

POPULATION DENSITY AND DEMOGRAPHIC STUDIES OF SUBALPINE SPRUCE-FIR
AVIAN COMMUNITIES IN THE NORTHEASTERN UNITED STATES.

Progress Report 1995

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Abstract: Research on Bicknell's Thrush was expanded to encompass the entire subalpine breeding bird community in 1995. Several field protocols (e.g., point counts, MAPS and BBIRD) were combined on study sites across the Northeast. Eleven point count series were conducted on 10 peaks, and 6 new sites were selected and marked for censuses planned to begin in 1996. Point count data indicated that relative abundance of breeding birds tended to be higher on large peaks with extensive spruce-fir habitat than on smaller, more isolated peaks. Mist-netting on 5 MAPS plots produced 607 total captures in 2,626 combined net hours (0.23 captures/net hour), and this protocol will likely be scaled down in 1996. Nest monitoring on 4 BBIRD plots yielded a total of 53 nests. Of the 49 nests whose outcome was known, 23 (47%) were successful in fledging at least one young. The most accessible and intensively monitored plot, Ranch Brook, accounted for 30 (57%) of the nests located. Plans in 1996 include assigning individual teams to single BBIRD plots and concentrating nest monitoring efforts on 3 species (Bicknell's Thrush, Swainson's Thrush and Blackpoll Warbler).

Introduction

Few studies have examined the population trends, dynamics, or productivity of migrant birds breeding in naturally fragmented habitats, such as mountaintops. Species restricted to high elevation habitat "islands" may be subject to greater risks of local or widespread extinctions due to their smaller population sizes, patchy distributions, and lower rates of population interchange. Because montane forests are limited in extent, occur as isolated patches of varying size (< 1 to several thousand hectares) and distance from one another, and support unique breeding bird assemblages, they provide vital habitat regionally. Loss or modification of these forests may adversely affect both breeding and migrant populations that depend on them. Detailed baseline data are critically needed to assess the conservation status of the high elevation avian community.

During 1995, VINS expanded its research on Bicknell's Thrush to encompass the entire subalpine breeding bird community. Several methods of study were combined in an effort to launch a comprehensive and integrated regional monitoring program. The project's overall goal was to collect bird population and habitat data along a north-south gradient spanning five discrete mountainous areas in the Northeast.

Methods

Six to 8 peaks in each of five northeastern U.S. mountain ranges (Catskills, Adirondacks, Greens/Taconics, Whites, and Maine mountains) were targeted as long-term population monitoring sites. Two sites (MANS and CAME) have been monitored since 1991. Nine additional sites were surveyed for the first time in 1995 (see *Population density and demographic studies of Bicknell's Thrush on Mt. Mansfield, Vermont and other northeastern United States peaks* in this volume for site descriptions and key to study plot four letter codes). Six new sites were established and will be censused beginning in 1996. Others are planned for future years.

The sampling protocol consisted of point counts (see Welsh 1995) at each site, following an existing scheme established in 1991 on MANS and CAME. A minimum of 5 points were located on each peak, depending on the extent of suitable habitat. Points were spaced at least 200 m apart and situated to optimize trail and terrain features. Points were marked with permanent metal tree tags and blue survey flagging. Points will be permanently referenced using a Global Positioning System (GPS) receiver in the future. Censuses were 10-min counts (recorded in first 3 min, second 2 min, last 5 min intervals) conducted twice during the height of breeding activities (early-mid June and late June to early July), beginning shortly after sunrise. Each individual bird seen or heard was plotted relative to its position inside or outside a 50m circle. This enabled density calculations for those birds encountered within 50 m of each point, as well as relative abundance estimates based on the larger sample of all birds counted at each point. These data will provide the basis for estimates of population change over time.

To more meaningfully assess densities, relative abundances and population changes of breeding species, and to enable comparisons among sites, detailed habitat data were collected on MANS in 1994 and on RABR, BELV, EQUI, and PLAT in 1995. Sampling protocol followed Martin and Conway (1994). Vegetation sampling will be conducted at 3-year intervals to monitor habitat change.

To complement long-term point counts, five study sites were selected for establishment of Monitoring Avian Productivity and Survival (MAPS) stations in 1995. One was situated on MANS, the site of a pilot MAPS station in 1994 and the location of focused demographic studies on Bicknell's

Thrush since 1992. This station was upgraded to conform fully with MAPS protocol. Four additional stations were established on the RABR, BELV, EQUI, and PLAT plots.

Beginning in early June, a team of two trained banders operated ten 12m, 36mm mist nets for 6 hours per day (beginning at local sunrise), for one day per 10-day period through 28 August. Hours of operation and placement of nets remained constant at each MAPS station throughout the year. All birds captured were identified, banded, aged, and sexed. Additional data recorded included date and time of capture, net site, characters used to determine age and sex, extent of skull pneumatization, breeding condition of adults, wing chord, weight, fat content, extent of juvenal plumage, extent of body and flight feather molt, and extent of primary feather wear. Numbers of nets and total net hours each day were recorded, as were numbers of newly banded and recaptured individuals of each species in each 10-day period. Data were recorded on standardized forms and submitted to the Institute for Bird Populations (coordinators of MAPS) for detailed analysis.

Four Breeding Bird Research and Monitoring Database (BBIRD) plots were established on the BELV, RABR, EQUI, and PLAT plots, in conjunction with the above MAPS stations. Plots were permanently marked in a 25 m grid system with tape measure, meter hip-chain, and compass. Nest searching and monitoring protocol followed the methods outlined in Martin and Conway (1994). Vegetation was measured at each active nest and at non-use sites associated with active nests, following the same method used at census points (Martin and Conway 1994).

Results and Discussion

Point Counts. A total of 35 species was recorded at the 11 point count sites (Table 1). However, only 12 species were encountered at 6 or more sites, and only 5 species were detected at all 11 sites (Table 1), illustrating the low diversity of regularly-breeding species in subalpine forests. Large peaks with extensive spruce-fir habitat (e.g., Mt. Mansfield, Hunger Mtn., Plateau Mtn., Whiteface Mtn.) tended to support higher overall relative abundances than did smaller, more isolated peaks (e.g., Burke Mtn., Haystack Mtn.). The low numbers recorded on Camel's Hump, Vermont's third highest peak, are difficult to explain. This could be related to vegetation changes caused by extensive red spruce decline documented during the 1970s and 1980s (Vogelmann 1982). Several years of additional bird population and habitat data collection at all sites will be necessary to interpret differences among sites and changes within sites.

MAPS Stations. Results of constant-effort mist-netting varied markedly among sites (Table 2). Birds captured per net hour ranged from 0.14 on RABR, 0.17 on EQUI, 0.18 on BELV, 0.29 on PLAT, to 0.36 on MANS. Data were submitted to the Institute for Bird Populations, and we await results of their detailed analysis. The combination of travel time (driving and hiking) between sites, forced rescheduling due to rain-outs or high winds, competing project demands, and generally small sample sizes cause us to question the efficacy of the MAPS protocol in subalpine forests. We plan to discontinue MAPS banding in 1996 on BELV, PLAT and EQUI. We will continue on MANS, RABR and implement one new station also on Mt. Mansfield, Vermont.

BBIRD Plots. Despite many hours of active searching, we located only 53 nests on the 4 BBIRD plots (Table 3). Of the 49 nests whose outcome was known, 23 (47%) were successful in fledging at least one young. RABR, the most accessible and intensively monitored plot, accounted for 30 (57%) of the nests located. Between-site travel times (driving and hiking) and the competing demands of other study protocols limited the success of the BBIRD technique on BELV, PLAT, and EQUI. We believe that assignment of teams to a single plot and concentration on a few selected species

(e.g., Bicknell's Thrush, Swainson's Thrush, Blackpoll Warbler) will greatly enhance the effectiveness of BBIRD monitoring in 1996.

Future Plans

We will continue point counts at the previously censused sites, recruit observers for six new sites established in 1995, and establish several new point count sites. In 1996 we will consolidate demographic and nest monitoring studies on 4 long-term Mt. Mansfield plots (MANS, RABR, NDPO, and a new plot to be established on the summit ridgeline south of the "Forehead"). Spot mapping and point counts of all breeding species will be conducted on these plots. Intensive research efforts (e.g., color-banding, nest monitoring) will be focused on 3 species (Bicknell's Thrush, Swainson's Thrush, Blackpoll Warbler), although productivity and habitat data will be collected on all nests found. Constant-effort banding (MAPS) will be continued on MANS and RABR sites, with a MAPS station possibly to be established on the new "Forehead" plot.

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Table 1. Point count results by site (5 stations per site except WHIT and PLAT, which have 10) in 1995. Data represent maximum relative abundance indices from unlimited distance counts, determined by selecting the highest counts from the two censuses (early and late) completed at each station.

Species	BELV	BURK	CAME	EQUI	HAYS	HUNG	KEAR	MANS	PLAT	RABR	WHIT	Total
White-throated Sparrow			9	22								241
Myrtle Warbler			13	13								184
Blackpoll Warbler			8	12								144
Winter Wren			13	8								141
Dark-eyed Junco			6	8								141
Swainson's Thrush			8	14								117
Pine Siskin				0								90
Magnolia Warbler			6	8								73
Yellow-bellied Flycatcher			11	0								64
Hermit Thrush			0	8							0	60
Bicknell's Thrush											17	57
Red-breasted Nuthatch			2	3							5	49
Nashville Warbler			0	0							6	42
White-winged Crossbill			0	0							15	31
Purple Finch			0	8							2	29
Ruby-crowned Kinglet			2	0							12	28
Golden-crowned Kinglet			3	2							1	20
Black-capped Chickadee			0	2							2	18
Brown Creeper			0	2							0	16
American Robin			0	0							0	10
Hairy Woodpecker			0								3	10
Mourning Dove			0	0							0	10
Blue Jay			0	0							0	7
Yellow-bellied Sapsucker			0	0							0	7
Red-eyed Vireo			0	2							0	6
Solitary Vireo			0	0							2	6
Canada Warbler			0	2							0	3
Blackburnian Warbler			2	0							0	2
Black-throated Blue Warbler			0	0							0	2
Black-throated Green Warbler			0	0							0	2
Cedar Waxwing			0	0							0	2
Common Yellowthroat			0	0							0	2
Ruffed Grouse			0	1							0	2
Northern Raven			0	0							0	1
White-breasted Nuthatch			0	0							0	1
Total Birds (40 species)	118	65	85	117	96	163	117	135	291	175	256	1618

Table 2. Summary results of MAPS banding stations, 1995.

	MANS	RABR	BELV	PLAT	EQUI	Total
New bandings	160	61	77	134	70	502
Unbanded	11	5	4	3	10	33
Recaptures	29	11	6	17	9	72
Total captures	200	77	87	154	89	607
Number of species	25	18	20	23	16	39

Table 3. Numbers of successful and failed nests on BBIRD plots, 1995.

Species	RABR		BELV		PLAT		EQUI		Total	
	S ^a	F ^b	S	F	S	F	S	F	S	F
Bicknell's Thrush	1	2							1	2
Blackpoll Warbler	6	4	1	0	0	1	1 unk ^c	2	7	7
White-throated Sparrow	3	3					0	1	3	4
Yellow-bellied Flycatcher	2	1							2	1
Red-breasted Nuthatch	1	0							1	0
Myrtle Warbler	1	0	0	1	0	1	1	1	2	3
Swainson's Thrush	2	2			0	2			2	4
Dark-eyed Junco	0	2			0	1	1	0	1	3
Brown Creeper					1	0	1	0	2	0
Blue Jay					1	0			1	0
Roughed Grouse					0	1			0	1
Magnolia Warbler					1	0	0	1	1	1
Red-breasted Nuthatch							1 unk			
Hermit Thrush							1 unk			
Purple Finch							1 unk			
Total	16	14	1	1	3	6	3	5	23	26

^a Successful nest (at least one young fledged)

^b Failed nest

^c Unknown outcome

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