

Sky Island *SONGBIRDS*

Story by Christopher C. Rimmer and Kent P. McFarland Photographs by Tim Laman



A research team finds out the hard way why Bicknell's thrush, which nests in the mountains of New England, long escaped scientific scrutiny.

Mount Mansfield, Vermont

At dusk on a mid-June evening, clouds drape the upper slopes of Mount Mansfield in Vermont, saturating the dense forest of stunted firs. The plaintive songs of white-throated sparrows are just beginning to fade, but a strange chorus of nasal *peers* and wild cascading song continues full force in the fog. It is the witching hour of Bicknell's thrush. The song resounds for another five minutes as darkness settles. A last solo erupts above the treetops, and a small, barely visible shape traces three circles in the sky and peels off to the east. By 9:30, all is quiet.

For the past ninety minutes, three biologists have been eavesdropping on the birds in their mountain haunts, listening to the songs and also using technology to pinpoint each bird's position. Huddling at fifty-yard intervals on one of Mount Mansfield's thirty-four ski slopes, each researcher holds a six-pronged antenna and

listens intently to a series of high-pitched beeps. These are relayed from radio transmitters weighing just one-thirtieth of an ounce and attached to the tails of one female and three male Bicknell's thrushes. On this night, the males had been foraging within small, discrete areas, often vocally challenging one another. The bird giving its final flight-song had touched down several hundred yards away. The female had not moved; she was incubating a clutch of four eggs.

These thrushes had arrived less than a month earlier, returning to their northern breeding grounds after completing a migratory journey that began in April some 1,500 miles away, in the broad-leaved forests of the Caribbean. The female sitting tight on her nest most likely spent the winter in the mountains of the Dominican Republic. In 1995 the recovery of a male Bicknell's thrush, caught and fitted with an identifying leg band the previous summer on Mount

Mansfield, first established a direct link between the two areas. After a four-month breeding season, the birds will leave Vermont for the Caribbean in mid- to late September.

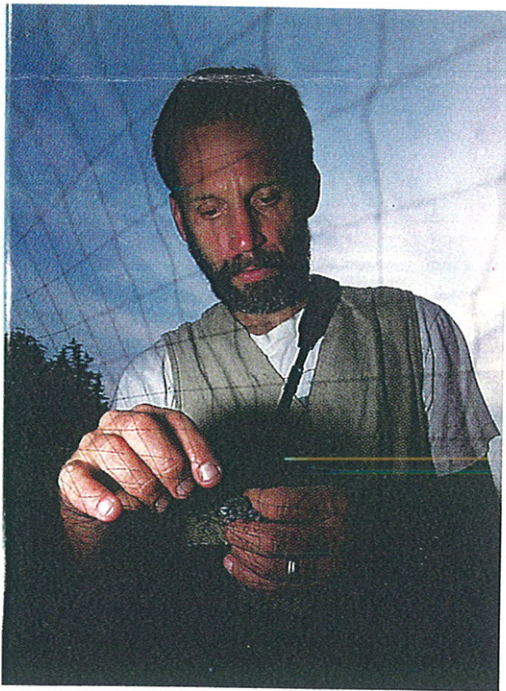
Bicknell's thrush was first discovered in 1881 on Slide Mountain in the Catskills of New York but received scant scientific attention. Until 1995 it was considered a subspecies of the more northern and widely distributed gray-checked thrush. While these thrushes are nearly indistinguishable to the human eye, a study conducted by the late Canadian ornithologist Henri Ouellet revealed many subtle differences that led to the recognition of Bicknell's thrush as a separate species. With such a little-known songbird nesting in our own backyard—along the spine of the Green Mountains—our group from the Vermont Institute of Natural Science (VINS) decided to begin fieldwork in 1992. We were not only curious about



the natural history and ecology of Bicknell's thrush but were also concerned about its survival on the mountaintop "sky islands" where it nests.

One of our first steps was to document the distribution of this species within its breeding range (see map, page 38). While some Bicknell's thrushes nest in isolated coastal forest and regenerating forest stands in Canada, the great majority breed at elevations greater than 3,000 feet in forests dominated by balsam fir and red spruce. During the summers of 1992 and 1993, we coordinated an army of volunteer

An army of volunteers scaled 332 northeastern U.S. peaks of more than 2,500 feet in elevation and found Bicknell's thrushes on 234 of them.



Birds in the hand and in the bush: Chris Rimmer, above, removes a bird from a mist net. Four-day-old chicks, left, beg for a meal as a parent picks up a fecal sac. By eating or discarding the waste, parents help keep predators, such as red squirrels, from detecting the nest.

birders who scaled 332 peaks of more than 2,500 feet in the northeastern United States and found the birds on 234 mountaintops. While the species was encouragingly widespread within its patchy range, we did confirm the disappearance of some populations on the periphery of the range by comparing our data with the few historic documents available. Many smaller peaks appeared to support only a few pairs of Bicknell's thrushes. A handful—Mount Mansfield, New Hampshire's Mount Washington, and Maine's Mount Katahdin—appeared capable of supporting hundreds of pairs.

In the process of gathering our data, we quickly discovered one reason for the long-standing scientific neglect of Bicknell's thrush. To reach its lofty breeding sites, we not only had to scale steep, rugged slopes but also beat our way through a cover of nearly impenetrable thicket. Regarding the vegetation of Mount Mansfield, ornithologist George Wallace, in his 1939 study of Bicknell's thrush, remarked that "only a freak ornithologist would think of leaving the trails for more than a few feet [because of] the discouragingly dense tangle." The additional factors of unpredictably severe mountaintop weather, clouds of insatiable blackflies, and the species' own elusive nature have made our fieldwork a challenge—and sometimes almost a crusade.

Sheer perseverance is our group's main tactic for studying Bicknell's thrush. A typical day in the field starts about 4:00 A.M. In addition to radio tracking, we set up nylon mist nets to capture thrushes for banding, we search for new nests, and we check the contents of known nests. We also videotape the activity at some nests. Although bulky, and situated an average of



On the slopes of Vermont's Stratton Mountain, ski trails alternate with patches of fir and spruce favored by nesting Bicknell's thrushes.

only five feet above ground, nests tend to be located in dense conifer thickets and are extremely difficult to find. Although we have discovered more than two hundred nests of blackpoll and myrtle warblers, white-throated sparrows, and slate-colored juncos, in seven summers we have located only fifty-seven Bicknell's thrush nests. However, the information gained from each is critical to our understanding of the species' ecology.

We estimate the total worldwide population of Bicknell's thrushes to be between twenty thousand and fifty thousand birds. In the short term, the species appears to be reproducing successfully enough to replenish its numbers. Although nesting success varies from year to year, the overall rate is a respectable one: in an average year, young will fledge from 63 percent of nests. While some nests are simply abandoned and bad weather takes a toll, most of the nests that fail are lost to predators. Red squirrels appear to be the primary raiders of eggs and chicks. We have found that the squirrel populations closely correspond to the annual production of fir and spruce cone crops. More cones mean more red squirrels and, we believe, fewer newly fledged Bicknell's thrushes.

Despite the relative inaccessibility and remoteness of the mountain peaks used by nesting thrushes, these aerial islands predispose the species to certain risks. Some threats, like global climate change,

are widespread, looming, and long term. But of immediate concern are factors that affect the vitality of the spruce-fir forest and could thus lead to losses of local populations. While the decline of red spruce and balsam fir since the 1970s—largely blamed on acid precipitation—shows signs of slowing or even reversing, sensitive high-elevation forests have become venues for telecommunications towers, year-round ski resorts, mountain biking, and hiking. In Vermont alone, nineteen mountains higher than three thousand feet in elevation are home to ski resorts. From a distance, some of these mountains now look like downward-sloping braided rivers, with pockets of wooded habitat in between ski trails.

To find out whether human activity—in particular, the construction and summer use of ski trails—is affecting Bicknell's thrushes, our group has been tracking radio-tagged thrushes on two study plots. One of these lies in an undisturbed, permanently protected watershed on Mount Mansfield; the second is in a developed area with ski trails, ski lifts, buildings, and roads. Two similar plots, on Stratton Mountain in southern Vermont, serve as replicates to reinforce the validity of our data.

To date, our telemetry and other field studies have not revealed any striking dif-

ferences in thrush habitat use or nesting success between the ski areas and the undeveloped plots. Bicknell's thrushes actually appear to favor the dense regenerating growth that often characterizes the edges of ski slopes and mountain roads, and they seem capable of tolerating moderate human traffic. We have video footage of a thrush nest just five feet off the busy Mount Mansfield toll road that shows a female brooding placidly as cars and noisy hikers pass by her. Fortunately, brown-headed cowbirds, which parasitize the nests of many songbirds, and predators such as raccoons, house cats, snakes, and crows, which patrol forest edges at lower elevations, are largely absent from mountain forests. The scarcity of these competitors, combined with the adaptability and tenacity of the bird itself, may be the saving grace for Bicknell's thrush, at least in the short term.

Any sound conservation plan depends on knowledge of a species' ecology and natural history, and our fieldwork is uncovering some surprising aspects of the life and times of Bicknell's thrushes. Our mist-netting operation shows that both male and female Bicknell's thrushes appear to have a high rate of survival and are faithful to their breeding sites from one summer to the next. One female, first banded in 1995, has been present and accounted for

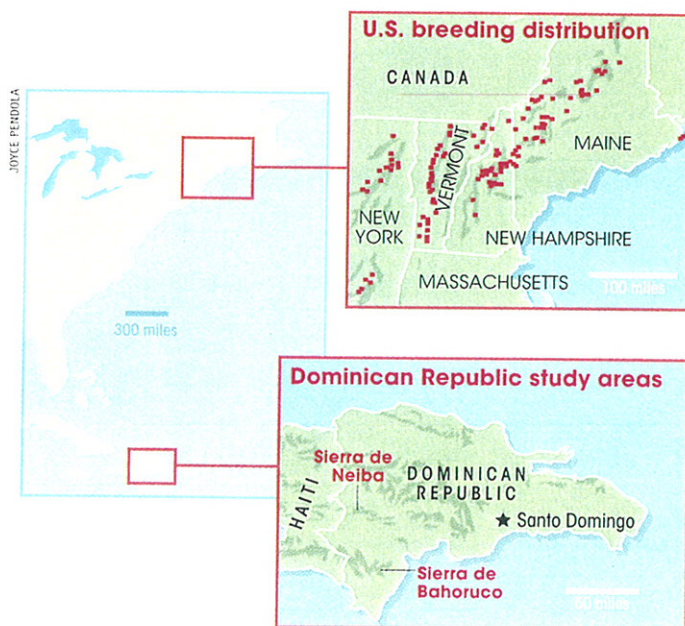
each year since, always within a hundred-yard radius of her original capture site. Some birds are found one year, elude us the next, but appear again the following season. We know that overall more than 50 percent of males and up to 75 percent of females return to nest at the same site from summer to summer. Juvenile birds are another story. Of

eighty-four that we have banded on Mount Mansfield, only six are known to have returned. We suspect that rather than coming back to the mountain where they hatched, young birds strike out and colonize other summits in the species' range. This may maintain a healthy exchange of genes among Bicknell's thrushes on isolated mountain peaks.

Our season-long telemetry studies from both Mount Mansfield and Stratton Mountain indicate that Bicknell's thrushes have an unusual social organization. On average, each male thrush's home range is overlapped by those of four other males, and the minimum home range size is almost ten acres, much larger than expected for a songbird. Our videotapes reveal that nearly all nests are attended by two males. On both Mansfield and Stratton, nestlings are typically fed by what we call a primary and a secondary male (determined by the frequency of their nest visits). Some males attend more than one nest. At two adjacent nests on Mount Mansfield, the same two males fed nestlings, but most nests have a unique male pair in attendance.

Using microsatellite DNA analysis, our colleague James Goetz determined the paternity of chicks in four nests and found that within each nest, the chicks did indeed have different fathers. This phenomenon suggests that Bicknell's thrush females may be in short supply. If true, what is happening to them? We intend to continue to monitor the species to find out. The answer may lie not in the thickets of balsam fir in New England but in the tropical forests of the Caribbean.

By the end of August, the Bicknell's thrushes have completed the task of nesting and rearing the year's young, and we have finished another field season. We come down from the mountains and retire to the lab and our computers to make hard numerical sense of our latest findings. In a few more months, in a much different setting, we might be meeting up with, possibly even holding in our hands, some of the same birds we first banded here in the mountains of Vermont. □



THE CARIBBEAN CONNECTION

Like all long-distance migrants, Bicknell's thrushes inhabit two worlds. So, to an extent, do the researchers who study them. The birds spend the winter months in the Greater Antilles. The species' stronghold appears to be the montane broad-leaved forests of the Dominican Republic, the only place where surveys have found them to be abundant (see map, opposite page). A very few of the birds have been located in Cuba, Jamaica, and Puerto Rico, and none in the Lesser Antilles. Haiti, which shares the island of Hispaniola with the Dominican Republic, is severely deforested but may still support some populations.

Each winter, our group from the Vermont Institute of Natural Science (VINS) travels to the southwestern Dominican Republic. Our main study site is seven thousand feet up in the Sierra de Bahoruco, a mountain range that may be the world's most important refuge for wintering Bicknell's thrushes. In a country that is estimated to have lost all but 13 percent of its original forest cover, Sierra de Bahoruco National Park,

near the border with Haiti, is well protected, thanks to an established system that discourages human settlement and the cutting and burning of trees. We have also worked in the Sierra de Neiba, a mountain range about thirty miles to the north. While also designated a national park, it is a preserve in name only, and its formerly extensive forests are rapidly disappearing.

Our November 1998 visit to the region proved to be far and away the most arduous of our seven excursions there. The mountain roads are an adventure in the best of times, and we undertook this trip knowing that the killer winds and rains of Hurricane Georges had swept through the island just six weeks earlier. Still, we figured that toppled trees were likely to be our greatest obstacle on the way to Sierra de Bahoruco. About five miles from our destination, a camp at Pueblo Viejo, we met a completely impassable section of road, with gouged-out trenches a couple of yards wide and deep that could have swallowed our two trucks. Ten of us spent the better part of the next twenty-four hours repairing the road. Without a chain saw, we might still be there. We packed lengths of Caribbean pine trunks into the gaping ditches, filled holes with limestone boulders of all sizes, and finally managed to squeeze the trucks through. All subsequent trouble spots paled in comparison, and we rumbled into Pueblo Viejo sweaty and exhausted but full of brash confidence, even after losing an entire day of the twelve we had allotted for fieldwork.

We threw ourselves into the work, setting up mist nets and recapturing a few of our old friends. But we were able to radio-track only five Bicknell's thrushes, which lived up to their reputation, at least among our group, as the most difficult organisms on earth to study. The birds are maddeningly wise to mist nets and biologists, especially in winter. While the numbers of Bicknell's thrushes appeared to be roughly the same as on our three previous November visits to the site, the numbers of resident birds were low. We saw almost no rufous-throated solitaires, a real signature species in these forests. Hispaniolan parakeets, usually omnipresent in large noisy flocks, were scarce. Trogons, Hispaniolan emerald hummingbirds, euphonias, and flycatchers were fewer too, and we missed the flocks of golden swallows we had previously seen flying overhead daily. However, migrants like the black-throated blue warbler, ovenbird, and Bicknell's thrush seemed to have fared better. Although our study areas were not badly damaged physically, Hurricane

Georges must have had some adverse impact—possibly on insect populations or on tree fruiting—that depressed the resident bird populations.

Because in winter the sexes of Bicknell's thrushes cannot be readily distinguished, we took blood samples from twelve of the birds. Later laboratory analyses showed that only one was female. This preliminary finding suggests that wintering



Prime winter quarters: healthy forest of the Sierra de Bahoruco in the Dominican Republic

male and female Bicknell's thrushes may segregate by habitat, with males laying claim to high-elevation mature forests, such as that of the Sierra de Bahoruco. We suspect that these are optimal areas, with ample food and cover. Females (and possibly younger birds) may be relegated to regenerating cutover forests and human-altered woodlands. They may thus be in relatively poor condition when they undertake migration. This could explain the apparent scarcity of females on the breeding grounds up north. If our finding holds true throughout the wintering range, it has great bearing on conservation plans for Bicknell's thrush.

On the conservation front, we can report encouraging news from the Dominican Republic. Our work has helped catalyze a rescue plan for the beleaguered Sierra de Neiba park. In addition, VINS is joining forces with several Dominican and North American groups to develop an alliance for avian conservation throughout the southwestern Dominican Republic. These efforts are a vital first step in preserving the natural riches of this region, including, of course, Bicknell's thrush.—C. C. R. and K. P. M.