

VERMONT INSTITUTE OF NATURAL SCIENCE

Long-term Population and Demographic Studies of Bicknell's Thrush and Blackpoll Warbler: Vermont's Montane Forest Obligates

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VINS' long-term goals for studies of the montane forest bird community focus primarily on two restricted habitat specialists: Bicknell's Thrush (*Catharus bicknelli*) and Blackpoll Warbler (*Dendroica striata*). While VINS' research and monitoring will collect census and reproductive biology data on all species, we believe that these two obligate inhabitants of high elevation fir-spruce forests are best suited to intensive demographic studies. We further expect that results obtained on Bicknell's Thrush and Blackpoll Warbler will provide valuable insights into the conservation status of the entire avian community.

We plan to continue our focal studies on two core mountains, Mt. Mansfield and Stratton Mountain. As part of a landscape-level metapopulation study of Bicknell's Thrush, we anticipate initiating similar demographic research on Equinox, Okemo, and Burke mountains in 2001. Our core study plots on Mansfield will be in the Octagon area and along the ridgeline between the summit station and Forehead. We will no longer concentrate demographic studies on the Ranch Brook (Valley) plot used since 1995, due to logistic difficulties of field work on our 20 ha plot and our inability to obtain adequate sample sizes of banded birds and nests there. This plot will be used for related studies (e.g. food availability research) and to bolster sample sizes on the core Mansfield plots. On Stratton, we will continue research and monitoring on our two existing study plots.

Our monitoring and research goals are so closely intertwined that it is difficult to categorize various project activities as either one or the other. Any long-term research program develops an important monitoring component over time. Our broad project goals are to elucidate 1) long term demographics of Bicknell's Thrush and Blackpoll Warbler on each study peak, 2) metapopulation dynamics among peaks of differing size and geographic isolation, 3) trends in populations and reproductive parameters of all species on Mansfield and Stratton, 4) population trends of all species on the landscape level (entire Northeast), 5) impacts from human activities and overall conservation status of various species, 6) annual nesting productivity of all bird species in relations to weather during breeding season and cyclical cone production and associated small mammal populations.

To achieve these goals, we will employ a variety of techniques, some intensive, some extensive. These are outlined in Table 1. Point counts on the Mt. Mansfield ridgeline, in Ranch Brook, at lower elevations in Underhill State Park as well as a number of other sites statewide will be integral to long-term monitoring of populations of all species. Data from Mansfield will be comparable to a growing base of similar data from many sites in Vermont and elsewhere in the Northeast, at both high and low elevations. Our more intensive studies will continue to focus on differences between human-disturbed and undisturbed or little-disturbed areas on Mansfield and Stratton. The demographic and behavioral ecology data that we collect will be at the heart of an eventual population and habitat viability assessment (PHVA) for Bicknell's Thrush and Blackpoll Warbler (see Fig. 1). This PHVA will require a minimum of 10 years of data collection and will form the underpinnings of a comprehensive conservation plan for montane forest birds.



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Table I. Data needed for population and habitat viability monitoring and assessment.

I. Population Dynamics (on each study mountain):

1. Age/stage structure
 2. Vital rates (survival rates, fecundities)
 3. Density dependence in vital rates
 4. Carrying capacities of populations
 5. Variability (demographic stochasticity, fluctuation in vital rates, fluctuation in carrying capacities)
 6. Sex ratio
 7. Sexual system structure
 8. Sexual system differences in vital rates
 9. Human impacted areas verses natural areas for all the above
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II. Metapopulation Dynamics (on several mountains of various habitat patch sizes and isolation):

1. Spatial structure
2. Spatial variability in age structure
3. Dispersal rates among subpopulations (spatial variation, age-stage specific, density-dependent, distance-dependent)
4. Correlation of environmental fluctuations
5. Distance-dependent spatial correlations
6. Regional catastrophes that affect population abundance, carrying capacities, vital rates
7. Spatial variation in catastrophes.

III. Population Trends (on both core peaks and at landscape level)

1. Short-term vs long-term census (point count) data
 2. Relation to changes in habitat variables over time
 3. Relation to other environmental variables (e.g. mammal populations) over time
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Figure 1. Flow chart displaying architecture of a population and habitat viability assessment model for Bicknell's Thrush and Blackpoll Warbler.

