2011 Report to the Vermont Monitoring Cooperative

Part I. Demographic Monitoring of Montane Forest Birds on Mt. Mansfield

Part II. Forest Bird Surveys on Mt. Mansfield and Lye Brook Wilderness Area

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Part I. Demographic Monitoring of Montane Forest Birds on Mt. Mansfield

In 2011, we continued demographic monitoring of Bicknell's Thrush *(Catharus bicknelli)*, Swainson's Thrush *(C. ustulatus)*, Blackpoll Warbler *(Dendroica striata)*, Yellow-rumped (Myrtle) Warbler *(D. coronata coronata)*, and White-throated Sparrow *(Zonotrichia albicollis)*, completing our 20th consecutive field season on Mt. Mansfield.

Study Areas and Methods

We used mist-netting and banding to sample breeding populations of the five target species on an established study plot on the Mt. Mansfield ridgeline between c. 1155-1190 m (3800-3900 ft) elevation. As in previous years, we conducted banding sessions from early June into mid-July, with one visit in mid-September, using 4 to 30 nylon mist nets (12 x 2.5-m and 6 x 2.5-m, 36-mm mesh) placed at sites that have been used annually since 1992, primarily on the Amherst, Lakeview, and Long trails. Nets were generally opened from late afternoon until dark and from pre-dawn until noon on the following morning. Bicknell's Thrushes were captured both passively and through the use of vocal lures (recorded conspecific vocalizations), while other species were passively captured. Each individual was fitted with a uniquely-numbered U.S. Fish and Wildlife Service (USFWS) leg band. We recorded data on age, sex, breeding condition, subcutaneous fat class, ectoparasites, flight feather wear, and net site of capture. Standard morphometrics recorded include wing chord, tail length, weight, tarsal length, culmen length, bill length from mid-nares, bill width, and bill depth. Several non-destructive tissue samples were collected from mist-netted Bicknell's Thrushes for studies of isotope markers. A single tail feather (right rectrix #5) was gently pulled and stored in an envelope. Approximately 2 mm of claw tip from the middle toe of both feet was collected using sharp dissection scissors and deposited in a small paper envelope.

Results and Discussion

In 2011, we operated mist nets on Mt. Mansfield on 16 days between 3 June and 16 Sept., accumulating 1,039.75 net-hours, with an average of 65 ±23.90 SD net-hours per day (range = 15.625 – 178.50). Among the five target species, we had 150 captures of 112 individual birds, for a capture rate of 14.43 birds/100 net-hours. Eighty-four individuals were banded as "first-time" captures and 28 were returns from previous years (Table 1.1). Thirty-one Bicknell's Thrush were captured (21 males, 9 females, 1 unknown sex), including 10 individuals that had been captured on the Mansfield ridgeline in at least one previous summer. One male, originally banded in 2003 as a second-year (SY) bird, went undetected until being recaptured in 2011 at 9 years of age, while another SY male that was first banded in 2006 has been captured in every subsequent year except 2010. Three recaptured Bicknell's Thrushes were also carrying solar geolocators, one of which was deployed in 2009 and carried two-year's worth of migration data (see McFarland et. al. 2011 for preliminary summary of geolocator results; analyses are ongoing).

These results highlight both the high survivorship and strong breeding site fidelity of adult Bicknell's Thrushes, as well as the difficulty of obtaining complete population samples in a given year, underscoring the need for multiple-year sampling in order to obtain accurate demographic data for individual birds. The difficulty of intensively sampling all montane forest habitat on this study plot, due to constraints of terrain, accessibility, and weather, undoubtedly causes a significant portion of the breeding population to go undetected each year. This may be particularly true for females, with their smaller home ranges and more limited movements than males (Rimmer et al. 2001).

Recent stable-isotope analyses of tail feather samples collected from Bicknell's Thrushes across its breeding range (including Mt. Mansfield) revealed insights into natal dispersal patterns and indicated

limited demographic connectivity between geographically isolated habitat patches (Studds et al. 2012). Although the majority of first-time breeders dispersed within 200 km of their natal region, these movements peaked near the geographic center of the breeding range where populations appear to reach their highest abundance. Comparatively few individuals dispersed up to 700 km from natal areas. These patterns are consistent with frequency-dependent dispersal and suggest that the majority of natal dispersal events act to connect presently abundant populations where suitable habitat reaches its highest availability. Low demographic connectivity at broad spatial scales can render isolated populations vulnerable to both temporary and sustained environmental disturbance. Populations weakly connected by dispersal may fluctuate asynchronously due to demographic and environmental stochasticity, potentially increasing the risk of local extinction (Peltonen et al., 2002; Jones et al., 2007). Additionally, these data indicated that natal dispersal probability declined by 30–38% from 1996–2005. This may signal that Bicknell's Thrush populations are declining range-wide, further limiting demographic exchange between habitat patches predicted to be increasingly isolated by natural and anthropogenic habitat changes.

Acknowledgements

We are grateful to the Stowe Mountain Resort for allowing us access to the Mt. Mansfield toll road and for overnight use of the Octagon. We also thank Brendan Collins, John Lloyd, and Rosalind Renfrew for their skilled and dedicated fieldwork. Additional funding for our work on Mt. Mansfield was provided by The Nature Conservancy, U.S. Fish and Wildlife Service, and U.S. Forest Service Office of International Programs.

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Table 1.1. Mist net captures of five target species by sex on Mt. Mansfield during 2011.

		Mist Net Captures			
Species	Sex	Total No. of Individuals (%)	New Captures (%)	Returns (%)	Total Captures* (%)
Bicknell's Thrush	M	21	15	6	34
	F	9	5	4	13
	Unk	1	1	0	1
	Total	31 (27.7)	21 (25.0)	10 (35.7)	48 (32.0)
Swainson's Thrush	M	6	4	2	6
	F	0	0	0	0
	Total	6 (5.4)	4 (4.8)	2 (7.1)	6 (4.0)
Blackpoll Warbler	M	15	11	4	26
	F	11	7	4	12
	Unk	2	2	0	2
	Total	28 (25.0)	20 (23.8)	8 (28.6)	40 (26.6)
Yellow-rumped Warbler	M	15	10	5	19
	F	8	8	0	9
	Unk	3	3	0	3
	Total	26 (23.2)	21 (25.0)	5 (17.9)	31 (20.7)
White-throated Sparrow	M	15	13	2	19
	F	5	4	1	5
	Unk	1	1	0	1
	Total	21 (18.7)	18 (21.4)	3 (10.7)	25 (16.7)
Grand Total		**112**	**84**	**28**	**150**

* Includes within-year recaptures of multiple individuals

Part II. Forest Bird Surveys on Mt. Mansfield and Lye Brook Wilderness Area

In 2011, breeding bird surveys were continued at 3 permanent study sites on Mt. Mansfield, and on a single site at the Lye Brook Wilderness Area (LBWA) of the Green Mountain National Forest. The Mt. Mansfield ridgeline was surveyed for the 21st consecutive year, while the Ranch Brook site was censused for the 16th year in 2011 (the 2004 survey was not completed due to inclement weather on attempted survey dates). Our permanent study site at Underhill State Park was surveyed for the 19th year in 2011 (the site was not surveyed in 2003 or 2005), while the LBWA was surveyed for the 12th consecutive year.

The Underhill State Park site consists of mature northern hardwoods ranging from 609 to 731 m (2000 to 2400 ft) elevation, while the Mansfield ridgeline site, at 1158 m (3800 ft), consists of montane fir-spruce. The Ranch Brook site ranges between 975 and 1097 m (3200 and 3600 ft), and is dominated by a paper birch-fir canopy. The Lye Brook study site, located in Winhall, just north of Little Mud Pond, is characterized by mature northern hardwoods at an elevation of 701 m (2300 ft).

These four study sites are part of VCE's long-term Forest Bird Monitoring Program (FBMP). This program was initiated in 1989 with the primary goals of conducting habitat-specific monitoring of forest interior breeding bird populations in Vermont and tracking long-term changes (Faccio et al. 1998). As of 2008, VCE had established 39 monitoring sites in 9 different forested habitats in Vermont, with additional montane sites in New York, New Hampshire, Maine, and Massachusetts. A complementary, volunteer-based, long-term monitoring program, called Mountain Birdwatch, was initiated in 2000 to collect census data on five common montane forest bird species throughout the Northeast. Also, through a cooperative agreement with the National Park Service, VCE is coordinating breeding bird monitoring at 9 National Parks and Historic Sites in the Northeast. Initiated in 2006, annual surveys are conducted at 19 study sites in New Jersey, Connecticut, New York, Massachusetts, Vermont, New Hampshire, and Maine.

Methods

In 2011, surveys were conducted by VCE staff biologists at the Mt. Mansfield Ridgeline and Ranch Brook, and by volunteer observers at the Lye Brook and Underhill sites. Each study site consisted of 5 point count stations. Survey methods consisted of unlimited distance point counts, based on the approach described by Blondel et al. (1981) and used in Ontario (Welsh 1995). The count procedure was as follows:

1) Counts began shortly after dawn on days where weather conditions were unlikely to reduce count numbers (i.e., calm winds and very light or no rain). Censusing began shortly (< 1 min) after arriving at a station.

2) Observers recorded all birds seen and heard during a 10-min sampling period, which was divided into 3 time intervals: 3, 2, and 5 mins. Observers noted in which time interval each bird was first encountered, and placed birds into one of 2 distance categories (within or beyond 50 m). To reduce duplicate records, individual birds were mapped on standardized field cards, and known or presumed movements were noted. Different symbols were used to record the status of birds encountered (i.e., singing male, pair observed, calling bird, etc.).

3) The number of surveys at each site was dependent on elevation; montane fir-spruce sites were sampled once, while LBWA and Underhill were sampled twice during the breeding season, the first during early June (ca. 2-12 June) and the second during late June (ca. 14-30 June). Observers were encouraged to space their visits 7-10 days apart. For each site visit, all stations were censused in a single morning and in the same sequence.

In summarizing data for analysis, the maximum count for each species was used as the station estimate for each year. All birds seen or heard were each counted as 1 individual unless a family group or active nest was encountered, in which case they were scored as a breeding pair, or 2 individuals. Population trends were calculated for the 8 most commonly encountered species at each site using simple linear regression. For each species, the annual population trend was calculated by plotting the maximum count against year, and then calculating the mean annual rate of change of a linear trendline inserted through the points (e.g. Percent Annual Trend = slope ÷ y intercept x 100). Regression and correlation analyses were done using SYSTAT 10.2.

Results and Discussion

Relative abundance and species richness were at or near record lows at the two montane study sites on Mount Mansfield in 2011, while these metrics were average at mid-elevation sites at Underhill State Park and Lye Brook Wilderness. Overall, a combined total of 55 avian species have been detected during breeding bird surveys at three study sites on Mt. Mansfield from 1991-2011. Species richness was similar at both montane forest sites, with a total of 30 species detected at the Mansfield ridgeline and 31 at Ranch Brook. Surveys at Ranch Brook continue to average a greater number of individuals and species per year than the higher elevation and more exposed Mansfield ridgeline site (Tables 2.1 and 2.2). Surveys at the mid-elevation, northern hardwood study sites at Underhill State Park and Lye Brook Wilderness showed similar species composition, with Underhill averaging 17.63 species per year compared to Lye Brook's 16.00 (Tables 2.3 and 2.4).

Mount Mansfield

On the Mt. Mansfield ridgeline plot in 2011, both species richness and numerical abundance were well below average, with 36 individuals of 11 species detected, the lowest number of individuals in the survey's 21-year history (Table 2.1). Of the 8 most commonly recorded species, all except American Robin were below the 21-year average, and the relative abundance of two species (Yellow-rumped and Blackpoll warblers) were at record lows. Seven species exhibited decreasing population trends, with Blackpoll Warbler continuing a significant decline of 3.07% per year ($r^2 = 0.387$; $P = 0.003$) for the sixth consecutive year. The number of Bicknell's Thrush increased by one over last year's count of 6 individuals, the lowest since 2004.

At the Ranch Brook study site in 2011, the number of species detected reached a record low of 11 species, while numerical abundance dropped to 52 individuals, the second lowest ever (Table 2.2). Among the 8 most abundant species, six were below the 16-year mean. Overall, just 2 of these 8 species showed increasing trends, while 6 declined. Three species declined significantly; White-throated Sparrow, which continued a downward trend at a rate of 3.98% per year ($r^2 = 0.438$; $P = 0.005$), Yellow-bellied Flycatcher, which declined at a rate of 2.95% per year ($r^2 = 0.410$; $P = 0.008$), and Blackpoll Warbler, which was not detected at Ranch Brook for the first time, resulting in a 3.31% annual decline ($r^2 = 0.294$; $P = 0.030$). Swainson's Thrush numbers increased to a near record high of 13 individuals in 2011.

At Underhill State Park in 2011, total number of individuals and species richness dropped slightly from 2010, with 53 individuals of 14 species detected (Table 2.3), including two new species for the site; Cedar Waxwing and Nashville Warbler. Among the 8 most common species at the site, three were above the 19-year mean, and five were below. Overall, five species showed increasing population trends, including significant increases for Black-throated Blue Warbler (5.59%; $r^2 = 0.285$, $P = 0.019$) and Black-throated Green Warbler (6.11%; $r^2 = 0.531$, $P = 0.0004$). Once common at Underhill State Park in low numbers,

Canada Warbler has only been detected once in the last seven years, continuing its declining trend at 5.20% per year ($r^2 = 0.732$, $P < 0.0001$).

Lye Brook Wilderness

At Lye Brook Wilderness, species richness and numerical abundance increased slightly from 2010 and were at or above the 12-year average, with 63 individuals of 17 species detected (Table 2.4). Among the 8 most common species, six were below the 12-year average. Of these 8 species, half exhibited increasing population trends, while half showed declines. Among significant trends, Ovenbird declined at a rate of 3.37% ($r^2 = 0.471$; $P = 0.014$), and Red-eyed Vireo increased at 12.28% per year ($r^2 = 0.285$; $P = 0.074$). The maximum count of Red-eyed Vireo (n=15) was the highest in site's 12-year history, while Hermit Thrush dropped from 8 to 2, equaling the lowest count of 2001.

The site-specific trend estimates presented for the Mt. Mansfield and Lye Brook sites must be interpreted carefully as these data are from a limited geographic sample with low power. Year to year changes in survey counts may simply reflect natural fluctuations, variable detection rates, and/or a variety of dynamic factors, such as prey abundance, overwinter survival, and local habitat change. Continued data collection and comparison with survey data from other ecologically similar sites will be necessary to elucidate meaningful population trends of various species at these sites.

Acknowledgements

Many thanks to Bobbie Jean Booth and Zoe Richards for conducting bird surveys at the Lye Brook Wilderness Area and Underhill State Park, respectively.

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Table 2.1. Maximum counts of individual birds, and population trends from linear regression analysis for the 8 most common species (bold type) at Mt. Mansfield Ridgeline, 1991-2011.

Common Name	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	Mean	SD	r^2	Annual Trend (%)
Red Squirrel											1											0.05	0.22		
Sharp-shinned Hawk										1												0.05	0.22		
Hairy Woodpecker				1																		0.05	0.22		
Northern Flicker			1																			0.05	0.22		
Yellow-bellied Flycatcher			1		1	2	3		1	1	1	1	2	1		1	2	1	3			1.00	0.95		
Alder Flycatcher							1															0.05	0.22		
Red-eyed Vireo									1													0.05	0.22		
Blue Jay		1												1		1						0.14	0.36		
Common Raven			1			1			1	1		1	1	1		2		1				0.48	0.60		
Red-breasted Nuthatch	1	2	3	1	3	1		1	2		1				1		1					0.81	0.98		
Winter Wren	**10**	**9**	**7**	**4**	**5**	**2**	**4**	**10**	**8**	**4**	**4**	**7**	**3**	**7**	**8**	**12**	**7**	**5**	**6**	**8**	**4**	**6.38**	2.62	0.001	-0.16
Golden-crowned Kinglet										1												0.05	0.22		
Ruby-crowned Kinglet		2			1							1	1							1		0.29	0.56		
Bicknell's Thrush	**6**	**15**	**11**	**8**	**10**	**11**	**9**	**9**	**8**	**7**	**9**	**9**	**6**	**5**	**8**	**11**	**12**	**7**	**10**	**6**	**7**	**8.76**	2.41	0.095	-1.19
Swainson's Thrush	**3**	**8**	**1**	**1**	**3**	**6**	**7**	**5**	**4**	**3**	**3**	**2**	**2**	**1**	**2**	**5**	**1**	**5**	**3**	**5**	**1**	**3.38**	2.09	0.049	-1.76
Hermit Thrush											1		1									0.10	0.30		
American Robin	**1**	**4**	**1**	**2**	**2**	**2**	**2**	**1**	**1**	**3**	**3**	**2**	**6**	**3**	**1**	**3**	**4**	**3**	**2**	**4**	**3**	**2.52**	1.29	0.155	5.04
Cedar Waxwing		1	4				9							1								0.71	2.10		
Nashville Warbler	2					2	3	1	1		1		1			1					1	0.62	0.86		
Magnolia Warbler	1	2				3	1	1			1		3	1	4		1				1	0.90	1.18		
Yellow-rumped Warbler	**9**	**11**	**8**	**9**	**8**	**12**	**10**	**13**	**11**	**9**	**11**	**14**	**10**	**13**	**9**	**9**	**7**	**12**	**12**	**8**	**5**	**10.00**	2.24	0.017	-0.44
Blackpoll Warbler	**8**	**9**	**9**	**7**	**7**	**15**	**10**	**10**	**9**	**8**	**8**	**3**	**3**	**9**	**8**	**8**	**2**	**4**	**5**	**5**	**1**	**7.05**	3.26	**0.387**	**-3.07***
Ovenbird			1						1													0.10	0.30		
Canada Warbler							1															0.05	0.22		
Lincoln's Sparrow	2					1																0.14	0.48		
White-throated Sparrow	**6**	**14**	**14**	**12**	**14**	**13**	**20**	**14**	**19**	**14**	**18**	**11**	**13**	**11**	**10**	**14**	**14**	**12**	**10**	**12**	**8**	**13.00**	3.32	0.047	-0.81
Dark-eyed Junco	**3**	**9**	**6**	**2**	**5**	**5**	**9**	**8**	**7**	**2**	**7**	**6**	**5**	**7**	**4**	**5**	**4**	**6**	**6**	**6**	**3**	**5.48**	2.02	0.013	-0.62
Purple Finch	2	4	1	2	3	2	2	1	4	2	3	4	4	2	1	2	2	4	3		2	2.38	1.16		
White-winged Crossbill					8		1	1														0.48	1.75		
Pine Siskin		1			1		2	1			11						5		1			1.05	2.56		
Evening Grosbeak		2																				0.10	0.44		
Species Richness [a]	13	16	15	11	14	15	17	14	15	13	15	12	15	14	11	13	13	11	11	9	11	**13.24**	2.05		
Number of Individuals [a]	54	94	69	49	71	78	94	76	78	56	80	61	61	63	56	62	62	60	61	55	36	**64.81**	13.55		

[a] Does not include counts of Red Squirrel

* $P = 0.003$

Table 2.2. Maximum counts of individual birds, and population trends from linear regression analysis for the 8 most common species (bold type) at Ranch Brook, 1995-2011. Note that a survey was not conducted in 2004.

Common Name	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	Mean	SD	r^2	Annual Trend (%)
Eastern Chipmunk													1					0.06	0.25		
Red Squirrel					4		1		7				4					1.00	2.10		
Sharp-shinned Hawk				1							1							0.13	0.34		
Mourning Dove						1	1											0.13	0.34		
Ruby-throated Hummingbird						1												0.06	0.25		
Hairy Woodpecker	1																	0.06	0.25		
Pileated Woodpecker							2											0.13	0.50		
Yellow-bellied Flycatcher	**4**	**4**	**4**	**3**	**3**	**4**	**2**	**4**	**4**		**3**	**2**	**4**	**3**	**2**	**1**	**2**	**3.06**	1.00	**0.410**	**-2.95****
Blue-headed Vireo												1						0.06	0.25		
Red-eyed Vireo				1														0.06	0.25		
Blue Jay	1										1	1		4				0.44	1.03		
Common Raven		4	3	4		4	2						1	1		1		1.25	1.61		
Black-capped Chickadee	1												1					0.13	0.34		
Red-breasted Nuthatch	7		2		6		2		2		4		5	1		5		2.13	2.47		
Winter Wren	**8**	**3**	**7**	**10**	**9**	**10**	**5**	**5**	**9**		**10**	**11**	**6**	**8**	**5**	**9**	**7**	**7.63**	2.31	0.008	0.53
Golden-crowned Kinglet				1	3	1		3			2	1		2		1		0.88	1.09		
Ruby-crowned Kinglet	3		3			3			1		1	1			1			0.81	1.17		
Bicknell's Thrush	**5**	**6**	**7**	**5**	**5**	**6**	**2**	**8**	**1**		**8**	**2**	**5**	**5**	**2**	**7**	**4**	**4.88**	2.19	0.040	-1.49
Swainson's Thrush	**6**	**15**	**9**	**5**	**3**	**4**	**8**	**11**	**10**		**8**	**5**	**9**	**7**	**3**	**7**	**13**	**7.69**	3.44	0.000	-0.07
Hermit Thrush	1		3															0.25	0.77		
American Robin		2	2	2	1	1	1	1	3		4	5	2	2	3	6	4	2.44	1.63		
Cedar Waxwing				1			1				1							0.19	0.40		
Nashville Warbler		1	3	2	1	3		3	4		3	2	3	2	1	4	1	2.06	1.29		
Northern Parula									1									0.06	0.25		
Magnolia Warbler	2	4	4	2	3	5	4	2	4		2	3	1	2	2	6	1	2.94	1.44		
Black-throated Blue Warbler	1																	0.06	0.25		
Yellow-rumped Warbler	**5**	**6**	**4**	**5**	**7**	**11**	**9**	**11**	**8**		**4**	**8**	**8**	**6**	**4**	**7**	**6**	**6.81**	2.26	0.000	0.03
Blackpoll Warbler	**9**	**9**	**15**	**8**	**3**	**8**	**7**	**8**	**8**		**8**	**10**	**4**	**6**	**6**	**7**		**7.25**	3.28	**0.294**	**-3.31***
White-throated Sparrow	**22**	**11**	**12**	**9**	**8**	**7**	**7**	**10**	**10**		**7**	**4**	**8**	**4**	**5**	**8**	**7**	**8.69**	4.22	**0.438**	**-3.98****
Dark-eyed Junco	**9**	**5**	**3**	**2**	**5**	**2**	**5**	**4**	**4**		**7**	**5**	**1**	**4**	**1**	**5**	**6**	**4.31**	2.18	0.032	-1.51
Purple Finch	2	1	4	4	2	4	4		6					2	1	5	1	2.44	1.90		
White-winged Crossbill	8		2		1		6											1.06	2.41		
Pine Siskin	12		1		7								1		1			1.38	3.32		
Species Richness [a]	19	13	18	17	16	17	18	12	15		17	15	16	16	14	15	11	**15.56**	2.22		
Number of Individuals [a]	107	71	88	65	67	75	69	82	82		74	61	62	59	37	79	52	**70.63**	15.94		

[a] Does not include counts of Eastern Chipmunk or Red Squirrel

* $P = 0.030$; ** $P \leq 0.008$

Table 2.3. Maximum counts of individual birds, and population trends from linear regression analysis for the 8 most common species (bold type) at Underhill State Park, 1991-2011. Note that surveys were not conducted in 2003 or 2005.

Common Name	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	Mean	SD	r^2	Annual Trend (%)
Eastern Chipmunk							3		5					1			1					0.53	1.34		
Red Squirrel							1		3		1					1	1			1		0.42	0.77		
Broad-winged Hawk							1															0.05	0.23		
Mourning Dove									1					1								0.11	0.32		
Yellow-bellied Sapsucker		2		1	1		1	1	1		3			2		2	3	2				1.00	1.05		
Downy Woodpecker							1										1	1		1		0.21	0.42		
Hairy Woodpecker				1			1	1	2										2	2		0.47	0.77		
Northern Flicker			1																			0.05	0.23		
Pileated Woodpecker	2	1	1			1																0.26	0.56		
Least Flycatcher																	2					0.11	0.46		
Eastern Phoebe												1										0.05	0.23		
Blue-headed Vireo	1	2				1	1			1				1		2	1	1	3	3		0.89	0.99		
Red-eyed Vireo	**3**	**4**	**4**	**6**	**9**	**8**	**7**	**6**	**10**	**8**	**8**	**7**		**5**		**7**	**8**	**6**	**2**	**5**	**4**	**6.16**	**2.14**	0.009	-0.48
Blue Jay	2	1		1		2	2		1	1	2	1		1			1	1		1		0.89	0.74		
American Crow																1		1			1	0.16	0.37		
Common Raven				4	1				1		1			1						2		0.53	1.02		
Black-capped Chickadee		1	1		2	3	3		3	1	1					2	1	3		2	2	1.32	1.16		
Red-breasted Nuthatch							1															0.05	0.23		
White-breasted Nuthatch							1							1								0.11	0.32		
Brown Creeper				1					1	1		1		1		1	1					0.37	0.50		
Winter Wren		**6**	**2**	**1**	**5**	**3**	**4**	**6**	**4**	**4**	**3**	**3**		**3**		**4**	**2**	**1**			**2**	**2.79**	**1.87**	0.136	-2.73
Golden-crowned Kinglet								1								1						0.11	0.32		
Veery	1	1								1												0.16	0.37		
Swainson's Thrush		1		2	4	3		1	4	2	2					1			2			1.16	1.38		
Hermit Thrush		**4**	**1**	**6**	**7**	**3**	**4**	**4**	**2**		**4**	**5**		**4**		**4**	**7**	**1**	**4**	**3**	**4**	**3.53**	**2.04**	0.017	1.35
Wood Thrush	1	1																				0.11	0.32		
American Robin	1				3	3	3	4	2	1	2	1		2			1			3		1.37	1.34		
Cedar Waxwing																					1	0.05	0.22		
Nashville Warbler																					1	0.05	0.22		
Magnolia Warbler	1				1											1						0.16	0.37		
Black-th. Blue Warbler	**4**	**9**	**5**	**6**	**7**	**8**	**6**	**5**	**6**	**5**	**5**	**5**		**11**		**15**	**8**	**11**	**5**	**14**	**9**	**7.58**	**3.20**	**0.285**	**5.59***
Yellow-rumped Warbler			2	2		2	3	3	1	1	3	2				1		1	1	1	1	1.26	1.05		

Continued

Common Name	'91	'92	'93	'94	'95	'96	'97	'98	'99	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	Mean	SD	r^2	Annual Trend (%)
Black-th. Green Warbler	**5**	**7**	**6**	**7**	**7**	**7**	**9**	**5**	**8**	**10**	**10**	**8**		**13**		**15**	**12**	**10**	**7**	**11**	**14**	**9.00**	**2.94**	**0.531**	**6.11****
Blackburnian Warbler											1	1				1				1		0.21	0.42		
Blackpoll Warbler						1	2															0.16	0.50		
Black-and-White Warbler		3	2	2	4	2	3	2	1	3	4	2		1		2	3		1	1	2	2.00	1.15		
American Redstart		4			1	1																0.32	0.95		
Ovenbird	**4**	**10**	**11**	**11**	**13**	**12**	**12**	**10**	**13**	**10**	**13**	**6**		**11**		**11**	**15**	**14**	**7**	**14**	**10**	**10.89**	**2.81**	0.064	1.13
Mourning Warbler																	1	1				0.11	0.32		
Canada Warbler	**3**	**4**	**4**	**6**	**2**	**4**	**4**	**2**	**2**	**3**	**2**	**2**						**1**				**2.05**	**1.81**	**0.732**	**-5.20*****
Scarlet Tanager					1				1							1						0.16	0.37		
White-throated Sparrow	2		2	1	1		1					1				1		1		1		0.58	0.69		
Dark-eyed Junco		**3**	**1**	**3**	**4**	**3**	**5**	**2**	**2**	**1**	**2**	**2**		**1**		**5**	**5**	**2**	**4**	**3**	**1**	**2.58**	**1.50**	0.035	2.05
Rose-breasted Grosbeak	4	2		1	3	1	2		1							1					1	0.84	1.17		
Purple Finch						1		1			1					1	1		1			0.32	0.48		
White-winged Crossbill											2											0.11	0.46		
Pine Siskin					1						1											0.11	0.32		
American Goldfinch	1													1								0.11	0.32		
Species Richness [a]	15	19	14	18	20	20	23	16	21	16	20	16		17		22	18	17	12	17	14	17.63	2.91		
Number of Individuals [a]	35	66	43	62	77	69	77	54	67	53	70	48		60		81	73	58	39	68	53	60.68	13.23		

[a] Does not include counts of Red Squirrel or Eastern Chipmunk

* $P = 0.019$

** $P = 0.0004$

*** $P < 0.0001$

Table 2.4. Maximum counts of individual birds, and population trends from linear regression analysis for the 8 most common species (bold type) at Lye Brook Wilderness Area, 2000-2011.

Common Name	'00	'01	'02	'03	'04	'05	'06	'07	'08	'09	'10	'11	Mean	SD	r^2	Annual Trend (%)
Eastern Chipmunk	2			1									0.25	0.62		
Red Squirrel	1	1											0.17	0.39		
Ruffed Grouse	1					2							0.25	0.62		
Mourning Dove		1											0.08	0.29		
Yellow-Billed Cuckoo									1				0.08	0.29		
Barred Owl	1												0.08	0.29		
Chimney Swift	2												0.17	0.58		
Ruby-throated Hummingbird									1	1		1	0.25	0.45		
Yellow-bellied Sapsucker	**5**	**6**			**2**		**2**	**2**	**5**	**8**	**11**	**2**	**3.58**	**3.48**	0.119	23.32
Downy Woodpecker	1		1										0.17	0.39		
Hairy Woodpecker	2	1	2					1	1	1		5	1.08	1.44		
Unidentified Woodpecker	3												0.25	0.87		
Northern Flicker									1				0.08	0.29		
Pileated Woodpecker	**1**		**3**	**1**	**4**	**1**	**1**		**2**	**1**	**2**		**1.33**	**1.23**	0.021	-2.96
Eastern Wood-Pewee				1									0.08	0.29		
Yellow-bellied Flycatcher							1						0.08	0.29		
Least Flycatcher	2												0.17	0.58		
Great Crested Flycatcher				1									0.08	0.29		
Blue-headed Vireo		1	4	1		1				1		1	0.75	1.14		
Red-eyed Vireo	**10**	**6**	**9**	**4**	**6**	**6**	**4**	**5**	**13**	**14**	**10**	**15**	**8.50**	**3.92**	**0.285**	**12.28***
Blue Jay		3		1		1			2	1	3	1	1.00	1.13		
Common Raven					1	1							0.18	0.40		
Black-capped Chickadee	1	1		2			1	2	1		1	1	0.83	0.72		
White-breasted Nuthatch						1	1					1	0.25	0.45		
Brown Creeper	1											2	0.25	0.62		
Winter Wren	7		1		3	1			2				1.17	2.08		
Ruby-crowned Kinglet						1						1	0.17	0.39		
Veery					1								0.08	0.29		
Swainson's Thrush	2		1	3	2		2	1	1	2			1.17	1.03		
Hermit Thrush	**4**	**2**	**6**	**5**	**4**	**4**	**4**	**5**	**6**	**7**	**8**	**2**	**4.75**	**1.82**	0.107	4.46
American Robin	1		1		3			1	1		2	2	0.92	1.00		
Cedar Waxwing	1								1				0.17	0.39		
Northern Parula				3	1								0.33	0.89		
Magnolia Warbler	1		3										0.33	0.89		
Black-throated Blue Warbler	**9**	**7**	**10**	**9**	**8**	**12**	**11**	**8**	**8**	**8**	**5**	**7**	**8.50**	**1.88**	0.161	-2.13
Yellow-rumped Warbler	2	1				0				1		1	0.42	0.67		
Black-throated Green Warbler	**8**	**10**	**4**	**6**	**8**	**9**	**12**	**3**	**11**	**9**	**6**	**10**	**8.00**	**2.76**	0.024	1.64
Blackburnian Warbler	5												0.42	1.44		
American Redstart	2	1	3	1		4							0.92	1.38		
Ovenbird	**15**	**13**	**19**	**11**	**14**	**13**	**12**	**12**	**8**	**12**	**10**	**10**	**12.42**	**2.81**	**0.471**	**-3.37****
Canada Warbler	1												0.08	0.29		
Scarlet Tanager	1		3	2	2	2			1		1		1.00	1.04		
White-throated Sparrow	2		2	4		2							0.83	1.34		
Dark-eyed Junco	**2**	**3**	**1**	**1**	**1**	**4**		**1**			**2**	**1**	**1.33**	**1.23**	0.136	-5.85
Rose-breasted Grosbeak	2	1											0.25	0.62		
Species Richness [a]	28	15	17	17	16	17	11	11	18	13	12	17	16.00	4.55		
Number of Individuals [a]	98	58	73	57	60	65	51	41	66	66	61	63	63.25	13.65		

[a] Does not include counts of Red Squirrel or Eastern Chipmunk

* $P = 0.074$, ** $P = 0.014$