

# COLBY HILL ECOLOGICAL PROJECT

Summary of Bird Research 1998-2018

By Warren King

The Colby Hill Ecological Project bird research component utilizes the point count protocol established by the Vermont Center for Ecostudies, formerly a part of the Vermont Institute of Natural Science, for its Vermont Forest Bird Monitoring Program (FBMP). The data generated along the transect established for the FBMP are one of 31 long-term data sets in secure forest interiors across Vermont. The purpose of the FBMP is to track long-term changes in populations of interior forest songbirds. Other long-term bird monitoring projects, notably the Breeding Bird Survey, which is tied to existing road systems, do not monitor interior forest bird populations adequately.

Researchers monitor five points, spaced roughly 200 m apart, along a transect that follows the abandoned road descending from the northwestern side of the Guthrie-Bancroft fields southwesterly to Route 17. We have monitored this transect twice annually during the first and third weeks of June at the height of the songbird breeding season in Vermont since 1997. A serious storm prevented completion of the second set of counts in 1998. Each point is marked with an aluminum tag and orange flagging on a prominent tree along the northern side of the road. Point 1 is located ca. 250 m west of the field edge. Point 5 is ca 300 m from Route 17 along old woods roads. Counts begin at 0500 hours plus or minus 10 minutes and conclude by 0700. Observers remain at each point ten minutes, identifying and mapping all birds seen or heard. Observers in 1998 were Warren King and Judy Peterson. Thereafter observers were Warren and Barry King. Barry was the primary mapper and recorder for the most recent ten years.

We recorded 50 bird species during monitoring. We recorded an additional 17 species at other times on the Guthrie-Bancroft property. All birds seen or heard on the Guthrie-Bancroft property have been compiled in a comprehensive bird species list (Appendix 1).

## Consistency of Species Occurrence

Six species were recorded in point counts all 21 years. They include:

Yellow-bellied Sapsucker  
Eastern Wood Pewee  
Veery  
Red-eyed Vireo  
Black-throated Blue Warbler  
Ovenbird

An additional species, American Robin, was seen in 20 years, Hermit Thrush, Wood Thrush, American Redstart, Black-throated Green Warbler, Scarlet Tanager and Rose-breasted Grosbeak were seen in 19 years, and Hairy Woodpecker, Least Flycatcher and Black-capped Chickadee were seen in 18 years. The average number of species recorded per year was 22.8 with a range of 17-29 (20-29 if we exclude 1998, when we monitored the transect only once due to flooding). For the first seven years the average number of species recorded was 21.7 (22.5 excluding 1998) compared to 24.0 for the middle 7 years, and 22.7 for the last 7 years. Most species showed no or modest differences in their annual frequency of appearance. Exceptions include Brown Creeper (fairly regular to 2008, then none), Winter Wren (6 of the first 8 years, then 3 in the next 13 years), Canada Warbler (fairly regular to 2008, then none), and White-throated Sparrow (fairly regular to 2011, then none).

### Differences Between Points

The transect traverses mature mixed northern hardwoods, within which are a variety of conditions that offer microhabitat choices. At Point 1, at about 1200 feet asl at the eastern end of the transect, the ground is saturated, but less so than 50 m east of Point 1, where wet conditions encourage frequent windthrow. Openings caused by downed trees there result in dense low vegetation that has attracted three species not found elsewhere on the transect: Common Yellowthroat (3 of 12 years), Canada Warbler (8 of 12 years), and White-throated Sparrow (11 of 12 years). Their song invariably comes from this wet area. Other species that reach their greatest frequency at Point 1 include Blue Jay, Black-capped Chickadee, Red-breasted Nuthatch, Brown Creeper, Hermit Thrush, Black-throated Blue Warbler, and Blackburnian Warbler, all birds characteristic of forest with a boreal component, including red spruce and yellow birch. Least Flycatcher and American Redstart have occurred at Point 1 only once. Northern Oriole has turned up at all points except 1 and 5.

Descending, the transect passes through several small areas of apparent calcium soil enrichment, producing the suite of plants and trees characteristic of the rich northern hardwood forest natural community. Songbirds are more influenced by forest structure than by plant species diversity, however. No bird species appear to specialize in these small enriched areas. However, the location of the points does not lend itself to study of differential bird species diversity associated with the pockets of rich northern forest natural community.

Point 2 is less wet than Point 1. Reaching their peak frequency here are Yellow-bellied Sapsucker and American Robin.

Point 3 is perhaps the driest point, and also perhaps the most mature. Reaching greatest frequency of occurrence here are Hairy Woodpecker, Least Flycatcher, Veery, Wood Thrush, Blue-headed Vireo, American Redstart, and Rose-breasted

Grosbeak. Least Flycatcher is characteristic of more youthful forest. Why it reaches peak frequency at Point 3 is not clear. In fact, the forest along the entire transect is of an age where one would expect Least Flycatcher to have already disappeared. Wood Thrush has its greatest frequency here but its frequency at 2 and 4 aren't far behind.

Point 4 is similar to Point 3. Black-throated Green Warbler is the only species with greatest frequency here.

Point 5, with the most youthful forest and the farthest down into the New Haven River gorge at 1050 feet asl, regularly has the fewest species. No species has occurred only at Point 5. Only Eastern Wood Pewee and Scarlet Tanager reach maximum frequency here. Winter Wren and Blackburnian Warbler have not been recorded from Point 5.

Some species show little preference for any one or more points, including Yellow-bellied Sapsucker, American Robin, Red-eyed Vireo, Ovenbird and Scarlet Tanager.

#### Species Occurrence per Point

The number of species recorded per point varies considerably. Point 1 leads with 39 species, Point 2 with 29, Point 3 with 29, Point 4 with 30, and Point 5 with 26 species. However, if we eliminate the 17 species we have recorded in the Guthrie-Bancroft forest only once or twice, and might be considered irregular or vagrant, including Ruffed Grouse, Mourning Dove, American Goldfinch, Black-billed Cuckoo, Great Horned Owl, Barred Owl, Northern Flicker, Common Raven, Cedar Waxwing, Black and White Warbler, Chestnut-sided Warbler, Common Grackle, Brown-headed Cowbird, Purple Finch, and American Goldfinch, we find a rather different story. Point 1 then has 30 species, Point 2 has 29, Point 3 has 28, Point 4 has 30, and Point 5 has 26. The difference between points virtually disappears. Point 1 evidently gains in abundance due to its proximity to a wetland with abundant shrubs, providing it with greater habitat variety. It is worth noting that 9 of the one-timers or two-timers occurred at Point 1, 1 at Point 2, 0 at Point 3, 6 at Point 4, and 0 at Point 5. Yet none of the one- or two-time species would be disproportionately attracted to the wet habitat.

Looking at the number of species that occurred year by year at each point, we see a pattern similar to that of the preceding paragraph. Point 1 had a mean of 12.7 species per year, Point 2 a mean of 11.5, Point 3 a mean of 12.7, Point 4 a mean of 10.3 and Point 5 a mean of 8.7 species per year. Species per point ranged from 18 at Point 1 in 2008 to 5 at Point 5, also in 2008. If we eliminate species that occurred on the transect only once or twice, as we did in the preceding paragraph, we find a mean species per point of 12.1 for Point 1, 11.5 for Point 2, 13.1 for Point 3, 10.0 for Point 4 and 8.7 for Point 5. Eliminating one- and two-timers reduces the difference between points but does not eliminate it.

## Occurrence Frequency

The mean number of species per point for the twenty-one years of the study was 11.17 species per point. If we eliminate 1998's data (8 species per point, outside the expected range) we get 11.35 species per point, with a range of 9 (in 2011) to 14.4 (in 2007).

The most ubiquitous species on the transect is the Ovenbird. Of a possible 205 occurrences (5 points x 20 years x 2 monitorings plus 5 points x 1 year x 1 monitoring), Ovenbirds occurred on 195 point counts (95 percent occurrence rate). Red-eyed Vireo had an occurrence rate of 77 percent. The top ten species ranked in order of frequency of occurrence were as follows:

<u>Species</u>	<u>Occurrence Frequency</u>
Ovenbird	95 percent
Red-eyed Vireo	77
American Robin	60
Yellow-bellied Sapsucker	47
Wood Thrush	44
Veery	41
Eastern Wood Pewee	40
Rose-breasted Grosbeak	36
Black-throated Green Warbler	31
Black-throated Blue Warbler	31
Hermit Thrush	30
Scarlet Tanager	23

## Changes in Occurrence Through Time

In an effort to discern trends of species' decline or increase, here are species that occurred more frequently in the first seven years than in the later fourteen years of the study, along with notes on species' statewide decline or increase from the Breeding Bird Survey and the Forest Bird Monitoring Program, where known:

Great Crested Flycatcher

American Crow

Winter Wren

Black-throated Green Warbler BBS annual increase 0.9%, FBMP annual increase 1.9%

Canada Warbler BBS annual decline 5.4%, FBMP annual decline 5.1%

White-throated Sparrow BBS annual decline 3.9%, FBMP annual decline 4.0%

Species that occurred more frequently during the second seven years:

Blue-headed Vireo BBS annual decrease 0.6%, FBMP annual decrease 0.8%

Veery BBS annual decline 1.5%, FBMP annual decline 2.1%

Wood Thrush BBS annual decline 0.1%, FBMP annual decline 4.6%

Magnolia Warbler

American Redstart BBS annual decline 1.9%, FBMP annual decline 0.1%

Scarlet Tanager BBS annual decline 1.2% FBMP annual decline 0.7%

Rose-breasted Grosbeak BBS annual decline 1.5% FBMP annual decline 1.8%

Species that occurred most frequently during the third seven-year period:

Hairy Woodpecker BBS annual decline 1.2%, FBMP annual increase 2.5%

Eastern Wood Pewee BBS annual decline 2.3% FBMP annual decline 1.8%

Species that occurred most frequently during the first and second seven-year period:

Yellow-bellied Sapsucker BBS annual gain 2.9%, FBMP annual increase 3.8%

Brown Creeper BBS annual gain 2.3%, FBMP annual decrease 0.9%

Species that occurred most frequently during the first and third seven-year period:

Red-eyed Vireo BBS annual increase 1.8%, FBMP annual increase 0.6%

Species that occurred most frequently during the second and third seven-year period:

Least Flycatcher BBS annual decrease 3.1%, FBMP annual increase 0.9%

Blue Jay BBS annual decrease 0.6%, FBMP annual decrease 2.0%

Red-breasted Nuthatch BBS annual decrease 0.5%, FBMP annual decline 2.9%

Species roughly evenly distributed during all three seven-year periods:

Black-capped Chickadee BBS annual increase 0.4%, FBMP annual decline 0.6%

White-breasted Nuthatch BBS annual increase 0.3%, FBMP annual decline 0.2%

Hermit Thrush BBS annual increase 1.1%, FBMP annual decline 0.2%

Black-throated Blue Warbler BBS annual decline 0.2%, FBMP annual gain 0.3%

### Species Abundance

Thus far, we have presented information largely on species occurrence, that is, on presence or absence during a given point count irrespective of the number of individuals recorded. But this approach ignores the fact that more than one

individual of a species, in fact up to four in our study, can occur during a point count.

In most cases we record birds at a point by identifying the male's territorial song. We can assume that the singer's mate is present in or near the point circle, although females normally do not sing. The situation is confused by several factors. First, singing birds move. We try to avoid counting a moving singer more than once by taking into account its movement on the map we create of the point circle. Second, females of a very few species, notably American Redstart, sing. Third, many species have a recognizable call in addition to a territorial song. Both sexes make calls. If we identify a species by its call we can't assume a mate is nearby. If we hear a responding call, we won't know if it is from a mate, a competitor, or neither. Chickadees of both sexes, for example, call chick-a-dee-dee-dee in a variety of circumstances, but males chickadees sing fee-bee to proclaim their breeding territory. To simplify our analysis, we assume a record is of one individual, although most probably represent a pair.

We recorded 1933 individual birds during our twenty-one years of bird point count monitoring. The overall rate at which species occurred at the 205 point counts we conducted was 9.43 per count. If only one individual of a species occurred on each point count where the species was recorded, the overall rate would have been 1.00 birds of that species per count.

The species showing the greatest abundance was Ovenbird. A total of 328 Ovenbirds was recorded at 205 point count sites, an abundance rate of 1.60 per point count. Here are the twelve most abundant species:

<u>Species</u>	<u>Total Abundance</u>	<u>Abundance per Point</u>
Ovenbird	328	1.60
Red-eyed Vireo	246	1.20
American Robin	168	.83
Yellow-bellied Sapsucker	106	.52
Veery	102	.50
Wood Thrush	101	.49
Eastern Wood Pewee	77	.38
Rose-breasted Grosbeak	73	.36
Black-throated Green Warbler	72	.35
Black-throated Blue Warbler	70	.34
Hermit Thrush	66	.32
Black-capped Chickadee	52	.25

Comparing the above figures from 1998-2018 with 1998-2009 occurrence frequency numbers, two modest differences appear. Eastern Wood Pewee

ranked four positions higher, and Black-throated Blue Warbler moved past Hermit Thrush in the more comprehensive figures.

### Abundance at Points

Ovenbird was most abundant at Point 1 (94 individuals), decreasing to 84 at Point 2 and the high 50s at Points 3-5. Red-eyed Vireo, by contrast, reached peak abundance at Point 4 (67), with the other points all in the 40s and 50s. American Robin was uniquely most abundant at Point 5 (118) during the first 14 years, but then shifted to Point 3 during the last 7 years. Yellow-bellied Sapsucker was most numerous at Points 2 and 3 (mid-30s). Veery was twice as abundant (40) at Point 3 as at the other four points. Wood Thrush was most abundant (25-30) at Points 3 and 4. Rose-breasted Grosbeak was most numerous at Point 3, but its numbers at Points 2 and 4 were fairly close behind. Black-throated Green Warbler was at peak abundance at Points 2 and 4. There was no clear abundance frontrunner among the points.

### Differences Between Monitoring Dates

Each year's first monitoring session occurs during the first week of June. The second session occurs about 10 days later. The time between sessions varied by several days between years because monitoring is not advised during rainy or windy weather. Such conditions reduce the frequency and hearing distance of bird song. Three species, Least Flycatcher, Veery, and Red-eyed Vireo were recorded in somewhat or significantly greater numbers in the second session than in the first during the first 14 years. But addition of the next 7 years' data evened out the numbers between the first and second sessions for most species, especially Ovenbird and Red-eyed Vireo, the most abundant species. It appears that the timing of monitoring is not as strong a factor in determining whether a species is recorded on the first or second monitoring session as overall abundance.

In 1998, when we first started monitoring, I assumed that we would find that most breeding pairs would be established on territory, and that the second monitoring would be a duplication of what we had already found. Nature, at least avian nature, is not quite so predictable. The following species occurred preponderantly at a given point in the first or the second monitoring, but not or rarely both:

Hairy Woodpecker  
Downy Woodpecker  
Great Crested Flycatcher  
Blue jay  
White-breasted Nuthatch  
Brown Creeper  
Magnolia Warbler  
Blackburnian Warbler

## Scarlet Tanager

The following species occurred as frequently at a given point in both sessions as in either session alone:

Yellow-bellied Sapsucker  
Eastern Wood Pewee  
Black-capped Chickadee  
Winter Wren  
Wood Thrush  
American Robin  
Red-eyed Vireo  
Black-throated Blue Warbler  
Black-throated Green Warbler  
American Redstart  
Ovenbird  
Rose-breasted Grosbeak  
White-throated Sparrow

And finally, these species occurred disproportionately in one session:

Least Flycatcher  
Veery  
Hermit Thrush  
Canada Warbler

The group that is likely to occur in both sessions at a given point includes nine of the ten most abundant species. The abundance of these species inclines them to occur in both sessions. All four species that occur disproportionately in one session occur most in the second session, suggesting that they are relatively late arrivers and breeders, which they, in fact, are.

### Acknowledgements

We thank CHEP for the opportunity to conduct long-term research on interior forest birds in a lovely, permanently protected forest. We thank Lester and Monique Anderson for making available this splendid forest tract for long-term study and for their strong interest in and support of this work. We thank Vermont Family Forests for safeguarding the future of this land, and Marc Lapin for cracking a gentle whip to get us all to produce and analyze data and for encouraging us to think about the biota that inhabit the CHEP lands in an interdisciplinary way. I thank Barry for her acute hearing, her willingness to play an increasing role in this study through the years, and her encouragement and companionship. And I thank Peter Meyer for his willingness to carry on the tradition of monitoring the Bancroft Woods bird transect. Barry and I hope that we

will be able to accompany him for the next year or two to ensure a smooth transition.

Appendix 1: Bird Species Recorded at Guthrie-Bancroft Farm, 1998-2009

Canada Goose Branta canadensis\*

Turkey Vulture Cathartes aura\*

Ruffed Grouse Bonasa umbellus

Wild Turkey Meleagris gallipavo

Mourning Dove Zenaida macroura

Black-billed Cuckoo Coccyzus erythrophthalmus

Great Horned Owl Bubo virginianus

Barred Owl Strix varia

Yellow-bellied Sapsucker Sphyrapicus varius

Downy Woodpecker Picoides pubescens

Hairy Woodpecker Picoides villosus

Northern Flicker Colaptes auratus

Pileated Woodpecker Dryocopus pileatus

Eastern Wood Pewee Contopus virens

Least Flycatcher Empidonax minimus

Blue-headed Vireo Vireo solitarius

Red-eyed Vireo Vireo olivaceus

Great Crested Flycatcher Myiarchus crinitus

Blue Jay Cyanocitta cristata

American Crow Corvus brachyrhynchos

Common Raven Corvus corax

Black-capped Chickadee Poecile atricapilla

Tufted Titmouse Baeolophus bicolor

White-breasted Nuthatch Sitta carolinensis

Red-breasted Nuthatch Sitta canadensis

Brown Creeper Certhia americana

Winter Wren Troglodytes troglodytes

Golden-crowned Kinglet Regulus satrapa\*

Veery Catharus fuscescens

Hermit Thrush Catharus guttatus

Wood Thrush Hylocichla mustelina

American Robin Turdus migratorius

Bohemian Waxwing Bombycilla garrulus

Cedar Waxwing Bombycilla cedrorum

European Starling Sturnus vulgaris\*

Ovenbird Seiurus aurocapillus

Northern Waterthrush Parkesia noveboracensis\*

Louisiana Waterthrush Parkesia motacilla\*

Black-and-white Warbler Mniotilta varia

Common Yellowthroat Geothlypis trichas

American Redstart Setophaga ruticilla

Magnolia Warbler Setophaga magnolia  
Blackburnian Warbler Setophaga fusca  
Yellow Warbler Setophaga petechia\*  
Chestnut-sided Warbler Setophaga pensylvanica  
Black-throated Blue Warbler Setophaga caerulescens  
Yellow-rumped Warbler Setophaga coronata\*  
Black-throated Green Warbler Setophaga virens  
Canada Warbler Cardellina canadensis  
Scarlet Tanager Piranga olivacea  
Rose-breasted Grosbeak Pheucticus ludovicianus  
Indigo Bunting Passerina cyanea\*  
Chipping Sparrow Spizella passerina\*  
Song Sparrow Melospiza melodia\*  
White-throated Sparrow Zonotrichia albicollis  
Red-winged Blackbird Agelaius phoeniceus\*  
Brown-headed Cowbird Molothrus ater  
Common Grackle Quiscalus quiscula  
Northern Oriole Icterus galbula  
Pine Grosbeak Pinicola enucleator\*  
Red Crossbill Loxia curvirostra\*  
White-winged Crossbill Loxia leucoptera\*  
Purple Finch Carpodacus purpureus  
Common Redpoll Acanthis flammica  
Pine Siskin Carduelis pinus\*  
American Goldfinch Carduelis tristis  
Evening Grosbeak Coccothraustes vespertinus\*

\* species recorded on Guthrie-Bancroft Farm, but not at transect points