

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

2020 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



A freshly banded immature Blackpoll Warbler, mist-netted on 18 September 2020 on the Mt. Mansfield ridgeline.

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

Introduction

In 2020, 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 29th consecutive field season on the Mt. Mansfield ridgeline. This report presents a brief summary of data collected.

Methods

For the 29th 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 20 days between 4 June and 18 September 2020, 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 morphometrics included wing chord, tail length, and weight. 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 2,313 net-hours in 2020 (Table 1.1), with a mean of 116 ± 34.3 SD net-hours per day (range = 44–163). Our total of 512 mist net captures consisted of 398 individuals of 35 species, including 356 new bandings, 46 returns from previous years, and 51 within-season recaptures (Table 1.2).

As usual, Bicknell's Thrush had a relatively high rate of return captures ($n = 17$; 46%) in 2020. High site fidelity combined with use of playback lures likely plays a role in Bicknell's Thrush recapture rates. We captured five Bicknell's Thrushes (3 males, 2 females) that were 5 years or older in age. The oldest female was a 7 year-old bird banded as a yearling in 2014, while the oldest male was one of our oldest birds on record at 10 years of age, having been banded as a yearling in 2011. All but two of the 17 returning birds were originally banded as yearlings; one

was banded as a 2+ year-old in June of 2019, the other as a hatching-year bird in September of 2019. All banding data from Mt. Mansfield (1992–2020) are available in supplemental file S1.

In 2020, mist net captures of adult Bicknell's Thrush continued to show a male-biased sex ratio, with 2.5 males captured for every female among birds of known sex (25 males, 10 females). 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 therefore continue to focus on conserving female-dominated winter habitats (McFarland et al. 2018).

We collected and archived 43 blood samples from Bicknell's Thrushes in 2020, 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 methylmercury 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 (PRML) from 1993–2016, we published a peer-reviewed paper in *Ecotoxicology* during 2020 (Rimmer et al. 2020; 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.

Publications During this Report Period

- Brlík, Vojtěch, et al. (including K.P. McFarland and C.C. Rimmer) 2020. 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. 2020. 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 2021

- Complete 30th consecutive year of weekly field monitoring using mist nets and banding during the 2021 breeding season.
- Initiate research on intratropical migrations and migratory connectivity by affixing miniaturized GPS tags to adult Bicknell's Thrush.
- Conduct analyses of Blackpoll Warbler demographic data from Mansfield banding and Mountain Birdwatch for integration into a peer-reviewed paper

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Table 1.1. Daily net hours (hours per 12-m net) on Mt. Mansfield in 2020.

Date	Net Hours (hrs/12-m net)
6-4-2020	110.38
6-5-2020	105
6-9-2020	130.38
6-10-2020	143
6-16-2020	145.5
6-17-2020	162.75
6-24-2020	122.13
6-25-2020	121.5
7-8-2020	62.25
7-9-2020	148.25
7-14-2020	66.75
7-15-2020	138
7-21-2020	72.38
7-22-2020	147.88
7-28-2020	88.75
7-29-2020	155.5
8-5-2020	92.75
8-6-2020	124.63
9-17-2020	43.75
9-18-2020	131.38
Total:	2312.91

Table 1.2. Numbers of individual birds captured on Mt. Mansfield in 2020, ranked by species abundance.

Species	New Bandings	Returns from Previous Years	Within-Season Recaptures
Blackpoll Warbler	59	7	16
White-throated Sparrow	56	7	10
Dark-eyed (Slate-colored) Junco	51	4	7
Yellow-rumped (Myrtle) Warbler	33	9	2
Bicknell's Thrush	26	17	11
Purple Finch	26	0	3
Yellow-bellied Flycatcher	14	0	0
American Robin	10	1	1
Swainson's Thrush	10	0	1
Golden-crowned Kinglet	10	0	0
Black-throated Blue Warbler	8	0	0
Brown Creeper	7	0	0
Ruby-crowned Kinglet	5	0	0
Red-breasted Nuthatch	4	0	0
Nashville Warbler	4	0	0
Sharp-shinned Hawk	3	1	0
Northern Saw-whet Owl	3	0	0
Black-capped Chickadee	3	0	0
Winter Wren	3	0	0
Canada Warbler	3	0	0
Ovenbird	2	0	0
Magnolia Warbler	2	0	0
Black-throated Green Warbler	2	0	0
Downy Woodpecker	1	0	0
Least Flycatcher	1	0	0
Blue-headed Vireo	1	0	0
Red-eyed Vireo	1	0	0
Blue Jay	1	0	0
Hermit Thrush	1	0	0
Black-and-white Warbler	1	0	0

Tennessee Warbler	1	0	0
Blackburnian Warbler	1	0	0
(Western) Palm Warbler	1	0	0
Song Sparrow	1	0	0
Lincoln's Sparrow	1	0	0
TOTAL	356	46	51

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 22 study sites across Vermont in 2020, including one site on Mt. Mansfield. Our Lye Brook Wilderness study Site was not surveyed in 2020 due to access issues. 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 Underhill State Park on the west slope of Mt. Mansfield.

Methods

Breeding bird surveys were conducted at a permanent study site located on the west slope of Mt. Mansfield in Underhill State Park (UNSP). This study site is 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 FBMP 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 2020 represented the 27th year of data collection at UNSP, exclusive of years when no surveys were conducted (2003, 2005, and 2012).

2020 in Summary

A total of 52 species have been detected at the mid-elevation, northern hardwood study site at Underhill State Park during all 27 survey years. In 2020, the number of individual birds and species richness increased at UNSP, although the long-term trends for both these metrics continue to be relatively flat (Fig. 1). Data from 2020 will be submitted to FEMC separately from this report.

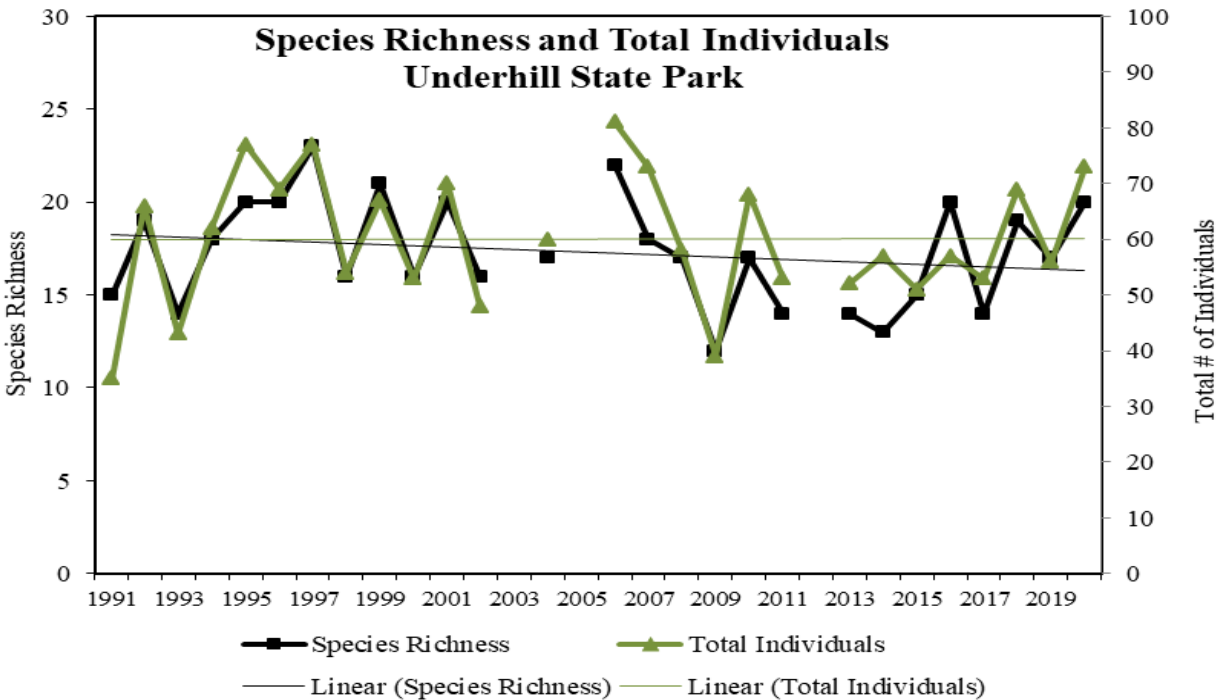


Figure 2.1. Annual totals and trends for species richness and total number of individuals detected at Underhill State Park, 1991-2020. Note that species richness values are on the left vertical axis and total number of individuals are on the right axis.

Long Term Trends

Underhill State Park – Total number of individuals and species richness increased from 2019, with 73 individuals of 20 species recorded, including 14 Ovenbirds, tying the second highest count for this, the most abundant species at UNSP. Among the nine most common species, four were below the 27-year mean (Black-throated Green Warbler, Black-and-White Warbler, Canada Warbler, and Dark-eyed Junco), while five were above. Ovenbird, Black-throated Green Warbler, and Hermit Thrush all increased from 2019, continuing their slightly increasing long-term trends (Fig 2.2.). After Two Canada Warblers were counted in 2019, the most since 2002, none were detected in 2020, underscoring its 3.96% rate of decline annually ($r^2=0.556$), which represents the strongest decline among the nine most commonly detected species.

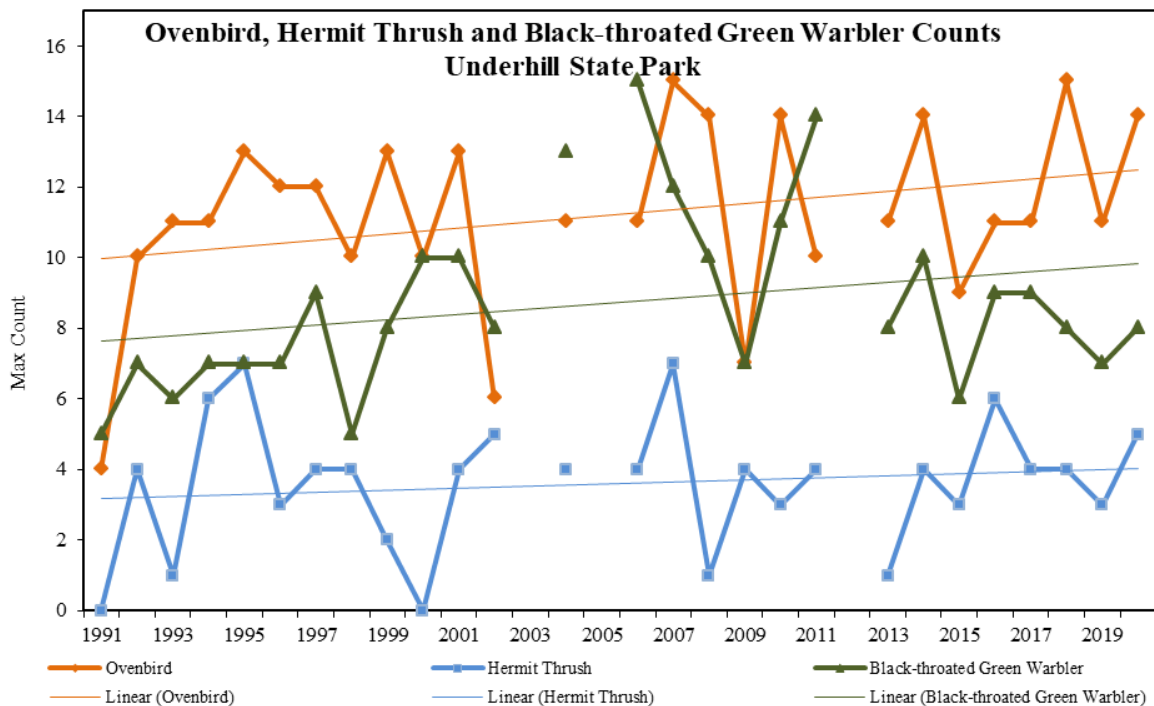


Figure 2.2. Twenty-seven year data and trends for Ovenbird, Hermit Thrush, and Black-throated Green Warbler from annual surveys conducted at Underhill State Park, 1991-2020.

Implications

Long-term trends of forest birds at UNSP suggest that the relative abundance of the total number of birds detected has remained relatively steady 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—including the increasing trends of Black-throated Green Warbler and Ovenbird, and the declining trend of Canada Warbler—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 the 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 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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