

Long-term Avian Research and Monitoring on Mt. Mansfield, Vermont

2018 Report to the Forest Ecosystem 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



The 2018 Mansfield season's first mist net capture: a return Yellow-rumped Warbler originally banded in June of 2016.

Submitted by:
Christopher C. Rimmer, Steven D. Faccio, and Nathaniel C. Sharp
Vermont Center for Ecostudies
P.O. Box 420
Norwich, VT 05055

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

Introduction

In 2018, we continued demographic monitoring of Bicknell's Thrush (*Catharus bicknelli*), Swainson's Thrush (*C. ustulatus*), Blackpoll Warbler (*Setophaga striata*), Yellow-rumped (Myrtle) Warbler (*S. coronata coronata*), White-throated Sparrow (*Zonotrichia albicollis*), and other songbirds, completing our 27th consecutive field season on the Mt. Mansfield ridgeline. This report presents a brief summary of data collected.

Methods

For the 27th consecutive breeding season, we used mist-netting and banding to monitor breeding bird 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 continued our efforts to monitor five common target species: Bicknell's Thrush, Swainson's Thrush, Blackpoll Warbler, Yellow-rumped (Myrtle) Warbler, and White-throated Sparrow. Since 2012, as a means to more broadly assess population changes and the potential impacts of climatic warming, our efforts have encompassed the entire avian community.

We netted birds on 18 days between 30 May and 1 August 2018, using 10–30 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 dusk and from dawn until late morning on the following day. Bicknell's Thrushes were captured both passively and through the use of vocal lures (recorded playbacks of 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, fat class, ectoparasites, flight feather wear, molt (if present), and net site of capture. Standard metrics included wing chord, tail length, weight, and tarsal length. On males, we measured maximum width of the cloacal protuberance, if present, to the nearest 0.01 mm to gauge phenology of breeding condition. Additionally, a small blood sample was obtained from Bicknell's Thrushes for long-term monitoring of mercury burdens. We collected 30–50 μ l of blood in a 75- μ l heparinized capillary tube by puncturing the cutaneous ulnar (brachial) vein with a 27.5 gauge needle. Capillary tubes were sealed on both ends with Critocaps, placed in labeled glass 7-cc vacutainers, and frozen within 24 hours.

Results and Discussion

We accumulated 1,735 net-hours in 2018 (Table 1.1), with a mean of 108.5 ± 45.1 SD net-hours per day (range = 55–163). Our total of 431 mist net captures was comprised of 321 individuals of 30 species, including 275 new bandings, 48 returns from previous years, and 54 within-season recaptures (Table 1.2).

As usual, Bicknell's Thrush had a relatively high rate of return captures ($n = 24$; 41%) in 2018. High site fidelity combined with intensive use of playback lures likely plays a role in Bicknell's Thrush recapture rates. We captured four male thrushes in 2018 aged 7 years or older. The oldest of these was banded as an after-second-year in 2012, making him at least 8 years old in 2018. The oldest female was banded as a second-year bird in 2013, making her exactly 6 years

old in 2018. All banding data from Mt. Mansfield (1992–2018) are available in supplemental file S1.

In 2018, mist net captures of adult Bicknell's Thrush continued to show a male-biased sex ratio, with 1.4 males captured for every female. Our complementary research on the species' Hispaniolan wintering grounds suggests that sexual habitat segregation may limit survivorship of females (Townsend et al. 2011, 2015), and we have therefore focused on conserving female-dominated winter habitats (McFarland et al. 2018).

We collected blood samples from 23 Bicknell's Thrushes, as part of our long-term monitoring of avian mercury burdens on Mt. Mansfield. Anthropogenic input of mercury into the environment has elevated risk to fish and wildlife, particularly in northeastern North America. We previously documented MeHg availability in a terrestrial montane ecosystem by examining a suite of insectivorous passerines and other trophic levels on Mt. Mansfield and elsewhere (Rimmer et al. 2005, 2009). Our recent (2014–2017) sampling of Bicknell's and Swainson's Thrush enabled us to compare blood mercury burdens in these two congeners, and to investigate changes in Bicknell's Thrush over a nearly 20-year period on Mt. Mansfield. Combining thrush data with atmospheric wet mercury deposition data collected at the Proctor Maple Research Lab (PMRL) from 1993–2016, we published a peer-reviewed paper in *Ecotoxicology* during 2019 (citation below). Among its findings, this publication documented (1) no differences in blood mercury concentrations between the two thrush species, (2) no detectable changes in Bicknell's Thrush blood mercury burdens from 2000–2017, and (3) no relationship between atmospheric deposition at PMRL and thrush blood mercury concentrations.

New Publications and Open Data During this Report Period

- Brlík, Vojtěch, et al. (including K.P. McFarland and C.C. Rimmer) 2019. Weak effects of geolocators on small birds: a meta-analysis controlled for phylogeny and publication bias. *Journal of Animal Ecology*. <https://doi.org/10.1111/1365-2656.12962>
- Rimmer, C.C., J.D. Lloyd, K.P. McFarland, D.C. Evers, and O.P. Lane. 2019. Patterns of blood mercury variation in two long-distance migratory thrushes on Mount Mansfield, Vermont. *Ecotoxicology*. <https://doi.org/10.1007/s10646-019-02104-3>

Work Planned in 2019

- Analyze influence of weather and other factors on apparent survivorship of Bicknell's Thrush using our long-term Mansfield banding dataset (peer-reviewed paper in preparation)
- Complete 28th consecutive year of weekly field monitoring using mist nets and banding during the 2019 breeding season.

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Table 1.1. Daily net hours (hours per 12-m net) in 2018.

Date	Net Hours (hrs/12m net)
6-6-18	86.00
6-7-18	163.00
6-11-18	69.00
6-12-18	136.50
6-19-18	55.00
6-20-18	149.00
6-26-18	68.16
6-27-18	151.83
7-10-18	63.02
7-11-18	161.38
7-18-18	57.38
7-19-18	150.75
7-24-18	63.29
7-25-18	150.66
7-31-18	68.25
8-1-18	142.00
Total	1,735.33

Table 1.2. Numbers of individual birds captured on Mt. Mansfield in 2017, ranked by species abundance.

Species	No. Individuals Captured	Status
Bicknell's Thrush	59	Breeding
Blackpoll Warbler	47	Breeding
White-throated Sparrow	42	Breeding
Yellow-rumped Warbler	34	Breeding
Dark-eyed Junco	30	Breeding
Pine Siskin	22	Breeding
American Robin	19	Breeding
Swainson's Thrush	14	Breeding
Purple Finch	13	Breeding
Red-breasted Nuthatch	12	Breeding
White-winged Crossbill	7	Breeding
Black-throated Blue Warbler	5	Transient
Black-throated Green Warbler	5	Transient
Gray Catbird	5	Transient
Yellow-bellied Flycatcher	5	Breeding
Song Sparrow	3	Transient
Black-capped Chickadee	2	Transient
Chipping Sparrow	2	Transient
Least Flycatcher	2	Transient
Magnolia Warbler	2	Breeding
Northern Cardinal	2	Transient
Ruby-crowned Kinglet	2	Transient
Red-eyed Vireo	2	Transient
American Redstart	1	Transient
Black-and-White Warbler	1	Transient
Brown Creeper	1	Transient
Northern Saw-whet Owl	1	Transient
Philadelphia Vireo	1	Transient
Sharp-shinned Hawk	1	Transient
Tennessee Warbler	1	Transient
Veery	1	Transient
White-breasted Nuthatch	1	Transient
Wilson's Warbler	1	Transient
Yellow Warbler	1	Transient

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

Introduction

As part of the Vermont Forest Bird Monitoring Program, we conducted point counts at 30 study sites across Vermont in 2018, including sites on Mt. Mansfield and the Lye Brook Wilderness. This long-term monitoring is essential to assess trends in species presence, species richness, and relative abundance, and can provide meaningful insights into how species respond to ecosystem change, which may include effects from invasive species, climate change, forest fragmentation, and more. This report provides a brief summary of results from two study sites—Underhill State Park on the west slope of Mt. Mansfield and the Lye Brook Wilderness.

Methods

Breeding bird surveys were conducted at permanent study sites located on the west slope of Mt. Mansfield in Underhill State Park (UNSP) and at the Lye Brook Wilderness Area (LBWA). These two study sites are part of VCE's long-term Forest Bird Monitoring Program (FBMP) which 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, Faccio et al. 2017). Each study site contains 5 point count stations. Survey methods include unlimited distance point counts, based on the approach described by Blondel et al. (1981) and used in Ontario (Welsh 1995). Counts begin shortly after dawn on days where weather conditions are unlikely to reduce count numbers. Observers record all birds seen and heard during a 10-min sampling period, divided into 2-, 3- and 5-minute intervals. Surveys during 2018 represented the 27th year of data collection at UNSP and the 17th at LBWA, exclusive of years when no surveys were conducted (2003, 2005, and 2012 at UNSP, and 2012 and 2015 at LBWA).

Results

Surveys at the mid-elevation, northern hardwood study sites at Underhill State Park and Lye Brook Wilderness showed similar species composition, with a total of 51 and 49 species detected over all survey years, respectively. In 2018, the number of individual birds and species richness increased at both UNSP and LBWA, although the long-term trends for both these metrics continue to decline (Fig. 2.1).

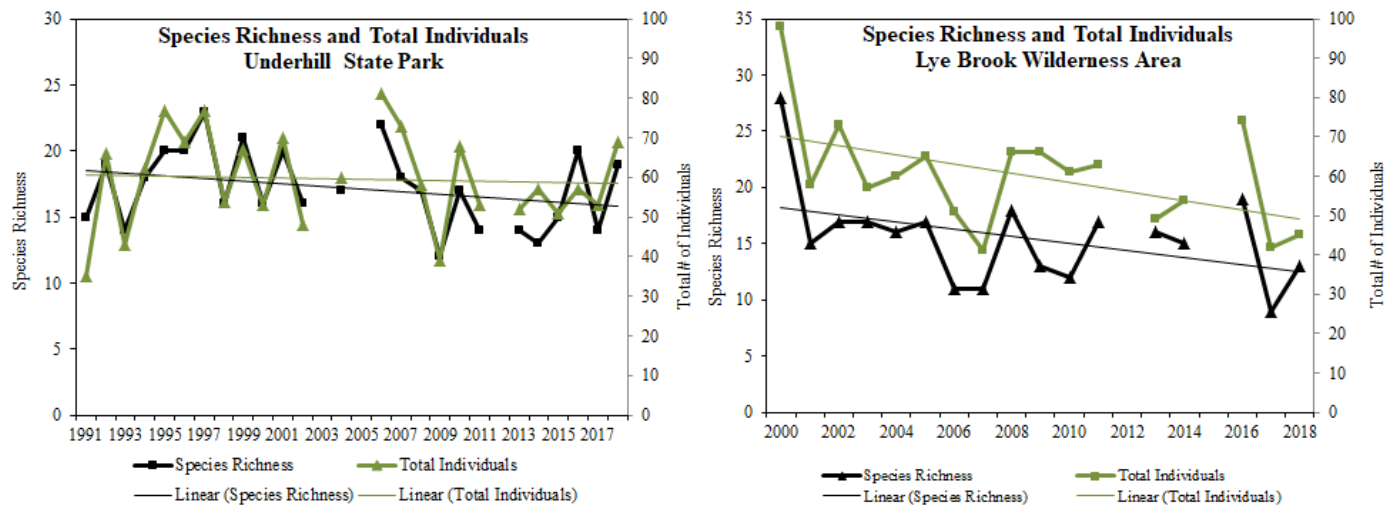


Figure 2.1. Annual totals and trends for species richness and total number of individuals detected at Underhill State Park, 1991–2018 and Lye Brook Wilderness Area, 2000–2018. Note that species richness values are on the left vertical axis and total number of individuals are on the right axis.

Long-term Trends

Underhill State Park – Total number of individuals and species richness increased from 2017, with 69 individuals of 19 species recorded, including six Dark-eyed Juncos, the most in the count’s history. Among the nine most common species, six were above the 27-year mean, and three were below. Overall, counts of Black-throated Blue Warbler and Hermit Thrush were the same as 2017, continuing the relatively flat long-term trend for Hermit Thrush, Vermont’s State bird (Fig. 2.2.). Additionally, the number of Ovenbirds increased to 15 individuals, matching the site’s highest count from 2007, while the count of Black-throated Green Warblers dropped slightly (Fig. 2.2.). These results echo the broader, 25-year trends observed for these three species in the state-wide Vermont FBMP dataset, in which both Black-throated Green Warbler and Ovenbird significantly increased, while Hermit Thrush showed no trend (Faccio et al. 2017). A single Canada Warbler was again detected in 2018, although this species is declining at a rate of 3.93% annually ($r^2 = 0.604$) and shows the strongest decline among the nine most commonly detected species.

Lye Brook Wilderness Area – Both relative abundance and species richness rebounded slightly in 2018, after reaching near-record or record lows, respectively, in 2017 (Fig.2.1). Among the nine most common species, six were below the 17-year mean, with only Red-eyed Vireo, Blue Jay, and Ovenbird above the long-term average. The count of Black-throated Blue Warblers dropped for the second consecutive year in 2018, continuing the species’ moderate decline (-2.18% per year, $r^2 = 0.225$) (Fig. 2.3). However, Red-eyed Vireo numbers remained stable, continuing a strong upward trend that increased by 5.37% annually ($r^2 = 0.277$) (Fig. 2.3), mirroring the significant state-wide trend exhibited by VCE’s 25-year study (Faccio et al. 2017).

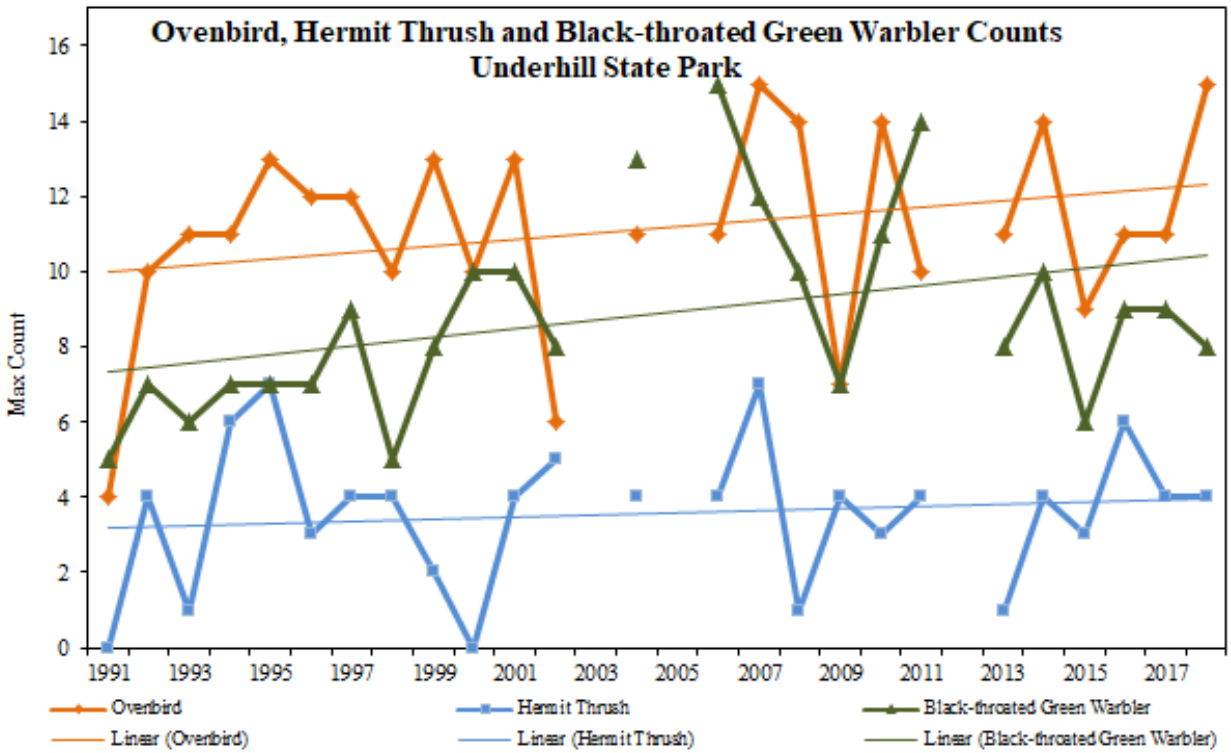


Figure 2.2. Twenty-seven year data and trends for Ovenbird, Hermit Thrush, and Black-throated Green Warbler from annual surveys conducted at Underhill State Park, 1991–2018.

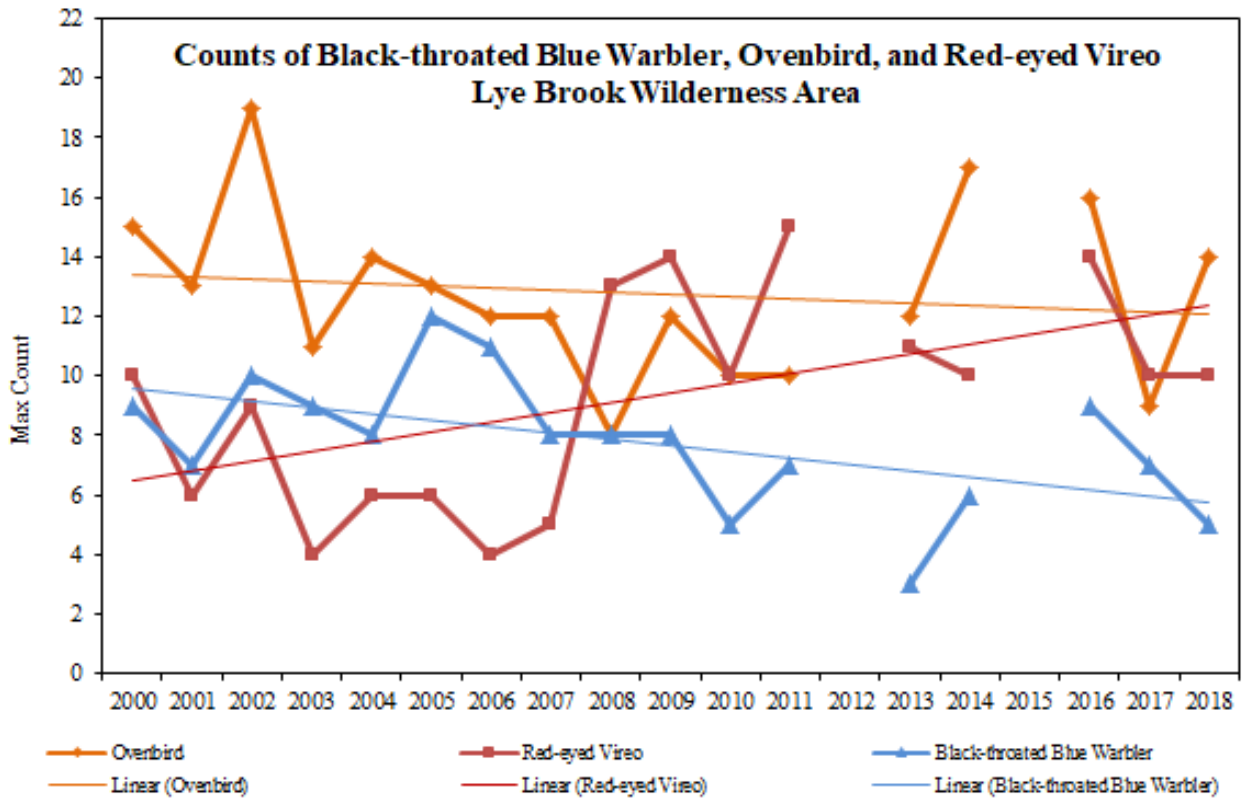


Figure 2.3. Seventeen year data and trends for Ovenbird, Red-eyed Vireo, and Black-throated Blue Warbler from annual surveys conducted at Lye Brook Wilderness Area, 2000–2018.

Discussion

Long-term trends of forest birds at both UNSP and LBWA suggest that the relative abundance of the total number of birds detected has declined slightly over the survey period. However, it should be noted that site-specific trend estimates must be interpreted with caution, as these data are from a limited geographic sample and can be greatly influenced by years with extreme high or low counts. Also, year-to-year changes in survey counts may simply reflect natural fluctuations in abundance, differences in detection rates of observers and/or species, variability of singing rates due to nesting stage, and/or a variety of dynamic factors, such as predator or prey abundance, overwinter survival, effects of diseases such as West Nile Virus, and local habitat change.

Not surprisingly, most of the strongest population trends observed at both study sites—including the increasing trends of Black-throated Green Warbler at UNSP and Red-eyed Vireo at LBWA, and the declining trend of Canada Warbler at UNSP—reflect the broader state-wide trends for these species during the 25-year study of the Vermont Forest Bird Monitoring Program (Faccio et al. 2017).

It is unknown which of many anthropogenic stressors (e.g., habitat degradation and loss due to development, land use change, acid precipitation and other atmospheric pollutants, or changing climatic conditions) may be contributing to these population trends, but it is likely all have had impacts. In addition, migratory species, whether short-distance or long-distance Nearctic-Neotropical migrants, have declined across Vermont forests, while year-round residents, as a group, showed no significant trend (Faccio et al. 2017). This suggests that migratory species face additional limiting factors, both on their wintering grounds and during migratory stopover that could be impacting populations. Continued data collection and comparison with survey data from other ecologically similar sites will be necessary to fully elucidate population trends of various species at these sites.

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