

# COLBY HILL ECOLOGICAL PROJECT

Summary of Bird Research 1998-2009

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 29 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 westerly 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. 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 (and rather less by north-south straight-line distance). Counts begin between 0500 and 0515 hours 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.

We recorded 42 bird species during monitoring. We recorded an additional 16 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

Seven species were recorded in point counts all 12 years. They include:

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

## Rose-breasted Grosbeak

An additional nine were seen in 10 or 11 years. Ten species were seen only one year. The average number of species recorded per year was 24.0 with a range of 17-30 (20-30 if we exclude 1998, when we monitored the transect only once). For the first six years the average number of species recorded was 22.3 (23.2 excluding 1998) compared to 25.7 for the more recent 6 years. Most species showed no or modest differences in their annual frequency of appearance. Exceptions were Great Crested Flycatcher (4 of the first 6 years, 1 of the later 6 years) and Blue-headed Vireo (2 of the first 6 years, 5 of the later 6 years). Several additional years of data may clarify if the number of species has changed significantly over time.

### Differences Between Points

The transect traverses mature mixed northern hardwoods, within which are a variety of conditions that offer microhabitat choices for a variety of birds. 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, Winter Wren, Hermit Thrush, Black-throated Blue Warbler, and Blackburnian Warbler, all birds characteristic of forest with a boreal component, including red spruce and yellow birch. Eastern Wood Pewee and Least Flycatcher have occurred at all points except Point 1. American Redstart and Northern Oriole have turned up at all points except 1 and 5.

Descending, the road 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 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, Least Flycatcher, and American Robin. Least Flycatcher is characteristic of more youthful forest. Why it reaches peak frequency at Point 2 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.

Point 3 is perhaps the driest point, and also perhaps the most mature. Reaching greatest frequency of occurrence here are Hairy Woodpecker, Veery, American Redstart, Scarlet Tanager, and Rose-breasted Grosbeak.

Point 4 is similar to Point 3. Wood Thrush has its greatest frequency here but its frequency at 2 and 3 aren't far behind. Black-throated Green Warbler is the only other 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 reaches maximum frequency here. Hairy Woodpecker, Winter Wren, Blackburnian Warbler, and American Redstart have not been recorded from Point 5.

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

#### Species Occurrence per Point

The number of species recorded per point varies considerably. Point 1 leads with 35 species. Point 2 is next with 30, followed by Point 3 with 28, Point 4 with 27, and Point 5 with 21 species. However, if we eliminate the species we have recorded in the Guthrie-Bancroft forest only once or twice, including Ruffed Grouse, Mourning Dove, Black-billed Cuckoo, Yellow-shafted Flicker, Common Raven, Tufted Titmouse, Yellow-throated Vireo, Warbling Vireo, Yellow-rumped Warbler, Brown-headed Cowbird, Purple Finch, and American Goldfinch, we find a rather different story. Point 1 then has only 27 species, Point 2 has 26, Point 3 has 27, Point 4 has 25, and Point 5 has 21. The difference between points virtually disappears, with the possible exception of Point 5. It is worth noting that 8 of the one-timers or two-timers occurred at Point 1, 4 at Point 2, 1 at Point 3, 2 at Point 4, and 0 at Point 5. No particular requirements or preferences of these 12 species, of which we are aware, leads them to occur so preponderantly at Point 1 and not at all at Point 5. It is possible that the nearness of Point 1 to very wet woods with frequent shrubby patches provides that point with greater habitat variety. Yet none of the one- or two-time species would be disproportionately attracted to this wet habitat. This enigma awaits further data for resolution.

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 14.5 species per year, Point 2 a mean of 12.1, Point 3 a mean of 13.2, Point 4 a mean of 10.4 and Point 5 a mean of 8.6 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 13.8 for Point 1, 11.8

for Point 2, 13.1 for Point 3, 10.3 for Point 4 and 8.6 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 twelve years of the study was 11.8 species per point. If we eliminate 1998's data (7.6 species per point, outside the expected range) we get 12.2 species per point, with a range of 10.4 (in 2001) to 14.4 (in 2007). In line with other figures, there is a slight trend toward higher numbers of species per point during the second 6 years (12.6 species per point) than the first 6 years (9.1 species per point, 11.6 excluding 1998 data). Eliminating records of species recorded once or twice yields a mean species per point of 11.5 and, again eliminating 1998 data, a mean of 11.9 species per point.

The most ubiquitous species on the transect is the Ovenbird. Of a possible 115 occurrences (5 points x 11 years x 2 monitorings plus 5 points x 1 year x 1 monitoring) Ovenbirds occurred on 107 point counts (93 percent occurrence rate) Red-eyed Vireo had an occurrence rate of 74 percent. The top ten species ranked in order of frequency of occurrence were as follows:

<u>Species</u>	<u>Occurrence Frequency</u>
Ovenbird	93 percent
Red-eyed Vireo	74
American Robin	60
Yellow-bellied Sapsucker	52
Wood Thrush	46
Veery	44
Rose-breasted Grosbeak	43
Black-throated Green Warbler	37
Eastern Wood Pewee	34
Black-throated Blue Warbler	30
Hermit Thrush	30
Scarlet Tanager	28

### 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 six years than in the later six 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  
Winter Wren  
Red-eyed Vireo

Black-throated Green Warbler Annual BBS increase 4.5 percent<sup>3</sup>, FBMP increase 12 percent<sup>2</sup>

White-throated Sparrow Annual BBS decline 4.2 percent<sup>1</sup>

Species that occurred more frequently during the second six years:

Hairy Woodpecker

Least Flycatcher Annual BBS decline 1.9 percent<sup>1</sup>

Blue Jay

American Crow

Black-capped Chickadee

Veery Annual BBS decline 2.5 percent<sup>1</sup>, FBMP decline 12 percent<sup>2</sup>

Wood Thrush Annual BBS decline 2.2 percent<sup>1</sup>, FBMP increase 0.5 percent<sup>4</sup>

Blue-headed Vireo Annual BBS increase 0.6 percent<sup>3</sup>, FBMP increase 2.0 percent<sup>4</sup>

Magnolia Warbler

American Redstart Annual BBS decline 2.3 percent<sup>1</sup>

Scarlet Tanager Annual BBS decline 0.6 percent<sup>3</sup>, FBMP decline 4.3 percent<sup>2</sup>

Rose-breasted Grosbeak

Species that occurred equally frequently during the first and second six-year periods:

Yellow-bellied Sapsucker Annual BBS increase 7.4 percent<sup>1</sup>, FBMP increase 10 percent<sup>4</sup>

Downy Woodpecker

Eastern Wood Pewee Annual BBS decline 4.5 percent<sup>3</sup>, FBMP decline 8.8 percent<sup>2</sup>

Hermit Thrush Annual BBS decline 2.5 percent<sup>1</sup>

Black-throated Blue Warbler Annual BBS decline 1.7 percent<sup>3</sup>, FBMP decline 6.1 percent<sup>2</sup>

<sup>1</sup> Statistically significant annual decline or increase from Vermont Breeding Bird Survey data between 1980 and 2004

<sup>2</sup> Statistically significant overall decline or increase from Vermont Forest Bird Monitoring Program data between 1998 and 2004

<sup>3</sup> Statistically nonsignificant annual decline or increase from Vermont Breeding Bird Survey data between 1980 and 2004

<sup>4</sup> Statistically nonsignificant overall decline or increase from Vermont Forest Bird data between 1998 and 2004

### 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 1232 individual birds during our twelve years of bird point count monitoring. The overall rate at which species occurred at the 115 point counts we conducted was 1.31 per count at which a given species was present. 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 198 Ovenbirds was recorded at 102 point count sites, an abundance rate of 1.94 per point count at which Ovenbird was recorded. Here are the twelve most abundant species:

<u>Species</u>	<u>Total Abundance</u>	<u>Abundance per Occupied Point</u>
Ovenbird	198	1.94
Red-eyed Vireo	143	1.64
American Robin	118	1.53
Yellow-bellied Sapsucker	77	1.31
Veery	66	1.29
Wood Thrush	63	1.21
Rose-breasted Grosbeak	56	1.10
Black-throated Green Warbler	49	1.11
Hermit Thrush	42	1.20
Black-throated Blue Warbler	41	1.14
Eastern Wood Pewee	40	1.08
Black-capped Chickadee	39	1.26

Comparing the above figures with the earlier occurrence frequency numbers, two modest differences appear. Veery and Wood Thrush change positions, due to a

greater number of individuals per occupied point on the Veery's part. Eastern Wood Pewee ranked higher in occurrence frequency, but switched positions with Hermit Thrush in total abundance. The former was more likely to occur singly.

### Abundance at Points

Ovenbird was most abundant at Point 1 (52 individuals), decreasing to 47 at Point 2 and the low 30s at Points 3-5. Red-eyed Vireo, by contrast, reached peak abundance at Point 4 (42), with the other points all in the mid-twenties. American Robin was uniquely most abundant at Point 5 (118). Yellow-bellied Sapsucker was most numerous at Point 2 (27). Veery was twice as abundant (22) at Point 3 as the other four points. Wood Thrush was most abundant (18) at Point 4. Rose-breasted Grosbeak was most numerous at Point 3, but its numbers at Points 2 and 4 were close behind. Black-throated Green Warbler was at peak abundance at Point 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. The first two of these species return to Vermont beginning the first week of May, and the third during the second week of May, ample time for them to have established their breeding territories. It appears that the timing of monitoring is not a strong factor in determining whether a species is recorded on the first or second monitoring session.

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 five 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 look forward to year thirteen of CHEP and to the further elucidation and confirmation of some of the trends we have noted in this paper. We thank Lester and Monique Anderson for making available this splendid forest tract for long-term study and for their continuing 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. And lastly 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.

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

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

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\*

Blue-headed Vireo Vireo solitarius

Yellow-throated Vireo Vireo flavifrons

Warbling Vireo Vireo gilvus

Red-eyed Vireo Vireo olivaceus

Yellow Warbler Dendroica petechia\*

Magnolia Warbler Dendroica magnolia

Black-throated Blue Warbler Dendroica caerulescens

Yellow-rumped Warbler Dendroica coronata

Black-throated Green Warbler Dendroica virens

Blackburnian Warbler Dendroica fusca

American Redstart Setophaga ruticilla

Ovenbird Seiurus aurocapillus

Northern Waterthrush Seiurus noveboracensis\*

Common Yellowthroat Geothlypis trichas  
Canada Warbler Wilsonia 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  
Northern Oriole Icterus galbula  
Pine Grosbeak Pinicola enucleator\*  
Purple Finch Carpodacus purpureus  
Pine Siskin Carduelis pinus\*  
American Goldfinch Carduelis tristis  
Evening Grosbeak Coccothraustes vespertinus

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