FOREST BIRD SURVEYS ON MT. MANSFIELD

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Abstract: Censuses of breeding bird populations on two Mount Mansfield sites were conducted for a third year in 1993. One site in Underhill State Park at 650 m elevation consisted of mature northern hardwoods, while the second site on the Mt. Mansfield ridgeline at 1160 m elevation consisted of subalpine spruce-fir. Ten-minute counts at each of 5 sampling points in the two habitats were conducted twice during June. Fourteen species were recorded at Underhill State Park, with a maximum of 70 individuals on 28 June and a mean of 67.5 for both visits. Relative abundance indices of several common species at Underhill State Park revealed generally lower densities there than at other northern hardwoods study sites in Vermont. Reasons for this are probably related to site-specific habitat characteristics. Fifteen species were recorded on Mt. Mansfield, with a maximum of 104 individuals on 24 June and a combined mean of 96. Species diversity and numerical abundance were lower at both sites in 1993 than in 1992. The causes of this decrease, whether reflecting actual changes in bird populations or an artifact of differing sampling conditions between the two years, are not entirely clear. Declines at both sites were more pronounced among species occurring at low densities. Populations of the most abundant species at each site have not changed markedly in three years.

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Introduction: In 1993, breeding bird censuses were conducted for a third consecutive year on two permanent study sites on Mt. Mansfield, as part of a long-term Vermont Forest Bird Monitoring Program conducted by the Vermont Institute of Natural Science (VINS). This program was initiated in 1989 with the primary goal of conducting habitat-specific monitoring of forest interior breeding bird populations in Vermont and tracking long-term changes. As of 1993, VINS has selected, marked and censused 17 permanently protected sites of mature forest habitat in Vermont. The specific objectives of the Mt. Mansfield study include: 1) adding a bird monitoring component to the integrated ecological research being conducted under the VMC; 2) adding two study sites to VINS' statewide monitoring program; and 3) sampling bird populations in the high elevation spruce-fir zone.

Methods: Survey methods were identical to those in 1991 and 1992. Each site consists of a series of five sampling points spaced 200-300 meters apart. Preliminary site visits were made in late spring to check the condition of vinyl flagging and metal tree tags. Each site was censused twice during the height of breeding activities in June. Each census consisted of 10-minute counts of all birds seen and heard at each of the five sampling points. Field data were transcribed onto standardized forms and subsequently computerized, using DBASE3. Vegetation sampling was postponed until 1994, pending development of a continentwide, standardized protocol for measuring habitat in relation to bird diversity and abundance.

Results and Discussion: Overall numerical abundance was significantly lower at both sites in 1993 than in 1992, although somewhat higher than in 1991 (Table 1). Species diversity also dropped at the two sites from 1992. Fourteen species were recorded at Underhill State Park, with a maximum of 70 individuals (111 in 1992) on 28 June and a mean of 67.5 (103.5 in 1992) for both visits (Table 2). Declines at the Underhill site were more pronounced among species occurring at low densities and in fewer than three years than among those recorded at higher densities and in all three years. Of the five most abundant species (Red-eyed Vireo, Black-throated Warbler, Black-throated Green Warbler, Ovenbird, and Canada Warbler), only two declined in 1993, and only Black-throated Blue Warblers decreased significantly (41%) in number. However, four species recorded at low densities in 1991 and 1992 dropped out completely in 1993, and an additional nine species previously recorded only in 1992 either declined (n=5) or went undetected (n=4) in 1993 (Table 1).

Comparing 1991-93 means of eight species at Underhill State Park and at VINS' five other northern hardwoods sites reveals generally lower densities at Underhill (Table 3). Red-eyed Vireos, in particular, occur at surprisingly low density at the Underhill site. Populations of Black-throated Blue Warblers and Ovenbirds, while low, fall within the ranges recorded at other northern hardwoods sites. Black-throated Green and Canada warblers, in contrast, are both relatively abundant at Underhill. It is difficult to advance an explanation for these between-site differences, given the marked variation that exists within each species over the six sites (Table 3). Bird populations undoubtedly vary with site-specific habitat characteristics, such as relative

proportions and sizes of dominant hardwood species, proportions of mature spruce trees, and density and composition of the understory shrub layer. We anticipate that detailed habitat sampling in 1994 will provide insights into differences in the composition and relative abundance of bird populations among all sites.

Fifteen species were recorded on Mt. Mansfield in 1993, with a maximum of 104 individuals (141 in 1992) on 24 June and a combined mean of 96 (133 in 1992). Of nine species recorded in each year since 1991, eight declined from 1992 levels (Table 4). However, five of these decreasing species occurred in numbers greater or equal to those recorded in 1991. Four of the five most abundant species at the site (Winter Wren, Yellow-rumped Warbler, Blackpoll Warbler, and White-throated Sparrow) changed relatively little, while Gray-cheeked [Bicknell's] Thrush numbers dropped by 35% (Table 4). Strong westerly winds on both count dates may have hindered song behavior and detectability at two sampling points on the mountain's west slope. Counts of thrushes may have been particularly influenced by this.

The changes in bird populations recorded at Underhill State Park and Mt. Mansfield in 1993 may have been influenced by a combination of factors. Changes in insect food availability, migration or breeding season weather, interspecific competition, overwinter survival, or habitat changes can all cause short-term population fluctuations. It is also possible that bird populations have changed little since 1991, and that variable detection rates between years, based on weather or breeding chronology, have exaggerated real changes. Small sample sizes of many species preclude meaningful analysis of their population trends. However, it appears that populations of the most abundant species at each site have not changed markedly in three years. The sharp declines of some species, such as Swainson's Thrush on Mt. Mansfield and Winter Wren at Underhill State Park, must be interpreted cautiously. With only three years of census data, it is premature to draw conclusions. Several years of additional data collection, and their correlation with other VMC data, will be necessary to elucidate population trends of various species and groups at the two sites.

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Table 1. Maximum counts of individual birds recorded on Mt Mansfield and Underhill State Park, 1991-93.

Species	Mansfield			Underhill		
	91	92	93	91	92	93
Yellow-bellied Sapsucker					2	
Northern Flicker			1			2
Pileated Woodpecker				2	1	2
Yellow-bellied Flycatcher			2			
Blue Jay		1				
Common Raven			1			
Black-capped Chickadee					2	1
Red-breasted Nuthatch		2	3			
Winter Wren	20	18	14		12	
Ruby-crowned Kinglet		4				
Veery						
Gray-cheeked Thrush	10	23	15			
Swainson's Thrush	6	16	2			
Hermit Thrush					7	2
Wood Thrush				1	2	
American Robin	2	7	2			
Cedar Waxwing		1	4			
Solitary Vireo				1	4	
Red-eyed Vireo				5	8	8
Blue-winged Warbler					2	
Nashville Warbler	4					
Magnolia Warbler	2	4				
Black-throated Blue Warbler				11	17	10
Yellow-rumped Warbler	22	21	16			4
Black-throated Green Warbler				9	14	12
Blackpoll Warbler	20	18	18			
Black-and-white Warbler					6	4
American Redstart					6	
Ovenbird			2	7	20	22
Canada Warbler				5	8	8
Rose-breasted Grosbeak				7	3	
Lincoln's Sparrow	4					
White-throated Sparrow	14	28	26	2		2
Dark-eyed Junco	8	17	10		6	2
Purple Finch	2	8	2			
Pine Siskin		1				
Evening Grosbeak		2				
Number of individuals	114	171	118	52	112	83
Number of species	12	16	15	11	18	14

Table 2. Numbers of individual birds recorded in Underhill State Park in 1993. Maximum count for each species represents relative abundance index to be used in population analyses.

Species	10 June	28 June
Northern Flicker		2
Pileated Woodpecker		2
Black-capped Chickadee	1	
Winter Wren	4	4
Hermit Thrush		2
Red-eyed Vireo	8	6
Black-throated Blue Warbler	6	10
Yellow-rumped Warbler	4	
Black-throated Green Warbler	12	12
Black-and-white Warbler	4	4
Ovenbird	16	22
Canada Warbler	8	2
White-throated Sparrow	2	2
Dark-eyed Junco		2
Number of individuals	65	70
Number of species	10	12

Table 3. Mean 1991-93 relative abundance indices of eight species found on VINS' northern hardwoods study sites, compared with 1991-93 means from Underhill State Park.

Species	DB	SH	TC	CW	MP	ALL[a]	UN
Winter Wren	6.7	0	8.0	6.7	2.7	4.4	5.3
Wood Thrush	6.0	4.7	7.0	0	0	3.5	1.0
Red-eyed Vireo	20.0	26.0	19.3	23.3	22.0	22.1	7.0
Black-thr. Blue Warbler	17.7	17.7	10.7	19.0	12.0	15.4	12.7
Black-thr. Green Warbler	5.0	2.0	4.7	13.3	15.0	8.0	11.7
Ovenbird	25.0	13.3	21.3	29.3	21.0	22.0	16.3
Canada Warbler	0.7	0	3.7	0	1.0	1.1	7.0
Rose-breasted Grosbeak	9.7	6.7	6.3	0	3.3	5.2	3.3

[a] ALL = pooled mean of first five sites, excluding UN.

DB = Dorset Bat Cave (Dorset)
SH = Sugar Hollow Preserve (Pittsford)
TC = The Cape (Chittenden)
CW = Concord Woods (Concord)
MP = May Pond Preserve (Barton)
UN = Underhill State Park (Underhill)

Table 4. Numbers of individual birds recorded on Mt. Mansfield in 1993. Maximum count for each species represents relative abundance index to be used in population analyses.

Species	10 June	24 June
Northern Flicker	1	
Yellow-bellied Flycatcher		2
Common Raven		1
Red-breasted Nuthatch		3
Winter Wren	14	12
Gray-cheeked Thrush	14	15
Swainson's Thrush		2
American Robin	2	
Cedar Waxwing		4
Yellow-rumped Warbler	13	16
Blackpoll Warbler	18	15
Ovenbird		2
White-throated Sparrow	16	26
Dark-eyed Junco	10	4
Purple Finch		2
Number of individuals	88	104
Number of species	8	13