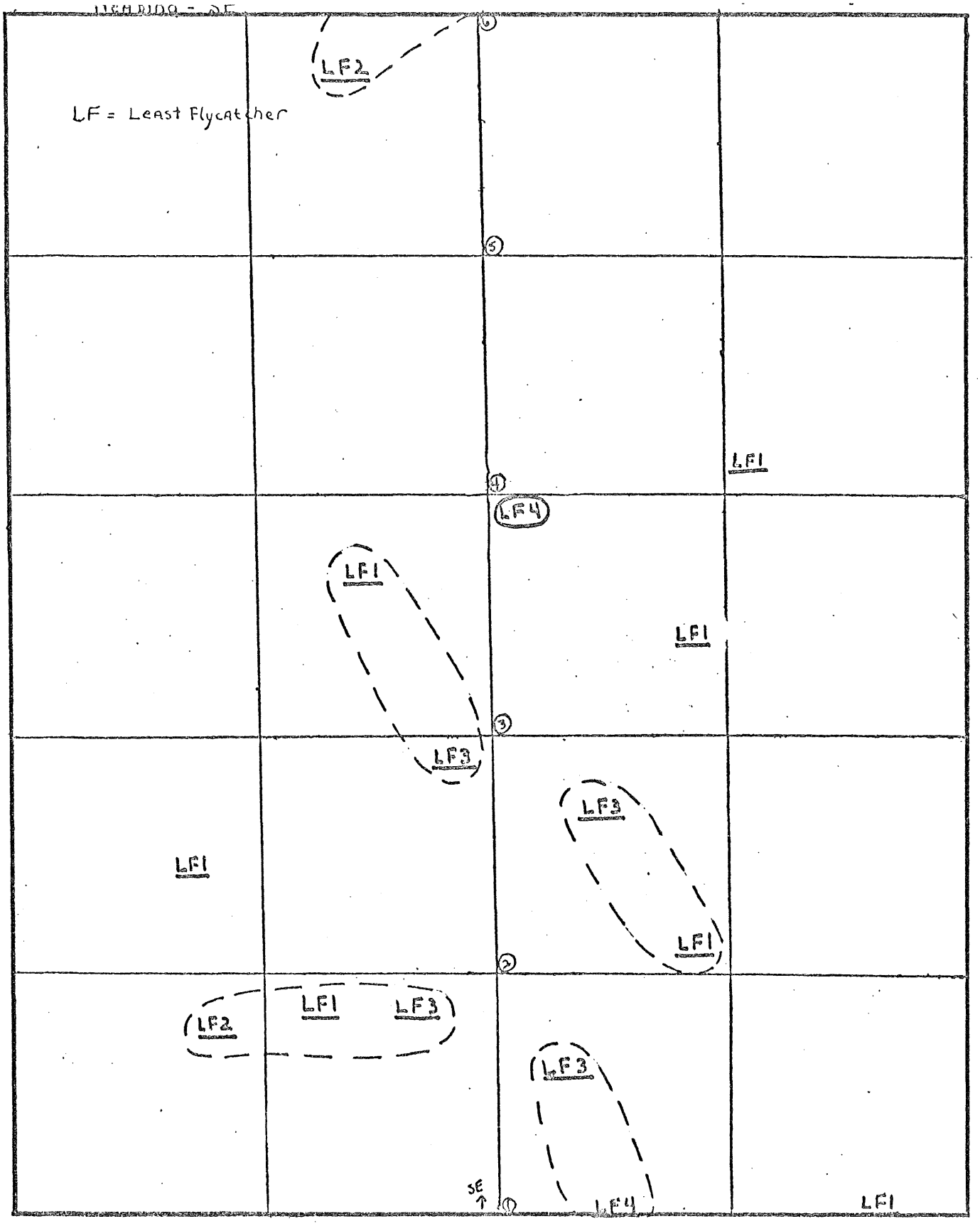


Figure BT-1. (cont.)

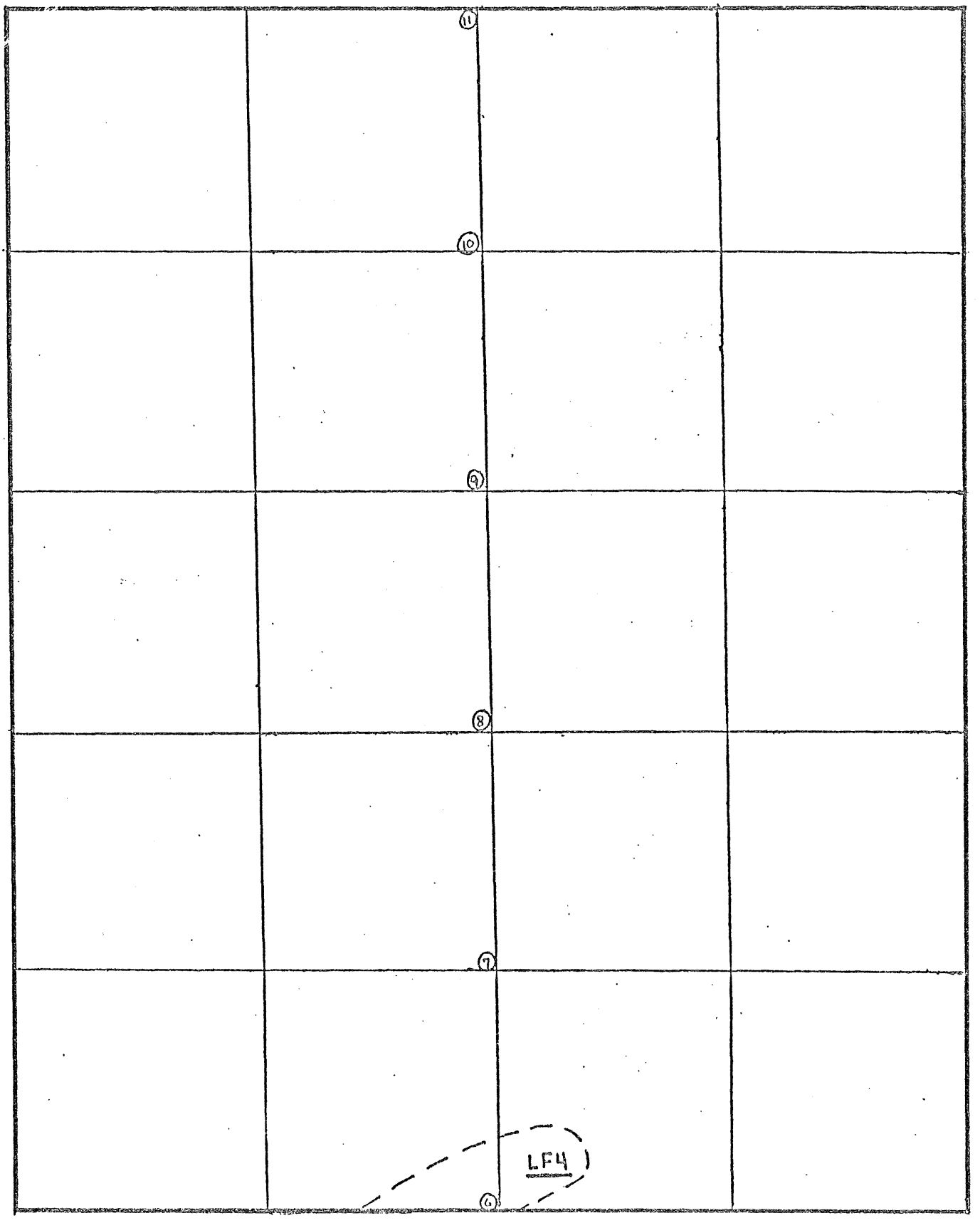


Figure BT-
Composite maps and territory maps for Wilsonia canadensis (Canada Warbler), Oporornis philadelphia (Mourning Warbler), Dendroica fusca (Blackburian Warbler), and Sphyrapicus varius (Yellow-bellied Sapsucker) on transect B31.

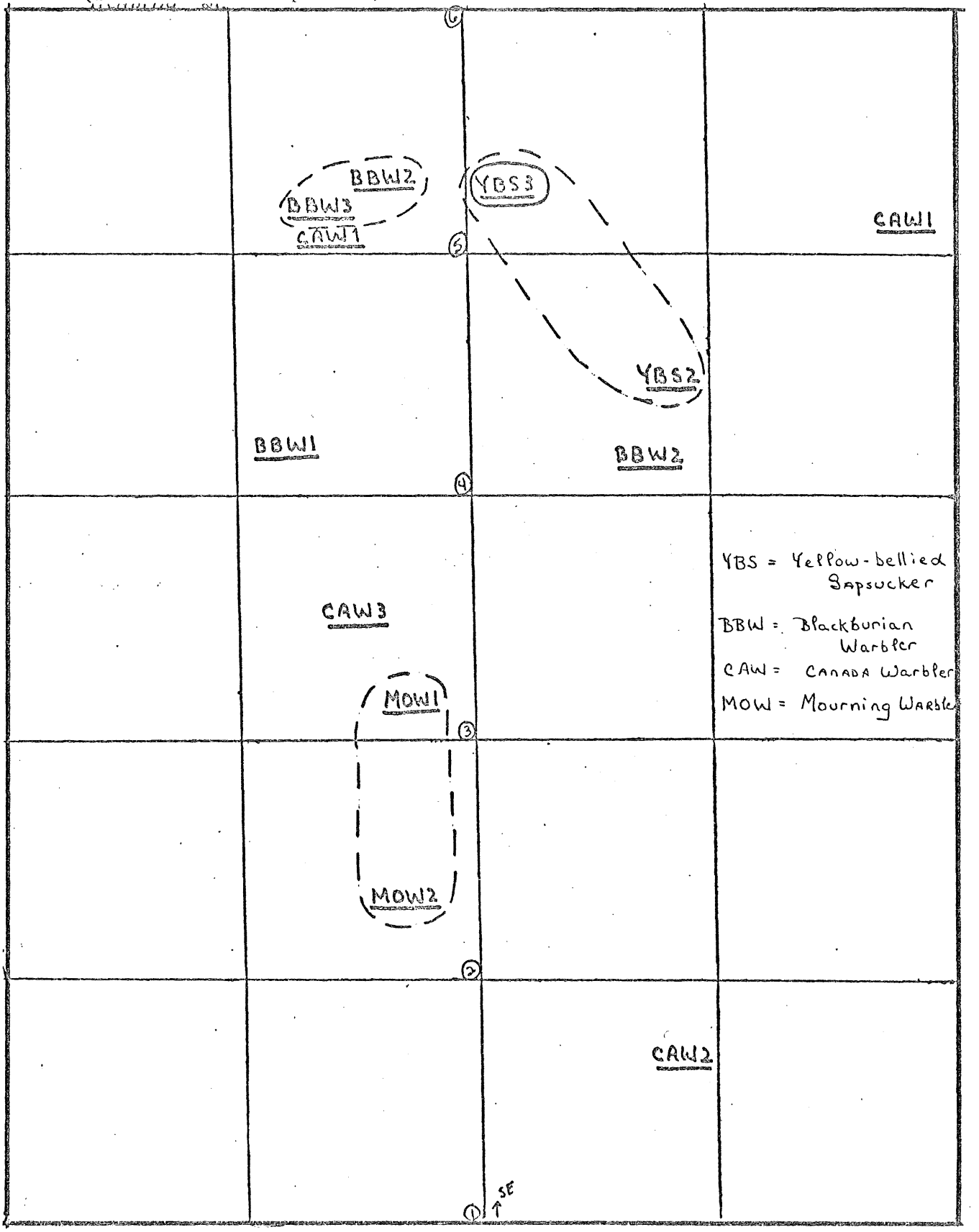


Figure BT 3.. (cont.)

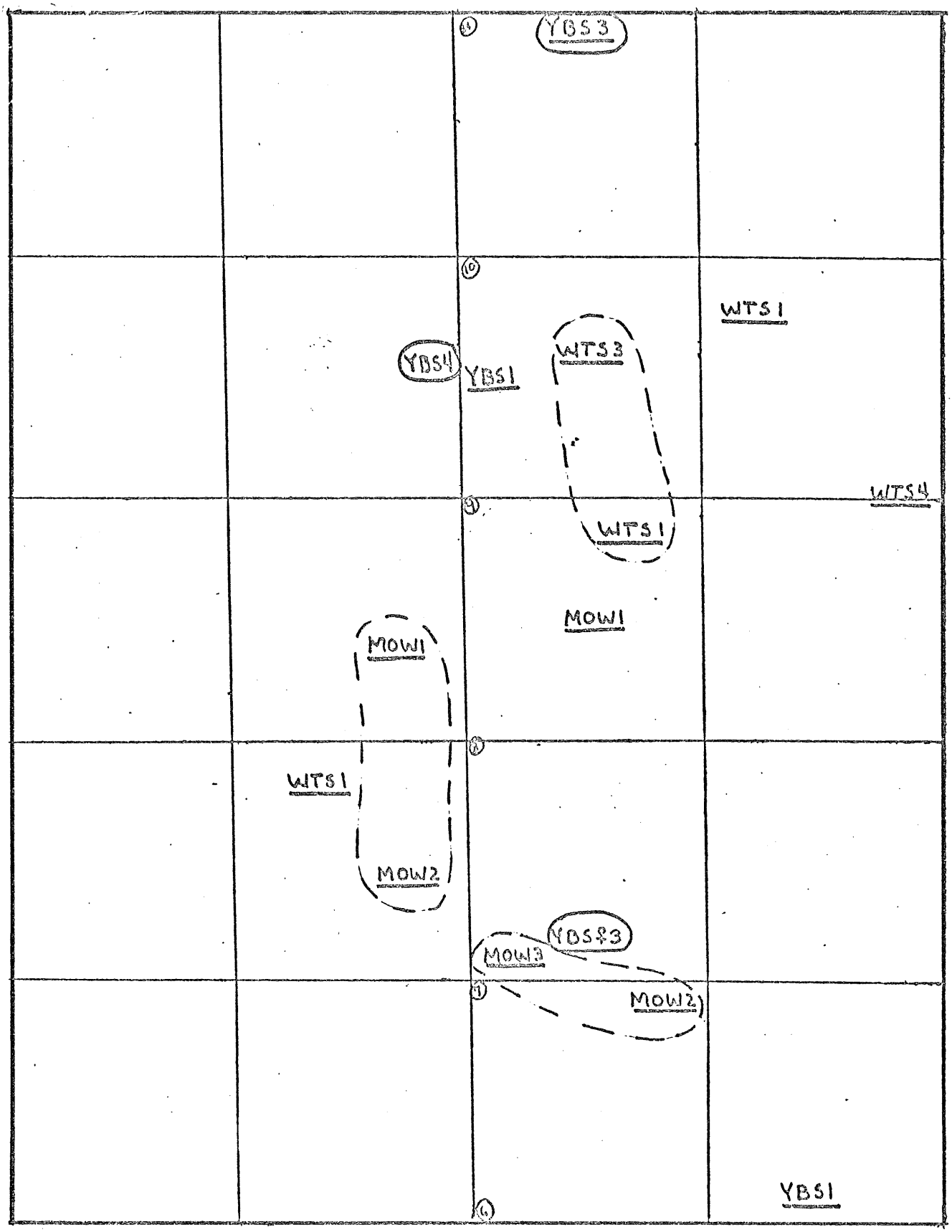
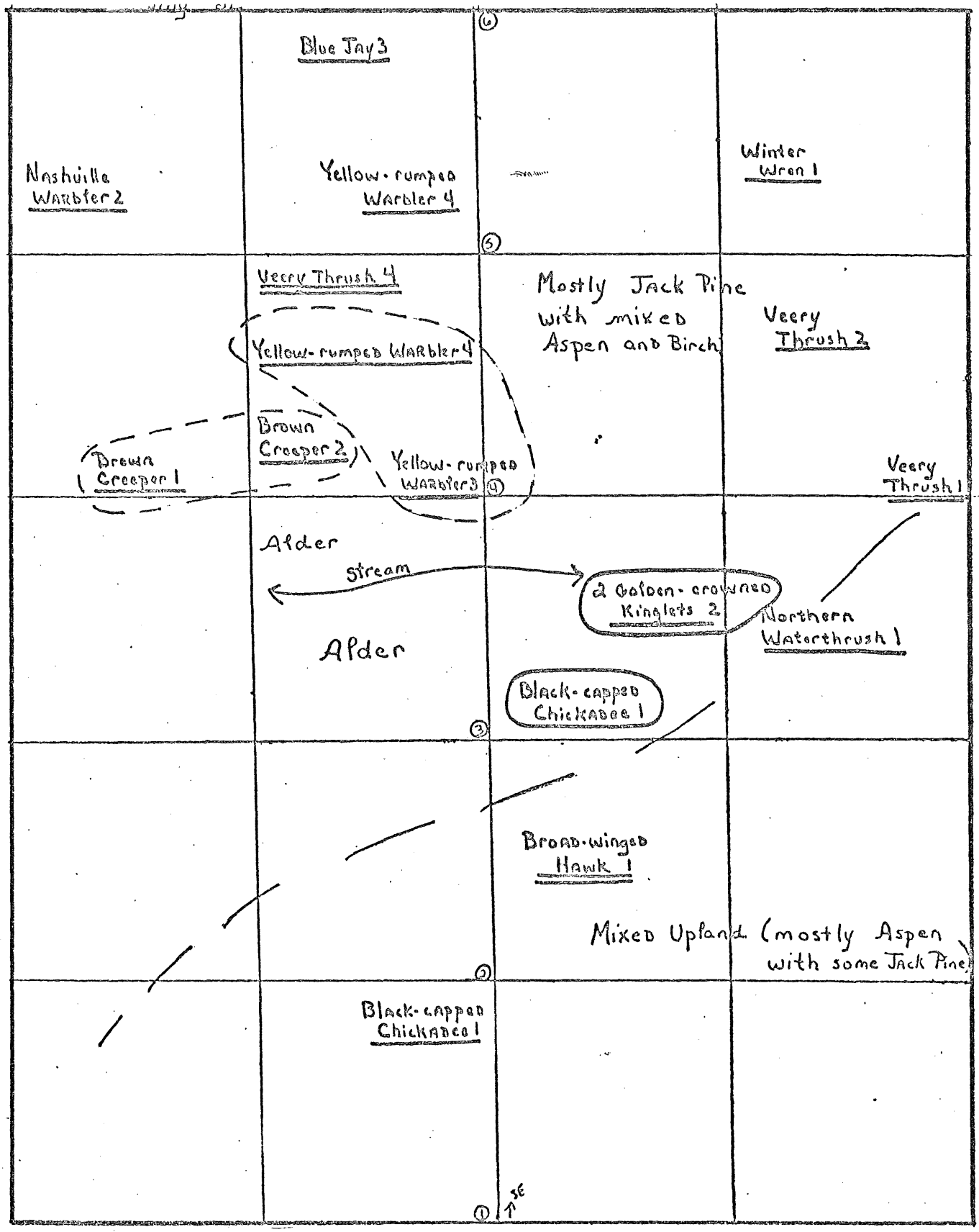


Figure BT-
Composite map and territory map for bird species uncommon on transect B3.



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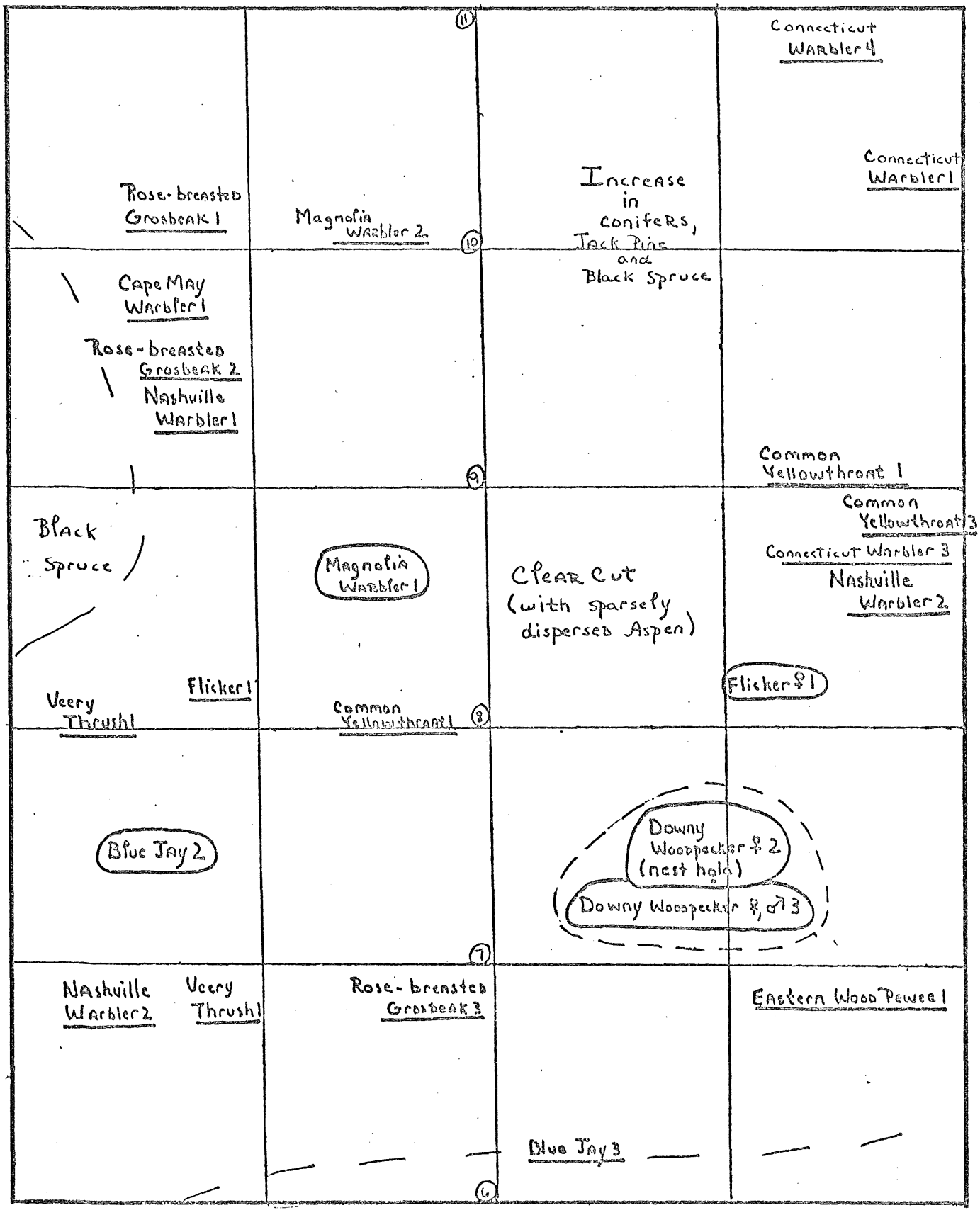

Table BT-1

Technical description of bird transects
for the 1976 field season.

Site No.	Cover Type	General Location	Map No.	Square Mile No.	Technical Description of Plot #	Ownership
B1	Clear Cut	On Hwy #1, approx. 1.5 mi. N of Junc. w/USFS Road #424	7	253	T.61N., R.10W. Sec. 30. NE¼	Federal
B2	Young Tamarack and Black Spruce	On USFS Road #424, .2 mi. SW of Junc. w/Hwy#1	7	277	T.61N., R.10W. Sec.31	Federal
B3	Mixed Upland and Mixed Lowland	On USFS Road #424, at Junc. w/USFS Road #428	11	327	T.60N., R.11W. Sec. 9 NE¼ and NW¼	Federal and Non-Federal
B4	Mature Aspen	On USFS Road #178, NW of Junc. w/USFS Rd#424	11	325	T.60N., R.11W. Sec. 7 SE¼	Federal and Non-Federal
B5	Mature Jack Pine	On USFS Road #178, .5 mi. NW of Junc. w/USFS Road #424	11	325	T.60N., R.11W. Sec. 7 NE¼ and SE¼	Federal and Non-Federal
B6	White Cedar	On USFS Road #424, .8 mi. W of Junc. w/USFS Road #1431	11	349	T.60N., R.11W. Sec.18 NW¼	Federal
B7	Tamarack	On USFS Road #424 approx. 1 mi. W of Junc. w/USFS Road #1431	10	348	T.60N., R.12W. Sec.13 NE¼	Federal
B8	Mid-aged Jack Pine Plantation	On USFS Road #173, approx. .2 mi. W of Junc. w/USFS Rd. #386	7	255	T.61N., R.10W. Sec.28 SW¼	Federal
B9	Mature Jack Pine Plantation	On USFS Road #112, approx. .3 mi. SE of Junc. w/USFS Rd. #424	10	346 347	T.60N., R.12W. Sec.23 Sec. 15, SE¼ Sec. 14, SW¼	Federal

Table BT-1 . (contd.)

Site No.	Cover Type	General Location	Map No.	Square Mile No.	Technical Description of Plot #	Ownership
B10	Red Pine Plantation	On USFS Road #112, approx. 1.5 mi. SE of Junc. w/USFS Road #424	10	371	T.60N., R.12W. Sec. 23, SE¼	Federal
B11	Black Spruce	On USFS Road #173, E of Junc. w/Hwy #1	7	277 278	T.61N., R.10W. Sec. 31, NE¼ Sec. 32, NW¼	
B12	Mixed Aspen	On USFS Road #386, approx. 1 mi. SW of Junc. w/USFS Road #173	7 12	278 309	T.61N., R.10W. Sec. 32, SE¼ T.60N., R.10W. Sec. 5, NE¼	Federal
B13	Mixed Upland and Young Red Pine Plantation treated w/2,4,5-D	On USFS Road #386, approx. 3.5 mi. W of Junc. w/USFS Road #173	12	310	T.60N., R.10W. Sec. 3, SE¼	Federal
B14	Mature Aspen	On USFS Road #386, approx. 2 mi. SW of Junc. w/USFS Rd. #173	Undesig-nated	Undesig-nated	T.60N., R.9W. Sec. 6, NW¼ & NE¼	Federal
B15	Mixed Aspen	On USFS Road #388, N of Junc. w/USFS Road #173	7	255	T.61N., R.10W. Sec. 28 NE¼ and SE¼	Federal
B16	Mature Red Pine	On USFS Road #388, approx. 4 mi. N of Junc. w/USFS Rd. #173	7	184	T.61N., R.10W. Sec. 10 NE¼ and SE¼	Federal
B17	Pole Aspen	On USFS Road #130, approx. 3 mi. S of Junc. w/USFS Road #569	17	699	T.58N., R.14W. Sec. 33, NW¼	Non-Federal
B18	Jack Pine Plantation	On USFS Road #130, approx. .1 mi. N of Junc. w/780	21	739 740	T.57N., R.14W. Sec. 7, NE¼ Sec. 8, NW¼	Federal

Table BT-1 . (contd.)

Site No.	Cover Type	General Location	Map No.	Square Mile No.	Technical Description of Plot #	Ownership
B19	White Cedar	On USFS Road #1822, W of Junc. w/USFS Road #130	21	739 757	T.57N., R.14W. Sec. 7, SE¼ Sec. 18, NE¼	Federal
B20	Red Pine Plantation	On old logging road, W of USFS Road #130, approx. .5 mi. S of Junc. w/USFS Road #1822	21	757	T.57N., R.14W. Sec. 18, SE¼	Federal
B21	Mixed Lowland	On USFS Road #130, approx. 2.2 mi. S of Junc. w/USFS Road #1822	21	794	T.57N., R.14W. Sec. 29, NW¼ and SW¼	Federal
B22	Ash Lowland	On USFS Road #130, 3 mi. S of Junc. w/USFS Road #1822	21	811 812	T.57N., R.14W. Sec. 31, NE¼ Sec. 32, NW¼	Federal
B23	White Birch	On USFS Road #569, .5 mi. SW of Junc. w/USFS Road #130	17	652 653	T.58N., R.14W. Sec. 22, NE¼ Sec. 23, NW¼	Federal
B24	Black Spruce	On USFS Road #569, at Junc. w/USFS Road #130	17	628	T.58N., R.14W. Sec. 15, SW¼ and SE¼	Federal
B25	Cut and Burn Area	On USFS Road #1431, approx. .3 mi. S of Junc. w/USFS Road #424	11	349 373	T.60N., R.11W. Sec. 18, SE¼ Sec. 19, NE¼	Federal
B26	Young Jack Pine Plantation	On USFS Road #1431, approx. .6 mi. NE of Junc. w/USFS Road #112	10	372 396	T.60N., R.12W. Sec. 24, SE¼ Sec. 25, NE¼	Non-Federal
B27	White Birch	On USFS Road #112, approx. 1 mi. SW of Junc. w/Hwy #2	12	427	T.60N., R.10W. Sec. 31, SE¼	Federal

Table BT-1 . (contd.)

Site No.	Cover Type	General Location	Map No.	Square Mile No.	Technical Description of Plot #	Ownership
B28	Mixed Aspen	On USFS Road #112, approx. 2 mi. SW of Junc. w/Hwy #2	16	456	T.59N., R.11W. Sec. 1, SE¼	Federal
B29	Black Spruce	On USFS Road #112, approx. 4 mi. W of Junc. w/USFS Road #114	11	424 454	T.60N., R.11W. Sec. 34, SW¼ T.59N., R.11W. Sec. 3, NW¼	Federal and Non-Federal
B30	Mixed Upland	On USFS Road #112, approx. 2 mi. W of Junc. w/USFS Road #114	11	422	T.60N., R.11W. Sec. 32, SW¼	Federal
B31	Mixed Upland (w/cut)	On USFS Road #178, approx. 1.5 mi. SW of Junc. w/USFS Road #424	11	351	T.60N., R.11W Sec. 16, SW½	Federal and Non-Federal
B32	Mixed Upland (w/some Black Spruce Lowland)	On USFS Road #178, approx. 2 mi. SW of Junc. w/USFS Road #424	11	351 375	T.60N., R.11W. Sec. 16, SE¼ Sec. 21, NE¼	Federal and Non-Federal
B33	Old Burn (w/Mixed Upland)	On USFS Road #381, approx. 1 mi. NE of Junc. w/USFS Road #173	8	235 236	T.61N., R.9W. Sec. 19, NE¼ Sec. 20, NW¼	Federal
B34	1975 Clear Cut	On USFS Road #381, approx. 2.5 mi. NE of Junc. w/USFS Road #173	8	212	T.61N., R.9W. Sec. 17, NE¼	Federal
B35a	Alder-Willow Lowland	On USFS Road #128, approx. 3 mi. S of Junc. w/USFS Road #569 (250 m long)	22	728 746	T.57N., R.13W. Sec. 5, SW¼ Sec. 8, NW¼	Federal and Non-Federal
B35b	Alder-Willow Lowland	On USFS Road #128, approx. 3.5 mi. S of Junc. w/USFS Road #569 (250m long)	22	746	T.57N., R.13W. Sec. 8, NW¼ and SW¼	Non-Federal

Table TB- 2 .

List of bird species observed or heard along 35 different transects during the spring breeding season (June & July) of 1976.

Scientific Name	Common Name	No. and % of Transects Where a Species was Present (35 Different Transects)		No. and % of Observations per pecies (Sound and/or Sight)	
		June No. (0.0%)	July No. (0.0%)	June No. (0.00%)	July No. (0.00%)
Botaurus lentiginosus	***American bittern	1 (2.9)	0 (0.0)	1 (0.03)	0 (0.00)
Buteo jamaicensis	***red-tailed hawk	1 (2.9)	1 (2.9)	3 (0.10)	1 (0.07)
Buteo platypterus	broad-winged hawk	6 (17.1)	5 (14.3)	9 (0.30)	5 (0.36)
Circus cyaneus	**marsh hawk	0 (0.0)	1 (2.9)	0 (0.00)	1 (0.07)
Pandion haliaetus	***osprey	1 (2.9)	0 (0.0)	1 (0.03)	0 (0.00)
Falco sparverius	**American kestrel	7 (20.0)	5 (14.3)	8 (0.27)	8 (0.57)
Charadrius vociferus	**killdeer	1 (2.9)	1 (2.9)	3 (0.10)	1 (0.07)
Philohela minor	***American woodcock	1 (2.9)	0 (0.0)	1 (0.03)	0 (0.00)
Capella gallinago	**common snipe	1 (2.9)	0 (0.0)	1 (0.03)	0 (0.00)
Tringa solitaria	**solitary sandpiper	1 (2.9)	0 (0.0)	1 (0.03)	0 (0.00)
Coccyzus erythropthalmus	***black-billed cuckoo	1 (2.9)	3 (8.6)	1 (0.03)	6 (0.43)
Aegolius acadieus	**saw-whet owl	1 (2.9)	0 (0.0)	1 (0.03)	0 (0.00)
Chordeiles minor	common nighthawk	1 (2.9)	3 (8.6)	0 (0.00)	3 (0.22)
Archilochus colubris	***ruby-throated hummingbird	5 (14.3)	4 (11.4)	7 (0.23)	11 (0.79)
Megaceryle alcyon	***belted kingfisher	3 (8.6)	0 (0.0)	4 (0.13)	0 (0.00)

For description of astericks, see footnote at end of table.

Table TB- 2 . (cont.)

Scientific Name	Common Name	No. and % of Transects Where a Species was Present (35 Different Transects)				No. and % of Observations per Species (Sound and/or Sight)			
		June		July		June		July	
		No.	(0.0%)	No.	(0.0%)	No.	(0.00%)	No.	(0.00%)
Colaptes auratus	common flicker	10	(28.6)	11	(31.4)	15	(0.50)	18	(1.29)
Dryocopus pileatus	**pileated woodpecker	2	(5.7)	1	(2.9)	4	(0.13)	1	(0.07)
Sphyrapicus varius	yellow-bellied sapsucker	10	(28.6)	9	(25.7)	24	(0.80)	12	(0.86)
Dendrocopos villosus	***hairy woodpecker	4	(11.4)	4	(11.4)	6	(0.20)	4	(0.29)
Dendrocopos pubescens	***downy woodpecker	5	(14.3)	13	(37.1)	7	(0.23)	19	(1.36)
Picoides arcticus	**black-backed three-toed woodpecker	0	(0.0)	1	(2.9)	0	(0.00)	1	(0.07)
Tyrannus tyrannus	***eastern kingbird	3	(8.6)	1	(2.9)	6	(0.20)	1	(0.07)
Myiarchus crinitus	*great crested flycatcher	1	(2.9)	0	(0.0)	1	(0.03)	0	(0.00)
Empidonax flaviventris	***yellow-bellied flycatcher	8	(22.9)	7	(20.0)	24	(0.80)	7	(0.50)
Empidonax alnorum	alder flycatcher	6	(17.1)	3	(8.6)	17	(0.57)	14	(1.00)
Empidonax minimus	least flycatcher	18	(51.4)	10	(28.6)	100	(3.34)	47	(3.37)
Contopus virens	***eastern wood pewee	5	(14.3)	4	(11.4)	15	(0.50)	6	(0.43)
Nuttallornis borealis	***olive-sided flycatcher	2	(5.7)	2	(5.7)	3	(0.10)	1	(0.07)
Iridoprocne bicolor	tree swallow	9	(25.7)	3	(8.6)	27	(0.90)	4	(0.29)
Perisoreus canadensis	***gray jay	4	(11.4)	5	(14.3)	10	(0.33)	15	(1.08)
Cyanocitta cristata	blue jay	15	(42.9)	13	(37.1)	38	(1.27)	20	(1.43)

For description of astericks, see footnote at end of table.

Table TB- 2. (cont.)

Scientific Name	Common Name	No. and % of Transects Where a Species was Present (35 Different Transects)				No. and % of Observations per Species (Sound and/or Sight)			
		June		July		June		July	
		No.	(0.0%)	No.	(0.0%)	No.	(0.00%)	No.	(0.00%)
Corvus corax	common raven	2	(5.7)	3	(8.6)	7	(0.23)	3	(0.22)
Corvus brachyrhynchos	common crow	0	(0.0)	2	(5.7)	0	(0.00)	7	(0.50)
Parus atricapillus	black-capped chickadee	13	(37.1)	21	(60.0)	26	(0.87)	77	(5.52)
Parus hudsonicus	**boreal chickadee	3	(8.6)	7	(20.0)	5	(0.17)	15	(1.08)
Sitta carolinensis	**white-breasted nuthatch	0	(0.0)	1	(2.9)	0	(0.00)	1	(0.07)
Sitta canadensis	red-breasted nuthatch	7	(20.0)	16	(45.7)	13	(0.43)	30	(2.15)
Certhia familiaris	**brown creeper	4	(11.4)	2	(5.7)	9	(0.30)	2	(0.14)
Troglodytes aedon	**house wren	1	(2.9)	1	(2.9)	2	(0.07)	2	(0.14)
Troglodytes troglodytes	winter wren	8	(22.9)	4	(11.4)	10	(0.33)	7	(0.50)
Dumetella carolinensis	**gray catbird	1	(2.9)	1	(2.9)	4	(0.13)	7	(0.50)
Toxostoma rufum	*brown thrasher	3	(8.6)	0	(0.0)	6	(0.20)	2	(0.14)
Turdus migratorius	American robin	24	(68.6)	24	(68.6)	66	(2.20)	44	(3.16)
Catharus guttatus	***hermit thrush	14	(40.0)	16	(45.7)	24	(0.80)	26	(1.87)
Catharus ustalatus	Swainson's thrush	2	(5.7)	4	(11.4)	5	(0.17)	6	(0.43)
Catharus fuscescens	veery	18	(51.4)	12	(34.3)	71	(2.37)	27	(1.94)
Regulus satrapa	***golden-crowned kinglet	14	(40.0)	16	(45.7)	49	(1.64)	71	(5.09)
Regulus calendula	***ruby-crowned kinglet	8	(22.9)	3	(8.6)	17	(0.57)	5	(0.36)

For description of astericks, see footnote at end of table.

Table 3B-2. (cont.)

Scientific Name	Common Name	No. and % of Transects Where a Species was Present (35 Different Transects)				No. and % of Observations per Species (Sound and/or Sight)			
		June		July		June		July	
		No.	(0.0%)	No.	(0.0%)	No.	(0.00%)	No.	(0.00%)
Bombycilla cedrorum	cedar waxwing	12	(34.3)	9	(25.7)	24	(0.80)	22	(1.58)
Vireo solitarius	solitary vireo	3	(8.6)	2	(5.7)	3	(0.10)	2	(0.14)
Vireo olivaceus	red-eyed vireo	29	(82.9)	24	(68.6)	225	(7.51)	115	(8.24)
Vireo philadelphicus	**Philadelphia vireo	2	(5.7)	1	(2.9)	8	(0.27)	1	(0.07)
Mniotilta varia	black-and-white warbler	20	(57.1)	11	(31.4)	52	(1.74)	28	(2.01)
Vermivora chrysoptera	golden-winged warbler	4	(11.4)	2	(5.7)	7	(0.23)	2	(0.14)
Vermivora ruficapilla	Nashville warbler	28	(80.0)	21	(60.0)	240	(8.01)	49	(3.52)
Parula americana	***parula warbler	2	(5.7)	2	(5.7)	4	(0.13)	3	(0.22)
Dendroica petechia	**yellow warbler	2	(5.7)	1	(2.9)	3	(0.10)	1	(0.07)
Dendroica magnolia	magnolia warbler	10	(28.6)	7	(20.0)	22	(0.73)	19	(1.36)
Dendroica tigrina	***cape may warbler	9	(25.7)	1	(2.9)	27	(0.90)	2	(0.14)
Dendroica caerulescens	**black-throated blue warbler	0	(0.0)	1	(2.9)	0	(0.00)	1	(0.07)
Dendroica coronata	yellow-rumped warbler	20	(57.1)	10	(28.6)	49	(1.64)	19	(1.36)
Dendroica virens	***black-throated green warbler	8	(22.9)	7	(20.0)	21	(0.70)	17	(1.22)
Dendroica fusca	blackburian warbler	15	(42.9)	6	(17.1)	59	(1.97)	7	(0.50)
Dendroica pensylvanica	chestnut-sided warbler	28	(80.0)	16	(45.7)	254	(8.48)	51	(3.66)
Dendroica castanea	***bay-breasted warbler	4	(11.4)	1	(2.86)	5	(0.17)	2	(0.14)

For description of astericks, see footnote at end of table.

Table TB-2. (cont.)

Scientific Name	Common Name	No. and % of Transects Where a Species was Present (35 Different Transects)				No. and % of Observations per Species (Sound and/or Sight)			
		June		July		June		July	
		No.	(0.0%)	No.	(0.0%)	No.	(0.00%)	No.	(0.00%)
Seiurus aurocapillus	ovenbird	25	(71.4)	21	(60.0)	520	(17.38)	67	(4.80)
Seirus noveboracensis	***northern waterthrush	2	(5.7)	0	(0.0)	4	(0.13)	0	(0.00)
Oporornis agilis	**Connecticut warbler	7	(20.0)	1	(2.9)	23	(0.77)	3	(0.22)
Oporornis philadelphia	mourning warbler	31	(88.6)	18	(51.4)	169	(5.64)	32	(2.30)
Geothlypis trichas	common yellowthroat	20	(57.1)	21	(60.0)	145	(4.84)	94	(6.74)
Wilsonia canadensis	Canada warbler	15	(42.9)	9	(25.7)	41	(1.37)	14	(1.00)
Setophaga ruticilla	American redstart	1	(2.9)	2	(5.7)	3	(0.10)	3	(0.22)
Agelaius phoeniceus	red-winged blackbird	2	(2.9)	3	(8.6)	12	(0.40)	9	(0.65)
Quiscalus quisacula	***common grackle	1	(2.9)	1	(2.9)	1	(0.03)	20	(1.43)
Molothrus ater	brown-headed cowbird	4	(11.4)	2	(5.7)	15	(0.50)	3	(0.22)
Piranga olivacea	***scarlet tanager	6	(17.1)	1	(2.9)	7	(0.23)	2	(0.14)
Pheucticus ludovicianus	rose-breasted grosbeak	20	(57.1)	6	(17.1)	38	(1.27)	12	(0.87)
Passerina cyanea	**indigo bunting	1	(2.9)	0	(0.0)	1	(0.03)	0	(0.00)
Hesperiphona vespertina	***evening grosbeak	7	(20.0)	3	(8.6)	15	(0.50)	7	(0.50)
Carpodacus purpureus	purple finch	4	(11.4)	3	(8.6)	5	(0.17)	4	(0.29)
Spinus tristis	***American goldfinch	3	(8.6)	3	(8.6)	6	(0.20)	9	(0.65)

For description of astericks, see footnote at end of table.

Table TB-2. (cont.)

Scientific Name	Common Name	No. and % of Transects Where a Species was Present (35 Different Transects)				No. and % of Observations per Species (Sound and/or Sight)			
		June		July		June		July	
		No.	(0.0%)	No.	(0.0%)	No.	(0.00%)	No.	(0.00%)
Junco hyemalis	***dark-eyed junco	9	(25.7)	3	(8.6)	15	(0.50)	4	(0.29)
Spizella passerina	chipping sparrow	12	(34.3)	10	(28.6)	24	(0.80)	22	(1.58)
Zonotrichia albicollis	white-throated sparrow	22	(62.9)	28	(80.0)	119	(3.97)	110	(7.89)
Melospiza lincolnii	**Lincoln's sparrow	8	(22.9)	4	(11.4)	18	(0.60)	5	(0.36)
Melospiza georgiana	swamp sparrow	10	(28.6)	12	(34.3)	85	(2.83)	54	(3.87)
Melospiza melodia	song sparrow	17	(48.6)	11	(31.4)	76	(2.54)	42	(3.01)
					Total Observations	2997	(99.74)	1395	(100.04)

Footnote: According to Gruen (1971), the following definitions of abundance are "based on how often a knowledgeable birder would see or hear a bird if he were actively looking for birds over a wide range of area within the Superior National Forest for every day of the summer."

* very rare - not found every year
** rare - found one to four times a summer
*** uncommon - found once a week to ten days

Table BT-3

Summary information for 12 different road transects chosen for uniformity of habitat: percent distribution of number of breeding pairs among bird families, total number of breeding pairs, and the total number of species along each transect.

Bird Families	Clear Cut #1	1975 Clear Cut #34	Alder-Willow #35a-35b	Mixed Aspen #12	Mature Aspen #14	Mixed Upland #15	Pole Aspen #17	Red Pine #10	Jack Pine #18	Young Jack Pine #26	Black Spruce #29	Tamarack #7	Range of % Vales	Mean of % values (per transect)
Falconidae	3.3	7.1										2.6	0-7.1	1.1
Charadriidae		14.3											0-14.3	1.2
Scolopacidae		7.1											0-7.1	.6
Trochipidae			4.7		2.7								0-4.7	.6
Alcedinidae	3.3												0-3.3	.3
Picidae	6.7		1.6	3.4	16.2			3.6		4.9	1.8		0-16.2	3.2
Tyrannidae			4.7		2.7	3.1	10.6	3.6	2.9	4.9	1.8	5.3	0-10.6	3.3
Hirundinidae	3.3	14.3	1.6							7.3		5.3	0-14.3	2.7
Coruidae	6.7				2.7	3.1				2.4	3.6		0-6.7	1.5
Sittidae					2.7								0-2.7	.2
Certhiidae									5.7				0-5.7	.5
Trogpodytidae	6.7									4.9	1.8		0-6.7	1.1
Mimidae			4.7							4.9			0-4.9	.8
Turdidae	3.3	7.1	12.5	3.4	10.8	3.1	10.6	14.3	5.7	2.4	1.8	2.6	1.8-14.3	6.5
Sypuiidae						9.4					9.1		0-9.4	1.5
Bombycillidae			3.1	3.4	5.4					7.3		5.3	0-7.3	2.0
Vireonidae	6.7		3.1	3.4	8.1	12.5	6.4	21.4	11.4	7.3		5.3	0-21.4	7.1
Parupidae	33.3		40.6	75.9	43.2	59.4	55.3	46.4	62.9	36.7	63.6	36.8	0-75.9	46.2
Icteridae			1.6						5.7				0-5.7	.6
Fringillidae	26.7	50.0	20.3	3.4	5.4	9.4	14.9	10.7	5.7	17.1	16.4	36.8	0-50.0	18.1
Paridae			1.6	6.9			2.1						0-6.9	.9
Total # breeding pairs (all species/ 5 ha.)	30	14	64	29	37	32	47	28	35	41	55	38	14-64	37.5
Total # species	16	8	27	12	19	14	14	16	14	18	22	13	8-27	16.1

Table BT-

Population estimates for bird transect 31 for the month of June.

I. Summation Method
II. Territory Mapping--a minimum of 2 recorded observations are necessary
III. Territory Mapping--a minimum of 3 recorded observations are necessary

Species	I. Maximum No. of Breeding Pairs Observed on Transect	I. Maximum Number of Breeding Pairs per 100 acres	II. Number of Territories on the Transect	II. Number of Territories per 100 acres	III. Number of Territories on the Transect	III. Number of Territories per 100 acres
Ovenbird	6	49	5.17	42	1.67	14
Chestnut-sided warbler	6	49	7.17	58	4.67	38
Red-eyed vireo	5	40	5	40	2	16
Least flycatcher	4	32	4.67	38	.67	5
Blackburian warbler	3	24	1	8		
Yellow-bellied sapsucker	3	24	1	8		
Mourning warbler	3	24	3	24		
White-throated sparrow	2	16	1	8		
Yellow-rumped warbler	2	16	1	8		
Brown creeper	1	8	.5	4		
Downy woodpecker	1	8	1	8		
Canada warbler	1	8				
Black-capped chickadee	2	16				
Broad-winged hawk	1	1				
Magnolia warbler	1	8				
Common yellowthroat	1	8				
Tree swallow	1	8				
Veery	1	8				
Golden-crowned kinglet	2	16				
Blue jay	2	16				
Rose-breasted grosbeak	1	8				
Total Number	49	387	30.51	246	9.01	73

Table BT - 5

Numbers and ages of bird species collected
in mist-nets during period I. July 19, 1976 - July 21, 1976.

Species	Mature Aspen #4 (4 nets)			Jack Pine #5 (5 nets)			Cut Area #25 (3 nets)			White Cedar #6 (3 nets)			Tamarack #7 (3 nets)			Total Numbers per Species		
	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown
American kestrel							1									1	0	0
Black-billed cuckoo							1									1	0	0
Yellow-bellied flycatcher										1						1	0	0
Alder flycatcher									1							0	0	1
Least flycatcher	1			1												2	0	0
Black-capped chickadee				1												1	0	0
Boreal chickadee													1			1	0	0
House wren							1									1	0	0
Brown thrasher								1								0	1	0
American robin							1									1	0	0
Swainson's thrush	2	1					1	1								3	2	0
Veery	1															1	0	0
Ruby-crowned kinglet										2						2	0	0
Red-eyed vireo	1															1	0	0
Nashville warbler						1										0	0	1
Chestnut-sided warbler	2									2						4	0	0
Ovenbird	2	1		1												3	1	0
Common yellowthroat							2			1						3	0	0
Canada warbler	2	1				1										2	1	1
Rose-breasted gorsbeak	1						2			1						4	0	0
American goldfinch	1															1	0	0
White-throated sparrow				4		2	4	1		1						9	1	2
Lincoln's sparrow							1	1								1	1	0
Swamp sparrow										2						2	0	0
Song sparrow							1	1	1				2			3	1	1
Total numbers/habitat	13	3	0	7	0	4	15	5	2	10	0	0	3	0	0			

Table BT-

Numbers and ages of bird species collected in mist-nets during period II, August 2, 1976 - August 4, 1976

Species	White Birch #23 (5 nets)			Black Spruce #24 (3 nets)			Pole Aspen #17 (3 nets)			Jack Pine #17 (3 nets)			White Cedar #19 (6 nets)			Mixed Lowland #21 (3 nets)			Total Numbers per Species		
	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown	Adult	Immature	Unknown
Broad-winged hawk										1									1	0	0
Gray jay				1	1														1	1	0
Black-capped chickadee							2	3	3										2	3	3
Brown creeper													1						1	0	0
Hermit thrush		1					4												4	1	0
Veery								1					1						1	1	0
Red-eyed vireo							1	1											1	1	0
Black-and-white warbler							2	2											2	2	0
Golden-winged warbler							2	2											2	2	0
Nashville warbler		1					2	1											2	2	0
Yellow-rumped warbler																1			1	0	0
Chestunut-sided warbler								5											0	5	0
Ovenbird							1						2						3	0	0
Connecticut warbler														1					0	1	0
Mourning warbler								1					2	2					2	3	0
Common yellowthroat														1					0	1	0
Canada warbler				1			1												2	0	0
White-throated sparrow							4	2					4	1	1				8	3	1
Total numbers/habitat	0	2	0	2	1	0	19	18	3	1	0	0	10	5	1	1	0	0			